AGENDA

NEC Code-Making Panel 11 (NEC P11)
NFPA 70 Second Draft Meeting (Annual 2025)

October 18 - 19, 2024
8:00 a.m. – 5:00 p.m. (PT)

Torrance Marriott Redondo Beach, CA

1. **Call to order.** Dirk Müeller.
2. **Introductions.** See committee roster attached.
3. **Chair Report.** Dirk Müeller.
4. **Staff liaison report/presentation.** Jennifer Sisco.
5. **Previous meeting minutes.** January 2024, Charleston, SC. See attached.
6. **NFPA 70 Second Draft.**
   a. **Review of Public Comments.** See attached.
      i. **Task group report(s).**
   b. **Extract updates (if applicable)**
7. **Other Business.**
8. **Future meetings.**
9. **Adjournment.**

Address List No Phone

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Code-Making Panel 11

National Electrical Code®

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Code-Making Panel 11

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MINUTES

NFPA NEC Code-Making Panel 11
NFPA 70 First Draft Meeting (Annual 2025)

January 18-20, 2024
8:00 AM – 5:00 PM (ET)

Charleston, SC

1. **Call to order.** Dirk Mueller, chair, called the meeting to order at 8:00 AM on 1/18/2024.
2. **Introductions.** Attendees introduced themselves and identified their affiliation and NFPA staff took attendance.
3. **Chair report.** Dirk Mueller welcomed attendees and provided an overview of the meeting.
4. **Staff liaison report.** Jennifer Sisco provided an overview of the standards development process and the revision cycle schedule.
5. **Previous meeting minutes.** The minutes from October 2021 Second Draft virtual meeting were approved without revision.
6. **NFPA 70 First Draft.**
   a. **Review of Public Inputs.** The Technical Committee reviewed the Public Inputs and developed First Revisions and Committee Inputs as necessary. These will be available in the First Draft Report at www.nfpa.org/70.
   b. **Task group reports.** The following task groups provided their reports and recommendations.
      i. **CMP 11 Task Group 1**. K. Waters. The task group provided a report, first revisions were made. The task group was reconstituted to continue work. See attached.
      ii. **CMP 11 Task Group 2**. S. Carlton. The task group provided a report, first revisions were made. The task group was reconstituted to continue work. See attached.
      iii. **Task Group on PI-3308**. TG Chair: J. Duvuvie. Members: G. Boom, C. Kelly, J. Light, D. Hill. Review Public Input 3308 and provide a recommendation to the panel with acceptable code language that would address the intent of the public input. First revisions were made. The task group was discharged with thanks.
      iv. **1000 Volt Nomenclature**. TG Chair: K. Waters. Members: C. Littlefield. Review all sections under the purview of CMP-11 for consistency with 1000 volts ac, 1500 volts dc, nominal nomenclature. First revisions were made. The task group was discharged with thanks.

v. **Industrial Control Panel Marking**. TG Chair: J. Novak. Members: G. Boom, J. Duvuvie, C. Littlefield, L. Bas, C. Goetz. Review Public Inputs 1759 and 1518 and provide a recommendation to the panel with acceptable code language that would address the intent of the public inputs. First revisions were made. The task group was discharged with thanks.

c. **Presentation(s).** The committee heard presentations from the following individuals.

i. **Proposed Reorganization of NEC®.** Chuck Kennedy. 30 minutes. Presentation attached.

ii. **Motor Design Letters BE and CE.** Steve Ruffing. 7 minutes. Presentation attached.

iii. **GRCI on Outside HVAC Equipment.** Bill Koffel. 4 minutes. Verbal presentation only

iv. **Absence of Voltage Testing.** John Kovacik. 6 minutes. Presentation attached.

7. **Other Business.** There was no other business taken up by the CMP.

8. **Future meetings.** The next committee meeting will be October 14-26/2024. A meeting notification will be posted at www.nfpa.org/70next when the meeting is scheduled.

9. **Adjournment.** The meeting was adjourned at 5:23 p.m. (ET) on January 19, 2024.

Attendees

Committee Members:

✓	**Dirk Mueller**	Chair	UL Solutions
✓	**Luis Bas**	Principal	Intertek Testing Services
✓	**Zivorad Cosic**	Principal	ABB, Inc.
	Donald Deachin	Principal	Edison Electric Institute
✓	**Jesse Duvuvei**	Principal	NFPA Electrical Inspection Section
✓	**Tim Hinson**	Principal	NECA
✓	**Chester Kelly**	Principal	American Chemistry Council
✓	**Joseph Larson**	Principal	Daikin Applied Americas
✓	**Charles Littlefield**	Principal	IAEI
✓	**Arthur Neubauer**	Principal	American Petroleum Institute
✓	**Jebediah Novak**	Principal	IBEW
	Anthony Sardina	Principal	Carrier/UTC
✓	**Joe Schomaker**	Principal	Eaton
	Arthur Smith	Principal	IEEE-IAS/PES JTCC
✓	**George Tidden**	Principal	IEC, Inc.

✓	**Keith Waters**	Principal	Schneider Electric
	Ron Widup	Principal	InterNational Electrical Testing Association
✓	**Gary Boom**	Alternate	IEC, Inc.
✓	**Mashell Carissimi**	Alternate	NECA
✓	**Seth Carleton**	Alternate	UL Solutions
	Eric Gesualdi	Alternate	American Petroleum Institute
✓	**Charles Goetz**	Alternate	NEMA
✓	**Daryl Hill**	Alternate	IBEW
✓	**Jason Light**	Alternate	American Chemistry Council
✓	**Brad McVey**	Alternate	IAEI
✓	**Daleep Mohla**	Alternate	IEEE-IAS/PES JTCC
✓	**Joseph Pavia**	Alternate	Eaton Bussman Business
✓	**Darrell Sumbera**	Alternate	Electric Light & Power Group/EEI
	Bobby Walton	Alternate	Intertek Testing Services
✓	**Jennifer Sisco**	Staff	NFPA
✓	**Sarah Caldwell**	Staff	NFPA

Guests:

1. Dale Crawford — Steel Tube Institute
2. Steve Ruffing — NEMA/Nidec Motor Corporation
3. Charles McGaughy — Schneider Electric
4. Chad Kennedy — Schneider Electric
5. William Koffel — Koffel Associates, Inc.
6. Bryan Holland — NEMA

Total number in attendance: 31

NEC® Code-Making Panel 11 First/Second Draft Chair Report

Signature: Dirk Müller

Date of Meeting: Jan 18th until 19th, 2024

1. List names of NEC® Code-Making Panel Members in Attendance: see attached

2. List names of Guests in Attendance: see attached

3. List names of Guests who addressed the Panel, the subject of their presentation and the length of time they spoke:
   a) Chad Kennedy on behalf of CC; Long-Term roadmap of the NEC; 9 min, ppt attached to meeting minutes
   b) Bill Koffel, Art 440.9/PI4030, 4 min, no ppt used
   c) Steve Ruffing; Implication of Energy Efficient motors; 7 min, ppt attached to meeting minutes
   d) John Kovacik, Absence of voltage tester, 6 min; ppt attached to meeting minutes
4. Number of Public Inputs acted upon: 128

5. Number of First Revisions Created: 51

6. List any Task Groups appointed to work subsequent to the First/Second Draft Meeting, along with the names of Task Group Chair/members: None

7. List any Public Input/Comment or First/Second Revision that may need to be referred to another Panel for information or correlation:

   None

8. List any Public Input/Comment that requires NEC® Correlating Committee attention:

   None

9. List any general requests for information or assistance from the NEC® Correlating Committee:
   None

10. List any issues that should be brought to the attention of the NFPA Research Foundation:

    None

11. List any additional information that would be helpful to the NEC® Correlating Committee, NFPA Staff, or process in general:

a) Global Inputs

Public Input #	PI Report Page #	TG Recommendation & Statement
3085 [CMP-1]	1 (9)	**Statement for the Chair Report:** After review of the Articles within the purview of CMP-11, it was found that all informational notes are in compliance with 2.1.10 of the NEC Style Manual.
3086 [CMP-2]	2 (10)	**Statement for the Chair Report:** All Articles under the purview of CMP-11 are currently compliant or have proposed first revisions to be compliant with 2.2.1 of the NEC Style Manual.
3099 [CMP-15]	3 (11)	**Statement for the Chair Report:** No action was taken related to the PI-3099 on any articles under the purview of CMP-11. Adding reference to some definitions without providing a comprehensive list could be confusing to users of the code and is redundant with Article 100.
4050 [CMP-10]	5 (13)	**Statement for the Chair Report:** No action was taken related to the PI-4050 on any articles under the purview of CMP-11. The submitter has not defined a specific problem or instance where a term has been used incorrectly or out of context.
4287 [CMP-1]	6 (14)	**Statement for the Chair Report:** Multiple first revisions have been drafted to clarify that requirements over 1000 volts are applicable to 1000 volts ac, 1500 volts dc, nominal.

b) Lack of projector screen in the meeting room. Most of the CMP-11 members have expressed their agreement with the concept of following the meeting on team's vs a projector in the room. Some members did express the additional financial burden on volunteers to buy a second screen. However, in some cases members of CMP-11 had difficulties following the meeting on the screen due to delays in the internet in the room. This did apply in the morning of the second as well to the chair.

c) Request to CMP-3 and the CC: Consider unintended implications to Art 430 especially control circuits associated with the motor circuits (control circuits controlling the contactors of motor circuits) if Art .724 get (partly)deleted according to e.g. PI 3674

d) Request to CMP 1: FR 7981 related to PI 1519 on 430.98 (A) related to 110.21(B) and 110.22(B)

e) Request for CMP-1 to create a definition of a ghost to address PI 60 as related PI occur in various Art of the Code.

2026 NEC® Public Input Task Group Report

CMP #	**11**		
TG#	**1**		
TG Chair	**Keith Waters**		
TG Members	**Casey Littlefield, Brad McVey, Darryl Hill, Don Deachin, Zeke Cosic, Jason Light, Daleep Mohla, Tim Hinson, Jesse Duvuvei, Chuck Goetz, Arthur Smith, Art Neubauer, Darrell Sumbera, Seth Carlton, Joe Pavia, & Joe Schomaker.**		
Article/Section	**Public Input #**	**PI Report Page #**	**TG Recommendation & Statement**
100	1740	8	**Resolve PI 1740** **Statement: Public Input violated Section 4.3.4.1 (C) of the NFPA Regulations for Standard development by not providing correct new language. The term outlet is frequently misused to mean receptacles. The connection of utilization equipment is an outlet, see Article 100 definition.**
100	**1855**	11	**Resolve PI 1855** **Statement: Public Input violated Section 4.3.4.1 (C) of the NFPA Regulations for Standard development by not providing new language. The definition is not needed as it is already covered in Article 100 for continuous load. Unless the driven equipment is operated in a way that it cannot be run continuously, otherwise all motors are continuous.**
430.1	**1809** **4375**	318 33	**Create FR# TG1-1** **Statement: Recommends acceptance of this IN to the scope of 430 while recognizing that the CC has responsibility for scopes. Information**

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			provided in IEEE 3004.8 would provide additional data for motor & motor control application installations.
430.1	**3099**	**3**	In order to increase usability, an informational note is being added to 430.1 to guide readers to Article 100 for defined terms that are related specifically to this Article.
430.2	**1979** **2610** **3746**	**35** **36** **37**	**Create FR#TG1-2** **Statement: Relocated for compliance with the NEC Style Manual Section 2.2.1. The committee agrees that the changes for hazardous duty motors improves clarity and correlates with the hazardous duty articles.**
430.5	**997**	**38**	**Create FR# TG1-3** **Statement: 430.5 deleted per section 4.1.4 of the NEC style manual to remove references to an entire article.**
430.6	**2059**	**39**	**Resolve** **Statement:** **Changes proposed do not provide clarity to the code but did provide confusion. More information on the issue and how the changes proposed would improve the code are needed. The motor ratings indicated do include the motor load. Using the tables to determine motor loads was confusing.**
430.6 (A)(1)	**1778**	**42**	**Resolve** **Statement: Creating an exception with the motors listed as not to be used in this section does not improve clarity. While the wording**

			may be improved, the section currently provides the necessary information.
430.6 (A)(2)	**2477** **3662**	**44** **47**	**Resolve PI 2477** **Statement: The changes submitted create confusion and do not improve clarity or readability. Additional information as to why the changes should be made and how it would improve the section need to be included.** **Resolve PI 3662** **Statement: The NEC contains the motor types and voltages approved for applications for the proper installation per this code. The addition of other motors cannot be accepted without further clarification on where they would be used and that they can be protected by the full range of motor controllers.**
430.7(A)	**1313**	**48**	**Create FR# TG1- 4** **Statement:** **This change is needed to correlate with the addition of 2 new motor designs in Table 430.251 (C). These new designs are to meet increase efficiencies as specified by the DOE and because of differences in motor characteristics such as LRC. A new design is needed to make sure motor protection and control solutions are safely applied.**
430.7 (D)(1)	**485**	**50**	**Resolve** **Statement:** **The inclusion of maximum overcurrent protection and minimum circuit conductor ampacity provides the information needed for**

			a proper installation. The addition of an equivalent HP rating would not improve the installation.
430.10 (A)	**1523**	**57**	**Create FR# TG1- 5** **Statement: editorial change provides correct spelling for overcurrent device as used elsewhere in the code.**
430.18	**1260**	**58**	**Create FR# TG1- 6** remove Interval of assessment sentence. **Statement: The requirement of cybersecurity for connected motor management products/systems is needed to improve safety for employees and equipment.. The industry has seen cyber attacks on key infrastructure motor control systems with examples: WWTP, Pipelines, power generation, etc..**
430.24	**445**	**60**	**Resolve** **Statement: The addition of the specific language on which motors of the same FLC are considered the highest rated does not improve clarity and usability of this code. This requirement has been documented within then the code for years without issue.**
430.32 (D)(2)	**2702**	**62**	**Create FR# TG1-7** **Statement: editorial change made for section to meet NEC Style manual section 4.1.4.**
430.33	**2236**	**63**	**Resolve** **Statement: This is an attempt to define a continuous duty motor which would put it in conflict with the already defined Continuous Load and Continuous Duty in Article 100.**

			Proposed language duplicates text located in 430.33.
430.51	**4378**	**64**	**Resolve** **Statement: IEEE 3004.8 was added as an informational note into the scope of 430 and the IEEE 3002.7 was not shown to improve this code.**
430.52 (C)(1)	**1471** **3583**	**66** **71**	**Create FR TG1-8** **Statement: The panel recognizes the need to include BE and CE motors in the code. However, the ratings for instantaneous trip circuit breakers need further technical substantiation providing details on how the protection of the motor circuit components will function properly, ex. Sizing of controllers, conductors, inst. Trip CB, etc.** **Resolve PI 3583** **Statement: References to standards outside of NFPA in normative text is prohibited per NEC Style manual 4.2. References to NEMA MG1 would have to be as informational notes.**
430.52 (C)(3)	**1470** **913**	**75** **82**	**Create FR TG1-9** **Design B or C energy-efficient, Design B or C premium efficiency, Design BE, and Design CE motors shall be permitted to be increased but shall in no case exceed 1700 percent of the motor full-load current.** **Statement: The panel recognizes the need to include BE and CE motors in the code. However, the ratings for instantaneous trip circuit breakers need further technical substantiation as the 2750% adjustment will**

			provide the protection of the motor circuit components will function properly, ex. Sizing of controllers, conductors, inst. Trip CB, etc. **Resolve PI 913** **Statement: Inst. Trip CB do have a continuous current rating as marked on the handle. Setting the mag level to the lowest setting does not correspond to UL testing requirements for highest setting.**
430.52 (C)(6)	**3564**	**94**	**Create FR TG1-10** Design B or C energy-efficient and Design B or C premium efficiency motors and not more than 1700 percent of the full-load motor current for Design B or C energy-efficient, Design B or C premium efficiency, Design BE, and Design CE motors . **Statement: The panel recognizes the need to include BE and CE motors in the code. However, the ratings for instantaneous trip circuit breakers need further technical substantiation as the 2750% adjustment will provide the protection of the motor circuit components will function properly, ex. Sizing of controllers, conductors, inst. Trip CB, etc.**
430.52 (C)(7)	**1469** **3574**	**96** **97**	**Create FR TG1-11** Design B or C energy-efficient and Design B or C premium efficiency motors and not more than 1700 percent of the full-load motor current for Design B or C energy-efficient, Design B or C premium efficiency, Design BE, and Design CE motors .

			Statement: The panel recognizes the need to include BE and CE motors in the code. However, the ratings for instantaneous trip circuit breakers need further technical substantiation as the 2750% adjustment will provide the protection of the motor short circuit components will function properly, ex. Sizing of controllers, conductors, inst. Trip CB, etc. **Resolve PI 3574** **Statement: The expansion of standard efficiency motor requirements does not improve readability or clarity. Addition of MSCP ratings are provided in FR TG1-11 .**
430.53 (C)(5)	**2703**	**99**	**Create FR# TG1-12** **Statement: editorial change made for section to meet NEC Style manual section 4.1.4.**
430.62(A)	**1524** **4133**	**100** **101**	**Resolve PI 1524** **Statement: Proposed change does not improve clarity or readability of this section.** **Resolve PI 4133** **Statement: The changes proposed create style manual issue with the exceptions. The existing wording meets the current requirements for the code.**
430.72 (C)(1)	**2704**	**102**	**Create FR# TG1-13** **Statement: editorial change made for the section to meet NEC Style manual section 4.1.4.**
430.83 (A)(1)	**1786** **1787**	**103** **104**	**Resolve PI 1786 & PI 1787** **Statement: The additional language does not improve usability of the code. There are**

			existing motors with higher LRC's that are addressed with the current language.
430.94	2705	105	Create FR# TG1-14 Statement: editorial change made for section to meet NEC Style manual section 4.1.4.
430.95	1414 4028	106 107	Resolve PI 1414 Statement: Proposed change referencing a section in chapters 1 thru 4 violates the NEC Style manual section 4.1.1. Resolve PI 4028 Statement: The changes submitted do not improve clarity or readability. While services are the purview of CMP10, this panel recognizes the need to provide this information.
430.96	2838	108	Resolve PI 2828 Statement: The section refers to equipment grounding conductors and bussing. The more general heading provides a better introduction to the section.
430.98	1519 1760	109 110	Resolve PI's 1519 & 1760 Statement: When the location of the disconnecting means is needed, the requirements can already be found in Article 110. The reference to where the power originates is unclear.
430.99	3308 1257	111 112	Create FR TG1-15 Statement: The addition of this marking will improve the safe installation of MCC's.
430.102	1634	113	Resolve 1634

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	2535	116	Statement: The substantiation did not provide details on what problem this PI is attempting to fix and could create enforcement issues in the future. Create FR# TG1-16 Statement: editorial change made to meet NEC Style manual section 3.2.5.3.
430.102(A)	2345 3585	118 119	Resolve PI 2345 Statement: Proposed change referencing a section in chapters 1 thru 4 violates the NEC Style manual section 4.1.1. Readily accessible requirements are located in 430.107. Resolve PI 3585 Statement: Enforceability in an industrial environment makes this change problematic. Readily accessible requirements exist in 430.107. The substantiation needs more work on how it relates to readily accessible in article 110 and is different than seen in industry.
430.102 (B)	2346	120	Resolve PI 2346 Statement: Proposed change referencing a section in chapters 1 thru 4 violates the NEC Style manual section 4.1.1. Readily accessible requirements are located in 430.107.
430.102 (B)(1)	3586	121	Resolve PI 3586 Statement: Enforceability in an industrial environment makes this change problematic. Readily accessible requirements exist in 430.107. The substantiation needs more work on how it relates to readily accessible in

			article 110 and is different than seen in industry.
430.102 (B)(2)	209 3322	122 124	Resolve PI 209 & 3322 Statement: Substantiation does not document where the existing text has created a hazard. The fact that an engineer is attempting to enforce informational note text is not something this panel can correct.
430.107	484	125	Resolve PI 484 Statement: The existing language provides the necessary requirement for being readily accessible. The substantiation does not provide details on how the change would improve safety.
430.110 (A)	525	126	Resolve PI 525 Statement: The concerns brought up are currently covered in 430.110 (C) (1)
430.110 (C)	486	127	Resolve PI 486 Statement: The addition of an equivalent HP rating disconnect requirement would not improve the installation. The substantiation did not provide facts related to how the change would improve safety.
430.110 (C)(1)	1314 521	137 139	Create FR TG1-17 Statement: The addition of table 250.251 (C) created the need to include it in this section to maintain readability and clarity. Resolve PI 521

			Statement: The proposed changes impact is unclear. Additional clarification on how it would impact disconnect selection with the addition of new BE and CE motors.
430.113	2536 2706	142 143	Create FR# TG1-18 Statement: editorial change made for section to meet NEC Style manual sections 3.2.5.3 and 4.1.4.
430.122(A)	4446	144	Resolve PI 4446 Statement: Proper sizing of the conductors is based on the rated input current of the power conversion equipment not the motor HP connected. This is due to the function of the drive system. The input voltage and output voltage could be different as an example.
430.122 (B)	845	145	Create FR# TG1-19 Statement: Movement of the exception to normative text is to create better clarity.
430.208	2537 3072	147 148	Create FR# TG1-20 Statement: editorial change made for section to meet NEC Style manual section 3.2.5.3. Resolve PI 3072 Statement: The proposed language violates the NEC style manual in several areas with the largest 2.1.6.3.2. The pointer to 430.102 is incomplete. The technical changes listed in 3 (D) need to have further identification of the problem and how this addition would improve the code. The addition of product standard language needs better clarification. The term ultimate overload setting is undefined.
430.245	2707	152	Create FR# TG1-21

			Statement: editorial change made for section to meet NEC Style manual section 4.1.4.
Table 430.250	777	319	Resolve Statement: The public input is in violation of NFPA regulation 4.3.4.1 (c). There is no proposed text or table change provided.
Part XIV	1400 1472 2793 3427	320 327 335 343	Resolve PI 1400 Statement: The problem being addressed is unclear and how the change would improve clarity or safety needs better explanation. 1472 – Create FR TG1-22 Statement: The addition of the new design BE and CE LRC table will provide information that will be the basis of additional discussions on these motors. There is concern that the necessary standard, NEMA MG1 is published. These motor designs have been developed to meet DOE requirements for energy efficiency. Resolve PI 2793 Statement: The public input is in violation of NFPA regulation 4.3.4.1 (c). There is no proposed text or table change provided. Resolve PI 3427 Statement: Detailed data on why the change is necessary is not provided. The change to the FLA table should have a corresponding change to the LRC table. A review of 430.6 another option should be investigated.

2026 NEC® Public Input Task Group Report

CMP #	11		
TG#	2		
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Article/Section	**Public Input #**	**PI Report Page #**	**TG Recommendation & Statement**
Annex A	2410	222	Resolve. The requirement for absence of voltage testers to be Listed is not included as a first revision. Therefore, the related standards can't be added to Table A.1(a).
Annex A	-	-	TG2-1. Product safety standards for absence of voltage testers and detection devices are being added to Annex A, Table A.1(b), Article 409. While these aren't currently required to be Listed, the guidance for relevant products safety standards is useful in case installers, AHJ's, other authorities or relevant parties aren't aware of the appropriate standards.

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Article/Section	Public Input #	PI Report Page #	TG Recommendation & Statement
409.Definition	177	9	Resolve. Because there is no requirement for industrial control panels to be listed, the proposed revision is not necessary.
409.Definition	490	10	Resolve. The term “fused disconnect switch” is being used as an example of a power circuit component in this definition. It is the correct use of the term, as fused disconnect means is not consistent with terminology elsewhere in the code.
409.1	2429	12	TG2-1. The scope of Article 409 is being updated to include voltages that are consistent with elsewhere in the code.
409.1	4373	13	Resolve. Sufficient substantiation has not been provided on how the referenced standard provides valuable information specifically with respect to industrial control panels.
409.3	3722	14	TG2-2. This clause is being removed because it is redundant to the use of the code, other parts of the NEC are applicable and do not need to be restated. Further, this clause is not in compliance with 2.2.1 of the NEC Style Manual.
409.21(A)	2682	15	TG2-3. This clause is being revised to comply with 4.1.4 of the style manual.
409.22	1759	16	Resolve. When industrial control panels have multiple feeders and the box is not large enough, the information being proposed will not fit on the box itself. Also, when the location of the disconnecting means is needed, the requirements can already be found in Article 110.
409.22(B)	3625	17	TG2-4. To increase electrical safety and proper installation, the available fault current is being required to be provided on the industrial control panel. This is consistent with other Articles of the code such as service equipment (110.24(A), switchgear (408.6), switchboards (408.6), panel boards (408.6), DC Busway (480.7(F)), elevator control panels (620.51(D)(1)), Industrial Machinery (670.5(B)), Energy Storage System (ESS) (706.15(C)), and stationary standby battery systems (706.15(E)(4)).

409.30	1518	18	Resolve. When industrial control panels have multiple feeders and the box is not large enough, the information being proposed will not fit on the box itself. Also, when the location of the disconnecting means is needed, the requirements can already be found in Article 110.
409.30	2409	19	Resolve. It is not clear exactly what the proposed revisions are attempting to accomplish. The proposed text is permissive, however the submitter has not provided substantiation of which part of the code would not allow the use of absence of voltage testers on the line side of feeder or branch circuit disconnecting means. Also, the requirement is written such that only a listed AVT can be used on the line side of the branch circuit or feeder disconnect, but it is unclear what the intent is for AVT's that may be on the load side of these disconnects (with respect to listed or non-listed).
409.30	2683	23	TG2-5. The reference to Part IX of Article 430 in 409.30 is revised to comply with section 4.1.4 of the NEC Style Manual.
409.70	1243	24	TG2-6. The requirement of cybersecurity for connected motor management products/systems is needed to improve safety for employees and equipment. The industry has seen cyber attacks on key infrastructure motor control systems with examples: WWTP, Pipelines, power generation, etc.
409.102	1190	26	Resolve. This requirement is covered already in Article 110. Unless an issue specific to industrial control panels is known, it is not necessary to be repeated here.
409.110	1747	27	TG2-7. The location of the marking of the short-circuit current rating of the panel is being changed to the outside of the industrial control panel to facilitate ease of inspection, which may need to be done while the industrial control panel is in operation, e.g. after a change to the supply which changes the available fault current. Also, the short-circuit current rating may be dependent on the upstream protective device, if the device changes then the short circuit current rating of the panel will need to be changed. Having it on the outside will facilitate this.
409.110	4354	29	Resolve. Industrial control panels are not required to be Listed to UL 508A, therefore alignment is not necessarily required. Also, the requirement does not refer to ratings, it is the actual values of the supply circuit(s).

2026 NEC® Public Input Task Group Report

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Article/Section	**Public Input #**	**PI Report Page #**	**TG Recommendation & Statement**
440.1	3909	155	Resolve. The requirement for this equipment to be Listed is better suited in the mechanical code. Further, this is already required by the International Building Code by reference to the Mechanical Code.
440.1	3099	3	TG2-1. In order to increase usability, an informational note is being added to 440.1 to guide readers to Article 100 for defined terms that are related specifically to this Article.
440.4(A)	468	157	TG2-2. In order to facilitate ease of inspection, maintenance, and service, the nameplate for hermetic refrigerant motor-compressors is being required to be visible. The submitter did not provide specific substantiation for the requirement to make the nameplates accessible.
440.4(B)	487	159	Resolve. Maximum overcurrent and other information necessary for the correct sizing of the disconnect is already provided on the nameplate. Also, it is unclear if an equivalent horsepower rating is needed for non-motor loads.
440.4(C)	4029	167	Resolve. The submitter has not provided substantiation as to what these methods are an alternate for. This proposal needs further clarification on the need for these changes.
440.8	2224	169	Resolve. Changing the title to “Air-conditioning mini-splits” will narrow the scope of the requirement, which may leave out equipment and installations that this should apply to such as window type A/C units or through-the-wall type heat pumps. It is not necessary to clarify that a single disconnecting means can service multiple motors, this is addressed already elsewhere in the code. And the requirements all pertain to the title, there isn’t a need to split in order to comply with the style manual.
440.9	2839	170	Resolve. The submitter did not provide substantiation on how the current title of the section is not descriptive or concise. The equipment grounding conductor’s purpose is for bonding the equipment through the raceway, therefore

			the title of 440.9 is accurate. Further, the section covers not only the conductor, but location, fittings, etc.
440.9	4030	171	Resolve. Substantiation has not been provided on how the alternate methods provide equivalent protection to a GFCI.
440.10(A)	2452	173	Resolve. The wording of the exception takes a complex subject and oversimplifies it (for reference, see Supplement SB of UL 508A). There are concerns with having series protective devices that have not been tested as a series. Also, the proposed method does not work for certain components such as variable frequency drives. Further, what this proposal attempts to achieve is already allowed for an industrial control panel using Supplement SB of UL 508A, as referenced in the informational note to 409.110(4)(b).
440.10 (new section after 440.10)	3370	153	TG2-3. The requirement of cybersecurity for connected HVAC systems is needed to improve safety for employees and equipment. The industry has seen cyber attacks on key infrastructure HVAC systems with examples: hospitals, retail, industrial HVAC.
440.11	1262 2033	174 177	TG2-4. For the purpose of clarification, 440.11 is being revised to have similar language as 690.13(A)(2).
440.11	1413	175	Resolve. This is covered by 110.22(A), which requires that the purpose of the disconnect be legibly marked.
440.11	1765	176	Resolve. This is covered by 110.22(A), which requires that the purpose of the disconnect be legibly marked.
440.11	582	178	Resolve. There may be instances where the disconnect would be used to disconnect from an ungrounded supply conductor, such as allowed in 430.105 for motor branch circuits.
440.12(A)(2)	1311	179	TG2-5. A reference to Table 430.251(C) is being added to be consistent with revisions in Article 430 which add a new Table 430.251(C).
440.12(B)(1)	1308	180	TG2-6. A reference to Table 430.251(C) is being added to be consistent with revisions in Article 430 which add a new Table 430.251(C).
440.12(B)(1)	488	181	Resolve. The inclusion of maximum overcurrent protection and minimum circuit conductor ampacity provides the information needed for a proper installation. The addition of an equivalent HP rating would not improve the installation.
440.12(B)(1)	526	189	Resolve. Further description of the problem this is trying to correct needs to be provided to substantiate the proposed change.
440.14	1444	191	Resolve. The proposed text would be applicable to non-fused pullout type disconnects, however it is not necessarily applicable to fused pullout type disconnects. Also, this

			would allow the disconnect to not be in sight of the equipment.
440.14	1486	192	Resolve. The proposed text would be applicable to non-fused pullout type disconnects, however working space should still be required for fused pullout type disconnects.
440.14	1635	193	Resolve. Because 110.29 is already applicable, further substantiation is needed as to why a reference needs to be included in 440.14.
440.14	2708	195	TG2-7. The reference to Article 430, Parts VII and IX is updated to comply with 4.1.4 of the NEC Style Manual.
440.14	3015	196	TG2-8. The term “lockable” in Exception 1 is revised to “lockable open” for compliance with 3.2.5 of the NEC Style Manual.
440.14	4135	197	Resolve. The requirements all pertain to location, it is not necessary to further subdivide them. Also, the proposed revision may mis-align the exceptions to a requirement they are not intended for.
440.14	60	198	Resolve. Substantiation lacks technical proof or historical data that there is a problem with unauthorized operation of disconnects.
440.31	2709	199	TG2-9. The reference to Part III of Article 310 is revised to comply with Part 4.1.4 of the NEC Style Manual.
440.33	2215	200	Resolve. The proposed change does not provide clarity or usability to the existing requirement. It is possible that the proposed items 2) and 3) could cause confusion as they imply that both a motor compressor current and a motor full load current be excluded (due to the use of “all other”, when it may only be one or the other of items 2) or 3)).
440.33	2710	201	TG2-10. The reference to Part VII of Article 440 is revised to comply with Part 4.1.4 of the NEC Style Manual.
440.41(A)	1310	202	First revision TG2-11. A reference to Table 430.251(C) is being added to be consistent with revision in Article 430 which add a new Table 430.251(C).
440.51	2711	203	TG2-12. The reference to Parts III and VI of Article 440 is revised to comply with Part 4.1.4 of the NEC Style Manual.
440.54	809	204	TG2-13. 277 is being added this part because single phase 277 volt (derived from 480/277 transformers) can be found in heavy commercial and industrial properties.
440.55	810	205	Resolve. 277 volts is not a common voltage for receptacle type outlets. Substantiation has not been given for the need for adding 277 V for cord and attachment plug equipment.
440.60	808	206	Resolve. Substantiation has not been provided for adding 277 V single phase, 250 V three phase.
440.61	2840	207	Resolve. 2.1.3.2 applies only to Chapters. Also, the requirements pertain to grounding of equipment, not the equipment grounding conductor itself.

440.62	811	208	Resolve. Substantiation has not been provided for adding 277 V single phase, 250 V three phase.
440.63	812	209	Resolve. Substantiation has not been provided for adding 277 V single phase, 250 V three phase.
440.64	813	210	Resolve. Substantiation has not been provided for adding 277 V single phase, 250 V three phase.

2026 NEC® Public Input Task Group Report

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Article/Section	Public Input #	PI Report Page #	TG Recommendation & Statement
460.1	1263	211	Reject. Reconditioning of capacitors should not be allowed, in-line with the NEMA position paper on reconditioned equipment.
460.1	3099	3	TG2-1. In order to increase usability, an informational note is being added to 460.1 to guide readers to Article 100 for defined terms that are related specifically to this Article.
460.1 (new clause following 460.1)	630	212	TG2-2. A new clause 460.3 is being added to specify that capacitors shall not be reconditioned, in-line with the NEMA position paper on reconditioned equipment. The numbering and wording is as required per 2.2.1 of the NEC Style Manual.
460.3	3755	213	TG2-3. This clause is being re-numbered for compliance with 2.2.1 of the NEC Style Manual.
460.8	2172	214	TG2-4. The requirements of 460.8 are being split into three sections to increase usability of the code.
460.9	2197	216	TG2-5. Due to 460.8 being split into three sections, this clause is being renumbered.
460.10	2198	217	TG2-6. Due to 460.8 being split into three sections, this clause is being renumbered.
460.10	2841	218	Reject. 2.1.3.2 applies only to Chapters. Also, the requirements pertain to grounding of capacitor cases, not the equipment grounding conductor itself.
460.12	2200	219	TG2-7. Due to 460.8 being split into three sections, this clause is being renumbered.

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Article/Section	**Public Input #**	**PI Report Page #**	**TG Recommendation & Statement**
470.2	2611	220	TG2-1. 470.2 is being renumbered and split based on the requirements in 2.2.1 of the NEC Style Manual.
470.2	3777	221	Resolve. While the renumbering is required according to the style manual, parts A and B need to be re-worded and re-ordered.

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Article/Section	**Public Input #**	**PI Report Page #**	**TG Recommendation & Statement**
	3085	1	Statement for the Chair Report: After review of the Articles within the purview of CMP-11, it was found that all informational notes are in compliance with 2.1.10 of the NEC Style Manual.
	3086	2	Statement for the Chair Report: All Articles under the purview of CMP-11 are currently compliant or are being revised to be compliant with 2.2.1 of the NEC Style Manual under other public inputs.
	3099	3	Statement for the Chair Report: In order to increase usability of the code, an informational note is being added to the scope of Articles 430, 440, and 460 to guide readers to Article 100 for defined terms that are related specifically to each Article.
	4050	5	Statement for the Chair Report: CMP--11 has determined that first revisions are not necessary based on this PI. The submitter has not defined a specific problem or instance where a term has been used incorrectly or out of context.
	4287	6	Statement for the Chair Report: CMP--11 has determined that first revisions are not necessary based on this PI. After a quick review of our assigned Articles, it was found that requirements that should be AC only or DC only have already been written correctly. Also, requirements for DC have existed for quite some time, e.g. Article 430, Table 430.247.

Motion: Create FR based PI-1759 & 1518

Substantiation: There is a need for marking or documentation for the location of disconnects, the current language in other areas of the code is not sufficient as industrial control panels can have multiple sources of supply. There is a related FR deleting the existing requirements in 409.110(3) as they are incorporated into this new section.

FR 8111

409.23 Source(s) of Supply.

(A) Identification.

Industrial control panels shall identify the location of the means necessary to disconnect all sources of supply 50-volts or more marked in accordance with 409.23(C) or documented in a manner that is available to those authorized to install, inspect, and maintain the equipment.

(B) Multiple Sources of Supply.

Industrial control panels supplied by more than one source operating at 50-volts or more, and where more than one disconnecting means is required to disconnect all circuits operating at 50-volts or more, shall be permanently marked with the following:

WARNING – MULTIPLE DISCONNECTING MEANS REQUIRED TO DE-ENERGIZE ALL SOURCES OF SUPPLY 50-VOLTS OR MORE

(C) Markings.

Markings installed to comply with the requirements of 409.23(A) or (B) shall be a label that complies with both of the following:

(1) Be permanently affixed to the exterior of the enclosure and of sufficient durability to withstand the environment involved

(2) Use a method that is not handwritten

FR 8116

409.110 Marking.

An industrial control panel shall 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. The markings in 409.110(1), (3), (4), (5), and (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) Where the industrial control panel is supplied by more than one electrical source and where more than one disconnecting means is required to disconnect all circuits 50 volts or more within the control panel, marked to~~

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~~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~~3) 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~~3): Short-circuit current rating markings are not required for industrial control panels containing only control circuit components.

(~~5~~4) If the industrial control panel is intended as service equipment, marked to identify it as being suitable for use as service equipment.

(~~6~~5) Electrical wiring diagram, the identification number of a separate electrical wiring diagram, or a designation referenced in a separate wiring diagram.

(~~7~~6) An enclosure type number.

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NEC Code Panel 11
Section 409.xx New
Public Inputs 2409 & 2410

Absence of Voltage and Presence of Voltage Detection Devices

John Kovacik – Trusted Safety Solutions

19Jan23

Absence & Presence of Voltage Detection Devices

- Products currently installed in the field
  - Used for over 10 years with positive results
- Intent to have code recognize use of these products
  - Brings clarity on use and installation of products
  - Specifies installation on the line side of the main disconnect
  - Reduces confusion, time for install and project completion, and dissatisfaction for customers and Authorities Having Jurisdiction
- Increases worker safety
  - These devices eliminate the need for a qualified worker to go inside the enclosure with hand-held probes
  - Potential for arc flash and shock hazards to occur is significantly reduced with use of these products by removing the need to open the door to go inside the enclosure.
- These devices will continue to be installed. This industry needs an international installation document.

NFPA 70E – Article 120

120.2 Lockout/Tagout Program.

(A) General.

Each employer shall establish, document, and implement a lockout/tagout program. The lockout/tagout program shall specify lockout/tagout procedures to safeguard workers from exposure to electrical hazards The lockout/tagout program and procedures shall also incorporate the following:

(1) Be applicable to the experience and training of the workers and conditions in the workplace
(2) Meet the requirements of **120.2** through **120.6**
(3) Apply to fixed, permanently installed equipment, temporarily installed equipment, and portable equipment

120.6 Process for Establishing and Verifying an Electrically Safe Work Condition

Products meet the requirements of List Item (7) and Exception No. 1

NFPA 70E – Article 120

120.6 Process for Establishing and Verifying an Electrically Safe Work Condition.
Establishing and verifying an electrically safe work condition shall include all of the following steps, which shall be performed in the order presented, if feasible:

Testing for the absence of voltage is part of the process for establishing and verifying an electrically safe work condition

(7)Use an adequately rated portable test instrument to test each phase conductor or circuit part at each point of work to test for the absence of voltage. Test each phase conductor or circuit part both phase-to-phase and phase-to-ground. Before and after each test, determine that the test instrument is operating satisfactorily through verification on any known voltage source.

Exception No. 1 to 7: An adequately rated permanently mounted absence of voltage tester shall be permitted to be used to test for the absence of voltage of the conductors or circuit parts at the work location, provided it meets all of the following requirements: (1) It is permanently mounted and installed in accordance with the manufacturer's instructions and tests the conductors and circuit parts at the point of work; (2) It is listed and labeled for the purpose of testing for the absence of voltage; (3) It tests each phase conductor or circuit part both phase-to-phase and phase-to-ground; (4) The test device is verified as operating satisfactorily on any known voltage source before and after testing for the absence of voltage.

Listing Standards

An absence of voltage tester (AVT) shall comply with the Standard for Outlet Circuit Testers and Similar Indicating Devices, UL 1436.

An absence of voltage and presence of voltage detection device shall comply with the Standard for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements, UL 61010-1, and the Standard for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-030: Particular Requirements for Testing and Measuring Circuits, UL 61010-2-030.

UL 508A – Industrial Control Panels

- Proposal submitted for preliminary review
  - Three comments, no negative comments received
- Proposal covered installation requirements for voltage detection devices
  - Par. 36.6.3 – Conductors supplying these devices can be installed on the line or load side of a feeder or branch circuit
  - Par. 75.8 - Devices can be installed on the line side of the service disconnecting means
- Proposal included definitions for voltage detection devices
  - Absence of Voltage Detection Device
  - Absence of Voltage Tester (Extracted from UL 1436)
  - Presence of Voltage Detection Device
- Next step - Revised proposal submitted to TC for review and ballot

Closing Remarks

- Why is this public input important?
  - Input directly addresses a current gap in the NEC
  - Reduces implementation time and confusion for customers and AHJ's
  - Increases worker safety, the potential for arc flash hazard is significantly reduced with use of this product.
- We are asking for your support on public inputs 2409 & 2410.
- Thank you for your consideration

NFPA 70 public inputs from NEMA related to motor Design Letters BE and CE

11/17/2023

Scope of 12 PIs

Primary

Table 430.251(C), Public Input No. 1472: new table with rms symmetrical values of locked-rotor current for new motor Design Letters BE and CE from 1-500 horsepower

Companions

- Addition of new Design Letters to allowable nameplate markings: 430.7(9), Public Input No. 1313
- Instantaneous-trip settings: 430.52(C)(3)(b)(2), 430.52(C)(6),430.52(C)(7), Table 430.52(C)(1). Public Inputs No. 1470, 3564, 1469, and 3583 (replaces 1471).
- References to Table 430.251(C) for determining locked-rotor current equivalent to horsepower rating: 430.110(C)(1), 440.12(A)(2),440.12(B)(1)(b), 440.41(A), 455.8(C)(2)(2), 675.8(A)(2). Public Inputs No. 1314, 1311, 1308, 1310, 1315, and 1312.

Why?

- New motor energy conservation standards announced May 2023 by US Department of Energy (DOE) with mandatory compliance date in 2027.
  - Increases 100 – 250 HP from Premium Efficiency (IEC IE3) to Super Premium Efficiency (IEC IE4)
  - Aligns with European Union regulations with mandatory compliance date of 7/1/23
  - Other horsepower ratings could see efficiency increases in the future
- Prior to latest EU regulations, IEC Design Letters N and H primarily used
  - For most ratings, ≈ 30% to 40% higher locked-rotor current than Design B in Table 430.251(B)
- Compliance with latest EU regulations required introduction of IEC Design Letters NE & HE in 2016 in IEC 60034-12:

  E: motors utilizing extended / higher locked rotor apparent power and current to achieve a higher efficiency class according to IEC 60034-30-1

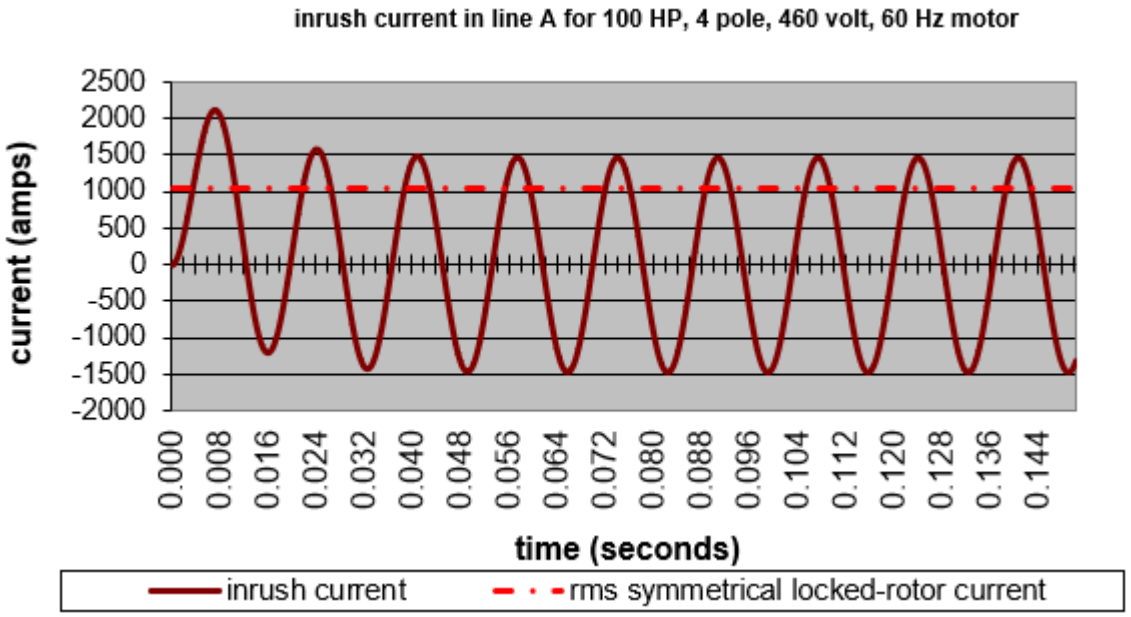
  - For most ratings, ≈ 60% higher locked-rotor current than Design B in Table 430.251(B)
- Compliance with new DOE regulation requires reduction in I^2R losses => reduction in motor impedance => increase in locked-rotor current to Design NE & HE level:
  - New NEMA Design Letters BE & CE accomplish this
  - Preferred to alternative of existing NEMA Design Letter A because locked-rotor current limit is defined instead of unconstrained, thus promoting safety by aiding in proper sizing of equipment

Motor Controller

- Market studies show ≈7% of market share in USA now is IEC motors
- Expect motor controllers used with IEC Design NE & HE motors to be suitable for Designs BE & CE because:
  - Motor types are identical in terms of locked-rotor current per motor output power: only difference is BE & CE power is in units of horsepower in increments (15 HP, 20 HP, etc) not exactly aligned with kilowatt ratings (11 kW, 15 kW, etc) for NE & HE
    - HP rating is within 1.7% of kW rating for all ratings from ½ to 500 HP with exception of 125 & 350 HP which differ by 3.6% & 4.4%
- IEC 60947-4-1 Edition 3.0 defines for these controllers (AC4 utilization category) a ratio of 10 for (rms symmetrical current made and broken) / (rated operational current)
  - This exceeds the highest ratio for any Design BE or CE rating of [locked-rotor current in new Table 430.251(C)] / [full-load current in existing Table 430.350]
    - Highest ratio is 9.83 for the 30 HP rating
- UL 60947-4-1 is based upon IEC 60947-4-1 but has the following national differences for (rms symmetrical current made and broken) / (rated operational current):
  - Canada: ratio is 6 for 3-phase motors
  - USA: ratio based upon NEC Tables 430.251(B) & 430.250: largest ratio is 9.09 for ½ horsepower

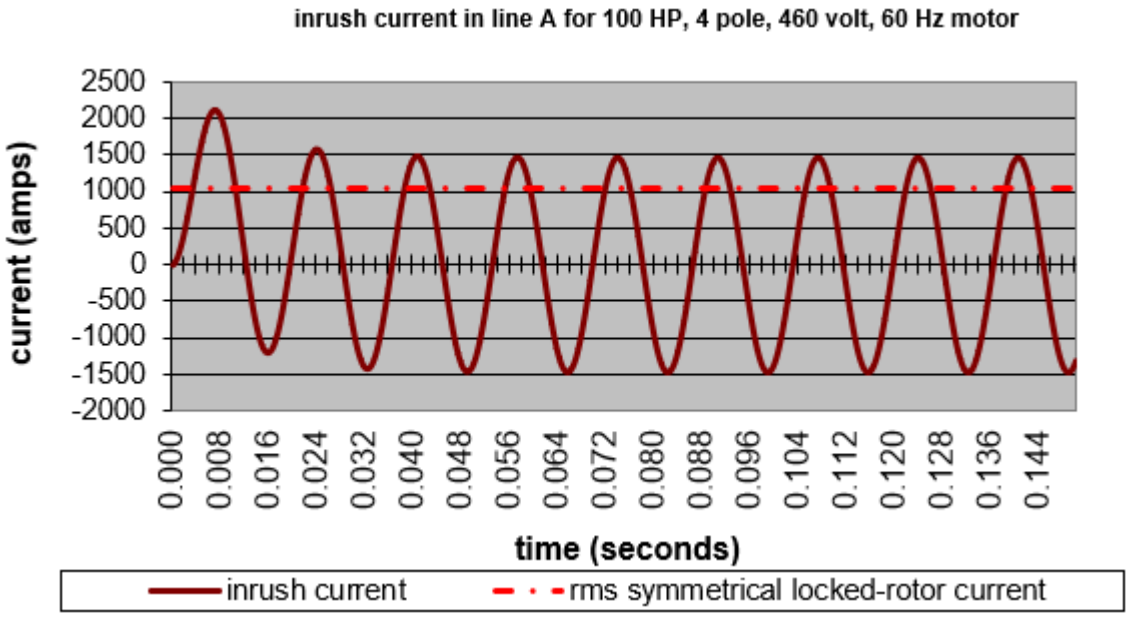
Instantaneous peak of inrush current

- Peak inrush occurs ½ a.c. cycle after energization per this equation:
- $I(t) = 1.414*I_{rms} * \{\sin[(2*pi*f*t)+\alpha-\theta] - [\sin(\alpha-\theta)/e^{Rt/L}]\}$ where,
  - I(t) = instantaneous value of inrush current in units of amps
  - I_{rms} = rms symmetrical locked-rotor current in units of amps
  - f = a.c. frequency in units of hertz
  - t = time elapsed since energization in units of seconds
  - α = phase angle of voltage in units of radians for that phase when contactors close
  - θ = angle in radians that locked-rotor current lags voltage by in that phase
  - R = total resistance of motor equivalent circuit at locked rotor in units of ohms
  - L = total inductance of motor equivalent circuit at locked rotor in units of Henries
- Instantaneous peak inrush is 1.8 to 2.8 times the rms symmetrical locked-rotor current depending on switching angle and motor design



Instantaneous trip setting

- Instantaneous-trip breaker setting in Table 430.52(C)(1) is 1100% of full-load current for Design B energy-efficient & premium efficiency.
  - Proposed setting is 1750% for Design BE & CE since both rms symmetrical locked-rotor current and instantaneous peak of inrush current are ≈ 60% higher than Design B
- 430.52(C)(3)(b)(2), 430.52(C)(6), and 430.52(C)(7) allow setting to increase to 1700% for Design B energy-efficient & premium efficiency.
  - Proposed setting is 2750% for Design BE & CE and is derived from:
    - Maximum ratio of [rms symmetrical locked-rotor current in Table 430.251(C)] / [full-load current in Table 430.250] = 9.83
    - Maximum ratio of [instantaneous peak inrush] / [rms symmetrical locked-rotor current] = 2.8
    - 9.83 * 2.8 = 27.5 => 2750%
- For 100 HP, 460 volt example in image:
  - Full-load current per Table 430.250 = 124 amps
  - rms symmetrical locked-rotor current = 1038 amps (limit in Table 430.251(C) is 1123)
  - 1038 / 124 = 8.37
  - Instantaneous peak of inrush = 2117 amps
  - 2117 / 1038 = 2.04
  - 8.37 * 2.04 = 17.07 => 1707% => 1750% setting in Table 430.52(C)(1) is sufficient & no need to increase to 2750%
  - Note: voltage phase angle chosen to maximize inrush peak



Short circuit protection of conductors

- For each horsepower in Table 430.251(C), the minimum size for the conductors supplying the motor was determined per 430.22 and 430.6 for:
  - 60°C copper insulated conductor selected from Table 310.16 (not more than three current-carrying conductors in raceway, cable, or earth)
  - 75°C copper insulated conductor selected from Table 310.16 (not more than three current-carrying conductors in raceway, cable, or earth)
  - 75°C copper single-insulated conductors in free air selected from Table 310.17

- The value of short-circuit current for a time duration of ½ a.c. cycle (.0083 seconds) which elevates a copper conductor with thermoplastic insulation to its maximum safe short-circuit temperature of 150°C was computed using the below formula found in this document published by Cooper Bussman: Introduction (eaton.com)

  $[I/A]^2 * t = .0297 * \log [(T_2 + 234) / (T_1 + 234)]$, where:

  I = short-circuit current in units of amps

  A = conductor area in units of circular mils

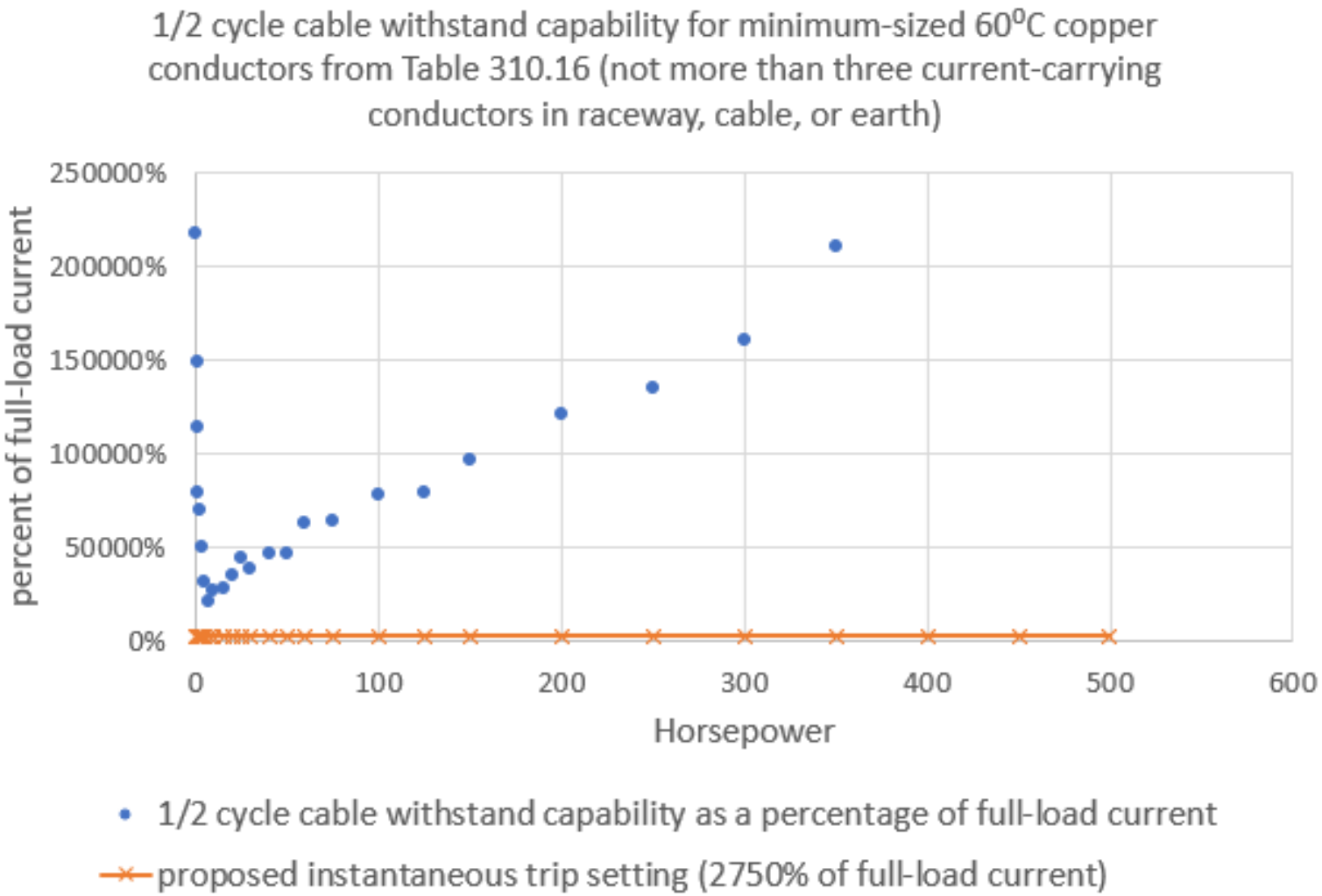
  t = time duration in units of seconds

  T_1 = rated operating temperature of cable

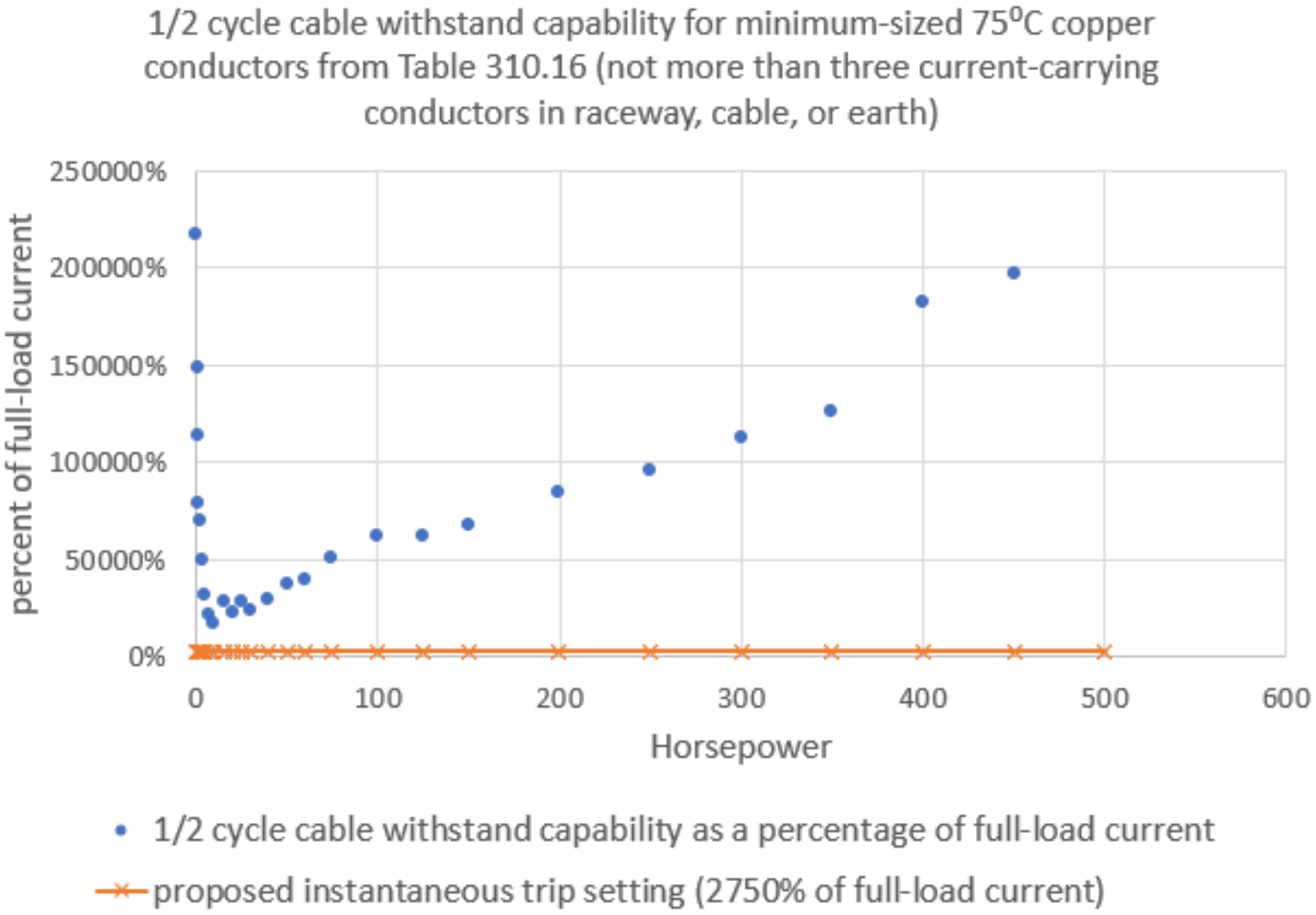
  T_2 = maximum safe short-circuit temperature of 150°C

- This short circuit current was converted to a % of full-load current, is referred to as the ½ cycle cable withstand capability, &, for each horsepower rating for each conductor type, is well above the 2750% instantaneous trip setting as the plots in the following slides show. Thus, conductors are protected under short circuit conditions.

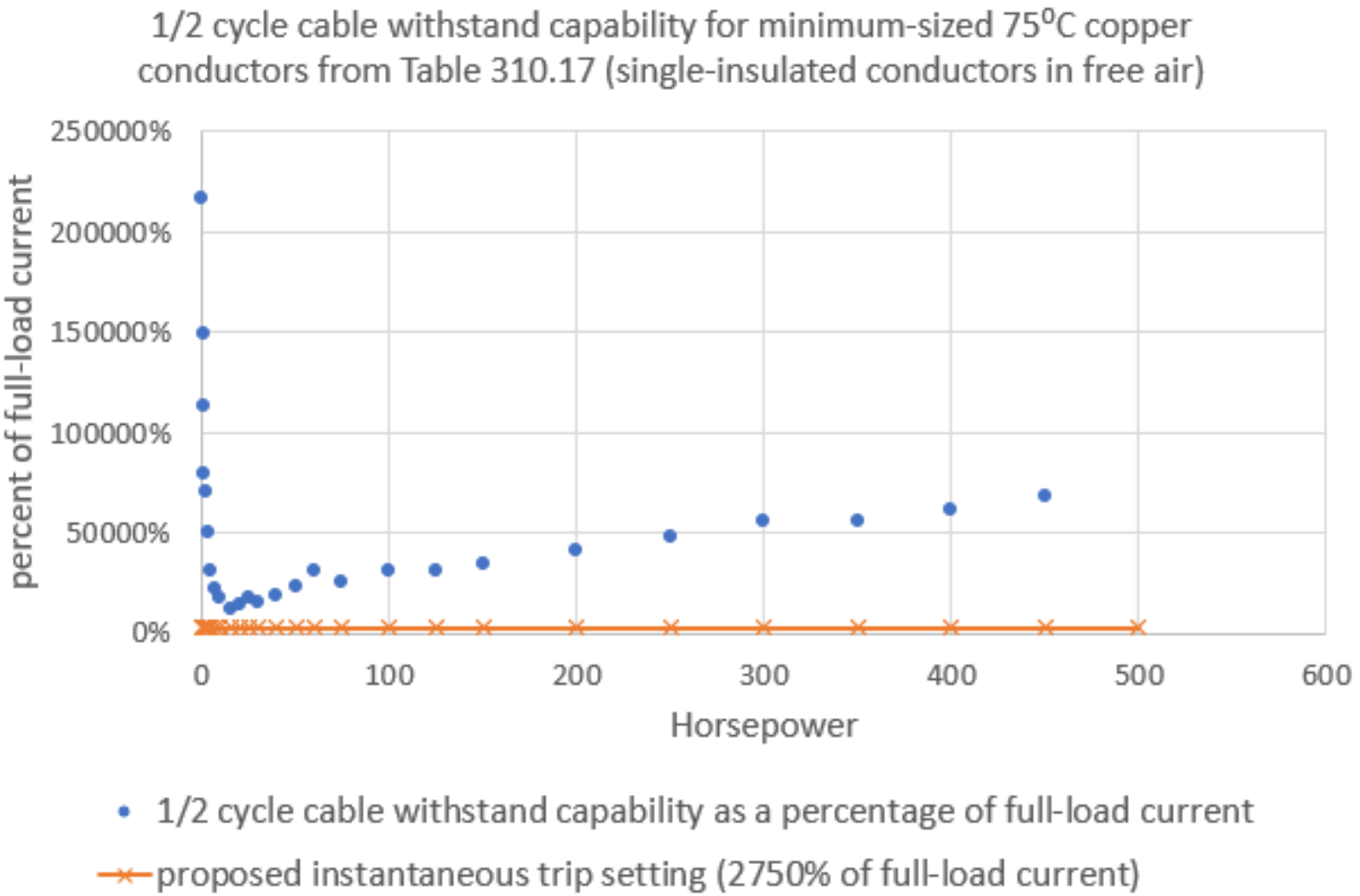
Short circuit protection of conductors



Short circuit protection of conductors



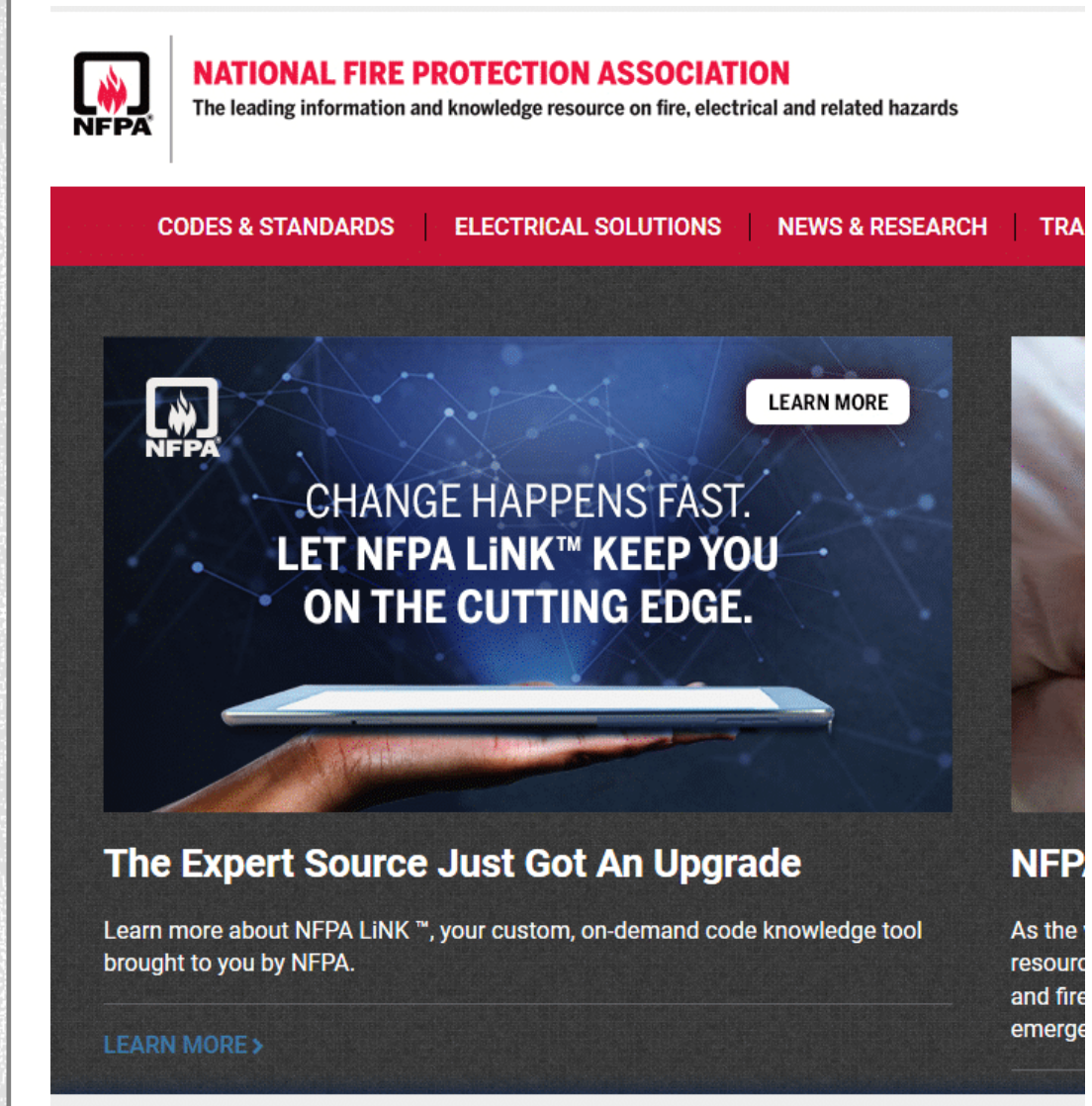
Short circuit protection of conductors



Founded to sell watches; evolved to sell everything	Founded to sell books; evolved to sell everything
1972	2017
sears	amazon
2 of every 3 Americans shopped in last 3 months	2 of every 3 Americans shopped in last 3 months
1987 Sales = 1% of GDP	2017 Sales = 1% of GDP

Merriam Associates

Source: Chicago Tribune



March 2020

Chapter 1

General

Chapter 2

Wiring & Protection

Chapter 3

Wiring Methods & Materials

Chapter 4

Equipment for General Use

Chapter 5

Special Occupancies

Chapter 6

Special Equipment

Chapter 7

Special Conditions

Chapter 8

Communications Systems

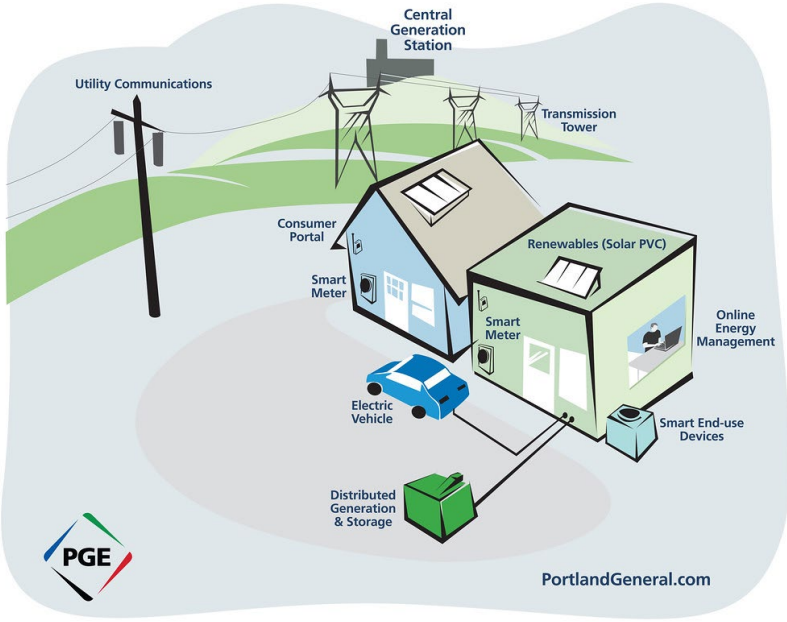
1937-2023 (35 editions):

Introduction (Identified as Article 90 starting in the 1959 edition)	Chapter 1 – General	Chapter 2 – Wiring Design and Protection	Chapter 4 has grown from 10 articles in the 1937 edition to 22 articles in the 2023 edition
Chapter 5 has grown from 5 articles in the 1937 edition to 27 articles in the 2023 edition	Chapter 6 has grown from 7 articles in the 1937 edition to 27 articles in the 2023 edition	Chapter 7 has grown from 4 articles in the 1937 edition to 15 articles in the 2023 edition	Chapter 8 has grown from 2 articles in the 1937 edition to 6 articles in the 2023 edition

What Else is Coming Down the Pike?

By: MTA Construction and Development

By: Portland General Electric



By:National Renewable Labs

Where do we want to go?

- Remain relevant with the quickly evolving electrical industry
- Improve usability
  - Place content where it makes sense
  - Logical/parallel structure
    - Systems below 1000V
    - Limited Energy
    - Medium Voltage
  - Eliminate “Special Equipment”/ “Special Conditions”
  - Leverage the past to make the future even better
- Create a structure that looks to the future

NATIONAL FIRE PROTECTION ASSOCIATION
The leading information and knowledge resource on fire, electrical and related hazards

National Electrical Code® Correlating Committee White Paper

Keeping the NEC® Relevant - Is Now the Time to Modernize?

The National Electrical Code® (NEC®) is the foundation of the electrical installation regulatory infrastructure for the United States, Mexico, and numerous other jurisdictions around the world. Growing demand for safe, reliable, resilient, and efficient use of electrical power to support society and the economy is aligning with technological advancement of power generation sources, electrical distribution, and new electrical power loads. It is critical the NEC be revised and implemented by the electrical community every three years to support the accelerating pace of change and technological advancement.

The structure of the NEC plays a critical role for personnel in learning, understanding, applying, and enforcing the requirements established within this regulatory code. While the current structure, first introduced in 1937, has provided tremendous success and stability and continues to be used by engineers, contractors, electricians and training programs, the ability to efficiently learn and quickly apply and inspect advancing technologies and uniquely configured electrical systems is a challenge for all electrical professionals. The existing NEC structure needs modernization to continue to support the advancing electrical infrastructure configurations and technological advancements. Therefore, it is imperative that the electrical industry actively pursue a revised NEC organizational structure to support ease of learning, understanding, and applying the NEC safety provisions in a rapidly advancing new energy landscape.

Keeping the NEC Relevant Now is the Time to Modernize

- Industry Trends
- Medium Voltage
- Limited Energy
- Multi-Directional Power Flow
- Digital Delivery of Content
- Future Vision
- Path Forward
- Feedback

Medium Voltage

A Starting Point for Considering a New Approach

- More difficult for AHJ's when inspecting
- Less likely to have listed equipment since traditionally geared toward utility.
- More likely to have requirements that are antiquated
- Depth of knowledge of Technical Committees can be a challenge.
- Wiring methods in Chapter 3 for >1000 volt systems are difficult to determine
- With renewable energy and microgrids lines of distinction between NESC and NEC are blurred.

Limited Energy

Past

- Confusing
- No more Ma Bell
- Independence Chapter 8 vs Dependence Chapter 1-7
- Cat 5/6 Cable Article 725 and 805
- POE is Article 725 and 840
- How do we maintain relevance?

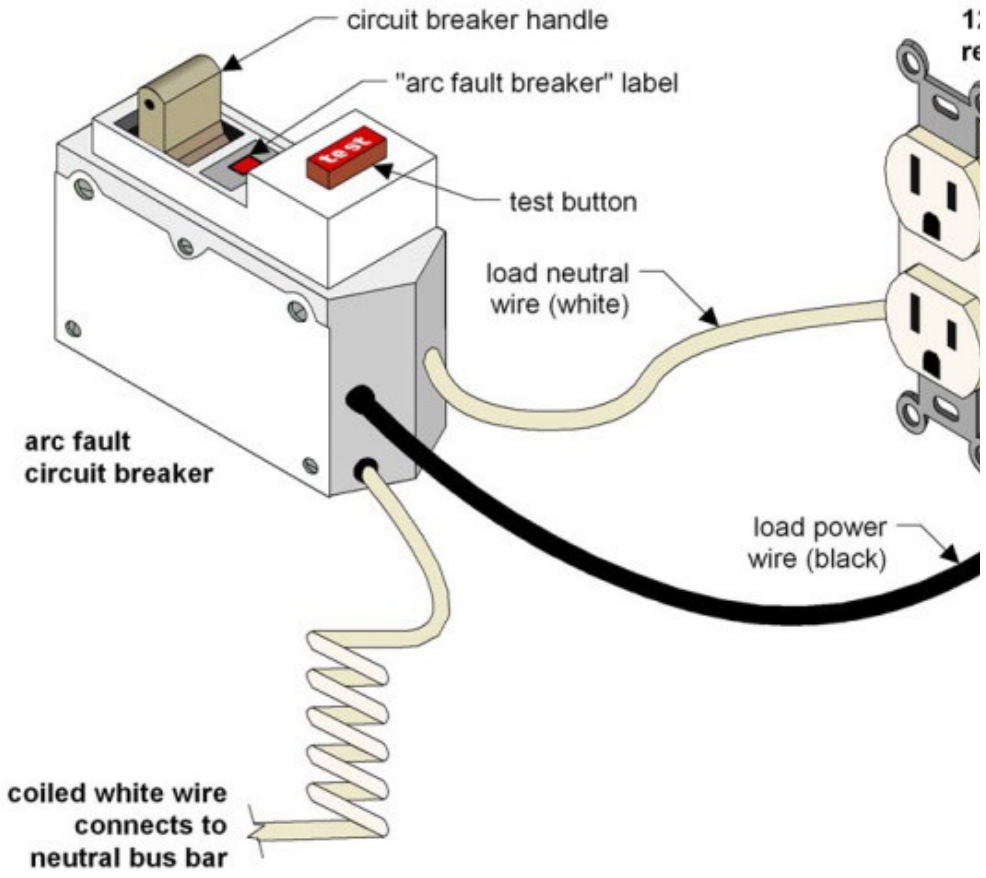
Future

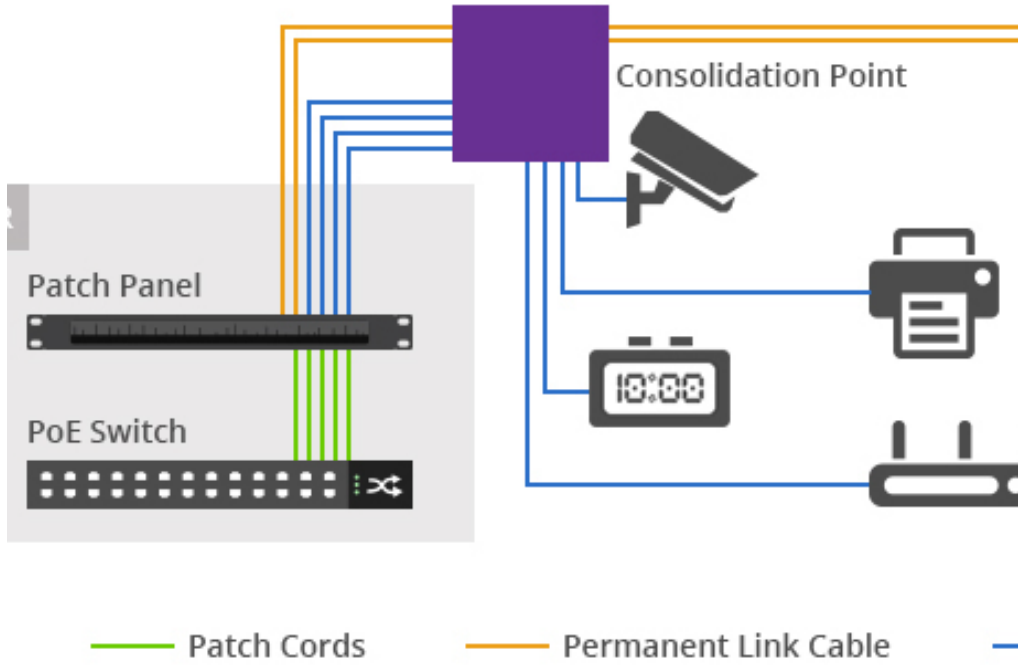
- Improve usability.
- Improve Terminology
- Create structure that is technology agnostic.
- Eliminate redundancy.
- Parallel Structure
- Everything communicates

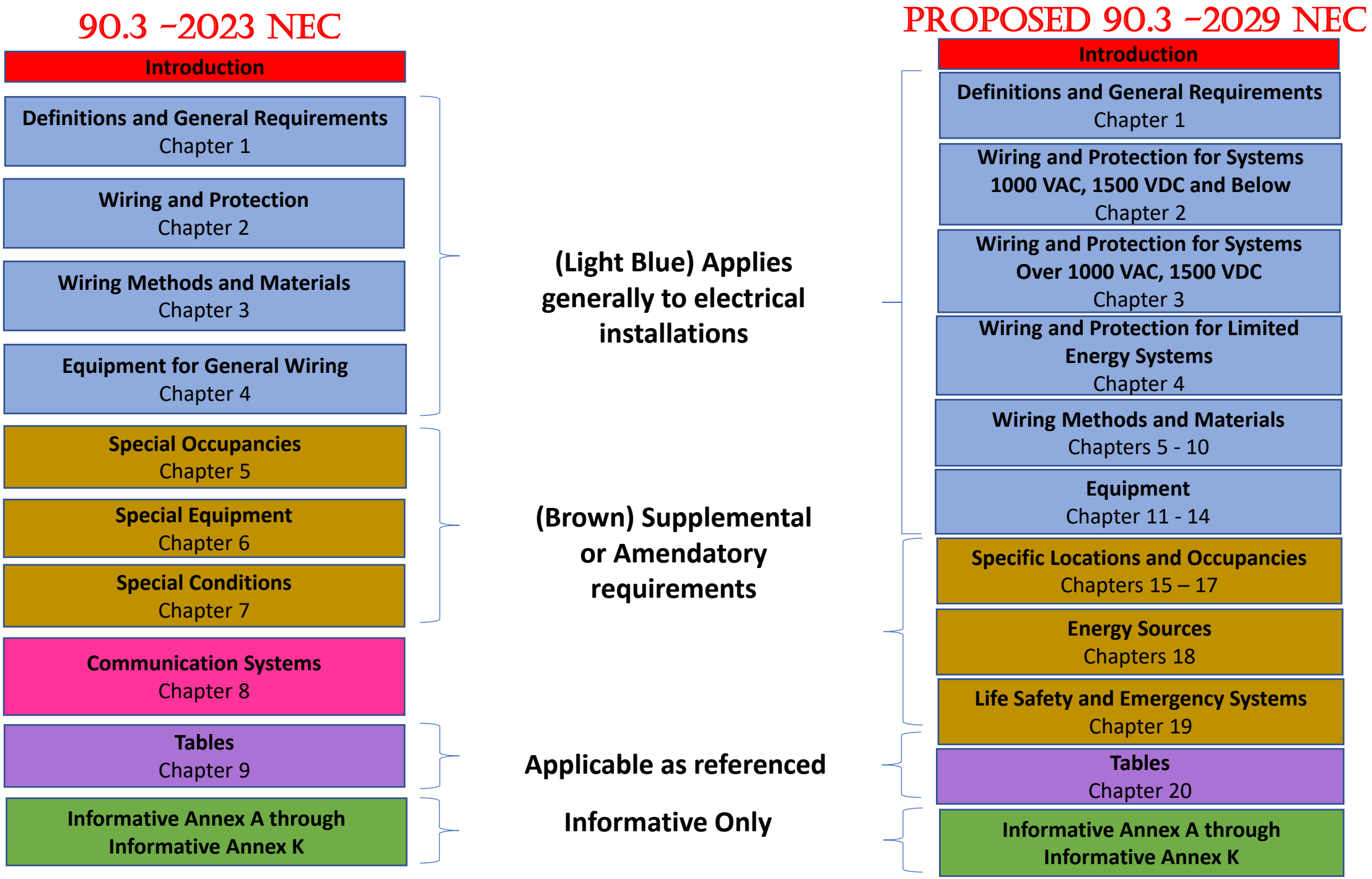
Short-Term Goals (2026)

MV /Limited Energy	• Move from Medium voltage structure to Medium Voltage Technical changes • Work on Limited Energy
Create parallel structure for Limited Energy	• Make it look like the front of the book. • (Protection scheme, wire and a load)
Begin Implementation	• Move certain articles for long-term road map implementation

Arc fault circuit interrupter






90.3 -2023 NEC
Introduction
Definitions and General Requirements
Chapter 1
Wiring and Protection
Chapter 2
Wiring Methods and Materials
Chapter 3
Equipment for General Wiring
Chapter 4
Special Occupancies
Chapter 5
Special Equipment
Chapter 6
Special Conditions
Chapter 7
Communication Systems
Chapter 8
Tables
Chapter 9
Informative Annex A through
Informative Annex K
(Light Blue) Applies generally to electrical installations
(Brown) Supplemental or Amendatory requirements
Applicable as referenced
Informative Only
PROPOSED 90.3 -2029 NEC
Introduction
Definitions and General Requirements
Chapter 1
Wiring and Protection for Systems
1000 VAC, 1500 VDC and Below
Chapter 2
Wiring and Protection for Systems
Over 1000 VAC, 1500 VDC
Chapter 3
Wiring and Protection for Limited
Energy Systems
Chapter 4
Wiring Methods and Materials
Chapters 5 - 10
Equipment
Chapter 11 - 14
Specific Locations and Occupancies
Chapters 15 – 17
Energy Sources
Chapters 18
Life Safety and Emergency Systems
Chapter 19
Tables
Chapter 20
Informative Annex A through
Informative Annex K

Title		2023 Reference	2026 CMP	2029 CMP
90	Introduction	90	1	1
Chapter 1 Definitions and General Requirements				
100	Definitions	100	1	1
110	Requirements for Electrical Installations	110	1	1
120	Load Calculations	220	2	2
130	Energy Management Systems	750	13	13
140	Temporary Installations	590	3	3
Chapter 2 Wiring and Protection for Systems 1000 VAC, 1500 VDC and Below				
200	General Requirements	300	3	3
205	Conductors	310	6	6
206	Use and Identification of Grounded Conductors	200	5	5
210	Branch Circuits	210	2	2
215	Feeders	215	10	10
225	Outside Branch Circuits and Feeders	225	10	10
230	Services	230	10	10
240	Overcurrent Protection	240	10	10
242	Overvoltage Protection (Part I and II)	242	10	10
250	Grounding and Bonding	250	5	5

3

Chapter 3 Wiring and Protection for Systems Over 1000 VAC, 1500 VDC				
300	General Requirements	305	9	9
305	Conductors and Cables	315	9	9
306	Use and Identification of Grounded Conductors	205	5	9
310	Branch Circuits	235	9	9
315	Feeders	235	9	9
325	Outside Branch Circuits and Feeders	235	9	9
330	Services	235	9	9
342	Overvoltage Protection	242 (Part III)	10	9
350	Grounding and Bonding	250 (Part X)	5	5

4

Chapter 4 Wiring and Protection for Limited Energy Systems				
400	Wiring Requirements and Materials		3	3
405	Conductors and Cables (Including Listing and Flammability)	722	3	3
406	Use and Identification of Conductors		3	3
430	Interior Cabling Systems Part I- Class 1 Power-Limited Circuits Part II- Class 2 and Class 3 Part III- Class 4	724, 725, 726	3	3
435	Exterior Cabling Systems (Outside Plant) Part I- Communication Circuits Part II- Antenna Systems Part III- CATV Part IV- Networked-Powered Broadband Communication Systems Part V- Premises-Powered Broadband Communication Systems		16	16
440	Overcurrent Protection Part I- Class 1 Power-Limited Circuits Part II- Class 2 and Class 3 Part III- Class 4	724, 725, 726	3	3
442	Overvoltage Protection		3	3
450	Grounding and Bonding		16	5

5, 6

Chapter 5 Enclosures and Wiring Support Structures				
500	Cabinets, Cutout Boxes, and Meter Socket Enclosures	312	8	8
502	Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Handhole Enclosures	314	8	8
504	Cable Trays	392	8	8
506	Auxiliary Gutters	366	8	8
508	Metal Wireways	376	8	8
510	Nonmetallic Wireways	378	8	8
512	Nonmetallic Extensions	382	6	8
Chapter 6 Wire and Cable				
600	Armored Cable: Type AC	320	6	6
602	Flat Cable Assemblies: Type FC	322	6	6
604	Flat Conductor Cable: Type FCC	324	6	6
606	Integrated Gas Spacer Cable: Type IGS	326	6	6
608	Metal-Clad Cable: Type MC	330	6	6
610	Mineral-Insulated, Metal-Sheathed Cable: Type MI	332	6	6
612	Nonmetallic-Sheathed Cable: Types NM and NMC	334	6	6
614	Optical Fiber Cables	770	16	16
616	Instrumentation Tray Cable: Type ITC	335	6	6
618	Power and Control Tray Cable: Type TC	336	6	6
620	Type P Cable	337	6	6
622	Service-Entrance Cable: Types SE and USE	338	6	6
624	Underground Feeder and Branch-Circuit Cable: Type UF	340	6	6
626	Flexible Cords and Flexible Cables	400	6	6
628	Fixture Wires	402	6	6

7, 8

Chapter 7 Circular Raceways (Conduit and Tubing)				
700	Intermediate Metal Conduit: Type IMC	342	8	8
702	Rigid Metal Conduit: Type RMC	344	8	8
704	Flexible Metal Conduit: Type FMC	348	8	8
706	Liquidtight Flexible Metal Conduit: Type LFMC	350	8	8
708	Rigid Polyvinyl Chloride Conduit: Type PVC	352	8	8
710	High Density Polyethylene Conduit: Type HDPE Conduit	353	8	8
712	Nonmetallic Underground Conduit with Conductors: Type NUCC	354	8	8
714	Reinforced Thermosetting Resin Conduit: Type RTRC	355	8	8
716	Liquidtight Flexible Nonmetallic Conduit: Type LFNC	356	8	8
718	Electrical Metallic Tubing: Type EMT	358	8	8
720	Flexible Metallic Tubing: Type FMT	360	8	8
722	Electrical Nonmetallic Tubing: Type ENT	362	8	8
724	Raceways for Limited Energy Systems (Communication Raceways)	800, 805, 810, 820, 830, 840	16	16
Chapter 8 Non-Circular Raceways				
800	Cellular Concrete Floor Raceways	372	8	8
802	Cellular Metal Floor Raceways	374	8	8
804	Strut-Type Channel Raceway	384	8	8
806	Surface Metal Raceways	386	8	8
808	Surface Nonmetallic Raceways	388	8	8
810	Underfloor Raceways	390	8	8

9, 10, 11

Chapter 9 Power and Lighting Systems				
900	Busways	368	8/9	8
902	Cablebus	370	8	8
904	Insulated Bus Pipe (IBP) and Tubular Covered Conductors (TCC) (New)	369	8	8
906	Flexible Bus System (New)	371	8	8
908	Multioutlet Assembly	380	8	8
910	Low-Voltage Suspended Ceiling Power Distribution Systems	393	18	18
912	Manufactured Wiring Systems	604	7	7
916	Office Furnishings	605	18	18
Chapter 10 Open Wiring				
1000	Concealed Knob-and-Tube Wiring	394	6	6
1002	Messenger-Supported Wiring	396	6	6
1004	Open Wiring on Insulators	398	6	6
Chapter 11 Devices				
1100	Switches	404	9/10	10
1102	Wiring Devices	406	18	18
1104	Switchboards, Switchgear and Panelboards	408	10	10
1106	Industrial Control Panels	409	11	11
1108	Transformers and Transformer Vaults	450	9	9
1110	Phase Converters	455	13	13
1112	Capacitors	460	9/11	11
1114	Resistors and Reactors	470	9/11	11

12

Chapter 12 Utilization Equipment				
1200	Luminaires, Lampholders and Lamps	410	18	18
1202	Low-Voltage Lighting	411	18	18
1204	Electric Signs and Outline Lighting	600	18	18
1206	Motors, Motor Circuits, and Controller	430	11	11
1208	Cranes and Hoists	610	12	12
1210	Elevators, Dumbwaiters, Escalators, Moving Walks, Platform Lifts, and Stairway Chairlifts	620	12	12
1212	Electrically Driven or Controlled Irrigation Machines	675	7	7
1214	Appliances	422	17	17
1216	Fixed Electric Space Heating Equipment	424	17	17
1218	Fixed Resistance and Electrode Industrial Process Heating Equipment	425	17	17
1220	Fixed Outdoor Electric Deicing and Snow-Melting Equipment	426	17	17
1222	Fixed Electric Heating Equipment for Pipelines and Vessels	427	17	17
1224	Air-Conditioning and Refrigeration Equipment	440	11	11
1226	Induction and Dielectric Heating Equipment	665	12	12
1228	Electric Welders	630	12	12
1230	Pipe Organs	650	12	12
1232	Information Technology Equipment	645	12	12
1234	Sensitive Electronic Equipment	647	12	12
1236	X-Ray Equipment	660	12	12

13, 14

Chapter 13 Systems (Equipment)				
1300	Electric Vehicle Power Transfer System	625	12	12
1302	Electrified Truck Parking Spaces	626	12	12
1304	Audio Signal Processing, Amplification, and Reproduction Equipment	640	12	12
1306	Modular Data Centers	646	12	12
1308	Electrolytic Cells	668	12	12
1310	Electroplating	669	12	12
1312	Industrial Machinery	670	12	12
1314	Integrated Electrical Systems	685	12	12
Chapter 14 Equipment Over 1000 VAC, 1500 VDC				
1400	General	495 (Part I & II)	9	9
1402	Switchgear and Industrial Control Assemblies	495 (Part III)	9	9
1404	Mobile and Portable Equipment	495 (Part IV)	9	9
1406	Boilers	495 (Part V)	9	9
1408	Motors, Motor Circuits, and Controllers	430 (Part XI)	11	9
1410	Capacitors	460 (Part III)	11	9
1412	Resistors and Reactors	470 (Part III)	11	9

15

Chapter 15 Hazardous Locations				
1500	Hazardous (Classified) Locations, Classes I, II, and III, Divisions 1 and 2	500	14	14
1501	Class I Locations	501	14	14
1502	Class II Locations	502	14	14
1503	Class III Locations	503	14	14
1504	Intrinsically Safe Systems	504	14	14
1505	Zone 0, 1, and 2 Locations	505	14	14
1506	Zone 20, 21, and 22 Locations for Combustible Dusts or Ignitible Fibers/Flyings	506	14	14
1511	Commercial Garages, Repair and Storage	511	14	14
1512	Cannabis Oil Equipment and Cannabis Oil Systems Using Flammable or Combustible Materials	512	14	14
1513	Aircraft Hangars	513	14	14
1514	Motor Fuel Dispensing Facilities	514	14	14
1515	Bulk Storage Plants	515	14	14
1516	Spray Application, Dipping, Coating, and Printing Processes Using Flammable or Combustible Materials	516	14	14

16

Chapter 16 Occupancies				
1600	Health Care Facilities	517	15	15
1602	Assembly Occupancies	518	15	15
1604	Theaters, Audience Areas of Motion Picture and Television Studios, Performance Areas, and Similar Locations	520	15	15
1606	Control Systems for Permanent Amusement Attractions	522	15	15
1608	Carnivals, Circuses, Fairs, and Similar Events	525	15	15
1610	Motion Picture and Television Studios and Similar Locations	530	15	15
1612	Motion Picture Projection Rooms	540	15	15
1614	Manufactured Buildings and Relocatable Structures	545	7	7
1616	Agricultural Buildings	547	7	7
1618	Mobile Homes, Manufactured Homes, and Mobile Home Parks	550	7	7
1620	Recreational Vehicles and Recreational Vehicle Parks	551	7	7
1622	Park Trailers	552	7	7

17,

18,

19,

Chapter 17 Installations Associated with Bodies of Water				
1700	Swimming Pools, Fountains, and Similar Installations	680	17	17
1702	Natural and Artificially Made Bodies of Water	682	7	7
1704	Marinas, Boatyards, Floating Buildings, and Commercial and Noncommercial Docking Facilities	555	7	7
Chapter 18 Power Production and Energy Storage Systems				
1800	Interconnected Systems	705	13	13
1802	Generators	445	13	13
1804	Stationary Standby Batteries	480	13	13
1806	Solar Photovoltaic (PV) Systems	690	4	4
1808	Large-Scale Photovoltaic (PV) Electric Supply Stations	691	4	4
1810	Fuel Cell Systems	692	4	4
1812	Wind Electric Systems	694	4	4
1814	Energy Storage Systems	706	13	13
1816	Stand Alone Systems	710	4	4
1818	Optional Standby Systems	702	13	13
Chapter 19 Life Safety and Emergency Systems				
1900	Emergency Systems	700	13	13
1902	Legally Required Standby Systems	701	13	13
1904	Fire Pumps	695	13	13
1906	Fire Alarm Systems	760	3	3
1908	Circuit Integrity Cables and Electrical Protective Systems (Fire- Resistive Cable Systems)	728	3	3
1910	Critical Operations Power Systems (COPS)	708	13	13

Introduction

Definitions and General Requirements
Chapter 1

Wiring and Protection
Chapter 2

Wiring Methods and Materials
Chapter 3

Equipment for General Wiring
Chapter 4

Special Occupancies
Chapter 5

Special Equipment
Chapter 6

Special Conditions
Chapter 7

Communication Systems
Chapter 8

Tables
Chapter 9

Informative Annex A through Informative Annex K

2026 NEC STRUCTURE

2026 NEC		2023 NEC Reference
Chapter 1 Definitions and General Requirements		
100	Definitions	100
110	Requirements for Electrical Installations	110
120	Load Calculations	220
130	Energy Management Systems	750
140	Temporary Installations	590

Takeaways

- Feedback to Jeff Sargent
- Proposed structure is fluid and will continue to evolve as we receive input
- Intent to print proposed structure in Annex for 2026 NEC edition.
- Structure is not intended to impact technical, only the organization and correlation of the technical content
- Intent is to move articles once

Public Comment No. 1651-NFPA 70-2024 [Global Input]

This Global Public Comment is for CMP-11 to review the use of the terms "overcurrent", "overcurrent protective devices" and "overcurrent protection".

Additional Proposed Changes

File Name	Description	Approved
CMP-11_OCPD_TG-4_CMP-10.pdf	CMP-11_OCPD_TG-4 CMP-10	
All_CMP_Comments_Files_from_CMP-10_TG-4.pdf	All CMP Comments Files from CMP-10 TG-4	

Statement of Problem and Substantiation for Public Comment

This Public Comment is submitted on behalf of a Task Group formed under the purview of Code Making Panel 10 consisting of Randy Dollar, Thomas Domitrovich, Jason Doty, Diane Lynch, Alan Manche, Nathan Philips, David Williams, and Danish Zia. This Public Comment, along with other Public Comments, was developed with the goal of improving usability and accuracy on requirements associated with overcurrent protective devices.

The Task Group reviewed all instances of the term "overcurrent", "overcurrent protective devices" and "overcurrent protection" and provided recommended changes to align proposed and current defined terms.

For consistency, the task group chose to use the full defined term "overcurrent protective device" in the title of all sections or subdivisions and the acronym "OCPD" or "OCPDs" when used in the body of each code section.

The term overcurrent protection applies to the application of an overcurrent protective device OCPD, to protect conductors and equipment.

Two documents are attached: One for your specific code panel and the other is a comprehensive document illustrating all of the code-wide comments made by this task group.

The current term "Overcurrent Protective Device, Branch-Circuit" is being deleted and the new defined term "Overcurrent Protective Device (OCPD)" will be used instead.

The following are the proposed terms being submitted to CMP-10.

PC 1639 Overcurrent Protection.
Automatic interruption of an overcurrent

PC 1636 Overcurrent Protective Device (OCPD).
A device capable of providing protection over the full range of overcurrent between its rated current and its interrupting rating. (CMP-10)

Informational Note 1: Prior editions of NFPA 70 included the defined term "branch circuit overcurrent protective device" for overcurrent protective devices suitable for providing protection for service, feeder and branch circuits. This term has been revised to a generalized term of "overcurrent protective device" (OCPD). The specific requirements using this term may include modifiers (such as branch OCPD, feeder OCPD, service OCPD) to specify location or application of the OCPD, or to specify variations (such as supplementary OCPD).

Informational Note 2: See 240.7 for a list of overcurrent protective devices suitable for providing protection for service, feeder, branch circuits and equipment.

Related Item

• Global PI 4050 • PC 1636 • PC 1639

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
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Zip:

Submittal Date: Sun Aug 25 21:50:26 EDT 2024
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CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-11			
CMP	NEC Section (using First Draft of 2026 NEC)	Current Language	"New" Language
11	Article 409		
	409.21. TITLE	Overcurrent Protection	Fine as is
	409.21(A)	Overcurrent Protection	Fine as is
	409.21(B)	Protection	Overcurrent protection
	409.21(B)	overcurrent protective device	OCPD
	409.21(B)	Overcurrent Protection	Fine as is
	409.21(C). (X2)	overcurrent protective device	OCPD
	409.104	Overcurrent Devices	OCPDs
11	Article 430		
	430.10(A) In.	Overcurrent Device	OCPD
	430.22(G)(1)(1)	Overcurrent Protection	Fine as is
	430.22(G)(1)(2)	Overcurrent Protection	Fine as is
	430.22(G)(2)(1)	Overcurrent Protection	Fine as is
	430.22(G)(2)(2)	Overcurrent Protection	Fine as is
	430.28	Branc-Circuit protective device	OCPD
	430.28	Overcurrent Device	OCPD
	430.51	Overcurrent	Fine as is
	430.53(C)(5)	Overcurrent Protection	Fine as is
	430.55	Overcurrent Protection	Fine as is
	430.61	Overcurrents	Fine as is
	430.62(A)Ex.2	Feeder Overcurrent protective device	Feeder OCDP
	430.62(A)Ex.2	Overcurrent Protection	Fine as is
	430.62(B)	Feeder Overcurrent protective device	Feeder OCDP
	430.63Ex.	Feeder Overcurrent device	Feeder OCDP
	430.63Ex.	Overcurrent Protection	Fine as is
	430.72. Title	Overcurrent Protection	Fine as is
	430.72(A)	protected against overcurrent	shall be provided with overcurrent protection in accordance with
	430.72(A)	Branch-circuit overcurrent protective devices	OCPDs
	430.72(A)	protected against overcurrent	shall be provided with overcurrent protection in accordance with
	430.72(B). (X2)	Overcurrent Protection	Fine as is
	430.72(B)	Overcurrent Device	OCPD

	430.72(B)	Overcurrent Protection	Fine as is
	430.72(B)(1) (X3)	Overcurrent Protection	Fine as is
	430.72(B)(2) Title	Branch-circuit overcurrent protective device	Fine as is
	430.72(B)(2) (X2)	protective devices	OCPDs
	430.72(C)Ex.	Overcurrent Protection	Fine as is
	430.72(C)(3)	Overcurrent Devices	OCPDs
	430.72(C)(4)	Overcurrent Device	OCPD
	430.72(C)(5)	Protection	Overcurrent protection
	430.87	Overcurrent Device	OCPD
	430.94. (X2)	Overcurrent Protection	Fine as is
	430.94. (X3)	Overcurrent protective device	OCPD
	430.109(A)(7)	Overcurrent protection	Fine as is
	430.109(B)	Branch-circuit overcurrent device	branch-circuit OCPD
	430.111(A). (X2)	Overcurrent Device	Fine as is
	430.112 Ex.	Branch circuit protective device	Suggest CMP to Review
	430.206. Title	Overcurrent protection	Fine as is
	430.206(B)(2)	considered to have Overcurrent	Overload
	430.206(C)	Fault-Current protection	Suggest CMP to Review
	430.207	Overcurrent (overload)Relays	Fine as is
	430.207	Overcurrent Relays	Fine as is
11	**Article 440**		
	440.21	Overcurrent	Fine as is
	440.21	Overcurrent Protection	Fine as is
	440.22(B)(2)Ex.	Overcurrent device	OCPD
	440.52(B)	Overcurrent	shall be provided with overcurrent protection
11	**Article 460**		
	460.9. Title	Overcurrent Protection	Fine As Is
	460.9. (X3)	Overcurrent Device	OCPD
	460.25	Overcurrent Protection	Fine As Is
	460.28(B)	Overcurrent Device	OCPD

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-1			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
1	**Article 110**		
	110.10.	overcurrent protective devices	OCPDs
	110.10.	circuit protective devices	Fine as is
	110.26(C)(2)	overcurrent devices	OCPD
	110.26(C)(3)	overcurrent devices	OCPD
	110.52	Overcurrent protection	Fine as is
	110.52	Overcurrent	Motor-operated Equipment shall be provided with overcurrent protection
	110.52	Overcurrent	Transformers shall be provided with overcurrent protection

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-2			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
2	**Article 100**		
	Branch Circuit (Branch-Circuit)	overcurrent device	overcurrent protective device (OCPD)
2	**Article 120**		
	120.5(E)	overcurrent device	OCPD
	120.7(B)	overcurrent protective device	OCPD
	120.87(3)	Overcurrent protection	Fine as is
2	**Article 210**		
	210.4(A)	branch-circuit overcurrent protective device, OCPD	Fine as is
	210.4(C)	branch-circuit OCPD	Fine as is
	210.11(B)	branch-circuit OCPD	Fine as is
	210.12(A)	branch-circuit OCPD (X-8)	Fine as is
	210.18	~~overcurrent device~~ OCPD (X-2)	Fine as is
	210.19(A)(1)EX	branch-circuit OCPD	Fine as is
	210.20.	Overcurrent protection	Fine as is
	210.20.	branch-circuit OCPD	Fine as is
	210.20(A)	branch-circuit OCPD	Fine as is
	210.20(C)	branch-circuit OCPD	Fine as is
	T-210.24	Overcurrent protection	Fine as is
2	**Annex D**		
	D3. (X2)	Overcurrent Protection	CMP-2 To review references to OCPD and the revised terms.
	D3a. (X8)	Branch-Circuit OCPD	CMP-2 to Review
	D3a.	Overcurrent Protection	CMP-2 to Review
	D3a. (X2)	Branch-Circuit OCPD	CMP-2 to Review

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-3			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
3	**Article 100**		
	Fault Managed Power.	Overcurrent protection	Fine as is
	Fire Alarm Circuit	Overcurrent device	overcurrent protective device (OCPD)
3	**Article 300**		
	300.5-T	Overcurrent Protection	Fine as is
	300.17(I)	Overcurrent Device	OCPD
	300.28(C)(3). (X5)	Overcurrent Protection	Fine as is
3	**Article 590**		
	590.6(A)	Overcurrent Protection	Fine as is
	590.6(B)	be protected from Overcurrent	shall be provided with overcurrent protection
	590.9. Title	Overcurrent protective device	Fine as is
	590.9(A)	Overcurrent protective devices	OCPDs
	590.9(B) Title	Service Overcurrent protective devices	Fine as is
	590.9(B)	Overcurrent protective devices	OCPDs
3	**Article 721**		
	721.50(A)	Overcurrent	Fine as is
3	**Article 722**		
	722.1	Overcurrent Protection	Fine as is
3	**Article 724**	Class 1	
	724.40(B). (X3)	Overcurrent Devices	OCPDs
	724.40(B). (X2)	Overcurrent Device	OCPD
	724.40(B). (X2)	Overcurrent Protection	Fine as is
	724.43. (X4)	Overcurrent Protection	Fine as is
	724.45	Overcurrent Device	OCPD
	724.45. (X3)	Overcurrent Devices	OCPDs
	724.45(A)	Overcurrent Devices	OCPDs
	724.45(B)	Overcurrent Protection	Fine as is
	724.45(B)	Overcurrent Device	OCPD
	724.45(C). (X2)	Overcurrent protective devices	OCPDs
	724.45(D)	Overcurrent Protection	Fine as is
	724.45(E)	Overcurrent Protection	Fine as is
3	**Article 725**		
	725.1 In	Overcurrent Protection	Fine as is

	725.127	Overcurrent Device	OCPD
3	**Article 760**		
	760.41(B)	Overcurrent protective device	OCPD
	760.41(B)	Overcurrent protection devices	OCPDs
	760.43. (X3)	Overcurrent Protection	Fine as is
	760.45. Title	Overcurrent device	Overcurrent protective device
	760.45	Overcurrent protection devices	OCPDs
	760.45 Ex 1 & 2	Overcurrent Protection	Fine as is
	760.121(B)	Branch-Circuit Overcurrent protective device	OCPD
	760.121(B)	Overcurrent protection devices	OCPDs
	760.127	Overcurrent Protection	Fine as is
	760.127	Overcurrent Device	OCPD
3	**Article 794**		
	794.1	Overcurrent Protection	Fine as is

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-4			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
4	**Article 690**		
	690.2	PV dc Overcurrent protective devices	PV dc OCPDs
	690.8	Overcurrent Device	OCPD and OCPDs
	690.9. Title	Overcurrent Protection	Fine as is
	690.9(A). (X2)	be protected from Overcurrent	shall be provided with overcurrent protection
	690.9(A)(1). Title	Overcurrent Protection	Fine as is
	690.9(A)(1).	Overcurrent protective devices	OCPDs
	690.9(A)(2). Title	Overcurrent Protection	Fine as is
	690.9(A) (2)	be protected from Overcurrent	shall be provided with overcurrent protection
	690.9(A) (2) In	Overcurrent protection	Fine as is
	690.9(A) (2) In	Overcurrent device	OCPD
	690.9(A)(3)	Overcurrent	Fine as is
	690.9(B)	shall be permitted to prevent overcurrent of conductors	Fine as is
	690.9(B)	Overcurrent device	OCPD and OCPDs
	690.9(C)	Overcurrent protective device and Devices	OCPD and OCPDs
	690.31(E)	Overcurrent protective devices	OCPDs
	690.45	Overcurrent protective device	OCPD
	690.45	Overcurrent Device	OCPD
4	**Article 692**		
	692.8. Title	Overcurrent Device	Overcurrent Protective Devices
	692.8	Overcurrent protective device	OCPDs
	692.9	Overcurrent Protection	Fine as is
	692.9	Overcurrent Devices	OCPDs
4	**Article 694**		
	694.7(D)	Overcurrent Device	OCPD
	694.12(B). Title	Overcurrent Device	Overcurrent Protective Device
	694.12(B)(2). Title	Overcurrent Devices	Overcurrent Protective Devices
	694.12(B)(2)	Overcurrent Devices	OCPDs
	694.15	Overcurrent Protection	Fine as is
	694.15	Overcurrent Devices	OCPDs
	694.15 In	Overcurrent Protection	Fine as is
	694.15(B)(1)	Overcurrent Protection	Fine as is
	694.15(C)	Overcurrent Devices	OCPDs

4	Article 705		
	705.11(C). Title	Overcurrent Protection	Fine as is
	705.11(C)	be protected from overcurrent	have overcurrent protection
	705.11(C)(1). (1) (2) (3)	Overcurrent protective device	OCPD
	705.11(C)(2)	Overcurrent protection devices	OCPDs
	705.12(A)(2). (X4)	Overcurrent Device	OCPD
	705.12(A)(3)	Overcurrent Devices	OCPDs
	705.12(B)	(Multiple) Overcurrent Device and (s)	OCPD. And OCPDs
	705.12(B)	(Warning labels) Overcurrent Device and (s)	Overcurrent Protective Device and Devices
	705.28(B)Ex.1	Overcurrent Devices	OCPDs
	705.28(B)Ex.3	Overcurrent Device	OCPD
	705.30. Title	Overcurrent Protection	Fine as is
	705.30(A). (X2)	Overcurrent Protection	Fine as is
	705.30(A)	Overcurrent Devices	OCPDs
	705.30.(C)	Overcurrent Devices	OCPDs
	705.30.(F)	Overcurrent Protection	Fine as is
	705.70.	Overcurrent Devices	OCPDs
	705.70.	Overcurrent Protection	Fine as is

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-5			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
5	**Article 100**		
	Ground-Fault Current Path, Effective	overcurrent protective device	overcurrent protective device (OCPD)
	Ground-Fault Protection of Equipment	overcurrent device	overcurrent protective device (OCPD)
5	**Article 200**		
	200.10(E)	overcurrent device	OCPD
5	**Article 250**		
	250.4(A)(5). Title	Overcurrent protective Device	Fine as is
	250.4(A)(5)	Overcurrent Device	OCPD
	250.4(B)(4)	Overcurrent Devices	OCPDs
	250.30(A)(1)	Overcurrent Device	OCPD
	250.30(A)(1)	Overcurrent Devices	OCPDs
	250.32(B)(2). (X4)	Overcurrent Protection	Fine as is
	250.32(C)(2). (X4)	Overcurrent Protection	Fine as is
	250.35(B)	Overcurrent Protection	Fine as is
	250.36(D)	Overcurrent Device	Fine as is
	250.36(E)(1)	Overcurrent Device	OCPD
	250.102(B)(2)	Overcurrent Protection	Fine as is
	250.102(D). (X3)	Overcurrent Devices	OCPDs
	250.118(A)(5)	Overcurrent Devices	OCPDs
	250.118(A)(6)	Overcurrent Devices	OCPDs
	250.118(A)(7)	Overcurrent Devices	OCPDs
	250.122(C)	Overcurrent Device	OCPD
	250.122(F)(1). (X3)	Overcurrent protective device	OCPD
	250.122(G)	Overcurrent Device	OCPD
	250.142. (X2)	Overcurrent Device	OCPD
	250.148	Overcurrent Device	OCPD
	250.164	Overcurrent Device	OCPD
	250.166	Overcurrent Protection	Fine as is
	250.169	Overcurrent Devices	OCPD
5	**Article 270**		
	270.4(A)(5)	Overcurrent Device	OCPD
	270.4(B)(4)	Overcurrent Devices	OCPDs
	270.30(A)(1)	Overcurrent Devices	OCPDs

	270.32(B)(2). (X4)	Overcurrent Protection	Fine as is
	270.32(C)(2). (X4)	Overcurrent Protection	Fine as is
	270.35(B)	Overcurrent Protection	Fine as is
	270.35(B)	Overcurrent protective device	OCPD
	270.36(D)	Overcurrent Device	OCPD
	270.36(E)	Overcurrent Devices	OCPDs
	270.102(C)(2)	Overcurrent Protection	Fine as is
	270.102(D)	Overcurrent Device	OCPDs
	270.114(C)(3)	Overcurrent setting	CMP to review Language based on new terms
	270.118	Overcurrent Devices	OCPDs
	270.142	Overcurrent Devices	OCPDs
	270.148(B)	Overcurrent Device	OCPD
	270.164(B)	Overcurrent Device	OCPD
	270.166(A)	Overcurrent Protection	Fine as is
	270.169	Overcurrent Devices	OCPDs

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-6			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
6	**Article 310**		
	310.10(G).	Overcurrent Protection	Fine as is
	310.15(A)	Overcurrent Protection	Fine as is
	310.16-T	Overcurrent Protection	Fine as is
	310.17-T	Overcurrent Protection	Fine as is
6	**Article 335**		
	335.90.	Overcurrent Protection	Fine as is
6	**Article 382**		
	382.4	Supplementary Overcurrent Protection	Supplementary Overcurrent Protective Device
6	**Article 400**		
	400.16	Overcurrent Protection	Fine as is
	400.16	protected against Overcurrent	shall be provided with overcurrent protection
6	**Article 402**		
	402.14 (X2)	Overcurrent Protection	Fine as is

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-7			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
7	**Article 100**		
	Service Equipment, Mobile Home	overcurrent protective devices	overcurrent protective devices (OCPDs)
7	**Article 545**		
	545.24	Branch-circuit overcurrent protective device	Branch-circuit OCPD
	545.24(B) Title	Branch Circuit Overcurrent Protection Device	Overcurrent protective devices
	545.24(B)	a Branch Circuit Overcurrent Protective Device	an OCPD
7	**Article 547**		
	547.41(A)(6). (X2)	Overcurrent Protection	Fine as is
	547.41(B)	Overcurrent Protection	Fine as is
	547.42	Overcurrent Protection	Fine as is
7	**Article 550**		
	550.11(B). Title	Branch-Circuit protective equipment	Branch-Circuit Overcurrent Protection
	550.11(B)	Overcurrent Protection	Fine as is
	550.11(B)	Branch-Circuit Overcurrent Devices	OCPDs
	550.11(B)	Overcurrent protection size	OCPD rating
	550.15(E)	Branch-circuit overcurrent protective device	OCPD
	550.32	Overcurrent Protection	Fine as is
7	**Article 551**		
	551.31(A)	Overcurrent protective device	OCPD
	551.31(C)	Overcurrent protective device	OCPD
	551.31(D)	Overcurrent Protection	Fine as is
	551.42	Overcurrent Protection	Fine as is
	551.43. Title	Branch-Circuit protection	Branch-Circuit Overcurrent Protection
	551.43(A)	Branch Circuit Overcurrent Devices	Branch-Circuit OCPDs
	551.43(A)(3)	Overcurrent Protection	Fine as is
	551.45(C)	Overcurrent protective device	OCPD
	551.47(Q)	Overcurrent protective device	OCPD
	551.47(R)	Overcurrent Protection	Fine as is
	551.47(S)	Overcurrent Protection	Fine as is
	551.74	Overcurrent Protection	Fine as is
7	**Article 552**		
	552.10.(E) Title	Overcurrent Protection	Fine as is
	552.10(E)(1)	Overcurrent protective devices	OCPDs

	T-552.10(E)(1)	Overcurrent Protection	Fine as is
	552.10(E)(4). (X2)	Overcurrent protective device	OCPD
	552.42(A)	Branch Circuit Overcurrent Devices	OCPDs
	552.42(A)	Overcurrent Protection	Fine as is
	552.45(C)	Overcurrent protective device	OCPD
	552.46(A) IN	Overcurrent Protection	Fine as is
	552.47(P)	Overcurrent protective device	OCPD
	552.47(Q)	Overcurrent Protection	Fine as is
7	**Article 555**		
	555.53	Overcurrent protective device	OCPD
7	**Article 675**		
	675.6	Branch Circuit Overcurrent Protective Device	OCPD
	675.7	Branch Circuit Overcurrent Protective Devices	OCPDs
	675.8	Overcurrent Protection	Fine as is
7	**Article 682**		
	682.15(B)	Feeder Overcurrent protective device	Feeder OCPD

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-8			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
8	**Article 312**		
	312.11. Title	Overcurrent Devices	Overcurrent Protective Device
	312.11	Overcurrent Devices	OCPDs
	312.11(A). (X3)	Overcurrent Device	OCPDs
	312.11(B)	Overcurrent Devices	OCPDs
	312.11(B)(1)	Overcurrent Device	OCPD
8	**Article 366**		
	366.12	Overcurrent Devices	OCPDs
	366.56(D)	Overcurrent Protection	Fine as is
8	**Article 368**		
	368.17(A). Title	Overcurrent Protection	Fine as is
	368.17	Overcurrent Protection	Fine as is
	368.17(A)	Protected against Overcurrent	shall be provided with overcurrent protection
	368.17(B). (X2)	Overcurrent Protection	Fine as is
	368.17(B)	Overcurrent Device	OCPD
	368.17(C)	Overcurrent Devices	OCPDs
	368.17(C)Ex.2	Branch-Circuit Overcurrent Device	Branch-Circuit OCPD
	368.17(C)Ex.3	Overcurrent Device	OCPD
	368.17(C)Ex.4	Branch-Circuit overcurrent plug-in device	CMP to review Language based on new terms
	368.17(D). Title	Overcurrent Protection	Fine as is
	368.17(D)	Protected against Overcurrent	shall be provided with overcurrent protection
8	**Article 370**		
	370.23. Title	Overcurrent Protection	Fine as is
	370.23	Protected against Overcurrent	shall be provided with overcurrent protection
8	**Article 371**		
	371.17. Title	Overcurrent Protection	Fine as is
	371.17	Overcurrent Protection	Fine as is
	371.17 (A)-(C). Titles	Overcurrent Protection	Fine as is
	371.17(A)-(C)	Protected against Overcurrent	shall be provided with overcurrent protection
	371.17(D)	Protected against Overcurrent	shall be provided with overcurrent protection
	371.17(F)	Overcurrent	shall be provided with overcurrent protection
	371.17(G)	Overcurrent Protection	
	371.17(G)Ex	Overcurrent Protection	Fine as is
	371.17(G)Ex	Overcurrent Device	OCPD

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-9			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
9	**Article 265**		
	265.18	Overcurrent Device	OCPD
	265.20.	Overcurrent Protection	Fine as is
	265.20.	Overcurrent protective devices	OCPDs
	265.20.	Overcurrent Devices	OCPDs
9	**Article 266**		
	266.1	Overcurrent Protection	Fine as is
	266.5	Overcurrent Protection	Fine as is
	266.5	Protected against overcurrent	shall be provided with overcurrent protection
	266.5	Overcurrent Device	OCPD
9	**Article 268**		
	268.2. (X2)	Overcurrent Protection	Fine as is
	268.70(F)	Overcurrent Devices	OCPDs
	268.82. (X4)	Overcurrent Protection	Fine as is
	Art. 268 Part VII	Overcurrent Protection	Fine as is
	268.90.	Overcurrent Device	OCPD
	268.90.	Overcurrent Devices	OCPDs
	268.91	Overcurrent Device	OCPD
	268.92	Overcurrent Devices	OCPDs
	268.93	Overcurrent Device	OCPD
9	**Article 450**		
	450.5 (previously 450.3). (X3)	overcurrent protection	Fine As Is
	450.5(A) and Table. (X3)	overcurrent protection	Fine As Is
	Table 450.5(A) Footnote 2. (X4)	overcurrent device	OCPD
	450.5(B)	overcurrent protection	Fine As Is
	Table 450.5(B) and Table (X2)	overcurrent protection	OCPD
	Table 450.5(B) Footnote 2. (X3)	overcurrent device	OCPD
	Table 450.5(B) Footnote 3	overcurrent protection	OCPD
	450.6(A) Title	overcurrent protection	Fine As Is
	450.6(A) (X3)	overcurrent device	OCPD
	450.6(A) Exception	overcurrent device	OCPD
	450.7(A)(1). (X2)	overcurrent protection	OCPD
	450.7(A)(2). Title	overcurrent protection	Fine As Is

	450.7(A)(2)	overcurrent sensing device	Fine As Is
		overcurrent protection	OCPD
		overcurrent device	OCPD
		branch or feeder protective devices	branch or feeder OCPDs
	450.7(A)(3)	overcurrent device	OCPD
	450.7(B)(2)	overcurrent protection	Fine As Is
	450.7(B)(2)(a)	overcurrent protective device	OCPD
	450.7(B)(2)(b)	overcurrent protection	OCPD
	450.7(B)(2)(b)	overcurrents	Fine As Is
	450.7(B)(2)(b) Exception	overcurrent device	OCPD
	450.8(A). (X2)	overcurrent protection	Fine As Is
	450.8(A)(1)	overcurrent protection	Fine As Is
	450.8(A)(2)	overcurrent protection	Fine As Is
	450.8(A)(3)	protective device	OCPD
	450.8(A)(4)(a)	protective device	OCPD
	450.8(B). Title	Overcurrent Protection	Fine As Is
	450.8(B)	overcurrent device	OCPD
	450.9	overcurrent protection	Fine As Is
	450.9	protective devices (2x)	OCPDs
	450.23(A)(1)(d) Informational Note	overcurrent protection	OCPD
	450.23(B)(1) Informational Note 2	overcurrent protection	OCPD
9	**Article 495**		
	495.62. Title	Overcurrent Protection	Fine As Is
	495.72	Overcurrent Relay	Fine As Is

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-10			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
10	**Article 100**		
	Circuit Breaker	Overcurrent	Fine as is
	Coordination, Selective. (Selective Coordination)	Overcurrent condition	Fine as is
	Coordination, Selective. (Selective Coordination)	overcurrent protective devices	overcurrent protective devices (OCPDs)
	Coordination, Selective. (Selective Coordination)	overcurrents	Fine as is
	Coordination, Selective. (Selective Coordination)	overcurrent protective device	overcurrent protective device (OCPD)
	Current Limiting (as applied to overcurrent protection devices)	overcurrent protection devices	overcurrent protective devices (OCPDs)
	Feeder	final branch-circuit overcurrent protective device	overcurrent protective device (OCPD)
	Fuse	overcurrent protective device	overcurrent protective device (OCPD)
	Fuse	overcurrent	Fine as is
	Fuse, Electronically Actuated	overcurrent protective device	overcurrent protective device (OCPD)
	Fuse, Electronically Actuated	overcurrent	Fine as is
	Overcurrent	Overcurrent protection	Fine as is
	Overcurrent Protective Device, Branch-Circuit	Revise with the term Overcurrent Protective Device. (OCPD)	
	Overcurrent **Protective** Device, Supplementary (need to Revise term with acronym)	overcurrent protective device	overcurrent protective device (OCPD)
	Panelboard	overcurrent devices	overcurrent protective devices (OCPDs)
	Surge-Protective Device (SPD). (X2)	overcurrent device. (X2)	overcurrent protective device (OCPD)
	Switchboard	overcurrent	overcurrent protective devices (OCPDs)
	Tap Conductor	Overcurrent protection	Fine as is
10	**Article 215**		
	215.1	Overcurrent protection	Fine as is
	215.4(A)(1)Ex.1	overcurrent devices protecting the feeders	feeder OCPD
	215.4(A)(1)Ex.3	overcurrent device	OCPD
	215.5 Title	Overcurrent protection	Fine as is
	215.5	Feeders shall be protected against overcurrent	Feeders shall be provided with overcurrent protection in accordance with Article 240, Parts I
	215.5	overcurrent device	OCPD
	215.5Ex	overcurrent device protecting the feeders	feeder OCPDs
	215.5Ex	overcurrent device	OCPD

	215.18(B)	branch circuit overcurrent devices	OCPDs
10	**Article 225**		
	225.40. Title	Overcurrent protective devices	Fine as is
	225.40.	feeder overcurrent device (x2)	feeder OCPD
	225.40.	branch circuit overcurrent devices	Branch circuit OCPDs
	225.42(B)	branch circuit overcurrent devices	OCPDs
10	**Article 230**		
	230.7 Ex.2	Overcurrent protection	Fine as is
	230.42(A)(1)	overcurrent device (X3)	OCPD
	230.82(6)	Overcurrent protection	Fine as is
	230.82(7)	Overcurrent protection	Fine as is
	230.82(8)	Overcurrent protection	Fine as is
	230.82(9)	Overcurrent protection	Fine as is
	230.82(10)	Overcurrent protection	Fine as is
	230 Part VII	Overcurrent protection	Fine as is
	230.90(A)	overcurrent device	OCPD
	230.90(A)Ex.3	overcurrent device	OCPD
	230.90(B)	overcurrent device	OCPD
	230.91	overcurrent device (X2)	OCPD
	230.92	overcurrent device (X4)	OCPDs and OCPD
	230.93	overcurrent device	OCPD
	230.94	overcurrent device (X3)	OCPD
	230.94	Overcurrent protection (X2)	Fine as is
	230.95(A)	overcurrent device	OCPD
	230.95(B)	overcurrent device	OCPD
10	**Article 240**		
	240	Overcurrent Protection	Fine as is
	240.1 (X3)	Overcurrent protection	Fine as is
	240.2	branch-circuit Overcurrent protective devices	~~branch-circuit~~ Overcurrent protective devices
	240.4. Title	Protection of Conductors	Overcurrent Protection of Conductors
	240.4	Protected against overcurrent	shall be provided with overcurrent protection in accordance with
	240.4(B). Title	Overcurrent devices	Overcurrent protective Devices
	240.4(B)	Overcurrent device	OCPD
	240.4(B)	Overcurrent protective device	OCPD

	240.4(C). Title	Overcurrent devices	Overcurrent protective Devices
	240.4(C). (X2)	Overcurrent device.	OCPD
	240.4(D)	Overcurrent Protection	Fine as is
	240.4(D)(1)	Overcurrent protection	Fine as is
	240.4(D)(1)(2)		(a) OCPDs in accordance with 240.7 shall be marked for use with 18 AWG copper conductor (b) Delete (c) change to (b)
	240.4(D)(2)	Overcurrent protection	Fine as is
	240.4(D)(2)(2)		(a) OCPDs in accordance with 240.7 shall be marked for use with 16 AWG copper conductor (b) Delete (c) change to (b)
	240.4(D)(3)	Overcurrent protection	Fine as is
	240.4(D)(3)(2)		~~(a) Fuses and circuit breakers in accordance with 240.7 marked for use with 14 AWG copper-clad aluminum conductor~~ ~~(b) Delete~~
	240.4(D)(3)(2)		OCPDs in accordance with 240.7 shall be marked for use with 14 AWG copper-clad aluminum conductor
	240.4(E)	Protected against overcurrent	shall be permitted to have overcurrent protection in accordance with the following
	240.4(F)	Overcurrent protection	Fine as is
	240.4(F)	Overcurrent protective device	OCPD
	240.4(G). (X2)	Overcurrent protection	Fine as is
	240.4(H)	Protected against overcurrent	shall be provided with overcurrent protection in accordance with
	240.5	Protected against overcurrent	shall be provided with overcurrent protection in accordance with
	240.5(A)	Overcurrent device	OCPD
	240.5(A)	Protected against overcurrent	Fixture wires shall be provided with overcurrent protection in accordance with
	240.5(A)	Supplementary overcurrent protection	Fine as is
	240.5(B) Title	Branch-circuit overcurrent device.	Branch-Circuit Overcurrent protective Devices

	240.9	Protection of conductors against overcurrent	Fine as is
	240.10. Title	Supplementary Overcurrent protection	Fine as is
	240.10.	Supplementary overcurrent protection	Fine as is
	240.10.	Branch-Circuit overcurrent devices	OCPDs
	240.10.	Supplementary overcurrent devices	Supplementary OCPDs
	240.11. (X2)	Feeder overcurrent protective devices.	Feeder OCPDs
	240.11. (X2)	Service overcurrent protective device.	Service OCPD
	240.15(A). Title	Overcurrent device	Overcurrent protective device required
	240.15(A)	Overcurrent device	OCPD
	240.15(A)	Overcurrent trip. Overcurrent relay	Fine as is
	240.15(B) Title	Overcurrent device	Circuit breaker as Overcurrent protective device
	240.16	Branch circuit overcurrent protective devices	OCPDs
	240.21	Overcurrent Protection	Fine as is
	240.21	overcurrent protective device	OCPD
	240.21 (A)	Overcurrent Protection	Fine as is
	240.21 (B)	Overcurrent Protection	Fine as is
	240.21 (B) (1) (1) (b)	Overcurrent device(s)	OCPDs
	240.21 (B) (1) (1) (b)	overcurrent protective device	OCPD
	240.21 (B)(1) (1) (4)	Overcurrent device	OCPD
	240.21 (B) (1)(1) (4) In	Overcurrent Protection	Fine as is
	240.21 (B) (2) (1)	Overcurrent device	OCPD
	240.21 (B) (2) (2)	Overcurrent devices	OCPDs
	240.21 (B) (3) (1)	Overcurrent device	OCPD
	240.21 (B) (3) (2)	Overcurrent device	OCPD
	240.21 (B) (4) (3)	Overcurrent device	OCPD
	240.21 (B) (4) (4)	Overcurrent device	OCPD
	240.21 (B) (4) (4)	Overcurrent devices	OCPDs
	240.21 (B) (5) (2)	Overcurrent device	OCPD
	240.21 (B) (5) (2)	Overcurrent devices	OCPDs
	240.21 (B) (5) (3)	Overcurrent device	OCPD
	240.21 (C). (X2)	Overcurrent Protection	Fine As Is
	240.21 (C) (1). Title	Title change	Overcurrent Protective Device
	240.21 (C) (1)	"…protected by overcurrent protection…"	Fine As Is
	240.21 (C) (1)	Overcurrent protective device	OCPD
	240.21 (C) (2) (1) (b)	Overcurrent device(s)	OCPDs

	240.21 (C) (2) (1) (b)	Overcurrent device	OCPD
	240.21 (C) (2) (4)	Overcurrent device	OCPD
	240.21 (C) (2) (4)	Overcurrent device	OCPD
	240.21 (C) (2) (4)	Overcurrent protection	Fine as is
	240.21 (C) (3) (2)	Overcurrent devices	OCPDs
	240.21 (C) (3) (3)	Overcurrent devices	OCPDs
	240.21 (C) (4) (2)	Overcurrent device	OCPD
	240.21 (C) (4) (2)	Overcurrent devices	OCPDs
	240.21 (C) (4) (3)	Overcurrent device	OCPD
	240.21 (C) (5)	Overcurrent Protection	Fine As Is
	240.21 (C) (6) (1)	Overcurrent device	OCPD
	240.21 (D)	Overcurrent devices	OCPDs
	240.21 (E)	.shall be permitted to be protected against overcurrent.	"..shall be permitted to have overcurrent protection.."
	240.21 (F)	.shall be permitted to be protected against overcurrent.	"..shall be permitted to have overcurrent protection.."
	240.21 (H). (X2)	Overcurrent Protection	Fine As Is
	240.22. (X2)	Overcurrent device	OCPD
	240.24(A)	Supplementary overcurrent protection	Fine as is
	240.24(A). (X4)	Overcurrent protective devices	OCPDs
	240.24(B)	Overcurrent devices	OCPDs
	240.24(B)(1). Title	Feeder overcurrent protective devices	Feeder OCPDs
	240.24(B)(1)	Service overcurrent protective devices	Service OCPDs
	240.24(B)(2). TITLE	Branch-circuit overcurrent protective device	Fine as is
	240.24(B)(2).	Branch-circuit overcurrent protective device	Branch-Circuit OCPD
	240.24(C)	Overcurrent protective devices	OCPDs
	240.24(D)	Overcurrent protective devices	OCPDs
	240.24(E)	Overcurrent protective devices	OCPDs
	240.24(E)	Supplementary overcurrent protection	Fine as is
	240.24(E) (X2)	Overcurrent protective devices	OCPDs
	240.24(F)	Overcurrent protective devices	OCPDs
	240.30(A)	Overcurrent devices	OCPDs
	240.32	Overcurrent devices	OCPDs
	240.33	Overcurrent devices	OCPDs
	240.86	Overcurrent device	OCPD
	240.86(B)	Overcurrent device	OCPD
	240.86(C)	Overcurrent device	OCPD

	240.87	Overcurrent device	OCPD
	240.90.	Overcurrent protection	Fine as is
	240.91(B). (X2)	Overcurrent device	OCPD
	240.92	Overcurrent device	OCPD
	240.92(A)	~~be protected~~	shall be provided with overcurrent protection
	240.92(C)	Overcurrent protection	Fine as is
	240.92(C)(1)(1)	Overcurrent device	OCPD
	240.92(C)(1)(2)	protective devices	Fine as is
	240.92(C)(1)(3)	Overcurrent devices	OCPDs
	240.92(C)(2)(1)	Overcurrent device	OCPD
	240.92(C)(2)(2) (X3)	Overcurrent devices	OCPDs
	240.92(C)(2)(3)	Overcurrent relaying	Fine as is
	240.92(C)(2)(4)	Overcurrent device	OCPD
	240.92(D)	Overcurrent protection	Fine as is
	240.92(D)(2). (X3)	Overcurrent devices	OCPDs
	240.92(D)(4)	Overcurrent device	OCPD
	240.92(E)	Overcurrent device	OCPD
	240.92(E)	Overcurrent protection	Fine as is
10	**Article 242**		
	242.14(ABC)	Overcurrent device	OCPD
	242.16	Overcurrent protection	Branch-circuit OCPD
10	**Article 404**		
	404.5	Overcurrent Devices	OCPDs
10	**Article 408**		
	408.4(A)	Overcurrent device	OCPD
	408.6 (X2)	Overcurrent protection devices	OCPDs
	408.36. Title	Overcurrent protection	Fine as is
	408.36. (X2)	Overcurrent protective device	OCPD
	408.36. (X3)	Overcurrent devices	OCPDs
	408.36(A)	Overcurrent protection	Fine as is
	408.36(B)	Overcurrent protection	Fine as is
	408.36(C)	Overcurrent device	OCPD
	408.36(D)	Overcurrent protection devices	OCPDs
	408.52	Overcurrent devices	OCPDs
	408.54	Overcurrent devices	OCPDs

	408.55	Overcurrent devices	OCPDs

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-11			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
11	**Article 409**		
	409.21. TITLE	Overcurrent Protection	Fine as is
	409.21(A)	Overcurrent Protection	Fine as is
	409.21(B)	Protection	Overcurrent protection
	409.21(B)	overcurrent protective device	OCPD
	409.21(B)	Overcurrent Protection	Fine as is
	409.21(C). (X2)	overcurrent protective device	OCPD
	409.104	Overcurrent Devices	OCPDs
11	**Article 430**		
	430.10(A) In.	Overcurrent Device	OCPD
	430.22(G)(1)(1)	Overcurrent Protection	Fine as is
	430.22(G)(1)(2)	Overcurrent Protection	Fine as is
	430.22(G)(2)(1)	Overcurrent Protection	Fine as is
	430.22(G)(2)(2)	Overcurrent Protection	Fine as is
	430.28	Branc-Circuit protective device	OCPD
	430.28	Overcurrent Device	OCPD
	430.51	Overcurrent	Fine as is
	430.53(C)(5)	Overcurrent Protection	Fine as is
	430.55	Overcurrent Protection	Fine as is
	430.61	Overcurrents	Fine as is
	430.62(A)Ex.2	Feeder Overcurrent protective device	Feeder OCDP
	430.62(A)Ex.2	Overcurrent Protection	Fine as is
	430.62(B)	Feeder Overcurrent protective device	Feeder OCDP
	430.63Ex.	Feeder Overcurrent device	Feeder OCDP
	430.63Ex.	Overcurrent Protection	Fine as is
	430.72. Title	Overcurrent Protection	Fine as is
	430.72(A)	protected against overcurrent	shall be provided with overcurrent protection in accordance with
	430.72(A)	Branch-circuit overcurrent protective devices	OCPDs
	430.72(A)	protected against overcurrent	shall be provided with overcurrent protection in accordance with
	430.72(B). (X2)	Overcurrent Protection	Fine as is
	430.72(B)	Overcurrent Device	OCPD

	430.72(B)	Overcurrent Protection	Fine as is
	430.72(B)(1) (X3)	Overcurrent Protection	Fine as is
	430.72(B)(2) Title	Branch-circuit overcurrent protective device	Fine as is
	430.72(B)(2) (X2)	protective devices	OCPDs
	430.72(C)Ex.	Overcurrent Protection	Fine as is
	430.72(C)(3)	Overcurrent Devices	OCPDs
	430.72(C)(4)	Overcurrent Device	OCPD
	430.72(C)(5)	Protection	Overcurrent protection
	430.87	Overcurrent Device	OCPD
	430.94. (X2)	Overcurrent Protection	Fine as is
	430.94. (X3)	Overcurrent protective device	OCPD
	430.109(A)(7)	Overcurrent protection	Fine as is
	430.109(B)	Branch-circuit overcurrent device	branch-circuit OCPD
	430.111(A). (X2)	Overcurrent Device	Fine as is
	430.112 Ex.	Branch circuit protective device	Suggest CMP to Review
	430.206. Title	Overcurrent protection	Fine as is
	430.206(B)(2)	considered to have Overcurrent	Overload
	430.206(C)	Fault-Current protection	Suggest CMP to Review
	430.207	Overcurrent (overload)Relays	Fine as is
	430.207	Overcurrent Relays	Fine as is
11	**Article 440**		
	440.21	Overcurrent	Fine as is
	440.21	Overcurrent Protection	Fine as is
	440.22(B)(2)Ex.	Overcurrent device	OCPD
	440.52(B)	Overcurrent	shall be provided with overcurrent protection
11	**Article 460**		
	460.9. Title	Overcurrent Protection	Fine As Is
	460.9. (X3)	Overcurrent Device	OCPD
	460.25	Overcurrent Protection	Fine As Is
	460.28(B)	Overcurrent Device	OCPD

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-12			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
12	**Article 610**		
	610. Part V	Overcurrent Protection	Fine as is
	610.41(A)	Overcurrent Devices	OCPDs
	610.43(A)(1)	Branch Circuit Overcurrent Device	OCPD
	610.53 Title	Overcurrent Protection	Fine as is
	610.53	be protected from Overcurrent	shall be provided with overcurrent protection
	610.53	Overcurrent Devices	OCPDs
	610.53(B)	Branch Circuit Overcurrent Devices	OCPDs
12	**Article 620**		
	620.12(A)(4)	Overcurrent Protection	Fine as is
	620.22(A)(2) Title	Overcurrent protective device	Fine as is
	620.22(A)(2)	Overcurrent Device protecting	branch-circuit OCPD
	620.22(A)(2)	Overcurrent Device	OCPD
	620.22(B)	Overcurrent Device protecting	branch-circuit OCPD
	620.22(B)	Overcurrent Device	OCPD
	620.25 Title	Overcurrent Devices	Overcurrent Protective Devices
	620.25. (X2)	Overcurrent Devices	OCPDs
	620.53	Overcurrent protective device	OCPD
	620.54	Overcurrent protective device	OCPD
	620.55	Overcurrent protective device	OCPD
	Art 620 Part VII	Overcurrent Protection	Fine as is
	620.61	Overcurrent Protection	Fine as is
	620.61(A). (X2)	be protected against Overcurrent	shall be provided with overcurrent protection
	620.62(A)	Overcurrent protective devices, (OCPD)	OCPDs
	620.62(B)	OCPDs	Fine as is
	620.62(C)	OCPDs. And. Overcurrent Devices	Fine as is. And. OCPDs
	620.62	Overcurrent protective devices	OCPDs
	620.65. (X3)	Overcurrent Devices	OCPDs
12	**Article 625**		
	625.60(C). (X4)	Overcurrent Protection	Fine as is
12	**Article 627**		
	627.41	Overcurrent Protection	Fine as is
	627.41(A)	Overcurrent Protection	Fine as is

	627.41(B)	Overcurrent Devices	OCPDs
12	**Article 630**		
	630.12	Overcurrent Protection	Fine as is
	630.12	Overcurrent Device	OCPD
	630.12(A). (X2)	Overcurrent Protection	Fine as is
	630.12(A). (X5)	Overcurrent Device	OCPD
	630.13	Overcurrent Protection	Fine as is
	630.32	Overcurrent Protection	Fine as is
	630.32	Overcurrent Device	OCPD
12	**Article 640**		
	640.9(C)	Overcurrent Protection	Fine as is
	640.22	Overcurrent protection devices	OCPDs
	640.22	Overcurrent Devices	OCPDs
	640.43	Overcurrent protection devices	OCPDs
12	**Article 645**		
	645.27	Overcurrent protective devices, (OCPD)	OCPDs
	645.27	Overcurrent protective devices	OCPDs
12	**Article 646**		
	646.7. (X11)	Overcurrent Protection	Fine as is
12	**Article 647**		
	647.5	Overcurrent Protection	Fine as is
12	**Article 650**		
	650.9	Overcurrent Protection	Fine as is
	650.9	Overcurrent Device	OCPD
12	**Article 660**		
	660.7	Overcurrent Protection	Fine as is
	660.7(A)	Overcurrent protective devices	OCPDs
	660.7(B)	Overcurrent Devices	OCPDs
	660.7(B)	Overcurrent Protection	Fine as is
	660.9	Overcurrent Devices	OCPDs
12	**Article 665**		
	665.24	Overcurrent Protection	Fine as is
12	**Article 668**		
	668.4(C)(2)	Overcurrent Protection	Fine as is
	668.21	Overcurrent Protection	Fine as is

	668.21	Overcurrent Device	OCPD
12	**Article 669**		
	669.9	Overcurrent Protection	Fine as is
	669.9	be protected from Overcurrent	shall be provided with overcurrent protection
12	**Article 670**		
	670.1	Overcurrent Protection	Fine as is
	670.4(B). (X3)	Overcurrent Protection	Fine as is
	670.5. (X4)	Overcurrent Protection	Fine as is
	670.5(C). (X2)	Overcurrent protective device	OCPD
12	**Article 685**		
	685.10.	Overcurrent Devices	OCPDs

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-13			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
13	**Article 100**		
	Emerg.Power Supply Systems (EPSS)	overcurrent protection devices	overcurrent protective devices (OCPDs)
	Transfer-Switch B-C Emerg. Ltg.	branch-circuit overcurrent device	branch-circuit overcurrent protective device (OCPD)
13	**Article 130**		
	130.80(C)	overcurrent devices	OCPDs
	130.80(C)	branch-circuit overcurrent device	OCPD
13	**Article 445**		
	445.11	Overcurrent protective Relay	Fine as is
	445.12. Title	Overcurrent Protection	Fine as is
	445.12(A)	Overcurrent protective means	Overcurrent protection means
	445.12(B)	Overcurrent Protection	Fine as is
	445.12(B) (X2)	Overcurrent Device	OCPD
	445.12(C)	Overcurrent Device	OCPD
	445.12(D)	Overcurrent Devices	OCPDs
	445.12(E). (X3)	Overcurrent Devices	OCPDs
	445.13(A). (X2)	Overcurrent Protection	Fine as is
	445.13(B). Title	Overcurrent protection	Fine as is
	445.13(B).	Overcurrent protective device	OCPD
	445.13(B)	Overcurrent Relay	Fine as is
13	**Article 455**		
	455.7	Overcurrent Protection	Fine As Is
	455.7	protected from Overcurrent	shall be provided with overcurrent protection in accordance with
	455.7(A)	Overcurrent Protection	Fine As Is
	455.7(B)	Overcurrent Protection	Fine As Is
13	**Article 480**		
	480.4(B) IN.2	Overcurrent Protection	Fine As Is
	480.6. (X2)	Overcurrent Protection	Fine As Is
	480.7	Overcurrent Device	OCPD
13	**Article 695**		
	695.4(C)	Overcurrent protective devices	OCPDs
	695.4(H). Title	Overcurrent Device Selection	Overcurrent Protective Device Selection
	695.4(H)	Overcurrent Devices	OCPDs

	695.5	Overcurrent Device	OCPD
	695.5	Overcurrent protective devices	OCPDs
	695.5	Overcurrent Protection	Fine as is
	695.6	Overcurrent protective devices	OCPDs
	695.6	Overcurrent Devices	OCPD
	695.6	Overcurrent Protection	Fine as is
	695.7(A)(2)	Overcurrent Devices	OCPDs
	695.7	Overcurrent Protection	Fine as is
13	**Article 700**		
	700.4(F)(8)	Overcurrent protective devices, (OCPD)	OCPDs
	700.6(E)	Overcurrent protective device	OCPD
	700.10(B). (X6)	Overcurrent Protection	Fine as is
	700.10(B)(6)(b)(ii)	Overcurrent protective device	OCPD
	700.10(B)(6)(e)	Overcurrent protective devices	OCPDs
	Art. 700 Part VI	Overcurrent Protection	Fine as is
	700.30.	Branch-circuit overcurrent devices	OCPDs
	700.32(A)	Overcurrent protective devices, (OCPDs)	OCPDs
	700.32(A) In	Overcurrent Protection	Fine as is
	700.32(C)	Overcurrent Devices	OCPDs
13	**Article 701**		
	701.6(C)	Overcurrent protective device	OCPD
	701.10(B)(1). (X5)	Overcurrent Protection	Fine as is
	701.10(B)(1)	Overcurrent protective device	OCPD
	Art. 701. Part IV	Overcurrent Protection	OCPDs
	701.30.	Branch-Circuit Overcurrent devices	Branch-Circuit OCPDs
	701.32(A). (X2)	Overcurrent protective devices, OCPDs	OCPDs
	701.32(B). (X3)	OCPDs	Fine as is
	701.32(C). (X2)	OCPDs	Fine as is
	701.32(C)Ex	Overcurrent Devices	OCPDs
	701.32(C) In 2	OCPD and OCPDs	Fine as is
13	**Article 702**		
	702.5(C)	Overcurrent protective device	OCPD
13	**Article 706**		
	706.15(E)(1)	Overcurrent Device	OCPD
	706.30(B)	Overcurrent Devices	OCPDs

	706.31 Title	Overcurrent Protection	Fine as is
	706.31(A)	shall be protected at the source from overcurrent.	shall be provided with overcurrent protection at the source
	706.31(A)	shall be protected from overcurrent.	shall be provided with overcurrent protection
	706.31(A) In	Overcurrent Device	OCPD
	706.31(B). Title	Overcurrent Device	Overcurrent Protective Device
	706.31(B)	Overcurrent protective devices	OCPDs
	706.31(B)	Overcurrent devices	OCPDs
	706.31(C)	Overcurrent protective devices	OCPDs
	706.31(E)	Overcurrent Protection	Fine as is
	706.33(B)(2)	Overcurrent Device	OCPD
13	**Article 708**		
	708.10(B)	Overcurrent Protection	Fine as is
	708.24(E)	Overcurrent protective device	OCPD
	Art. 708. Part IV	Overcurrent Protection	Fine as is
	708.50.	Feeder- and Branch-circuit overcurrent devices	Feeder- and Branch-circuit OCPDs
	708.52(B)	Overcurrent Devices	OCPDs
	708.54(A)	Overcurrent protective devices, (OCPD)	OCPDs
	708.54(A). (B). (C)	OCPDs	Fine as is
	708.54	Overcurrent Devices	OCPDs

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-14			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
14	**Article 500**		
	500.30(A)(2)	Branch Circuit Overcurrent Protection	OCPD
	500.30.	Overcurrent Protection	Fine as is
14	**Article 501**		
	501.105(B)(5)	Overcurrent Protection	Fine as is
	501.125(B)(2)	Motor Overcurrent	Fine as is
14	**Article 502**		
	502.120(A)	Overcurrent Devices	OCPDs
	502.120(B)(1)	Overcurrent Devices	OCPDs
	502.125	Motor Overcurrent	Fine as is
14	**Article 505**		
	505.30(A)(2)	Branch Circuit Overcurrent Protection	OCPD
	505.30.	Overcurrent Protection	Fine as is
14	**Article 506**		
	506.30.	Branch Circuit Overcurrent Protection	OCPD
	506.30.	Overcurrent Protection	Fine as is

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-15			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
15	**Article 100**		
	Bull Switch	Overcurrent protection	Fine as is
15	**Article 517**		
	517.17(B)	Overcurrent protective devices	OCPDs
	517.31(G). (X5)	Overcurrent protective devices	OCPDs
	517.31(G)	Overcurrent	Fine as is
	517.33((C). (X5)	Overcurrent protective devices	OCPDs
	517.42(F)	Overcurrent protective devices	OCPDs
	517.42(F)	Overcurrent	Fine as is
	517.73	Overcurrent Protection	Fine as is
	517.73(A)	Overcurrent protective devices	OCPDs
	517.73(B)	Overcurrent protective devices	OCPDs
	517.73(B)	Overcurrent Protection	Fine as is
	517.74(B)	Overcurrent protective devices	OCPDs
	517.160(A)(2)	Overcurrent Protection	Fine as is
	517.160(A)(2)	Overcurrent protective device	OCPD
	517.160(A)(2)	be protected against Overcurrent	be provided with overcurrent protection
	517.160(A)(3)	Overcurrent protective devices	OCPDs
	517.160(B)(1)	Overcurrent protective devices	OCPDs
15	**Article 518**		
	518.7(A)(1)	Overcurrent Protection	Fine as is
	518.17(A)(1) and (2)	Overcurrent Devices	OCPDs
15	**Article 520**		
	520.9	Branch Circuit Overcurrent Device	OCPD
	520.21	Overcurrent protective devices	OCPDs
	520.25. (X3)	Overcurrent Protection	Fine as is
	520.26	Overcurrent protective devices	OCPD
	520.26. (X3)	Overcurrent Protection	Fine as is
	520.27. (X2)	Overcurrent Device	OCPD
	520.44-T	Overcurrent Devices	OCPD
	520.50(C)	Overcurrent Protection	Fine as is
	520.50.	Branch-circuit overcurrent protective device	OCPDs
	520.52	Overcurrent Protection	Fine as is

	520.53(A)	Overcurrent protective devices	OCPDs
	520.53(D)	Overcurrent Protection	Fine as is
	520.54	Overcurrent Devices	OCPDs
	520.54(D)	Overcurrent Device	OCPD
	520.54(D)(1) and (2)	Overcurrent protective devices	OCPD
	520.54(E)	Overcurrent protective device	OCPD
	520.54(E). (X4)	Overcurrent protection device	OCPD
	520.54(E)	Overcurrent Devices	OCPDs
	520.54(K)	Overcurrent Device	OCPD
	520.68	Overcurrent protective device	OCPD
	520.68(3)	Overcurrent Device	OCPD
	520.68(4)	Overcurrent protective device	OCPD
	520.68(6)	Overcurrent Devices	OCPDs
	520.68(C)	Overcurrent Protection	Fine as is
15	**Article 522**		
	522.10(A)(2). (X3)	Overcurrent Devices	OCPDs
	522.10(A)(2	Overcurrent protective device	OCPD
	522.10(B). (X4)	Overcurrent Devices	OCPDs
	522.23. (X3)	Overcurrent Protection	Fine as is
15	**Article 525**		
	525.12	Overcurrent Device	OCPD
	525.23(B)	Overcurrent Device	OCPD
	525.23(C). (X2)	Overcurrent Protection	Fine as is
15	**Article 530**		
	530.9(A)	Branch-circuit overcurrent device	Branch-circuit OCPD
	530.10(C)	Overcurrent Protection	Fine as is
	530.23 and (A)	Overcurrent Protection	Fine as is
	530.23(B)	Overcurrent protective devices	OCPDs
	530.23(D)	Overcurrent Protection	Fine as is
	530.42	Overcurrent Protection	Fine as is
15	**Article 540**		
	540.11(B)	Overcurrent Devices	OCPDs

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-16			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
16	**Article 830**		
	830.15. (X4)	Overcurrent Protection	Fine as is

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-17			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
17	**Article 422**		
	422.5(C)	Branch-circuit overcurrent protective device	Branch-Circuit OCPD
	422.11. Title	Overcurrent Protection	Fine as is
	422.11	protected against overcurrent	shall be provided with overcurrent protection
	422.11(A)	Overcurrent Protection	Fine as is
	422.11(A)	Branch-circuit overcurrent protective device	Branch-Circuit OCPD
	422.11(B)	Overcurrent Protection	OCPDs
	422.11(C)	Overcurrent Protection	OCPDs
	422.11(D)	Overcurrent protective devices	OCPDs
	422.11(E)	Overcurrent Protection	Fine as is
	422.11(E)(1)	Overcurrent Protection	Fine as is
	422.11(E)(2)	Overcurrent Protection	Fine as is
	422.11(E)(3)	Overcurrent Protection	OCPD
	422.11(E)(3)	Overcurrent Device	OCPD
	422.11(F)(1)	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	422.11(F)(1)	Overcurrent Protective Devices	OCPDs
	422.11(G)	Overcurrent Protective Devices	OCPDs
	422.13	Overcurrent Protection	Fine as is
	422.31(A)	Branch-circuit overcurrent protective device	Branch-Circuit OCPD
	422.60(A)	Overcurrent Protection	Fine as is
	422.62(B)(1). (X2)	Overcurrent protective device	OCPD
17	**Article 424**		
	424.19	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	424.19(A)	Supplementary Overcurrent Protection	Fine as is
	424.19(A)	Supplementary Overcurrent Protection	Fine as is
	424.19(A)	Supplementary Overcurrent Protective Device(s)	Supplementary OCPDs
	424.19(B)	Supplementary Overcurrent Protection	Fine as is
	424.22	Overcurrent Protection	Fine as is
	424.22(A)	Overcurrent Protection	Fine as is
	424.22(A)	protected against overcurrent	"..shall be permitted to have overcurrent protection.."
	424.22(B)	Supplementary Overcurrent Protective Device	Supplementary OCPD
	424.22(C). Title	Overcurrent Protective Devices	Fine as is
	424.22(C)	Supplementary Overcurrent Protective Devices	Supplementary OCPDs

	424.22(C)	Overcurrent Protection	Fine as is
	424.22(C)	Supplementary Overcurrent Protection	Fine as is
	424.22(D) (X2)	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	424.22(E). (X3)	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	424.72	Overcurrent Protection	Fine as is
	424.72(A)	Overcurrent protective device	OCPD
	424.72(B)	Overcurrent protective device	OCPD
	424.72(C). Title	Supplementary Overcurrent Protective Devices	Fine as is
	424.72(C)	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	424.72(C)	Overcurrent Protection	Fine as is
	424.72(D). Title	Supplementary Overcurrent Protective Devices	Fine as is
	424.72(D).	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	424.72(D)	Overcurrent protective device	OCPD
	424.72(E)	Supplementary Overcurrent Protective Devices. (X3)	Supplementary OCPDs
	424.82	Overcurrent protective devices	OCPDs
17	**Article 425**		
	425.19	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	425.19(A). (X2)	Supplementary Overcurrent Protection	Fine as is
	425.19(A)	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	425.19(B)	Supplementary Overcurrent Protection	Fine as is
	425.22. Title	Overcurrent Protection	Fine as is
	425.22(A)	Overcurrent Protection	Fine as is
	425.22(A)	protected against overcurrent	"..shall be permitted to have overcurrent protection.."
	425.22(B)	Supplementary Overcurrent Protective Device	Supplementary OCPD
	425.22(C). Title	Overcurrent Protective Devices	Fine as is
	425.22(C)	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	425.22(C). (X2)	Supplementary Overcurrent Protection	Fine as is
	425.22(D). Title	Supplementary Overcurrent Protective Devices	Fine as is
	425.22(D). (X2)	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	425.22(E) (X3)	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	425.72	Overcurrent Protection	Fine as is
	425.72(A)	Overcurrent protective device	OCPD
	425.72(B)	Overcurrent protective device	OCPD
	425.72(C). Title	Supplementary Overcurrent Protective Devices	Fine as is
	425.72(C)	Supplementary Overcurrent Protective Devices	Supplementary OCPDs

	425.72(C)	Overcurrent Protection	Fine as is
	425.72(D)	Overcurrent protection	Fine as is
	425.72(E). Title	Supplementary Overcurrent Protective Devices	Fine as is
	425.72(E)	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	425.72(E)	Overcurrent Protective Devices	OCPD
	425.72(F). (X3)	Supplementary Overcurrent Protective Devices	Supplementary OCPDs
	425.82	Overcurrent protective devices	OCPDs
17	**Article 427**		
	427.57	Overcurrent Protection	Fine as is
	427.57	considered protected against Overcurrent	considered to have overcurrent protection
17	**Article 680**		
	680.10.(A)& (B)(2)	Overcurrent protective devices	OCPDs
	680.23(F)(2)	Overcurrent Protection	Fine as is

CMP-10 TG-4 Review of Overcurrent Language for the Articles undeer the purview of CMP-18			
CMP	**NEC Section (using First Draft of 2026 NEC)**	**Current Language**	**"New" Language**
18	**Article 393**		
	393.45. Title	Overcurrent ..... Protection	Overcurrent Protection ....
	393.45(A)	Overcurrent Protection	Fine as is
18	**Article 406**		
	406.46(F)	Overcurrent Device	OCPD
18	**Article 410**		
	410.59(A)	Branch-circuit overcurrent devices	Branch-Circuit OCPD
	410.153	Overcurrent Protection	Fine as is
18	**Article 600**		
	600.41	Overcurrent	CMP to Review

Public Comment No. 697-NFPA 70-2024 [Global Input]

The Correlating Committee directs CMP 11 to review FR 7962 with respect to whether all the information deleted is redundant, or if some requirements are unique and should remain. Refer to comments provided in negative votes during balloting.

Additional Proposed Changes

File Name	Description	Approved
CN_42.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 42 appeared in the First Draft Report on First Revision No. 7962.

The Correlating Committee directs CMP 11 to review FR 7962 with respect to whether all the information deleted is redundant, or if some requirements are unique and should remain. Refer to comments provided in negative votes during balloting.

Related Item

• First Revision No. 7962

Submitter Information Verification

Submitter Full Name: CC Notes
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Submittal Date: Fri Aug 02 12:25:48 EDT 2024
Committee: NEC-P11

Correlating Committee Note No. 42-NFPA 70-2024 [Section No. 430.95]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Tue May 07 15:21:00 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 11 to review FR 7962 with respect to whether all the information deleted is redundant, or if some requirements are unique and should remain. Refer to comments provided in negative votes during balloting.

First Revision No. 7962-NFPA 70-2024 [Section No. 430.95]

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned
McDaniel, Roger D.

Affirmative All
Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 376-NFPA 70-2024 [Section No. 409.22]

409.22 Short-Circuit Current Rating.

(A) Installation.

An industrial control panel shall not be installed where the available fault current exceeds its short-circuit current rating as marked in accordance with 409.110(3).

(B) Documentation.

If an industrial control panel is required to be marked with a short-circuit current rating in accordance with 409.110(3), the available fault current at the industrial control panel and the date the available fault current calculation was performed shall be documented and made available to those authorized to inspect, install, or maintain the installation.

Additional Proposed Changes

File Name	Description	Approved
CN_40.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 40 appeared in the First Draft Report on First Revision No. 8111.

The Correlating Committee directs CMP-11 to review FR 8111 and the requirements in409.23(C). As requirements for 'Hazard Markings', which include "WARNING", are covered in 110.21(B), CMP 11 should consider a reference to that section rather than repeating requirements here.

Related Item

• First Revision No. 8111

Submitter Information Verification

Submitter Full Name: CC Notes
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Submittal Date: Tue Jul 30 12:21:02 EDT 2024
Committee: NEC-P11

Correlating Committee Note No. 40-NFPA 70-2024 [Section No. 409.22]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Tue May 07 15:04:03 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-11 to review FR 8111 and the requirements in 409.23(C). As requirements for 'Hazard Markings', which include "WARNING", are covered in 110.21(B), CMP 11 should consider a reference to that section rather than repeating requirements here.

First Revision No. 8111-NFPA 70-2024 [New Section after 409.22]

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 1360-NFPA 70-2024 [Section No. 409.23]

409.23 Source(s) of Supply.

(A) Identification.

~~Industrial control panels shall identify the~~ The location of the means necessary to disconnect all sources of supply 50 volts or more ~~marked~~ shall be marked on industrial control panels in accordance with 409.23(C) ~~or documented in a manner that is available to those authorized to install, inspect, and maintain the equipment~~ .

(B) Multiple Sources of Supply.

Industrial control panels supplied by more than one source operating at 50 volts or more, and where more than one disconnecting means is required to disconnect all circuits operating at 50 volts or more, shall be permanently marked with the following:

WARNING — MULTIPLE DISCONNECTING MEANS REQUIRED TO DE-ENERGIZE ALL SOURCES OF SUPPLY 50 VOLTS OR MORE

(C) Markings.

Markings installed to comply with the requirements of 409.23(A) or 409.23(B) shall be a label that complies with both of the following:

(1) Be permanently affixed to the exterior of the enclosure and of sufficient durability to withstand the environment involved

(2) Use a method that is not handwritten

(D) Documentation

The location of all disconnecting means shall be documented in a manner that is available to those authorized to install, inspect, and maintain the equipment.

Statement of Problem and Substantiation for Public Comment

The industrial control panel can't identify anything. I believe what the panel meant to indicate that the marking should indicate the location of the disconnecting means. I don't believe that the existence of documentation about disconnects is an alternative to marking. Both are necessary.

Related Item

• FR 8111

Submitter Information Verification

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Submittal Date: Wed Aug 21 14:07:30 EDT 2024
Committee: NEC-P11

Public Comment No. 2004-NFPA 70-2024 [Section No. 409.23(A)]

(A) Identification.

Industrial control panels shall identify the location of the means necessary to disconnect all sources of supply 50 volts or more marked in accordance with ~~409~~ 110 . ~~23~~ 21 (~~C~~ B) or documented in a manner that is available to those authorized to install, inspect, and maintain the equipment.

Statement of Problem and Substantiation for Public Comment

The requirements of 409.23 (C) are a duplication of text that is already stated in 110.21(B). This is a violation of section 4.1.1 of the NEC Style manual.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 2005-NFPA 70-2024 [Section No. 409.23(C)]	

Related Item

- PI 1518 and 1759

Submitter Information Verification

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Submittal Date: Wed Aug 28 15:09:13 EDT 2024
Committee: NEC-P11

Public Comment No. 2005-NFPA 70-2024 [Section No. 409.23(C)]

~~(C) Markings.~~

~~Markings installed to comply with the requirements of 409.23(A) or 409.23(B) shall be a label that complies with both of the following:~~

(1) ~~Be permanently affixed to the exterior of the enclosure and of sufficient durability to withstand the environment involved~~

(2) ~~Use a method that is not handwritten~~

Statement of Problem and Substantiation for Public Comment

The requirements of 409.23 (C) are a duplication of text that is already stated in 110.21(B). This is a violation of section 4.1.1 of the NEC Style manual.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 2004-NFPA 70-2024 [Section No. 409.23(A)]	PI 1518 and 1759

Related Item

• PI 1518 and 1759

Submitter Information Verification

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Submittal Date: Wed Aug 28 15:17:28 EDT 2024
Committee: NEC-P11

Public Comment No. 1574-NFPA 70-2024 [New Section after 409.70]

TITLE OF NEW CONTENT

Type your content here ...

409.71. Cybersecurity

Industrial Control Panels, located in life safety-related infrastructures, that are connected to a communication network and have the capability to be controlled or permit control of any portion of the premises shall comply with either of the following:

(1) The ability to control the industrial control panel is limited to a direct connection through a local nonnetworked interface.

(2) The industrial control panel is connected through a networked interface complying with both of the following methods:

a. The industrial control panel and associated software are identified as being evaluated for cybersecurity.

b. A cybersecurity assessment of the industrial control panel is completed and documentation of the assessment and certification is available to those authorized to inspect, operate, and maintain the system.

Informational Note No. 1: See ANSI/ISA 62443, *Cybersecurity Standards series* , UL 2900 *Cybersecurity Standard series* , or the NIST *Framework for Improving Critical Infrastructure Cybersecurity* , Version 1.1 for assessment requirements.

Informational Note No. 2: Examples used to demonstrate the system has been investigated for cybersecurity vulnerabilities could be one of the following:

(1) The ISA Security Compliance Institute (ISCI) conformity assessment program

(2) Certification of compliance by a nationally recognized test laboratory

(3) Manufacturer certification for the specific type and brand of system provided

Informational Note No. 3: Cybersecurity is a specialized field requiring constant, vigilant attention to security vulnerabilities that could arise due to software defects, system configuration changes, or user interactions. Installation of devices that can be secured is an important first step but not sufficient to guarantee a secure system.

Informational Note No. 4: See NEMA CY70001-2023, *Cybersecurity Implementation Guidance for Connected Electrical Infrastructure* , for recommendations on how to meet this requirement.

Informational Note No. 5: Examples of life safety-related infrastructures include, but are not limited to, waste water treatment facilities, water supply facilities, police stations, call centers, financial centers, data centers, and military bases.

Statement of Problem and Substantiation for Public Comment

At first glance the Panel statement to resolve PI 1243, “Considerations for cybersecurity should occur during the product development stage, not during installation stage. Entities involved in product development or listing should be responsible for addressing cybersecurity”, seems to be an adequate response. However, upon further investigation, it becomes obvious that just the availability of cyber protected equipment is not enough. Manufacturers may produce equipment that is identified as being evaluated for cybersecurity, but, without a requirement in this Code, it doesn’t guarantee that cyber protected equipment will be installed. This Code must include the requirement. Without the Code requirement, manufacturers may or may not produce cyber protected equipment, and the available cyber protected equipment might not be installed.

Most of the cybersecurity focus has been on IT systems. There has been very little public discussion about cybersecurity for Operational Technology (OT), but cyber attacks on OT occur on almost a daily basis. For an example of just how common cyber attacks on life safety related infrastructure have become, let’s look at just the water supply and waste water treatment industry. The DNI (Director of National Intelligence), through the CTIIC (Cyber Threat Intelligence Integration Center) recently released a report of 12 cyber attacks on the industrial control systems of water utilities, water systems, and waste water treatment systems, for the six-month period from November 2023 through April 2024. This report can be found at

https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.dni.gov/files/CTIIC/documents/products/Recent_Cyber_Attacks_on_US_Infrastructure_Underscore_Vulnerability_of_Crit June2024.pdf&ved=2ahUKEwi5gP7-m4eIAxUakYkEHasyIRQQFnoECB8QAQ&usg=AOvVaw3hJL2DMlRs-CECfmewcXVP

While this example covered attacks on industrial control systems, successful attacks can occur on all electrical equipment that is continuously connected to the internet and even equipment that is only connected to the internet during system updates. (Cyber attacks can lay quiet for years, waiting for an update, and then do their intended damage during the update.)

Hackers can easily destroy unprotected equipment and shut down entire unprotected facilities. Our adversaries are continuously mounting cyber attacks on our life safety-related infrastructure. We have the ability, and obligation, to prevent this type of damage to our infrastructure from malicious cyber attacks.

Examples of “life safety-related infrastructure” were added in new Informational Note No. 5 because “life safety-related infrastructure” is not defined in Article 100. (It should be noted that “life safety equipment”, in 110.3(A)(8), is a similar phrase used in conjunction with cybersecurity. It is not defined in Article 100 either. Public Comments have been submitted to add Informational Notes to 110.3(A)(8) providing examples of both life safety equipment and life safety-related infrastructures.)

Let’s look at an example of a waste water treatment facility. 110.3(A)(8) currently requires that a fire alarm system in the waste water treatment facility, because it is life safety equipment, be evaluated in light of cybersecurity. However, there is no requirement for other non-life safety equipment/systems within the waste water treatment plant, such as industrial control panels, which could easily be compromised by a cyber attack. The proposed text in this Public Comment addresses this vulnerability.

Informational Note No. 4 was added to correlate with FR 9040 (110.3(A)(8)), FR 9210 (240.6(D)), and FR 8219 (708.7).

THIS PUBLIC COMMENT SIMPLY REQUIRES THAT INDUSTRIAL CONTROL PANELS, INSTALLED ONLY IN LIFE SAFETY-RELATED INFRASTRUCTURES, EITHER NOT BE CONNECTED TO THE INTERNET, OR IF THEY ARE CONNECTED TO THE INTERNET, THAT THEY BE IDENTIFIED FOR CYBERSECURITY AND THAT AN ASSESSMENT IS PROVIDED.

Related Item

- PI 1243

Submitter Information Verification

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Submittal Date: Sat Aug 24 08:44:44 EDT 2024
Committee: NEC-P11

Public Comment No. 1718-NFPA 70-2024 [New Section after 409.70]

TITLE OF NEW CONTENT

Type your content here ...

409.71. Cybersecurity

Industrial Control Panels that are connected to a communication network and have the capability to be controlled or permit control of any portion of the premises shall comply with either of the following:

(1) The ability to control the system is limited to a direct connection through a local nonnetworked interface.

(2) The industrial control panel is connected through a networked interface complying with both of the following methods:

a. The industrial control panel and associated software are identified as being evaluated for cybersecurity.

b. A cybersecurity assessment is conducted on the connected system to determine vulnerabilities to cyberattacks.

Documentation of the assessment, and certification shall be made available to those authorized to inspect, operate, and maintain the system.

Informational Note No. 1: See ANSI/ISA 62443, Cybersecurity Standards series; UL 2900, Cybersecurity Standards series; and the NIST Framework for Improving Critical Infrastructure Cybersecurity, Version 1.1, for assessment guidelines.

Informational Note No. 2: Examples of the commissioning certification used to demonstrate the system has been investigated for cybersecurity vulnerabilities could be one of the following:

(1) The ISA Security Compliance Institute (ISCI) conformity assessment program

(2) Certification of compliance by a nationally recognized test laboratory

(3) Manufacturer certification for the specific type and brand of system provided

Informational Note No. 3: Cybersecurity is a specialized field requiring constant, vigilant attention to security vulnerabilities that could arise due to software defects, system configuration changes, or user interactions. Installation of devices that can be secured is an important first step but not sufficient to guarantee a secure system.

Informational Note No. 4: See NEMA CY70001-2023, *Cybersecurity Implementation Guidance for Connected Electrical Infrastructure* , for recommendations on how to meet this requirement.

Statement of Problem and Substantiation for Public Comment

Code Making Panel 11 is encouraged to reverse their position on the cybersecurity protection proposal for industrial control panels in PI 1243.

In the realm of industrial operations, automated processes play a critical role in ensuring the safety, stability, and efficiency of various systems. These processes, driven by a combination of Operational Technology (OT) and Information Technology (IT), rely heavily on sensors to measure physical world conditions such as temperature, pressure, flow, velocity, voltage, and current. However, despite their importance, these sensors are fraught with vulnerabilities that can lead to catastrophic outcomes.

One of the primary functions of automated systems is to maintain the stability and safety of operations by responding to changes in the operational environment. Sensors are crucial in this context, as they provide real-time data that informs corrective actions to fine-tune processes. In cases where systems become seriously unstable, sensors measure the extent of the instability, and rather than attempting corrective measures, the entire process may be shut down to prevent accidents and ensure safety.

As engineers will confirm, the accuracy and reliability of sensor readings are not infallible. Over time, sensors experience a phenomenon known as "drift," where their measurement readings become less accurate. This drift necessitates routine calibration to maintain the precision of the readings. Calibration typically comes from equipment manufacturer or vendor websites, accessed via the Internet. While this ensures that sensors provide accurate data, it introduces a significant security risk. The calibration connection via the Internet, often required for maintaining sensor accuracy, paradoxically compromises the security provided by air-gapped OT networks.

Air-gapping, a best practice in industrial systems, involves isolating OT networks from the Internet to prevent unauthorized access. However, the need for online calibration creates a potential pathway for cyber threats. During the calibration process, malicious actors can scan for specific sensor markers, such as manufacturer, model, and year of production, which are traceable via serial numbers. Once identified, these malefactors can exploit the Internet connection to insert malware into the OT systems. This malware can then move freely throughout the OT network, potentially compromising IT systems as well.

The consequences of such security breaches are dire. False or inaccurate sensor readings, if not acted upon, can lead to unsafe operations, property damage, and life-threatening conditions. In environments where automated measurements are crucial for safety and reliability, such as chemical plants or manufacturing facilities, the risk of fires, explosions, and other catastrophic events is significantly heightened. There is no network (logic layer) security solution to this glaring vulnerability. Any and all solutions must be fabricated at the physical layer where the sensors live. This is why engineering personnel must, in the future, be fully read-in and then actively included in process planning and updating.

Operational Technology (OT) networks, which serve as the communication pathways for sensor readings to actuators, are critical in translating physical world measurements into actionable responses. However, unlike IT systems, which generally handle business communications, OT networks are directly involved in controlling physical processes. The lack of cybersecurity measures for process sensors—devices that do not support passwords or other protective features—makes them particularly vulnerable to exploitation.

The intersection of OT and IT in industrial systems presents a complex challenge. While OT operates in the realm of physical measurements, IT functions in the logical world, managing business data and communications. The integration of these two domains, while necessary for modern industrial operations, creates potential points of vulnerability that can be exploited by cybercriminals, terrorist cells, and adverse nation-states which, on a wartime, wholesale level, would cripple an entire nation’s supply chain for targeted commodities.

In conclusion, the vulnerabilities inherent in the automation of industrial processes, particularly those related to sensor calibration and cybersecurity, pose significant threats to safety and stability. The need for routine calibration of sensors, often conducted via Internet-based connections, undermines the security of air-gapped OT networks, opening the door to potential cyberattacks. As industrial systems continue to evolve, addressing these vulnerabilities through enhanced security measures and practices that include engineering expertise will be crucial in safeguarding against the real-world threats of property damage, loss of life, and catastrophic incidents such as fires and explosions.

The Code Making Panel statement claims that “considerations for cyber security should occur during the product development stage, not during installation stage”, and that “entities involved in product development or listing should be responsible for addressing cyber security”. There are serious and significant problems with

this logic. Even if cybersecurity considerations were to find their way into product development calendars/schedules and product safety standards calendars/schedules it can take three to ten years to be written, be accepted, and take effect. However, even more importantly, considerations for cybersecurity in the product development stage and in product safety standards don't insert requirements into the Code. Code Making Panel 11 has the possibility and responsibility to positively influence the safety and stability of our country through requirements for cybersecurity protection of industrial control panels.

Related Item

• PI 1243 • FR 9210 • FR 9040 • FR 8219

Submitter Information Verification

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Submittal Date: Mon Aug 26 15:55:12 EDT 2024
Committee: NEC-P11

Public Comment No. 1780-NFPA 70-2024 [Section No. 409.110]

409.110 Marking.

An industrial control panel shall have permanent markings that are visible after installation. The markings in 409.110(2) and 409.110(3) shall be attached to the outside of the enclosure. The markings in 409.110(1), 409.110(4), 409.110(5), and 409.110(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) Short-circuit current rating of the industrial control panel based on one of the following:

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

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

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

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

(8) An enclosure type number.

Statement of Problem and Substantiation for Public Comment

The proposed text restores the exception for not requiring SCCR ratings for panels containing only control circuit components and exists in the 2023 NEC, but now with correct reference to reordered item (3). As SCCR ratings only apply to power circuits per UL508A, this exception is necessary control circuit only panels. The deletion of the exception was not proposed in the original PI's.

Note there are no proposed changes to list items a.) and b). and the underlining shown by Terra is in error. In addition, the exception text should be at the same indent level as item (3).

Related Item

• FR8126

Submitter Information Verification

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Submittal Date: Tue Aug 27 10:55:53 EDT 2024
Committee: NEC-P11

Public Comment No. 2027-NFPA 70-2024 [Section No. 409.110]

409.110 Marking.

An industrial control panel shall have permanent markings that are visible after installation. The markings in 409.110(2) and 409.110(3) shall be attached to the outside of the enclosure. The markings in 409.110(1), 409.110(4), 409.110(5), and 409.110(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) Short-circuit current rating of the industrial control panel based on one of the following:

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

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

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

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

(8) An enclosure type number.

Statement of Problem and Substantiation for Public Comment

No justification was provided for removing the exception for requiring short circuit ratings on enclosures with only control elements by either the submitter of the original public input 8116, public input 1747 or the committee statement. The removal of the exception was an editorial mistake. If this is not corrected, every 2 gang light switch will require a short circuit rating labeled on the face plate.

Please note that the underlining of items 4 and 5 and changing 3a and 3b to 4 and 5 are a Terra View error. No changes are submitted for anything besides the restoration of the exception.

Related Item

• PI 8126 • PI 1747

Submitter Information Verification

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Submittal Date: Wed Aug 28 16:12:01 EDT 2024
Committee: NEC-P11

Public Comment No. 1456-NFPA 70-2024 [Section No. 430.3]

430.3 Reconditioned Motors.

Reconditioned motors shall be permitted ~~to be installed~~ if the reconditioning has been conducted in accordance with the manufacturer's instructions or, if no instructions are provided, nationally recognized standards.

Reconditioned motors for use in hazardous (classified) locations shall be permitted where permitted elsewhere in this code.

Informational Note: See ANSI/EASA AR100-2020, *Recommended Practice for the Repair of Rotating Electrical Apparatus*, for information on the rewinding and repair of motors.

Statement of Problem and Substantiation for Public Comment

The change brings the first sentence in line with the second sentence by removing the words "to be installed". This change is necessary to add clarity that a motor can be reconditioned even if it is in place. If the words "to be installed" are not removed, the language only applies to motors that are being installed and not if being reconditioned to any extent in place.

Related Item

• FR 7925

Submitter Information Verification

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Submittal Date: Fri Aug 23 09:17:49 EDT 2024
Committee: NEC-P11

Public Comment No. 381-NFPA 70-2024 [Section No. 430.3]

430.3 Reconditioned Motors.

Reconditioned motors shall be permitted to be installed if the reconditioning has been conducted in accordance with the manufacturer's instructions or, if no instructions are provided, nationally recognized standards.

Reconditioned motors for use in hazardous (classified) locations shall be permitted where permitted elsewhere in this code.

Informational Note: See ANSI/EASA AR100-2020, *Recommended Practice for the Repair of Rotating Electrical Apparatus*, for information on the rewinding and repair of motors.

Additional Proposed Changes

File Name	Description	Approved
CN_41.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 41 appeared in the First Draft Report on First Revision No. 7925.

The Correlating Committee directs CMP 11 to review FR 7925 and consider whether the second paragraph is necessary, as requirements for equipment (including motors)installed in hazardous locations are addressed in the Chapter 5 articles for hazardous locations. Additionally, the Correlating Committee directs CMP 11 to consider deletion of the entire section, as the requirements are redundant with those in 110.20. The requirement regarding applying the original manufacturer's instructions is provided in110.20(B)(2), and the requirements regarding "applicable standards" is provided in the parent language of 110.20. The title of 430.3 should be revised to comply with Section2.2.1 of the NEC Style Manual.

Related Item

• First Revision No. 7925

Submitter Information Verification

Submitter Full Name: CC Notes
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Submittal Date: Tue Jul 30 13:11:57 EDT 2024
Committee: NEC-P11

Correlating Committee Note No. 41-NFPA 70-2024 [Section No. 430.3]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Tue May 07 15:06:59 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 11 to review FR 7925 and consider whether the second paragraph is necessary, as requirements for equipment (including motors) installed in hazardous locations are addressed in the Chapter 5 articles for hazardous locations. Additionally, the Correlating Committee directs CMP 11 to consider deletion of the entire section, as the requirements are redundant with those in 110.20. The requirement regarding applying the original manufacturer's instructions is provided in 110.20(B)(2), and the requirements regarding "applicable standards" is provided in the parent language of 110.20. The title of 430.3 should be revised to comply with Section 2.2.1 of the NEC Style Manual.

First Revision No. 7925-NFPA 70-2024 [Section No. 430.2]

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.

Schultheis, Timothy James

Williams, David A.

Public Comment No. 1077-NFPA 70-2024 [Section No. 430.6(A)(2)]

(2) Nameplate Values.

The motor nameplate current ratings shall be used to determine the values for the following:

(1) Separate motor overload protection

(2) For motors built for low speeds (less than 1200 RPM), high torques, canned pumps, or multispeed motors, the following:

a. Ampacity of conductors

b. Current ratings of switches

c. Current ratings of branch-circuit short-circuit and ground-fault protection

(3) Large motors exceeding the values in Part XIV ~~shall~~ , and motors using voltages not listed in Part XIV , shall be permitted to , use the nameplate current rating for conductor sizing.

Statement of Problem and Substantiation for Public Comment

This is a Public Comment to revive resolved Public Input 3662. The original substantiation was:
"There is more and more equipment that originates in foreign countries being installed under the rules of the NEC. In many cases these motors have operating voltages that are not standard in the US. Without this change there is no code compliant way to install this equipment as the current code only permits the use of the currents shown in the Part XIV Tables to size the motor circuit conductors."

The panel resolve statement said:
"The NEC contains the motor types and voltages approved for applications for the proper installation per this code. The addition of other motors cannot be accepted without further clarification on where they would be used and if they can be protected by the full range of motor controllers."

It appears to me that the application of the resolve statement is telling code users that motors with voltages other than those shown in the Article 430 Part XIV tables cannot be used for installations where the NEC applies. There is a large amount of equipment from foreign sources that have motors with voltages that are not provided for the the motor full load current tables. There has to be a code compliant way to use this equipment. This is an everyday installation for many industrial occupancies.

Related Item

• Public Input No. 2477-NFPA 70-2023

Submitter Information Verification

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Submittal Date: Tue Aug 13 19:18:57 EDT 2024
Committee: NEC-P11

Public Comment No. 1575-NFPA 70-2024 [New Section after 430.18]

TITLE OF NEW CONTENT

Type your content here ...

430.19. Cybersecurity

Motors, motor circuits, and controllers, located in life safety-related infrastructures, that are connected to a communication network and have the capability to be controlled or permit control of any portion of the premises shall comply with either of the following:

(1) The ability to control the motor, motor circuit, and controller is limited to a direct connection through a local nonnetworked interface.

(2) The motor, motor circuit, and controller is connected through a networked interface complying with both of the following methods:

a. The motor, motor circuit, and controller is identified as being evaluated for cybersecurity.

b. A cybersecurity assessment of the motor, motor circuit, and controller is completed and documentation of the assessment and certification is available to those authorized to inspect, operate, and maintain the system.

Informational Note No. 1: See ANSI/ISA 62443, *Cybersecurity Standards series* , UL 2900 *Cybersecurity Standard series* , or the NIST *Framework for Improving Critical Infrastructure Cybersecurity* , Version 1.1 for assessment requirements.

Informational Note No. 2: Examples used to demonstrate the system has been investigated for cybersecurity vulnerabilities could be one of the following:

(1) The ISA Security Compliance Institute (ISCI) conformity assessment program

(2) Certification of compliance by a nationally recognized test laboratory

(3) Manufacturer certification for the specific type and brand of system provided

Informational Note No. 3: Cybersecurity is a specialized field requiring constant, vigilant attention to security vulnerabilities that could arise due to software defects, system configuration changes, or user interactions. Installation of devices that can be secured is an important first step but not sufficient to guarantee a secure system.

Informational Note No. 4: See NEMA CY70001-2023, *Cybersecurity Implementation Guidance for Connected Electrical Infrastructure* , for recommendations on how to meet this requirement.

Informational Note No. 5: Examples of life safety-related infrastructures include, but are not limited to, waste water treatment facilities, water supply facilities, police stations, call centers, financial centers, data centers, and military bases.

Statement of Problem and Substantiation for Public Comment

At first glance the Panel statement to resolve “Considerations for cybersecurity should occur during the product development stage, not during installation stage. Entities involved in product development or listing should be responsible for addressing cybersecurity”, seems to be an adequate response. However, upon further investigation, it becomes obvious that just the availability of cyber protected equipment is not enough. Manufacturers may produce equipment that is identified as being evaluated for cybersecurity, but, without a requirement in this Code, it doesn’t guarantee that cyber protected equipment will be installed. This Code must include the requirement. Without the Code requirement, manufacturers may or may not produce cyber protected equipment, and the available cyber protected equipment might not be installed.

Most of the cybersecurity focus has been on IT systems. There has been very little public discussion about cybersecurity for Operational Technology (OT), but cyber attacks on OT occur on almost a daily basis. For an example of just how common cyber attacks on life safety related infrastructure have become, let’s look at just the water supply and waste water treatment industry. The DNI (Director of National Intelligence), through the CTIIC (Cyber Threat Intelligence Integration Center) recently released a report of 12 cyber attacks on the industrial control systems of water utilities, water systems, and waste water treatment systems, for the six-month period from November 2023 through April 2024. This report can be found at

https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.dni.gov/files/CTIIC/documents/products/Recent_Cyber_Attacks_on_US_Infrastructure_Underscore_Vulnerability_of_Crit June2024.pdf&ved=2ahUKEwi5gP7-m4eIAxUakYkEHasyIRQQFnoECB8QAQ&usg=AOvVaw3hJL2DMlRs-CECfmewcXVP

While this example covered attacks on industrial control systems, successful attacks can occur on all electrical equipment that is continuously connected to the internet and even equipment that is only connected to the internet during system updates. (Cyber attacks can lay quiet for years, waiting for an update, and then do their intended damage during the update.)

Hackers can easily destroy unprotected equipment and shut down entire unprotected facilities. Our adversaries are continuously mounting cyber attacks on our life safety-related infrastructure. We have the ability, and obligation, to prevent this type of damage to our infrastructure from malicious cyber attacks.

Examples of “life safety-related infrastructures” were added in new Informational Note No. 5 because “life safety-related infrastructure” is not defined in Article 100. (It should be noted that “life safety equipment”, in 110.3(A)(8), is a similar phrase used in conjunction with cybersecurity. It is not defined in Article 100 either. Public Comments have been submitted to add Informational Notes to 110.3(A)(8) providing examples of both life safety equipment and life safety-related infrastructure.)

Let’s look at an example of a waste water treatment facility. 110.3(A)(8) requires that a fire alarm system in the waste water treatment facility, because it is life safety equipment, be evaluated in light of cybersecurity. However, there is no requirement for other non-life safety equipment/systems within the waste water treatment plant, such as motor controllers, which could easily be compromised by a cyber attack. The proposed text in this Public Comment addresses this vulnerability.

Informational Note No. 4 was added to correlate with FR 9040 (110.3(A)(8)), FR 9210 (240.6(D)), and FR 8219 (708.7).

THIS PUBLIC COMMENT SIMPLY REQUIRES THAT MOTORS, MOTOR CIRCUITS, AND CONTROLLERS, INSTALLED ONLY IN LIFE SAFETY-RELATED INFRASTRUCTURES, EITHER NOT BE CONNECTED TO THE INTERNET, OR IF THEY ARE CONNECTED TO THE INTERNET, THAT THEY BE IDENTIFIED FOR CYBERSECURITY AND THAT AN ASSESSMENT IS PROVIDED.

Related Item

- PI 1260

Submitter Information Verification

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Committee: NEC-P11

430.22 Single Motor.

Conductors that supply a single motor used in a continuous duty application shall have an ampacity of not less than 125 percent of the motor full-load current rating, as determined by 430.6(A)(1), or not less than specified in 430.22(A) through 430.22(~~G~~ H).

(A) Direct-Current Motor-Rectifier Supplied.

For dc motors operating from a rectified power supply, the conductor ampacity on the input of the rectifier shall not be less than 125 percent of the rated input current to the rectifier. For dc motors operating from a rectified single-phase power supply, the conductors between the field wiring output terminals of the rectifier and the motor shall have an ampacity of not less than the following percentages of the motor full-load current rating:

(1) Where a rectifier bridge of the single-phase, half-wave type is used, 190 percent.

(2) Where a rectifier bridge of the single-phase, full-wave type is used, 150 percent.

(B) Multispeed Motor.

For a multispeed motor, the selection of branch-circuit conductors on the line side of the controller shall be based on the highest of the full-load current ratings shown on the motor nameplate. The ampacity of the branch-circuit conductors between the controller and the motor shall not be less than 125 percent of the current rating of the winding(s) that the conductors energize.

(C) Wye-Start, Delta-Run Motor.

For a wye-start, delta-run connected motor, the ampacity of the branch-circuit conductors on the line side of the controller shall not be less than 125 percent of the motor full-load current as determined by 430.6(A)(1). The ampacity of the conductors between the controller and the motor shall not be less than 72 percent of the motor full-load current rating as determined by 430.6(A)(1).

Informational Note: The individual motor circuit conductors of a wye-start, delta-run connected motor carry 58 percent of the rated load current. The multiplier of 72 percent is obtained by multiplying 58 percent by 1.25.

(D) Part-Winding Motor.

For a part-winding connected motor, the ampacity of the branch-circuit conductors on the line side of the controller shall not be less than 125 percent of the motor full-load current as determined by 430.6(A)(1). The ampacity of the conductors between the controller and the motor shall not be less than 62.5 percent of the motor full-load current rating as determined by 430.6(A)(1).

Informational Note: The multiplier of 62.5 percent is obtained by multiplying 50 percent by 1.25.

(E) Other Than Continuous Duty.

Conductors for a motor used in a short-time, intermittent, periodic, or varying duty application shall have an ampacity of not less than the percentage of the motor nameplate current rating shown in Table 430.22(E), unless the authority having jurisdiction grants special permission for conductors of lower ampacity.

Table 430.22(E) Duty-Cycle Service

Classification of Service	Nameplate Current Rating Percentages			
	5-Minute Rated Motor	15-Minute Rated Motor	30- & 60-Minute Rated Motor	Continuous Rated Motor
Short-time duty operating valves, raising or lowering rolls, etc.	110	120	150	—
Intermittent duty freight and passenger elevators, tool heads, pumps, drawbridges, turntables, etc. (for arc welders, see 630.11)	85	85	90	140
Periodic duty rolls, ore- and coal-handling machines, etc.	85	90	95	140
Varying duty	110	120	150	200

Note: Any motor application shall be considered as continuous duty unless the nature of the apparatus it drives is such that the motor will not operate continuously with load under any condition of use.

(F) Separate Terminal Enclosure.

The conductors between a stationary motor rated 1 hp or less and the separate terminal enclosure permitted in 430.245(B) shall be permitted to be smaller than 14 AWG but not smaller than 18 AWG, provided they have an ampacity as specified in 430.22.

(G) Conductors for Small Motors.

Conductors for small motors shall not be smaller than 14 AWG unless otherwise permitted in 430.22(G)(1) or 430.22(G)(2).

(1) 18 AWG Copper.

18 AWG individual copper conductors installed in a cabinet or enclosure, copper conductors that are part of a jacketed multiconductor cable assembly, or copper conductors in a flexible cord shall be permitted, under either of the following sets of conditions:

(1) The circuit supplies a motor with a full-load current rating, as determined by 430.6(A)(1), of greater than 3.5 amperes, and less than or equal to 5 amperes, and all the following conditions are met:

(2) The circuit is protected in accordance with 430.52 .

(3) The circuit is provided with maximum Class 10 or Class 10A overload protection in accordance with 430.32 .

(4) Overcurrent protection is provided in accordance with 240.4(D)(1)(2) .

(5) The circuit supplies a motor with a full-load current rating, as determined by 430.6(A)(1), of 3.5 amperes or less, and all the following conditions are met:

(6) The circuit is protected in accordance with 430.52 .

(7) The circuit is provided with maximum Class 20 overload protection in accordance with 430.32 .

(8) Overcurrent protection is provided in accordance with 240.4(D)(1)(2) .

(2) 16 AWG Copper.

16 AWG individual copper conductors installed in a cabinet or enclosure, copper conductors that are part of a jacketed multiconductor cable assembly, or copper conductors in a flexible cord shall be permitted under either of the following sets of conditions:

(1) The circuit supplies a motor with a full-load current rating, as determined by 430.6(A)(1), of greater than 5.5 amperes, and less than or equal to 8 amperes, and all the following conditions are met:

(2) The circuit is protected in accordance with 430.52 .

(3) The circuit is provided with maximum Class 10 or Class 10A overload protection in accordance with 430.32 .

(4) Overcurrent protection is provided in accordance with 240.4(D)(2)(2) .

(5) The circuit supplies a motor with a full-load current rating, as determined by 430.6(A)(1), of 5.5 amperes or less, and all the following conditions are met:

(6) The circuit is protected in accordance with 430.52 .

(7) The circuit is provided with maximum Class 20 overload protection in accordance with 430.32 .

(8) Overcurrent protection is provided in accordance with 240.4(D)(2)(2) .

Additional Proposed Changes

File Name	Description	Approved
NEMA_additional_PC_to_430.22_H_.docx	NEMA proposed PC_430.22(H)	

Statement of Problem and Substantiation for Public Comment

This comment is a companion to the NEMA submitted public comment for Table 430.251(C) introduced into the NEC with First Revision No. 8006-NFPA 70-2024 (Public Input 1472) and, to eliminate potential safety issues, proposes requirements to ensure the protection of conductors supplying Design BE and CE motors not only during continuous operation (as 430.22 presently addresses), but also at the locked-rotor current values in Table 430.251(C).

These motors have typical values of full-load current according to Table 430.250 just as other three-phase alternating-current motors do. This means that, according to the present requirements of 430.22, the size of conductors supplying Design BE and CE motors is the same as those supplying other three-phase alternating current motors not addressed in 430.22(A) through 430.22(G). A significant difference, however, between Design BE and CE motors and other three-phase alternating-current motors such as Design B, C, and D motors is a higher maximum value of locked-rotor current as can be seen by comparing Table 430.251(C) to Table 430.251(B). Except for cases where a locked-rotor current reduction technique such as starting with an adjustable speed drive or a reduced voltage motor controller or starting on wye connection and running on delta connection is utilized, the higher locked-rotor current warrants an analysis regarding whether heating due to this current is the limiting factor for selecting the minimum size of conductors supplying Design BE and CE motors. This analysis was conducted per the methods described in these documents which are based upon the material in ANSI/ICEA P-32-382-2007 (R2018):
• Conductor Short-Circuit Protection (https://www.eaton.com/content/dam/eaton/products/electrical-circuit-protection/fuses/solution-center/bus-ele-tech-lib-conductor-protection-wire-cable-protection-2.pdf) published in 2000 by Cooper Bussmann, Inc, now known as Eaton's Bussmann Business.
• Short Circuit Currents of Insulated Cables (2307-Short-Circuit-Currents-Insulated-Cables-Whitepaper-PRINT.pdf (southwire.com))
published in 2023 by Southwire Company, LLC.

The one exception in the analysis relative to the methods described in the above referenced documents is that the maximum short circuit temperature of thermoset insulated conductors was, for the sake of safety, assumed to be the more conservative value of 200 degrees C specified for rubber insulated conductors in ANSI/ICEA P-32-382-2007 (R2018) instead of the 250 degrees C value specified for thermoset insulated conductors in that standard. As rubber is a thermoset material, there is an ambiguity as to how to cross reference certain conductor insulation Types in Table 310.4(1) to the classification of thermoset insulated (250 C maximum short circuit temperature) or to rubber insulated (200 C maximum short circuit temperature) in ANSI/ICEA P-32-382-2007 (R2018). The chair of the working group for ANSI/ICEA P-32-382 has acknowledged this and agreed to address this ambiguity in the next revision of the standard. For example, Type RHH is identified in Table 310.4(1) as thermoset, but can be supplied as either non-rubber thermoset (e.g., cross-liked polyethylene) with a short circuit temperature of 250 C or rubber thermoset (e.g., ethylene propylene rubber) with a short circuit temperature of 200 C. Since the distinction of rubber or non-rubber insulation is not identified on the cable, it is unclear to the installer which of these two short circuit temperatures is the appropriate one to apply. Therefore, this comment proposes the more conservative value.

The objective of the analysis was to determine if the following currents potentially drawn by a Design BE or CE motor during starting elevate the temperature of conductors of minimum size selected per the sizing requirements in 430.22 beyond the maximum short-circuit temperature of the conductors:
1) Current at the instantaneous-trip breaker setting of 2750% of full-load current value proposed on Public Input 1470 for Design BE and CE motors for the following time durations: ½ AC 60 Hz cycle (.0083 seconds), 1 AC 60 Hz cycle (.0167 seconds), 1 ½ AC 60 Hz cycles (.025 seconds), 2 AC 60 Hz cycles (.0333 seconds)
2) RMS current at the locked-rotor current values in Table 430.251(C) for Design BE and CE motors for a time duration of 5 seconds.

The analysis was performed for both copper and aluminum conductors which are thermoplastic insulated or thermoset insulated. This accounts for all conductor types in Tables 310.16 – 310.20 and Table 400.5(A)(1) with the exception of the following:

UF: underground feeder and branch circuit cable
USE and USE-2: underground service entrance cable
Z, ZW, and ZW-2: modified ethylene tetrafluoro-ethylene

FEP and FEPB: fluorinated ethylene propylene
MI: mineral insulation (metal sheathed)
PFA and PFAH: perfluoro-alkoxy
TFE: extended polytetra-fluoro-ethylene

These conductor types were not included in the analysis because ANSI/ICEA P-32-382-2007 (R2018) does not define the maximum short-circuit temperature for the insulation in these conductor types.

For all the types of conductors analyzed, it was found that current at the instantaneous-trip breaker setting for the time durations listed in item 1) does not elevate the temperature beyond the maximum short-circuit temperature of the conductors for any horsepower rating in Table 430.251(C). In the worst case, the current is 93% of that required to elevate the conductor temperature to the maximum short-circuit temperature of the conductors. This worst case is current for a 10 horsepower Design BE or CE motor at the instantaneous-trip breaker setting continuously for 2 AC 60 Hz cycles when the conductors are minimum-sized 90ºC copper conductors with thermoplastic insulation from Table 310.17 (single-insulated conductors in free-air).

Cases were found for which minimum-sized conductors are elevated beyond the maximum short-circuit temperature of the conductors when RMS current at the locked-rotor current values in Table 430.251(C) persists for 5 seconds. These cases are limited to horsepower ratings ranging from 3 to 100 horsepower and are limited to conductors with a temperature rating of 90ºC or less. For conductors of these temperature ratings and of the types considered in the analysis, this public comment addresses this by proposing a requirement for Design BE and CE motors with a horsepower rating ranging from 3 to 100 HP and not utilizing a locked-rotor current reduction technique which in some cases results in the supply conductors being larger than would otherwise be required. This proposal requires in these cases that the allowable short circuit current computed with the provided formula is greater than or equal to the locked-rotor current in Table 430.251(C) for the corresponding motor horsepower and voltage rating. Some examples for which this requirement results in supply conductors being larger than would otherwise be required are:

• 7.5 horsepower motor supplied by 75ºC copper conductors with thermoplastic insulation from Table 310.16 (not more than three current carrying conductors in raceway, cable, or earth): conductor size is required to increase to 12 AWG from the otherwise required 14 AWG
• 20 horsepower motor supplied by 75ºC copper conductors with thermoset insulation from Table 310.17 (single-insulated conductors in free-air): conductor size is required to increase to 10 AWG from the otherwise required 12 AWG

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1362-NFPA 70-2024 [Section No. 430.251(C)]	

Related Item

• FR8006 • PI1472

Submitter Information Verification

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Submittal Date: Sun Aug 18 21:54:24 EDT 2024
Committee: NEC-P11

Additional comments for NEMA Proposed Public Comment No. 1262-NFPA 70-2024

(H) Design BE or CE Motor.

Conductors that supply a single Design BE or CE motor used in a continuous duty application shall have an ampacity of not less than 125 percent of the motor full-load current rating, as determined by 430.6(A)(1). Conductors that supply a single Design BE or CE motor used in an application other than continuous duty shall have an ampacity per 430.22(E).

The sizing of any thermoplastic insulated or thermoset insulated copper or aluminum conductors with a temperature rating of 90°C or less supplying a single Design BE or CE motor shall additionally limit the temperature of the conductors to a value not exceeding the maximum short-circuit temperature of the conductors when locked-rotor current equal to that in Table 430.251(C) for the corresponding motor horsepower and voltage rating is drawn for a time duration of 5 seconds with the conductors initially at their rated maximum operating temperature. The temperature is limited in this manner under any of the following conditions:

(1) The motor rating is less than or equal to 2 horsepower or greater than or equal to 125 horsepower
(2) The motor locked-rotor current is reduced relative to that associated with full voltage, across-the-line starting by any of the following means:
    a. The motor is started with an adjustable speed drive.
    b. The motor is started with a reduced voltage motor controller.
    c. Starting on wye connection and running on delta connection is utilized.
(3) The allowable short circuit current computed with the following formula is greater than or equal to the locked-rotor current in Table 430.251(C) for the corresponding motor horsepower and voltage rating:

$I = [A/(\text{square root of } t)]*\{\text{square root of } [c*\log[(T_2+k)/(T_1+k)]]\} = [A/(\text{square root of } t)]*Fc$, where:

I is the allowable short circuit current in Amperes

A is the conductor area in circular mils as determined per Table 8 in Chapter 9

t is a time duration of 5 seconds

c is equal to .0297 for copper conductors and equal to .0125 for aluminum conductors

T_1 is the rated maximum operating temperature of the conductor in degrees Celsius

T_2 is the maximum short-circuit temperature of the conductor which is equal to 150°C for thermoplastic insulated conductors and 200°C for thermoset insulated conductors

k is equal to 234 for copper conductors and is equal to 228 for aluminum conductors

Fc is the conductor short circuit factor which is equal to $\{\text{square root of } [c*\log[(T_2+k)/(T_1+k)]]\}$ and has a numerical value as follows:

(1) .0662 for copper thermoset insulated conductors with $T_1 = 75°C$ and $T_2 = 200°C$

(2) .0614 for copper thermoset insulated conductors with $T_1 = 90°C$ and $T_2 = 200°C$

(3) .0587 for copper thermoplastic insulated conductors with T_1 = 60°C and T_2 = 150°C

(4) .0529 for copper thermoplastic insulated conductors with T_1 = 75°C and T_2 = 150°C

(5) .0468 for copper thermoplastic insulated conductors with T_1 = 90°C and T_2 = 150°C

(6) .0433 for aluminum thermoset insulated conductors with T_1 = 75°C and T_2 = 200°C

(7) .0402 for aluminum thermoset insulated conductors with T_1 = 90°C and T_2 = 200°C

(8) .0384 for aluminum thermoplastic insulated conductors with T_1 = 60°C and T_2 = 150°C

(9) .0346 for aluminum thermoplastic insulated conductors with T_1 = 75°C and T_2 = 150°C

(10) .0306 for aluminum thermoplastic insulated conductors with T_1 = 90°C and T_2 = 150°C

Informational Note: In some cases, satisfying 430.22(H)(3) requires the size of the conductors supplying a Design BE or CE motor to be larger than would otherwise be required.

Public Comment No. 1263-NFPA 70-2024 [Section No. 430.24]

430.24 Several Motors or a Motor(s) and Other Load(s).

Conductors supplying several motors, or a motor(s) and other load(s), shall have an ampacity not less than the sum of each of the following:

(1) 125 percent of the full-load current rating of the highest rated motor, as determined by 430.6(A)

(2) Sum of the full-load current ratings of all the other motors in the group, as determined by 430.6(A)

(3) 100 percent of the noncontinuous non-motor load

(4) 125 percent of the continuous non-motor load.

Informational Note: See Informative Annex D, Example No. D8.

Exception No. 1: Where one or more of the motors of the group are used for short-time, intermittent, periodic, or varying duty, the ampere rating of such motors to be used in the summation shall be determined in accordance with 430.22(E). For the highest rated motor, the greater of either the ampere rating from 430.22(E), or the largest continuous duty motor full-load current multiplied by 1.25 shall be used in the summation.

Exception No. 2: The ampacity of conductors supplying motor-operated fixed electric space-heating equipment shall comply with 424.4(B).

Exception No. 3: Where the circuitry is interlocked so as to prevent simultaneous operation of selected motors or other loads, the conductor ampacity shall be permitted to be based on the summation of the currents of the motors and other loads to be operated simultaneously that results in the highest total current.

Exception No. 4: Where one or more of the motors of the group are Design BE or CE motor(s) the conductors supplying the group shall have an ampacity not less than the sum of each of 430.24(1) through 430.24(4). Additionally, the sizing of any thermoplastic insulated or thermoset insulated copper or aluminum conductors with a temperature rating of 90 °C or less supplying the group shall limit the temperature of the conductors to a value not exceeding their maximum short-circuit temperature when locked-rotor current for any Design BE or CE motor(s) not subject to any of the conditions in 430.22(H)(1) or 430.22(H)(2) is drawn for a time duration of 5 seconds with the conductors initially at their rated maximum operating temperature. The determination that the conductor temperature is limited in this manner shall be according to the method this determination is made for a single Design BE or CE motor in 430.22(H) with the exception that the locked-rotor current shall be the sum of the current values from Table 430.251(C) for the horsepower and voltage rating(s) corresponding to all the Design BE or CE motors not subject to any of the following conditions in 430.22(H)(1) or 430.22(H)(2) which can be started simultaneously. In cases where there are Design BE or CE motors not subject to any of the following conditions in 430.22(H)(1) or 430.22(H)(2) which cannot be started simultaneously and multiple locked-rotor current values are obtained, the largest value obtained shall be used.

Informational Note: In some cases, the requirements in Exception No. 4 related to limited conductor temperature when locked-rotor current is drawn for a time duration of 5 seconds result in the required size of the supply conductors being larger than would otherwise be required.

Statement of Problem and Substantiation for Public Comment

This comment is a companion to the NEMA submitted public comment for Table 430.251(C) introduced into the NEC with First Revision No. 8006-NFPA 70-2024 (Public Input 1472) and, to eliminate potential safety issues, proposes requirements to ensure the protection of conductors supplying Design BE and CE motors not only during continuous operation (as 430.22 presently addresses), but also at the locked-rotor current values in Table 430.251(C).

These motors have typical values of full-load current according to Table 430.250 just as other three-phase alternating-current motors do. This means that, according to the present requirements of 430.24, the size of conductors supplying Design BE or CE motors in combination with other motors and/or loads is the same as those supplying other three-phase alternating current motors not addressed in Exception No. 1, 2, or 3 of 430.24 when in combination with the same motors and/or loads. A significant difference, however, between Design BE and CE motors and other three-phase alternating-current motors such as Design B, C, and D motors is a higher maximum value of locked-rotor current as can be seen by comparing Table 430.251(C) to Table 430.251(B). Except for cases where a locked-rotor current reduction technique such as starting with an adjustable speed drive or a reduced voltage motor controller or starting on wye connection and running on delta connection is utilized, the higher locked-rotor current warrants an analysis regarding whether heating due to this current is the limiting factor for selecting the minimum size of conductors supplying Design BE and CE motors. This analysis was conducted per the methods described in the following documents which are based upon the material in ANSI/ICEA P-32-382-2007 (R2018) and, for the sake of simplicity, was performed only for conductors supplying a single motor (as in 430.22) as opposed to several motors (as in 430.24):

• Conductor Short-Circuit Protection (https://www.eaton.com/content/dam/eaton/products/electrical-circuit-protection/fuses/solution-center/bus-ele-tech-lib-conductor-protection-wire-cable-protection-2.pdf) published in 2000 by Cooper Bussmann, Inc, now known as Eaton's Bussmann Business.
• Short Circuit Currents of Insulated Cables (2307-Short-Circuit-Currents-Insulated-Cables-Whitepaper-PRINT.pdf (southwire.com))
published in 2023 by Southwire Company, LLC.

The objective of the analysis was to determine if the following currents potentially drawn by a single Design BE or CE motor(s) during starting elevate the temperature of conductors of minimum size selected per the sizing requirements in 430.24 beyond the maximum short-circuit temperature of the conductors:

1) Current at the instantaneous-trip breaker setting of 2750% of full-load current value proposed on Public Input 1470 for Design BE and CE motors for the following time durations: ½ AC 60 Hz cycle (.0083 seconds), 1 AC 60 Hz cycle (.0167 seconds), 1 ½ AC 60 Hz cycles (.025 seconds), 2 AC 60 Hz cycles (.0333 seconds)
2) RMS current at the locked-rotor current values in Table 430.251(C) for Design BE and CE motors for a time duration of 5 seconds.

The analysis was performed for both copper and aluminum conductors which are thermoplastic insulated or thermoset insulated. This accounts for all conductor types in Tables 310.16 – 310.20 and Table 400.5(A)(1) with the exception of the following:

UF: underground feeder and branch circuit cable
USE and USE-2: underground service entrance cable
Z, ZW, and ZW-2: modified ethylene tetrafluoro-ethylene
FEP and FEPB: fluorinated ethylene propylene
MI: mineral insulation (metal sheathed)
PFA and PFAH: perfluoro-alkoxy
TFE: extended polytetra-fluoro-ethylene

These conductor types were not included in the analysis because ANSI/ICEA P-32-382-2007 (R2018) does not define the maximum short-circuit temperature for the insulation in these conductor types.

Cases were found for which minimum-sized conductors are elevated beyond the maximum short-circuit temperature of the conductors when RMS current at the locked-rotor current values in Table 430.251(C) persists for 5 seconds. These cases are limited to horsepower ratings ranging from 3 to 100 horsepower and are limited to conductors with a temperature rating of 90ºC or less. For conductors of these temperature ratings and of the types considered in the analysis, the accompanying public comment submitted by NEMA for 430.22 addresses this by proposing a requirement for Design BE and CE motors with a horsepower rating ranging from 3 to 100 HP and not utilizing a locked-rotor current reduction technique which in some cases results in the supply conductors being larger than would

otherwise be required. The NEMA submitted proposal for 430.22 requires in these cases that the allowable short circuit current computed with the provided formula is greater than or equal to the locked-rotor current in Table 430.251(C) for the corresponding motor horsepower and voltage rating. Some examples for which this requirement results in supply conductors being larger than would otherwise be required are:

• 7.5 horsepower motor supplied by 75ºC copper conductors with thermoplastic insulation from Table 310.16 (not more than three current carrying conductors in raceway, cable, or earth): conductor size is required to increase to 12 AWG from the otherwise required 14 AWG
• 20 horsepower motor supplied by 75ºC copper conductors with thermoset insulation from Table 310.17 (single-insulated conductors in free-air): conductor size is required to increase to 10 AWG from the otherwise required 12 AWG

The analysis shows that, for conductors supplying a single Design BE or CE motor (as in 430.22), RMS locked-rotor current persisting for a time duration of 5 seconds is in some cases the limiting factor for the selection of the minimum allowable conductor size. It follows that this will also be true in some cases for conductors supplying several Design BE or CE motors (as in 430.24) and, therefore, the locked-rotor current should be considered in 430.24 for the selection of minimum supply conductor size.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1362-NFPA 70-2024 [Section No. 430.251(C)]	

Related Item

• FR8006 • PI1472

Submitter Information Verification

Submitter Full Name: Megan Hayes
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Submittal Date: Sun Aug 18 22:37:25 EDT 2024
Committee: NEC-P11

Public Comment No. 2044-NFPA 70-2024 [Section No. 430.98(A)]

(A) Motor Control Centers.

Motor control centers shall be marked according to 110.21, and the marking shall be plainly visible after installation. Marking shall also include common power bus current rating and motor control center short-circuit current rating. When supplied by a feeder(s), motor control centers shall be permanently marked ~~in accordance with the following:With the~~ w ith the identification and location(s) of the means necessary to disconnect all power to the motor control center

- ~~With a label that is permanently affixed and of sufficient durability to withstand the environment involved~~
- ~~Using a method that is not handwritten~~

Statement of Problem and Substantiation for Public Comment

Repeating the text of earlier sections of the code are not allowed by Section 4.1.1 of the NEC style Manual. By making the proposed adjustments, all of the desired requirements are still preserved with violating the style guide.

Related Item

• PI 1519 and PI1760

Submitter Information Verification

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Submittal Date: Wed Aug 28 16:43:35 EDT 2024
Committee: NEC-P11

Public Comment No. 388-NFPA 70-2024 [Section No. 430.98(A)]

(A) Motor Control Centers.

Motor control centers shall be marked according to 110.21, and the marking shall be plainly visible after installation. Marking shall also include common power bus current rating and motor control center short-circuit current rating. When supplied by a feeder(s), motor control centers shall be permanently marked in accordance with the following:

(1) With the identification and location(s) of the means necessary to disconnect all power to the motor control center

(2) With a label that is permanently affixed and of sufficient durability to withstand the environment involved

(3) Using a method that is not handwritten

Additional Proposed Changes

File Name	Description	Approved
CN_43.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 43 appeared in the First Draft Report on First Revision No. 7981.

The Correlating Committee directs CMP 11 to review FR 7981 with respect to430.98(A) regarding the use of “when” that should be “where” or “if”. Refer to the NEC Style Manual 3.5.4. Additionally, in 430.98(A) the reference to 110.21 provides the marking requirements therefore, 430.98(A)(2) and 430.98(A)(3) can be deleted. With the deletion of (2) and (3), (1) should be revised to be in the main paragraph for clarity.

Related Item

• First Revision No. 7981

Submitter Information Verification

Submitter Full Name: CC Notes
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Submittal Date: Tue Jul 30 14:18:04 EDT 2024
Committee: NEC-P11

Correlating Committee Note No. 43-NFPA 70-2024 [Section No. 430.98(A)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Tue May 07 15:22:34 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 11 to review FR 7981 with respect to 430.98(A) regarding the use of “when” that should be “where” or “if”. Refer to the NEC Style Manual 3.5.4. Additionally, in 430.98(A) the reference to 110.21 provides the marking requirements therefore, 430.98(A)(2) and 430.98(A)(3) can be deleted. With the deletion of (2) and (3), (1) should be revised to be in the main paragraph for clarity.

First Revision No. 7981-NFPA 70-2024 [Section No. 430.98(A)]

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 390-NFPA 70-2024 [Section No. 430.99]

430.99 Short-Circuit Rating.

(A) Installation.

Motor control centers shall not be installed where the available fault current exceeds its short-circuit current rating as marked in accordance with 430.98(A).

(B) Available Fault Current.

The available fault current at the motor control center and the date the available fault current calculation was performed shall be documented and made available to those authorized to inspect, install, or maintain the installation.

Additional Proposed Changes

File Name	Description	Approved
CN_44.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 44 appeared in the First Draft Report on First Revision No. 8043.

The Correlating Committee directs CMP 11 to review FR 8043 and consider revising430.99 (A) for clarity. A suggested revision is: “Motor control centers shall have a short-circuit current rating not less than the available fault current as marked in accordance with 430.98(A).”

Related Item

• First Revision No. 8043

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
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Zip:
Submittal Date: Tue Jul 30 14:22:10 EDT 2024
Committee: NEC-P11

Correlating Committee Note No. 44-NFPA 70-2024 [Section No. 430.99]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Tue May 07 15:24:19 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 11 to review FR 8043 and consider revising 430.99 (A) for clarity. A suggested revision is: “Motor control centers shall have a short-circuit current rating not less than the available fault current as marked in accordance with 430.98(A).”

First Revision No. 8043-NFPA 70-2024 [Section No. 430.99]

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 6-NFPA 70-2024 [Section No. 430.110(A)]

(A) ~~General.~~ ~~**Single Motor**~~

A disconnecting means serving a single motor circuit shall be selected on the basis of the full-load current and locked-rotor current, respectively, of the motor as follows.

(1) Ampere Rating . The disconnecting means for motor circuits rated 1000 volts ac, 1500 volts dc, nominal, or less shall have a current rating not less than 115 percent of the full-load current rating of the motor.

Exception: A listed unfused motor-circuit switch having a horsepower rating not less than the motor horsepower shall be permitted to have a current rating less than 115 percent of the full-load current rating of the motor.

(2) Equivalent Horsepower. To determine the equivalent horsepower in complying with the requirements of 430.109, the horsepower rating shall be selected from Table 430.248, Table 430.249, or Table 430.250 corresponding to the full-load current, and also the horsepower rating from table 430.251(A) or Table 430.251(B) corresponding to the locked-rotor current. In case the full-load current and locked-rotor current do not correspond to the currents shown in Table 430.248, Table 430.249, Table 430.250, Table 430.251(A), or Table 430.251(B), the horsepower rating corresponding to the next higher value shall be selected. In case different horsepower ratings are obtained when applying these tables, a horsepower rating at least equal to

Statement of Problem and Substantiation for Public Comment

This comment is in regards to the Resolution found in the Committee Statement section of Public Input No. 525-NFPA 70-2023 which announces that the Input was rejected on the basis "The concerns brought up are currently covered in 430.110(C)(1)."

430.110(C)(1) pertains to combination loads. If it is the intention of 430.110(C)(1) to pertain to single motor applications as well as combination load situations, the language should be located in 430.110(A).

As written, there is no prescribed means to determine equivalent horsepower rating which could subject disconnecting means to loads in excess of their rating.

Article 430.109(A) states that where a motor circuit switch is used, is shall be rated in HP. This change would clarify acceptable means to determine equivalent horsepower rating. In addition, this would create consistency with requirements for disconnecting means in Article 440.

Related Item

• Public Input No. 525-NFPA 70-2023

Submitter Information Verification

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Submittal Date: Wed Jul 10 10:07:33 EDT 2024
Committee: NEC-P11

Public Comment No. 54-NFPA 70-2024 [Section No. 430.110(C)(1)]

(1) Horsepower Rating.

The rating of the disconnecting means shall be determined from the sum of all currents, including resistance loads, at the full-load condition and also at the locked-rotor condition. The combined full-load current and the combined locked-rotor current so obtained shall be considered as a single motor ~~for the purpose of this requirement.~~ as required by 430.110(C)(1)(a) and 430.110(C)(1)(b).

(a) The full-load current equivalent to the horsepower rating of each motor shall be selected from Table 430.247, Table 430.248, Table 430.249, or Table 430.250. These full-load currents shall be added to the rating in amperes of other loads to obtain an equivalent full-load current for the combined load.

(b) The locked-rotor current equivalent to the horsepower rating of each motor shall be selected from Table 430.251(A), Table 430.251(B), or Table 430.251(A). The locked-rotor currents shall be added to the rating in amperes of other loads to obtain an equivalent locked-rotor current for the combined load. Where two or more motors or other loads cannot be started simultaneously, the largest sum of locked-rotor currents of a motor or group of motors that can be started simultaneously and the full-load currents of other concurrent loads shall be permitted to be used to determine the equivalent locked-rotor current for the simultaneous combined loads.

In cases where different ~~current~~ horsepower ratings are obtained when applying these tables, ~~the largest value obtained shall~~ a horsepower rating at least equal to the larger of the values shall be used.

Exception No. 1: The locked-rotor current equivalent to the horsepower rating of each polyphase motor with design letter A shall be one of following:

(1) If available, the motor's marked value of locked-rotor amperes

(2) In the absence of a marked value of locked-rotor amperes for the motor, the value calculated from Equation 430.110(C)(1)a

$$\text{locked-rotor amperes} = \left(\frac{kVA}{hp}\right) \times \frac{(1000 \times \text{motor's marked value of rated horsepower})}{(\text{motor's marked value of rated volts}) \times (\sqrt{3})} \qquad \textit{[430.110(C)(1)a]}$$

where:

kVA/hp = maximum range value of kilovolt-amperes per horsepower with locked rotor in Table 430.7(B) associated with the motor's marked locked-rotor indicating code letter

Informational Note: Equation 430.110(C)(1)a is obtained by solving for locked-rotor amperes in the formula for "kilovolt-amperes per horsepower with locked rotor," as follows:

$$\frac{kVA}{hp} = \frac{(\sqrt{3}) \times (\text{motor's marked value of rated volts}) \times (\text{locked-rotor amperes})}{(1000 \times \text{motor's marked value of rated horsepower})} \qquad \textit{[430.110(C)(1)b]}$$

The numerator of Equation 430.110(C)(1)b for kilovolt-amperes per horsepower is the apparent power input to a three-phase motor with locked rotor in units of volt-amperes. The factor of 1000 VA/kVA in the denominator converts this value to units of kilovolt-amperes, and "(marked value of rated horsepower)" in the denominator converts this to kilovolt-amperes per horsepower. Note that "motor's marked value of rated volts" is a line-to-line value and "locked-rotor amperes" is a line value as opposed to a phase value.

Exception No. 2: Where part of the concurrent load is resistance load, and where the disconnecting means is a switch rated in horsepower and current, the switch used shall be permitted to have a horsepower rating not less than the combined load of the motor(s) if the current rating of the switch is not less than the locked-rotor current of the motor(s) plus the resistance load.

Statement of Problem and Substantiation for Public Comment

Third level subdivisions added for clarity per NEC Style Manual section 2.6.1.3 which states sections shall be permitted to be subdivided for clarity, with each subdivision representing either a rule or a part of a rule, and section 3.5.1.2 which states additional subdivisions shall be used where multiple requirements can be broken into independent requirements.

The word current should be replaced with the word horsepower as, in regards to equivalent horsepower, LRC will always be higher than FLC, but equivalent horsepower may be less which could expose disconnects to loads above their rated horsepower.

For example, consider a disconnect serving a 10 amp load and a 10 HP 460v 3 phase squirrel cage motor. Using FLC Table 430.250, the motor FLC and added 10 amp load would result in an equivalent full-load current for the combined load of 24 amps and 20 HP rating. Using the LRC Table 430.251(B) the motor LRC and added 10 amp load would result in an equivalent locked-rotor current for the combined load of 91 amps and 15 HP rating. In this case the current rating is higher but the HP rating is lower using LRC compared to FLC.

FLC 14 A + 10 A = 24 A
Table 430.250 equivalent HP = 20 HP

LRC 81 A + 10 A = 91 A
Table 430.251(B) equivalent HP = 15 HP

Current is higher using LRC but HP equivalent HP is lower

Related Item

• Public Input No. 521-NFPA 70-202

Submitter Information Verification

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Submittal Date: Sat Jul 13 15:28:52 EDT 2024
Committee: NEC-P11

Public Comment No. 753-NFPA 70-2024 [Section No. 430.110(C)(1)]

(1) Horsepower Rating.

The rating of the disconnecting means shall be determined from the sum of all currents, including resistance loads, at the full-load condition and also at the locked-rotor condition. The combined full-load current and the combined locked-rotor current so obtained shall be considered as a single motor for the purpose of this requirement.

The full-load current equivalent to the horsepower rating of each motor shall be selected from Table 430.247, Table 430.248, Table 430.249, or Table 430.250. These full-load currents shall be added to the rating in amperes of other loads to obtain an equivalent full-load current for the combined load.

The locked-rotor current equivalent to the horsepower rating of each motor shall be selected from Table 430.251(A), Table 430.251(B), or Table 430.251(~~A~~ C). The locked-rotor currents shall be added to the rating in amperes of other loads to obtain an equivalent locked-rotor current for the combined load. Where two or more motors or other loads cannot be started simultaneously, the largest sum of locked-rotor currents of a motor or group of motors that can be started simultaneously and the full-load currents of other concurrent loads shall be permitted to be used to determine the equivalent locked-rotor current for the simultaneous combined loads. In cases where different current ratings are obtained when applying these tables, the largest value obtained shall be used.

Exception No. 1: The locked-rotor current equivalent to the horsepower rating of each polyphase motor with design letter A shall be one of following:

(1) If available, the motor's marked value of locked-rotor amperes

(2) In the absence of a marked value of locked-rotor amperes for the motor, the value calculated from Equation 430.110(C)(1)a

$$\text{locked-rotor amperes} = \left(\frac{kVA}{hp}\right) \times \frac{(1000 \times \text{motor's marked value of rated horsepower})}{(\text{motor's marked value of rated volts}) \times (\sqrt{3})} \qquad \textit{[430.110(C)(1)a]}$$

where:

kVA/hp = maximum range value of kilovolt-amperes per horsepower with locked rotor in Table 430.7(B) associated with the motor's marked locked-rotor indicating code letter

Informational Note: Equation 430.110(C)(1)a is obtained by solving for locked-rotor amperes in the formula for "kilovolt-amperes per horsepower with locked rotor," as follows:

$$\frac{kVA}{hp} = \frac{(\sqrt{3}) \times (\text{motor's marked value of rated volts}) \times (\text{locked-rotor amperes})}{(1000 \times \text{motor's marked value of rated horsepower})} \qquad \textit{[430.110(C)(1)b]}$$

The numerator of Equation 430.110(C)(1)b for kilovolt-amperes per horsepower is the apparent power input to a three-phase motor with locked rotor in units of volt-amperes. The factor of 1000 VA/kVA in the denominator converts this value to units of kilovolt-amperes, and "(marked value of rated horsepower)" in the denominator converts this to kilovolt-amperes per horsepower. Note that "motor's marked value of rated volts" is a line-to-line value and "locked-rotor amperes" is a line value as opposed to a phase value.

Exception No. 2: Where part of the concurrent load is resistance load, and where the disconnecting means is a switch rated in horsepower and current, the switch used shall be permitted to have a horsepower rating not less than the combined load of the motor(s) if the current rating of the switch is not less than the locked-rotor current of the motor(s) plus the resistance load.

Statement of Problem and Substantiation for Public Comment

The first draft apperas to contain an error, as the panel statement discusses 430.251(C) but the text does not.

Related Item

• FR 7996

Submitter Information Verification

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Submittal Date: Sun Aug 04 16:11:20 EDT 2024
Committee: NEC-P11

Public Comment No. 391-NFPA 70-2024 [Section No. 430.122]

430.122 Conductors — Minimum Size and Ampacity.

(A) Branch/Feeder Circuit Conductors.

Circuit conductors supplying power conversion equipment included as part of an adjustable-speed drive system shall have an ampacity not less than 125 percent of the rated input current to the power conversion equipment.

Informational Note: Power conversion equipment can have multiple power ratings and corresponding input currents.

(B) Output Conductors.

(1) Output Motor Conductors.

The conductors between the power conversion equipment and the motor shall have an ampacity equal to or larger than 125 percent of the motor full-load current as determined by 430.6(A) or 430.6(B).

(2) Suitable for Output Motor Conductor Protection.

When power conversion equipment is listed and marked as “Suitable for Output Motor Conductor Protection,” the conductors between the power conversion equipment and the motor shall have an ampacity equal to or greater than the larger of the following:

(1) 125 percent of the motor full-load current as determined by 430.6(A) or 430.6(B)

(2) The ampacity of the minimum conductor size marked on the power conversion equipment

Informational Note No. 1: See 430.130 and 430.131 for branch circuit protection requirements. The minimum ampacity required of output conductors is often different than that of the conductors supplying the power conversion equipment.

Informational Note No. 2: Circuit conductors on the output of an adjustable-speed drive system are susceptible to breakdown under certain conditions due to the characteristics of the output waveform of the drive. Factors affecting the conductors include, but are not limited to, the output voltage, frequency, and current; the length of the conductors; the spacing between the conductors; and the dielectric strength of the conductor insulation. Methods to mitigate breakdown include consideration of one or more of these factors.

(C) Bypass Device.

The ampacity of circuit conductors supplying power conversion equipment included as part of an adjustable-speed drive system that utilizes a bypass device shall be the larger of either of the following:

(1) 125 percent of the rated input current to the power conversion equipment

(2) 125 percent of the motor full-load current rating determined in accordance with 430.6

(D) Several Motors or a Motor and Other Loads.

Conductors supplying several motors or a motor and other loads, including power conversion equipment, shall have ampacity in accordance with 430.24, using the rated input current of the power conversion equipment for purposes of calculating ampacity.

Additional Proposed Changes

File Name	Description	Approved
CN_45.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 45 appeared in the First Draft Report on First Revision No. 7999.

The Correlating Committee directs CMP 11 to review FR 7999 regarding the use of the term “when”. Section 430.122(B)(2) describes a condition, not a time. The panel is directed to review 3.5.4 of the NEC Style Manual, to establish whether “if” is the correct word, rather than “when.”

Related Item

• First Revision No. 7999

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 14:29:05 EDT 2024
Committee: NEC-P11

Correlating Committee Note No. 45-NFPA 70-2024 [Section No. 430.122(B)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Tue May 07 15:26:02 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 11 to review FR 7999 regarding the use of the term “when”. Section 430.122(B)(2) describes a condition, not a time. The panel is directed to review 3.5.4 of the NEC Style Manual, to establish whether “if” is the correct word, rather than “when.”

First Revision No. 7999-NFPA 70-2024 [Section No. 430.122(B)]

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 1843-NFPA 70-2024 [Section No. 430.122(B)(2)]

(2) Suitable for Output Motor Conductor Protection.

~~When~~ Where power conversion equipment is listed and marked as “Suitable for Output Motor Conductor Protection,” the conductors between the power conversion equipment and the motor shall have an ampacity equal to or greater than the larger of the following:

(1) 125 percent of the motor full-load current as determined by 430.6(A) or 430.6(B)

(2) The ampacity of the minimum conductor size marked on the power conversion equipment

Informational Note No. 1: See 430.130 and 430.131 for branch circuit protection requirements. The minimum ampacity required of output conductors is often different than that of the conductors supplying the power conversion equipment.

Informational Note No. 2: Circuit conductors on the output of an adjustable-speed drive system are susceptible to breakdown under certain conditions due to the characteristics of the output waveform of the drive. Factors affecting the conductors include, but are not limited to, the output voltage, frequency, and current; the length of the conductors; the spacing between the conductors; and the dielectric strength of the conductor insulation. Methods to mitigate breakdown include consideration of one or more of these factors.

Statement of Problem and Substantiation for Public Comment

"Where" is preferred term per the NEC manual of style language vs. "when".

Related Item

• FR7999

Submitter Information Verification

Submitter Full Name: Jay Tamblingson
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City:
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Submittal Date: Tue Aug 27 16:51:59 EDT 2024
Committee: NEC-P11

Public Comment No. 831-NFPA 70-2024 [Section No. 430.122(D)]

(D) Several Motors or a Motor and Other Loads.

Conductors supplying several motors or a motor and other loads, including power conversion equipment, shall have ampacity in accordance with 430.24, using the ~~rated input~~ full-load current rating of the ~~power conversion equipment for~~ connected motor load for purposes of calculating ampacity.

Statement of Problem and Substantiation for Public Comment

430.131 allows branch circuit protective device sizing using the full-load current rating of the connected motor load. However, 430.122(D) requires using the input rating of the power conversion equipment. This disparity results in circuits with oversized conductors according to the protective device ahead of them. The conductor would be adequately protected if sized the same way as the protective device using the connected motor load. The specific problem solved is oversized conductors in group installations of small motor loads controlled by power conversion equipment. The proposed change better aligns 430.122(D) with 430.131.

Related Item

• 430.122 Feedback from Mike Holt related to the ampacity of the conductor according to the connected motor horsepower versus the drive input rating.

Submitter Information Verification

Submitter Full Name: Gregory Doppke
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Submittal Date: Tue Aug 06 07:47:55 EDT 2024
Committee: NEC-P11

Public Comment No. 270-NFPA 70-2024 [Section No. 430.205 [Excluding any Sub-Sections]]

The ampacities of conductors supplying equipment rated over 1000 volts ac, 1500 volts dc, nominal, shall be determined in accordance with 315.60~~- or~~ and 430.205(A)~~- and~~ or 430.205(B).

Statement of Problem and Substantiation for Public Comment

It appears this text was revised in the 2023 edition and I believe the words "and" and "or" were unintentionally swapped in the specific locations cited. In the event there is an oversized adjustable speed drive that subsequently feeds a motor directly, you can more closely size conductors to the actual load expected (and not the oversized drive input current, like a spare, standardization of drive size, etc.). This assumes the conductors are adequately protected at the point they receive supply by a feeder protection relay, for example.

Related Item

• adjustable speed drive

Submitter Information Verification

Submitter Full Name: Austen Bryan
Organization: LHB Corp
Street Address:
City:
State:
Zip:

Submittal Date: Fri Jul 26 17:12:25 EDT 2024
Committee: NEC-P11

Public Comment No. 832-NFPA 70-2024 [Section No. 430.208]

430.~~208~~ 208 . Disconnecting Means.

Disconnecting means in motor circuits over 1000 Volts AC, 1500 V dc, shall comply with 430.208(A) through 430.208(E). The requirements for disconnecting means in Part IX of this Article are applicable only as referenced in 430.208(A) and 430.208(B).

(A) Motor Controller Disconnecting Means. The disconnecting means for a motor controller shall comply with 430.102(A) and shall be lockable in accordance with 110.25.

(B) Disconnecting Means In Motor Circuits . All disconnecting means

~~shall be a switch or circuit breaker having a voltage~~
in motor circuits shall comply with 430.103, 430.104, 430.105, 430.107, 430.112, and 430.113.

(C) Voltage Rating. All disconnecting means in motor circuits shall have a voltage rating not less than that of the circuit involved

~~, and shall be lockable open in accordance with 110.25 . The disconnecting means shall~~
.

(D) Device Type. All disconnecting means in motor circuits shall be one of the devices in (1) through (3)

(1) A switch with make and break current ratings no less than the full load current of the circuit involved.

(2) An isolating switch, in series with a contactor or circuit breaker, that is interlocked with a contactor or circuit breaker such that the contactor or circuit breaker must be in the open position before the isolating switch is opened or closed.

(3) A draw-out-type contactor or circuit breaker, interlocked such that it must be in the open position before it can be moved out of or into the connected position.

(E) Current Rating. All disconnecting means in motor circuits shall have a current rating of not less than
~~100 percent of the full-load current rating of the motor. For~~
the overload trip current setting of overcurrent (overload) relays or other motor-protective devices used.
Exception to (E): For adjustable-speed drive systems, the disconnecting
~~means shall~~
means on the line side of the adjustable-speed drive shall have a current rating not less than
~~100 percent of the rated input~~
100 percent of the rated maximum input current of the power conversion equipment , regardless of the current setting of motor protective devices .

Informational Note: Where a disconnecting means is included as part of a listed motor controller, the current rating of the disconnecting means has been determined to be acceptable as part of the controller listing.

Statement of Problem and Substantiation for Public Comment

This Public Comment is submitted on behalf of a Correlating Committee Medium Voltage Task Group consisting of Robert Osborne (Chair), Paul Barnhart, Lou Grahor, Donny Cook, Scott Higgins, Mike Querry, Roger McDaniel, Dave Burns, Rod Belisle, Kevin Rogers, Tony Ricciuti, Paul Knapp, Paul Sullivan, George Smith, Eric Simmon, Kevin Arnold, Larry Wildermuth, and Kyle Krueger.

This Public Comment is an update to Public Input 3072, with revisions to address statements in the Committee Statement for that PI.

As currently written in 430.201, Part XI of Article 430 adds to or amends the other provision of Article 430. It is unclear if Section 430.208 adds to, revises, or replaces some or all of the requirements for disconnect switches that appear in Part IX of Article 430. The proposed changes clarify exactly what requirements are applicable to disconnecting means in circuits above 1000 V ac, 1500 V dc, including the appropriate type of disconnects for those circuits.

A specific reference to 430.102(A) is included to identify the proper location of a motor controller disconnecting means.

430.208(B) identifies additional portions of Part IX that are applicable to disconnecting means that are specifically located in motor circuits.

The type of devices noted in 430.109 are not appropriate for circuits above 1000 V ac, 1500 V dc, so the proposed addition of 430.208(D) identifies the specific types of devices that are appropriate, and also include appropriate interlocking requirements when the switch is not rated for making or breaking current in a motor circuit.

430.208(E) provides the appropriate requirements for the current rating of disconnects in circuits above 1000 V ac, 1500 V dc. This makes it clear that the requirements of 430.110 are specifically applicable to circuits of 1000 V ac, 1500 V dc and below, and are not applicable for the higher voltage circuits.

The term “ultimate overload trip current setting” that appeared in the original public input has been replaced by “overload trip current setting” to avoid the use of an undefined term.

An Informational Note is included to recognize that when a disconnect switch is integral to a listed motor controller, the listing determines the disconnect switch rating is appropriate for the controlled motor circuit.

Related Item

• PI 3072

Submitter Information Verification

Submitter Full Name: Robert Osborne
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Submittal Date: Tue Aug 06 09:21:05 EDT 2024
Committee: NEC-P11

Public Comment No. 756-NFPA 70-2024 [Section No. 430.247]

430.247 Direct-Current Motors.

Table 430.247- ~~shall provide~~ provides the values of full-load currents, which are average dc quantities, for motors running at base speeds.

Table 430.247 Full-Load Current in Amperes, Direct-Current Motors

Horsepower	Armature Voltage Rating*					
	90 Volts	120 Volts	180 Volts	240 Volts	500 Volts	550 Volts
¼	4.0	3.1	2.0	1.6	—	—
⅓	5.2	4.1	2.6	2.0	—	—
½	6.8	5.4	3.4	2.7	—	—
¾	9.6	7.6	4.8	3.8	—	—
1	12.2	9.5	6.1	4.7	—	—
1½	—	13.2	8.3	6.6	—	—
2	—	17	10.8	8.5	—	—
3	—	25	16	12.2	—	—
5	—	40	27	20	—	—
7½	—	58	—	29	13.6	12.2
10	—	76	—	38	18	16
15	—	—	—	55	27	24
20	—	—	—	72	34	31
25	—	—	—	89	43	38
30	—	—	—	106	51	46
40	—	—	—	140	67	61
50	—	—	—	173	83	75
60	—	—	—	206	99	90
75	—	—	—	255	123	111
100	—	—	—	341	164	148
125	—	—	—	425	205	185
150	—	—	—	506	246	222
200	—	—	—	675	330	294

*These are average dc quantities.

Statement of Problem and Substantiation for Public Comment

The first occurance of the word "shall" (Table xyz SHALL provide...) is nonsensical. How do you violate that "requirement"? It seems that only the CMP could. And how do I enforce it? And over whom? The table provides information, the table is not "required" to provide intormation.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 754-NFPA 70-2024 [Section No. 430.248]	
Public Comment No. 755-NFPA 70-2024 [Section No. 430.249]	
Public Comment No. 757-NFPA 70-2024 [Section No. 430.250]	

Related Item

- FR 8006

Submitter Information Verification

Submitter Full Name: Ryan Jackson
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Submittal Date: Sun Aug 04 16:22:24 EDT 2024
Committee: NEC-P11

Public Comment No. 754-NFPA 70-2024 [Section No. 430.248]

430.248 Single-Phase Alternating-Current Motors.

Table 430.248~~- shall provide~~ provides the values of full-load currents for motors running at usual speeds and motors with normal torque characteristics. The voltages listed shall be rated motor voltages. The currents listed ~~shall be permitted~~ are for system voltage ranges of 110 volts to 120 volts and 220 volts to 240 volts, nominal .

Table 430.248 Full-Load Currents in Amperes, Single-Phase Alternating-Current Motors

Horsepower	115 Volts	200 Volts	208 Volts	230 Volts
⅛	4.4	2.5	2.4	2.2
¼	5.8	3.3	3.2	2.9
⅓	7.2	4.1	4.0	3.6
½	9.8	5.6	5.4	4.9
¾	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8.0
1½	20	11.5	11.0	10
2	24	13.8	13.2	12
3	34	19.6	18.7	17
5	56	32.2	30.8	28
7½	80	46.0	44.0	40
10	100	57.5	55.0	50

Statement of Problem and Substantiation for Public Comment

The first occurance of the word "shall" (Table xyz SHALL provide...) is nonsensical. How do you violate that "requirement"? It seems that only the CMP could. And how do I enforce it? And over whom? The table provides information, the table is not "required" to provide intormation.
Using this table is not a permission, it is a requirement. The permisive text needs to be removed.
Also, without the word "nominal" in the text, the table could not be used for a circuit voltage of, say, 121V.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 755-NFPA 70-2024 [Section No. 430.249]	
Public Comment No. 756-NFPA 70-2024 [Section No. 430.247]	
Public Comment No. 757-NFPA 70-2024 [Section No. 430.250]	

Related Item

• FR 8006

Submitter Information Verification

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Submittal Date: Sun Aug 04 16:14:23 EDT 2024
Committee: NEC-P11

Public Comment No. 755-NFPA 70-2024 [Section No. 430.249]

430.249 Two-Phase Alternating-Current Motors (4-Wire).

Table 430.249~~ shall provide~~ provides values of full-load current for motors running at speeds usual for belted motors and motors with normal torque characteristics. Current in the common conductor of a 2-phase, 3-wire system shall be 1.41 times the value given. The voltages listed shall be rated motor voltages. The currents listed ~~shall be permitted~~ are for system voltage ranges of 110 volts to 120 volts, 220 volts to 240 volts, 440 volts to 480 volts, and 550 volts to 600 volts, nominal .

Table 430.249 Full-Load Current, Two-Phase Alternating-Current Motors (4-Wire)

Horsepower	Induction-Type Squirrel Cage and Wound Rotor (Amperes)				
	115 Volts	230 Volts	460 Volts	575 Volts	2300 Volts
½	4.0	2.0	1.0	0.8	—
¾	4.8	2.4	1.2	1.0	—
1	6.4	3.2	1.6	1.3	—
1½	9.0	4.5	2.3	1.8	—
2	11.8	5.9	3.0	2.4	—
3	—	8.3	4.2	3.3	—
5	—	13.2	6.6	5.3	—
7½	—	19	9.0	8.0	—
10	—	24	12	10	—
15	—	36	18	14	—
20	—	47	23	19	—
25	—	59	29	24	—
30	—	69	35	28	—
40	—	90	45	36	—
50	—	113	56	45	—
60	—	133	67	53	14
75	—	166	83	66	18
100	—	218	109	87	23
125	—	270	135	108	28
150	—	312	156	125	32
200	—	416	208	167	43

Statement of Problem and Substantiation for Public Comment

The first occurance of the word "shall" (Table xyz SHALL provide...) is nonsensical. How do you violate that "requirement"? It seems that only the CMP could. And how do I enforce it? And over whom? The table provides information, the table is not "required" to provide intormation.
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Also, without the word "nominal" in the text, the table could not be used for a circuit voltage of, say, 121V.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 754-NFPA 70-2024 [Section No. 430.248]	Same issue.
Public Comment No. 756-NFPA 70-2024 [Section No. 430.247]	
Public Comment No. 757-NFPA 70-2024 [Section No. 430.250]	

Related Item

• FR 8006

Submitter Information Verification

Submitter Full Name: Ryan Jackson
Organization: Self-employed
Street Address:
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Submittal Date: Sun Aug 04 16:17:58 EDT 2024
Committee: NEC-P11

Public Comment No. 757-NFPA 70-2024 [Section No. 430.250]

430.250 Three-Phase Alternating-Current Motors.

Table 430.250~~- shall provide~~ provides values of full-load currents typical for motors running at speeds usual for belted motors and motors with normal torque characteristics. The voltages listed shall be rated motor voltages. The currents listed ~~shall be permitted~~ are for system voltage ranges of 110 volts to 120 volts, 220 volts to 240 volts, 440 volts to 480 volts, and 550 volts to 600 volts, nominal .

Table 430.250 Full-Load Current, Three-Phase Alternating-Current Motors

Horsepower	Induction-Type Squirrel Cage and Wound Rotor (Amperes)							Synchronous-Type Unity Power Factor* (Amperes)			
	115 Volts	200 Volts	208 Volts	230 Volts	460 Volts	575 Volts	2300 Volts	230 Volts	460 Volts	575 Volts	2300 Volts
½	4.4	2.5	2.4	2.2	1.1	0.9	—	—	—	—	—
¾	6.4	3.7	3.5	3.2	1.6	1.3	—	—	—	—	—
1	8.4	4.8	4.6	4.2	2.1	1.7	—	—	—	—	—
1½	12.0	6.9	6.6	6.0	3.0	2.4	—	—	—	—	—
2	13.6	7.8	7.5	6.8	3.4	2.7	—	—	—	—	—
3	—	11.0	10.6	9.6	4.8	3.9	—	—	—	—	—
5	—	17.5	16.7	15.2	7.6	6.1	—	—	—	—	—
7½	—	25.3	24.2	22	11	9	—	—	—	—	—
10	—	32.2	30.8	28	14	11	—	—	—	—	—
15	—	48.3	46.2	42	21	17	—	—	—	—	—
20	—	62.1	59.4	54	27	22	—	—	—	—	—
25	—	78.2	74.8	68	34	27	—	53	26	21	—
30	—	92	88	80	40	32	—	63	32	26	—
40	—	120	114	104	52	41	—	83	41	33	—
50	—	150	143	130	65	52	—	104	52	42	—
60	—	177	169	154	77	62	16	123	61	49	12
75	—	221	211	192	96	77	20	155	78	62	15
100	—	285	273	248	124	99	26	202	101	81	20
125	—	359	343	312	156	125	31	253	126	101	25
150	—	414	396	360	180	144	37	302	151	121	30
200	-		552	528	480	240	192	49 -		400	201	161	40
250	—	—	—	—	302	242	60	-	—	—	—	—
300	—	—	—	—	361	289	72	-	—	—	—	—
350	—	—	—	—	414	336	83	-	—	—	—	—
400	—	—	—	—	477	382	95	-	—	—	—	—
450	—	—	—	—	515	412	103	-	—	—	—	—
500	—	—	—	—	590	472	118	-	—	—	—	—

*For 90 and 80 percent power factor, the figures shall be multiplied by 1.1 and 1.25, respectively.

Statement of Problem and Substantiation for Public Comment

The first occurance of the word "shall" (Table xyz SHALL provide...) is nonsensical. How do you violate that "requirement"? It seems that only the CMP could. And how do I enforce it? And over whom? The table provides information, the table is not "required" to provide intormation.
Using this table is not a permission, it is a requirement. The permisive text needs to be removed.
Also, without the word "nominal" in the text, the table could not be used for a circuit voltage of, say, 121V.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 754-NFPA 70-2024 [Section No. 430.248]	
Public Comment No. 755-NFPA 70-2024 [Section No. 430.249]	
Public Comment No. 756-NFPA 70-2024 [Section No. 430.247]	

Related Item

• FR 8006

Submitter Information Verification

Submitter Full Name: Ryan Jackson
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Submittal Date: Sun Aug 04 16:23:44 EDT 2024
Committee: NEC-P11

Public Comment No. 1362-NFPA 70-2024 [Section No. 430.251(C)]

(C) Polyphase Design BE and Design CE Maximum Locked-Rotor Currents.

Table 430.251(C) shall provide conversions for polyphase Design BE and Design CE maximum locked-rotor currents for selection of disconnecting means and controllers.

Table 430.251(C) Conversion Table of Polyphase Design BE and Design CE Maximum Locked-Rotor Currents for Selection of Disconnecting Means and Controllers as Determined from Horsepower and Voltage Rating and Design Letter

Note: This table is for use only with 430.22, 430.24, 430.110, 440.12, 440.41, and 455.8(C).

Maximum Motor Locked-Rotor Current in Amperes, Two- and Three-Phase, Design BE and Design CE						
Rated Horsepower	115 Volts BE, CE	200 Volts BE, CE	208 Volts BE, CE	230 Volts BE, CE	460 Volts BE, CE	575 Volts BE, CE
½	41.2	23.7	22.8	20.6	10.3	8.2
¾	53.3	30.7	29.5	26.7	13.3	10.7
1	63.6	36.6	35.2	31.8	15.9	12.7
1½	84.2	48.4	46.6	42.1	21.1	16.8
2	112	64.6	62.1	56.2	28.1	22.5
3	—	96.9	93.1	84.2	42.1	33.7
5	—	161	155	140	70.2	56.2
7½	—	242	233	211	105	84.2
10	—	301	290	262	131	105
15	—	452	435	393	197	157
20	—	603	580	524	262	210
25	—	753	724	655	328	262
30	—	904	869	786	393	314
40	—	1119	1076	973	487	389
50	—	1399	1345	1217	608	487
60	—	1679	1614	1460	730	584
75	—	2099	2018	1825	913	730
100	—	2583	2484	2246	1123	898
125	—	3229	3105	2808	1404	1123
150	—	3875	3726	3369	1685	1348
200	—	5166	4968	4492	2246	1797
250	—	—	—	—	2808	2246
300	—	—	—	—	3369	2695
350	—	—	—	—	3931	3145
400	—	—	—	—	4492	3594
450	—	—	—	—	5054	4043
500	—	—	—	—	5616	4492

~~Note: This table is for use only with 430.110, 440.12, 440.41, and 455.8(C).~~

Informational Note: Values in Table 430.251(C) should be carefully considered when replacing Design B, C, or D motors with Design BE or Design CE motors, which are capable of higher efficiency levels. Motor control devices tested for Design B, C, or D motors, such as those covered in UL 508 and UL 60947-4-1, might not have been evaluated to these higher locked rotor current values.

Statement of Problem and Substantiation for Public Comment

This comment proposes to change Design BE and CE Table 430.251(C) which was introduced into the NEC on First Revision No. 8006-NFPA 70-2024 (Public Input 1472). The proposed change is to add 430.22 and 430.24 to the list of articles appearing in the “For use only with…” statement which appears below the title of Table 430.251(C).

This comment is in addition to a separate NEMA submitted public comment for Table 430.251(C) which proposes to reduce the maximum value of locked-rotor current for some ratings. The reference to 430.22 and 430.24 in this comment is proposed because NEMA submitted public comments for 430.22 and 430.24, which are also in response to FR-8006 (PI 1472), propose to add to those articles a requirement under certain conditions to utilize the locked-rotor current values in Table 430.251(C) when determining the minimum allowable size of conductors supplying Design BE or CE motor(s).

The purpose of the NEMA submitted public comments for 430.22 and 430.24 is to eliminate potential safety issues in installations of the Design BE or CE motors dealt with in Table 430.251(C). These potential safety issues are eliminated by adding requirements to 430.22 and 430.24 which ensure the protection of conductors supplying Design BE and CE motors not only during continuous operation (as 430.22 presently addresses), but also at the locked-rotor current values in Table 430.251(C).

The complete substantiation for the proposal to utilize under certain conditions the locked-rotor current values in Table 430.251(C) when determining the minimum allowable size of conductors supplying Design BE or CE motors appears in the NEMA submitted public comments for 430.22 and 430.24. That substantiation is summarized as follows:

Design BE and CE motors have typical values of full-load current according to Table 430.250 just as other three-phase alternating-current motors do. This means that, according to the present requirements of 430.22, the size of conductors supplying Design BE and CE motors is the same as those supplying other three-phase alternating current motors not addressed in 430.22(A) through 430.22(G). A significant difference, however, between Design BE and CE motors and other three-phase alternating-current motors such as Design B, C, and D motors is a higher maximum value of locked-rotor current as can be seen by comparing Table 430.251(C) to Table 430.251(B). Except for cases where a locked-rotor current reduction technique such as starting with an adjustable speed drive or a reduced voltage motor controller or starting on wye connection and running on delta connection is utilized, the higher locked-rotor current warrants an analysis regarding whether heating due to this current is the limiting factor for selecting the minimum size of conductors supplying Design BE and CE motors. This analysis was conducted per the methods described in these documents which are based upon the material in ANSI/ICEA P-32-382-2007 (R2018):

•Conductor Short-Circuit Protection (https://www.eaton.com/content/dam/eaton/products/electrical-circuit-protection/fuses/solution-center/bus-ele-tech-lib-

conductor-protection-wire-cable-protection-2.pdf) published in 2000 by Cooper Bussmann, Inc, now known as Eaton's Bussmann Business.
• Short Circuit Currents of Insulated Cables (2307-Short-Circuit-Currents-Insulated-Cables-Whitepaper-PRINT.pdf (southwire.com))
published in 2023 by Southwire Company, LLC.

The one exception in the analysis relative to the methods described in the above referenced documents is that the maximum short circuit temperature of thermoset insulated conductors was, for the sake of safety, assumed to be the more conservative value of 200 degrees C specified for rubber insulated conductors in ANSI/ICEA P-32-382-2007 (R2018) instead of the 250 degrees C value specified for thermoset insulated conductors in that standard. As rubber is a thermoset material, there is an ambiguity as to how to cross reference certain conductor insulation Types in Table 310.4(1) to the classification of thermoset insulated (250 C maximum short circuit temperature) or to rubber insulated (200 C maximum short circuit temperature) in ANSI/ICEA P-32-382-2007 (R2018). The chair of the working group for ANSI/ICEA P-32-382 has acknowledged this and agreed to address this ambiguity in the next revision of the standard. For example, Type RHH is identified in Table 310.4(1) as thermoset, but can be supplied as either non-rubber thermoset (e.g., cross-liked polyethylene) with a short circuit temperature of 250 C or rubber thermoset (e.g., ethylene propylene rubber) with a short circuit temperature of 200 C. Since the distinction of rubber or non-rubber insulation is not identified on the cable, it is unclear to the installer which of these two short circuit temperatures is the appropriate one to apply. Therefore, this comment proposes the more conservative value.

The objective of the analysis was to determine if the following currents potentially drawn by a Design BE or CE motor during starting elevate the temperature of conductors of minimum size selected per the sizing requirements in 430.22 beyond the maximum short-circuit temperature of the conductors:

1) Current at the instantaneous-trip breaker setting of 2750% of full-load current value proposed on Public Input 1470 for Design BE and CE motors for the following time durations: ½ AC 60 Hz cycle (.0083 seconds), 1 AC 60 Hz cycle (.0167 seconds), 1 ½ AC 60 Hz cycles (.025 seconds), and 2 AC 60 Hz cycles (.0333 seconds)
2) RMS current at the locked-rotor current values in Table 430.251(C) for Design BE and CE motors for a time duration of 5 seconds.

The analysis was performed for both copper and aluminum conductors which are thermoplastic insulated or thermoset insulated. This accounts for all conductor types in Tables 310.16 – 310.20 and Table 400.5(A)(1) with the exception of the following:
UF: underground feeder and branch circuit cable
USE and USE-2: underground service entrance cable
Z, ZW, and ZW-2: modified ethylene tetrafluoro-ethylene
FEP and FEPB: fluorinated ethylene propylene
MI: mineral insulation (metal sheathed)
PFA and PFAH: perfluoro-alkoxy
TFE: extended polytetra-fluoro-ethylene

These conductor types were not included in the analysis because ANSI/ICEA P-32-382-2007 (R2018) does not define the maximum short-circuit temperature for the insulation in these conductor types.

For all the types of conductors analyzed, it was found that current at the instantaneous-trip breaker setting for the time durations listed in item 1) does not elevate the temperature beyond the maximum short-circuit temperature of the conductors for any horsepower rating in Table 430.251(C). In the worst case, the current is 93% of that required to elevate the conductor temperature to the maximum short-circuit temperature of the conductors. This worst case is current for a 10 horsepower Design BE or CE motor at the instantaneous-trip breaker setting continuously for 2 AC 60 Hz cycles when the conductors are minimum-sized 90ºC copper conductors with thermoplastic insulation from Table 310.17 (single-insulated conductors in free-air).

Cases were found for which minimum-sized conductors are elevated beyond the maximum short-circuit temperature of the conductors when RMS current at the locked-rotor current values in Table 430.251(C) persists for 5 seconds. These cases are limited to horsepower ratings ranging from 3 to 100 horsepower and are limited to conductors with a temperature rating of 90ºC or less. For conductors of these temperature ratings and of the types considered in the analysis, the public comment submitted by NEMA for 430.22 addresses this by proposing a requirement for Design BE and CE motors with a horsepower rating ranging from 3 to 100 HP and not utilizing a locked-rotor current reduction technique which in some cases results in the supply conductors being larger than would otherwise be required. This proposal for 430.22 requires in these cases that the allowable short circuit current computed with the provided formula is greater than or equal to the locked-rotor current in Table 430.251(C) for the corresponding motor horsepower and voltage rating. Some examples for which this requirement results in supply conductors being larger than would otherwise be required are:
• 7.5 horsepower motor supplied by 75ºC copper conductors with thermoplastic insulation from Table 310.16 (not more than three current carrying conductors in raceway, cable, or earth): conductor size is required to increase to 12 AWG from the otherwise required 14 AWG
• 20 horsepower motor supplied by 75ºC copper conductors with thermoset insulation from Table 310.17 (single-insulated conductors in free-air): conductor size is required to increase to 10 AWG from the otherwise required 12 AWG

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1262-NFPA 70-2024 [Section No. 430.22]	
Public Comment No. 1263-NFPA 70-2024 [Section No. 430.24]	

Related Item

• FR8006 • PI1472 • PC No. 1262-NFPA 70-2024 • PC No. 1263-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Megan Hayes
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Submittal Date: Wed Aug 21 14:18:55 EDT 2024
Committee: NEC-P11

Public Comment No. 1363-NFPA 70-2024 [Section No. 430.251(C)]

(C) Polyphase Design BE and Design CE Maximum Locked-Rotor Currents.

Table 430.251(C) shall provide conversions for polyphase Design BE and Design CE maximum locked-rotor currents for selection of disconnecting means and controllers.

Table 430.251(C) Conversion Table of Polyphase Design BE and Design CE Maximum Locked-Rotor Currents for Selection of Disconnecting Means and Controllers as Determined from Horsepower and Voltage Rating and Design Letter

Note: This table is for use only with 430.110, 440.12, 440.41, and 455.8(C).

Maximum Motor Locked-Rotor Current in Amperes, Two- and Three-Phase, Design BE and Design CE						
Rated Horsepower	**115 Volts BE, CE**	**200 Volts BE, CE**	**208 Volts BE, CE**	**230 Volts BE, CE**	**460 Volts BE, CE**	**575 Volts BE, CE**
½	41.2	23.7	22.8	20.6	10.3	8.2
¾	53.3	30.7	29.5	26.7	13.3	10.7
1	63.6	36.6	35.2	31.8	15.9	12.7
1½	84.2	48.4	46.6	42.1	21.1	16.8
2	112	64.6	62.1	56.2	28.1	22.5
3	—	96.9	93.1	84.2	42.1	33.7
5	—	161	155	140	70.2	56.2
7½	—	242	233	211	105	84.2
10	—	301	290	262	131	105
15	—	452	435	393	197	157
20	—	603	580	524	262	210
25	—	753	724	655	328	262
30	—	904	869	786	393	314
40	—	1119	1076	973	487	389
50	—	1399	1345	1217	608	487
60	—	1679	1614	1460	730	584
75	—	2099	2018	1825	913	730
100	—	2583	2484	2246	1123	898
125	—	3229	3105	2808	1404	1123
150	—	3875	3726	3369	1685	1348
200	—	5166	4968	4492	2246	1797
250	—	—	—	—	2808	2246
300	—	—	—	—	3369	2695
350	—	—	—	—	3931	3145
400	—	—	—	—	4492	3594
450	—	—	—	—	5054	4043
500	—	—	—	—	5616	4492

~~Note: This table is for use only with 430.110, 440.12, 440.41, and 455.8(C).~~

Informational Note: Values in Table 430.251(C) should be carefully considered when replacing Design B, C, or D motors with Design BE or Design CE motors, which are capable of higher efficiency levels. Motor control devices tested for Design B, C, or D motors, such as those covered in UL 508 and UL 60947-4-1, might not have been evaluated to these higher locked rotor current values.

Additional Proposed Changes

File Name	Description	Approved
Table_430.251_C_for_submission_to_NFPA.docx		

Statement of Problem and Substantiation for Public Comment

This comment proposes to change Design BE and CE Table 430.251(C) which was introduced into the NEC on First Revision No. 8006-NFPA 70-2024 (Public Input 1472). The proposed change reduces the maximum value of locked-rotor current for some ratings. This reduction is proposed for the purpose of harmonizing with the locked-rotor current values for IEC motor design letters NE and HE as defined in Table 3 of IEC 60034-12:2024 so that Design BE and CE motors are compatible with the controllers for Design NE and HE motors. This comment is in addition to a separate NEMA submitted public comment for Table 430.251(C) which proposes to add 430.22 and 430.24 to the list of articles that Table 430.251(C) states it is intended for use with.

The logic used for determining the proposed changes to the maximum values of locked-rotor current in Table 430.251(C) is as follows:

The locked-rotor current values in Table 430.251(C) from FR-8006 (PI 1472) result in a ratio of locked rotor apparent power to motor output power that exactly matches Table 3 of IEC 60034-12:2024, but the locked-rotor current values are only an approximate match for some ratings. These ratings are those for which the horsepower output power in Table 430.251(C) is only an approximate match to the nearest standard kW output power value defined in Table 6 of IEC 60072-1:2022. This slight difference in the denominator of the ratio of locked rotor apparent power to motor output power results in the same difference in the numerator of this ratio and, therefore, the same slight difference in the locked-rotor current value.

For ratings for which the Design BE and CE locked-rotor current is presently lower than the IEC Design NE and HE locked-rotor current, no change is proposed in this comment for Table 430.251(C) since lower current does not adversely affect compatibility with the controller for Design NE and HE motors. For ratings for which the Design BE and CE locked-rotor current is presently higher than the IEC Design NE and HE locked-rotor current, a reduction in the locked-rotor current value in Table 430.251(C) is proposed to match the value for IEC Designs NE and HE. The size of the proposed reductions fall within the range of 0.71% to 4.21%.

The revised values from this comment are what will appear in ANSI/NEMA MG 00001-2024 when it is published. At the time this public comment was written, such publication had not occurred, but it is expected to occur around August 2024.

Related Item

• FR8006 • PI1472

Submitter Information Verification

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Submittal Date: Wed Aug 21 14:29:36 EDT 2024
Committee: NEC-P11

Table 430.251(C) as proposed in NEMA PC No. 1363-NFPA 70-2024

Rated Horsepower	Maximum Motor Locked-Rotor Current in Amperes, Two- and Three-Phase, Design BE and CE					
	115 Volts	200 Volts	208 Volts	230 Volts	460 Volts	575 Volts
	BE, CE	BE, CE	BE, CE	BE, CE	BE, CE	BE, CE
½	~~41.2~~40.9	~~23.7~~23.5	~~22.8~~22.6	~~20.6~~20.4	~~10.3~~10.2	8.2
¾	~~53.3~~52.5	~~30.7~~30.2	~~29.5~~29.0	~~26.7~~26.2	~~13.3~~13.1	~~10.7~~10.5
1	63.6	36.6	35.2	31.8	15.9	12.7
1½	~~84.2~~82.8	~~48.4~~47.6	~~46.6~~45.8	~~42.1~~41.4	~~21.1~~20.7	~~16.8~~16.6
2	112	64.6	62.1	56.2	28.1	22.5
3		~~96.9~~95.3	~~93.1~~91.6	~~84.2~~82.8	~~42.1~~41.4	~~33.7~~33.1
5		~~161~~160	~~155~~154	~~140~~139	~~70.2~~69.7	~~56.2~~55.7
7½		~~242~~238	~~233~~229	~~211~~207	~~105~~104	~~84.2~~82.8
10		301	290	262	131	105
15		~~452~~445	~~435~~427	~~393~~387	~~197~~193	~~157~~155
20		603	580	524	262	210
25		~~753~~748	~~724~~719	~~655~~650	~~328~~325	~~262~~260
30		~~904~~889	~~869~~855	~~786~~773	~~393~~387	~~314~~309
40		1119	1076	973	487	389
50		~~1399~~1389	~~1345~~1335	~~1217~~1207	~~608~~604	~~487~~483
60		1679	1614	1460	730	584
75		~~2099~~2064	~~2018~~1985	~~1825~~1795	~~913~~897	~~730~~718
100		2583	2484	2246	1123	898
125		~~3229~~3118	~~3105~~2998	~~2808~~2711	~~1404~~1356	~~1123~~1084
150		~~3875~~3811	~~3726~~3664	~~3369~~3313	~~1685~~1657	~~1348~~1325
200		5166	4968	4492	2246	1797
250					~~2808~~2786	~~2246~~2229
300					~~3369~~3313	~~2695~~2651
350					~~3931~~3765	~~3145~~3012
400					4492	3594
450					~~5054~~5046	~~4043~~4036
500					5616	4492

Public Comment No. 1828-NFPA 70-2024 [New Section after 440.1]

440.2 Listing Requirements.

(A) Listing Required. Factory-assembled electric motor-driven air-conditioning equipment and refrigerating equipment shall be listed.

(B) Field Installed Electric Heaters. Electric heaters field installed within the enclosure of listed electric motor-driven air-conditioning equipment shall be identified as a listed field installable accessory as part of the listed equipment.

Statement of Problem and Substantiation for Public Comment

This Public Comment is provided as a follow-up to Public Input No. 3909. In addition to the substantiation provided in PI 3909, additional substantiation is provided in response to CMP 11's Committee Statement. For consideration:

1. Not all jurisdictions which adopt the NEC also adopt a mechanical code. Two domestic examples are the states of Vermont and Hawaii. Adoption is also spotty in jurisdictions which do not have state-wide codes, or in international jurisdictions.

2. Mechanical codes do not usually apply to residential occupancies.

3. There is not always a clear distinction between the various trades and their associated AHJs. HVAC/R routinely involves electrical, mechanical, gas, plumbing, and fire codes. Consistency across codes is important in the circumstances where inspection responsibilities overlap and may be unclear.

4. 110.3(B) requires products that are listed to be installed and used in accordance with the listing; however, 110.3(B) doesn't require listing. A listing requirement for equipment under the scope of Article 440 belongs in 440.2 (per the NEC Style Manual, cl. 2.2.1), which is the purpose of this Public Comment. If 440.2 doesn't require listing, then unlisted HVAC equipment may be approved, and 110.3(B) would not apply.

5. In addition, it is important to supplement the general requirement of 110.3(B) in the specific case of field installed electric heaters for the following reasons:
a. There is a history of inconsistent application of 110.3(B) to field installed electric heaters
b. This equipment is often supplied by one of the largest electrical circuits in most buildings
c. There have been numerous fire incidents as a result of this misapplication and the available energy in these circuits.

6. The committee's statement did not address the concerns associated with the new flammable refrigerants:
a. Electrical sources of ignition are one of the primary concerns with these systems. The product listing drives product and installation requirements to mitigate these hazards.
b. The use of the manufacturer's specified electric heaters is even more critical with flammable refrigerants. The listing evaluates these kits as potential hot surface ignition sources, requires they be interlocked with circulating fan operation, and requires coordination with equipment mitigation controls which activate if a refrigerant leak is detected.

7. This PI correlates with NFPA 1 which require listing for this equipment through adoption of ASHRAE 15, which requires the listing.

Original Substantiation submitted with PI 3909:
EPA Significant New Alternative Policy Program (SNAP) rules regarding low-GWP refrigerants will essentially require the use of refrigerants with higher flammability safety classifications per ASHRAE 34. These refrigerants introduce new hazards compared to those used previously. These concerns are addressed in the standards used to evaluate this equipment for listing (UL 60335-2-40 for air-conditioning equipment, and UL 60335-2-89 for refrigerating equipment). Requiring listing of factory-built equipment is consistent with mechanical code requirements.

Field installed electric heaters within the enclosure of listed air-conditioning (which includes heat pumps) are covered by the scope of the end product standard (UL 60335-2-40). The heaters are required to be evaluated and tested as part of the equipment. The product standard requires that the equipment be marked to identify which field installed accessories are approved as part of the equipment listing.

Because the heaters addressed by this proposal are installed in the enclosure of heat pump and air conditioning equipment, these heaters are not clearly in scope of Article 422 (which covers gas and electric furnaces) or Article 424 (which covers duct heaters). The most appropriate location is Article 440 since the heaters are installed within the equipment covered by this Article. Due to the high levels of energy available in these circuits and equipment, there is a need for more clearly defined requirements.

The HVAC industry has seen an increase in installation of third-party manufactured electric heaters. These heaters are not approved by the equipment manufacturer and are not evaluated by the listing of the equipment. As a result, manufacturers have received numerous reports of fire incidents resulting from these installations.

The wording offered here is similar to wording in 312.8(B)(1), which addresses installation of power monitoring and energy monitoring equipment in enclosures for switches or overcurrent devices (such as panelboards), ensuring appropriate listing requirements are applied. The option for a listed third-party kit evaluated for field installation presently does not exist for electric heaters, therefore that provision from 312.8(B)(1) is not included in this public input.

PI 3909 CMP 11 Committee Statement:
Resolution: The requirement for this equipment to be Listed is better suited in the mechanical code. This is addressed by 110.3(B). Air conditioning equipment is required to be listed by the mechanical code, any accessories installed within the enclosure for listed equipment should be within the listing of the air conditioning equipment. Section 110.3(B) requires that listed equipment be in accordance with listing instructions.

Related Item

- Public Input No. 3909-NFPA 70-2023

Submitter Information Verification

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Submittal Date: Tue Aug 27 16:02:42 EDT 2024
Committee: NEC-P11

Public Comment No. 1895-NFPA 70-2024 [New Section after 440.1]

440.3 Cybersecurity

An HVAC System that is connected to a communication network and permits system control shall comply with the following:

(1) Connected directly through a local non-networked interface.

(2) Connected through a networked interface complying with one of the following methods:

a. The HVAC System and associated software for adjusting the settings are identified as being evaluated for cybersecurity.

b. A cybersecurity assessment of the network is completed. Documentation of the assessment shall be made available to those authorized to inspect, operate, and maintain the system.

Informational Note No. 1: See ANSI/ISA 62443., *Cybersecurity Standards series* , UL 2900 *Cybersecurity Standard series* , or the NIST *Framework for Improving Critical Infrastructure Cybersecurity* , Version 1.1 for assessment requirements.

Informational Note No. 2: Examples of the evaluation or assessment used to demonstrate the system has been investigated for cybersecurity vulnerabilities could be one of the following:

(1) Certification of compliance by a nationally recognized test laboratory

(2) Manufacturer declaration for the specific type and brand of system provided

Informational Note No. 3: Cybersecurity is a specialized field requiring constant, vigilant attention to security vulnerabilities that could arise due to software defects, system configuration changes, or user interactions. Installation of devices that can be secured is an important first step but not sufficient to guarantee a secure system.

Statement of Problem and Substantiation for Public Comment

HVAC system product safety standards for connected products do not contain cybersecurity requirements. It would take time for the product safety technical committee to add to a standard and then provide the amount of time for manufacturers to comply. During that time many systems will be attacked and by providing both product and system protection options will protect the public from safety issues that can and have arisen during attacks on HVAC systems. HVAC systems are highly connected as a lot of remote maintenance is conducted in this market.

HVAC systems, either. IoT sensors viewing from your computer they do need to connect to the internet for data gathering, remote control and analytics. Their direct access to the internet does make them a target of cyber attackers, posing serious security threats for buildings and their occupants.

A key example is the Target cyber-attack: it was national news for months on end. Ultimately, it was determined that a third-party HVAC system company was the entry point for the hackers.

Another example is from the Boston area where HVAC incident is said to affect Boston area hospitals.
https://www.healthcareinfosecurity.com/alleged-hvac-hack-shines-spotlight-on-ot-risks-to-healthcare-a-17320

https://www.ashrae.org/news/ashraejournal/protecting-hvac-systems-from-cybersecurity-threats
This article published in the ASHRAE Journal Newsletter in September of 2021 provides a broad view of why Cybersecurity protection is needed for HVAC Systems. Each incident can cause in excess of $7.5M which has a major impact on government entities and large corporations. However over small and medium size businesses are also being attacked. In 2019 43% of online attacks were aimed as small businesses.

Cyber-security is becoming more important every day. By including these requirements within a consensus document that is adopted by all states, consistency in the protection will be achieved. Without using consensus standards, the industry could have to address requirements differently for each state, territory, or federal government.

Related Item

• PI-3370

Submitter Information Verification

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Submittal Date: Tue Aug 27 21:40:54 EDT 2024
Committee: NEC-P11

Public Comment No. 392-NFPA 70-2024 [Section No. 440.4]

440.4 Marking on Hermetic Refrigerant Motor-Compressors and Equipment.

(A) Hermetic Refrigerant Motor-Compressor Nameplate.

A hermetic refrigerant motor-compressor shall be provided with a visible nameplate that shall indicate the manufacturer's name, trademark, or symbol; identifying designation; phase; voltage; and frequency. The rated-load current in amperes of the motor-compressor shall be marked by the equipment manufacturer on either or both the motor-compressor nameplate and the nameplate of the equipment in which the motor-compressor is used. The locked-rotor current of each single-phase motor-compressor having a rated-load current of more than 9 amperes at 115 volts, or more than 4.5 amperes at 230 volts, and each polyphase motor-compressor shall be marked on the motor-compressor nameplate. Where a thermal protector complying with 440.52(A)(2) and 440.52(B)(2) is used, the motor-compressor nameplate or the equipment nameplate shall be marked with the words "thermally protected." Where a protective system complying with 440.52(A)(4) and 440.52(B)(4) is used and is furnished with the equipment, the equipment nameplate shall be marked with the words, "thermally protected system." Where a protective system complying with 440.52(A)(4) and 440.52(B)(4) is specified, the equipment nameplate shall be appropriately marked.

(B) Multimotor and Combination-Load Equipment.

Multimotor and combination-load equipment shall be provided with a visible nameplate marked with the maker's name, the rating in volts, frequency and number of phases, minimum supply circuit conductor ampacity, the maximum rating of the branch-circuit short-circuit and ground-fault protective device, and the short-circuit current rating of the motor controllers or industrial control panel. The ampacity shall be calculated by using Part IV and counting all the motors and other loads that will be operated at the same time. The branch-circuit short-circuit and ground-fault protective device rating shall not exceed the value calculated by using Part III. Multimotor or combination-load equipment for use on two or more circuits shall be marked with the above information for each circuit.

Exception No. 1: Multimotor and combination-load equipment that is suitable under the provisions of this article for connection to a single 15- or 20-ampere, 120-volt, or a 15-ampere, 208- or 240-volt, single-phase branch circuit shall be permitted to be marked as a single load.

Exception No. 2: The minimum supply circuit conductor ampacity and the maximum rating of the branch-circuit short-circuit and ground-fault protective device shall not be required to be marked on a room air conditioner complying with 440.62(A).

Exception No. 3: Multimotor and combination-load equipment used in one- and two-family dwellings or cord-and-attachment-plug-connected equipment shall not be required to be marked with a short-circuit current rating.

(C) Branch-Circuit Selection Current.

A hermetic refrigerant motor-compressor, or equipment containing such a compressor, having a protection system that is approved for use with the motor-compressor that it protects and that permits continuous current in excess of the specified percentage of nameplate rated-load current given in 440.52(B)(2) or 440.52(B)(4) shall also be marked with a branch-circuit selection current that complies with 440.52(B)(2) or 440.52(B)(4). This marking shall be provided by the equipment manufacturer and shall be on the nameplate(s) where the rated-load current(s) appears.

Additional Proposed Changes

File Name	Description	Approved
CN_46.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 46 appeared in the First Draft Report on First Revision No. 8023.

The Correlating Committee directs CMP 11 to review FR 8023 and clarify the intent ofthe CMP regarding "the nameplate to be "accessible and visible" where "the equipmentnameplate could not be installed against a wall or other obstacle, or it would not be"visible" in 440.4(A) and 440.4(B).

Additionally, with respect to 440.4(A) and 440.4(B), consider a list format (NEC Style Manual Section 2.1.9.3) or short, simple declarative sentences (NEC Style Manual Section 3.5.1.1)

Lastly, the term "suitable" in 440.4(B), Exception #1, should be clarified, considering if the term "permitted" is more appropriate.

Related Item

• First Revision No. 8023

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
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Submittal Date: Tue Jul 30 14:31:33 EDT 2024
Committee: NEC-P11

Correlating Committee Note No. 46-NFPA 70-2024 [Section No. 440.4]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Tue May 07 15:31:55 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 11 to review FR 8023 and clarify the intent of the CMP regarding “the nameplate to be “accessible and visible” where “the equipment nameplate could not be installed against a wall or other obstacle, or it would not be “visible” in 440.4(A) and 440.4(B).

Additionally, with respect to 440.4(A) and 440.4(B), consider a list format (NEC Style Manual Section 2.1.9.3) or short, simple declarative sentences (NEC Style Manual Section 3.5.1.1)

Lastly, the term “suitable” in 440.4(B), Exception #1, should be clarified, considering if the term “permitted” is more appropriate.

First Revision No. 8023-NFPA 70-2024 [Section No. 440.4(A)]

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan

Osborne, Robert D.

Porter, Christine T.

Schultheis, Timothy James

Williams, David A.

Public Comment No. 1404-NFPA 70-2024 [New Section after 440.10(A)]

TITLE OF NEW CONTENT

Exception: The calculated available fault current at the equipment shall be permitted to be reduced using the let-through curves of current-limiting overcurrent protective devices upstream of the equipment, provided the equipment does not contain overcurrent protective devices with an interrupting rating less than the calculated available fault current.

Additional Proposed Changes

File Name	Description	Approved
MN_Inspector_SCCR_form.pdf	MN SCCR Inspection Form	

Statement of Problem and Substantiation for Public Comment

It is not unusual to have installations where the installed HVAC equipment marked SCCR is less than the calculated available fault current. Installations where the equipment SCCR is inadequate for the available fault current, may result in serious electrical hazards such as electrical shock, fire, and shrapnel. In addition, where the installed HVAC equipment SCCR is less than the calculated available fault current, there is currently no cost-effective way address this safety issue, nor is it currently addressed in the NEC.

The use of current-limiting fuses has been an effective and industry accepted method of reducing the available fault current to protect certain types of equipment where the available fault current exceeds the equipment marked short-circuit current ratings. There is only one NEC requirement where this method is not permitted, and that is for the protection of circuit breakers in panelboards and switchboards in NEC 240.86. The proposed text specifically states the equipment cannot contain overcurrent protective devices with interrupting rating less than the calculated fault current, which would prevent the use of 240.86.

In addition, it is important to separate UL 508A and required marking of equipment short-circuit current rating with the electrical system available fault current. UL 508A Supplement SB is an approved method of determining the required marked short-circuit current rating. This proposal is not intended to revise the marked SCCR of the equipment, which could only be done using a field evaluation. Instead, this proposal allows the available fault current analysis to use the published manufacturer RMS let-through as part of the available fault current analysis at certain types of equipment. There is no guidance on how to calculate the available fault current in the NEC. Industry practice has been to determine the available fault current at equipment by considering the impedance effects of transformers, conductors and busway. Once this calculation is completed, then it has been industry practice to consult the published manufacturer RMS let-through of upstream current-limiting overcurrent protective devices, if present, which can reduce the available fault current at certain types of equipment.

This proposal is intended to address smaller (200A and less) HVAC equipment, because this is a type of equipment where this method would be suitable. It would likely not be suitable for larger equipment which has an industrial control panel. The reason for this is that smaller HVAC equipment often does not contain overcurrent protective devices, or if it does this proposal requires those overcurrent devices to have adequate interrupting ratings based on the calculated available fault current. This method is suitable for motor controllers, including VFDs, since this is dealing with the reduction of available fault current. The issue of with VFDs applied on systems with higher available fault currents is a heating and useful life issue, not a safety issue where there is concern for protection of the VFD and it's associated marked SCCR rating.

In some jurisdictions, such as in Minnesota, the Electrical Inspectors allow (and publish per the attached document) four methods to address this safety issue:

Install longer length of conductor required to lower the available fault current to a value equal or less than the marked equipment SCCR.

Install a transformer rated for the load, with a KVA and impedance that reduces the available fault current to a value equal to or less than the marked equipment SCCR.

Modify the equipment components to achieve the required SCCR and conduct a field evaluation to relabel the equipment with the revised equipment SCCR.

Install current limiting fuses that reduce the available fault current to a value equal or less than the marked equipment SCCR, provided the equipment does not contain overcurrent protective devices with an interrupting rating less than the calculated available fault current.

The added exception provides a cost-effective method to address the safety issue with installed equipment with inadequate equipment SCCR without having to add additional sources of impedance or require modification and reevaluation of the equipment.

Related Item

- PI 2452

Submitter Information Verification

Submitter Full Name: Daniel Neeser
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City:
State:
Zip:

Submittal Date: Thu Aug 22 12:17:43 EDT 2024
Committee: NEC-P11

DEPARTMENT OF LABOR AND INDUSTRY

Short-Circuit Current Ratings

Short-Circuit Current Ratings are in place to protect equipment and overcurrent devices from sustaining damage when exposed to a high level of current during a short-circuit condition. In the National Electrical Code (NEC), Sections 110.9 and 110.10, addresses those general requirements; however, there are many **equipment specific** SCCR requirements where the AHJ can request documentation. When it is determined that an equipment installation is not within the available fault current, field wiring alterations or modifications to the electrical equipment could be a solution. There are four options to ensure equipment SCCR compliance:

1. Install an isolation transformer.
2. Increase conductor length.
3. Change the equipment components (requires a field evaluation).
4. Install current limiting fuses - where permitted by the AHJ. In this application, if overcurrent devices are present, they must have an interrupting rating equal to or greater than the available fault current.

**If option 4 is used, please fill out the information below and upload the document to our electronic record (permit).

Permit Number:	
Project Name:	
Project Address:	
Calculation Completed By (please print):	
Type of App Used for the calculation (if applicable):	
Date of Calculation:	
Fuse rating and new equipment fault current rating:	
Signature:	Date of Signature:

Public Comment No. 1763-NFPA 70-2024 [Section No. 440.11]

440.11 General.

~~Disconnecting~~ A disconnecting means shall be ~~capable of disconnecting~~ provided to disconnect air-conditioning and refrigerating equipment, including motor-compressors and controllers, from the circuit conductors. ~~If the disconnecting means is readily accessible to unqualified persons, any enclosure door or hinged cover of a disconnecting means enclosure that exposes energized parts when open shall have its door or cover locked or require a tool to be opened.~~

Statement of Problem and Substantiation for Public Comment

The requirement for the access to internal components of an enclosed switch are addressed in 404.30. As the requirements in 404 apply 'generally', there is no need to repeat them here.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1758-NFPA 70-2024 [Section No. 404.30]	
Public Comment No. 1758-NFPA 70-2024 [Section No. 404.30]	

Related Item

• Correlating Committee Note No. 47-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Bryan Tatum
Organization: Underwraters Laboratories
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 08:31:54 EDT 2024
Committee: NEC-P11

Public Comment No. 1795-NFPA 70-2024 [Section No. 440.11]

440.11 General.

Disconnecting means shall be capable of disconnecting air-conditioning and refrigerating equipment, including motor-compressors and controllers, from the circuit conductors. ~~If the disconnecting means is~~ Section 404.30 shall apply only to disconnects that are readily accessible to unqualified persons~~, any enclosure door or hinged cover of a disconnecting means enclosure that exposes energized parts when open shall have its door or cover locked or require a tool to be opened.~~

Statement of Problem and Substantiation for Public Comment

Requirements found in Section 404.30 are removed for clarity and consistency. This comment was developed by a task group reviewing CN 47 consisting of Nathan Philips, Jim Rogers, Dirk Meuller, Keith Waters and Seth Carlton.

Related Item

• CN 47, FR 8025

Submitter Information Verification

Submitter Full Name: Nathan Philips
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Affiliation: NECA
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City:
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Submittal Date: Tue Aug 27 11:58:20 EDT 2024
Committee: NEC-P11

Public Comment No. 394-NFPA 70-2024 [Section No. 440.11]

440.11 General.

Disconnecting means shall be capable of disconnecting air-conditioning and refrigerating equipment, including motor-compressors and controllers, from the circuit conductors. If the disconnecting means is readily accessible to unqualified persons, any enclosure door or hinged cover of a disconnecting means enclosure that exposes energized parts when open shall have its door or cover locked or require a tool to be opened.

Additional Proposed Changes

File Name	Description	Approved
CN_47.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 47 appeared in the First Draft Report on First Revision No. 8025.

The Correlating Committee directs that a Task Group with members from CMP's 4, 10,and 11 review requirements in 440.11 and 690.13 and consider if the intent is met by the requirements of 404.30, refer to that section in 440.11 and 690.13. If the requirements of 404.30 do not meet the intent of 440.11 and 690.13, develop revisions to 404.30 that meet the intent of these three requirements.

Related Item

• First Revision No. 8025

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 14:33:10 EDT 2024
Committee: NEC-P11

Correlating Committee Note No. 47-NFPA 70-2024 [Section No. 440.11]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Tue May 07 15:54:10 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs that a Task Group with members from CMP's 4, 10, and 11 review requirements in 440.11 and 690.13 and consider if the intent is met by the requirements of 404.30, refer to that section in 440.11 and 690.13. If the requirements of 404.30 do not meet the intent of 440.11 and 690.13, develop revisions to 404.30 that meet the intent of these three requirements.

First Revision No. 8025-NFPA 70-2024 [Section No. 440.11]

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 758-NFPA 70-2024 [Section No. 440.11]

440.11 General.

Disconnecting means shall be capable of disconnecting air-conditioning and refrigerating equipment, including motor-compressors and controllers, from ~~the circuit~~ their ungrounded supply conductors. If the disconnecting means is readily accessible to unqualified persons, any enclosure door or hinged cover of a disconnecting means enclosure that exposes energized parts when open shall have its door or cover locked or require a tool to be opened.

Statement of Problem and Substantiation for Public Comment

The committee respone to PI 582 is nonsensical. My PI is to clarify that ONLY the ungrounded conductors need to be disconnected. As currently written, nearly every 120V equipment covered by this article is a violation because the disconnect does not open all the circuit conductors, it only opens the ungorunded conductors. My change was to recognize this fact and allow it, becuase that is obviously the intent of this section. The committee response points to a section that ALLOWS the grounded conductor to be disconnected, but 440.11 REQUIRES the grounded conductor to be disconnected. Is it really the intent of the committee that grounded conductor ALWAYS be disconnected? Because that is what is currently required. This section needs to change.

Related Item

• PI 582

Submitter Information Verification

Submitter Full Name: Ryan Jackson
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City:
State:
Zip:

Submittal Date: Sun Aug 04 16:30:02 EDT 2024
Committee: NEC-P11

Public Comment No. 759-NFPA 70-2024 [Section No. 440.12(A)(2)]

(2) Equivalent Horsepower.

To determine the equivalent horsepower in complying with the requirements of 430.109, the horsepower rating shall be selected from Table 430.248, Table 430.249, or Table 430.250 corresponding to the rated-load current or branch-circuit selection current, whichever is greater, and also the horsepower rating from Table 430.251(A), Table 430.251(B), or Table 430.251(~~A~~ C) ~~corresponding~~ corresponding to the locked-rotor current. In case the nameplate rated-load current or branch-circuit selection current and locked-rotor current do not correspond to the currents shown in Table 430.248, Table 430.249, Table 430.250, Table 430.251(A), Table 430.251(B), or Table 430.251(C), the horsepower rating corresponding to the next higher value shall be selected. In case different horsepower ratings are obtained when applying these tables, a horsepower rating at least equal to the larger of the values obtained shall be selected.

Statement of Problem and Substantiation for Public Comment

Fixing what appears to be an error.

Related Item

• FR 8045

Submitter Information Verification

Submitter Full Name: Ryan Jackson
Organization: Self-employed
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City:
State:
Zip:

Submittal Date: Sun Aug 04 16:35:43 EDT 2024
Committee: NEC-P11

Public Comment No. 1352-NFPA 70-2024 [Section No. 440.14]

440.14 Location.

Disconnecting means shall be located within sight from, and readily accessible from, the air-conditioning or refrigerating equipment. The disconnecting means shall be permitted to be installed on or within the air-conditioning or refrigerating equipment. Disconnecting means shall meet the working space requirements of 110.26(A).

The disconnecting means shall not be located on panels that are designed to allow access to the air-conditioning or refrigeration equipment or where it obscures the equipment nameplate(s).

Exception No. 1: Where the disconnecting means provided in accordance with 430.102(A) is lockable open in accordance with 110.25 and the refrigerating or air-conditioning equipment is essential to an industrial process in a facility with written safety procedures, and where the conditions of maintenance and supervision ensure that only qualified persons service the equipment, a disconnecting means within sight from the equipment shall not be required.

Exception No. 2: Where an attachment plug and receptacle serve as the disconnecting means in accordance with 440.13, their location shall be accessible but shall not be required to be readily accessible.

Exception No.3: Residential non fused single phase 250 volt or less and 60 amperes shall be in site and accessible.

Informational Note: See Article 430, Parts VII and IX for additional requirements.

Statement of Problem and Substantiation for Public Comment

I have made changes per the Panel's recommendations on their statement.
The location for the disconnecting means does not need to be readily accessible only and not be readily accessible. The size of disconnecting means and limited need for operation does not need the space required for larger units. The incident energy on these residential units is not high and does not pose the dangers of larger equipment.
PI No. 1444-NFPA 70-2023 Section 440.14

Related Item

• PI 1444- NFPA 70-2023

Submitter Information Verification

Submitter Full Name: George Tidden
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Affiliation: CHP 11 IEC
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 21 09:58:36 EDT 2024
Committee: NEC-P11

Public Comment No. 395-NFPA 70-2024 [Section No. 440.15]

440.15 Split-System Disconnect Identification.

In other than one- and two-family dwellings, in addition to the requirements of 110.22(A), the disconnecting means located at the exterior unit of a split-system HVAC shall identify the location of all indoor units supplied by the disconnect.

Additional Proposed Changes

File Name	Description	Approved
CN_48.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 48 appeared in the First Draft Report on First Revision No. 8026.

The Correlating Committee directs that CMP 11 review FR 8026. The list of standard terms in the NEC Style includes “disconnecting means” (a noun that is defined in Article100), rather than “disconnect” (a verb). The Correlating Committee directs CMP 11 to review the two instances of “disconnect” being used as a noun.

Related Item

• First Revision No. 8026

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 14:35:01 EDT 2024
Committee: NEC-P11

Correlating Committee Note No. 48-NFPA 70-2024 [Section No. 440.15]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Tue May 07 15:55:49 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs that CMP 11 review FR 8026. The list of standard terms in the NEC Style includes “disconnecting means” (a noun that is defined in Article 100), rather than “disconnect” (a verb). The Correlating Committee directs CMP 11 to review the two instances of “disconnect” being used as a noun.

First Revision No. 8026-NFPA 70-2024 [New Section after 440.14]

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 1460-NFPA 70-2024 [Section No. 460.3]

460.3 Reconditioned Equipment.

Reconditioned capacitors shall not be ~~installed~~ permitted .

Statement of Problem and Substantiation for Public Comment

This public comment is made to address an issue with the first draft language changes. The proposed language in this first revision allows electrical equipment to be reconditioned in place as the language pertains to the installation process and not to when any equipment is reconditioned in place. With the existing language in this first revision, the only time reconditioned equipment would not be permitted is if it is being installed. The Code does apply to existing equipment when additions or modifications are being made. The proposed language change from "installed" to "permitted" is more inclusive.

Related Item

• FR 8136

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
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City:
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Submittal Date: Fri Aug 23 09:28:54 EDT 2024
Committee: NEC-P11

Public Comment No. 405-NFPA 70-2024 [Sections 460.8, 460.9, 460.10]

Sections 460.8, 460.9, 460.10

460.8 Conductors — Ampacity.

The ampacity of capacitor circuit conductors shall not be less than 135 percent of the rated current of the capacitor. The ampacity of conductors that connect a capacitor to the terminals of a motor or to motor circuit conductors shall not be less than one-third the ampacity of the motor circuit conductors and in no case less than 135 percent of the rated current of the capacitor.

460.9 Overcurrent Protection.

An overcurrent device shall be provided in each ungrounded conductor for each capacitor bank. The rating or setting of the overcurrent device shall be as low as practicable.

Exception: A separate overcurrent device shall not be required for a capacitor connected on the load side of a motor overload protective device.

460.10 Disconnecting Means.

A disconnecting means shall be provided in each ungrounded conductor for each capacitor bank and shall meet the following requirements:

(1) The disconnecting means shall open all ungrounded conductors simultaneously.

(2) The disconnecting means shall be permitted to disconnect the capacitor from the line as a regular operating procedure.

(3) The rating of the disconnecting means shall not be less than 135 percent of the rated current of the capacitor.

Exception: A separate disconnecting means shall not be required where a capacitor is connected on the load side of a motor controller.

Additional Proposed Changes

File Name	Description	Approved
CN_49.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 49 appeared in the First Draft Report on First Revision No. 8144.

The Correlating Committee directs that CMP 11 review FR 8144 and clarify in 460.9“low as practicable” as the phrase is vague and unenforceable. The objective criteria for device settings should be identified. Refer to the NEC Style Manual Section 3.5.4.

Related Item

• First Revision No. 8144

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 15:26:36 EDT 2024
Committee: NEC-P11

Correlating Committee Note No. 49-NFPA 70-2024 [Sections 460.8, 460.9, 460.10]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Tue May 07 15:57:36 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs that CMP 11 review FR 8144 and clarify in 460.9 “low as practicable” as the phrase is vague and unenforceable. The objective criteria for device settings should be identified. Refer to the NEC Style Manual Section 3.5.4.

First Revision No. 8144-NFPA 70-2024 [Section No. 460.8]

Ballot Results

This item has passed ballot

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 1461-NFPA 70-2024 [Section No. 470.3]

470.3 Reconditioned Equipment.

(A) Permitted~~- to be Installed~~ .

Reconditioned reactors shall be permitted~~- to be installed~~ .

(B) Not Permitted~~- to be Installed~~ .

Reconditioned resistors shall not be ~~installed~~ permitted .

Statement of Problem and Substantiation for Public Comment

This public comment is made to address an issue with the first draft language changes. The proposed language in this first revision allows electrical equipment to be reconditioned in place as the language pertains to the installation process and not to when any equipment is reconditioned in place. With the existing language in this first revision, the only time reconditioned equipment would not be permitted is if it is being installed. The Code does apply to existing equipment when additions or modifications are being made. The proposed language change from "installed" to "permitted" is more inclusive.

Related Item

• FR 8148

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
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City:
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Submittal Date: Fri Aug 23 09:30:54 EDT 2024
Committee: NEC-P11

Public Comment No. 105-NFPA 70-2024 [New Part after I.]

Mini Split units.

Mini split units shall not use the equipment grounding conductor as a current carrying conductor for the neutral load of the 120 volt fan motor or any other 120 volt load. A separate grounded conductor shall be supplied for all units that have 120 volt loads.

Reason for comment, Most if not all 240 volt mini split units have a 3 conductor circuit installed to a terminal board on the condenser unit and then uses the equipment grounding conductor to get 120 volts to the indoor head unit for the fan motor and controls which induces voltage on the equipment grounding conductor. with a mini split unit with 1 blower head running, a current leakage test indicates in excess of 40mA which will trip a GFCI or 30mA GFP which is the A/C unit of choice on floating structures.

Statement of Problem and Substantiation for Public Comment

This would remove current induced on the equipment ground of the mini split and resolve current leakage and tripping GFCI and GFP devices making the installation safer especially on floating structures.

Related Item

• Air conditioning and refridgeration

Submitter Information Verification

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Submittal Date: Wed Jul 17 15:47:20 EDT 2024
Committee: NEC-P11

Public Comment No. 374-NFPA 70-2024 [Section No. A.1]

A.1

Table A.1(a) Product Safety Standards for Conductors and Equipment That Have an Associated Listing Requirement

Article	Standard Number	Standard Title
110	UL 10C-2016	Positive Pressure Fire Tests of Door Assemblies
	UL 305-2012	Panic Hardware
	UL 486D-2015	Sealed Wire Connector Systems
	UL 2043-2013	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
	UL 62275-2021	Cable Management Systems — Cable Ties for Electrical Installations
130	UL 60730-1	Automatic Electrical Controls
210	UL 498-2017	Attachment Plugs and Receptacles
	UL 935-2001	Fluorescent-Lamp Ballasts
	UL 943-2016	Ground Fault Circuit Interrupters
	UL 1029-1994	High-Intensity-Discharge Lamp Ballasts
	UL 1699-2017	Arc-Fault Circuit-Interrupters
	UL 1699A-2010	Outlet Branch Circuit Outlet Branch Circuit Arc-Fault Circuit-Interrupters
225	UL 6-2022	Electrical Rigid Metal Conduit — Steel
	UL 6A-2008	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 360-2013	Liquid-Tight Flexible Metal Conduit
	UL 651-2011	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 1242-2006	Electrical Intermediate Metal Conduit — Steel
	UL 1660-2019	Liquid-Tight Flexible Nonmetallic Conduit
	UL 2515-2019	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
230	UL 6-2022	Electrical Rigid Metal Conduit — Steel
	UL 6A-2008	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 67-2018	Panelboards
	UL 98-2016	Enclosed and Dead-Front Switches
	UL 218-2015	Fire Pump Controllers
	UL 231-2016	Power Outlets
	UL 360-2013	Liquid-Tight Flexible Metal Conduit
	UL 414-2016	Meter Sockets
	UL 486A-486B-2016	Wire Connectors
	UL 486C-2018	Splicing Wire Connectors
	UL 489-2016	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 508-2018	Industrial Control Equipment
	UL 508A-2018	Industrial Control Panels
	UL 514B-2012	Conduit, Tubing and Cable Fittings
	UL 651-2011	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 845-2021	Motor Control Centers

Article	Standard Number	Standard Title
	UL 857-2009	Busways
	UL 869A-2006	Reference Standard for Service Equipment
	UL 891-2019	Switchboards
	UL 977-2012	Fused Power-Circuit Devices
	UL 1008-2014	Transfer Switch Equipment
	UL 1008M-2022	Meter-Mounted Transfer Switches
	UL 1008S-2012	Solid-State Transfer Switches
	UL 1053-2015	Ground-Fault Sensing and Relaying Equipment
	UL 1062-1997	Unit Substations
	UL 1066-2022	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 1242-2006	Electrical Intermediate Metal Conduit — Steel
	UL 1429-2000	Pullout Switches
	UL 1449-2021	Surge Protective Devices
	UL 1558-2016	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
	UL 1660-2019	Liquid-Tight Flexible Nonmetallic Conduit
	UL 1740-2018	Robots and Robotic Equipment
	UL 1953-2020	Power Distribution Blocks
	UL 2011-2022	Machinery
	UL 2200-2012	Stationary Engine Generator Assemblies
	UL 2416-2015	Audio/Video, Information and Communication Technology Equipment Cabinet, Enclosure and Rack Systems
	UL 2446-2004	Unitary Boiler Room Systems
	UL 2565-2013	Industrial Metalworking and Woodworking Machine Tools
	UL 2735-2011	Electric Utility Meters
	UL 2745-2014	Meter Socket Adapters for Communications Equipment
	UL 2876-2022	Remote Racking Devices for Switchgear and Controlgear
	UL 4248-1-2022	Fuseholders — Part 1: General Requirements
	UL 60947-1-2012	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 61800-5-1-2022	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
240	UL 248-1-2000	Low-Voltage Fuses — Part 1: General Requirements
	UL 248-2-2000	Low-Voltage Fuses — Part 2: Class C Fuses
	UL 248-3-2000	Low-Voltage Fuses — Part 2: Class CA and CB Fuses
	UL 248-4-2000	Low-Voltage Fuses — Part 4: Class CC Fuses
	UL 248-5-2000	Low-Voltage Fuses — Part 5: Class G Fuses
	UL 248-6-2000	Low-Voltage Fuses — Part 6: Class H Non-Renewable Fuses
	UL 248-8-2011	Low-Voltage Fuses — Part 8: Class J Fuses
	UL 248-9-2000	Low-Voltage Fuses — Part 9: Class K Fuses
	UL 248-10-2011	Low-Voltage Fuses — Part 10: Class L Fuses
	UL 248-11-2011	Low-Voltage Fuses — Part 11: Plug Fuses
	UL 248-12-2011	Low-Voltage Fuses — Part 12: Class R Fuses
	UL 248-15-2018	Low-Voltage Fuses — Part 15: Class T Fuses
	UL 248-17-2018	Low-Voltage Fuses — Part 17: Class CF Fuses

Article	Standard Number	Standard Title
	UL 248-18-2022	Low-Voltage Fuses — Part 18: Class CD Fuses
	UL 489-2016	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures
	UL 489I-2022	Solid State Molded-Case Circuit Breakers
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 1053-2015	Ground-Fault Sensing and Relaying Equipment
	UL 1066-2022	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 4248-1-2022	Fuseholders — Part 1: General Requirements
242	UL 1449-2021	Surge Protective Devices
250	UL 1-2005	Flexible Metal Conduit
	UL 4-2004	Armored Cable
	UL 5-2016	Surface Metal Raceways and Fittings
	UL 6-2022	Electrical Rigid Metal Conduit — Steel
	UL 6A-2008	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 153-2014	Portable Electric Luminaires
	UL 360-2013	Liquid-Tight Flexible Metal Conduit
	UL 467-2022	Grounding and Bonding Equipment
	UL 486A-486B-2018	Wire Connectors
	UL 486C-2018	Splicing Wire Connectors
	UL 486D-2015	Sealed Wire Connector Systems
	UL 498-2017	Attachment Plugs and Receptacles
	UL 504-2022	Mineral-Insulated, Metal-Sheathed Cable
	UL 514A-2013	Metallic Outlet Boxes
	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 797-2007	Electrical Metallic Tubing — Steel
	UL 797A-2014	Electrical Metallic Tubing — Aluminum
	UL 1242-2006	Electrical Intermediate Metal Conduit — Steel
	UL 1569-2018	Metal-Clad Cables
	UL 1652-2006	Flexible Metallic Tubing
300	UL 4-2004	Armored Cable
	UL 44-2018	Thermoset-Insulated Wires and Cables
	UL 83-2017	Thermoplastic-Insulated Wires and Cables
	UL 83A-2016	Fluoropolymer Insulated Wire
	UL 263-2011	Fire Tests of Building Construction and Materials
	UL 504-2022	Mineral-Insulated, Metal-Sheathed Cable
	UL 746C-2018	Polymeric Materials — Use in Electrical Equipment Evaluations
	UL 1569-2018	Metal-Clad Cable
	UL 1581-2001	Reference Standard for Electrical Wires, Cables, and Flexible Cords
	UL 2239-2015	Hardware for Support of Conduit, Tubing and Cable
	UL 2556-2021	Wire and Cable Test Methods
	UL 62275-2021	Cable Management Systems — Cable Ties for Electrical Installations
310	UL 44-2018	Thermoset-Insulated Wires and Cables

Article	Standard Number	Standard Title
	UL 83-2017	Thermoplastic-Insulated Wires and Cables
	UL 83A-2016	Fluoropolymer Insulated Wire
	UL 83B	Switchboard and Switchgear Wires and Cables
	UL 224-2021	Extruded Insulating Tubing
	UL 493-2018	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
	UL 854-2020	Service-Entrance Cables
	UL 1063-2017	Machine-Tool Wires and Cables
	UL 1441-2021	Coated Electrical Sleeving
	UL 1581-2021	Reference Standard for Electrical Wires, Cables, and Flexible Cords
312	UL 50-2015	Enclosures for Electrical Equipment
	UL 50E-2020	Enclosures for Electrical Equipment, Environmental Considerations
	UL 514C-2014	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 2808-2020	Energy Monitoring Equipment
	UL 61010-1-2012	Electrical Equipment for Measurement, Control, and Laboratory Use — Part 1: General Requirements
	UL 61010-2-030-2018	Electrical Equipment for Measurement, Control, and Laboratory Use — Part 2-030: Particular Requirements for Testing and Measuring Circuits
314	UL 50-2015	Enclosures for Electrical Equipment
	UL 50E-2020	Enclosures for Electrical Equipment, Environmental Considerations
	UL 486D-2015	Sealed Wire Connector Systems
	UL 498-2017	Attachment Plugs and Receptacles
	UL 498B-2022	Receptacles with Integral Switching Means
	UL 498D-2020	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E-2020	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
	UL 514A-2013	Metallic Outlet Boxes
	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 514C-2014	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 514D-2013	Cover Plates for Flush-Mounted Wiring Devices
	UL 1953-2020	Power Distribution Blocks
315	ANSI C119.4	Electric Connectors — Connectors for Use between Aluminum-to-Aluminum and Aluminum-to-Copper Conductors Designed for Normal Operation at or Below 93ºC and Copper-to-Copper Conductors Designed for Normal Operation at or Below 100ºC
	IEEE 48	IEEE Standard for Test Procedures and Requirements for Alternating-Current Cable Terminations Used on Shielded Cables Having Laminated Insulation Rated 2.5 kV through 765 kV or Extruded Insulation Rated 2.5 kV through 500 kV
	IEEE 386	IEEE Standard for Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5 kV through 35 kV
	IEEE 404	IEEE Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2.5 kV to 500 kV
	UL 4-2004	Armored Cable

Article	Standard Number	Standard Title
	UL 504-2022	Mineral-Insulated, Metal-Sheathed Cable
	UL 1072-2006	Medium Voltage Power Cables
	UL 1569-2018	Metal-Clad Cable
320	UL 4-2004	Armored Cable
	UL 44-2018	Thermoset-Insulated Wires and Cables
	UL 83-2017	Thermoplastic-Insulated Wires and Cables
	UL 83A-2016	Fluoropolymer Insulated Wire
	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 514C-2014	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 1063-2017	Machine-Tool Wires and Cables
	UL 1565-2022	Positioning Devices
	UL 2239-2015	Hardware for the Support of Conduit, Tubing, and Cable
322	UL 486A-486B-2018	Wire Connectors
	UL 498-2017	Attachment Plugs and Receptacles
	UL 514A-2013	Metallic Outlet Boxes
324	UL 486A-486B-2018	Wire Connectors
	UL 498-2017	Attachment Plugs and Receptacles
330	UL 44-2018	Thermoset-Insulated Wires and Cables
	UL 66-2023	Fixture Wire
	UL 83-2017	Thermoplastic-Insulated Wires and Cables
	UL 83A-2016	Fluoropolymer Insulated Wire
	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 1063-2017	Machine-Tool Wires and Cables
	UL 1565-2022	Positioning Devices
	UL 1569-2018	Metal-Clad Cables
	UL 2225-2013	Cables and Cable-Fittings For Use In Hazardous (Classified) Locations
	UL 2239-2015	Hardware for the Support of Conduit, Tubing, and Cable
332	UL 504-2022	Mineral-Insulated, Metal-Sheathed Cable
	UL 514B-2012	Conduit, Tubing and Cable Fittings
334	UL 719-2015	Nonmetallic-Sheathed Cables
	UL 2256-2001	Nonmetallic Sheathed Cable Interconnects
	UL 62275-2021	Cable Management Systems — Cable Ties for Electrical Installations
335	UL 2250-2017	Instrumentation Tray Cable
336	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 1277-2018	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
	UL 2225-2013	Cables and Cable-Fittings For Use In Hazardous (Classified) Locations
337	UL 1309A-2020	Cable for Use in Mobile Installations
338	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 854-2020	Service-Entrance Cables

Article	Standard Number	Standard Title
340	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 493-2018	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 1242-2006	Electrical Intermediate Metal Conduit — Steel
344	UL 6-2022	Electrical Rigid Metal Conduit — Steel
	UL 6A-2008	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 514B-2012	Conduit, Tubing, and Cable Fittings
348	UL 1-2005	Flexible Metal Conduit
	UL 62275-2021	Cable Management Systems — Cable Ties for Electrical Installations
350	UL 360-2013	Liquid-Tight Flexible Steel Conduit
	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 62275-2021	Cable Management Systems — Cable Ties for Electrical Installations
352	UL 651-2011	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
353	UL 651A-2011	Schedule 40 and 80 High Density Polyethylene (HDPE) Conduit
354	UL 1990-2013	Nonmetallic Underground HDPE Conduit with Conductors
355	UL 2420-2009	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515-2019	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515A-2011	Supplemental Requirements for Extra-Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
356	UL 1660-2019	Liquid-Tight Flexible Nonmetallic Conduit
	UL 62275-2021	Cable Management Systems — Cable Ties for Electrical Installations
358	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 797-2007	Electrical Metallic Tubing — Steel
	UL 797A-2014	Electrical Metallic Tubing — Aluminum and Stainless Steel
360	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 1652-2006	Flexible Metallic Tubing
362	UL 1653-2019	Electrical Nonmetallic Tubing
	UL 62275-2021	Cable Management Systems — Cable Ties for Electrical Installations
366	UL 870-2016	Wireways, Auxiliary Gutters, and Associated Fittings
368	UL 509-2015	Bus Drop Cable
370	ANSI/CSA C22.2 No. 273	Cablebus
371	UL 1386-2022	Flexible Bus Systems
	UL 1387-2022	Flexible Insulated Bus
374	UL 209-2011	Cellular Metal Floor Raceways and Fittings
	UL 360-2013	Liquid-Tight Flexible Metal Conduit
	UL 1660-2019	Liquid-Tight Flexible Nonmetallic Conduit
376	UL 870-2016	Wireways, Auxiliary Gutters, and Associated Fittings

Article	Standard Number	Standard Title
	UL 1953-2020	Power Distribution Blocks
378	UL 870-2016	Wireways, Auxiliary Gutters, and Associated Fittings
382	UL 5A-2015	Nonmetallic Surface Raceways and Fittings
	UL183-2009	Manufactured Wiring Systems
	UL 467-2022	Grounding and Bonding Equipment
	UL 498-2017	Attachment Plugs and Receptacles
	UL 498D-2020	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E-2020	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
	UL 498F-2020	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 498M-2020	Marine Shore Power Inlets
	UL 514D-2013	Cover Plates for Flush-Mounted Wiring Devices
	UL 746C-2018	Polymeric Materials — Use in Electrical Equipment Evaluations
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 991-2004	Tests for Safety-Related Controls Employing Solid-State Devices
	UL 1077-2015	Supplementary Protectors for Use in Electrical Equipment
	UL 1699-2017	Arc-Fault Circuit-Interrupters
	UL 1998-2013	Software in Programmable Components
384	UL 5B-2004	Strut-Type Channel Raceways and Fittings
386	UL 5-2016	Surface Metal Raceways and Fittings
388	UL 5A-2015	Nonmetallic Surface Raceways and Fittings
392	UL 62275-2021	Cable Management Systems — Cable Ties for Electrical Installations
393	UL 13-2015	Power-Limited Circuit Cables
	UL 50-2015	Enclosures for Electrical Equipment, Non-Environmental Considerations
	UL 50E-2020	Enclosures for Electrical Equipment, Environmental Considerations
	UL 514C-2014	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 1310-2018	Class 2 Power Units
	UL 2043-2013	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
	UL 2577-2013	Suspended Ceiling Power Grid Systems and Equipment
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
396	UL 1072-2006	Medium-Voltage Power Cables
404	ANSI/NEMA WD 6–2016	Wiring Devices — Dimensional Specifications
	UL 20-2018	General-Use Snap Switches
	UL 98-2016	Enclosed and Dead-Front Switches
	UL 98A-2014	Open-Type Switches
	UL 363-2011	Knife Switches
	UL 489-2016	Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Timers and Time Switches
	UL 773-2016	Plug-In Locking Type Photocontrols for Use with Area Lighting

Article	Standard Number	Standard Title
	UL 773A-2016	Nonindustrial Photoelectric Switches for Lighting Control
	UL 917-2006	Clock-Operated Switches
	UL 977-2012	Fused Power-Circuit Devices
	UL 1066-2022	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 1472-2015	Solid-State Dimming Controls
	UL 1429-2000	Pullout Switches
	UL 60730-1-2016	Automatic Electrical Controls — Part 1: General Requirements
	UL 60730-2-2020	Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Timers and Time Switches
	UL 60730-2-7-2014	Automatic Electrical Controls for Household and Similar Use; Part 2: Particular Requirements for Timers and Time Switches
406	UL 498-2017	Attachment Plugs and Receptacles
	UL 498B-2022	Receptacles with Integral Switching Means
	UL 498D-2020	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E-2020	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
	UL 498F-2020	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 498M-2020	Marine Shore Power Inlets
	UL 514A-2013	Metallic Outlet Boxes
	UL 514C-2014	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 514D-2013	Cover Plates for Flush-Mounted Wiring Devices
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 943B-2017	Appliance Leakage-Current Interrupters
	UL 943C-2012	Special Purpose Ground-Fault Circuit-Interrupters
	UL 970-2020	Retail Fixtures and Merchandising Displays
	UL 1053-2015	Ground-Fault Sensing and Relaying Equipment
		See 406.4(D)(8)
	UL 1286-2022	Office Furnishings Systems
	UL 1310-2018	Class 2 Power Units
	UL 1682-2017	Plugs, Receptacles, and Cable Connectors, of the Pin and Sleeve Type
	UL 1691-2021	Single Pole Locking-Type Separable Connectors
	UL 1699-2017	Arc-Fault Circuit-Interrupters
	UL 1699A-2010	Outlet Branch Circuit AFCIs
		See 406.4(D)(4)(1)
	UL 2999-2020	Individual Commercial Office Furnishings
408	UL 44-2018	Thermoset-Insulated Wires and Cables
	UL 67-2018	Panelboards
	UL 891-2019	Switchboards
	UL 1558-2016	Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear
409	UL 508-2018	Industrial Control Equipment
	UL 508A-2018	Industrial Control Panels

Article	Standard Number	Standard Title
410	ANSI/CSA-C22.2 No. 184.2	Solid-State Controls for Lighting Systems (SSCLS)
	UL 153-2014	Portable Electric Luminaires
	UL 496-2017	Lampholders
	UL 498-2017	Attachment Plugs and Receptacles
	UL 498B-2022	Receptacles with Integral Switching Means
	UL 498D-2020	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E-2020	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
	UL 498F-2020	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 542-2005	Fluorescent Lamp Starters
	UL 588-2015	Seasonal and Holiday Decorative Products
	UL 935-2001	Fluorescent-Lamp Ballasts
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 970-2020	Retail Fixtures and Merchandising Displays
	UL 1029-1994	High-Intensity-Discharge Lamp Ballasts
	UL 1029A-2006	Ignitors and Related Auxiliaries for HID Lamp Ballasts
	UL 1574-2004	Track Lighting Systems
	UL 1598-2008	Luminaires
	UL 1598B-2000	Luminaire Reflector Kits for Installation on Previously Installed Fluorescent Luminaires, Supplemental Requirements
	UL 1598C-2014	Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits
	UL 1993-2017	Self-Ballasted Lamps and Lamp Adapters
	UL 2388-2017	Flexible Lighting Products
	UL 8750-2015	Light Emitting Diode (LED) Equipment for Use in Lighting Products
	UL 8752-2012	Organic Light Emitting Diode (OLED) Panels
	UL 8753-2013	Field-Replaceable Light Emitting Diode (LED) Light Engines
	UL 8754-2013	Holders, Bases and Connectors for Solid-State (LED) Light Engines and Arrays
	UL 8800-2019	Horticultural Lighting Equipment and Systems
411	UL 1310-2018	Class 2 Power Units
	UL 1838-2003	Low-Voltage Landscape Lighting Systems
	UL 2108-2015	Low-Voltage Lighting Systems
	UL 5085-3-2006	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
422	ANSI/CSA-C22.2 No. 339	Hand-held motor-operated electric tools — Safety — Particular requirements for chain beam saws
	UL 22-2008	Amusement and Gaming Machines
	UL 73-2011	Motor-Operated Appliances
	UL 82-2017	Electric Gardening Appliances
	UL 122-2007	Photographic Equipment
	UL 141-2011	Garment Finishing Appliances
	UL 174-2004	Household Electric Storage Tank Water Heaters
	UL 197-2010	Commercial Electric Cooking Appliances

Article	Standard Number	Standard Title
	UL 283-2015	Air Fresheners and Deodorizers
	UL 399-2017	Drinking Water Coolers
	UL 430-2015	Waste Disposers
	UL 498-2017	Attachment Plugs and Receptacles
	UL 498D-2020	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E-2020	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
	UL 498F-2020	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 499-2014	Electric Heating Appliances
	UL 507-2017	Electric Fans
	UL 514A-2013	Metallic Outlet Boxes
	UL 515-2015	Electrical Resistance Trace Heating for Commercial Applications
	UL 561-2011	Floor Finishing Machines
	UL 574-2003	Electric Oil Heaters
	UL 621-2010	Ice Cream Makers
	UL 705-2017	Power Ventilators
	UL 710B-2011	Recirculating Systems
	UL 749-2017	Household Dishwashers
	UL 751-2016	Vending Machines
	UL 763-2018	Motor-Operated Commercial Food Preparing Machines
	UL 778-2016	Motor-Operated Water Pumps
	UL 834-2004	Heating, Water Supply, and Power Boilers — Electric
	UL 858-2014	Household Electric Ranges
	UL 859	Household Electric Personal Grooming Appliances
	UL 875-2009	Electric Dry-Bath Heaters
	UL 921-2020	Commercial Dishwashers
	UL 923-2013	Microwave Cooking Appliances
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 962-2014	Household and Commercial Furnishings
	UL 962A-2018	Furniture Power Distribution Units
	UL 979-2016	Water Treatment Appliances
	UL 982-2019	Motor-Operated Household Food Preparing Machines
	UL 987-2011	Stationary and Fixed Electric Tools
	UL 1017-2017	Vacuum Cleaners, Blower Cleaners, and Household Floor Finishing Machines
	UL 1026-2012	Household Electric Cooking and Food Serving Appliances
	UL 1086-2016	Household Trash Compactors
	UL 1090-2016	Electric Snow Movers
	UL 1206-2003	Electric Commercial Clothes-Washing Equipment
	UL 1240-2005	Electric Commercial Clothes-Drying Equipment
	UL 1278-2014	Movable and Wall- or Ceiling-Hung Electric Room Heaters
	UL 1447-2017	Electric Lawn Mowers

Article	Standard Number	Standard Title
	UL 1450-2010	Motor-Operated Air Compressors, Vacuum Pumps, and Painting Equipment
	UL 1453-2016	Electric Booster and Commercial Storage Tank Water Heaters
	UL 1576-2022	Flashlights and Lanterns
	UL 1594-2008	Sewing and Cutting Machines
	UL 1647-2015	Motor-Operated Massage and Exercise Machines
	UL 1727-2012	Commercial Electric Personal Grooming Appliances
	UL 1776-2002	High-Pressure Cleaning Machines
	UL 2157-2015	Electric Clothes Washing Machines and Extractors
	UL 2158-2018	Electric Clothes Dryers
	UL 2565-2013	Industrial Metalworking and Woodworking Machine Tools
	UL 60335-2-3-2004	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Electric Irons
	UL 60335-2-8-2018	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Shavers, Hair Clippers, and Similar Appliances
	UL 60335-2-24-2017	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice-Makers
	UL 60335-2-40-2019	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers
	UL 60335-2-67-2017	Household and Similar Electrical Appliances — Safety — Part 2-67: Particular Requirements for Floor Treatment Machines, For Commercial Use
	UL 60335-2-68-2020	Household and Similar Electrical Appliances — Safety — Part 2-68: Particular Requirements for Spray Extraction Machines, for Commercial Use
	UL 60335-2-79-2016	Household and Similar Electrical Appliances — Safety — Part 2-79: Particular Requirements for High Pressure Cleaners and Steam Cleaners
	UL 60730-2-9-2010	Automatic Electrical Controls; Part 2: Particular Requirements for Temperature Sensing Controls
	UL 60745-1-2007	Hand-Held Motor-Operated Electric Tools — Safety — Part 1: General Requirements
	UL 60745-2-1-2004	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-1: Particular Requirements for Drills and Impact Drills
	UL 60745-2-2-2004	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-2: Particular Requirements for Screwdrivers and Impact Wrenches
	UL 60745-2-3-2007	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-3: Particular Requirements for Grinders, Polishers, and Disk-Type Sanders
	UL 60745-2-4-2004	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-4: Particular Requirements for Sanders and Polishers Other Than Disk Type
	UL 60745-2-5-2012	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-5: Particular Requirements for Circular Saws
	UL 60745-2-6-2004	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-6: Particular Requirements for Hammers

Article	Standard Number	Standard Title
	UL 60745-2-8-2004	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-8: Particular Requirements for Shears and Nibblers
	UL 60745-2-9-2004	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-9: Particular Requirements for Tappers
	UL 60745-2-11-2004	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-11: Particular Requirements for Reciprocating Saws
	UL 60745-2-12-2005	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-12: Particular Requirements For Concrete Vibrators
	UL 60745-2-13-2011	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-13: Particular Requirements For Chain Saws
	UL 60745-2-14-2004	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-14: Particular Requirements for Planers
	UL 60745-2-15-2010	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-15: Particular Requirements for Hedge Trimmers
	UL 60745-2-16-2009	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-16: Particular Requirements for Tackers
	UL 60745-2-17-2011	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-17: Particular Requirements for Routers and Trimmers
	UL 60745-2-18-2005	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-18: Particular Requirements For Strapping Tools
	UL 60745-2-19-2005	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-19: Particular Requirements for Jointers
	UL 60745-2-20-2005	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-20: Particular Requirements for Band Saws
	UL 60745-2-21-2005	Hand-Held Motor-Operated Electric Tools — Safety — Part 2-21: Particular Requirements For Drain Cleaners
	UL 60745-2-22-2012	Hand-Held Motor-Operated electric Tools — Safety — Part 2-22: Particular Requirements for Cut-Off Machines
	UL 60745-2-23-2013	Hand-Held Motor-Operated electric Tools — Safety — Part 2-23: Particular Requirements for Die Grinders and Small Rotary Tools
	UL 62841-1-2015	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 1: General Requirements
	UL 62841-2-1-2018	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-1: Particular Requirements For Hand-Held Drills and Impact Drills
	UL 62841-2-2-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-2: Particular Requirements For Screwdrivers And Impact Wrenches
	UL 62841-2-3-2021	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-3: Particular Requirements For Hand-Held Grinders, Polishers, and Disk-Type Sanders
	UL 62841-2-4-2015	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-4: Particular Requirements For Hand-Held Sanders And Polishers Other Than Disc Type
	UL 62841-2-5-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-5: Particular Requirements For Hand-Held Circular Saws

Article	Standard Number	Standard Title
	UL 62841-2-8-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-8: Particular Requirements For Hand-Held Shears and Nibblers
	UL 62841-2-9-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-9: Particular Requirements For Hand-Held Tappers And Threaders
	UL 62841-2-10-2017	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-10: Particular Requirements For Hand-Held Mixers
	UL 62841-2-11-2017	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-11: Particular Requirements for Hand-Held Reciprocating Saws
	UL 62841-2-14-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-14: Particular Requirements For Hand-Held Planers
	UL 62841-2-17-2018	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-17: Particular Requirements For Hand-Held Routers
	UL 62841-2-21-2018	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-21: Particular Requirements For Hand-Held Drain Cleaners
	UL 62841-3-1-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-1: Particular Requirements For Transportable Table Saws
	UL 62841-3-4-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-4: Particular Requirements for Transportable Bench Grinders
	UL 62841-3-6-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-6: Particular Requirements For Transportable Diamond Drills with Liquid System
	UL 62841-3-9-2021	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-9: Particular Requirements For Transportable Mitre Saws
	UL 62841-3-10-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-10: Particular Requirements for Transportable Cut-Off Machines
	UL 62841-3-12-2019	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-12: Particular Requirements for Transportable Threading Machines
	UL 62841-3-13-2018	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-13: Particular Requirements For Transportable Drills
	UL 62841-3-14-2019	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-14: Particular Requirements for Transportable Drain Cleaners
	UL 62841-3-1000-2019	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-1000: Particular Requirements for Transportable Laser Engravers
	UL 62841-4-1-2020	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 4-1: Particular Requirements for Chain Saws
	UL 62841-4-2-2019	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 4-2: Particular

Article	Standard Number	Standard Title
		Requirements for Hedge Trimmers
	UL 62841-4-1000-2020	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 4-1000: Particular Requirements For Utility Machines
424	UL 499-2014	Electric Heating Appliances
	UL 1042-2009	Electric Baseboard Heating Equipment
	UL 1673-2010	Electric Space Heating Cables
	UL 1693-2010	Electric Radiant Heating Panels and Heating Panel Sets
	UL 1995-2015	Heating and Cooling Equipment
	UL 1996-2009	Electric Duct Heaters
	UL 2021-2015	Fixed and Location-Dedicated Electric Room Heaters
	UL 2683-2020	Electric Heating Products for Floor and Ceiling Installation
425	UL 508-2018	Industrial Control Equipment
	UL 2021-2015	Fixed and Location-Dedicated Electric Room Heaters
426	IEEE 515	Testing, Design, Installation and Maintenance of Electrical Resistance Trace Heating for Industrial Applications
	UL 1588-2002	Roof and Gutter De-Icing Cable Units
	UL 2049-2006	Residential Pipe Heating Cable
427	IEEE 515	Testing, Design, Installation and Maintenance of Electrical Resistance Trace Heating for Industrial Applications
	UL 515-2015	Electrical Resistance Heat Tracing for Commercial Applications
	UL 2049-2006	Residential Pipe Heating Cable
430	UL 4-2004	Armored Cable
	UL 98-2016	Enclosed and Dead-Front Switches
	UL 489-2016	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 508-2018	Industrial Control Equipment
	UL 705-2017	Power Ventilators
	UL 745-1-2007	Portable Electric Tools
	UL 845-2021	Motor Control Centers
	UL 987-2011	Stationary and Fixed Electric Tools
	UL 1004-1-2012	Rotating Electrical Machines — General Requirements
	UL 1004-2-2014	Impedance Protected Motors
	UL 1004-3-2015	Thermally Protected Motors
	UL 1004-6-2012	Servo and Stepper Motors
	UL 1004-7-2018	Electronically Protected Motors
	UL 1004-8-2013	Inverter Duty Motors
	UL 1004-9-2016	Form Wound and Medium Voltage Rotating Electrical Machines
	UL 1066-2022	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 1569-2018	Metal Clad Cables
	UL 1812-2013	Ducted Heat Recovery Ventilators
	UL 1815-2012	Nonducted Heat Recovery Ventilators
	UL 2565-2013	Industrial Metalworking and Woodworking Machine Tools

Article	Standard Number	Standard Title
	UL 60034-1-2018	Rotating Electrical Machines — Part 1: Rating and Performance
	UL 60335-2-40-2019	Household and Similar Electrical Appliances — Part 2: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers
	UL 60730-2-22-2017	Automatic Electrical Controls — Part 2: Particular Requirements for Thermal Motor Protectors
	UL 60745-1-2007	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 1: General Requirements
	UL 60745-2-1-2004	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-1: Particular Requirements For Hand-Held Drills and Impact Drills
	UL 60745-2-2-2004	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-2: Particular Requirements For Screwdrivers And Impact Wrenches
	UL 60745-2-3-2007	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-3: Particular Requirements For Hand-Held Grinders, Polishers, and Disk-Type Sanders
	UL 60745-2-4-2004	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-4: Particular Requirements For Hand-Held Sanders And Polishers Other Than Disc Type
	UL 60745-2-5-2012	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-5: Particular Requirements For Hand-Held Circular Saws
	UL 60745-2-8-2004	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-8: Particular Requirements For Hand-Held Shears and Nibblers
	UL 60947-1-2022	Low-Voltage Switchgear and Controlgear — Part 1: General Rules
	UL 60947-4-1-2022	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2-2022	Low-Voltage Switchgear and Controlgear — Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 60947-5-1-2022	Low-Voltage Switchgear and Controlgear — Part 5-1: Control Circuit Devices and Switching Elements — Electromechanical Control Circuit Devices
	UL 60947-5-2-2022	Low-Voltage Switchgear and Controlgear — Part 5-2: Control Circuit Devices and Switching Elements — Proximity Switches
	UL 61800-5-1-2012	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
	UL 62841-2-9-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-9: Particular Requirements For Hand-Held Tappers And Threaders
	UL 62841-2-10-2017	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-10: Particular Requirements For Hand-Held Mixers
	UL 62841-2-11-2017	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-11: Particular Requirements for Hand-Held Reciprocating Saws

Article	Standard Number	Standard Title
	UL 62841-2-14-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-14: Particular Requirements For Hand-Held Planers
	UL 62841-2-17-2018	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-17: Particular Requirements For Hand-Held Routers
	UL 62841-2-21-2018	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 2-21: Particular Requirements For Hand-Held Drain Cleaners
	UL 62841-3-1-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-1: Particular Requirements For Transportable Table Saws
	UL 62841-3-4-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-4: Particular Requirements for Transportable Bench Grinders
	UL 62841-3-6-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-6: Particular Requirements For Transportable Diamond Drills with Liquid System
	UL 62841-3-9-2021	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-9: Particular Requirements For Transportable Mitre Saws
	UL 62841-3-10-2016	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-10: Particular requirements for Transportable Cut-Off Machines
	UL 62841-3-12-2019	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-12: Particular requirements for Transportable Threading Machines
	UL 62841-3-13-2018	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-13: Particular Requirements For Transportable Drills
	UL 62841-3-14-2019	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-14: Particular requirements for Transportable Drain Cleaners
	UL 62841-3-1000-2019	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 3-1000: Particular Requirements for Transportable Laser Engravers
	UL 62841-4-1-2020	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 4-1: Particular Requirements for Chain Saws
	UL 62841-4-2-2019	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 4-2: Particular Requirements for Hedge Trimmers
	UL 62841-4-1000-2020	Electric Motor-Operated Hand-Held Tools, Transportable Tools And Lawn And Garden Machinery — Safety — Part 4-1000: Particular Requirements For Utility Machines
440	UL 98-2016	Enclosed and Dead-Front Switches
	UL 416-1993	Refrigerated Medical Equipment
	UL 484-2014	Room Air Conditioners
	UL 489-2016	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 508-2018	Industrial Control Equipment
	UL 541-2016	Refrigerated Vending Machines

Article	Standard Number	Standard Title
	UL 563-2009	Ice Makers
	UL 1429-2000	Pullout Switches
	UL 1995-2015	Heating and Cooling Equipment
	UL 60335-2-24-2017	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances and Ice-Makers
	UL 60335-2-40-2019	Household and Similar Electrical Appliances, Part 2: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers
	UL 60335-2-89-2017	Household and Similar Electrical Appliances — Safety — Part 2-89: Particular Requirements for Commercial Refrigerating Appliances with an Incorporated or Remote Refrigerant Unit or Compressor
	UL 60947-4-1-2022	Low-Voltage Switchgear and Controlgear — Part 4-1: Contactors and Motor-Starters — Electromechanical Contactors and Motor-Starters
	UL 60947-4-2-2022	Low-Voltage Switchgear and Controlgear — Part 4-2: Contactors and Motor-Starters — AC Semiconductor Motor Controllers and Starters
	UL 61800-5-1-2012	Adjustable Speed Electrical Power Drive Systems — Part 5-2: Safety Requirements — Functional
445	UL 508-2018	Industrial Control Equipment
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 943C-2012	Special Purpose Ground-Fault Circuit-Interrupters
	UL 1004-4-2018	Electric Generators
	UL 1741-2021	Inverters, Converters, Controllers, and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 2200-2012	Stationary Engine Generator Assemblies
450	UL 10C-2016	Positive Pressure Fire Tests of Door Assemblies
	UL 305-2012	Panic Hardware
	UL 340-2017	Tests for Comparative Flammability of Liquids
	UL 60730-2-14-2013	Automatic Electrical Controls; Part 2: Particular Requirements for Electric Actuators
480	UL 10C-2016	Positive Pressure Fire Tests of Door Assemblies
	UL 305-2012	Panic Hardware
	UL 1642-2020	Lithium Batteries
	UL 1973-2022	Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications
	UL 1989-2013	Standby Batteries
	UL 2054-2021	Household and Commercial Batteries
	UL 4127-2014	Low Voltage Battery Cable
	UL 4128-2020	Intercell and Intertier Connectors for use in Electrochemical Battery System Applications
490	UL 347-2020	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL 347A-2021	Medium Voltage Power Conversion Equipment
	UL 347C-2014	Medium Voltage Solid State Resistive Load Controllers, Up to 15kV
	UL 1008A-2017	Transfer Switch Equipment, Over 1000 Volts

Article	Standard Number	Standard Title
500	FM 121303	Guide for Use of Detectors for Flammable Gases
	IEEE 844.1	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — General, Testing, Marking, and Documentation Requirements
	IEEE 1349	Guide for the Application of Electric Machines in Zone 2 and Class I, Division 2 Hazardous (Classified) Locations
	NFPA 33-2024	Standard for Spray Application Using Flammable or Combustible Materials
	NFPA 34-2024	Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids
	NFPA 496-2024	Standard for Purged and Pressurized Enclosures for Electrical Equipment
	UL 674-2022	Electric Motors and Generators for Use in Hazardous (Classified) Locations
	UL 698A-2018	Industrial Control Panels Relating to Hazardous (Classified) Locations
	UL 783-2003	Electric Flashlights and Lanterns for Use in Hazardous (Classified) Locations
	UL 823-2006	Electric Heaters For Use in Hazardous (Classified) Locations
	UL 844-2012	Electric Heaters For Use in Hazardous (Classified) Locations
	UL 913-1997	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
	UL 1203-2013	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 1389-2019	Plant Oil Extraction Equipment for Installation and Use in Ordinary (Unclassified) Locations and Hazardous (Classified) Locations
	UL 1836-2022	Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations
	UL 2225-2013	Cable and Cable Fittings for Use in Hazardous (Classified) Locations
	UL 60079-28-2017	Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation.
	UL 60079-29-1-2019	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
	UL 60079-29-4-2018	Explosive Atmospheres — Part 29-4: Gas Detectors — Performance Requirements of Open Path Detectors for Flammable Gases
	UL 60079-30-1-2017	Explosive Atmospheres — Electrical Resistance Trace Heating — General and Testing Requirements
	UL 60079-33-2021	Explosive Atmospheres — Part 33: Equipment Protection by Special Protection “s”
	UL 121201-2017	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	UL 121303-2020	Guide for Use of Detectors for Flammable Gases
	UL 122001-2014	General Requirements for Electrical Ignition Systems for Internal Combustion Engines in Class I, Division 2 or Zone 2, Hazardous (Classified) Locations
	UL 122701-2022	Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids

Article	Standard Number	Standard Title
501	IEEE 844.1	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — General, Testing, Marking, and Documentation Requirements
	IEEE 1349	Guide for the Application of Electric Machines in Zone 2 and Class I, Division 2 Hazardous (Classified) Locations
	NFPA 496-2024	Standard for Purged and Pressurized Enclosures for Electrical Equipment
	UL 674-2022	Electric Motors and Generators for Use in Hazardous (Classified) Locations
	UL 783-2003	Electric Flashlights and Lanterns for Use in Hazardous (Classified) Locations
	UL 823-2006	Electric Heaters For Use in Hazardous (Classified) Locations
	UL 844-2012	Luminaires for Use in Hazardous (Classified) Locations
	UL 1072-2006	Medium-Voltage Power Cables
	UL 1203-2013	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 1277-2018	Electrical Power and Control Tray Cables with Optional Optical-Fiber Members
	UL 1309A-2020	Cable for Use in Mobile Applications
	UL 1836-2022	Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations
	UL 2225-2013	Cable and Cable-Fittings for Use in Hazardous (Classified) Locations
	UL 60079-28-2017	Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation
	UL 60079-29-1-2019	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
	UL 60079-29-4-2018	Explosive Atmospheres — Part 29-4: Gas Detectors — Performance Requirements of Open Path Detectors for Flammable Gases
	UL 60079-30-1-2017	Explosive Atmospheres — Part 30-1: Electrical Resistance Trace Heating — General and Testing Requirements
	UL 60079-33-2021	Explosive Atmospheres — Part 33: Equipment Protection by Special Protection “s”
	UL 121201-2017	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
	UL 122001-2014	General Requirements for Electrical Ignition Systems for Internal Combustion Engines in Class I, Division 2 or Zone 2, Hazardous (Classified) Locations
	UL 122701-2022	Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids
502	IEEE 844.1	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — General, Testing, Marking, and Documentation Requirements
	NFPA 496-2024	Standard for Purged and Pressurized Enclosures for Electrical Equipment
	UL 674-2022	Electric Motors and Generators for Use in Hazardous (Classified) Locations

Article	Standard Number	Standard Title
	UL 783-2003	Electric Flashlights and Lanterns for Use in Hazardous (Classified) Locations
	UL 823-2006	Electric Heaters For Use in Hazardous (Classified) Locations
	UL 844-2012	Luminaires for Use in Hazardous (Classified) Locations
	UL 1203-2013	Explosionproof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
	UL 1309A-2020	Cable for Mobile Installations
	UL 1836-2022	Outline of Investigation for Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations
	UL 2225-2013	Cable and Cable-Fittings for Use in Hazardous (Classified) Locations
	UL 60079-28-2017	Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation
	UL 60079-30-1-2017	Explosive Atmospheres — Electrical Resistance Trace Heating — General and Testing Requirements
	UL 60079-33-2021	Explosive Atmospheres — Part 33: Equipment Protection by Special Protection “s”
	UL 121201-2017	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
503	IEEE 844.1	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — General, Testing, Marking, and Documentation Requirements
	UL 823-2006	Electric Heaters For Use in Hazardous (Classified) Locations
	UL 844-2012	Luminaires for Use in Hazardous (Classified) Locations
	UL 1836-2022	Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations
	UL 60079-30-1-2017	Explosive Atmospheres — Electrical Resistance Trace Heating — General and Testing Requirements
	UL 121201-2017	Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
504	UL 698A-2018	Industrial Control Panels Relating to Hazardous (Classified) Locations
	UL 913-1997	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, and III, Division 1, Hazardous (Classified) Locations
	UL 120202-2014	Recommendations for the Preparation, Content, and Organization of Intrinsic Safety Control Drawings
505	FM 121303	Guide for Use of Detectors for Flammable Gases
	IEEE 844.1	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — General, Testing, Marking, and Documentation Requirements
	IEEE 1349	Guide for the Application of Electric Machines in Zone 2 and Class I, Division 2 Hazardous (Classified) Locations
	UL 1309A-2020	Cable for Mobile Installations
	UL 2225-2013	Cable and Cable-Fittings for Use in Hazardous (Classified) Locations
	UL 60079-0-2013	Explosive Atmospheres — Part 0: Equipment — General Requirements

Article	Standard Number	Standard Title
	UL 60079-1-2015	Explosive Atmospheres — Part 1: Equipment Protection by Flameproof Enclosures “d”
	UL 60079-2-2017	Explosive Atmospheres — Part 2: Equipment protection by pressurized enclosure “p”
	UL 60079-5-2016	Explosive Gas Atmospheres — Part 5: Type of Protection — Powder Filling “q”
	UL 60079-6-2016	Explosive Atmospheres — Part 6: Equipment Protection by Liquid Immersion “o”
	UL 60079-7-2008	Explosive Atmospheres — Part 7: Equipment Protection by Increased Safety “e”
	UL 60079-10-1	Explosive Atmospheres — Part 10-1: Classification of Areas — Explosive Gas Atmospheres
	UL 60079-11-2013	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety “i”
	UL 60079-13-2022	Explosive Atmospheres — Part 13: Equipment Protection by Pressurized Room “p” and Artificially Ventilated Room “v”
	UL 60079-15-2013	Explosive Atmospheres — Part 15: Equipment Protection by Type of Protection “n”
	UL 60079-18-2015	Explosive Atmospheres — Part 18: Equipment Protection by Encapsulation “m”
	UL 60079-25-2011	Explosive Atmospheres — Part 25: Intrinsically Safe Electrical Systems
	UL 60079-26-2017	Explosive Atmospheres — Part 26: Equipment with Equipment Protection Level (EPL) Ga
	UL 60079-28-2017	Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation
	UL 60079-29-1-2019	Explosive Atmospheres — Part 29-1: Gas Detectors — Performance Requirements of Detectors for Flammable Gases
	UL 60079-29-4-2018	Explosive Atmospheres — Part 29-4: Gas Detectors — Performance Requirements of Open Path Detectors for Flammable Gases
	UL 60079-30-1-2017	Explosive Atmospheres — Part 30-1: Electrical Resistance Trace Heating — General and Testing Requirements
	UL 60079-33-2021	Explosive Atmospheres — Part 33: Equipment Protection by Special Protection “s”
	UL 80079-36-2021	Explosive Atmospheres — Part 36: Non-Electrical Equipment for Explosive Atmospheres — Basic Method and Requirements
	UL 80079-37-2021	Explosive Atmospheres — Part 37: Non-Electrical Equipment for Explosive Atmospheres — Non Electrical Type of Protection Constructional Safety “c”, Control of Ignition Source “b”, Liquid Immersion “k”
	UL 121303-2020	Guide for Use of Detectors for Flammable Gases
	UL 122701-2022	Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids
506	IEEE 844.1	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — General, Testing, Marking, and Documentation Requirements
	UL 698A-2018	Industrial Control Panels Relating to Hazardous (Classified) Locations
	UL 2225-2013	Cable and Cable-Fittings for Use in Hazardous (Classified) Locations

Article	Standard Number	Standard Title
	UL 60079-0-2013	Explosive Atmospheres — Part 0: Equipment — General Requirements
	UL 60079-2-2017	Explosive atmospheres — Part 2: Equipment protection by pressurized enclosure “p”
	UL 60079-11-2013	Explosive Atmospheres — Part 11: Equipment Protection by Intrinsic Safety "i"
	UL 60079-18-2015	Explosive Atmospheres — Part 18: Equipment Protection by Encapsulation “m”
	UL 60079-25-2011	Explosive Atmospheres — Part 25: Intrinsically Safe Electrical Systems
	UL 60079-28-2017	Explosive Atmospheres — Part 28: Protection of Equipment and Transmission Systems Using Optical Radiation
	UL 60079-30-1-2017	Explosive Atmospheres — Electrical Resistance Trace Heating — General and Testing Requirements
	UL 60079-31-2015	Explosive Atmospheres — Part 31: Equipment Dust Ignition Protection by Enclosure “t”
	UL 60079-33-2021	Explosive Atmospheres — Part 33: Equipment Protection by Special Protection “s”
	UL 62784	Vacuum Cleaners and Dust Extractors Providing Equipment Protection Level Dc for the Collection of Combustible Dusts — Particular Requirements
	UL 80079-36-2021	Explosive Atmospheres — Part 36: Non-Electrical Equipment for Explosive Atmospheres — Basic Method and Requirements
	UL 80079-37-2021	Explosive Atmospheres — Part 37: Non-Electrical Equipment for Explosive Atmospheres — Non Electrical Type of Protection Constructional Safety “c”, Control of Ignition Source “b“, Liquid Immersion “k”
512	UL 1389-2019	Plant Oil Extraction Equipment for Installation and Use in Ordinary (Unclassified) Locations and Hazardous (Classified) Locations
516	NFPA 33-2024	Standard for Spray Application Using Flammable or Combustible Materials
	NFPA 34-2024	Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids
	UL 844-2012	Luminaires for Use in Hazardous (Classified) Locations
517	AAMI ES 60601-1	Medical electrical equipment — Part 1: General requirements for basic safety and essential performance
	UL 5-2016	Surface Metal Raceways and Fittings
	UL 5A-2015	Nonmetallic Surface Raceways and Fittings
	UL 467-2022	Grounding and Bonding Equipment
	UL 498-2017	Attachment Plugs and Receptacles
	UL 498D-2020	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E-2020	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
	UL 498F-2020	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 651-2011	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 1022-2012	Line Isolation Monitors
	UL 1047-2015	Isolated Power Systems Equipment

Article	Standard Number	Standard Title
	UL 1286-2022	Office Furnishing Systems
	UL 2930-2020	Cord-and-Plug-connected Health Care Facility Outlet Assemblies
	UL 60601-1-2003	Medical Electrical Equipment — Part 1: General Requirements for Safety
	UL 122701-2022	Requirements for Process Sealing Between Electrical Systems and Flammable or Combustible Process Fluids
518	UL 498-2017	Attachment Plugs and Receptacles
	UL 498D-2020	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E-2020	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
	UL 498F-2020	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 943C-2012	Special Purpose Ground-Fault Circuit-Interrupters
	UL 2305-2001	Exhibition Display Units, Fabrication and Installation
520	UL 62-2018	Flexible Cords and Cables
	UL 334-2022	Theater Lighting Distribution and Control Equipment
	UL 489-2016	Attachment Plugs and Receptacles
	UL 1573-2003	Stage and Studio Luminaires and Connector Strips
	UL 1640-2016	Portable Power-Distribution Equipment
	UL 1691-2021	Single Pole Locking-Type Separable Connectors
522	UL 13-2015	Power Limited Circuit Cables
	UL 1063-2017	Machine-Tool Wires and Cables
	UL 2250-2017	Instrumentation Tray Cable
525	UL 62-2018	Flexible Cords and Cables
	UL 817-2015	Cord Sets and Power-Supply Cords
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 943C-2012	Special Purpose Ground-Fault Circuit-Interrupters
	UL 1691-2021	Single Pole Locking-Type Separable Connectors
530	UL 62-2-18	Flexible Cords and Cables
	UL 1479-2-15	Fire Tests of Penetration Firestops
	UL 1573-2003	Stage and Studio Luminaires and Connector Strips
	UL 1680-2003	Stage and Lighting Cables
	UL 1691-2021	Single Pole Locking-Type Separable Connectors
	UL 1836-2022	Electric Motors and Generators for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2 and Zone 22 Hazardous (Classified) Locations
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
540	UL 67-2018	Panelboards
	UL 943-2016	Ground-Fault Circuit Interrupters
	UL 1640-2016	Portable Power-Distribution Equipment
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements

Article	Standard Number	Standard Title
545	UL 5-2016	Surface Metal Raceways and Fittings
	UL 5A-2015	Nonmetallic Surface Raceways and Fittings
	UL 5B-2004	Strut-Type Channel Raceways and Fittings
	UL 5C-2016	Surface Raceways and Fittings for Use with Data, Signal, and Control Circuits
	UL 20-2018	General Use Snap Switches
	UL 209-2011	Cellular Metal Floor Raceways and Fittings
	UL 498-2017	Attachment Plugs and Receptacles
	UL 498D-2020	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E-2020	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
	UL 498F-2020	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 514A-2013	Metallic Outlet Boxes
	UL 514C-2014	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 2024-2014	Cable Routing Assemblies and Communications Raceways
547	UL 50-2015	Enclosures for Electrical Equipment, Non-Environmental Considerations
	UL 50E-2020	Enclosures for Electrical Equipment, Environmental Considerations
	UL 62-2018	Flexible Cords and Cables
	UL 514A-2013	Metallic Outlet Boxes
	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 514C-2014	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 1598-2008	Luminaires
	UL 2225-2013	Cable and Cable-Fittings for Use in Hazardous (Classified) Locations
550	UL 6-2022	Electrical Rigid Metal Conduit — Steel
	UL 6A-2008	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 83-2017	Thermoplastic-Insulated Wires and Cables
	UL 307A-2018	Liquid Fuel-Burning Heating Appliances for Manufactured Homes and Recreational Vehicles
	UL 307B-2006	Gas-Burning Heating Appliances for Manufactured Homes and Recreational Vehicles
	UL 360-2013	Liquid-Tight Flexible Metal Conduit
	UL 467-2022	Grounding and Bonding Equipment
	UL 498-2017	Attachment Plugs and Receptacles
	UL 498D-2020	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E-2020	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
	UL 498F-2020	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 651-2011	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 817-2015	Cord Sets and Power-Supply Cords
	UL 1242-2006	Electrical Intermediate Metal Conduit — Steel

Article	Standard Number	Standard Title
	UL 1462-2006	Mobile Home Pipe Heating Cable
	UL 1598-2008	Luminaires
	UL 1660-2019	Liquid-Tight Flexible Nonmetallic Conduit
	UL 2108-2015	Low-Voltage Lighting Systems
	UL 2515-2019	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
551	UL 6-2022	Electrical Rigid Metal Conduit — Steel
	UL 6A-2008	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 62-2018	Flexible Cords and Cables
	UL 231-2016	Power Outlets
	UL 234-2005	Low Voltage Lighting Fixtures for use in Recreational Vehicles
	UL 360-2013	Liquid-Tight Flexible Metal Conduit
	UL 467-2022	Grounding and Bonding Equipment
	UL 486C-2018	Splicing Wire Connectors
	UL 498-2017	Attachment Plugs and Receptacles
	UL 498D-2020	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E-2020	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
	UL 498F-2020	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 514A-2013	Metallic Outlet Boxes
	UL 514C-2014	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 514D-2013	Cover Plates for Flush-Mounted Wiring Devices
	UL 651-2011	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 817-2015	Cord Sets and Power-Supply Cords
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 1004-4-2018	Electric Generators
	UL 1008-2014	Transfer Switch Equipment
	UL 1008M-2022	Transfer Switch Equipment, Meter Mounted
	UL 1008S-2012	Solid-State Transfer Switches
	UL 1242-2006	Electrical Intermediate Metal Conduit — Steel
	UL 1449-2021	Surge Protective Devices
	UL 1598-2008	Luminaires
	UL 1660-2019	Liquid-Tight Flexible Nonmetallic Conduit
	UL 2200-2012	Stationary Engine Generator Assemblies
	UL 2515-2019	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 60730-1-2009	Automatic Electrical Controls; Part 1: General Requirements
	UL 60730-2-9-2010	Automatic Electrical Controls; Part 2: Particular Requirements for Temperature Sensing Controls
552	SAE J1128-2015	Low Voltage Primary Cable, for Types GXL, HDT, and SXL
	SAE J1127-2015	Low Voltage Battery Cable, for Types SGT and SGR
	UL 6-2022	Electrical Rigid Metal Conduit — Steel

Article	Standard Number	Standard Title
	UL 6A-2008	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 50-2015	Enclosures for Electrical Equipment, Non-Environmental Considerations
	UL 50E-2020	Enclosures for Electrical Equipment, Environmental Considerations
	UL 62-2018	Flexible Cords and Cables
	UL 67-2018	Panelboards
	UL 231-2016	Power Outlets
	UL 234-2005	Low Voltage Lighting Fixtures for Use in Recreational Vehicles
	UL 360-2013	Liquid-Tight Flexible Metal Conduit
	UL 430-2015	Waste Disposers
	UL 467-2022	Grounding and Bonding Equipment
	UL 514A-2013	Metallic Outlet Boxes
	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 514C-2014	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 651-2011	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 817-2015	Cord Sets and Power-Supply Cords
	UL 916-2015	Energy Management Equipment
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 1004-4-2018	Electric Generators
	UL 1242-2006	Electrical Intermediate Metal Conduit — Steel
	UL 1563-2009	Electric Spas, Equipment Assemblies, and Associated Equipment
	UL 1598-2008	Luminaires
	UL 1660-2019	Liquid-Tight Flexible Nonmetallic Conduit
	UL 2108-2015	Low Voltage Lighting Systems
	UL 2200-2012	Stationary Engine Generator Assemblies
	UL 2515-2019	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
555	UL 6-2022	Electrical Rigid Metal Conduit — Steel
	UL 6A-2008	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 231-2016	Power Outlets
	UL 486D-2015	Sealed Wire Connector Systems
	UL 651-2011	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 676-2015	Underwater Luminaires and Submersible Junction Boxes
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 1053-2015	Ground-Fault Sensing and Relaying Equipment
	UL 1399	Leakage Current Measurement Devices for Use in Marina Applications
	UL 1650-2015	Portable Power Cable
	UL 2515-2019	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
590	UL 496-2017	Lampholders
	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 588-2015	Seasonal and Holiday Decorative Products

Article	Standard Number	Standard Title
	UL 817-2015	Cord Sets
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 1088-2015	Temporary Lighting Strings
	UL 1377-2019	Wire used in Low Voltage Seasonal Lighting Products In Circuits With a Maximum Available Power of 15W
	UL 1640-2016	Portable Power-Distribution Equipment
600	UL 1-2005	Flexible Metal Conduit
	UL 5-2016	Surface Metal Raceways and Fittings
	UL 5A-2015	Nonmetallic Surface Raceways and Fittings
	UL 13-2015	Power-Limited Circuit Cables
	UL 48-2011	Electric Signs
	UL 50-2015	Enclosures for Electrical Equipment, Non-Environmental Considerations
	UL 50E-2020	Enclosures for Electrical Equipment, Environmental Considerations
	UL 98B-2015	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
	UL 248-19-2015	Low-Voltage Fuses — Part 19: Photovoltaic Fuses
	UL 360-2013	Liquid-Tight Flexible Metal Conduit
	UL 489B-2016	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures For Use With Photovoltaic (PV) Systems
	UL 508I-2015	Disconnect Switches Intended for Use in Photovoltaic Systems
	UL 814-2011	Gas-Tube-Sign Cable
	UL 879-2009	Electric Sign Components
	UL 879A-2012	LED Sign and Sign Retrofit Kits
	UL 879B-2002	Polymeric Enclosure Systems for the Splice Between Neon Tubing Electrode Leads and GTO Cable, and the GTO Cable Leading to the Splice
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 1310-2018	Class 2 Power Units
	UL 1660-2019	Liquid-Tight Flexible Nonmetallic Conduit
	UL 1699B-2018	Photovoltaic (PV) DC Arc-Fault Circuit Protection
	UL 1741-2021	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 2161-2016	Neon Transformers and Power Supplies
	UL 2703-2015	Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels
	UL 3001-2023	Distributed Energy Generation and Storage Systems
	UL 3003-2015	Distributed Generation Cables
	UL 3703-2015	Solar Trackers
	UL 4703-2014	Photovoltaic Wire
	UL 6703-2014	Connectors for Use in Photovoltaic Systems
	UL 7103-2019	Investigation for Building-Integrated Photovoltaic Roof Coverings
	UL 8703-2011	Concentrator Photovoltaic Modules and Assemblies
	UL 9703-2018	Distributed Generation Wiring Harnesses
	UL 61730-1-2022	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements For Construction

Article	Standard Number	Standard Title
	UL 61730-2-2022	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements For Testing
	UL 62109-2014	Power Converters for Use in Photovoltaic Power Systems — Part 1: General Requirements
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
604	UL 1-2005	Flexible Metal Conduit
	UL 4-2004	Armored Cable
	UL 5-2016	Surface Metal Raceways and Fittings
	UL 5A-2015	Nonmetallic Surface Raceways and Fittings
	UL 5B-2004	Strut-Type Channel Raceways and Fittings
	UL 5C-2016	Surface Raceways and Fittings for Use with Data, Signal, and Control Circuits
	UL 62-2018	Flexible Cords and Cables
	UL 183-2009	Manufactured Wiring Systems
	UL 209-2011	Cellular Metal Floor Raceways and Fittings
	UL 360-2013	Liquid-Tight Flexible Metal Conduit
	UL 797-2007	Electrical Metallic Tubing — Steel
	UL 797A-2014	Electrical Metallic Tubing — Aluminum and Stainless Steel
	UL 857-2009	Busways
	UL 1569-2018	Metal-Clad Cables
	UL 2024-2014	Cable Routing Assemblies and Communications Raceways
605	UL 962-2014	Household and Commercial Furnishings
	UL 1286-2022	Office Furnishings Systems
	UL 1310-2018	Class 2 Power Units
	UL 2999-2020	Individual Commercial Office Furnishings
	UL 5085-3-2006	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
610	UL 62-2018	Flexible Cords and Cables
	UL 2273-2019	Festoon Cable
620	UL 62-2018	Flexible Cords and Cables
	UL 83-2017	Thermoplastic-Insulated Wires and Cables
	UL 98-2016	Enclosed and Dead-Front Switches
	UL 104-2016	Elevator Door Locking Devices and Contacts
	UL 489-2016	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 508-2018	Industrial Control Equipment
	UL 508A-2018	Industrial Control Panels
	UL 1066-2022	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 1310-2018	Class 2 Power Units
	UL 1449-2021	Surge Protective Devices
	UL 1685-2015	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 2556-2021	Wire and Cable Test Methods

Article	Standard Number	Standard Title
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
625	UL 62-2018	Flexible Cords and Cables
	UL 1650-2015	Portable Power Cable
	UL 1741-2021	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 2202-2022	DC Charging Equipment for Electric Vehicles
	UL 2231-1-2012	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits — Part 1: General Requirements
	UL 2231-2-2012	Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits — Part 2: Particular Requirements for Protection Devices for Use in Charging Systems
	UL 2251-2017	Plugs, Receptacles and Couplers for Electrical Vehicles
	UL 2580-2020	Batteries for Use in Electric Vehicles
	UL 2594-2022	Electric Vehicle Supply Equipment
	UL 9741-2021	Electric Vehicle Power Export Equipment (EVPE)
	UL 60730-1	Automatic Electrical Controls
626	UL 62-2018	Flexible Cords and Cables
	UL 231-2016	Power Outlets
	UL 498-2017	Attachment Plugs and Receptacles
	UL 498D-2020	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E-2020	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
	UL 498F-2020	Plugs, Socket-Outlets and Couplers with Arcuate (Locking Type) Contacts
	UL 817-2015	Cord Sets and Power-Supply Cords
	UL 1651-2015	Optical Fiber Cable
	UL 1686-2012	Pin and Sleeve Configurations
630	UL 551-2009	Transformer-Type Arc-Welding Machines
640	UL 13-2015	Power Limited Circuit Cables
	UL 62-2018	Flexible Cords and Cables
	UL 813-1996	Commercial Audio Equipment
	UL 1310-2018	Class 2 Power Units
	UL 1419-2016	Professional Video and Audio Equipment
	UL 1492-1996	Audio-Video Products and Accessories
	UL 1711-2006	Amplifiers for Fire Protective Signaling Systems
	UL 2269-2021	Optical Fiber/Communications/Signaling/Coaxial Cable Outlet Boxes
	UL 6500-1999	Audio/Video and Musical Instrument Apparatus for Household, Commercial, and Similar General Use
	UL 60065-2015	Audio, Video and Similar Electronic Apparatus — Safety Requirements
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
645	UL 38-2008	Manual Signaling Boxes for Fire Alarm Systems
	UL 268-2023	Smoke Detectors for Fire Alarm Systems

Article	Standard Number	Standard Title
	UL 444-2017	Communications Cables
	UL 464-2016	Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories
	UL 497B-2004	Protectors for Data Communications and Fire Alarm Circuits
	UL 833-2021	Control Units and Accessories for Fire Alarm Systems
	UL 864-2014	Control Units and Accessories for Fire Alarm Systems
	UL 1424-2015	Cables for Power-Limited Fire-Alarm Circuits
	UL 1425-2015	Cables for Non-Power-Limited Fire-Alarm Circuits
	UL 1449-2021	Surge Protective Devices
	UL 1480-2016	Speakers for Fire Alarm and Signaling Systems, Including Accessories
	UL 1638-2016	Visible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories
	UL 1651-2015	Optical Fiber Cable
	UL 1685-2015	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 1690-2015	Data-Processing Cable
	UL 1778-2014	Uninterruptible Power Systems
	UL 2024-2014	Cable Routing Assemblies and Communications Raceways
	UL 60950-1-2007	Information Technology Equipment Safety — Part 1: General Requirements
	UL 60950-21-2003	Information Technology Equipment Safety — Part 21: Remote Power Feeding
	UL 60950-22-2017	Information Technology Equipment Safety — Part 22: Equipment to be Installed Outdoors
	UL 60950-23-2007	Information Technology Equipment Safety — Part 23: Large Data Storage Equipment
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
646	UL 10C-2016	Positive Pressure Fire Tests of Door Assemblies
	UL 62-2018	Flexible Cords and Cables
	UL 67-2018	Panelboards
	UL 98-2016	Enclosed and Dead-Front Switches
	UL 305-2012	Panic Hardware
	UL 347-2020	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL 489-2016	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 508-2018	Industrial Control Equipment
	UL 508A-2018	Industrial Control Panels
	UL 845-2021	Motor Control Centers
	UL 869A-2006	Reference Standard for Service Equipment
	UL 891-2019	Switchboards
	UL 924-2016	Emergency Lighting and Power Equipment
	UL 977-2012	Fused Power-Circuit Devices
	UL 1008-2014	Transfer Switch Equipment
	UL 1008A-2017	Transfer Switch Equipment, Over 1000 Volts

Article	Standard Number	Standard Title
	UL 1008M-2022	Meter-Mounted Transfer Switches
	UL 1008S-2012	Solid-State Transfer Switches
	UL 1062-1997	Unit Substations
	UL 1066-2022	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 1429-2000	Pullout Switches
	UL 1449-2021	Surge Protective Devices
	UL 1655-2009	Community-Antenna Television Cables
	UL 1989-2013	Standby Batteries
	UL 2755-2018	Modular Data Centers
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
647	UL 1598-2008	Luminaires
650	UL 1310-2018	Class 2 Power Units
	UL 1581-2001	Reference Standard for Electrical Wires, Cables, and Flexible Cords
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
670	ANSI/CSA-C22.2 No. 19085-1	Woodworking machines — Safety — Part 1: Common requirements
	UL 508-2018	Industrial Control Equipment
	UL 61800-5-1-2012	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
675	UL 493-2018	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
	UL 1581-2001	Reference Standard for Electrical Wires, Cables, and Flexible Cords
680	UL 6-2022	Electrical Rigid Metal Conduit — Steel
	UL 6A-2008	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 20-2018	General Use Snap-Switches
	UL 62-2018	Flexible Cords and Cables
	UL 360-2013	Liquid-Tight Flexible Metal Conduit
	UL 379-2013	Power Units for Fountain, Swimming Pool, and Spa Luminaires
	UL 467-2022	Grounding and Bonding Equipment
	UL 486D-2015	Sealed Wire Connector Systems
	UL 489-2016	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 651-2011	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 676-2015	Underwater Luminaires and Submersible Junction Boxes
	UL 676A-2003	Potting Compounds for Swimming Pool, Fountain, and Spa Equipment
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 943C-2012	Special Purpose Ground-Fault Circuit-Interrupters
	UL 1004-10-2020	Pool Pump Motors
	UL 1081-2016	Swimming Pool Pumps, Filters, and Chlorinators
	UL 1241-2003	Junction Boxes for Swimming Pool Luminaires
	UL 1242-2006	Electrical Intermediate Metal Conduit — Steel
	UL 1261-2016	Electric Water Heaters for Pools and Tubs

Article	Standard Number	Standard Title
	UL 1563-2009	Electric Spas, Equipment Assemblies, and Associated Equipment
	UL 1569-2018	Metal-Clad Cables
	UL 1660-2019	Liquid-Tight Flexible Nonmetallic Conduit
	UL 1795-2016	Hydromassage Bathtubs
	UL 2420-2009	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2452-2006	Electric Swimming Pool and Spa Cover Operators
	UL 2515-2019	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515A-2011	Supplemental Requirements for Extra Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2995-2016	Lifts for Swimming Pools and Spas
	UL 60335-2-1000-2017	Household and Similar Electrical Appliances: Particular Requirements for Electrically Powered Pool Lifts
682	UL 486D-2015	Sealed Wire Connector Systems
	UL 943-2016	Ground-Fault Circuit-Interrupters
	UL 1053-2015	Ground-Fault Sensing and Relaying Equipment
	UL 1650-2015	Portable Power Cable
	UL 1838-2003	Low Voltage Landscape Lighting Systems
690	UL 98B-2015	Enclosed and Dead-Front Switches for Use in Photovoltaic Systems
	UL 248-19-2015	Low-Voltage Fuses — Part 19: Photovoltaic Fuses
	UL 467-2022	Grounding and Bonding Equipment
	UL 489B-2016	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures For Use With Photovoltaic (PV) Systems
	UL 508I-2015	Disconnect Switches Intended for Use in Photovoltaic Systems
	UL 1569-2018	Metal-Clad Cables
	UL 1699B-2018	Photovoltaic (PV) DC Arc-Fault Circuit Protection
	UL 1703-2002	Flat-Plate Photovoltaic Modules and Panels
	UL 1741-2021	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
	UL 2703-2015	Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels
	UL 3001-2023	Distributed Energy Generation and Storage Systems
	UL 3003-2015	Distributed Generation Cables
	UL 3703-2015	Solar Trackers
	UL 3730-2014	Photovoltaic Junction Boxes
	UL 3741-2020	Photovoltaic Hazard Control
	UL 4703-2014	Photovoltaic Wire
	UL 6703-2014	Connectors for Use in Photovoltaic Systems
	UL 7103-2019	Investigation for Building-Integrated Photovoltaic Roof Coverings
	UL 8703-2011	Concentrator Photovoltaic Modules and Assemblies
	UL 8801-2022	Photovoltaic Luminaire Systems
	UL 9703-2018	Distributed Generation Wiring Harnesses
	UL 9741-2021	Electric Vehicle Power Export Equipment (EVPE)

Article	Standard Number	Standard Title
	UL 61730-1-2022	Photovoltaic (PV) Module Safety Qualification — Part 1: Requirements for Construction
	UL 61730-2-2022	Photovoltaic (PV) Module Safety Qualification — Part 2: Requirements for Testing
	UL 62109-1-2014	Power Converters for Use in Photovoltaic Power Systems — Part 1: General Requirements
	UL 62109-2	Power Converters for Use in Photovoltaic Power Systems — Part 2: Particular Requirements for Inverters
	UL 62275-2021	Cable Management Systems — Cable Ties for Electrical Installations
692	UL 2262-2012	Fuel Cell Modules for Use in Portable and Stationary Equipment
	UL 2262A-2011	Borohydride Fuel Cartridges with Integral Fuel Processing for Use with Portable Fuel Cell Power Systems or Similar Equipment
	UL 2265-2012	Fuel Cell Power Units and Fuel Storage Containers for Portable Devices
	UL 2265A-2018	Hand-held or Hand-Transportable Fuel Cell Power Units with Disposable Methanol Fuel Cartridges for use in Original Equipment Manufacturer's Information Technology Equipment
	UL 2265C-2006	Hand-Held or Hand-Transportable Alkaline (Direct Borohydride) Fuel Cell Power Units and Borohydride Fuel Cartridges For Use With Consumer Electronics or Information Technology Equipment
	UL 2266-2007	Electromagnetic Compatibility, Electrical Safety, and Physical Protection of Stationary and Portable Fuel Cell Power Systems for Use with Commercial Network Telecommunications Equipment
	UL 2267-2020	Fuel Cell Power Systems for Installation in Industrial Electric Trucks
694	UL 467-2022	Grounding and Bonding Equipment
	UL 489C-2012	Molded-Case Circuit Breakers and Molded-Case Switches for Use with Wind Turbines
	UL 1741-2021	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 2227-2007	Flexible Motor Supply Cable and Wind Turbine Tray Cable
	UL 2736-2010	Single Pole Separable Interconnecting Cable Connectors for Use with Wind Turbine Generating Systems
	UL 4143-2018	Wind Turbine Generator — Life Time Extension (LTE)
	UL 6141-2016	Wind Turbines Permitting Entry of Personnel
	UL 6142-2012	Small Wind Turbine Generating Systems
695	UL 6-2022	Electrical Rigid Metal Conduit — Steel
	UL 6A-2008	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 218-2015	Fire Pump Controllers
	UL 448-2020	Centrifugal Stationary Pumps for Fire-Protection Service
	UL 448B-2023	Residential Fire Pumps Intended for One- and Two-Family Dwellings and Manufactured Homes
	UL 448C-2023	Stationary, Rotary-Type, Positive-Displacement Pumps for Fire Protection Service
	UL 651-2011	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 1004-5-2014	Fire Pump Motors
	UL 1242-2006	Electrical Intermediate Metal Conduit — Steel
	UL 1569-2018	Metal-Clad Cables

Article	Standard Number	Standard Title
	UL 1724-2006	Fire Tests for Electrical Circuit Protective Systems
	UL 2196-2017	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
	UL 2515-2019	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
700	UL 924-2016	Emergency Lighting and Power Equipment
	UL 1008-2014	Transfer Switch Equipment
	UL 1008A-2017	Transfer Switch Equipment, Over 1000 Volts
	UL 1449-2021	Surge Protective Devices
	UL 1724-2006	Fire Tests for Electrical Circuit Protective Systems
	UL 2196-2017	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
	UL 2200-2012	Stationary Engine Generator Assemblies
701	UL 924-2016	Emergency Lighting and Power Equipment
	UL 1008-2014	Transfer Switch Equipment
	UL 1008A-2017	Transfer Switch Equipment, Over 1000 Volts
702	UL 98-2016	Enclosed and Dead-Front Switches
	UL 1008-2014	Transfer Switch Equipment
	UL 1008A-2017	Transfer Switch Equipment, Over 1000 Volts
	UL 1008M-2022	Meter-Mounted Transfer Switches
	UL 1008S-2012	Solid-State Transfer Switches
705	UL 62-2018	Flexible Cords and Cables
	UL 98-2016	Enclosed and Dead-Front Switches
	UL 486D-2015	Sealed Wire Connector Systems
	UL 489-2016	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 1066-2022	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 1429-2000	Pullout Switches
	UL 1741-2021	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 2200-2012	Stationary Engine Generator Assemblies
	UL 3001	Distributed Energy Resource Systems
	UL 3003-2015	Distributed Generation Cables
	UL 3010	Single Site Energy Systems
	UL 6141-2016	Wind Turbines Permitting Entry of Personnel
	UL 6142-2012	Small Wind Turbine Systems
	UL 9540-2020	Energy Storage Systems and Equipment
	UL 9741-2021	Electric Vehicle Power Export Equipment (EVPE)
	UL 62109-1	Power Converters for Use in Photovoltaic Power Systems — Part 1: General Requirements
	UL 62109-2	Power Converters for Use in Photovoltaic Power Systems — Part 2: Particular Requirements for Inverters
706	UL 248-2-2000	Low-Voltage Fuses — Part 2: Class C Fuses
	UL 248-3-2000	Low-Voltage Fuses — Part 3: Class CA and CB Fuses
	UL 248-4-2000	Low-Voltage Fuses — Part 4: Class CC Fuses

Article	Standard Number	Standard Title
	UL 248-5-2000	Low-Voltage Fuses — Part 5: Class G Fuses
	UL 248-6-2000	Low-Voltage Fuses — Part 6: Class H Non-Renewable Fuses
	UL 248-8-2011	Low-Voltage Fuses — Part 8: Class J Fuses
	UL 248-9-2000	Low-Voltage Fuses — Part 9: Class K Fuses
	UL 248-10-2011	Low-Voltage Fuses — Part 10: Class L Fuses
	UL 248-12-2011	Low-Voltage Fuses — Part 12: Class R Fuses
	UL 248-15-2018	Low-Voltage Fuses — Part 15: Class T Fuses
	UL 248-17-2018	Low-Voltage Fuses — Part 17: Class CF Fuses
	UL 248-18-2022	Low-Voltage Fuses — Part 18: Class CD Fuses
	UL 489-2016	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 489H-2017	Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures, for Use with Direct Current (DC) Microgrids
	UL 1066-2022	Low-Voltage AC and DC Power Circuit Breakers Used in Enclosures
	UL 1741-2021	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 9540-2020	Energy Storage Systems and Equipment
708	UL 1-2005	Flexible Metal Conduit
	UL 4-2004	Armored Cable
	UL 83-2017	Thermoplastic-Insulated Wires and Cables
	UL 360-2013	Liquid-Tight Flexible Metal Conduit
	UL 493-2018	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
	UL 497A-2001	Secondary Protectors for Communications Circuits
	UL 1008-2014	Transfer Switch Equipment
	UL 1008A-2017	Transfer Switch Equipment, Over 1000 Volts
	UL 1008M-2022	Meter-Mounted Transfer Switches
	UL 1008S-2012	Solid-State Transfer Switches
	UL 1569-2018	Metal-Clad Cables
	UL 2196-2017	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
710	UL 1741-2021	Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources
	UL 2200-2012	Stationary Engine Generator Assemblies
	UL 8801-2022	Photovoltaic Luminaire Systems
	UL 9540-2020	Energy Storage Systems and Equipment
	UL 9741-2021	Electric Vehicle Power Export Equipment (EVPE)
	UL 62109-1-2014	Power Converters for use in Photovoltaic Power Systems — Part 1: General Requirements
	UL 62109-2	Power Converters for Use in Photovoltaic Power Systems — Part 2: Particular Requirements for Inverters
722	UL 13-2015	Power-Limited Circuit Cables
	UL 444-2017	Communications Cables
	UL 1424-2015	Cables for Power-Limited Fire-Alarm Circuits
	UL 1651-2015	Optical Fiber Cable

Article	Standard Number	Standard Title
	UL 1666-2007	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685-2015	Vertical-Tray Fire-Propagation and Smoke- Release Test for Electrical and Optical-Fiber Cables
	UL 1724-2006	Fire Tests for Electrical Circuit Protective Systems
	UL 2024-2019	Commercial Closed-Circuit Television Equipment
	UL 2196-2017	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
	UL 2556-2021	Wire and Cable Test Methods
725	UL 1310-2018	Class 2 Power Units
	UL 5085-3-2006	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL 9990-2021	Information and Communication Technology (ICT) Power Cables
	UL 60730-1	Automatic Electrical Controls
	UL 61010-2-201-2018	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use — Part 2-201: Particular Requirements for Control Equipment
	UL 61800-5-1-2012	Adjustable Speed Electrical Power Drive Systems — Part 5-1: Safety Requirements — Electrical, Thermal and Energy
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
726	UL 1400-1-2022	Fault-Managed Power Systems — Part 1 General Requirements
	UL 1400-2-2022	Fault-Managed Power Systems — Part 2 Requirements for Cables
	UL 1666-2007	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685-2015	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 2556-2021	Wire and Cable Test Methods
728	UL 5-2016	Surface Metal Raceways and Fittings
	UL 5A-2015	Nonmetallic Surface Raceways and Fittings
	UL 5B-2004	Strut-Type Channel Raceways and Fittings
	UL 5C-2016	Surface Raceways and Fittings for Use with Data, Signal, and Control Circuits
	UL 209-2011	Cellular Metal Floor Raceways and Fittings
	UL 467-2022	Grounding and Bonding Equipment
	UL 514A-2013	Metallic Outlet Boxes
	UL 514C-2014	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
	UL 568-2002	Nonmetallic Cable Tray Systems
	UL 884-2016	Underfloor Raceways and Fittings
	UL 1724-2006	Fire Tests for Electrical Circuit Protective Systems
	UL 2024-2014	Cable Routing Assemblies and Communications Raceways
	UL 2196-2017	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
760	UL 268-2023	Smoke Detectors for Fire Alarm Systems
	UL 268A-2008	Smoke Detectors for Duct Application
	UL 486C-2018	Splicing Wire Connectors
	UL 497B-2004	Protectors for Data Communication and Fire Alarm Circuits

Article	Standard Number	Standard Title
	UL 1424-2015	Cables for Power-Limited Fire-Alarm Circuits
	UL 1425-2015	Cables for Non–Power-Limited Fire-Alarm Circuits
	UL 1480-2016	Speakers for Fire Alarm and Signaling Systems, Including Accessories
	UL 1666-2007	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685-2015	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 2196-2017	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
	UL 60730-2-14-2013	Automatic Electrical Controls; Part 2: Particular Requirements for Electric Actuators
770	UL 467-2022	Grounding and Bonding Equipment
	UL 568-2002	Nonmetallic Cable Tray Systems
	UL 1651-2015	Optical Fiber Cable
	UL 2024-2014	Optical Fiber and Communication Cable Raceway
	UL 2196-2017	Fire Test for Circuit Integrity of Fire-Resistive Power, Instrumentation, Control and Data Cables
	UL 62275-2021	Cable Management Systems — Cable Ties for Electrical Installations
800	UL 444-2017	Communications Cables
	UL 467-2022	Grounding and Bonding Equipment
	UL 489A-2008	Circuit Breakers for Use in Communication Equipment
	UL 497-2001	Protectors for Paired-Conductor Communications Circuits
	UL 497A-2001	Secondary Protectors for Communications Circuits
	UL 497C-2001	Protectors for Coaxial Communications Circuits
	UL 497E-2011	Protectors for Antenna Lead-In Conductors
	UL 523-2006	Telephone Service Drop Wire
	UL 568-2002	Nonmetallic Cable Tray Systems
	UL 723-2018	Test for Surface Burning Characteristics of Building Materials
	UL 1581-2001	Reference Standard for Electrical Wires, Cables, and Flexible Cords
	UL 1666-2007	Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
	UL 1685-2015	Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables
	UL 1724-2006	Outline for Fire Tests for Electrical Circuit Protective Systems
	UL 1863-2004	Communication Circuit Accessories
	UL 2024-2014	Cable Routing Assemblies and Communications Raceways
	UL 2043-2013	Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
	UL 2196-2017	Tests for Fire Resistive Cables
	UL 2556-2021	Wire and Cable Test Methods
	UL 62275-2021	Cable Management Systems — Cable Ties for Electrical Installations
	UL 62368-1	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
805		

Article	Standard Number	Standard Title
	UL 497-2001	Protectors for Paired-Conductor Communications Circuits
	UL 497A-2001	Secondary Protectors for Communications Circuits
	UL 497C-2001	Protectors for Coaxial Communications Circuits
	UL 497E-2011	Protectors for Antenna Lead-In Conductors
	UL 523-2015	Telephone Service Drop Wire
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
810	UL 150-2004	Antenna Rotators
	UL 452-2006	Antenna-Discharge Units
	UL 467-2022	Grounding and Bonding Equipment
	UL 497E-2011	Protectors for Antenna Lead-In Conductors
820	UL 444-2017	Communications Cables
	UL 497E-2011	Protectors for Antenna Lead-In Conductors
	UL 1655-2009	Community-Antenna Television Cables
830	UL 444-2017	Communications Cables
	UL 497A-2001	Secondary Protectors for Communications Circuits
	UL 497C-2001	Protectors for Coaxial Communications Circuits
	UL 497E-2011	Protectors for Antenna Lead-In Conductors
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
840	UL 444-2017	Communications Cables
	UL 467-2022	Grounding and Bonding Equipment
	UL 498A-2008	Current Taps and Adapters
	UL 1310-2018	Class 2 Power Units
	UL 1651-2015	Optical Fiber Cable
	UL 1863-2004	Communication Circuit Accessories
	UL 2024-2014	Cable Routing Assemblies and Communications Raceways
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
Tables 11(A) and 11(B)	UL 1310-2018	Class 2 Power Units
	UL 1434-1998	Thermistor-Type Devices
	UL 5085-3-2006	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements
Tables 12(A) and 12(B)	UL 1310-2018	Class 2 Power Units
	UL 1434-1998	Thermistor-Type Devices

Article	Standard Number	Standard Title
	UL 5085-3-2006	Low Voltage Transformers — Part 3: Class 2 and Class 3 Transformers
	UL 62368-1-2012	Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements

Table A.1(b) Product Safety Standards for Conductors and Equipment That Do Not Have an Associated Listing Requirement

Article	Standard Number	Standard Title
110	NEMA CY 10000-2023	Cybersecurity Implementation Guidance for Connected Electrical Infrastructure
	UL 969-2017	Marking and Labeling Systems
	UL 9691-2021	Recommended Practice for Nameplates for Use in Electrical Installations
210	UL 1053-2015	Ground-Fault Sensing and Relaying Equipment
215	UL 1053-2015	Ground-Fault Sensing and Relaying Equipment
235	UL 6-2022	Electrical Rigid Metal Conduit — Steel
	UL 6A-2008	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL 360	Liquid-Tight Flexible Metal Conduit
	UL 486C-2018	Splicing Wire Connectors
	UL 514B-2012	Conduit, Tubing and Cable Fittings
	UL 651-2011	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
	UL 1008A-2017	Transfer Switch Equipment, Over 1000 Volts
	UL 1242-2006	Electrical Intermediate Metal Conduit — Steel
	UL 1660-2019	Liquid-Tight Flexible Nonmetallic Conduit
	UL 2200-2012	Stationary Engine Generator Assemblies
	UL 2515-2019	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2876-2022	Remote Racking Devices for Switchgear and Controlgear
240	NEMA CY 10000-2023	Cybersecurity Implementation Guidance for Connected Electrical Infrastructure
245	IEEE C37.09	IEEE Standard Test Procedures for AC High-Voltage Circuit Breakers with Rated Maximum Voltage Above 1000 V
	IEEE C37.41	IEEE Standard Design Tests for High-Voltage (>1000 V) Fuses and Accessories
	IEEE C37.42	IEEE Standard Specifications for High-Voltage (>1000 V) Fuses and Accessories
	NEMA C37.54	NEMA Standard Indoor AC High Voltage Circuit Breakers Applied as Removable Elements in Metal-Enclosed Switchgear — Conformance Test Procedures
300	UL 635-2012	Insulating Bushings
314	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
	UL 3004	Outline of Investigation for Medium Voltage Junction Boxes
320	UL 514A-2013	Metallic Outlet Boxes

Article	Standard Number	Standard Title
	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
322	UL 5-2016	Surface Metal Raceways and Fittings
	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
324	UL 5-2016	Surface Metal Raceways and Fittings
	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
330	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
332	UL 1565-2022	Positioning Devices
	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
334	UL 6-2022	Electrical Rigid Metal Conduit — Steel
	UL 6A-2008	Electrical Rigid Metal Conduit — Aluminum, Red Brass and Stainless Steel
	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 651-2011	Schedule 40 and 80 Rigid PVC Conduit
	UL 797-2007	Electrical Metallic Tubing — Steel
	UL 797A-2014	Electrical Metallic Tubing — Aluminum and Stainless Steel
	UL 1242-2006	Electrical Intermediate Metal Conduit — Steel
	UL 1565-2022	Positioning Devices
	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
	UL 2420-2009	Belowground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515-2019	Aboveground Reinforced Thermosetting Resin Conduit (RTRC) and Fittings
	UL 2515A-2011	Supplemental Requirements for Extra Heavy Wall Reinforced Thermosetting Resin Conduit (RTRC) and Fittings.
335	UL 2250-2017	Instrumentation Tray Cable
337	UL 1565-2022	Positioning Devices
	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
340	UL 493-2018	Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables
342	UL 635-2012	Insulating Bushings
	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
344	UL 635-2012	Insulating Bushings
	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
348	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
350	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
352	UL 635-2012	Insulating Bushings
	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
353	UL 635-2012	Insulating Bushings
355	UL 635-2012	Insulating Bushings
	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
356	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
358	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
362	UL 2239-2015	Hardware for the Support of Conduit, Tubing and Cable
368	UL 857-2009	Busways
392	UL 568-2002	Nonmetallic Cable Tray Systems
400	UL 62-2018	Flexible Cords and Cables

Article	Standard Number	Standard Title
	UL 498-2017	Attachment Plugs and Receptacles
	UL 498B-2022	Receptacles with Integral Switching Means
	UL 498D-2020	Attachment Plugs, Cord Connectors and Receptacles with Arcuate (Locking Type) Contacts
	UL 498E-2020	Attachment Plugs, Cord Connectors and Receptacles — Enclosure Types for Environmental Protection
	UL 514B-2012	Conduit, Tubing, and Cable Fittings
	UL 817-2015	Cord Sets and Power-Supply Cords
	UL 1650-2015	Portable Power Cable
	UL 1680-2003	Stage and Lighting Cables
402	UL 66-2023	Fixture Wire
408	UL 50-2015	Enclosures for Electrical Equipment, Non-Environmental Considerations
	UL 50E-2020	Enclosures for Electrical Equipment, Environmental Considerations
409	UL 1436	Outlet Circuit Testers and Other Similar Indicating Devices
	UL 61010-1	Electrical Equipment for Measurement, Control, and Laboratory Use — Part 1: General Requirements
	UL 61010-2-030	Electrical Equipment for Measurement, Control, and Laboratory Use — Part 2-30: Particular Requirements for Testing and Measuring Circuits
424	UL 834-2004	Heating, Water Supply, and Power Boilers — Electric
	UL 1693-2010	Electric Radiant Heating Panels and Heating Panel Sets
	UL 1995-2015	Heating and Cooling Equipment
	UL 1996-2009	Electric Duct Heaters
	UL 60335-1-2204	Safety of Household and Similar Electrical Appliances, Part 1: General Requirements
	UL 60335-2-40-2019	Household and Similar Electrical Appliances — Safety — Part 2–40: Part 2–40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers
425	UL 834-2004	Heating, Water Supply, and Power Boilers — Electric
426	UL 1588-2002	Roof and Gutter De-Icing Cable Units
427	UL 515-2015	Electrical Resistance Trace Heating for Commercial Applications
	UL 1462-2006	Mobile Home Pipe Heating Cable
	UL 2049-2006	Residential Pipe Heating Cable
430	UL 248-13-2022	Low Voltage Fuses — Part 13: Semiconductor Fuses
	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL 347A	Medium Voltage Power Conversion Equipment
445	UL 3001-2023	Distributed Energy Generation and Storage Systems
	UL 3010	Single Site Energy Systems
450	IEEE C57.12.00	IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
	IEEE C57.12.28	IEEE Standard for Pad-Mounted Equipment — Enclosure Integrity
	IEEE C57.12.29	IEEE C57.12.29 IEEE Standard for Pad-Mounted Equipment — Enclosure Integrity for Coastal Environments
	IEEE C57.16	IEEE Standard for Requirements, Terminology, and Test Code for Dry-Type Air-Core Series-Connected Reactors
	UL 50-2015	Enclosures for Electrical Equipment, Non-Environmental Considerations

Article	Standard Number	Standard Title
	UL 50E-2020	Enclosures for Electrical Equipment, Environmental Considerations
	UL 248-1-2022	Low-Voltage Fuses — Part 1: General Requirements
	UL 248-2-2000	Low-Voltage Fuses — Part 2: Class C Fuses
	UL 248-3-2000	Low-Voltage Fuses — Part 3: Class CA and CB Fuses
	UL 248-4-2000	Low-Voltage Fuses — Part 4: Class CC Fuses
	UL 248-5-2000	Low-Voltage Fuses — Part 5: Class G Fuses
	UL 248-8-2011	Low-Voltage Fuses — Part 8: Class J Fuses
	UL 248-9-2000	Low-Voltage Fuses — Part 9: Class K Fuses
	UL 489-2016	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures
	UL 1561-2011	Dry-Type General Purpose and Power Transformers
	UL 1562	Standard for Transformers, Distribution, Dry-Type Over 600 Volts
	UL 5085-2-2021	Low Voltage Transformers — Part 2: General Purpose Transformers
460	UL 810-2019	Capacitors
	UL 1283-2017	Electromagnetic Interference Filters
	UL 60384-14-2014	Fixed Capacitors for Use in Electronic Equipment — Part 14: Sectional Specification: Fixed Capacitors for Electromagnetic Interference Suppression and Connection to the Supply Mains
470	UL 508-2018	Industrial Control Equipment
	UL 1283-2017	Electromagnetic Interference Filters
495	IEEE C37.09	IEEE Standard Test Procedures for AC High-Voltage Circuit Breakers with Rated Maximum Voltage Above 1000 V
	IEEE C37.20.2	IEEE Standard for Metal-Clad Switchgear
	IEEE C37.20.3	IEEE Standard for Metal-Enclosed Interrupter Switchgear (1 kV–38 kV)
	IEEE C37.20.4	IEEE Standard for Indoor AC Switches (1 kV to 38 kV) for Use in Metal-Enclosed Switchgear
	IEEE C37.20.6	IEEE Standard for 4.76 kV to 38 kV Rated Ground and Test Devices Used in Enclosures
	IEEE C37.20.9	IEEE Standard for Metal-Enclosed Switchgear Rated 1 kV to 52 kV Incorporating Gas Insulating Systems
	IEEE C37.23	IEEE Standard for Metal-Enclosed Bus
	IEEE C37.41	IEEE Standard Design Tests for High-Voltage (>1000 V) Fuses and Accessories
	IEEE C37.42	IEEE Standard Specifications for High-Voltage (>1000 V) Fuses and Accessories
	IEEE C37.59	IEEE Standard for Requirements for Conversion of Power Switchgear Equipment
	IEEE C37.60	IEEE International Standard — High-voltage switchgear and controlgear — Part 111: Automatic circuit reclosers for alternating current systems up to and including 38 kV
	IEEE C37.74	IEEE Standard Requirements for Subsurface, Vault, and Padmounted Load-Interrupter Switchgear and Fused Load-Interrupter Switchgear for Alternating Current Systems up to 38 kV
	NEMA C37.54	American National Standard for Indoor AC High Voltage Circuit Breakers Applied as Removable Elements in Metal-Enclosed Switchgear — Conformance Test Procedures

Article	Standard Number	Standard Title
	NEMA C37.55	American National Standard for Switchgear — Medium Voltage Metal-Clad Assemblies — Conformance Test Procedures
	NEMA C37.57	American National Standard for Switchgear — Metal-Enclosed Interrupter Switchgear Assemblies — Conformance Testing
	NEMA C37.58	American National Standard for Switchgear — Indoor AC Medium Voltage Switches for Use in Metal-Enclosed Switchgear — Conformance Test Procedures
	UL 347	Medium-Voltage AC Contactors, Controllers, and Control Centers
	UL 347A	Medium Voltage Power Conversion Equipment
	UL 347C	Outline of Investigation for Medium Voltage Solid State Resistive Load Controllers, Up to 15KV
	UL 1008A-2017	Transfer Switch Equipment, Over 1000 Volts
	UL 2748	Arcing Fault Quenching Equipment
	UL 2877	Power Supplies, Medium Voltage
	UL 3004	Outline of Investigation for Medium Voltage Junction Boxes
500	ANSI/IEEE C2	National Electrical Safety Code, Section 127A, Coal Handling Areas
	ANSI/UL 121203	Recommended Practice for Portable/Personal Electronic Products Suitable for Use in Class I, Division 2, Class I, Zone 2, Class II, Division 2, Class III, Division 1, Class III, Division 2, Zone 21 and Zone 22 Hazardous (Classified) Locations
	API RP 14F	Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Division 1 and Division 2 Locations
	API RP 500	Recommended Practice for Classification of Locations of Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2
	API RP 2003	Protection Against Ignitions Arising Out of Static Lightning and Stray Currents.
	ASHRAE 15	Safety Standard for Refrigeration Systems.
	ASME B1.20.1	Pipe Threads, General Purpose (Inch)
	IEEE 844.2	Standard for Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — Application Guide for Design, Installation, Testing, Commissioning, and Maintenance
	IEEE 60079-30-2	IEEE/IEC International Standard for Explosive atmospheres — Part 30-2: Electrical resistance trace heating — Application guide for design, installation, and maintenance
	IIAR 2	Standard for Safe Design of Closed-Circuit Ammonia Refrigeration Systems
	ISA-12.10	Area Classification in Hazardous (Classified) Dust Locations
	ISO 965-1	ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data
	ISO 965-3	ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads
	NFPA 30-2024	Flammable and Combustible Liquids Code
	NFPA 32-2021	Standard for Drycleaning Facilities
	NFPA 33-2024	Standard for Spray Application Using Flammable or Combustible Materials
	NFPA 34-2024	Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids

Article	Standard Number	Standard Title
	NFPA 35-2021	Standard for the Manufacture of Organic Coatings
	NFPA 36-2025	Standard for Solvent Extraction Plants
	NFPA 45-2024	Standard on Fire Protection for Laboratories Using Chemicals
	NFPA 55-2026	Compressed Gases and Cryogenic Fluids Code
	NFPA 58-2024	Liquefied Petroleum Gas Code
	NFPA 59-2024	Utility LP-Gas Plant Code
	NFPA 77-2024	Recommended Practice on Static Electricity
	NFPA 497-2024	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
	NFPA 499-2024	Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installation in Chemical Process Areas
	NFPA 780-2026	Standard for the Installation of Lightning Protection Systems
	NFPA 820-2024	Standard for Fire Protection in Wastewater Treatment and Collection Facilities
	UL 60079-29-2-2018	Explosive Atmospheres — Part 29-2: Gas detectors — Selection, installation, use and maintenance of detectors for flammable gases and oxygen
	UL 120002-2022	Certificate Standard for AEx Equipment for Hazardous (Classified) Locations
	UL 120101-2019	Definitions and Information Pertaining to Electrical Equipment in Hazardous (Classified) Locations
	UL 121303-2020	Guide for Combustible Gas Detection as a Method of Protection
501	UL 62-2018	Flexible Cord and Cable
	UL 504-2022	Mineral-Insulated, Metal-Sheathed Cable
503	NFPA 505-2024	Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations
504	ISA-RP 12.06.01	Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation — Part 1: Intrinsic Safety
505	ANSI/API RP 14FZ	Recommended Practice for Design and Installation of Electrical Systems for Fixed and Floating Offshore Petroleum Facilities for Unclassified and Class I, Zone 0, Zone 1, and Zone 2 Locations
	API RP 505	Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2
	API RP 2003	Protection Against Ignitions Arising Out of Static Lightning and Stray Currents.
	ASME B1.20.1	Pipe Threads, General Purpose (Inch)
	EI 15	Model Code of Safe Practice, Part 15: Area Classification Code for Installations Handling Flammable Fluids
	IEEE 844.2	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — Application Guide for Design, Installation, Testing, Commissioning, and Maintenance

Article	Standard Number	Standard Title
	IEEE 60079-30-2	Explosive Atmospheres — Part 30-2: Electrical resistance trace heating — Application guide for design, installation and maintenance
	IIAR 2	Standard for Safe Design of Closed-Circuit Ammonia Refrigeration Systems
	ISA-60079-10-1 (12.24.01)	Explosive Atmospheres — Part 10-1: Classification of Areas — Explosive gas atmospheres
	ISA-60079-29-2	Explosive Atmospheres — Part 29-2: Gas detectors — Selection, installation, use and maintenance of detectors for flammable gases and oxygen
	ISO 965-1	ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data
	ISO 965-3	ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads
	NFPA 30-2024	Flammable and Combustible Liquids Code
	NFPA 77-2024	Recommended Practice on Static Electricity
	NFPA 497-2024	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
	NFPA 780-2026	Standard for the Installation of Lightning Protection Systems
	UL 80079-20-1-2020	Explosive Atmospheres — Part 20-1: Material Characteristics for Gas and Vapour Classification — Test Methods and Data
	UL 120101-2019	Definitions and Information Pertaining to Electrical Equipment in Hazardous (Classified) Locations
	UL 121303-2020	Guide for Use of Detectors for Flammable Gases
506	ASME B1.20.1	Pipe Threads, General Purpose (Inch)
	IEEE 844.2	Skin Effect Trace Heating of Pipelines, Vessels, Equipment, and Structures — Application Guide for Design, Installation, Testing, Commissioning, and Maintenance
	IEEE 60079-30-2	Explosive Atmospheres — Part 30-2: Electrical resistance trace heating — Application guide for design, installation and maintenance
	ISA-60079-10-2 (12.10.05)	Explosive Atmospheres — Part 10-2: Classification of Areas — Combustible Dust Atmospheres
	NFPA 499-2024	Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
511	NFPA 30A-2024	Code for Motor Fuel Dispensing Facilities and Repair Garages
	NFPA 88A-2023	Standard for Parking Structures
512	ICC IFC	International Fire Code
	NFPA 1-2023	Fire Code
	NFPA 30-2024	Flammable and Combustible Liquids Code
	NFPA 33-2024	Standard for Spray Application Using Flammable or Combustible Materials
	NFPA 36-2025	Standard for Solvent Extraction Plants

Article	Standard Number	Standard Title
	NFPA 58-2024	Liquefied Petroleum Gas Code
	NFPA 70B-2023	Standard for Electrical Equipment Maintenance
	NFPA 497-2024	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
513	NFPA 30-2024	Flammable and Combustible Liquids Code
	NFPA 33-2024	Standard for Spray Application Using Flammable or Combustible Materials
	NFPA 409-2022	Standard on Aircraft Hangars
514	NFPA 2-2023	Hydrogen Technologies Code
	NFPA 30A-2024	Code for Motor Fuel Dispensing Facilities and Repair Garages
	NFPA 52-2023	Vehicular Natural Gas Fuel Systems Code
	NFPA 58-2024	Liquefied Petroleum Gas Code
	NFPA 59-2024	Utility LP-Gas Plant Code
	NFPA 303-2026	Fire Protection Standard for Marinas and Boatyards
515	NFPA 30-2024	Flammable and Combustible Liquids Code
516	NFPA 13-2025	Standard for the Installation of Sprinkler Systems
	NFPA 33-2024	Standard for Spray Application Using Flammable or Combustible Materials
	NFPA 34-2024	Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids
	NFPA 77-2024	Recommended Practice on Static Electricity
	NFPA 91-2026	Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids
	NFPA 701-2023	Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
620	UL 4-2004	Armored Cable
	UL 44-2018	Thermoset-Insulated Wires and Cables
	UL 66-2023	Fixture Wire
	UL 504-2022	Mineral Insulated Wire
	UL 1063-2017	Machine-Tool Wires and Cables
	UL 1569-2018	Metal-Clad Cable
625	UL 3001-2023	Distributed Energy Generation and Storage Systems
	UL 3010	Single Site Energy Systems
630	UL 1276-2015	Welding Cable
650	UL 1651-2015	Optical Fiber Cable
660	UL 62-2018	Flexible Cords and Cables
	UL 817-2015	Cord Sets and Power Supply Cords
668	UL 4-2004	Armored Cable
	UL 62-2018	Flexible Cords and Cables
670	UL 1740-2018	Standard for Robots and Robotic Equipment
	UL 2011-2022	Machinery

Article	Standard Number	Standard Title
	UL 3100	Standard for Automated Mobile Platforms (AMPs)
675	UL 44-2018	Thermoset-Insulated Wires and Cables
	UL 83-2017	Thermoplastic-Insulated Wires and Cables
	UL 83A-2016	Fluoropolymer Insulated Wire
	UL 1063-2017	Machine-Tool Wires and Cables
	UL 1263-2020	Irrigation Cable
690	UL 3001-2023	Distributed Energy Generation and Storage Systems
	UL 3010	Single Site Energy Systems
691	UL 3001-2023	Distributed Energy Generation and Storage Systems
	UL 3010	Single Site Energy Systems
692	UL 44-2018	Thermoset-Insulated Wires and Cables
	UL 83-2017	Thermoplastic-Insulated Wires and Cables
	UL 83A-2016	Fluoropolymer Insulated Wire
	UL 1063-2017	Machine-Tool Wires and Cables
	UL 3001-2023	Distributed Energy Generation and Storage Systems
	UL 3010	Single Site Energy Systems
694	UL 44-2018	Thermoset-Insulated Wires and Cables
	UL 62-2018	Flexible Cords and Cables
	UL 83-2017	Thermoplastic-Insulated Wires and Cables
	UL 83A-2016	Fluoropolymer Insulated Wire
	UL 1063-2017	Machine-Tool Wires and Cables
	UL 3001-2023	Distributed Energy Generation and Storage Systems
	UL 3010	Single Site Energy Systems
700	UL 3001-2023	Distributed Energy Generation and Storage Systems
	UL 3008	Automatic Interconnection Switches for Emergency Systems
701	UL 3001-2023	Distributed Energy Generation and Storage Systems
	UL 3008	Automatic Interconnection Switches for Emergency Systems
702	UL 3001-2023	Distributed Energy Generation and Storage Systems
705	UL 3001-2023	Distributed Energy Generation and Storage Systems
	UL 3010	Single Site Energy Systems
708	NEMA CY 10000-2023	Cybersecurity Implementation Guidance for Connected Electrical Infrastructure
710	UL 3001-2023	Distributed Energy Generation and Storage Systems
	UL 3010	Single Site Energy Systems

Additional Proposed Changes

File Name	Description	Approved
CN_39.pdf		✓

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 39 appeared in the First Draft Report on First Revision No. 8154.

The Correlating Committee directs CMP 11 to review FR 8154 and include the edition or dates of the standards in Annex A.

Related Item

• First Revision No. 8154

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 12:17:57 EDT 2024
Committee: NEC-P11

Correlating Committee Note No. 39-NFPA 70-2024 [Section No. A.1]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Tue May 07 15:01:31 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 11 to review FR 8154 and include the edition or dates of the standards in Annex A.

First Revision No. 8154-NFPA 70-2024 [Detail]

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 327
Assigned to CMP - 1 Referred to CMPs 2 - 17

Public Comment No. 327-NFPA 70-2024 [Global Input]

CMP 1 has deleted the definition for “In Sight From”, and the requirements that were part of that definition are now located in 110.29. This global Correlating Committee Note directs all CMP’s to review occurrences of the phrase “in sight from”, “within sight from”, and “within sight” and consider whether references to 110.29 or 110.39 should be included.

Additional Proposed Changes

File Name	Description	Approved
CN_26.pdf	NEC_CN26	✓

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 26 appeared in the First Draft Report on First Revision No. 9187.

CMP 1 has deleted the definition for “In Sight From”, and the requirements that were part of that definition are now located in 110.29. This global Correlating Committee Note directs all CMP’s to review occurrences of the phrase “in sight from”, “within sight from”, and “within sight” and consider whether references to 110.29 or 110.39 should be included.

Related Item

• First Revision No. 9187

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jul 29 17:05:29 EDT 2024
Committee: NEC-P01

Correlating Committee Note No. 26-NFPA 70-2024 [Global Input]

Submitter Information Verification

Committee: NEC-AAC

Submittal Date: Tue May 07 14:23:07 EDT 2024

Committee Statement and Meeting Notes

Committee Statement: CMP 1 has deleted the definition for “In Sight From”, and the requirements that were part of that definition are now located in 110.29. This global Correlating Committee Note directs all CMP’s to review occurrences of the phrase “in sight from”, “within sight from”, and “within sight” and consider whether references to 110.29 or 110.39 should be included.

First Revision No. 9187-NFPA 70-2024 [Section No. 225.41]

Ballot Results

This item has passed ballot

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.

Bowmer, Trevor N.

Hickman, Palmer L.

Holub, Richard A.

Jackson, Peter D.

Kendall, David H.

Manche, Alan

Osborne, Robert D.

Porter, Christine T.

Schultheis, Timothy James

Williams, David A.

Public Comment No. 443-NFPA 70-2024 [Global Input]

The Correlating Committee directs all Code-Making Panels to verify cross-references to Article 200 are accurate due to the renumbering of the article.

Additional Proposed Changes

File Name	Description	Approved
CN_84.pdf		✓

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 84 appeared in the First Draft Report.

The Correlating Committee directs all Code-Making Panels to verify cross-references to Article 200 are accurate due to the renumbering of the article.

Related Item

• Correlating Committee Note No. 84

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 17:35:49 EDT 2024
Committee: NEC-P05

Correlating Committee Note No. 84-NFPA 70-2024 [Global Input]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 08:49:53 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs all Code-Making Panels to verify cross-references to Article 200 are accurate due to the renumbering of the article.

Ballot Results

This item has passed ballot

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 504
Assigned to CMP-18, Referred to CMPs 1 - 17

Public Comment No. 504-NFPA 70-2024 [Global Input]

The Correlating Committee directs the CMPs to review the revision of the title of Article406 (Wiring Devices) and the new definition for the term "wiring device" in Article 100 forcorrelation of existing terminology using the newly define term in their articles.

Additional Proposed Changes

File Name	Description	Approved
CN_157.pdf		✓

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 157 appeared in the First Draft Report on First Revision No. 7965.

The Correlating Committee directs the CMPs to review the revision of the title of Article 406 (Wiring Devices) and the new definition for the term "wiring device" in Article 100 for correlation of existing terminology using the newly define term in their articles.

Related Item

• First Revision No. 7965

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 22:29:14 EDT 2024
Committee: NEC-P18

Correlating Committee Note No. 157-NFPA 70-2024 [Global Input]

Submitter Information Verification

Committee: NEC-AAC

Submittal Date: Thu May 09 08:59:03 EDT 2024

Committee Statement and Meeting Notes

Committee Statement: The Correlating Committee directs the CMPs to review the revision of the title of Article 406 (Wiring Devices) and the new definition for the term "wiring device" in Article 100 for correlation of existing terminology using the newly define term in their articles.

First Revision No. 7965-NFPA 70-2024 [New Definition after Definition: Wireways, Nonmetallic. (No...]

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 527
Assigned to CMP- 2, Referred to CMPs 1 - 18

Public Comment No. 527-NFPA 70-2024 [Global Input]

The CMPs are directed to review references to Article 220 in the articles under their purview and make necessary revisions based on Article 220 being relocated to Article120.

Additional Proposed Changes

File Name	Description	Approved
CN_212.pdf		✓

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 212 appeared in the First Draft Report.

The CMPs are directed to review references to Article 220 in the articles under their purview and make necessary revisions based on Article 220 being relocated to Article 120.

Related Item

• Correlating Committee Note No. 212

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 23:08:41 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 212-NFPA 70-2024 [Global Input]

Submitter Information Verification

Committee: NEC-AAC

Submittal Date: Thu May 09 11:53:08 EDT 2024

Committee Statement and Meeting Notes

Committee Statement: The CMPs are directed to review references to Article 220 in the articles under their purview and make necessary revisions based on Article 220 being relocated to Article 120.

Ballot Results

✔ **This item has passed ballot**

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 542
Assigned to CMP-3, Referred to CMPs 1 - 18

Public Comment No. 542-NFPA 70-2024 [Global Input]

The Correlating Committee directs the CMPs to review all references to requirements in Chapters 7 & 8 for accuracy in light of the relocation of requirements occurring in the First Draft.

Additional Proposed Changes

File Name	Description	Approved
CN_401.pdf		✓

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 401 appeared in the First Draft Report.

The Correlating Committee directs the CMPs to review all references to requirements in Chapters 7 & 8 for accuracy in light of the relocation of requirements occurring in the First Draft.

Related Item

• Correlating Committee Note No. 401

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 23:39:04 EDT 2024
Committee: NEC-P03

Correlating Committee Note No. 401-NFPA 70-2024 [Global Input]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Fri May 10 12:35:51 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs the CMPs to review all references to requirements in Chapters 7 & 8 for accuracy in light of the relocation of requirements occurring in the First Draft.

Ballot Results

This item has passed ballot

12 Eligible Voters
1 Not Returned
11 Affirmative All
0 Affirmative with Comments
0 Negative with Comments
0 Abstention

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.
Bowmer, Trevor N.
Hickman, Palmer L.
Holub, Richard A.
Jackson, Peter D.
Kendall, David H.
Manche, Alan
Osborne, Robert D.
Porter, Christine T.
Schultheis, Timothy James
Williams, David A.

Public Comment No. 649-NFPA 70-2024 [Global Input]

Delete the words, "to be installed" everywhere they appear in the First Draft.

Statement of Problem and Substantiation for Public Comment

The term "to be installed" is always redundant. 90.2(C) says, "This code covers the installation and removal of electrical conductors, equipment, and raceways...". Every requirement of the NEC is about installation or removal (and requirements about removal are a very small minority). "Shall be permitted" and "shall not be permitted," as applied to equipment, mean that the subject equipment either is or is not allowed to be installed.
The new First Draft restrictions on reconditioned equipment seem to have overlooked the scope and purpose of the NEC. Adding the superfluous term "to be installed" also does not conform to 3.1.1, 3.1.2, and 3.5.1.1 of the NEC Style Manual.

Related Item

• FR-9197 • FR-9236 • FR-7868 • PI-3713 • FR-8938 • FR-7970 • FR-8831 • FR-8941 • FR-8944 • FR-8947 • FR-7925 • FR-7585 • FR-8136 • FR-8148 • FR-8984 • FR-8293 • FR-8362 • FR-8348 • FR-8360 • FR-7614 • FR-7658 • FR-7734 • FR-7746 • FR-8150 • FR-7717

Submitter Information Verification

Submitter Full Name: William Fiske
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Submittal Date: Fri Aug 02 09:19:44 EDT 2024
Committee: NEC-P01