AGENDA

NEC Code-Making Panel 2 (NEC P02)
NFPA 70 Second Draft Meeting (Annual 2025)

October 14 - 17, 2024
8:00 a.m. – 5:00 p.m. (PT)

Torrance Marriott Redondo Beach, CA

1. **Call to order.** David Humphrey.
2. **Introductions.** See committee roster attached.
3. **Chair Report.** David Humphrey.
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

09/27/2024
Jeffrey S. Sargent
NEC-P02

Code-Making Panel 2

National Electrical Code®

David G. Humphrey **E** 12/06/2019
Chair **NEC-P02**
County of Henrico, Virginia
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Code-Making Panel 2

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Code-Making Panel 2

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Douglas A. Lee — **C** 7/20/2000
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Einstein Miller — **C** 04/14/2021
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Code-Making Panel 2

National Electrical Code®

Jeffrey S. Sargent 08/31/2019

Staff Liaison **NEC-P02**

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

MINUTES

NFPA NEC Code-Making Panel 2
NFPA 70 First Draft Meeting (Annual 2025)

January 15-19, 2024
8:00 AM – 5:00 PM (ET)

Charleston, SC

1. **Call to order.** David Humphrey, chair, called the meeting to order at 8:00 AM on 1/15/2024.
2. **Introductions.** Attendees introduced themselves and identified their affiliation and NFPA staff took attendance.
3. **Chair report.** David Humphrey welcomed attendees and provided an overview of the meeting.
4. **Staff liaison report.** Barry Chase provided an overview of the standards development process and the revision cycle schedule.
   a. No members declared that they had been retained to represent the interest of an entity that would be classified in an interest category different from their own with respect to a specific issue or issues that were being addressed by the committee.
5. **Previous meeting minutes.** The minutes from October 2021 Second Draft 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-2 Task Group 1**. Thomas Domitrovich, Chair. The task group provided a report and revisions were made. The task group was reconstituted to continue work. See attached.
      ii. **CMP-2 Task Group 2**. Nehad El-Sherif, Chair. The task group provided a report and revisions were made. The task group was reconstituted to continue work. See attached.
      iii. **CMP-2 Task Group 3.** Alan Manche, Chair. The task group provided a report and revisions were made. The task group was reconstituted to continue work. See attached.

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iv. **CMP-2 Task Group 4.** Robert Osborne, Chair. The task group provided a report and revisions were made. The task group was reconstituted to continue work. See attached.

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

i. **210.8.** David Bixby, ACCA. 10 minutes. Verbal presentation only.

ii. **210.8** Greg Woyczynski, AHAM. 10 minutes. Presentation attached.

iii. **210.8** Randall Dollar, Siemens. 10 minutes. Presentation attached.

iv. **210.8(F)** William Koffel, Koffel & Associates. 10 minutes. Verbal presentation only.

v. **210.12** Keith Waters, Schneider Electric/ACBMA. 10 minutes. Presentation attached.

vi. **210.12** Dan Buuck, NAHB. 10 minutes. Verbal presentation only.

vii. **210.12** Merton Bunker/Steve Rood, AFCI Consortium & Legrand. 10 minutes. Presentation attached.

viii. **210.12(A)** Donald Talka, Mark Earley, John Kovacik, AFCI Consortium. 10 minutes. Presentation attached.

ix. **210.12** Randall Dollar, Siemens. 10 minutes. Presentation attached.

x. **210.70** Bob Spehalski, Lutron. 10 minutes. Verbal presentation only.

xi. **220.87** Brennan Less, LBNL. 10 minutes. Presentation attached.

xii. **220** John McCamish, ACBMA. 10 minutes. Presentation attached.

xiii. **Proposed Reorganization of NEC®.** Robert Osborne and Alan Manche. Approximately 45 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 4:13 PM (ET) on 1/19/2024.

Attendees

Committee Members:

✓	**David Humphrey**	Chair	IAEI
✓	**John Ambrosino**	Principal	ACCA
✓	**Charles Boynton**	Principal	ACC
✓	**Daniel Buuck**	Principal	NAHB
✓	**Steve Campolo**	Principal	Leviton Manufacturing Company, Inc.
✓	**Mark Cook**	Principal	Faith Technologies Electrical Contracting
✓	**Tyler Doering**	Principal	GE Appliance

✓	**Thomas Domitrovich**	Principal	NEMA
✓	**Nehad El-Sherif**	Principal	IEEE-IAS/PES JTCC
✓	**Brian Johnson**	Principal	Tower Pinkster
✓	**David Johnson**	Principal	IEC, Inc.
✓	**Andrew Kaszany**	Principal	Electric Light & Power Group/EEI
✓	**Arthur Libby**	Principal	State of Michigan
✓	**Alan Manche**	Principal	Schneider Electric
✓	**Daniel Naughton**	Principal	IBEW
✓	**Fred Neubauer**	Principal	NECA
✓	**Frederick Reyes**	Principal	UL Solutions
✓	**Johnny Rhodes**	Principal	City of Waco, TX
✓	**Jeremy Tidd**	Principal	Mitsubishi Electric, US Inc.
	Oscar Velasquez	Principal	Bechtel Corporation
✓	**Greg Woyczynski**	Principal	AHAM
✓	**Shelly Born**	Alternate	Electric Light & Power Group/EEI
✓	**William Crist**	Alternate	IEC, Inc.
✓	**Andrew Kriegman**	Alternate	Leviton Manufacturing Company, Inc.
✓	**Brett Larson**	Alternate	Schneider Electric
	Steven Orlowski	Alternate	NAHB
✓	**Robert Osborne**	Alternate	UL Solutions
	Irozenell Pruitt	Alternate	ACC
	Brian Rock	Alternate	NEMA
✓	**Erik Sprague**	Alternate	Mitsubishi Electric US, Inc.
✓	**Michael Weaver**	Alternate	NECA
✓	**Larry Wildermuth**	Alternate	IAEI
	Matt Zabel	Alternate	Faith Technologies Electrical Contracting
✓	**Douglas Lee**	NonVoting	US Consumer Products Safey Commission
	Einstein Miller	NonVoting-Alternate	US Consumer Products Safey Commission
✓	**Barry Chase**	Staff	NFPA
✓	**Steve Kaitharath**	Staff	NFPA

Guests:

1. Don Talka DJT Advisory, LLC

2.	John Kovacik	AFCI Consortium
3.	Paul Dobrowsky	Innovative Technology Solutions
4.	Megan Hayes	NEMA
5.	William Koffel	Koffel Associates Inc.
6.	David Kendall	ABB Inc.
7.	Joseph Wages Jr.	IAEI
8.	Bryan Holland	NEMA
9.	Gerald O'Connor	Eaton
10.	John McCamish	Eaton
11.	Ryan Jackson	Steel Tube Institute
12.	David Hewitt	Siemens Industry, Inc.
13.	David Bixby	ACCA
14.	Steve Rood	Legrand
15.	Chad Duffy	NFPA Staff
16.	Tim McClintock	NFPA Staff
17.	Chris Strange	Generac
18.	Jonathan Potter	Legrand
19.	John Brower	Hubbell
20.	Frank Tse	Hubbell
21.	Chad Roberts	Flour
22.	Doug DeVries	Musco
23.	Nick Tippett	Musco
24.	Amy Cronin	Strategic Code Solutions
25.	Mark Earley	Alumni Code Consulting Group
26.	Merton Bunker	Merton Bunker & Assoc., LLC
27.	Scott Harding	FB Harding
28.	Dean Austin	NFPA Staff
29.	Kim Cervantes	NFPA Staff
30.	Erik Hohengasser	NFPA Staff
31.	Randy Dollar	Siemens
32.	Bob Spehalski	Lutron Electronic
33.	Mark Pollock	Littlefuse
34.	Brian Baughman	NEMA
35.	James Hathorn	IAEI/City of Irving, TX
36.	Larry Ayer	IEC, Inc
37.	Keith Waters	Schneider Electric
38.	Susan Newman Scearce	IAEI
39.	Brennan Less	LBNL
40.	Mario Valdes	Mike Holt Enterprises
41.	Brian House	Mike Holt Enterprises
42.	Vincent Della Croce	Siemens

Total number in attendance: 73

Commented [ML1]: Add asterisk next to name if it is a hybrid meeting. This line can be deleted if it is a fully remote meeting.

NEC® Code-Making Panel 2 First/Second Draft Chair Report

Signature: David G. Humphrey

Date of Meeting: Jan. 15, 2024- Jan.19 2024

1. List names of NEC® Code-Making Panel Members in Attendance: On file with NFPA staff.

2. List names of Guests in Attendance: On file with NFPA staff

3. List names of Guests who addressed the Panel, the subject of their presentation and the length of time they spoke:

1)	D. Bixby	210.8	10 min.	ACCA Oppose Expansion
2)	G. Woyczynski	210.8	10 min.	AHAM Oppose Expansion
3)	R. Dollar	210.8	10 min	Siemens Support Expansion
4)	B. Koffel Date to 2029	210.8(F)	10 min.	AHRI/Leading Build. Move Eff.
5)	K. Water	210.12	10 min.	ACBMA Supp. expansion
6)	D. Buuck	210.12	10 min.	NHBA Oppose Expansion
7)	M. Bunker/ S. Rood Oppose expansion.	210.12	10 min.	AFCI Cons/Le Grande
8)	J. Kovacik, M. Early, D Talka New method for 210.12A list.	210.12(A)	10 min.	AFCI Consortium/
9)	R. Dollar	210.12	10 min.	Siemens Supp. Expansion
10)	B. Spehalski low battery indicator.	210.70	10. Min	Lutron Battery wall switch
11)	B. Less	Art. 220	10 min,	LBN Labs Overview of 220 FRs
12)	J. McCamish	Art. 220	10 min.	Eaton overview of 220 FRs Oppose.

4. Number of Public Inputs/Comments acted upon. **PI 330**

5. Number of First/Second Revisions Created: **FRs 80**

6. List any Task Groups appointed to work subsequent to the First/Second Draft Meeting, along with the names of Task Group Chair/members.
   N/A

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

a) Refer to CMP 10. This FR correlates with changes to 215.10 (PI 1641) and 230.95 (PI 1645) which eliminate the need for a second level of GFPE to achieve selective coordination, greatly simplifying selective coordination. See section 210.13.

b) Refer to CMP 7. Branch circuit is clearly defined in Article 100 as the circuit conductors between the final overcurrent device protecting the circuit and the outlet(s). The fact that there is an outlet that served the cord supplying an RV does not make the circuit a feeder as the outlet to which the cord is attached is supplied by the final overcurrent device in the circuit.

c) Refer to CMP 12 public input 3145 as detailed as bullet item 8 (c) below.

d) PI 4238 Energy Management System (EMS) was renamed to Power Control System (PCS) to differentiate an EMS with overload control from an EMS without overload control.
The name of the EMS with overload control and the addition of part II in article 750 will be decided by CMP 13. During the second revision CMP 2 will change the name of the system to align with CMP 13 and act in reference to part II if necessary.

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

a) Many articles use the phrase "shall not be refurbished" regarding specific equipment. CMP 2 has in PI 2598 rephrased this to "shall not be installed" as it is the installation that may not be permitted by this code.

b) PI 4050 Branch circuit overcurrent protective device has been made plural as follows "branch circuit overcurrent devices" to comply with the style manual section 3.5.3. Further "Branch circuit overcurrent device as found in 210.4(C) has been rephrased to "branch circuit OCPD".

c) While CMP 2 finds there is merit to changing EVSE to Electric Vehicle Power Transfer System Equipment (EVPTSE) or (EVPTS) as the submitter of PI 3145 suggests, changing the heading is inconsistent with the rest of the code, including the content in art. 625. We recommend that this be done at a global level, either through the correlating committee or a PI in the next code cycle.

9. List any general requests for information or assistance from the NEC® Correlating Committee:

N/A

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

CMP 2 sees merit in providing AFCI protection on DC circuitry. At this time there appear to be no such products on the market. The panel may gain direction as to the feasibility of such a requirement by understanding the current state of technological advancement of DC AFCI.

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

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2026 NEC® Public Input Task Group Report

CMP #	**2**
TG#	**1**
TG Chair	**Thomas Domitrovich**
TG Members	1. Daniel Buuck 2. Brett Larson 3. David Humphrey 4. Frederick Reyes 5. Andrew Kasznay 6. Greg Woyczynski 7. Andrew Kriegman 8. Douglas Lee 9. Nehad El-Sherif 10. Tyler Doering 11. Vince DellaCroce 12. Daniel Naughton 13. Randy Dollar

Article/Section	Public Input #	PI Report Page #	TG Recommendation & Statement
100 Basement	1711	**24**	**RESOLVE** The proposed definition includes a story of a building that is partly below grade which would classify an area of the structure beyond what would be classified as a basement by building codes and other industry reference codes and standards.
100 Basement	2186	**26**	**RESOLVE** The proposed definition includes an application of a building that is partly below grade which would classify an area of the structure beyond what would be classified as a basement by building codes and other industry reference codes and standards.
Bathing Area	3279	**25**	**RESOLVE** The term Bathing area is not used in the NEC, adding this defined term would violate the NEC Style manual section 2.1.2.2 which states that Definitions of terms used in the document shall only be located in Article 100. The term "Bathing Area" is not used in this document.

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100 Bathroom	3281	**9**	**RESOLVE** The proposed change in the definition of bathroom could have unintended consequences. Using the proposed definition, a room in a dwelling with just a toilet or just a sink, or just a tub would now be considered a bathroom and require a 20-amp circuit.
Bathroom	735	**10**	**RESOLVE** The existing defined term "Bathroom" is used in many locations throughout the Code. Changing this term to "Restroom" does not add clarity. This definition does not imply that there is a bathtub/shower.
Branch Circuit, Individual	453	**12**	**RESOLVE** This public input did not follow the rules established as part of Section 4.3.4.1 of the Regulations Governing the Development of NFPA Standards. Substantiation has not been provided to delete the defined term Branch Circuit, Individual. The term outlet referenced in the substantiation for this public input is a defined term found in Article 100 and does exist in power distribution systems. The substantiation is incorrect in stating that there is no outlet. This term is used in the NEC and deleting it could cause confusion. The proposed informational note proposed is not correct and conflicts with the definition of an outlet.
100 Branch Circuit, Individual	1344	**11**	**RESOLVE** The proposed language does not add clarity. An individual branch circuit is a branch circuit that supplies only one utilization equipment and it is not necessary that only one outlet exist as long as the individual branch circuit is serving only one utilization equipment.

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Column	1395	**27**	**RESOLVE** This term is not currently used within Article 210 in the context of a building structural or decorative element. Only terms used in the National Electrical Code should be placed in Article 100. The companion public input number 1397 seeking to add requirements for a column was not accepted.
Counter (Countertop)	175	**13**	**First Revision FR-TG1-01** The definition is modified to recognize beverage preparation and beverage serving in addition to food as the definition clearly references the risk of spillage of liquids. This change also separates preparation from serving as either and not both are important in the application of this defined term.
Dormitory Unit	2035	**15**	**RESOLVE** The suggested changes do not align with the international building code nor NFPA 5000. The text suggested to be removed is included in the building codes. Removing this text would have unintended consequences, one of which could include expanding this defined term to apply to hotels. The restrictions around number of persons and those pertaining to meals and cooking facilities are necessary to both align with building codes and limit the application of the term.
Dormitory Unit	798	**16**	**First Revision FR-TG1-02** The language is modified as extracted text from NFPA 101 Section 3.3.68 to add clarity and consistency within the NEC and between it and other NFPA documents.
Dwelling Unit	720	**19**	**RESOLVE** The proposed language does not add clarity and is not necessary. This is adefinition of a dwelling unit, adding language that suggests what is excluded can cause confusion if not all inclusive of every type of structure that is not a dwelling unit.

Commented [TD1]: NOTE TO MR. HUMPHREY AND MR. MANCHE: PLEASE PUT THIS IN ALAN MANCHE'S BASKET RIGHT AFTER PUBLIC INPUT NUMBER 1397 IS REVIEWED]

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Dwelling, Multifamily (Multifamily Dwelling)	2476	**20**	**RESOLVE** The suggested changes are not accepted. The phrase "shall be considered a single family dwelling" is written as a requirement and definitions cannot include requirements. Reference NEC Style Manual Section 2.1.10 which includes the requirements for informational notes and specifically Section 2.1.10.2, "Language", which states "Informational notes shall not be written in mandatory language and shall not contain requirements, make interpretations, or make recommendations.". Language stating that a townhouse shall be considered a single-family dwelling was not accepted because single phase dwelling is not the correct terminology and adding this language could cause confusion as a townhouse could include a 2-family dwelling.
Grade Level	1864	**28**	**RESOLVE** The public input does not include proposed changes in legislative text as required by Section 4.3.4.1(C) of the Regulations Governing the Development of NFPA Standards.
GFCI, Special Purpose	4523	**21**	**RESOLVE** The proposed language includes a requirement inside of a definition which violates NEC Style Manual Section 2.1.2.5 which states ". . . Definitions shall not contain requirements or recommendations." Use of the term practical is not accepted as the term practicable is a more appropriate term to be used. The addition of the phrase "protection of personnel" is not added as the UL Outline of Investigation, UL 943C, does not include the same phrase.

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Laundry Area	1834	**22**	**RESOLVE** The suggestion to remove "area" is not accepted as the use of the term is necessary. There are consequences related to accepting this suggested change that would reduce electrical safety. The fact is that an "Area" may not be a room. As an example, a closet may not constitute the dimensions to be considered a room but may still be an area where a washing machine and dryer and other laundry equipment could be located and would meet the definition of a "Landry Area".
Laundry Area	1835	**23**	**RESOLVE** The suggested language does not add clarity and would be difficult if not impossible to enforce. Determining intentions is not enforceable.
Residential Vehicle Bay	73	**31**	**RESOLVE** The suggested language is not accepted as adding precise dimensions would exclude many vehicle bays that do not fall within the dimensions proposed without substantiation on why those vehicle bays should not be subjected to the requirements for all vehicle bays. The suggested changes are not accepted. The phrase "shall be considered . . " is written as a requirement and definitions cannot include requirements. Reference NEC Style Manual Section 2.1.10 which includes the requirements for informational notes and specifically Section 2.1.10.2, "Language", which states "Informational notes shall not be written in mandatory language and shall not contain requirements, make interpretations, or make recommendations.".

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Worksurfaces	PI Committee 3		**FR-TG1-03** The definition is modified to recognize beverage preparation and beverage serving in addition to food as the definition clearly references the risk of spillage of liquids. This change also separates preparation from serving as either and not both are important in the application of this defined term.

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2026 NEC® Public Input Task Group Report

CMP #	**2**
TG#	**1**
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Article/Section	Public Input #	PI Report Page #	TG Recommendation & Statement
210.1	2626	58	**FR-TG1-01** This revision brings this text into alignment with Style Manual Section 4.1.4, regarding the use of Parts. 4.1.4 References to an Entire Article requires that references shall not be made to an entire article, except for Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number.

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210.2	2598 1317	60	**FR-TG1-02** This revision aligns with the NEC Style Manual requirements of Section 2.2.1 titled "Parallel Numbering Required," and recognizes the fact that the National Electrical Code is an installation requirements document and cannot control what happens to products that are not installed. This change makes it clear that the requirement pertains to reconditioned equipment requiring that it not be installed. Public Input 1317 – The phrase "shall not be permitted" is not accepted as it is no different than shall not. The phrase "shall not be installed" is clear and concise. NOT FOR PANEL STATEMENT: NOTE: Correlating committee should drive consistency with this language "shall not be installed" instead of "shall not be permitted." The phrase "shall not be permitted" is found in the following sections of the NEC: Sections 404.16, 406.2, 408.2,410.2, 470.2, 495.2, 495.49,695.2,700.2,701.2,702.2, and 708.2.
210.3	979		**FR-TG1-02A** Section 90.3 makes it clear on the organization of the Code. The existing Table could lead to confusion should sections or Articles be left out. Removing Section 210.3 will ensure no conflict exists.

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210.3	979	61	**FR-TG1-03** This revision brings this text into alignment with Style Manual Section 4.1.4, regarding the use of Parts. 4.1.4 References to an Entire Article requires that references shall not be made to an entire article, except for Article 100 or where referenced to provide the necessary context. References to specific parts within articles shall be permitted. References to all parts of an article shall not be permitted. The article number shall precede the part number. Part IV was added as the title of part IV is “motor branch circuit short circuit and ground fault protection.” And also must be included to be complete. Section 210.3 is moved to 210.14 to accommodate the change to moving 210.2 for reconditioned equipment to 210.3 in accordance with the NEC Style Manual section 2.2.1.
210.4(E)	2196	62	**Resolve** The suggested change would move a wiring method from Chapter 3 and is not accepted. The reference to informational Note No. 2 which states “See 300.13(B) for continuity of grounded conductors on multiwire circuits” is adequate and provides the User of the Code appropriate information to achieve what this submitter was seeking. Wiring methods must remain in Chapter 3 for clarity and usability.

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210.5(C)	781 782 3060	67 68 64	**FR-TG1-04** New second level subdivision is added to give users of the Code clear requirements for the proper identification of branch circuits supplied from a single nominal voltage system. The reference to Section 310.6(C) provides the link to the requirements on how to properly identify these ungrounded conductors from one nominal voltage system. The remainder of 210.5(C) has been renumbered to accommodate the addition. In addition, the word “enclosed” was appropriately located where necessary to align with the new defined term “enclosed panelboard” and for technical accuracy.

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210.4	4050		FR-TG1-05 Changes made to address the use of the term “Branch Circuit Overcurrent Protective Device”. This change addresses two areas in 210.4, including the following: 210.4(A) states “containing the branch-circuit overcurrent protective device or protective devices.” This is modified to read as “containing the branch-circuit overcurrent protective devices (OCPDs).” This change removes the “or protective devices” and makes the existing text protective device plural. This aligns with the NEC Style manual section 3.5.3 titled “Plural” which states the following: “Unless referring to a single item of equipment, references to electrical components and parts shall be plural rather than singular. This results in greater consistency and makes it clear that the requirement refers to all components or parts of a given type or class.” Additionally, this is the first use of the term branch-circuit overcurrent protective device and it is at this point for Article 210 that the use of the acronym “OCPD” is introduced and can be used throughout this Article. This is permitted by the NEC style manual as per Section 3.2.3 Titled “Acronyms and Uncommon Abbreviations” which states “All acronyms and any abbreviations that are not in common use and not in Article 100 shall be spelled out with the abbreviation following in parentheses for the first use of the term in the body of each article. Each subsequent use of the term in the article shall be permitted to be the acronym or abbreviation only. Acronyms for defined terms shall be unique and not used with any other term.” The second change is found in 210.4(C) which replaces “branch-circuit overcurrent device” with “branch-circuit OCPD” to align with the defined term branch-circuit overcurrent protective device and the previously established acronym OCPD.

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210.6(A)	969	71	Resolve There is no substantiation provided for allowing higher voltages in these occupancies. The suggested change could lead to confusion as there would be enforcement difficulties.
210.6(A)	4348	70	Resolve The word nominal is consistent with its use in other parts of this article as well as throughout the NEC and in some cases added per public inputs made during this code cycle. Reference 3.5.1.1 Sentence Structure as this exact phrase is used to demonstrate proper sentence structure.
210.8	1503	73	Resolve The suggested change was not accepted as the current structure of this section is understood.

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210.8	264	79	FR-TG1-06 PI 4269: The parent text of 210.8 was modified to accommodate AC and DC applications in accordance with the addition of first level subdivision (G). DC Circuit requirements are added to accommodate growth of DC circuits in structures. DC residential and commercial installations are emerging in the electrical infrastructure and are expected to be a growing alternative to the traditional AC only utility fed building. Examples include the US DOE Grid-interactive Efficient Buildings project (Note 1), the Purdue University RENEWW house (Note 2), and a DC Microgrid community in Vermont (Note 3). These installations may involve buildings that are distributed entirely with DC, or with an AC/DC hybrid distribution. The addition of (G) in 210.8 and adjustment of the parent text of 210.8 helps ensure safety from shock hazards for these types of applications. The following was accepted based on PI 264: The exception for receptacles on rooftops was moved to the parent text of 210.8 as this exception applies regardless of what type of occupancy. Type of occupancy doesn't dictate the accessible nature of the receptacle. The following items from PI 264 were not accepted: 210.8(F): Section 210.8(F) suggested changes were not accepted as clarity is not added and the existing language is sufficient. The existing language does not indicate that GFCI protection must be provided as a wiring device only. The language uses the word "protection" which indicates protection is provided either at the device or upstream of the device. 210.8(A) and 210.8(B): The removal of Kitchens from list item (6) in 210.8(A) and list item (2) in 210.8(B) is not accepted as it could create confusion. Identifying "kitchens" clearly in 210.8 adds clarity and increases usablity of the Code. A kitchen is well defined and not

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			in all cases does 210.8(A)(7) cover a kitchen. Not all of the criteria in 210.8(A)(7) are included for kitchens. 210.8(A)(7) says “or cooking” and the definition of a kitchen says “and cooking”.
210.8(G)	3630	72	Resolve The suggested language could cause confusion with 210.8(B) which would include work areas. The term “work area” is too vague and hard to enforce as work areas could exist in many locations.
Work Area	4266	32	Resolve The language of public input 3630 was not accepted and as such this term is not used in the Code. A definition for the term Work Area which is not used in Article 210 is not necessary. The proposed definition would be difficult to enforce and could cause further confusion.
210.8(G)	3889	173	Resolve Section 300.4(B), which covers NM cables passing through metal framing, requires listed bushings or grommets covering all metal edges, that are securely fastened in the openings.

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210.8(G)	4269	99	FR-TG1-07 The requirements of Section 210.8 provide lifesaving protection for personnel from electrical shock hazards. However, the requirements are currently applied to AC circuits only, even though the same electrical shock hazards exist in DC circuits. As there is continued expansion of DC throughout the infrastructure it is necessary to ensure that the same level of electrical shock protection is provided to personnel in the locations addressed by 210.8.
210.8	4315	198	Resolve The suggested language would no longer permit a Class A GFCI device to meet the requirements of 210.8. Compatiblity with appliances would be improved but not assured using the Class A-HF GFCI.
GFCI HF Definition	4308	29	Resolve The term is not used in the NEC and the companion public input, PI 4315, was not accepted. Terms that are used in the NEC are located in Article 100.
210.8	475	200	Resolve The suggested language is too restrictive and not substantiated. There are several methods available to achieve GFCI protection and the option chosen is up to the designer, installer, or owner.

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210.8	161	197	Resolve The suggested language is not necessary as a branch circuit is defined in Article 100 as the circuit conductors between the final overcurrent device protecting the circuit and the outlet(s). The fact that there is an outlet that served the cord supplying an RV does not make the circuit a feeder as the outlet to which the cord is attached is supplied by the final overcurrent device in the circuit.

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210.8(A)	1096 1334 182 1335 1949 1388 1764 3384	107 109 117 111 119 113 115 121	FR-TG1-09 Section 210.8(A) includes changes to numbering of list items due to accepted modifications to this section. Public inputs 1096, 1334: Existing list Item (2) is separated into two list items for clarity. In addition, the words “that have a floor located at or below grade level” are removed as the location of the floor does not remove the electrical shock hazard that GFCI is meant to address. Public inputs 182, 1335 and 1949: List item (12) is now separated into two list items for clarity to address the issue of the use of the word “and” between indoor damp locations and indoor wet locations. These are two separate areas that are not shown as two list items. This change adds clarity. Public Input 264: Exception No’s 2 and 3 are reworded for clarity. The removal of Kitchens from list item (6) in 210.8(A) and list item (2) in 210.8(B) is not accepted as it could create confusion. Identifying “kitchens” clearly in 210.8 adds clarity and increases usability of the Code. A kitchen is well defined and not in all cases does 210.8(A)(7) cover a kitchen. Not all of the criteria in 210.8(A)(7) are included for kitchens. 210.8(A)(7) says “or cooking” and the definition of a kitchen says “and cooking”. Public Inputs 1388, 1764, 3384: Exception No. 4 is modified to remove “bathroom” as exception should not only apply to bathroom exhaust fans. It would also be a valid exception in utility areas where that GFCI protection would otherwise be required.

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210.8(A)(13) 210.8(A)(13)	1447 2185	106 134	RESOLVE Substantiation hasn't been provided to expand GFCI protection to other areas covered as part of 210.8(A) and 210.8(B). If these floor receptacles are located in any of the areas identified in both 210.8(A) and 210.8(B), they would indeed be required to be protected by GFCIs. A floor receptacle is not an area location. The substantiation isn't correct that current wiring methods do not require GFCI protection to floor outlet receptacles". If they are in any of the locations found in (A) and (B) they would ineed have to be GFCI protected.
210.8(A)(3)	383	123	RESOLVE CMP-2 reaffirms these outlets are required to be GFCI protected. These outlets could be used for applications other than plugging in an RV attachment plug.
210.8(A)(5)	4381	130	RESOLVE The suggested language would result in an unprotected receptacle located in the basement that can be used for other equipment. The root cause of the tripping identified was not presented and so it is not confirmed that a compatibility issue exists. The tripping could have been because a ground fault was detected. In addition, this could create a conflict with the requirements in 422.5 where GFCI protection is required for a sump pump.
210.8(A) Except New	862	132	RESOLVE Substantiation was not provided to remove GFCI protection for ceiling receptacles powering a garage door opener. Exposure to water is not the only way electric shock can occur. There has been evidence of electric shock on garage doors due to failures.

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210.8(A) Except New	1346	195	RESOLVE The suggested language in proposed exception 5 is not accepted. The restriction of being on an individual branch circuit does not remove the hazard. Simply removing the receptacle does not remove the electrical hazard, the hazard is not the receptacle. Massachusetts data shows that a country wide issue with refrigerators is not substantiated. The suggested language could also lead to receptacles that provide power to the refrigerator left without GFCI protection yet serve other appliances. The receptacle does not have to be located in the space behind the refrigerator. The suggested language in proposed exception 6 is not accepted. This suggested language could result in general receptacles in the areas identified in 210.8 to be left without GFCI protection. Appliance standards do not require GFCI protection to be placed integral with the appliance and older appliances may still be plugged in to receptacles. Keep in mind that UL standard 60335-2-24 requires a means of disconnect.
210.8(A) Except New	4070	125	RESOLVE The proposed exception is not accepted. Placing an appliance on an individual branch circuit or placing the appliance within a dedicated space does not remove the electrical hazard. Language such as “not easily moved”, “in normal use” and more is vague and unenforceable.

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210.8(A) Except new	4107	91	RESOLVE The two exceptions proposed are not accepted as the exception does not remove the hazard. Placing an appliance within a dedicated space and not being able to be easily moved or is fastened in place does not remove the electrical hazard. Language such as “not easily moved”, “in normal use” and more is vague and unenforceable.
210.8(B)	9	154	FR-TG1-10 List item (8) is separated into two list items to align with changes made in 210.8(A) and for clarity as these are two separate locations. Public Input 264 Exception No. 2 is deleted as this exception was moved to the parent text of 210.8 as part of a separate first revision. Exception No. 6 is reworded for clarity. Public Input 9 Exception No. 3 has been replaced with language from the 2020 Edition of the NEC which was deleted during the NEC 2023 Code cycle. No information could be found to explain reasoning for this removal. This change brings back the exception for industrials for outdoor receptacle outlets and removes the previous exception for receptacles and equipment within 6 ft. of sinks. The assured equipment grounding conductor program that was previously optional has been modified to be required for that equipment supplied by receptacle outlets that would would create a greater hazard if power is interrupted or is of a design that is not compatible with GFCI protection for an additional consideration should GFCI protection not be provided.

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210.8(B)(16)	2237	146	RESOLVE The proposed language is vague and unenforceable. It is would be difficult to define what a welder work area is. And portable lighting equipment can be anywhere. Article 630 has the requirement in 630.8 requiring GFCI protection and is clear and enforceable. The intent is addressed.
210.8(B) Exception 6	2091	142	RESOLVE Substantiation was not provided to include the proposed language. This application of a receptacle within is like the receptacle in an exhaust fan which has an exception to GFCI.
210.8(B) Except NEW	3158	150	RESOLVE The suggested exception no. 7 is not accepted as hardwired control equipment would not be addressed in 210.8(B) as this section is for receptacles located in areas identified. If the appliance is cord and plug connected and located in these areas identified in 210.8(B), GFCI protection must be provided. Substantiation was not provided to reduce the current level of protection afforded by 210.8(B).

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210.8(B) Except NEW	3789	85	RESOLVE The proposed Exception No. 7 and No. 8 are not accepted. Exception No. 7 for luminaires proposes a twistlock type cord and plug connection but this solution does not remove the electrical shock hazard. In addition, a luminaire that is not readily accessible doesn't mean the receptacle is not readily accessible. Exception No. 8 for electric motors would cover all areas of 210.8(B), the substantiation was givien for only one area. There are unintended consequences that reach beyond where the substantiation was noted. Please note that twistlock is a trade name.
210.8(B) Parent Text	1897	138	RESOLVE The proposed language does not add clarity and could have unintended consequences. GFCI protection would be required with the existing language for the application stated by the submitter.
210.8(C)	92	159	FR-TG1-11 Adding the word "nominal" for 120 volts nominal is accepted and consistent with the use of the term in other areas of Article 210.8.
210.8(C)	3237	158	RESOLVE Adding "at or below grade" was not accepted as the proximity to grade does not remove the electrical shock hazard that GFCI is meant to address.

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210.8(D)	2549	164	RESOLVE Substantiation was not provided to support hard wired garbage disposals. Many cord and plug garbage disposals are GFCI protected by the existing language found in 210.8, this change would only impact hard wired garbage disposals.
210.8(D)	90	170	RESOLVE It is not necessary to provide an exception for appliances that would operate below the low-voltage contact limit. If these appliances are cord and plug connected, they would have to have conversion equipment hence the receptacle would still be at 120 Volts or other voltage where GFCI is required and should not be removed. Examples of Hard wired appliances that operate below the low-voltage contact limit would be helpful to understand the application better. Just because the appliance is low voltage, doesn't mean we should not provide protection for the outlet.
210.8(D)	29	166	RESOLVE The suggested language does not add clarity. The existing language ensures protection and is sufficient.
210.8(D)	82	168	RESOLVE Substantiation was provided as part of SR 7596 during the 2023 Code cycle when these items were added. The panel statement noted that the CPSC database demonstrated 104 electrocutions from 2011-2020, of which 81 percent were working on an appliance or other type of appliance or equipment.
210.8(D)	195	160	RESOLVE Removing the words "branch circuit or" does not add clarity. The existing language meets the intent of the submitter ensuring that a circuit breaker or wiring device type GFCI can be used.

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210.8(D)	2227	163	RESOLVE The suggested language would be difficult to enforce with appliances like microwaves and similar which are often store bought and installed by the occupant. Permits are typically not required to install these appliances hence enforcement would be very difficult. If permits are pulled, it is highly likely that enforcement of the existing language would be necessary.

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210.8(D)	4477 2092	167 161	FR-TG1-12 This first level subdivision is modified to align with the existing requirements found in 210.8(B) for three-phase branch circuits rated 150 volts or less to ground, 100 amperes or less. Appliances in three-phase applications are in use that are beyond the 60 A value currently stated and GFCI devices are commercially available at this amperage rating. The following items from public input 2092 were not accepted: 1. The voltage was not changed from 150 volts or less to ground as the existing language is adequate and clear. 2. The branch-circuit rating was not moved from 60Amperes to 50 Amperes as substantiation was not provided to reduce the level of protection currently afforded by 210.8(D). 3. Adding dewatering pumps was not accepted as this is not a defined term and could cause confusion. 4. An exception for elevator pits is not accepted as the GFCI protection requirements can be found in Article 620 as part of 620.6. 5. Removing list items (8) through (12) was also not accepted as substantiation was not provided to reduce the current level of protection afforded by these requirements. Substantiation was provided as part of SR 7596 during the 2023 Code cycle when these items were added. The panel statement noted that the CPSC database demonstrated 104 electrocutions from 2011-2020, of which 81 percent were working on an appliance or other type of appliance or equipment.

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210.8(F)	1501	174	RESOLVE Existing requirements were substantiated with unfortunate examples of death due to electrocution on outdoor equipment when 210.8(F) was added during the 2020 Code cycle. 210.8(F) compliments the existing requirements for outdoor receptacles which have been required to be GFCI protected for many years. The addition of 210.8(F) recognized the fact that the electrical shock hazard does not disappear when the equipment is hardwired instead of being cord-and-plug connected.
210.8(F)	3285	186	RESOLVE Substantiation has not been provided to warrant moving the ampere rating from 50A to 60A.

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210.8(F)	3619 1582 4392 4471 157	179	FR-TG1-13 *The language found in the parent text of 210.8(F) was modified to identify that the outlets are outdoor outlets which aligns with the title of 210.8(F) and that the outlets are installed at and not in the locations listed. In addition, (Reference Public Input No. 264), the language "shall be provided with GFCI protection" was modified to add clarity stating that these outlets "shall be GFCI protected". The existing language could be read as requiring outlets installed in garages, accessory buildings and boathouses to have GFCI protection. This change will make it clear that only outdoor outlets require GFCI protection. Note that the rule in 210.8(A) will continue to require GFCI protection for receptacle outlets installed in these locations.* Exception No. 2: The date found in Exception No. 2 was extended to provide more time for standards and manufactured solutions to be developed. The suggested three new exceptions proposed by PI 4471 were not accepted as substantiation was not provided to reduce the current level of protection provided. GFCI protection provided in EV chargers provides protection between the charger and the vehicle but not upstream of the charger between the panelboard and the outlet.
210.8(F) Exception 2	4026	189	RESOLVE The suggested language does not provide a solution for the problems identified with for the application when the requirement entered the NEC.
210.8(F) Exception 2	4203	191	RESOLVE The proposed language does not provide a solution that has been proven to be compatible with the ground-fault currents that flow through the equipment grounding conductor which is causing tripping of GFCI protection.

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2026 NEC® Public Input Task Group Report

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Article/Section	Public Input #	PI Report Page #	TG Recommendation & Statement
210.11(C)(1)	2389	202	**Resolve** The proposed language is redundant and not needed because 210.52(B)(2) states that small-appliance branch circuits in dwelling units shall have no other outlets.
210.11(C)(2)	985	203	**FR-TG-2-1** This revision is made to add clarity that the required 20-ampere branch circuit for the laundry area and 120-volt nominal equipment such as flat irons, washing machines, and for heat-pump clothes dryers or gas clothes dryer ignitions, and to clarify that this requirement applies to receptacle outlets in a laundry area as define in Article 100.
210.11(C) (3) & (4)	23	204	**FR-TG-2-2** This revision is made to add clarity regarding the voltage of bathroom branch circuits relative to "nominal voltage" cited in 110.4.

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NEW 210.11(C)(5)	3406	206	**Resolve** Insufficient substantiation was provided that the overloaded circuits and tripping issues were directly attributable to bedroom circuits being overloaded.
NEW 210.11(C)(6)	437	209	**Resolve** No evidence was provided in the substantiation to show a problem that warrants the addition of the proposed language. 120 V rated water heaters are only one option. There are water heaters requiring 240 V and others requiring no power at all.
210.11(C)(4)	1867	210	**Resolve** No proposed changes were provided, which is in violation of Section 4.3.4.1(c) of the Regulations Governing the Development of NFPA Standards.
210.11(C)(4)	1868	211	**Resolve** No proposed changes were provided, which is in violation of Section 4.3.4.1(c) of the Regulations Governing the Development of NFPA Standards.
210.11(C)(4)	2550	212	**Resolve** The 210.52(G)(1) mandate for the receptacle outlets is a subset of the mandates and allowances for the 210.11(C)(4) branch circuit. 210.52(G)(1) addresses receptacle outlets serving solely each vehicle bay up to 5½ feet above the floor. By contrast, the 2023 210.11(C)(4) words ", including those" expanded the allowance for that 120-volt branch circuit to supply receptacle outlets located within or at the garage but serving purposes not specifically related to that vehicle bay (e.g., power tools, work benches, ancillary appliances and equipment) or above the 5½ -foot height (e.g., garage-door openers) to be not prohibited by the "no other outlets" words. Exception No 2, added to this section last cycle, permissively allows other outlets besides the one receptacle outlet mandated by 210.52(G)(1).
210.11(C)(4)	2575 483	213 215	**FR-TG-2-3** This revision is made to add clarity by replacing "outlets for other equipment" by "other outlets" as the restrictions on other equipment within the same

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			garage are sufficiently addressed in 210.23(B). Outlets for luminaires are also covered in 210.23(B).
210.11(C)(4)	2858	214	**Resolve** Public Input 2858 results in correlation issues. Article 210 addresses the wiring of a branch circuit within or at the detached garage. Where branch circuits run between buildings (i.e., between the dwelling and a detached garage), however, those requirements fall within the scope of Article 225. From a dwelling to a detached garage, the Submitter's objective is already mandated by 225.30 and by existing 210.11(C)(4) Exception 1 for receptacle outlets of the load side of one outdoor branch circuit, multiwire or not, or of multiple branch circuits from one outdoor feeder. Further, the proposed language effectively the 20 A garage branch circuit to supplying only outdoor receptacles in the same garage.
Group 1 – 210.12 Parent Text			
210.12	1230 3492	216 375	**FR-TG-2-4** (Detail) To enhance Code usability and to provide clarity, the following revisions were made: 1. The reference to list items (1) through (6) of 210.12(A) in the parent text of 210.12, 210.12(B), (C), and (D) are deleted; 2. Editorial changes are made in 2nd level subdivision list items 210.12(A)(5) and (6) to change the language from permissible to mandatory to comply with the parallel construction requirement of Section 2.1.8.2 of the NEC Style Manual.
Group 2 – 210.12 (A)			
210.12 (A)	2794	242	**FR-TG-2-5** (Detail) A new option to provide AFCI protection using a listed outlet branch circuit-type AFCI in conjunction with a listed overcurrent protective device is added.
210.12 (A)	3786	221	**FR-TG-2-6** (Detail) A new option to provide AFCI protection using a listed outlet branch circuit-type AFCI in conjunction with a listed overcurrent protective device is added.
Group 3 – 210.12 (B)			

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210.12(B)	4163-I 1438 1903	230 273 277	**Resolve** Interoperability continues to be a concern. Expansion of AFCI protection should not take place until interoperability is addressed.
NEW 210.12(E)	4276	235	**Resolve** Despite the merits of providing arc-fault protection for dc circuits, there are currently no listed products commercially available for this purpose.
210.12(B)	1229 1773 3379	271 275 339	**Resolve** Interoperability continues to be a concern. Expansion of AFCI protection should not take place until interoperability is addressed. The issue of garages has been looked at from group of welder manufactures.
210.12(B)	3155-I 3966 4450	279 353 357	**FR-TG-2-7** (Detail) Kitchens and laundry areas are deleted from the list because they are the primary locations for appliances that experience incompatibility issues causing nuisance tripping.
210.12(B)	889 3155-II	363 279	**FR-TG-2-8** (Detail) Similar areas are deleted because it is a vague and an unenforceable term per NEC® Style Manual 3.2.1 and Table 3.2.1. Arbitrary inspection interpretations have resulted in inconsistency as to what exactly constitutes a "similar area".
210.12(B)	3372 3407	337 344	**Resolve** Interoperability continues to be a concern. Expansion of AFCI protection should not take place until interoperability is addressed. The issue of garages has been looked at from group of welder manufactures.
210.12(B)	3380 3408	341 346	**FR-TG-2-9** (Details) A new requirement for arc-fault protection of dwelling unit bathroom branch circuits is added. This revision is to recognize that these branch circuits experience similar hazards to other dwelling unit branch circuits and thus should be afforded the same level of protection.

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			Bathrooms have been added to the list as inoperability concerns with bathroom exhaust fans have been addressed.
210.12(B)	3635 4163-II	349 230	**Resolve** Exception No. 2 is not deleted to address incompatibility issues.
210.12(B)	534	361	**FR-TG-2-10** (Detail) The date in Exception No. 2 was deleted and the exemption of arc welding equipment from AFCI protection was extended to dwelling unit garages and accessory buildings.
210.12 (B), (C), & (D)	3926 3931	351 370	**Resolve** The charging language of 210.12(B), (C), and (D) is for locations required to be protected by one of the AFCI means of protections in 210.12(A). The proposed language addresses a wiring method and not a location.
210.12(B)	482	359	**Resolve** The term outlet encompasses the utilization equipment. Outlets serve utilization equipment
210.12 (B), (C), & (D)	16	365	**FR-TG-2-11** (Detail) This revision is made to add clarity regarding the voltage of AFCI-protected branch circuits relative to "nominal voltage" cited in 110.4.
210.12(C), (D), & (E)			
210.12(C)	800-I	368	**FR-TG-2-12** (Detail) Changing the title of 210.12(C) from "*Dormitory Units*" to "*Dormitories*" is to enhance Code usability and to better corelate with NPFA 101 and NFPA 5000.
210.12(C)	800-II	368	**FR-TG-2-13** (Detail) Bathrooms were deleted because of interoperability concerns.
210.12(C)	800-III	368	**FR-TG-2-14** (Detail) Similar rooms were deleted because it is a vague and an unenforceable term per NEC® Style Manual 3.2.1 and Table 3.2.1. Arbitrary inspection

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			interpretations have resulted in inconsistency as to what exactly constitutes a "similar area"
NEW 210.12(G)	1445	372	**Resolve** The hazard being addressed by location of tamper-resistant receptacles differs from the hazard being addressed by AFCI protection and substantiation has not been provided to support the inclusion of the locations in 406.12.
210.12(E)	2341	373	**FR-TG-2-15** Adding 'or switch' gives installers the option to provide AFCI protection via a AFCI switch device if the circuit is extended, modified, or replaced.
210.12(E)	2594	374	**Resolve** The proposed language only affords AFCI protection to branch circuits and eliminates AFCI protection of outlets, devices, and appliance supply cords.
Global	3085	1	**No Action** The Informational Note in 210.12(A) is included to differentiate between different methods of AFCI protection. Thus, the Informational note is not in conflict with the NEC Style Manual.
End of 210.12			
210.13	1633	376	**FR-TG-2-16** This FR correlates with changes to 215.10 (PI 1641) and 230.95 (PI 1645) which eliminate the need for a second level of GFPE to achieve selective coordination, greatly simplifying selective coordination. The FR does not prohibit GFPE, but rather makes it optional when very specific arc-flash energy reduction methods are utilized. Equipment damage is reduced because arc-flash energy reduction, used for personnel protection, is much faster than GFPE that is used for equipment protection.
210.17	799	385	**FR-TG-2-17** "Dormitories" was included in the occupancies listed to improve usability of the NEC® and to correlate consistently with the defined term's cited extraction sources NFPA 101® Life Safety Code®,

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			revised since being included originally in NEC®, 3.3.205 (2024) and A.3.3.205 (2024). regarding individual guest rooms and individual guest suites of dormitories versus the entire dormitory occupancy. This First Revision FR-TG-2-17 (PI-799), together with First Revision FR-TG-1-02 (PI-798) for the revised definition of "Dormitory" in place of "Dormitory Unit", will bring the treatment of this occupancy in the NEC® into correlation with its usage in NFPA 101®, NFPA 5000 Building Construction and Safety Code, and other codes.
210.18	966	387	**Resolve** The substantiation provided is not clear and did not provide any evidence to support that the use of labels will improve safety.
210.19(A)	1823	388	**Resolve** This section covers the general requirements for branch circuits and is appropriately located in article 210. Article 240 covers overcurrent protection and not the ampacity of branch circuit conductors. Moving this section to Article 240 could create confusion to Code users.
210.19(A)(1) & (2)	471	390	**Resolve** These are list items that do not require a title as per Section 2.1.8.2 of the NEC Style Manual
210.19(A)(1)	494	392	**Resolve** The 125% continuous use factor does not exist in the NEC solely due to the limitation of an overcurrent device installed in an enclosure. Heat rise tests performed on equipment address more than just the OCPDs located within. These tests are also addressing other components installed within the assembly. The increase in conductor size by application of 125% of continuous loads helps to provide conductor material to act as a heat sync for achieving a lower impact on temperature rise.
NEW 210.19(E)	1911	394	**Resolve** No proposed changes were provided, which is in violation of Section 4.3.4.1(c) of the Regulations Governing the Development of NFPA Standards.
210.19	281	395	**Resolve**

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			Adding "Nominal" to the text is unnecessary as the text "for circuits exceeding 1000 volts ac or 1500 volts dc" have be deleted in FR-TG-2-18.
210.19	2423-1	5	**FR-TG-2-18** With the identification in the title and scope of the Article that the requirements apply to certain voltage ranges, the inclusion of this detail in this section is redundant and unnecessary.
210.20	282	396	**Resolve** Adding "Nominal" to the text is unnecessary as the text "for circuits exceeding 1000 volts ac or 1500 volts dc" have be deleted in FR-TG-2-19
210.20	2423-2	5	**FR-TG-2-19** With the identification in the title and scope of the Article that the requirements apply to certain voltage ranges, the inclusion of this detail in this section is redundant and unnecessary.
210.21(B)	748	397	**Resolve** The substation provided does not corelate with the requirements of 210.18, 210.22, and 210.24.
210.21(B)(2)	3147	399	**Resolve** The existing requirements are requirements for both continuous and non-continuous loads.
210.21(B)(3)	2459	400	**Resolve** NEMA configurations of NEMA Standard WD 6 do not represent the sum-total of all configurations eligible for receptacles, attachment plugs, connectors and inlets (motor plugs). Other configuration standards exist, such as UL 1681, UL 1686, and UL 1691 to name a few. Furthermore, proprietary configurations that do not violate 406.8 and 406.4(F) are not precluded. Although not common, receptacles rated at 40 amperes have been listed and produced in the past, and remain eligible to be listed and produced in the future.
210.23(A)(1)	2497	401	**Resolve** No evidence was provided in the substantiation for allowing exhaust fans to be supplied from 10-

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			ampere branch circuits other than those for bathroom or laundry room lighting. Exhaust fans are typically found in bathrooms and laundry rooms. Supplying them from 10-ampere lighting circuits in bathrooms and laundry rooms is preferred as it keeps the location of the exhaust fan and the circuits supplying it together. This section only addresses 10-ampere branch circuits. There is no restriction to supply exhaust fans from branch circuits with other ratings. No evidence was provided in the substantiation for eliminating gas fireplace units from being supplied by a 10-ampere branch circuit. This permission needs to be provided in 210.23 as this is the only section addressing 10-ampere branch circuits. The requirement contains an implied restriction that no other loads can be provided in the circuit supplying the gas fireplace unit. Therefore, an individual branch circuit is required.
210.23(A)	1643 1644	402	**FR-TG-2-20** To enhance Code usability and to add clarity, 210.23(A) was rewritten. The following revisions were made: 1. "Comply with the requirements of 210.23(A)(1) and (A)(2)" was deleted from 210.23(A)'s charging text; 2. The title of 210.23(A)(1) was deleted, while its list items (1) through (3) were retained and moved to 210.23(A); 3. List item (1) of 210.23(A)(2) was moved as a prohibition to 210.23(A)'s charging text and the remainder of 210.23(A)(2) was deleted in its entirety; 4. A new Exception was added to permit 10-ampere branch circuits to supply those unit receptacles that are integral to exhaust fans located in dwelling-unit bathrooms and laundry areas if those circuits also serve lighting outlets.
210.23(B)	1467	404	**Resolve**

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			Insufficient substantiation was provided to exempt garage branch circuits from supplying only the receptacle outlets specified in 210.11(C)(4).
210.23(B)	2390	405	**Resolve** Informational notes are not allowed to have a requirement as per Section 2.1.10.2 of the NEC Style Manual.
210.23(C), (D), & (E)	968	406	**Resolve** The substantiation provided is not clear and did not provide any evidence to support that the use of labels will improve safety.
210.23(E)	4183	408	**Resolve** The added language is not needed as 210.23(E) covers multiple-outlet branch circuits, while 210.18 covers branch circuit rating.
210.24	970	409	**Resolve** No substantiation was provided to warrant the change.15A receptacles having feed-through terminals are listed for carrying 20 A.
210.25(B)	1912	413	**Resolve** The substation provided does not corelate with the requirements of 210.25(A) and 240.24(B).
Global PI-4050 Overcurrent Protection terms			
210.11(B)	4050	2	**FR-TG-2-21** CMP 2 has revised text under its purview to use consistent terminology for “Branch-Circuit Overcurrent Protective Devices”, which is a defined term. CMP 2 also chose to include a commonly used acronym for Overcurrent Protective Devices (“OCPD”) and then apply it in the body of the text. The first use of the term is in 210.4(A), then the acronym is used throughout the rest of Article 210. This practice is permitted by Section 3.2.3 of the NEC Style Manual.
210.12	4050	2	**FR-TG-2-22** CMP 2 has revised text under its purview to use consistent terminology for “Branch-Circuit Overcurrent Protective Devices”, which is a defined term. CMP 2 also chose to include a commonly used

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			acronym for Overcurrent Protective Devices ("OCPD") and then apply it in the body of the text. The first use of the term is in 210.4(A), then the acronym is used throughout the rest of Article 210. This practice is permitted by Section 3.2.3 of the NEC Style Manual.
210.18	4050	2	**FR-TG-2-23** CMP 2 has revised text under its purview to use consistent terminology for "Branch-Circuit Overcurrent Protective Devices", which is a defined term. CMP 2 also chose to include a commonly used acronym for Overcurrent Protective Devices ("OCPD") and then apply it in the body of the text. The first use of the term is in 210.4(A), then the acronym is used throughout the rest of Article 210. This practice is permitted by Section 3.2.3 of the NEC Style Manual.
210.19(A)	4050	2	**FR-TG-2-24** CMP 2 has revised text under its purview to use consistent terminology for "Branch-Circuit Overcurrent Protective Devices", which is a defined term. CMP 2 also chose to include a commonly used acronym for Overcurrent Protective Devices ("OCPD") and then apply it in the body of the text. The first use of the term is in 210.4(A), then the acronym is used throughout the rest of Article 210. This practice is permitted by Section 3.2.3 of the NEC Style Manual.
210.20	4050	2	**FR-TG-2-25** CMP 2 has revised text under its purview to use consistent terminology for "Branch-Circuit Overcurrent Protective Devices", which is a defined term. CMP 2 also chose to include a commonly used acronym for Overcurrent Protective Devices ("OCPD") and then apply it in the body of the text. The first use of the term is in 210.4(A), then the acronym is used throughout the rest of Article 210. This practice is permitted by Section 3.2.3 of the NEC Style Manual.

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2026 NEC® Public Input Task Group Report (12/15/2023)

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Article/Section	Public Input #	PI Report Page #	TG Recommendation & Statement
210.52			Action / Language (FR or Resolve) (Code Language)
			Statement
210.52	1600		Resolve -
			Section 210.52 addresses receptacle outlets and therefore should not be retitled to expand the scope. The language in 210.60(A) is clear. The substantiation indicated receptacles should be provided to address furniture fixed in place however it would impact receptacle placement that could reduce the number of receptacles along the wall space.
210.52	867		Resolve

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			The language proposed is already in 210.52(4) by addressing the receptacles located 5-1/2ft above the floor.
210.52	1849		TG3-FR1 Controlled by a switch or listed wall-mounted control device.
			The language has been revised to provide consistency with 210.70.
210.52(A)(1)	1915		Resolve
			The proposed language is not necessary as it would have limited impact on dimensional measurements. The language does not add clarity to the requirement.
210.52(A)(2)	376		Recpt below counter Resolve
			NEC 210.52(A)(2) establishes the required wall space for determining receptacle locations.
210.52(A)(2)	1405		Recpt bar counter Resolve
			NEC 210.52(A)(2) establishes the required wall space for determining receptacle locations. NEC 210.52(C)(2) establishes the restrictions for locating the receptacle for a work surface or countertop.
210.52(A)(3)	1917		Resolve
			The proposed language is not necessary as it would have limited impact on dimensional measurements. The language does not add clarity to the requirement.
210.52(A)(4)	288 See (C)(2)		CounterTop Resolve
			NEC 210.52(A)(4) establishes that receptacles for countertops and work surfaces are not to be considered as the receptacles located along the wall in accordance with 210.52(A). NEC 210.52(C)(2) establishes the restrictions for locating the receptacle for a work surface or countertop.
210.52(A)(4)	321 See (C)(2)		CounterTop Resolve
			The receptacles serving the countertop or work surface are located to serve that specific location based on the multi-appliance usage requiring the need for those receptacles. NEC 210.52(A) is determining the usable wall space where general use receptacle are place to support other general

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			loads. NEC 210.52(C)(2) establishes the restrictions for locating the receptacle for a work surface or countertop.
210.52(A)(4)	3274		CounterTop Resolve
			NEC 210.52(A)(4) establishes that receptacles for countertops and work surfaces are not to be considered as the receptacles located along the wall in accordance with 210.52(A). NEC 210.52(C)(2) establishes the restrictions for locating the receptacle for a work surface or countertop.
NEW After 210.52(A)(4)	1397		Columns Resolve
			There is insufficient substantiation to require receptacles specific to columns. The language would create an enforcement challenge. NEC 210.52(A)(2)(1) would already address “any space 2ft or more in width (including space measured around corners).”
NEW After 210.52(A)(4)	289		Resolve
			A recessed receptacle will not address the damage to a cord being plugged into an outlet behind a door, swinging or barn door. A receptacle can be located beyond the sliding door as already addressed with pocket doors.
210.52(B)(1)	1914		Resolve
			The proposed language is confusing and does not add clarity. The existing language requirement is for the receptacle outlet and not the receptacle. The code does not require a duplex receptacle to be fed by both small appliance branch circuits.
210.52(B)(3)	1831		Resolve
			The current language provides the utility to serve the necessary loads in consideration of the two receptacles found in a duplex configuration from the two small appliance branch circuits. The two small appliance branch circuits will still supply the same load capacity through the two receptacles in the duplex configuration.
210.52(B)(3)	3644		Resolve
			The outdoor area that meets the definition of a kitchen needs to follow the rules for the wiring installations for a kitchen. There are a number of configurations for outdoor kitchens similar to indoor kitchens that need the same requirements to operate and provide appropriate safety parameters.
210.52(C)	2093		Resolve

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			Receptacles located to serve the appliance in a location other than on the countertop is permitted. The branch circuit and receptacles serving the countertop are not permitted to serve other outlets except as permitted in 210.52(B).
210.52(C)	3383		Resolve
			No substantiation has been provided to require the receptacles to be deenergized when located below the work surface.
210.52(C)	322		Resolve
			Cabinets with countertops are not considered wall space as found in 210.52(A)(4). Any cabinets located outside of areas denoted in 210.52(C) could have the receptacle located above the cabinet not more than 5 ft 6 inches in height 210.52(4).
210.52(C)(1)	13		Resolve
			Insufficient substantiation has been provided to support the language revision. Confusion may be created in attempting to align a point along the wall with edge of the counter. The existing language is clear and enforceable.
210.52(C)(1) (c)2?	1316	Bucket	
210.52(C)(1)	1919		Resolved Similar to 1914 and 1915
			The proposed language is not necessary as it would have limited impact on dimensional measurements. The language does not add clarity to the requirement.
210.52(C)(2)	318	Bucket	Adding a rept back to the island
210.52(C)(2)	1155	Bucket	Similar to 1316
210.52(C)(2)	1228	Bucket	FR? – Not addressing countertop
210.52(C)(2)	1546	Resolve	Resolve
			Summer Kitchen Countertop is not defined in the NEC and would create additional confusion.
210.52(C)(2)	1658	Bucket	
210.52(C)(2)	2574	Bucket	
210.52(C)(2)	3404 1316 318 1155 1228 2574 1658		TG3-FR2 TG – Looking for a path to get a receptacle on the island that addresses the CPSC data. Place a receptacle on the island 210.52(C)(3)

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	3995 4313 4408 81 2338 3405 3335		Replace existing language in (2) with the following: At least one receptacle outlet shall be installed in accordance with 210.52(C)(3) (SEE BELOW) when an island has a minimum of 9 square feet of counter top surface. This area shall not include a range, counter mounted appliances or sinks. With a working surface long dimension of 24 inches and a short dimension of 18 inches At least one receptacle outlet shall be installed on each island or peninsular countertop and located in accordance with 210.52(C)(3).
			Committee Statement The language has been revised to require at least one receptacle on the island or peninsula. 2023 NEC attempted to address the CPSC reports on incidents caused by hanging cords off the top of kitchen islands and peninsulas. The code removed all requirements for receptacles serving the countertops of islands and peninsulas. The future provisions for installing a receptacle has been eliminated because it may unintentionally drive receptacles to be located on the side of cabinets for kitchen islands and peninsulas that enable the safety concern cited in the development of the 2023 NEC. Language has also been added to clarify the receptacle location restriction for wall space below a counter that may also reside toward the bottom of a cabinet or wall divider deemed as wall space. The reference is updated to reflect the lasted document title and date.
			210.52 Dwelling Unit Receptacle Outlets. (C) Countertops and Work Surfaces. (2) Island and Peninsular Countertops and Work Surfaces. ~~Receptacle outlets, if installed~~ At least one receptacle shall be provided to serve an island or peninsular countertop or work surface with a long dimension of 600 mm (24 in.) or greater and a short dimension of 300 mm (12 in.) or greater and shall be installed in accordance with 210.52(C)(3). ~~If a receptacle outlet is not provided to serve an island or peninsular countertop or work surface, provisions shall be provided at the island or peninsula for future addition of a receptacle outlet to serve the island or peninsular countertop or work surface.~~ A peninsular countertop shall be measured from the connected perpendicular wall. (3) Receptacle Outlet Location.

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			Receptacle outlets shall be located in one or more of the following: (1) On or above, but not more than 500 mm (20 in.) above, a countertop or work surface (2) In a countertop using receptacle outlet assemblies listed for use in countertops (3) In a work surface using receptacle outlet assemblies listed for use in work surfaces or listed for use in countertops (4) Receptacle outlets shall not be installed on the exterior of the cabinet or wall space between 450 mm (18 in.) above the floor to the bottom edge of the countertop or work surface. (4) Separate Spaces. Countertop or work surface spaces separated by rangetops, refrigerators, or sinks shall be considered as separate countertop spaces in applying the requirements of 210.52(C)(2). If a range, counter-mounted cooking unit, or sink is installed in an island or peninsular countertop or work surface and the depth of the countertop behind the range, counter-mounted cooking unit, or sink is less than 300 mm (12 in.), the range, counter-mounted cooking unit, or sink shall be considered to divide the countertop space or work surface into two separate spaces. Each separate countertop or work surface space shall comply with the applicable requirements in 210.52(C)(2). Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, sinks, or rangetops as covered in 210.52(C)(1), Exception No. 1, or appliances occupying assigned spaces shall not be considered as these required outlets.
210.52(C)(2)	3995	Bucket	
210.52(C)(2)	4313	Bucket	
210.52(C)(2)	4408	Bucket	
210.52(C)(3)	81	Bucket	
210.52(C)(3)	1541	Resolve	Resolve
			The language is maintained to clarify the requirements for the installer to use appropriate receptacle assemblies.
210.52(C)(3)	1901		Resolve
			Where the NEC is addressing a safety issue, it must also be addressed for those requiring accessibility. It is the understanding of CMP-2 that a new version of the A117.1

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			Standards will align and work within the requirements of the NEC.
210.52(C)(3)	1922 Same as 1924 1927 1928 1929 1930 1934 1945		Resolve
			The proposed language is not necessary as it would have limited impact on dimensional measurements. The language does not add clarity to the requirement.
210.52(C)(3)	2338	Bucket	
210.52(C)(3)	3335	Bucket TG3- FR2	
			The reference is updated to reflect the lasted document title and date.
NEW After 210.52(C)(3)	3405	Bucket	
210.52(D)	1924	1922	Resolve
			The proposed language is not necessary as it would have limited impact on dimensional measurements. The language does not add clarity to the requirement.
210.52(D)	3646		TG3-FR3 Additional Charging Statement Receptacle outlets shall be installed in accordance with 210.52(D) 1 through 3. Also include structural revisions
			The section is revised to comply with NFPA Style Manual 3.5.1.2.
210.52(D)	669		Resolve
			NEC 406.9(C) exception 4 permits the installation of a receptacle near the toilet. Insufficient substantiation has been provided to support the proposed requirement.
210.52(E)(1)	1406		Resolve
			The additional language does not add clarity.
210.52(E)(1)	1927	1922	Resolve
			The proposed language is not necessary as it would have limited impact on dimensional measurements. The language does not add clarity to the requirement.

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210.52(E)(2)	1928		Resolve
			The proposed language is not necessary as it would have limited impact on dimensional measurements. The language does not add clarity to the requirement.
210.52(E)(3)	1407		Resolve
			Substantiation has not been provided to convey the hazard of concern.
210.52(E)(3)	1929		Resolve
			The proposed language is not necessary as it would have limited impact on dimensional measurements. The language does not add clarity to the requirement.
210.52(G)(1)	1930		Resolve
			The proposed language is not necessary as it would have limited impact on dimensional measurements. The language does not add clarity to the requirement.
210.52(G)(1)	1932		Resolve
			The proposed language does not add clarity.
210.60	801	PI2035 PI798 - FR	TG3-FR4
			Align with FR (PI 798)… The terminology and usage for dormitories and for guest rooms and guest suites of dormitories in NFPA 70® be clarified at this time, consistent with NFPA 101 and to avoid enforcement confusion.
210.60	1602		Similar to PI 1600 Resolve
			Section 210.52 addresses receptacle outlets and therefore should not be retitled to expand the scope. The language in 210.60 is clear. The substantiation indicated receptacles should be provided to address furniture fixed in place and would impact receptacle placement that could reduce the number of receptacles along the wall space.
210.62	1934		Resolve
			The proposed language is not necessary as it would have limited impact on dimensional measurements. The language does not add clarity to the requirement.
210.63	3478		
210.63	1945		Resolve
			The proposed language is not necessary as it would have limited impact on dimensional measurements. The language does not add clarity to the requirement.
210.63(A)	277		Resolve

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			No evidence has been provided that demonstrates a hazard would exist from a receptacle located inside the equipment where proper access is established.
210.63(A)	1498 3637		Resolve
			NEC Section 400.12 already prohibits a cord from being run through doors or windows to reach the outside.
210.63(A)	1832		Resolve
			A receptacle outlet is required however the current language does not require the receptacle to be located above the ceiling and below the floor or attic above.
210.63(A)	3637	Bucket	
210.63(B)	272 4009 10 498 772		TG3-FR5 Use language as proposed but keep “room or area” provided within the same room or area as Remove Exception and place after “dwellings,” In other than ~~one- and two-family~~ within a dwelling unit, a receptacle outlet shall be required for premises wiring systems that include a solidly-grounded system operating at less than 150 volts to ground. The receptacle outlet shall be located within the same room or area as indoor switchboards, switchgear, panelboards, motor control centers, and service equipment.
			The language has been simplified to align with revisions to the dedicated electrical space established in the 2023 NEC. The language to require the receptacle to not be located on the load side of the equipment disconnecting means is removed.
210.63(B)	2095		Resolve
			In multi-family dwellings there is no substantiation to remove GFCI protection from the receptacle servicing the equipment.
210.63(B)(2)	10	Bucket	
210.63(B)(2)	498	Bucket	

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210.63(B)(2)	772	Bucket	
210.63(B)(2)	2094		Resolve
			The receptacles needs to be located to comply with 300.22 and avoid compliance issues with cords.
210.63(B)(2)	4009	Bucket	
210.65	765 1504		Resolve
			The proposed revision is making an assumption that the receptacle or outlet will feed a table which may not be accurate. The use of the room is unknown. The receptacles and outlet are located to serve the area for multiple configurations.
210.65	1504	Bucket	
210.65(A)	2096		Resolve
			The proposed language is making an assumption based on the occupancy permitted. The use of the space may require receptacles or outlets located in accordance with the provision of this section with limited occupants.
210.65(B)(2)	1578		Resolve
			The proposed revised language does not enhance the enforceability of the requirement. The phrase “no possible” is in conflict with the NEC style manual. A room smaller than 215 sqft is not required to have receptacles or outlets.
210.65(B)(2)	1579		Resolve
			There is not a retrofit requirement in this section of the NEC for existing buildings.
210.70	795 1086 1833 4444		TG3-FR6 TIA 1753 – TG would like to include PI 4286 in the discussion **210.70 Lighting Outlets Required.** Lighting outlets shall be installed where specified in 210.70(A), (B), and (C). The switch or listed wall-mounted control device shall not rely exclusively on ~~a~~ battery power unless ~~a~~ it incorporates a positive means of notification of impending battery depletion. ~~is provided for automatically energizing the lighting outlets upon battery failure.~~ Informational Note: Examples of positive means of battery depletion notification include an audible indicator, a visual indicator, a graphical indicator in an application program that controls the wall-mounted control device, or a combination of these, that provides advance notification of battery depletion and the need for battery replacement.

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			The language aligns with TIA 1753 for the 2023 NEC. The informational note is added to provide examples for the users for the revised requirement.
210.70	1086	Bucket	
210.70	1833	Bucket	
210.70	4286		Take to Panel for discussion FR - Reverting back to 2020 language FR – Affirmation of TIA 1753 language Resolve – See 795 above
			FR – Committee Statement for TIA 1753 The code panel reaffirms its position in support of the language accepted in TIA 1753 and revised to align with TG3-FR6. FR - Committee Statement for reverting back to 2020 NEC The exhaustion of a battery in a control device does not pose any greater threat to safe egress than the failure of any other element of a lighting branch circuit such as a failed lamp, loss of utility power, or a tripped circuit breaker. The committee also recognizes that the automatic energization of the lighting could also create a safety issue. Additionally, the need for safe egress lighting falls within the scope of the NFPA 101.
210.70	4444	Bucket	
210.70(A)(1)	184 2187 Similar but not Bucketed 2188 2190		TG3-FR7 At least one lighting outlet controlled by a switch or listed wall-mounted control device shall be installed …
			The language is revised to align with the parent language to include “switch” for consistency and useability.
210.70(A)(1)	1135		Resolve
			The public input does not provide sufficient substantiation to warrant the revision. Enforcement would be challenging. Access from closets, balconies, internal spaces, and other such areas do not necessarily warrant the addition of a switch.
210.70(A)(1)	1506		Resolve
			The revised language does not add clarity and does not provide adequate substantiation.

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210.70(A)(1)	1836		Resolve
			The language in this section refers to laundry areas and not laundry rooms.
210.70(A)(1)	1902		Resolve
			The lighting outlet is to be located to provide illumination for the area.
210.70(A)(1)	2187	Bucket	At least one lighting outlet controlled by a switch or listed wall-mounted control device shall be installed …
			The language is revised to align with the parent language to include "switch" for consistency and useability.
210.70(A)(2)	275 2188		TG3-FR8 3. For other than *an outdoor, grade-level bulkhead door with stairway access to a sub-grade-level basement* where lighting outlets are installed for an interior stairway with six or more risers between floor levels, there shall be a listed wall-mounted control device at each floor level and at each landing level that includes a stairway entry to control the lighting outlets.
			The language is revised by adding positive language to Item 3 in order to accomplish the same action in the suggest revision provided in the public input. The language is revised to align with the parent language to include "switch" for consistency and useability
210.70(A)(2)	2188	Bucket	At least one lighting outlet controlled by a switch or listed wall-mounted control device shall be installed …
			The language is revised to align with the parent language to include "switch" for consistency and useability.
210.70(B)	2190		TG3-FR9 At least one lighting outlet controlled by a switch or listed wall-mounted control device shall be installed …
			The language is revised to align with the parent language to include "switch" for consistency and useability.
210.70(C)	1538		TG3-FR10 **(C)** All Occupancies. For attics and underfloor spaces, utility rooms, and basements, at least one lighting outlet containing a switch or controlled by a wall switch or listed wall-mounted control device shall be installed where these spaces are used for

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			storage or contain equipment requiring servicing shall comply with (1), (2), and (3). 1) A point of control shall be at each entry that permits access to the attic and underfloor space, utility room, or basement. 2) Where a lighting outlet is installed for equipment requiring service, the lighting outlet shall be installed at or near the equipment. 3) Control by automatic means shall not be permitted to control all illumination in attics, underfloor spaces or utilities rooms unless a manual means to bypass the control is provided.
			The structure of the section is revised to align with the NEC style manual. Item 3 is added to prohibit exclusive automatic control of lighting in these areas.

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2026 NEC® Public Input Task Group Report

CMP #	2
TG#	4
TG Chair	Robert Osborne
TG Members	Irozenell Pruitt, Brett Larson, William Crist, Nehad El-Sheriff, Tyler Doering, Andy Kriegman, Arthur Libby, Andrew Kasznay, Vince DellaCroce, Brennan Less, James Frey, David Humphrey

Article/Section	Public Input #	PI Report Page #	TG Recommendation & Statement
Article 100 Definition – Demonstrated Load	4251		Resolve Committee Statement: No revision processed for CMP 2 utilized the term "demonstrated load". A similar concept is addressed in 220.87; however, the historical demand is referred to as 'metered data'. This is a term that does not require a definition. It is noted that the public input is related to a public input submitted to CMP 15 (refer to PI 2903). As such, CMP 15 may consider taking action based on this public input.
120	4311	33	First Revision NOTE: As this is a relocation of the entire Article, there is no mark-up provided, and therefore, no "TG 4, FR X" designation. Committee Statement: Requirements in Article 220 applies to all installations; therefore, it is more appropriate to have it located in Chapter 1 of the NEC. This First Revision would relocate Article 220, as modified by other First Revisions by CMP 2.
220.5(D)	3334	552	Resolve Committee Statement: Section 90.4(B) gives the AHJ the responsibility for enforcement of the Code and making interpretations of

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			the rules. As part of these responsibilities, the AHJ may request documentation, such as load calculations.
220.5(D)	4267	553	TG 4, FR 1 Committee Statement: Throughout Article 220 there are requirements for utilizing "volt-ampere" ratings for conducting load calculations. However, DC rated equipment and dc loads are routinely rated in watts (W) and kilowatts (kW). For dc circuits, these are equivalent to volt-amperes (VA) and kilovolt-amperes (kVA), respectively. This new sub-section for 220.5 recognizes the electrical power equivalency and clarifies the load calculation rules as applicable to DC rated equipment and loads.
220.5(A)	**2916** 3129	554 555	TG 4, FR 2 Committee Statement: Many industrial and commercial facilities, such as data centers, now use a 416Y/240 volt system. Adding this as a standard voltage to Article 220 assists users of the Code when performing load calculations for these systems.
220.5(B)	1039	556	Resolve Committee Statement: This move could have unintended consequences for other Articles in the Code. The relocation (or not) of these requirements to Article 110 (PI 1057) is the decision of CMP 1. CMP 2 can revisit removal of the requirement from Article 220 as a PC, should this be added to Article 110 by CMP 1.
220.5(B)	1514	559	TG 4, FR 3

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			Committee Statement: Adding the word "Load" provides clarity to this paragraph as to when rounding up or down is permitted.
220.5(C)	1389 **1763**	560 561	TG 4, FR 4 Committee Statement: Including "detached garages" to the list of areas not included in floor area calculations clears up the confusion of whether or not to include detached garages.
220.5(C)	3066	562	Resolve Committee Statement: By removing the text as proposed, areas such as large open porches or other unfinished areas are unnecessarily added to the floor area for load calculations. This addition of these areas is not substantiated.
220.5(E) (NEW)	-	-	TG 4, CI 1 Committee Statement: For the 1999 NEC Code Cycle the TCC Task Group on the Usability of the NEC, submitted a proposal with the following substantiation: "The proposal serves to make Article 220 a true calculations article and relocate any other requirements (such as conductor or overcurrent device sizing) to the appropriate parts of Articles 210" (refer to NEC-ROP-1998, Proposal 2-5). Load calculations in Article 220 are not intended to require a 125 percent multiplier simply due to the fact that the load is considered continuous. However, there are Section in 220 that do require a 125 percent multiplier. To improve clarity, a new sub-section is added to Section 220.5 that addresses this issue. Also included is an Informational Note that explains that being a continuous load impacts the sizing of the conductor and

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			overcurrent device, but not necessarily the computation of the load when performing a load calculation.
220.10	596	563	Resolve Committee Statement: This move could have unintended consequences for other Articles in the Code. Small appliance and laundry circuit load calculations should remain in 220.52 similar to Appliance, Electric clothes dryer, and electric cooking appliance load calculations.
220.11	1739	564	Resolve Committee Statement: The language was added in the 2023 NEC to specifically address how these loads are used in the calculation of branch circuit loads. The referenced sections are calculations for services and feeders. Refer to 2023, SR 8214.
220.11(A)	-	-	TG 4, CI 2 Committee Statement: The current wording is clarified to indicate that the 125 percent multiplier is a minimum value.
220.11(B)	-	-	TG 4, CI 3 Committee Statement: The sub-section heading includes more details than necessary. To align with other sub-section titles for this Section, the title modified to reflect "Lighting Loads".
220.14(D)	-	-	TG 4, CI 4 Committee Statement: The current wording is clarified to indicate that the maximum volt-ampere rating of the equipment and lamps is a minimum value.
220.14(E)	448	565	Resolve Committee Statement: Requirements for “Continuous and Non-Continuous Loads”

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			were located in Article 220 in the 1996 and earlier editions of the NEC. For 1999, these requirements were relocated to Articles 210 and 215, as these requirements are associated with the sizing of the conductor and overcurrent device, and not the computation of the load. While some requirements in 220 may indicate a multiplier of 125%, it is not the intent to apply the 125% multiplier based on the load being considered "continuous".
220.14(F)	1505	566	Resolve Committee Statement: The requirement for a 1200 volt-ampere allocation for signs or outline lighting has been in place for decades and may be considered outdated based on the extensive use of LED technology. CMP 2 made extensive revisions to the table for general lighting loads in 2020 (refer to FR 8075-NFPA 70-2018) based on "technology enhancements" and data from ASHRAE 90.1 ("Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings"). Consistent with the action taken in 2020, data should be provided to support a reduction in the 1200 volt-ampere value.
220.14(H)	2210	567	Resolve Committee Statement: The term "appliance" is a broad term covering many types of utilization equipment (not just for use in dwelling units) and the proposed term of "load" is not a defined term. To ensure clarity in the requirement, the term "appliance" should be maintained.
220.14(I)	593	568	Resolve Committee Statement: The change that is proposed in the Public Input is not

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			substantiated. Other statements provided with the substantiation do not have corresponding recommended changes that would address the concerns of the submitter.
220.14(K)	290	569	TG 4, FR 5 Committee Statement: Outlets not covered by 220.14(A) through 220.14(J) may include loads that are known to be greater than 180 volt-amps per outlet. The current wording is clarified to indicate that the 180 volt-ampere per outlet is a minimum value.
220.14(K)	4255	570	Resolve Committee Statement: The use of 180 volt-amps for the load calculation of receptacle outlets for general-use has been in this requirement for many years and is adequate for limiting the number of outlets per circuit. The recommended text identifies grade school buildings as the focus but did not provide substantiation for the suggested 120 volt-amps use. The same argument could be considered for other occupancies. The fact that this is a grade school does not warrant a reduction. Building uses can change over time. The substantiation also used the recent pandemic as a reason. While uses of educational facilities may evolve as a result of the pandemic, many primary and secondary schools, which are the focus of the PI, have returned to full-time in person learning. See CMP 2 Committee Statement for 2023 PI 4014.
220.16	4209	572	Resolve Committee Statement: The intent of this PI is unclear. Clarification is needed to respond to the PI.

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220.16(A)	**827** 915	573 574	TG 4, FR 6 Committee Statement: The requirement is revised for clarity. All of 220.14 should be referenced. With this reference to the entire Section, other requirements referred to in 220.14, such as 220.41 (refer to 220.14(I)) are included.
220.41	3236	575	TG 4, FR 7 Committee Statement: The minimum load for general lights and receptacles over-estimates the load when high-efficacy light sources (e.g., LED, CFL) are used. In new dwelling units, building code requirements for high-efficacy lighting are ubiquitous in the US. In addition, recent rulemaking by the US Department of Energy (DOE) prohibits the sale of any general service lamp (GSL) that does not meet a minimum efficacy standard of 45 lumens per watt (10 CFR 430.32(dd)). This rulemaking effectively prohibits the sale of all incandescent and halogen GSL in the US. Lawrence Berkely National Lab (LBNL) has recently reported on sub-metering in 896 occupied US dwellings showing median general lights and receptacle density of 2.3 watts/ft2, including dwellings with a variety of lighting types. Similarly, LBNL reported on lighting audit data from 2,053 existing dwellings in the Pacific Northwest. The installed lighting density was strongly dependent on the fraction of LED/CFL light sources, with an observed reduction in lighting density of 0.015 va/ft2 for each percent of LED or CFL light sources in the

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			dwelling. 100% CFL or LED lighting reduced lighting density by 1.5 va/ft2. The new value of 2 va/ft2 assumes approx. 80% LED or CFL lighting in the dwelling (3 va/ft2 – 0.80*0.012). Note - The 0.015 va/ft2 from LBNL is reduced in this calculation to 0.012 va/ft2 using an 80% power factor (this is consistent with treatment of lighting loads in Table 220.42(A)). In order to avoid impacting the number of branch circuits serving general lights and receptacles in dwellings, 220.10 is revised to reference a new section 220.13. This new section located in Part II of the article, maintains branch circuit calculations at the current value of 3 va/ft2.
220.41	595	577	Resolve Committee Statement: This move could have unintended consequences for other Articles in the Code. Small appliance and laundry circuit load calculations should remain in 220.52 similar to Appliance, Electric clothes dryer, and electric cooking appliance load calculations.
220.47	1946	579	Resolve Committee Statement: A load that operates continuously impacts the size of conductors and size of the overcurrent devices, but not the computation of the load. Demand factors for receptacle loads are not intended to be impacted by whether or not a load is continuous.
220.50(B)	2629	580	TG 4, FR 8

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			Committee Statement: The text is reformatted to comply with Section 4.1.4 of the NEC Style Manual.
220.51	4361	581	TG 4, FR 9 Committee Statement: Differentiating between types of space heating equipment is necessary, because they have been shown to have different impacts on maximum demand. The revised requirements separate space heating equipment into three categories: (1) Central electric resistance space heating (at 100%), (2) Fixed heat pump space heating (at 75%), and (3) Fixed room electric space heating (at 30%). The percentages for these technologies are based on analysis shared by Lawrence Berkely National Lab (LBNL) of sub-metering end-use data in 953 occupied US dwellings. LBNL observed the following median demand factors for existing space heating loads in dwellings: • Central Electric Resistance Heating (n=81), 95% • Fixed Heat Pump Space Heating (n=550), 72% • Fixed Room Electric Resistance Space Heating (n=198), 1% (mean of 31%) Note: The demand factors reported from LBNL above are conservative. They are based on the maximum demand observed for the load over 15-minute time-steps, not on the nameplate rating, which was always higher than observed (typically 20% higher).
220.52	1581	582	Resolve Committee Statement: While it could certainly be true that there could be loads

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			similar to kitchen and laundry rooms used in a bathroom there is not enough information provided by the submitter to understand if there is a true need to add to the additional load to the service and feeder calculations.
220.53	4144	583	TG 4, FR 10 Committee Statement: The demand factor for appliance loads is reduced from 75% to 30%, with no minimum number of loads required, based on analysis shared by Lawrence Berkely National Lab (LBNL) of sub-metering end-use data in 953 occupied US dwellings. LBNL observed the following median demand factors for existing appliance loads: • Hot tub (n=65), 34% • Pumps (n=107), 27% • Refrigerator/Freezer (n=708), 20% • Laundry Receptacles (n=92), 14% • Dishwasher (n=637), 13% • Clothes Washer (n=517), 12% • Kitchen Receptacles (n=1,063), 8% • Garbage Disposal (n=314), 5% Most appliances had observed demand factors well below 30%. Household appliances operated by occupants were amongst the load types with the lowest demand factors in the LBNL research. Note: The demand factors reported from LBNL above are conservative. They are based on the maximum demand observed for the load over 15-minute time-steps, not on the nameplate rating, which was always higher than observed (typically 20% higher).

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220.53	4220	584	Resolve Committee Statement: Regardless of whether EVSE's are considered an appliance, inclusion in the list ensures proper application of the requirement.
220.54	1948	585	Resolve Committee Statement: The longstanding rule for both dryers and ranges (RE: 220.55) has been the two or more units, as presently stated. Balancing between phases becomes an option as soon as you have more than one unit. With two units, you can choose to apply one per phase or two per phase, but if two are applied per phase, the adder is necessary, unless the two loads are balanced, which is encouraged by the existing rule.
220.58 (220.54) (220.55)	**1947** 3651 3652	611 586 595	TG 4, FR 11 Committee Statement: The requirement related to loads connected between two phases of a 3-phase, 4-wire feeder or service is covered in two places (220.54 for clothes dryers, and 220.55 for ranges). Other power intense single-phase loads should apply the same requirement. Relocating to a new Section, and making the requirement agnostic to the load, ensures equal treatment for all loads.
220.54	4151	587	TG 4, FR 12 Committee Statement: The demand factor for clothes dryers is revised. The value of 80% is based on analysis shared by Lawrence Berkely National Lab (LBNL) of sub-metering end-use data in 953 occupied US dwellings. LBNL observed the following median demand factors for electric resistance clothes dryers:

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			• Clothes Dryer (resistance) (n=574), mean of 64% demand factor (median of 77%) Additionally, nameplate ratings (when available) for clothes dryers are permitted to be used in lieu of the 5000 watt default. This is in response to newer technologies, such as heat pump clothes dryers, which have much lower electrical requirements than traditional electric resistance units. A minimum load of 5000 watts overestimates when these lower-powered clothes dryers are installed. These lower powered clothes dryers commonly use standard 120-volt receptacles, and as a result, replacement with higher powered, resistance clothes dryers, is not trivial and requires new electrical work. This First Revision also effects 220.14(B), reference First Revision XXXX, which removes references to 220.54 from 220.14(B). Lastly, requirements related to single-phase loads supplied by a 3-phase, 4-wire feeder or service, are relocated to a new Section 220.58, reference First Revision XXXX.
220.14(B)	-	-	TG 4, CI 5 Committee Statement: References to electric dryers, and the reference to 220.54, are removed from this section so that changes implemented in 220.54 do not impact dryers on an individual branch circuit. With this change, 5 or more dryers would no longer be supplied by an individual

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			branch circuit with a diversity factor applied. The existing provision to require treatment of the dryer at the nameplate rating, or 5000 watts, whichever is greater, is now stated in 220.14 for the branch circuit.
220.54	463	589	Resolve Committee Statement: The title of this Section is consistent with other Sections in Article 220 regarding the use of the term "Dwelling" (and not including the phrase "In Dwelling"). The first sentence in 220.54 explains that the requirement applies to "…clothes dryers in a dwelling unit(s)…".
220.55	1056	590	Resolve Committee Statement Note 3 provides a method in lieu of that in Column C (as stated in the Title of Table 220.55 – "Column C to be used in all cases except as other permitted in Note 3"). If opting to use the provision in Note 3, a calculation is based on the demand factors in Columns A or B, as appropriate (based on the kW rating of the appliances). Adding the statement, as proposed, would create confusion, as it would imply that Note 3 method isn't an option (i.e., permissive rule), but a mandatory rule.
220.55	4160	600	TG 4, FR 13 Committee Statement: The demand factors in columns A and B of Table 220.55 overestimate cooking appliance loads on services and feeders; therefore, these values are revised to a maximum of 50%. All values currently less than 50% are unmodified. Consistent with this treatment at 50%, the Maximum Demands in Column C of Table 220.55 are reduced by 2 kW for one through

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			five cooking appliances. The value of 50% is based on analysis shared by Lawrence Berkeley National Lab (LBNL) of sub-metering end-use data in 953 occupied US dwellings. Cooking appliances had very low demand factors across the population of dwellings analyzed, and the selected 50% value is conservative based on their results. LBNL observed the following median demand factors for electric cooking appliances: • Stove/Oven/Range (n=644), 28% • Microwave (n=404), 8% • Kitchen plugs (n=1,063), 8% Note: The demand factors reported from LBNL above are conservative. They are based on the maximum demand observed for the load over 15-minute time-steps, not on the nameplate rating, which was always higher than observed (typically 20% higher). The changes for service and feeder loads are not intended to impact branch circuit loads for cooking appliances. Yet, sections 220.11(C) and 220.14(B) both reference 220.55 for branch circuit load calculations. In order to avoid unintended impacts, Note 4 of Table 220.55 is revised so that one range is treated at the larger of either 8 kW or 80% of its nameplate rating. For clarity, Note 6 is also revised to point the user back to Note 4 for ranges. Lastly, requirements related to single-phase loads supplied by a 3-phase, 4-wire feeder

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			or service, are relocated to a new Section 220.58 (refer to FR XX).
220.55	432	605	Resolve Committee Statement Note 3 provides a method in lieu of that in Column C (as stated in the Title of Table 220.55 – "Column C to be used in all cases except as other permitted in Note 3"). The wording in Note 3 is consistent with the Title of the table and conveys the correct usage of Columns A and B.
220.56	1005	610	Resolve Committee Statement: Current language includes "water heaters", which would include all water heaters, regardless of type. Including a specific type of water heater is unnecessary, and may lead to an incorrect conclusions that some types of water heaters are not covered by the requirement.
220.57	1439	612	Resolve Committee Statement: Although the informational note is informative and adds clarity to nameplate ratings, the continuous load requirements apply to the sizing of the conductor and overcurrent device, and not to load calculations.
220.57	3145	613	Resolve Committee Statement: While we find that there is merit to changing EVSE to Electric Vehicle Power Transfer System Equipment (EVPTSE) or (EVPTS), changing the heading is inconsistent with the rest of the code, including the content in art. 625. We recommend that this be done at a global level, either through the correlating committee or a PI in the next code cycle.

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			Changes to allow the calculation to be based on the nameplate rating of the equipment, or 7200 watts if the nameplate is not available do not account for updates to the system where a larger EVSE may be installed. Reference to 625.42(A) and (B) is not necessary as 220.70 already permits the use of EMS and the required nameplate rating would include the information of 625.42(B)
220.57	750	615	Action: Resolve Committee Statement: Basing load calculations on amperes rather than watts or VA is inconsistent with other requirements throughout Article 220.
220.6 (NEW) (220.60)	1261 1826 2049 3024 309 3996 4235 **4298** 83	616 617 618 619 620 621 622 623 624	TG 4, FR 14 Committee Statement: Section 220.60 has been rewritten and restructured to clarify the determination and treatment of noncoincident loads. Requirements regarding the "125 percent of either the motor load or air-conditioning load, whichever is larger" was originally added to clarify that the value included application of the motor-operated and combination loads as specified in 220.11(A) (Refer to FR 8062-NFPA 70-2018; note that 220.11(A) was 220.18(A) in the 2020 NEC). Present wording is confusing, so rather than restate the requirement, the statement is revised to note that the largest noncoincident load treat the motor-operated and combination loads as specified in 220.11(A), thus maintaining the original intent of the requirement.

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			List items were added to specify what is considered as noncoincident loads, with feeders and services maintaining the traditional usage of "two or more loads that are unlikely to be in use simultaneously", and a more rigorous requirement applying to branch-circuits, since those loads do not benefit from diversity of multiple loads. Section 220.60 is also relocated to Article 220, Part I (General), to allow the provision to apply to load calculation throughout Article 220, including branch-circuits in addition to feeders and services.
220.61(A)	1827	626	Recommend: Resolve Committee Statement: The requirement specifies that the neutral load is the maximum unbalance of the load. For line-to-line loads, there is no unbalance, and therefore text is unnecessary.
220.61(B)	**3071** 1540	627 628	TG 4, FR 15 Committee Statement: The 70 percent demand factor is relocated to sub-sections (1) and (2) for improved clarity.
220.7 (NEW) (220.57) (220.70) (220.70) (220.70) (220.82(B)) (220.83(B)) (220.83(A)) (220.84(C))	 4238 **3025** 4302 4357 4237 4491 4488 4498	 614 629 631 632 648 686 681 695	TG 4, FR 16 Committee Statement: Section 220.70 was relocated to Article 220 Part I to reinforce that a Power Control System can be used for load calculations throughout Article 220. The new 220.7 restructures the requirements into 5 sub-sections for clarity. Energy Management System (EMS) was renamed to Power Control System(PCS) to differentiate an EMS with overload control from an EMS without overload control. 220.7A refers to part II of article 750 which is the subject of a PI for CMP 13 to identify

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			requirements for EMS with overload control functionality. Should CMP 13 not create part II, this action will need to be revisited. Chair note: The name of the EMS with overload control and the addition of part II in article 750 will be decided by CMP 13. During second revision CMP 2 will change the name of the system to align with CMP 13 and take action in reference to part II if necessary. A requirement was added that the setpoint shall be determined by “Qualified Personnel”. Chair Note: The requirement for qualified personnel to determine the setpoint should be in Article 750 Part II. This will be decided by CMP 13. If this is added in 750 Part II, it will be removed from this section in the second revision stage. PCS are intended to manage loads so the overcurrent protective devices (OCPDs) do not have to interrupt the circuit in response to an overload condition. In order to ensure this behavior, the setpoint must be no greater than 80% of the OCPD protecting the relevant circuits. This is not because PCS loads are continuous, but because a margin is required for any controller to adequately avoid OCPD interruption in an overload condition of any duration.

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			Clarification was added on how to handle load calculations for PCS's that only monitor controlled loads (220.7(C)(1)), versus PCS's that monitor both controlled and non-controlled loads (220.7(C)(2)): Monitoring Only Controlled Loads - For PCS that only monitor controlled loads, the PCS manages the loads based on the operational current of only the loads that are monitored. In this scenario, the current setpoint of the PCS is used in place of a traditional load calculation for those loads, as the current setpoint of the PCS is effectively replacing the load. Monitoring Both Controlled and Non-Controlled Loads - For PCS monitoring both controlled and non-controlled loads, the PCS manages the load based on the operational current of the entire system. In this scenario, while the PCS has visibility of the entire system, it can only control a sub-set of loads. The minimum operational current of that sub-set of controlled loads establishes the current value used in place of a traditional load calculation for those controlled loads. The value is the lowest setting of the PCS, which may be 0 amps or some other value(s), depending on whether the PCS de-energizes or modulates the load(s) to limit the current.

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			A sub-section was added to ensure requirements in Parts II – VII of this article are applied. As part of a separate First Revision, examples of load calculations with PCS's were added to Annex D. An informational note was added to this section to inform the user which examples to refer to.
220.82(D) (NEW) (220.82) (220.82(B))	 2282 3204	 634 645	TG 4, FR 17 Committee Statement: EVSE are becoming more commonplace and represent a significant load. As such, a new sub-section (D) is added to refer back to 220.57, which is the Section in 220 that provides requirements for calculating the load attributed to EVSE.
220.82(A)	2407	638	TG 4, FR 18 Committee Statement: New sub-section (D) is added to the requirement to align with First Revision XXXX (TG 4, FR 16).
220.82(A)	457	642	Resolve Committee Statement: The recommended revisions do not add clarity.
220.82(B)	1886 3067 **3239** 643 838	643 644 646 650 651	TG 4, FR 19 Committee Statement: In response to this data provided by Lawrence National Labs (Refer to Committee Statement related to First Revision in Section 220.41), the requirement of 3 VA per ft2 is reduced to 2 VA per ft2. Additionally, the treatment of the first 10 kW of load at 100% is reduced to 8 kW at 100%, based on analysis performed by Lawrence Berkely National Lab (LBNL) on sub-metering data from 942 occupied US

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			dwellings. LBNL assessed the connected loads in these homes (based on observed maximum power demand for each branch circuit) and compared this with the metered maximum power demand for the whole dwelling. The report demonstrates that the 8 kW value leads to accurate load calculations in 95% of dwellings, where the predicted load is greater than the metered load. The 10 kW assumption performs similarly, while negatively impacting homes with fewer loads by overestimating their loads. Lastly, inconsistencies have emerged between 220.5(C) and 220.82(B)(1). The description of the floor area should match between these two sub-sections, but due to changes in 220.5(C), that alignment has been lost. Rather than repeat the text from 220.5(C), a reference to that sub-section is provided.
220.82(C)	4169	652	TG 4, FR 20 Committee Statement: Based on analysis reported by Lawrence Berkely National Lab (LBNL) of sub-metering end-use data in 953 occupied US dwellings, the following median demand factors were observed for existing space heating and cooling loads in dwellings: • Central Electric Resistance Heating (n=81), 95% • Air Handler (n=691), 79% • Central Cooling (n=376), 75% • Central Heat Pump (n=550), 72% • Room Cooling (n=8), 16% (mean of 33%)

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			• Room Heating (n=198), 1% (mean of 31%) Consistent with these findings, the demand factors associated with space heating and cooling loads is revised. While the code does not differentiate between electric resistance room heaters and central electric resistance space heating (i.e., electric furnace), the report observed very different behavior between these load types, as described below: Central electric resistance space heating was often a very large load (10-11 kW) with very high demand factor (95%), while room heaters were small with very low demand factors. Requirements underestimate the load for central electric resistance space heating, treating it at 65%; therefore, a category of Central Electric Resistance Space Heating is added to 220.82(c), and it is clarified that items 4 and 5 apply to room heaters. Heat pump equipment had substantially lower demand factors, and for that reason will be treated at 75%. Ductless heat pumps (not differentiated above) had particularly low demand factors (mean 29%). Central Cooling behaved similarly to heat pumps. Backup resistance electric heat paired with heat pumps will be treated similarly to central electric resistance space heating at 100%. Finally, room heaters showed very low demand factors across the board, and for this reason, differential treatment based on the number of room

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			heaters is eliminated, and the associated demand factors are lowered.
220.83	**3319** 3028 308 916 850 851 1234	670 654 667 678 683 688 697	TG 4, FR 21 Committee Statement: 220.83 differentiates when adding or not adding new HVAC equipment. This is not justified based on analysis of 8,529 individually sub-metered end-uses in existing dwellings reported by Lawrence Berkely National Lab (LBNL). Most new HVAC equipment added to dwellings contributes much less than 100% of its nameplate rating to dwelling maximum demand. In contrast, other loads are currently allowed to be added using 220.83 at 40%, but their contributions are substantially underestimated (for example, EVSE, water heaters and clothes dryers). LBNL also reported analysis of metering data from 9,093 existing Vermont dwellings that installed cold climate heat pumps. They observed only a 5% demand factor across this population of dwellings, with new heat pumps rated at an average of 3.6 kW, increasing whole dwelling maximum demand by only 0.2 kW. Consistent with these findings, 220.83 is revised as follows: • Differential treatment when adding new HVAC is eliminated, condensing 220.83(A) and 220.83(B) into a single section 220.83, with a single Table 220.83 for load percentages. • General lights and general receptacles loads are reduced from 3 to 2 va/ft2,

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			consistent with other revisions (see 220.41). • Treatment of existing loads remains the same (first 8 kVA at 100%, remainder at 40%). • All new loads being added to existing dwellings is treated at a more conservative 50% demand factor, which is consistent with median values observed in sub-metering data for water heating, clothes dryers and a variety of HVAC loads. • Two notable exceptions are treated with higher demand factors of 80%—EVSE and Central Electric Resistance Space Heating—because sub-metering showed they were large loads with the highest demand factors. The treatment of new loads being added at 50% was evaluated by LBNL using the same sub-metering data, and they found that the proposed treatment at 50% resulted in conservative load predictions for 99% of branch circuits. Underestimates were most commonly due to the presence of EVSE and Central Electric Resistance Space Heating, hence their treatment at 80%. Lastly, Reference to 220.42 is unnecessary and has been removed. Response Message for PI 1234: Note that the PI does not appear to accurately capture the intended changes; therefore, it is unclear if the First Revision addresses the concerns identified by the submitter.
220.83(A)	873	685	Resolve

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			The Public Input is incomplete, as it does not indicate what changes should be made to the text. Refer to the Regulations Governing the Development of NFPA Standards, clause 4.3.4.1(c).
220.84(A)	3073	690	TG 4, FR 22 Committee Statement: As presented in PI Committee Statement: Including this requirement will align the Section with the new Section 220.58.
220.84(A)	438	691	Resolve Committee Statement: The idea of adding an exception for these types of loads, similar to what is done in 220.84(A)(2) Exception, has merit. However, the proposed text relies on the phrase “simulated, engineered in-dwelling heating or air-conditioning system”, which is not defined or explained elsewhere in the Code. Additionally clarity is needed regarding this part of the proposed text before this exception could be added.
220.84(C)	3242	693	TG 4, FR 23 Committee Statement: Refer to Committee Statement related to First Revision in Section 220.41.
220.87	3303	701	Resolve Committee Statement: Extensive revisions have been made to Section 220.87; however, these revisions do not limit the provision to “other than dwelling units”. There is no justification for limiting the rule to “other than dwelling units”.
220.87	3320 1990 2855 349	702 699 700 712	TG 4, FR 24 Committee Statement: The language in 220.87 is unclear on the following items: (a) time-step for metered data, (b) duration of metered data, (c) metering hardware types,

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			(d) treatment of loads being added or removed, and (e) operating conditions or occupancy during metering. Most of the details in 220.87 are embedded in the exception, resulting in a lack of clarity. A summary of changes include: • New section 220.87(A) specifying the requirements for determining and using existing load from metering data (addressing the unclear items identified above). While the method targets metered data in 15-minute time intervals, in dwellings, it allows use of adjusted 60-minute time intervals. This allowance for 60-minute data is important because it allows the nation's smart meter infrastructure to be used to generate load calculations for dwellings. These values are based on a study by Lawrence Berkely National Lab (LBNL), where 15-minute and 60-minute maximum demand were compared in the same 11,940 existing US dwellings. The adjustments in 220.87(A)(3), Exception, were designed around a 99% performance target, where actual 15-minute maximum demand exceeds the prediction in only 1% of dwellings. Without the adjustments, use of 60-minute data will under-predict actual demand. • New section 220.87(B) specifies treatment of loads being added or

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			removed from the installation, as determined by either the nameplate ratings, or by application of the load applications in Parts III-IV of Article 220. • While the unit of measurement is changed from kilowatts to kVA, a sentence is added, similar to the one in 220.54 and 220.55, that indicates kVA shall be considered equivalent to kW. This ensures the existing unit of kW is still permitted in the revised text.
220.87	590	713	Resolve Committee Statement: Requirements for "Continuous and Non-Continuous Loads" were located in Article 220 in the 1996 and earlier editions of the NEC. For 1999, these requirements were relocated to Articles 210 and 215, as these requirements are associated with the sizing of the conductor and overcurrent device, and not the computation of the load. While some requirements in 220 may indicate a multiplier of 125%, it is not the intent to apply the 125% multiplier based on the load being considered "continuous".

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2026 NEC® Public Input Task Group Report

CMP #	2		
TG#	4		
TG Chair	Robert Osborne		
TG Members	Irozenell Pruitt, Brett Larson, William Crist, Nehad El-Sheriff, Tyler Doering, Andy Kriegman, Arthur Libby, Andrew Kasznay, Vince DellaCroce, Brennan Less, James Frey, David Humphrey		
Article/Section	**Public Input #**	**PI Report Page #**	**TG Recommendation & Statement**
Annex D	4050	2	TG 4, FR 1 Committee Statement: Annex D examples D1 through D6, as well as Articles 210 and 220, are under the purview of CMP 2. CMP 2 has revised text under its purview to use consistent terminology for “Branch-Circuit Overcurrent Protective Devices”, which is a defined term. CMP 2 also chose to include a commonly used acronym for Overcurrent Protective Devices (“OCPD”) and then apply it in the body of the text. In the case of Article 210, this occurs with the first use of the term in 210.4(A), then the acronym is used throughout the rest of Article 210; for Annex D, this occurs with the addition of the acronym in the beginning of the Annex. This practice is permitted by Section 3.2.3 of the NEC Style Manual. Additionally, the term “Overcurrent Protection” is used; however it is not defined in Article 100. For clarity, an explanation of that term is included in the beginning of Annex D. TG Recommendation: Suggest that the Chair Report include a referral to CMP 10 to consider a new definition for Overcurrent Protection and

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			including the "OCPD" acronym in the Article 100 definition for "Branch-Circuit Overcurrent Protective Device."
Annex D, Example D1(b)	3074	809	TG 4, FR 2 Committee Statement: In accordance with Section 220.5(A), calculations use 120 or 240 volts.
Annex D, Example D2(a)	3075 63	810 819	TG 4, FR 3 Committee Statement: In accordance with Section 220.5(A), calculations use 120 or 240 volts. Under Air Condition kVA Calculation, the value should be 1.44 kVA not 1.38 kVA. In addition, several appliances do not indicate a voltage, but the example include a calculation for a neutral load. To ensure clear understanding of the example, a utilization voltage is added for appliances where appropriate.
Annex D, Example D2(b)	3077 65	812 814	TG 4, FR 4 Committee Statement: In accordance with Section 220.5(A), calculations use 120 or 240 volts. In addition, several appliances do not indicate a voltage, but the example either include a calculation for a neutral load (assuming a 120/240 volt appliance) or do not include a calculation for a neutral load (assuming a 240 volt appliance). To ensure clear understanding of the example, a utilization voltage is added for appliances where appropriate.
Annex D, Example D1(a)	64 62	817 818	TG 4, FR 5 Committee Statement: In the example, the voltage for the range is not mentioned, but considering the calculation indicates a neutral load for the range, indicating it is rated 120/240 volts is appropriate. A similar revision is included to reflect that the dryer is rated

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			120/240 volts (as it also indicates a neutral load in the calculation).
Annex D, Example D4(a)	66	820	TG 4, FR 6 Committee Statement: In the example, the voltage for the range is not mentioned, but considering the calculation indicates a neutral load for the range, indicating it is rated 120/240 volts is appropriate.
Annex D, Example D4(b)	67	822	TG 4, FR 7 Committee Statement: In the example, the voltage for the range is not mentioned, but considering the calculation indicates a neutral load for the range, indicating it is rated 120/240 volts is appropriate.
Annex D, Examples D14(a) – D14(b)	-	-	TG 4, CI 1 Committee Statement: Four examples are added to Annex D to aid in the application of the requirements related to Power Control Systems (PCS) included in the NEW Section 220.7. As a new provision in the Code, with multiple options, these examples are intended to ensure clear understanding of the requirement.

Objectives

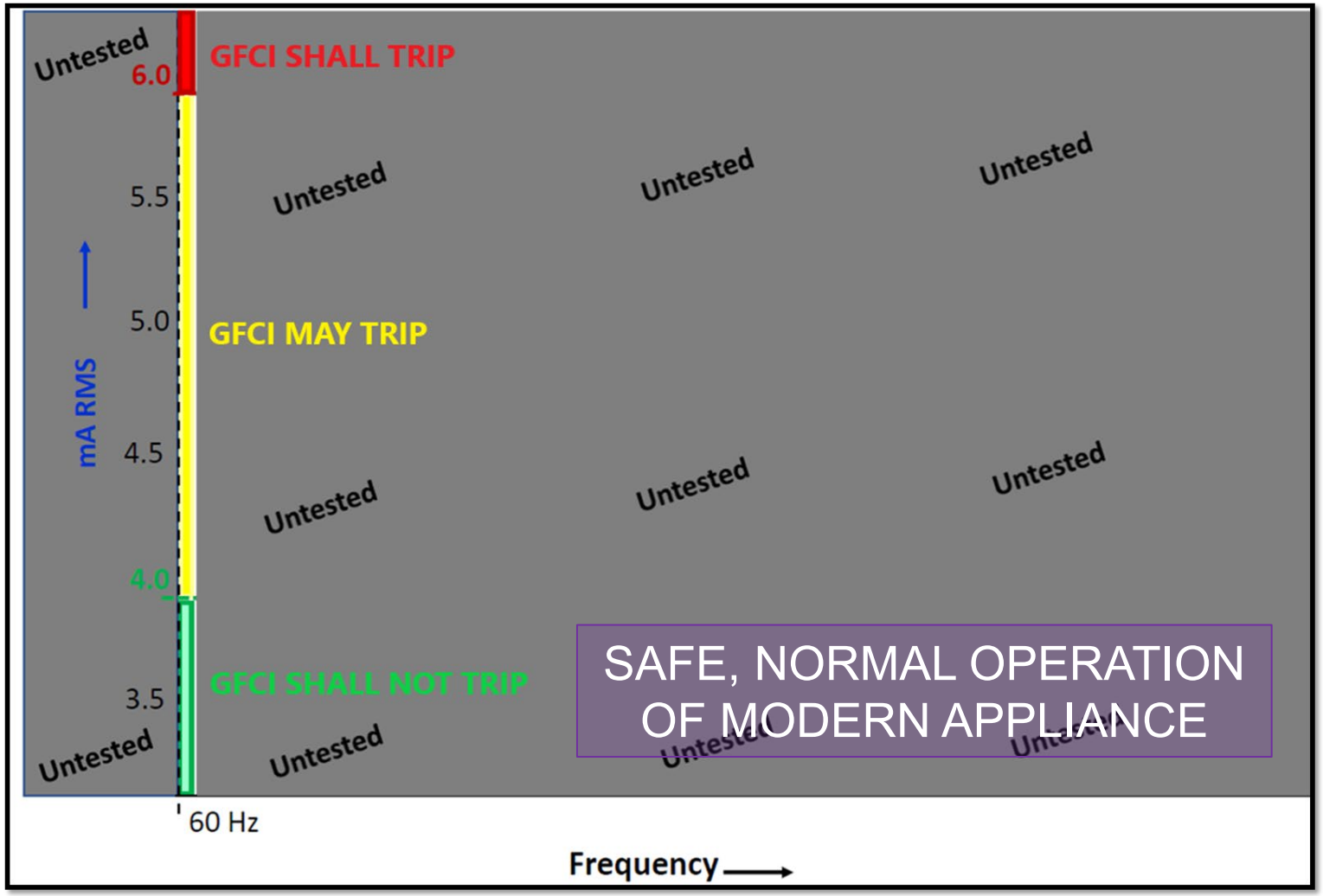
- Updates to UL GFCI standard
- Updates to UL appliance standards
- Solutions to nuisance tripping

GFCIs – Present state of UL 943

60Hz – mains frequency

REQUIREMENTS at 60HZ

Simple older construction appliances operate at 60Hz:
- Hair dryers
- Toasters
- Blenders



60Hz – mains frequency

NO REQUIREMENTS at higher frequencies

Modern, more complex, home appliances operate at 60Hz and higher frequencies:
- Refrigerators
- Cooking tops
- Air conditioners

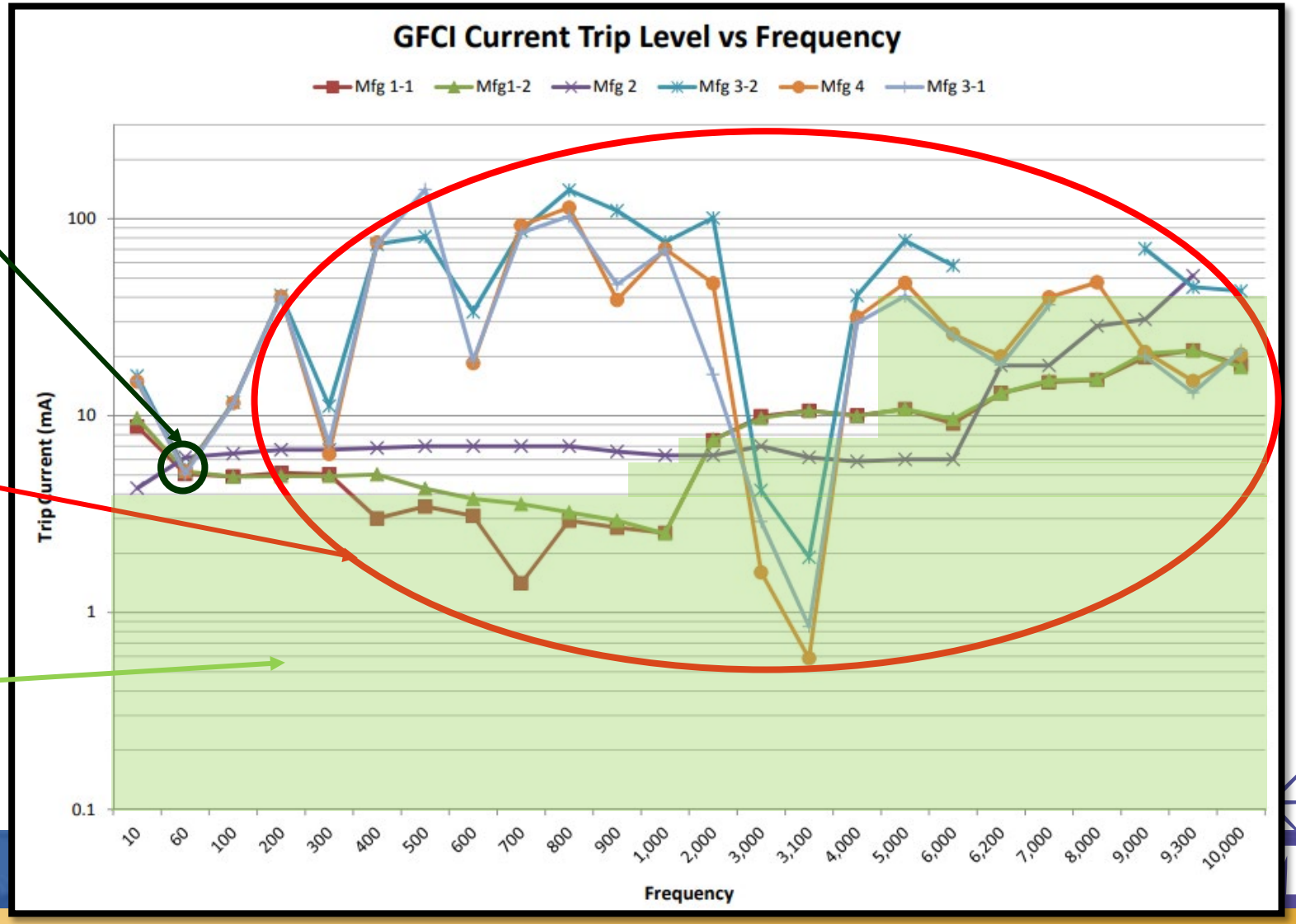
GFCI – Present state of UL 943

- Each GFCI manufacturer decides their own trip levels at high frequencies

- Standardized as per UL 943, appliance designers know what to expect in the field

- Non-standardized, up to individual GFCI manufacturers. Low trip thresholds cause nuisance tripping.

- No evidence of shock injuries from high frequency leakage



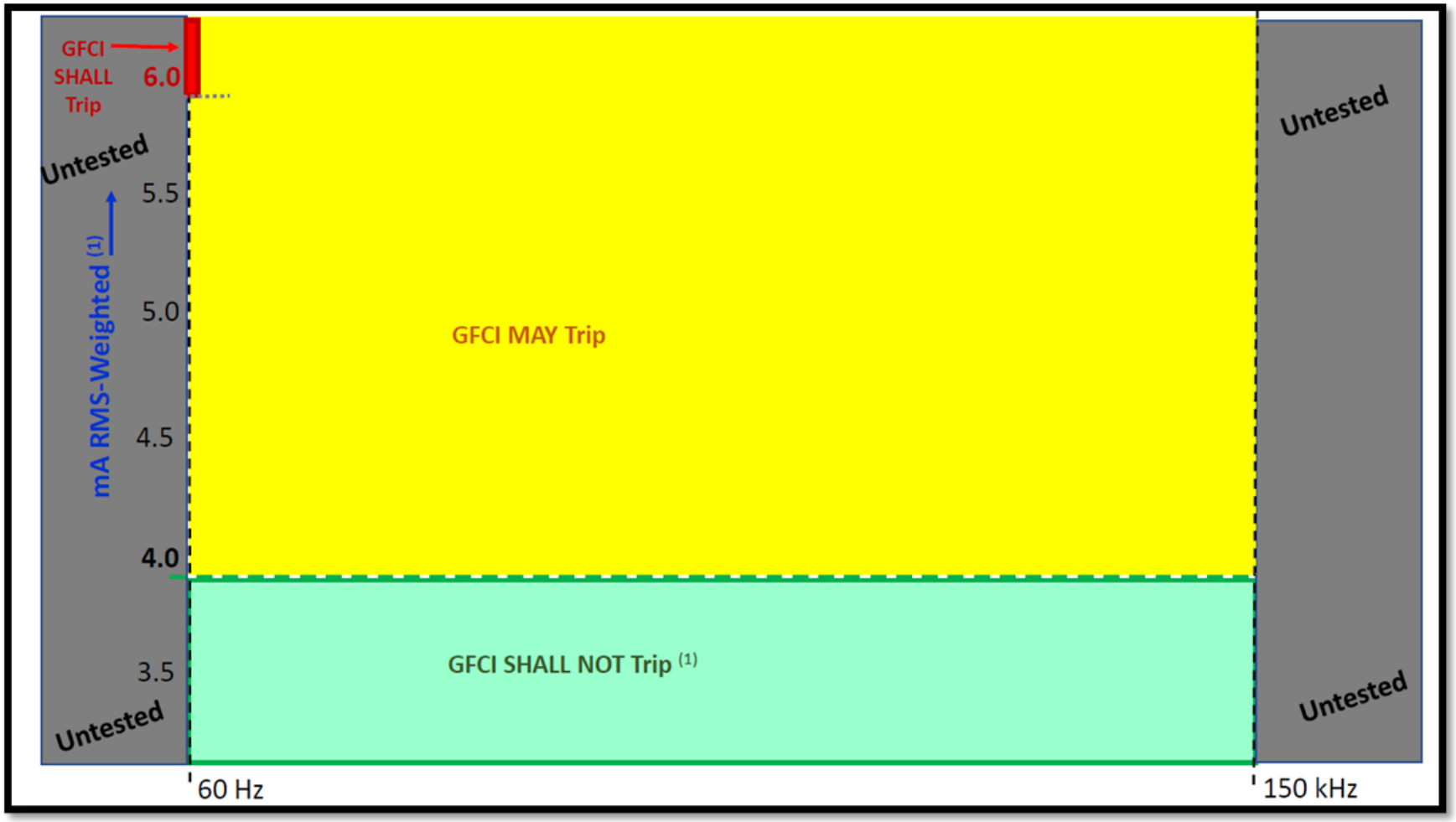
GFCI – UL study on nuisance tripping

- UL Solutions conducted compatibility testing on 3 appliances
  - Each appliance is a different type, from a different manufacturer
  - **All appliances were confirmed to be operating safely**
  - All appliances were operated normally after connection to 10 different GFCIs
  - **Nuisance tripping occurred on all 3 appliances**
  - The 3 appliances are representative of 70+ models that are “essentially identical” as defined by DOE

- crc.ul.com/app/library/33905

GFCI – Future state of UL 943

- UL 943 working group developed requirements for Class A-**HF**



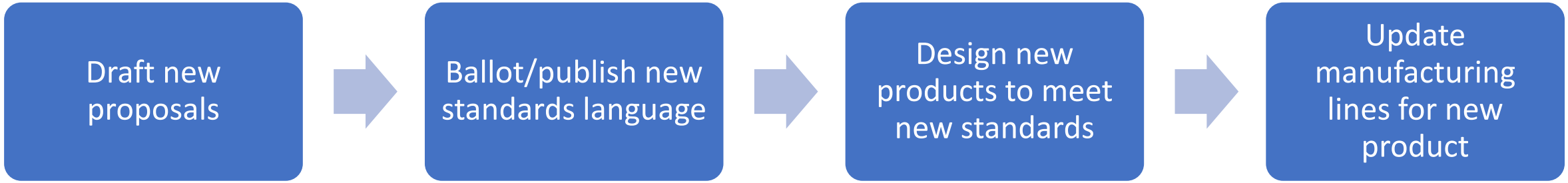
- Will start first step of UL standards process (preliminary review) in next couple months

Appliance – Present state of standards related to nuisance tripping

UL 858 – published electric range green zone requirements at 60Hz, goes into effect in 2025

UL 101 – test developed and published to measure high frequency leakage from appliances, help keep appliances in the green zone for 60Hz + high frequency

More work needs to be done in appliance standards:



CMP2 actions to prevent GFCI nuisance tripping

- Vote for Class A-HF even though it is not ideal solution (PIs 4308 and 4315)

> **Ground-Fault Circuit Interrupter, High Frequency (GFCI).**
>
> *A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when the frequency weighted differential current exceeds the values established for a Class A-HF device. (CMP-2)*
>
> *Informational Note: See UL 943, Standard for Ground-Fault Circuit Interrupters, for further information. Class A-HF ground-fault circuit interrupters do not trip when the frequency weighted differential current is less than 4 mA.*

  - If you would like to see **high frequency REQUIREMENTS** for Class A GFCIs, apply to 943 Technical Committee: safetyscience.my.site.com

- Neither optional Class A-HF or modernized Class A requirements are in place today for GFCIs
  - NEC needs to account for nuisance tripping and provide relief until one of these solutions is in place (PIs 4070 and 4107)

Thank you!

2026 NEC First Revision – CMP 2

PI’s 4070, 4107

SIEMENS

GFCI – PI 4070

Seeks to add an exception for refrigerators and HVAC given certain conditions

- Claims a “technological incompatibility” between appliances and GFCI
  - MA data shows a different story.
    - Data includes reports but does not require investigation
    - 1,868 total instances reported as of January 3, 2024, regardless of product type
    - HVAC: only 1 instance (heat pump)
    - Refrigerators: 22 instances
      - 3 appliance models, representing 13 of the 22 instances, were tested with no issues found.

GFCI – PI 4107

Seeks to add an exception for ranges, ovens, and microwaves given certain conditions

- Claims a “technological incompatibility” between appliances and GFCI
  - MA data was analyzed around the specific appliances identified in the PI.
    - Data includes reports but does not require investigation
    - 1,868 total instances reported as of January 3, 2024, regardless of product type
    - Microwave ovens: 5 instances
    - Ovens and Ranges: 1,780 instances (95.3% of total reported instances)
    - 1,441 instances from a single appliance manufacturer
      - 77.1% of all reported instances
      - 81.0% of oven/range reports

- Claims GFCIs trip on safe appliances
  - 60 Hz leakage current well in excess of 30mA was found in lab evaluations
  - 4 of the instances in the MA data were evaluated on site
    - All demonstrated >35mA leakage current at 60 Hz (enough to stop a person’s breathing)
    - Oven was run on a conventional circuit breaker for 20 minutes → <1mA leakage current after this burn-in
      - 1,297 instances from a single appliance manufacturer involve 2 specific heating/bake elements (90.0%)

GFCI - Conclusion

- Public safety is compromised by PI's 4070 and 4107

- The MA data does not confirm any "technological incompatibility".
  - 60Hz leakage current is a hazard, not a nuisance.

Please do not remove a layer of electrical safety.
Resolve PI's 4070 and 4107
Do not push out the expiration date of the Exceptions in place (PI 3619, 4203).

ACBMA

American Circuit Breaker Manufacturers Association

Headquartered in Washington DC, the ACBMA is an association of American manufacturers of circuit breakers to represent and promote the mutual interests of American circuit breaker manufacturers in areas of codes and standards, applications, safety, and education. Members of the Association include:

ABB

Eaton Corporation

Siemens Industry, Inc.

Square D/Schneider Electric

Confidential Property of the ACBMA

Public

Accept PI's 3372, 3379, and 3380

(Submitted by Keith Waters on behalf of ACBMA)

- Support AFCI expansion to additional 15/20A 120V circuits
  - PI 3372 Attics
    - Mississippi attic fire example details
  - PI 3379 Garage Door Openers
  - PI 3380 Bathrooms
    - Fan testing information (K. Waters)

  - Circuits easily identified for enforceability
    - Branch circuit wiring travels through multiple areas of a dwelling.

  - Supports CMP-2's continual & gradual expansion since initial 1999 AFCI introduction

Confidential Property of the ACBMA

Public

ACBMA®
American Circuit Breaker Manufacturers Association

PI 3372- Addition to 210.12 (B) - Attics

- Key Substantiation Items
  - Interoperability Testing for Attic Fans
    - New testing covered 5 different fans from 5 different manufacturers
      - Conditions: in a humidity chamber of 120Vac, and +54C (+130F)
      - 3 different NEMA manufacturers of dual function circuit breakers were → none tripped
  - The detailed Fire Marshal's report on the 7 fatalities from a 2020 Attic fire in Clinton, MS was reviewed.
    - Report stated the fire started in the attic.
    - The only ignition source was the electrical wiring.
    - There was wiring missing from the ignition point.
      - This indicates damage to wiring from either overload or arcing fault.
      - An overload would have tripped the overcurrent protection device.
    - Fault was most likely an arcing fault.
  - 4600 Fires per year occur in the Attic
    - Average of 10 fatalities, 70 injuries, & $194M in home damages
  - Since 1/1/2020, the Commonwealth of Massachusetts has required AFCI protection on all 15A & 20A receptacles without any reports of tripping on circuits feeding the attic.
    - 21,349 Single Family + 26,578 Multi-Family = 47,927 residential permits 1/1/2020 thru 12/31/2022 per NAHB. The data will be higher after 2023 data is included.

Confidential Property of the ACBMA

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PI 3380 - Addition to 210.12 (B) - Bathrooms

- Key Substantiation Items
  - Interoperability Testing for Bathroom Fans
    - Expanded interoperability testing of bathroom fans in a humidity chamber was conducted during May and June. The testing covered 11 different fans from 6 different manufacturers utilizing Conditions of 120Vac, +32C (+90F), and Relative Humidity 20% - 93%. The fans were a mix of types including those with lighting, humidity sensors, and ECM motors. Three different manufacturers of current dual function circuit breakers were used and none of the devices tripped. Similar tests were run on 5 Radon Fans without any tripping of the dual function circuit breakers.
  - 2300 Fires per year occur in the bathroom leading to an average of 10 fatalities, 50 injuries, & $48M in home damages.
  - Since 1/1/2020, the Commonwealth of Massachusetts has required AFCI protection on all 15A & 20A receptacles without any reports of tripping on circuits feeding the bathroom. *21,349 1-2 Family & 26,578 Multi-Family for a total of 47,927 residential permits 1/1/2020 thru 12/31/2022 per NAHB. . The data will be higher after 2023 data is included.*

Confidential Property of the ACBMA

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American Circuit Breaker Manufacturers Association

PI 3379 - Addition to 210.12 (B) – Circuits feeding garage door opener

- Key Substantiation Items
  - Interoperability Testing for Garage Loads
    - The industry still has questions on specific loads, but none of the concerns are around the garage door opener.
    - This load uses typical motors seen utilized without issue in other parts of the AFCI protected branch circuits.
    - The addition of this protection would help in reducing garage fires and be another incremental step by CMP 2 to improve electrical safety.
  - 6600 garage fires
    - Average of 30 deaths, 400 injuries, and $457M in property loss
    - Electrical malfunction is a major contributor to the number with an annual average of 1590/yr. and 10 deaths per year.
    - Reduction of these fires is needed.
  - Since 1/1/2020, the Commonwealth of Massachusetts has required AFCI protection on all 15A & 20A receptacles without any reports of tripping on circuits feeding the garage.
    - 21,349 One and Two Family + 26,578 Multi-Family = 47,927 residential permits 1/1/2020 thru 12/31/2022 per NAHB. . The data will be higher after 2023 data is included.

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American Circuit Breaker Manufacturers Association

Confirming: ACBMA recommends

- Support AFCI expansion to all 15/20A 120V circuits, or…continue gradual AFCI expansion to additional 15/20A 120V circuits

  - PI 3380 – bathrooms
  - PI 3372 – attics
  - PI 3379 – circuits supplying garage door openers

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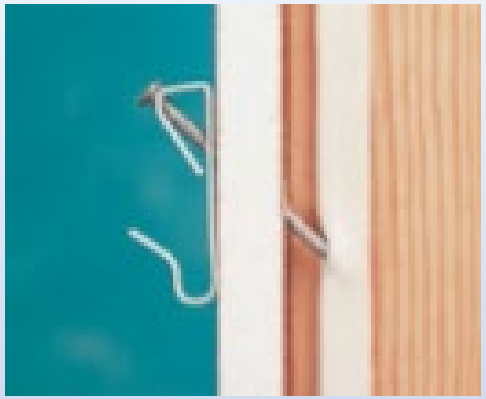
American Circuit Breaker Manufacturers Association

Questions?



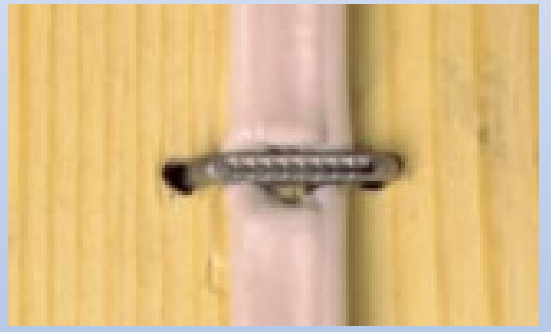
- Also…
  - Visit ACBMA website: www.acbma.org
  - Visit NEMA's AFCI website: www.afcisafety.org
  - Contact any of the ACBMA manufacturers:

ABB

Eaton Corporation

Siemens Industry, Inc.

Square D/Schneider Electric



ACBMA® American Circuit Breaker Manufacturers Association

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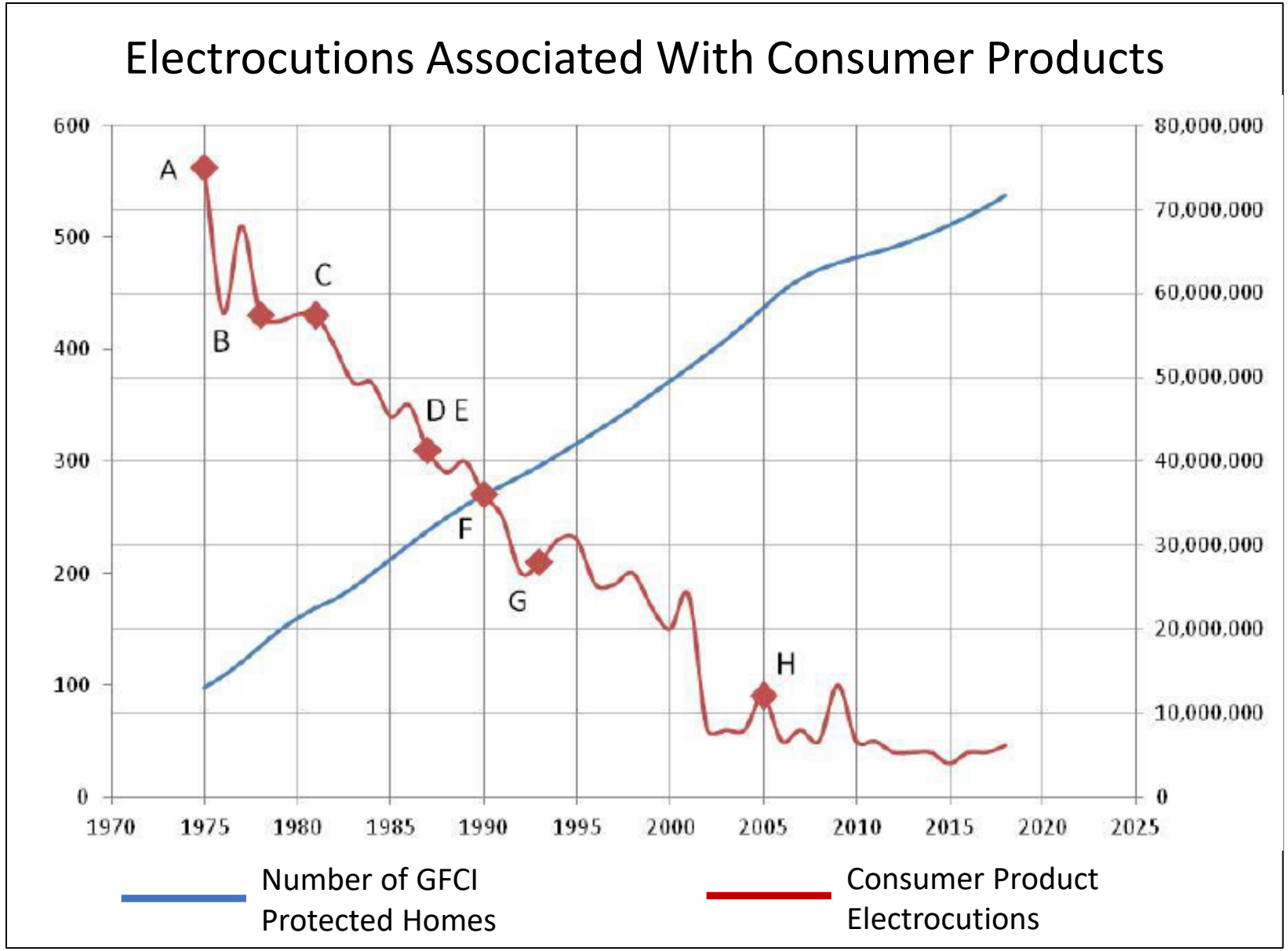

GFCIs: Required Locations

- **A** Bathrooms (1975)
- **B** Garages (1978)
- **C** Spas and Hot Tubs (1981)
- **D** Kitchens (1987)
- **E** Unfinished Basements (1987)
- **F** Crawlspaces (1990)
- **G** All Sinks (1993)
- **H** Laundry/Utility Rooms (2005)

Source: GFCI Protection in Homes Versus Electrocutions 1975 to 2018 (Source: A NEMA Ground Fault Personnel Protection Section Article entitled “GFCI Receptacles: Consumer Protection Personified” June 2020, Revision 2)

Home Fires Caused by Electrical Distribution and Lighting Equipment – *NFPA*

NFPA RESEARCH

HOME FIRES CAUSED BY ELECTRICAL DISTRIBUTION AND LIGHTING EQUIPMENT

Supporting Tables

February 2022
Richard Campbell

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Table 1. Home Structure Fires Involving Electrical Distribution and Lighting Equipment by Year

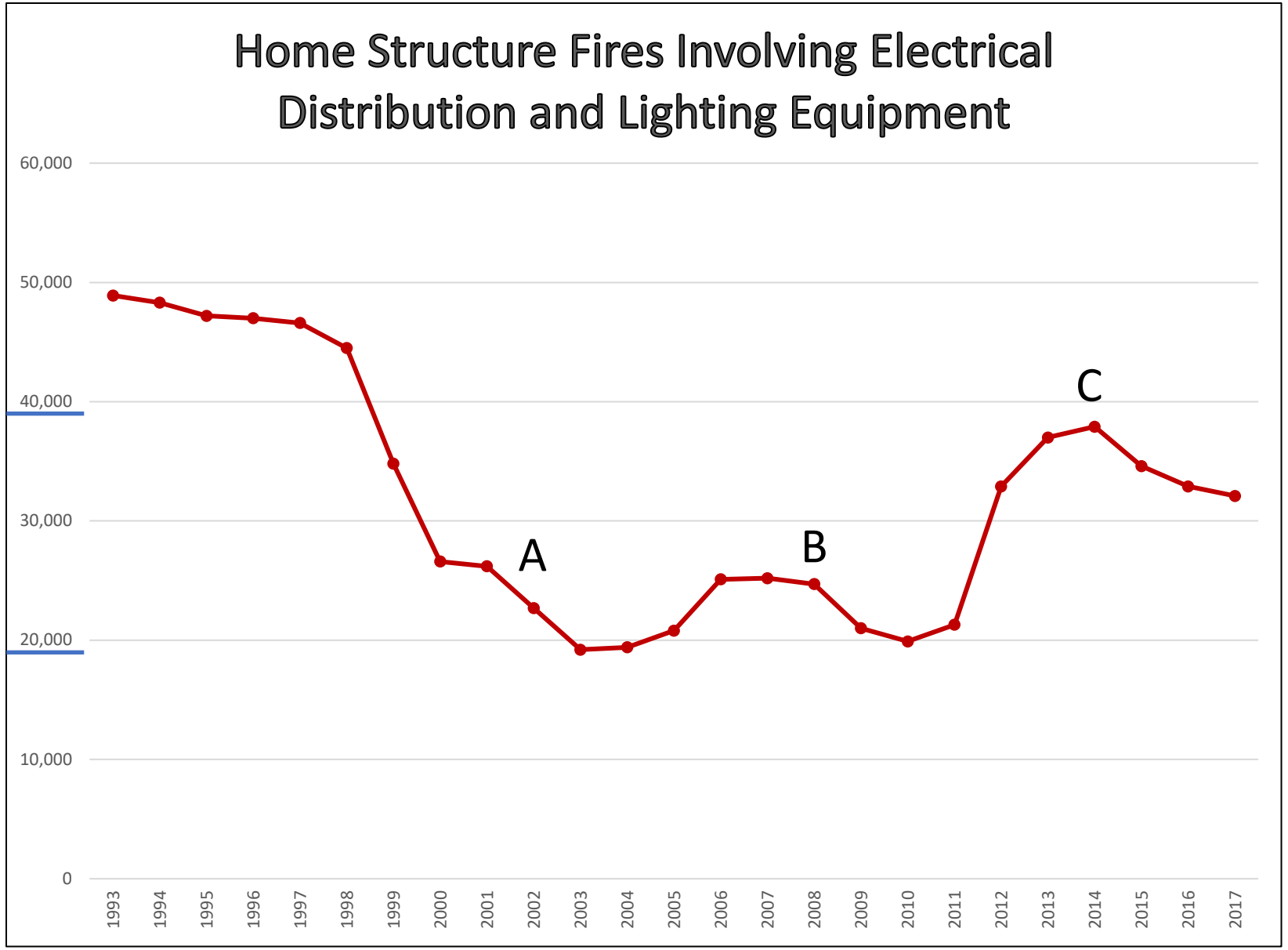
Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage	Direct Property Damage in 2019 Dollars
1980	68,400	523	1,650	$493	$1,532
1981	62,300	553	1,500	$459	$1,289
1982	60,900	408	1,820	$519	$1,374
1983	56,700	500	1,570	$548	$1,406
1984	54,800	445	1,520	$549	$1,349
1985	56,500	470	1,400	$720	$1,709
1986	54,300	717	1,420	$597	$1,394
1987	51,600	522	1,580	$512	$1,152
1988	53,400	439	1,720	$715	$1,547
1989	47,900	610	1,500	$642	$1,325
1990	47,400	438	1,540	$683	$1,338
1991	49,000	354	1,890	$958	$1,798
1992	46,400	403	1,770	$617	$1,125
1993	48,900	418	1,900	$818	$1,448
1994	48,300	464	1,640	$714	$1,233
1995	47,200	489	1,650	$775	$1,300
1996	47,000	470	1,560	$839	$1,369
1997	46,600	352	1,580	$865	$1,378
1998	44,500	363	1,370	$843	$1,324
1999	34,800	183	530	$806	$1,237
2000	26,600	122	1,130	$631	$938
2001	26,200	436	1,030	$717	$1,036
2002	22,700	166	700	$593	$843
2003	19,200	320	600	$698	$971
2004	19,400	292	840	$623	$844
2005	20,800	498	1,060	$858	$1,124
2006	25,100	366	840	$776	$984
2007	25,200	274	1,050	$663	$817
2008	24,700	515	880	$964	$1,146
2009	21,000	318	1,000	$935	$1,114
2010	19,900	242	980	$774	$909
2011	21,300	295	840	$822	$936
2012	32,900	292	1,250	$1,326	$1,478
2013	37,000	601	1,290	$1,418	$1,555

Table 1. Home Structure Fires Involving Electrical Distribution and Lighting Equipment by Year (Continued)

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage	Direct Property Damage in 2019 Dollars
2014	37,900	535	1,290	$1,433	$1,546
2015	34,600	461	1,020	$1,136	$1,226
2016	32,900	562	1,120	$1,020	$1,088
2017	32,100	343	850	$1,661	$1,733
2018	32,100	437	1,160	$1,336	$1,360
2019	29,800	333	1,160	$1,255	$1,255

Note: Figures in parentheses exclude confined fires, which are fires reported as confined to a fuel burner or boiler, chimney or flue, cooking vessel, trash, incinerator, or commercial compactor. These are national estimates of fires reported to US municipal fire departments and so exclude fires reported to only federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of a small number of unusually serious fires. Fires are rounded to the nearest hundred, civilian deaths to the nearest one, civilian injuries to the nearest ten, and direct property damage to the nearest million dollars. Figures for 1980–1998 are based on ignition factors 54–55 and reflect a proportional share of the home fires with ignition factor unknown, unreported, none, or blank. Figures for 1999 and later reflect a proportional share of the home fires with factor contributing to ignition as unknown, reported, none, or blank. Because of low participation in NFIRS Version 5.0 during 1999–2001, estimates for these years are highly uncertain and must be used with caution. Inflation adjustment to 2019 dollars was calculated using the Consumer Price Index.

Source: NFIRS 5.0 and NFPA's fire experience survey.



Source: Home Fires Caused by Electrical Distribution and Lighting Equipment: Supporting Tables, Feb. 2022, NFPA
Note: Because of low participation in NFIRS Version 5.0 during 1999-2001, data from these years is not considered reliable.

AFCIs: Required Locations

A Bedrooms (2002)

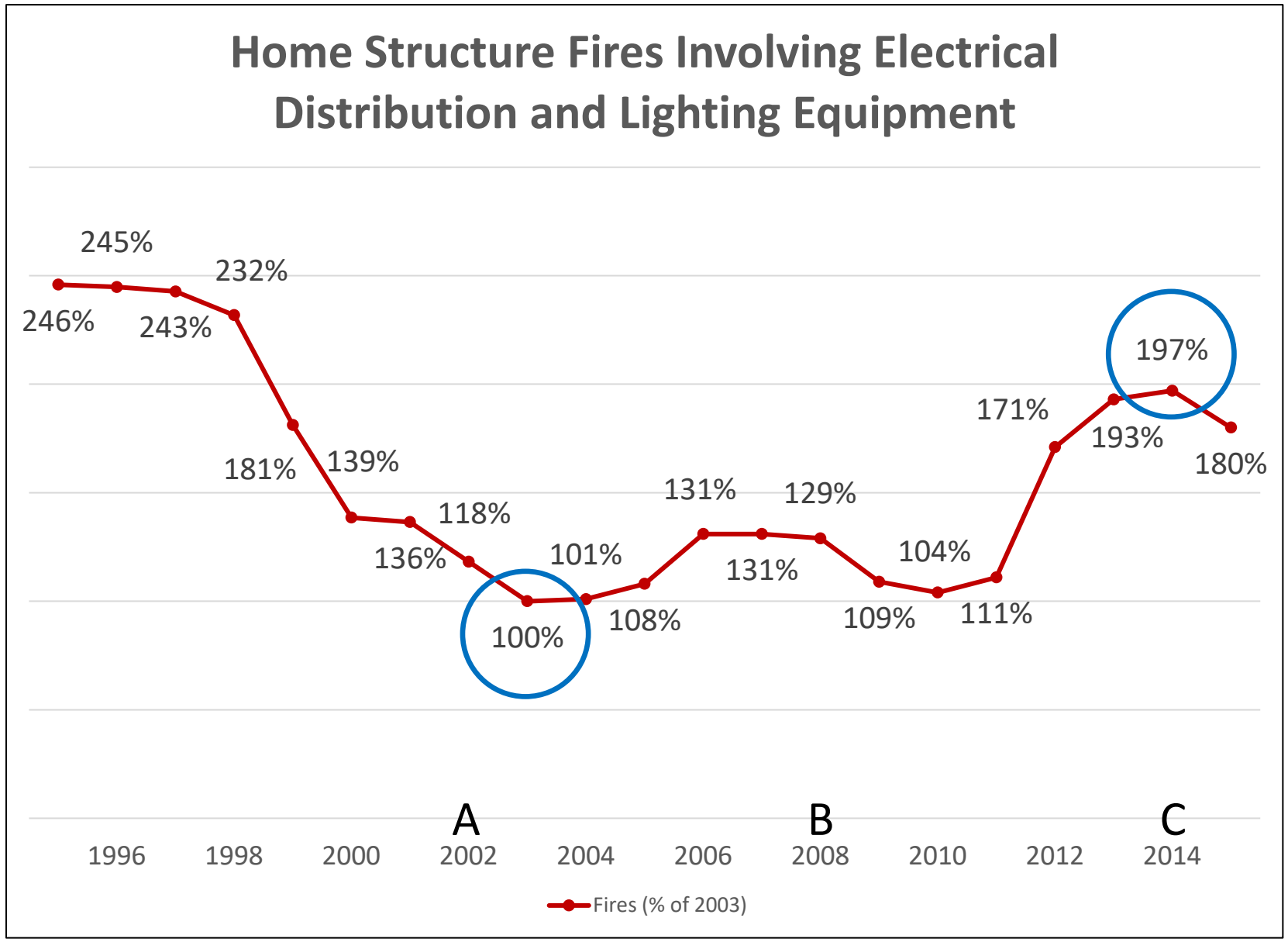
B Family rooms, dining rooms, living rooms, parlors, libraries, dens, sunrooms, recreation rooms, closets, hallways similar rooms or areas (2008)

C Kitchens, laundry areas (2014)

2003: Approx. 6 million AFCI devices installed*

2023: 10s of millions

* Presentation to CPSC on 9/23/2003



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Note: Because of low participation in NFIRS Version 5.0 during 1999-2001, data from these years is not considered reliable.

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Public Input No. 3155-NFPA 70-2023 [Section No. 210.12(B)]

Presented by:

Merton Bunker, PE - Merton Bunker & Associates

Steve Rood – Legrand Pass & Seymour

On behalf of: Arc Fault Circuit Interrupter Wiring Device Joint Research and Development Consortium

USFA Residential Building Electrical Malfunction Fire Trends (2012-2021)

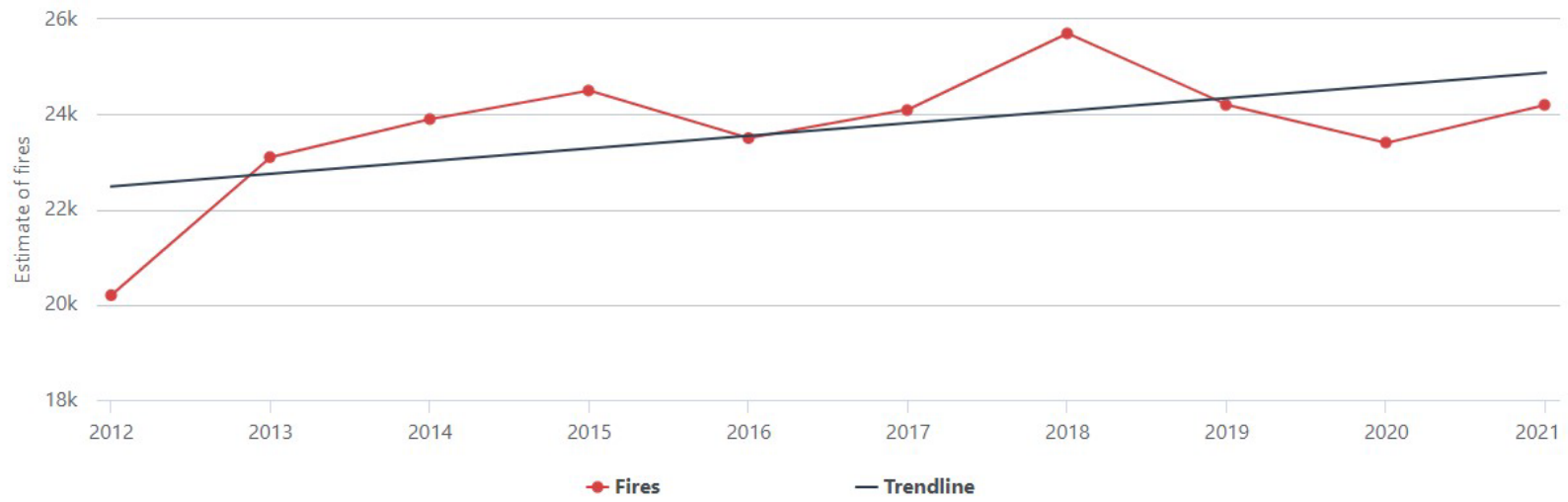
Fires, deaths, injuries and dollar loss

Fires | Deaths | Injuries | $ Loss

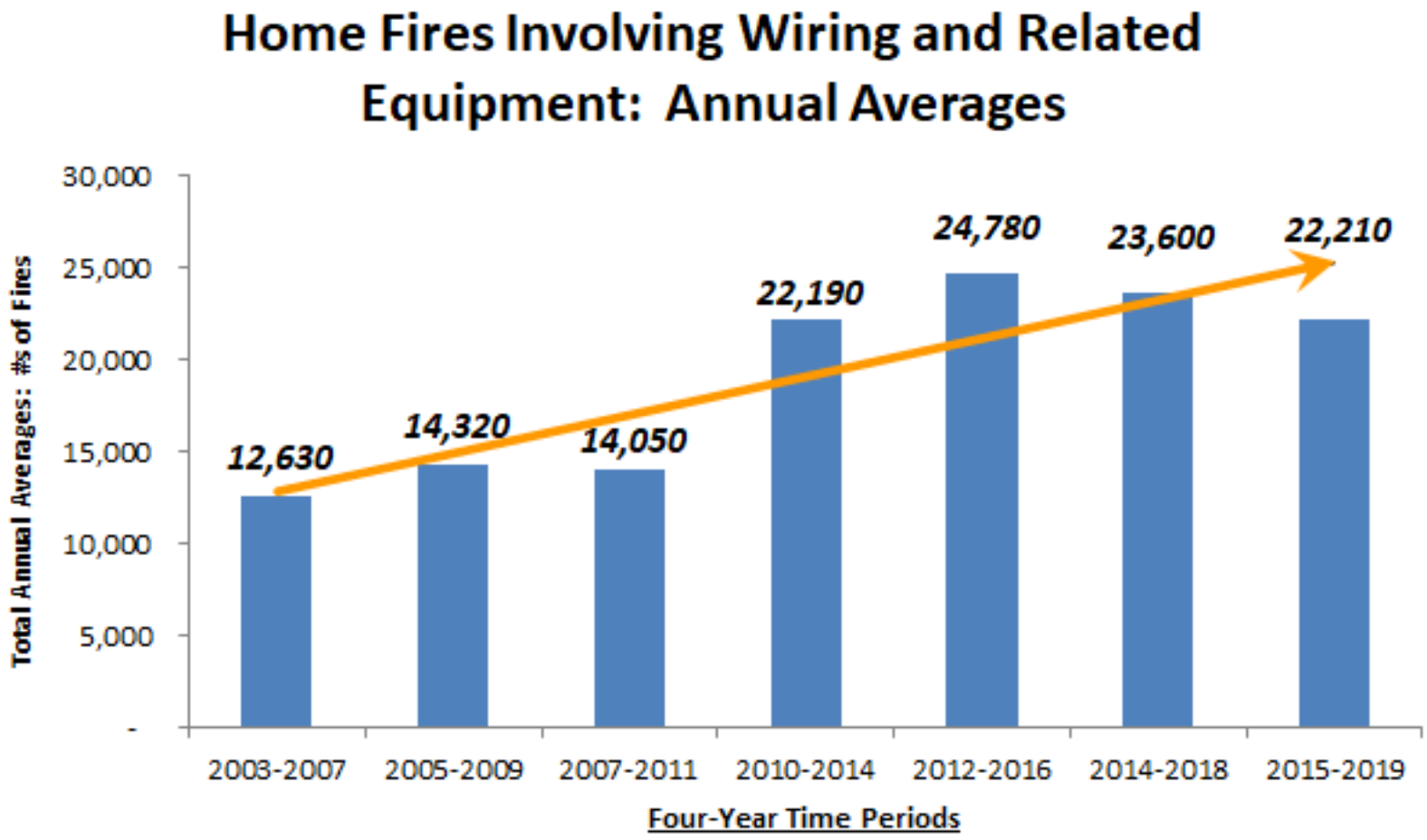
Residential building electrical malfunction fires

View data in a table | Download chart

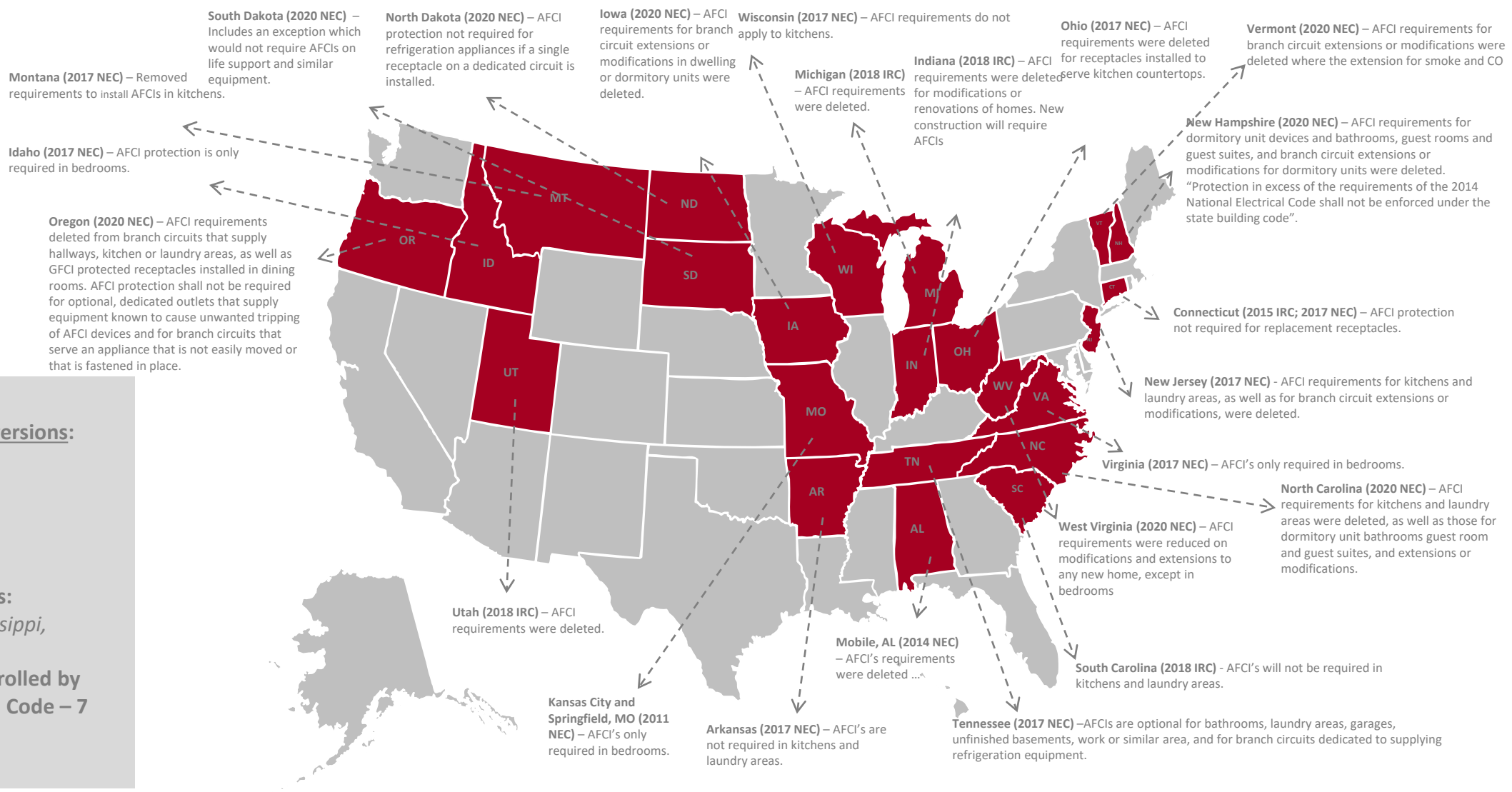
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Fires	20,200	23,100	23,900	24,500	23,500	24,100	25,700	24,200	23,400	24,200



National Fire Protection Association Fire Data (2003-2019)



Overview of AFCI Requirements: 20 states and 3 major municipalities have made amendments to reduce the AFCI requirements. Below is a summary of the changes that have been made:



Overview of NEC adopted versions:

- **2023 NEC – 2 States**
- **2020 NEC – 17 States**
- **2017 NEC – 17 States**
- **2014 NEC – 1 States**
- **2008 NEC – 1 States**
- **Local Adoption – 5 States:** *Alabama, Arizona, Mississippi, Missouri and Nevada.*
- **AFCI Requirements Controlled by International Residential Code – 7 States**

AFCI Manufacturers Changing Trip/No-Trip Criteria

- Individual manufacturers' proprietary AFCI trip/no-trip criteria change frequently with limited or no notice.
- This is an impossible task for appliance manufacturers, requiring hundreds of companies (which are constantly designing new consumer products) to check-in with at least eight companies, just to obtain AFCI specs.
- Development of AFCI trip/no-trip criteria are not collaborative but rather proprietary; appliance manufacturers MIGHT only be consulted if proprietary problems in the field have arisen.
- Until all AFCI trip/no-trip criteria are defined in the consensus standard, UL 1699, AFCI expansion is premature whether in the 2026 or previous Codes.

AFCI and Nuisance Tripping Research Study

Dr. Steven W. Schmidt
Dr. Xi Lin
East Carolina University

August 15, 2023

2023 Research Study Overview

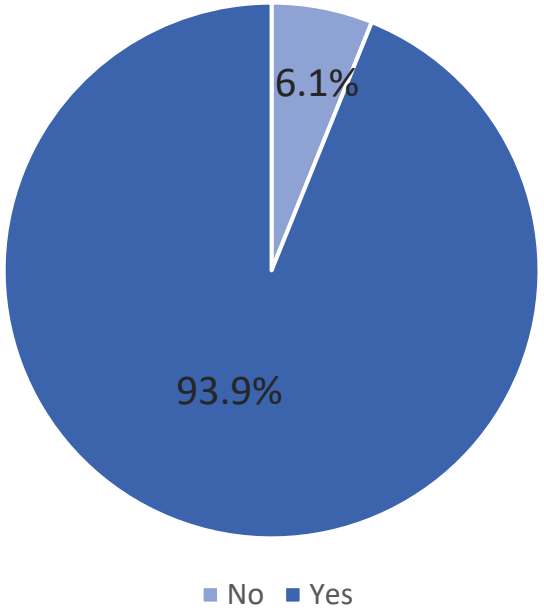
The purpose of this study was to investigate residential electricians' experience in the field with arc fault circuit interrupters (AFCIs) and nuisance tripping. This study was designed to build on the 2020 AFCI study.

This study was conducted to examine a variety of issues surrounding the use of AFCIs and nuisance tripping, including the following:

- Frequency of nuisance tripping, troubleshooting, and solutions
- Costs (time and money) associated with nuisance tripping
- Electricians' perceptions of AFCIs and nuisance tripping
- Customers' perceptions of nuisance tripping
- Customer safety and protection

Source: AFCI and Nuisance Tripping Research Study; Schmidt & Lin; East Carolina University August 2023

Have you ever experienced nuisance or unwanted tripping of AFCIs and/or Dual Function AFCI/GFCIs on residential projects?

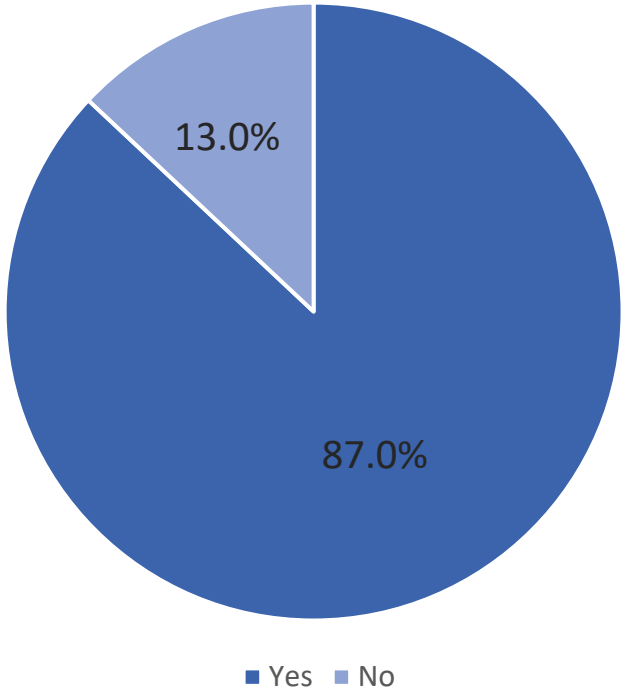


Most respondents have experienced nuisance tripping.

- **Yes: 93.9%**
- No: 6.1%

Source: AFCI and Nuisance Tripping Research Study; Schmidt & Lin; East Carolina University August 2023

Are you aware of anyone ever replacing an AFCI or Dual Function AFCI/GFCI Breaker with a standard circuit breaker to resolve the nuisance tripping issue?



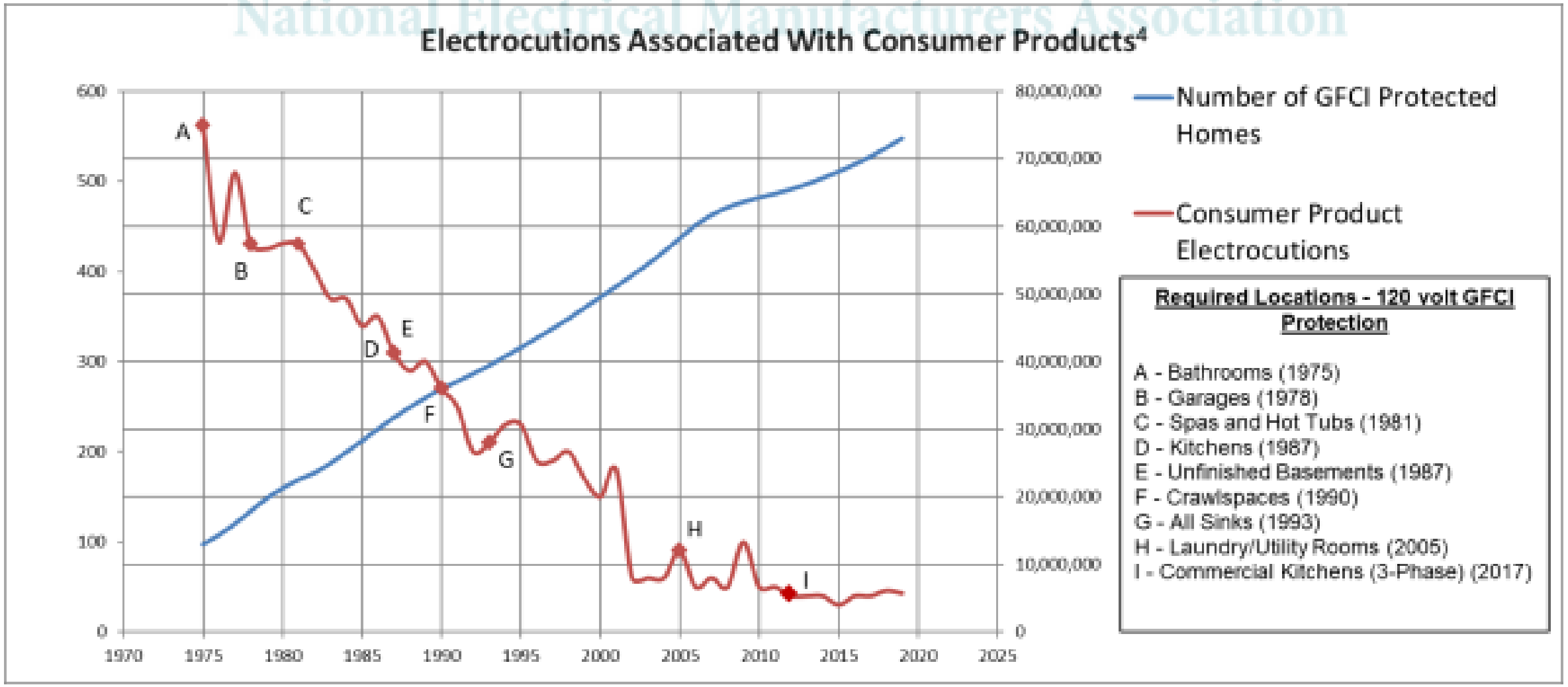
Most respondents knew someone who had replaced an AFCI breaker with a standard breaker. This percentage is consistent with that from the 2020 survey (83 percent).

- **Yes: 87%**
- No: 13%

Source: AFCI and Nuisance Tripping Research Study; Schmidt & Lin; East Carolina University August 2023

Electrocutions decline with expansion of GFCI protection

National Electrical Manufacturers Association



AFCI Nuisance Tripping Research Study Findings

- The major problems with nuisance tripping are as follows:
  - More technologically advanced appliances do not work well with the AFCIs being installed in the home.
  - Rewiring/rework projects on existing homes, whereby new AFCIs are added to existing wiring systems.

Source: AFCI and Nuisance Tripping Research Study; Schmidt & Lin; East Carolina University August 2023

AFCI Nuisance Tripping Research Study Findings

- **In the past year,** respondents worked on an average of 45 residential projects
  - 34% of these projects (15 of 45) experienced AT LEAST ONE issue with nuisance tripping
  - 87% of those projects (13 of 15) required at least one call-back
  - 18% of the projects (8 of 45) experienced TWO OR MORE issues with nuisance tripping
  - 88% of those projects (7 of 8) required two or more call-backs

- Note that the 8 projects that experienced TWO OR MORE issues with nuisance tripping are counted in the 15 projects that included at least one nuisance trip.

Source: AFCI and Nuisance Tripping Research Study; Schmidt & Lin; East Carolina University August 2023

AFCI Nuisance Tripping Research Study Findings

- Most respondents agreed that safety was the main benefit of AFCIs.
- Only 23% of respondents believed the benefits of AFCIs outweighed the problems associated with them.
- Overrun costs for replacing AFCIs are still a major concern for electricians.
- There is agreement that AFCI technology is improving, but not improving fast enough.

Source: AFCI and Nuisance Tripping Research Study; Schmidt & Lin; East Carolina University August 2023

AFCI expansion could inadvertently lead to a reduction in GFCI protection.

Please support PI 3155

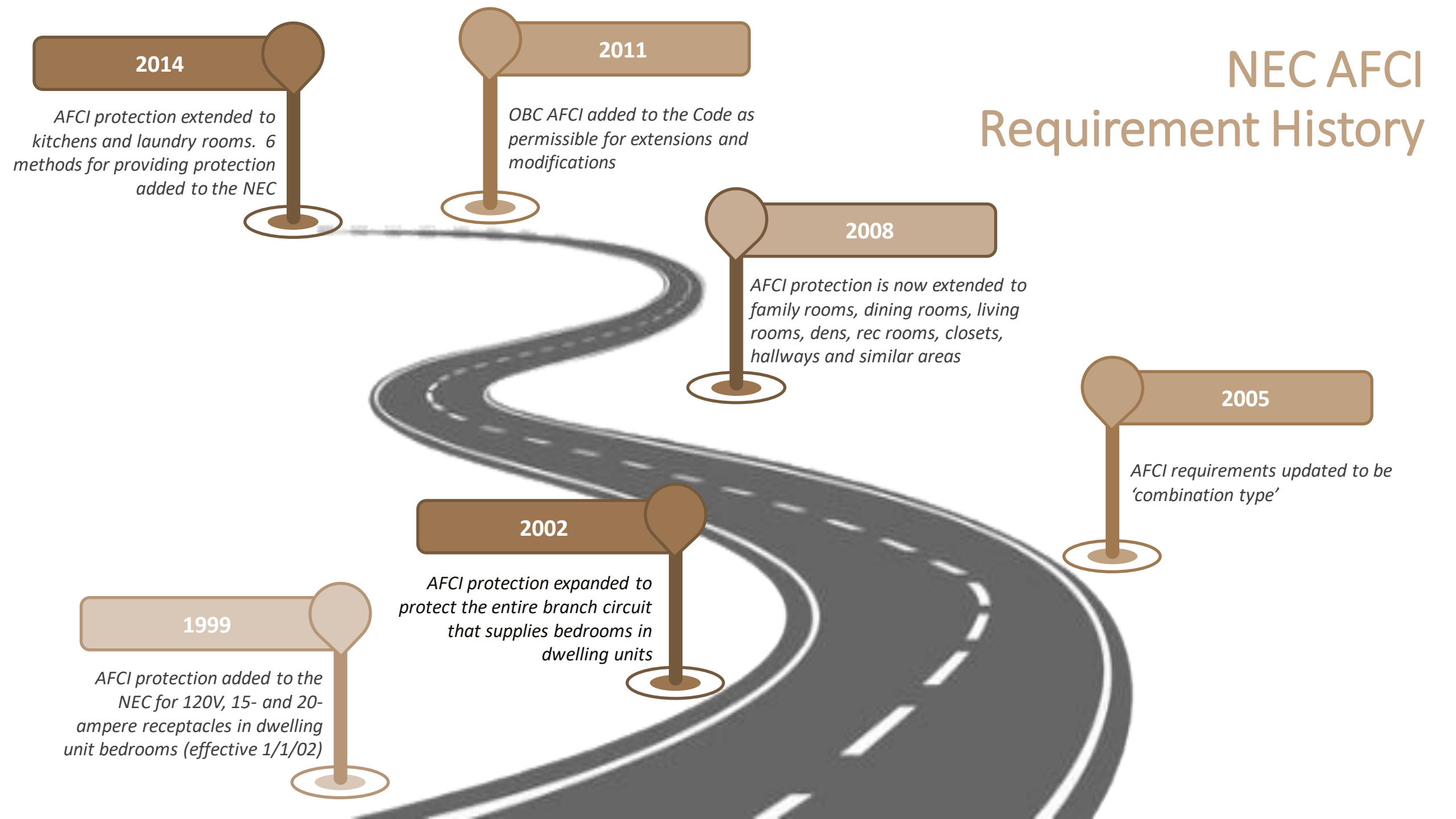
Addition of a ***New, Viable*** OBC AFCI Installation Method - PI #2794

John Kovacik - Retired Principal Engineer from UL after 49 years of service. Served on NEC Correlating Committee and CMPs 10, 12, 13, 15 and 20; NFPA Standards Council and UL Corporate Fellow

Mark Earley - Retired Chief Electrical Engineer from NFPA after 33 years of service; Editor-in-Chief of 11 editions of the NEC Handbook and former UL Electrical Council Member

Don Talka - Retired Senior Vice President and Chief Engineer from UL after 42 years of service. Served on CMPs 15 (Chair) and 20; NFPA Standards Council and UL Corporate Fellow

NEC AFCI Requirement History



Six Existing Installation Methods for Providing AFCI Protection per NEC 210.12(A)

Use of a listed combination-type AFCI installed to provide protection of the entire branch circuit	Valid installation method	✓
Use of a branch/feeder-type AFCI OCPD	No longer available on the market	✗
Use of a supplemental AFCI OCPD in combination with a AFCI receptacle	Supplemental AFCI OCPDs never made it to the market	✗
An OBC AFCI receptacle, as the first outlet, in combination with a listed OCPD, if the combination is identified as 'system combination-type AFCI'	There is no standard developed, and no progress on development, for a 'system combination-type AFCI' since this method was first introduced	✗
An OBC AFCI receptacle, as the first outlet, in combination with a listed OCPD, if the home run is type MC, AC or metal raceway	Vast majority of new construction utilizes type NM cable	✗
An OBC AFCI receptacle, as the first outlet, in combination with a listed OCPD, if the home run is encased in concrete	Vast majority of new construction utilizes type NM cable not buried in concrete	✗

Dwelling Locations Requiring AFCI Protection

Public Input

- Public Input #2794 ***lays out an additional method*** to installers for providing AFCI protection to homeowners via the use of an OBC AFCI
- Eight conditions are required for the use of this new method, ***ensuring equivalent protection*** is delivered to homeowners
- This Public Input offers installers a ***real, and immediately available,*** alternative to the present installation methods

Eight conditions are required for use of this added OBC method:

- The home-run is unspliced and untapped from the OCPD to the OBC AFCI
- Home-run length is a maximum of 50’ (for 14AWG) and 70’ (for 12AWG) copper conductors
- First outlet is to be marked
- The utility transformer has a minimum rating of 25kVA
- The use of ferromagnetic conduit is prohibited
- Service length from the transformer to the service equipment is limited to 125’ (for 3/0 aluminum) or 75’ (for 1/0 aluminum)
- The branch circuit OCPD is only allowed to be a listed single-pole thermal magnetic breaker
- The use of high magnetic trip breakers is prohibited

Technical Concerns Addressed

OBC AFCI Research History

Research

While I was working at UL, I commissioned the research surrounding this issue so that the CMP could make ***educated*** decisions. The research shows the safety of this method

The research, when taken along with other studies, can provide a ***valuable tool*** to assist in the decision-making process

Due to time elapsed and changing CMP rosters, it is important to re-visit the key findings of the research which show this method ***ensures equivalent protection***

- Risk deals with the ***probability*** of an event happening vs. the consequences of the event happening
- The NEC is a risk-based code with ***multiple examples*** of installations where low-level risk was found to be acceptable (panelboards installed on unheated exterior walls is a good example)
- The current methods for providing AFCI protection provides some ***low-level of risk***; this proposal does ***not increase risk*** to the NEC
- UL research shows that there is an ***extremely low probability*** of an installed NM cable run to transition into a parallel arcing fault**
- UL research* shows the following equation defines the parameters for a circuit breaker to protect the homerun:

$$I_{mag} < \frac{0.8\, V_{rms}}{2\rho_L L + R_c + \left(\frac{V_{rms}}{I_{pssc}}\right)}$$

  - This equation is based on cable length, available current at the panelboard and the magnetic trip levels of the circuit breaker
- Section 210.12(E) considers an AFCI receptacle, installed at the first receptacle, as ***proving equivalent protection*** to a listed combination type AFCI breaker.
  - 210.12(E) applies to old construction, where it can be assumed, has lower available fault current than what's required in this PI. The panel decided the "risk" was acceptable. In new construction, with higher available fault current, the "risk" is even lower
- It is ***time*** to accept this PI

*UL Solutions, *Evaluation of Run Lenth and Available Current on Breaker Ability to Mitigate Parallel Arcing Faults, Part II: Effect of Run Length with 500A Available at the PanelBoard, 2012*
**https://code-authorities.ul.com/wp-content/uploads/sites/40/2015/02/Investigation_of_Damage_and_Degradation_of_NM_Cables.pdf

2026 NEC First Revision – CMP 2

PI’s 2794, 3786, 4163

SIEMENS

AFCI – PI 2794

Seeks to add another means of protection similar to 210.12(A)(4) but removes the listing requirement in 210.12(A)(4)(d)

- Additional requirements compared to 210.12(A)(4)
  - Minimum rating for the transformer (minimum 25kVA)
  - Service conductor cannot be installed in ferro-magnetic conduit.
  - Service conductor <=125 ft
  - OCPD “shall not be a circuit breaker identified as high magnetic trip”
    - Key point for home run protection

- Problems that would result in reduced safety
  - A listed OCPD may not be sufficient to provide protection to the home run circuit.
    - “Identified” is a defined term related to product evaluation.
    - No standards or industry guidelines to define “high magnetic trip”
    - 15 & 20A single pole circuit breakers with instantaneous trip points from 140A to 600A
      - commonly available but not marked in any way as “high magnetic”

AFCI – PI 3786

Seeks to add another means of protection that includes an ADA-compliant type requirement

- Copies 210.12(A)(4) but leaves out the listing requirement in (d)
  - *"The combination of the branch-circuit overcurrent device and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and listed as such."*
  - Cannot piecemeal ADA requirements in the NEC
    - US Department of Housing and Urban Development covers these requirements.
  - Access via stairs should not be a reason to eliminate a listing requirement for safety.

AFCI – PI 4163

Seeks to include AFCI protection for all 10, 15 & 20A branch circuits in dwelling units

- Support expansion of AFCI to improve electrical safety in dwelling units

AFCI - Conclusion

- Public safety is compromised by PI's 2794 and 3786
  - Listing requirements ensure that products meet appropriate standards and has been tested and found suitable for a specified purpose.
  - Removing the listing requirement decreases electrical safety.

Please do not remove a layer of electrical safety.
Resolve PI's 2794 and 3786

BERKELEY LAB
LAWRENCE BERKELEY NATIONAL LABORATORY

U.S. DEPARTMENT OF ENERGY

Background for Proposed Changes to Dwelling Unit Load Calculations

By: Brennan Less (bdless@lbl.gov)

LBNL Residential Building Systems

2024-1-18

Download these slides here!!!

Who Are We and What Are Our Goals?

- Team
  - National lab researchers working on behalf of the US DOE
  - Other partners including practitioners, consultants and utility/government partners

- What did we do?
  - Reviewed Section 220 for barriers/challenges to existing dwelling electrification
  - Analyzed load data to understand dwelling power demand
  - Submitted 17 PIs to Section 220
  - Participated in Task Group 4

- Our Goals
  - Clear and safe electrical load calculations for dwelling units being electrified
  - Accurate, scalable electrical load calculations using nation’s smart meters

What Data Did We Use?

- **Whole dwelling 15- and 60-minute maximum demand data**
  - 11,750 existing US dwellings
  - 2.7 years per dwelling
  - 32,000 dwelling-years of data

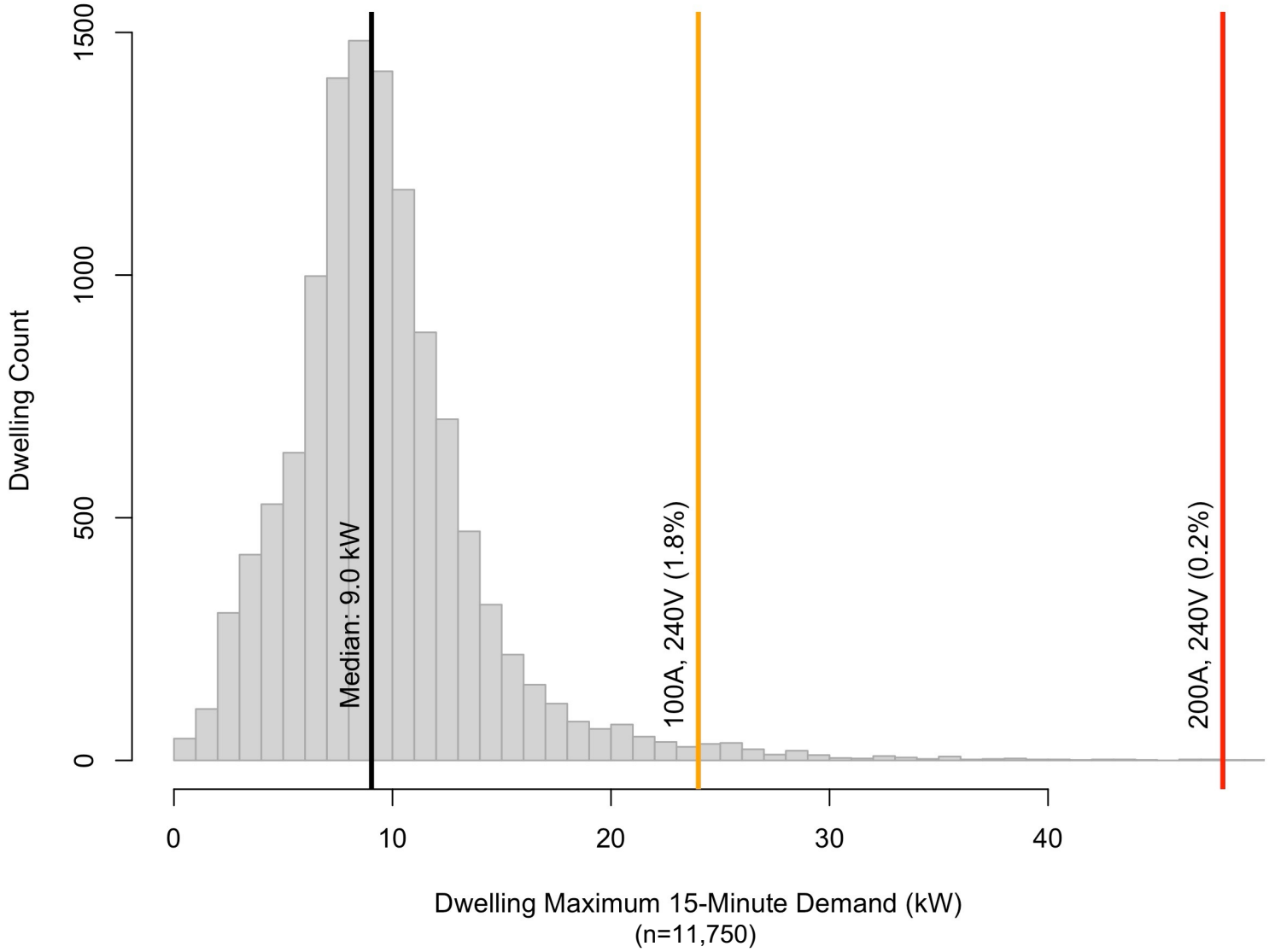
- **End-use sub-metering 15-minute data**
  - 957 existing US dwellings
  - 9,490 branch circuits
  - 3.5 years per dwelling
  - 3,376 dwelling-years of data

- **Lighting audit data**
  - 2,053 existing US dwellings

- States include: **TX**, CA, NY, CO, OR, WA, ID, MT, **VT**
- Housing types: **Single-family**, multi-family and manufactured

High-Level Learnings for Services and Feeders

- Most dwellings have LOTS of capacity for new loads
- New loads add at <100%
- Lots of load diversity (40-50%), increases with more connected loads
- Never do more than four loads operate at or near 100% together
- Appliance maximum power draw < nameplate ratings
- Existing Load vs. New Load demand factors are different



* 10 CFR 430.32(dd))

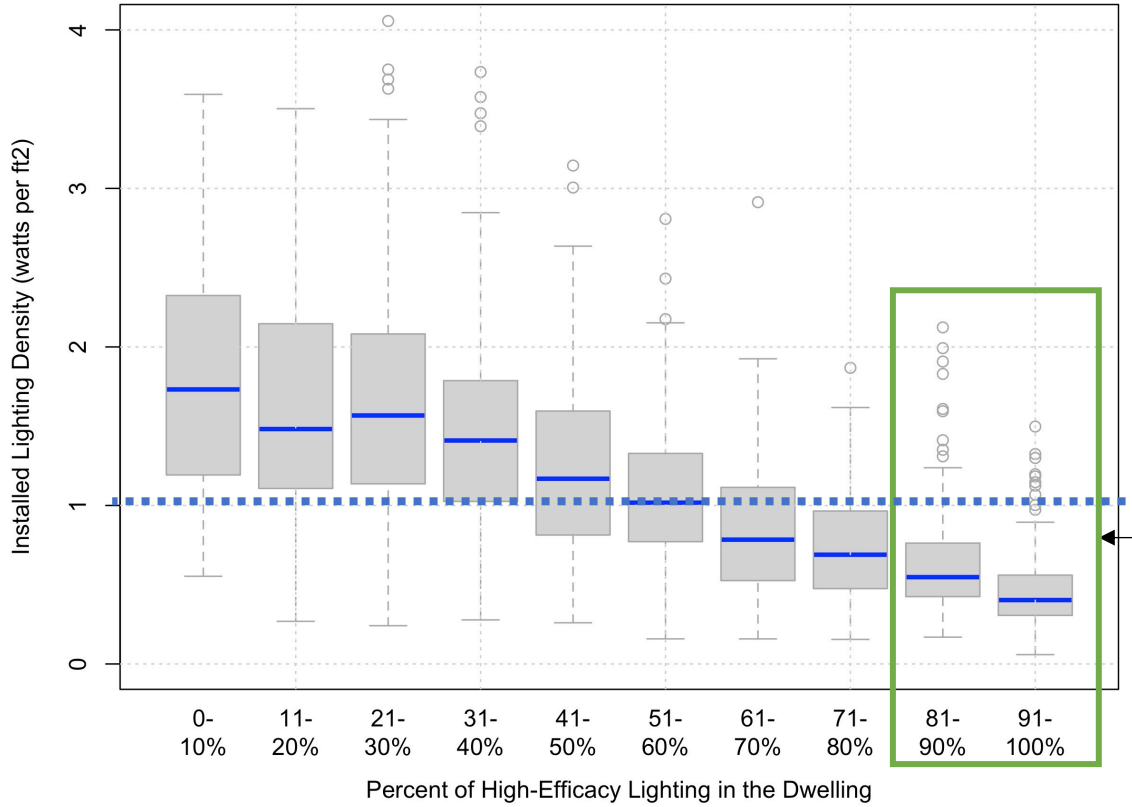
Lighting Density—220.41

- **Propose**: reducing 3 to 2 VA/ft^2 throughout 220

- Federal regulation* has banned sale of low-efficacy General Service Lamps
- Lighting density is reduced in dwellings with LEDs and CFL

Lighting audit data from 2,053 NEEA RBSA dwellings

Median =
52% high-efficacy
1.03 w/ft^2



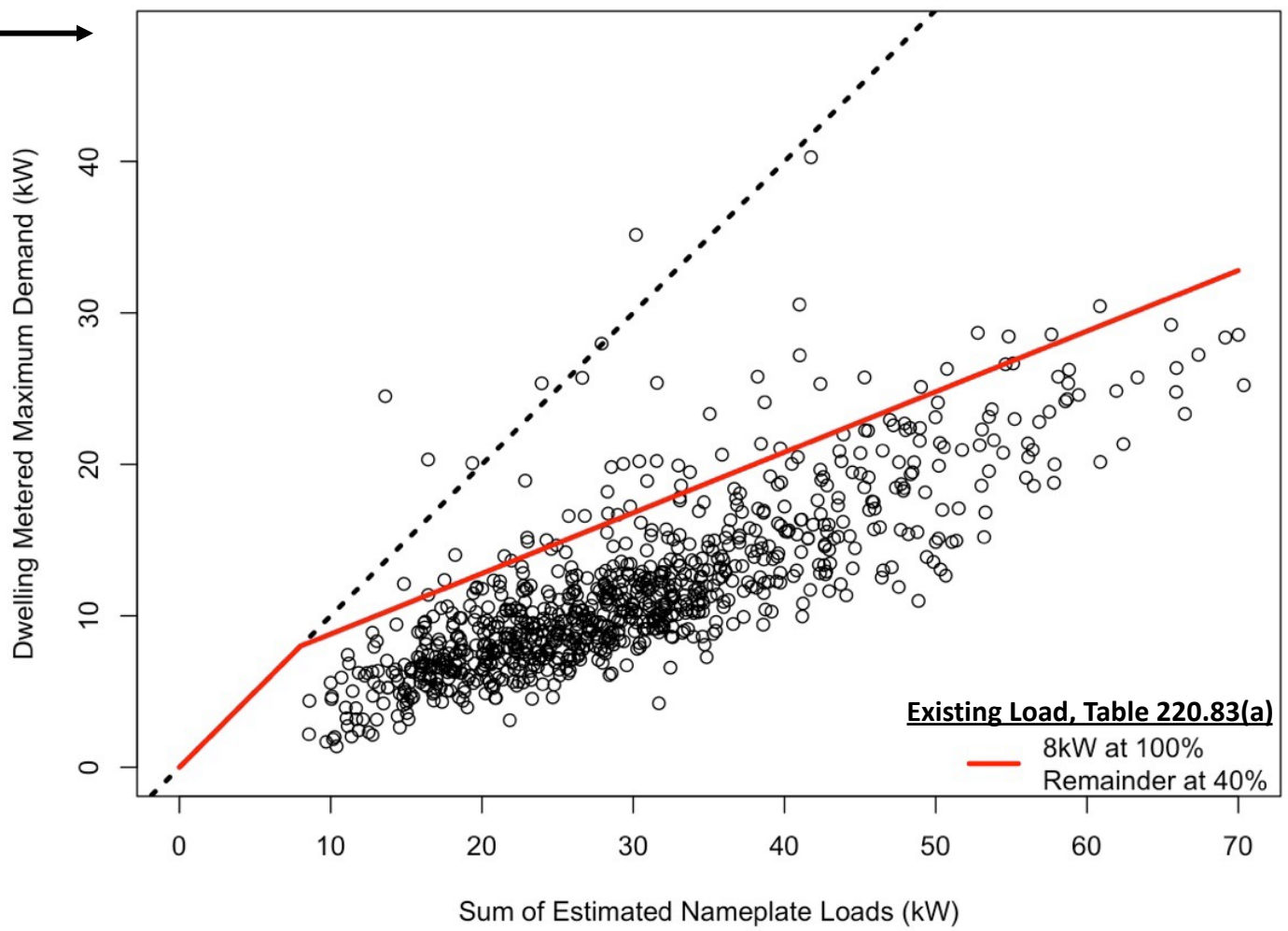
As regulation takes effect, most dwellings will become like these.

Existing Dwelling Unit—220.83

"Sum of connected loads"

- Keep existing load calculations unchanged →
- Simplify and eliminate different treatment for new HVAC

Load (kVA)	***Percent of Load***
First 8 kVA of existing and new load	100
Remainder of existing load	40
New Electric Vehicle Supply Equipment (EVSE)	80
New central electric resistance space heating	80
All other new loads	50



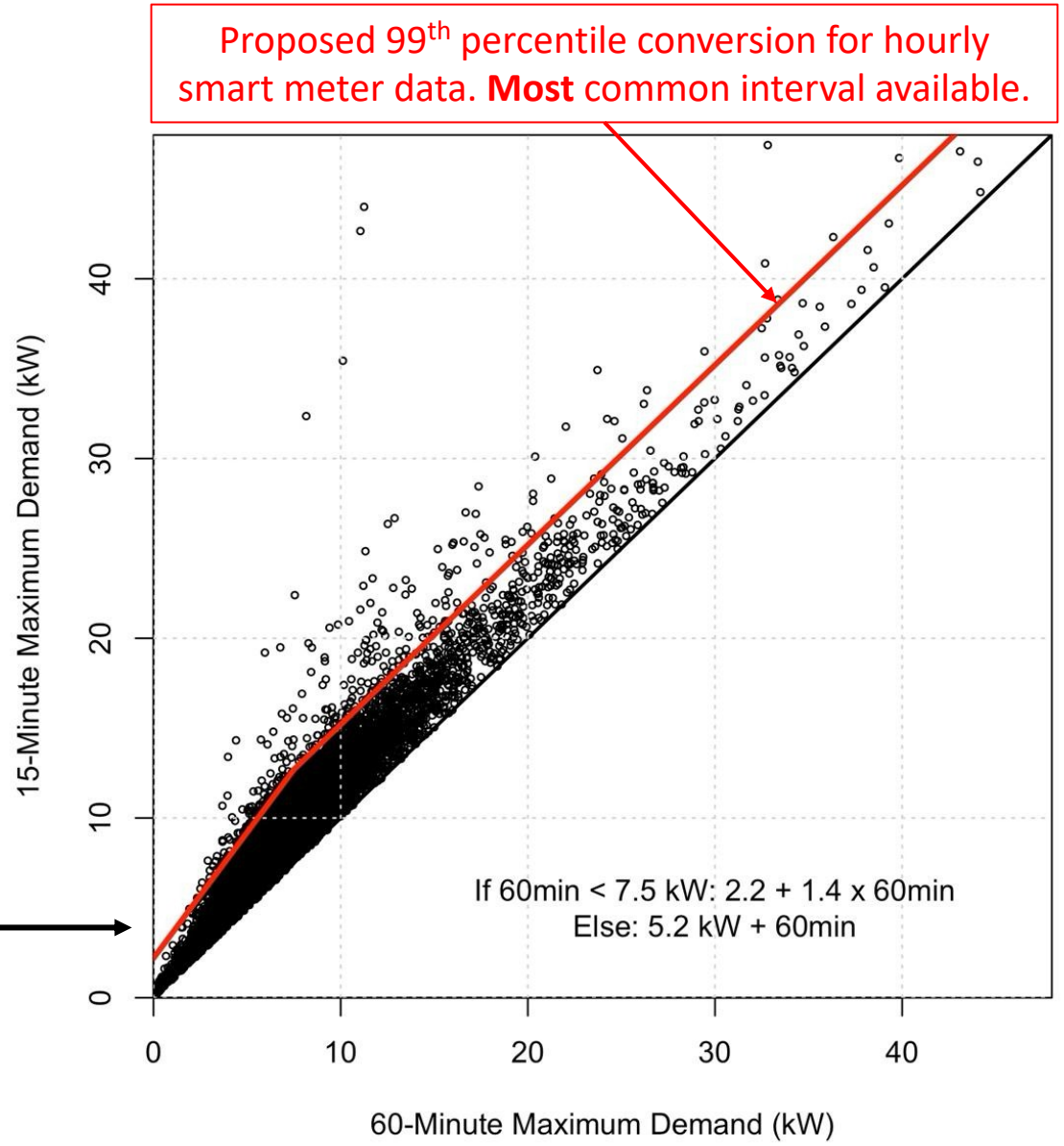
Adjusted for light/plugs, kitchen/laundry circuits, and divided by 80% nameplate ratings. Max of heating or cooling loads.

Determining Existing Loads—220.87

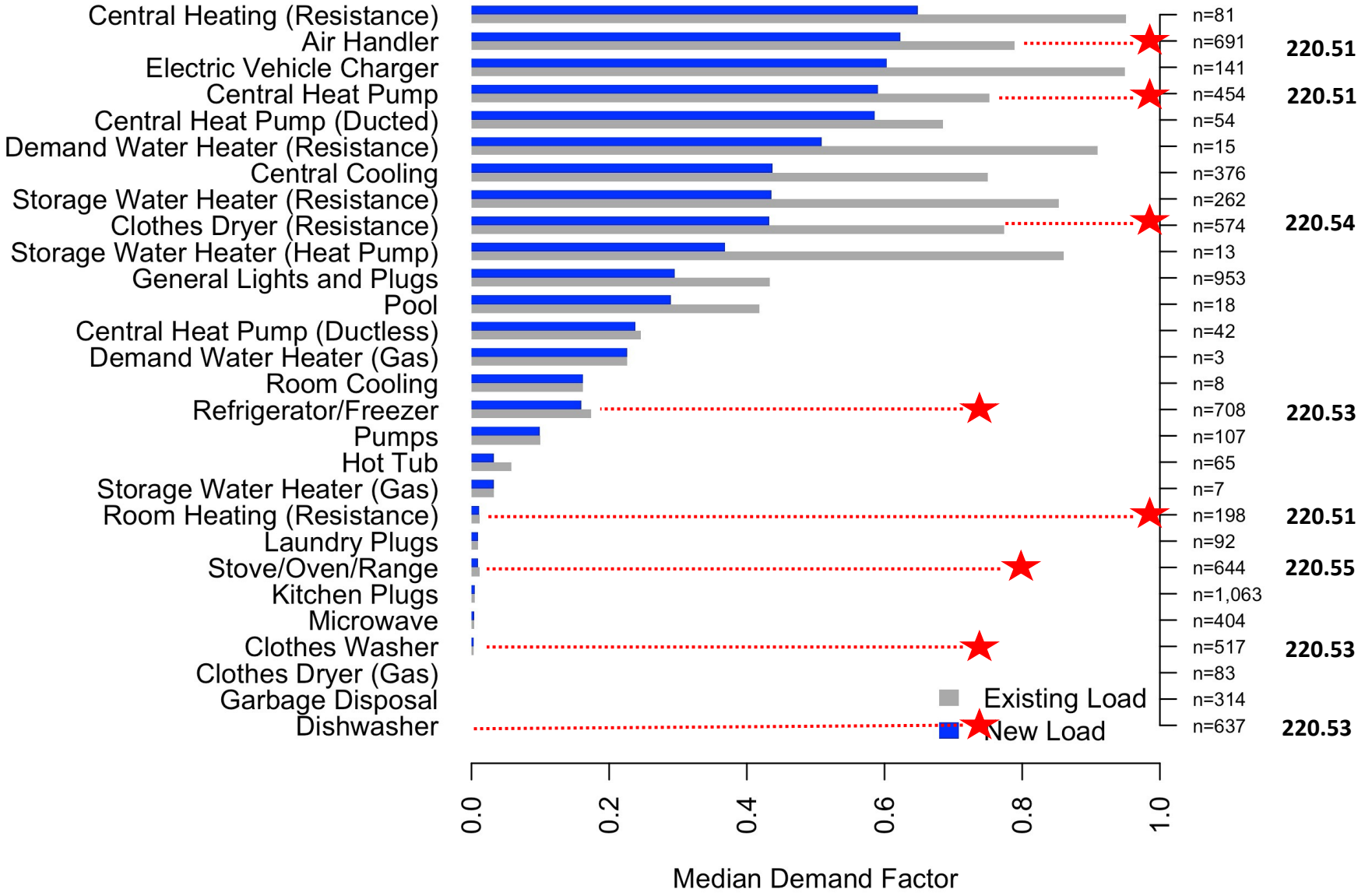
"Metered loads"

- Current language is **unclear**, leading to inconsistent use/interpretation:
  - Most details currently located in an Exception
    - Acceptable hardware for metering
    - Metering time-intervals and duration
    - Treatment of parallel power sources
  - Treatment of new loads being added

- **Propose**:
  - Eliminate reliance on the Exception
  - List acceptable metering hardware
  - 30-day minimum with requirements when <1-year
  - 15-minute metering interval with method for adjusting 60-minute data in dwellings
  - Account for loads being removed
  - Treat change in load using demand factor percentages from elsewhere in 220



Demand Factors vs. Metered Data—Section 220



Current Section 220 values

Assessment for Existing Dwelling Revisions

- For each branch circuit in the dataset, we tested it as a retrofit using the proposed 220.83 and 220.87 calculations treating new loads at 50%.
  - Compared - Dwelling load calculation vs. Metered dwelling demand

- For ~99% of branch circuits, the calculated load > the metered maximum demand of the dwelling.
  - The 1% are **NOT** the same as an overload

- Also re-worked current Annex D dwelling load examples
  - Typical 20% reduction in service/feeder load

Thank You!

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Download these slides here!!!

There are more details in additional slides.

Appendix Slides

One Billion Machines…

- Massive electrification of US housing
- Majority existing dwellings
- ~1/3 with 100A service
- Upsizing panels and service wires is expensive and time consuming
  - >$100 billion for all 100A service panels
- Context: Flexible utility rates, PV, storage, demand response, controls.

Type	Machines (Millions)
Fossil space heating	69
Fossil water heating	63
Clothes Drying	19
Cooking	95
Vehicles	275
Breaker boxes	100
Vehicle chargers	275
Rooftop solar	55
Home battery storage	29
Total Fossil	**980**
Elect. Resist. space heating	29
Elect. Resist. water heating	54
Total Fossil + Elect. Resist.	**1,063**

Table 6: Adding up all the machines.

Source: *https://www.rewiringamerica.org/policy/one-billion-machines*

Data Source Details

Data Source	Data Type	Time Interval	# of Dwellings	States Represented
Pecan Street Dataport	End-Use Sub-Metering	15-min	776	**TX**, CA, NY, CO
NEEA End-Use Load Research	End-Use Sub-Metering	15-min	181	OR, WA, ID, MT
VEIC Cold Climate Heat Pump Program	Whole Dwelling Maximum Demand	15-min and hourly	9,065	VT
Home Energy Analytics – Home Intel	Whole Dwelling Maximum Demand	15-min and hourly	1,728	CA
NEEA Residential Building Stock Assessment	Lighting Audit Data on Installed Fixtures		2,053	OR, WA, ID, MT

Calculation of demand factors

- **Existing Loads**
  a. For each dwelling, identify dwelling maximum demand and the time period
  b. For each load, identify maximum demand (i.e., estimated nameplate)
  c. For each load, identify demand during the dwelling maximum time period
  d. Demand factor is the ratio of c / b

- **New Loads Being Added**
  a. For each dwelling, identify dwelling maximum demand and the time period
  b. For each load, identify maximum demand (i.e., estimated nameplate)
  c. For each load, identify dwelling maximum demand that occurs when that load is subtracted from the dwelling demand at each time-step
  d. For each load, identify its contribution to dwelling maximum demand (a - c)
  e. Demand factor is the ratio of d / b

Methods

- Calculation of Demand Factors for each load and for whole dwellings
  - **Existing Loads**

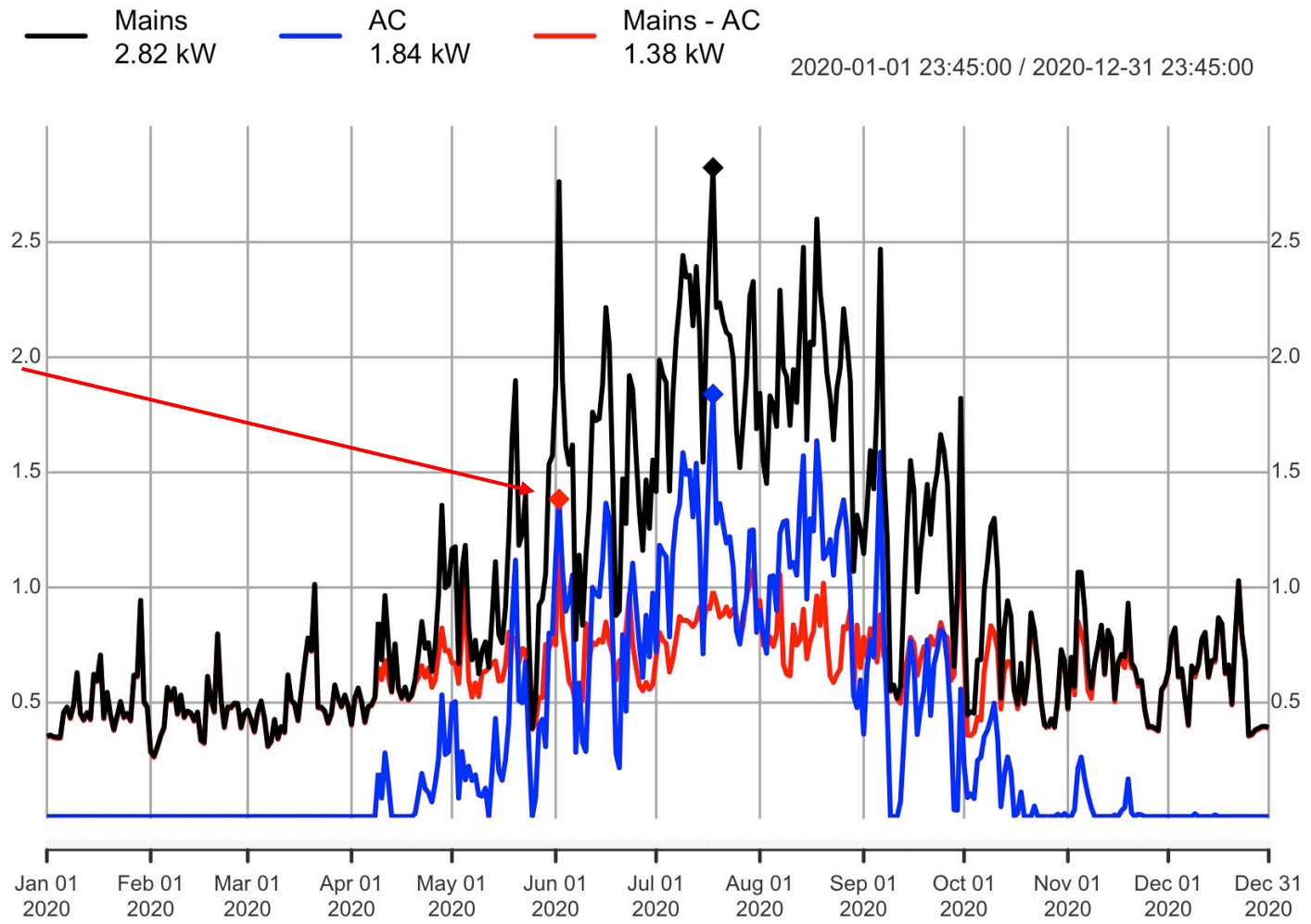
$$Demand\ Factor = \frac{EquipmentDemandDuringDwellingMaximum_{kW}}{EquipmentObservedMaximum_{kW}}$$

  - **New Loads Being Added**

$$Demand\ Factor = \frac{\left(DwellingMaximum_{withLoad,kW} - DwellingMaximum_{\text{withoutLoad},kW}\right)}{EquipmentObservedMaximum_{kW}}$$

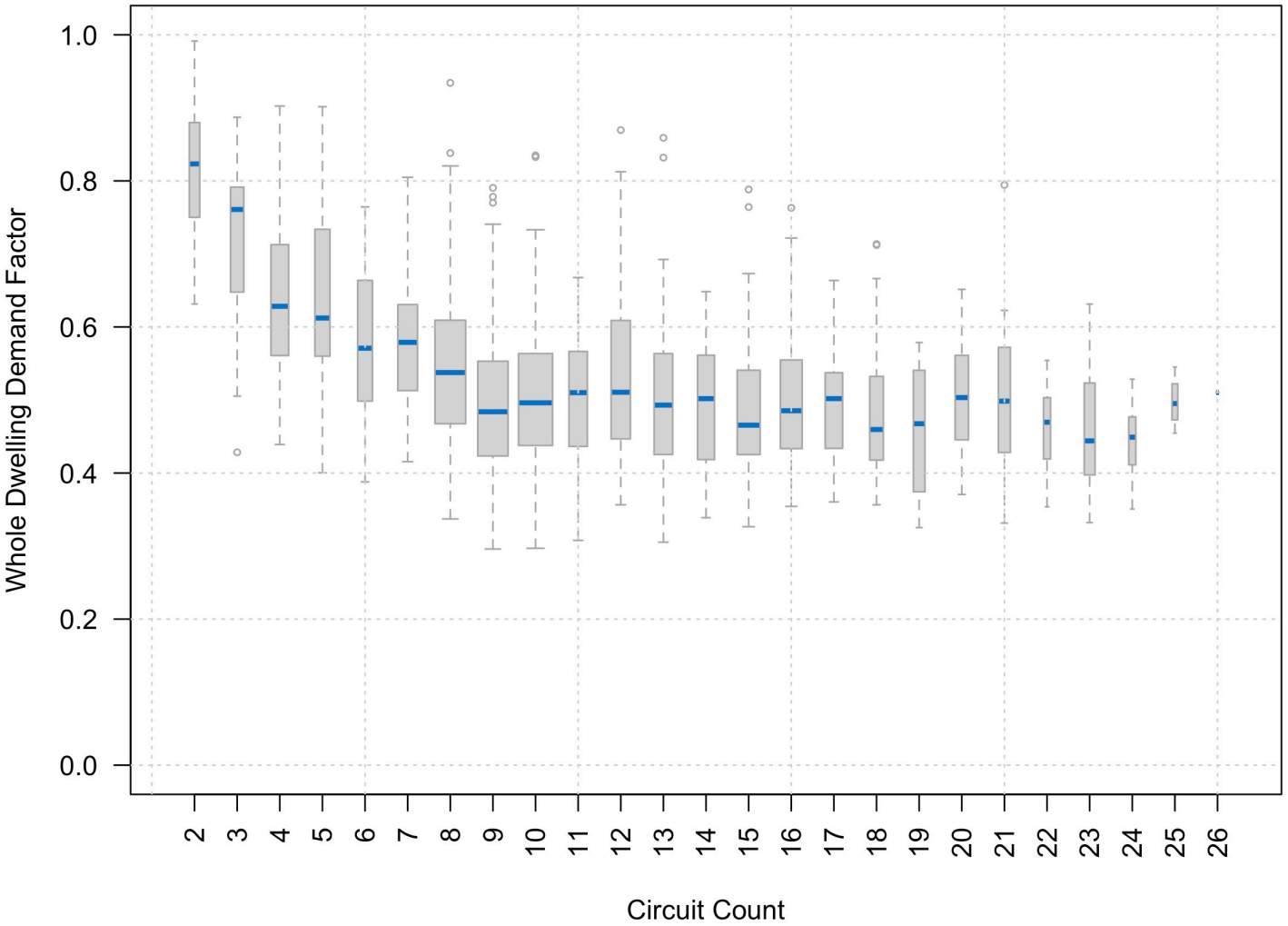
Calculating Demand Factors for Existing and New Loads Being Added

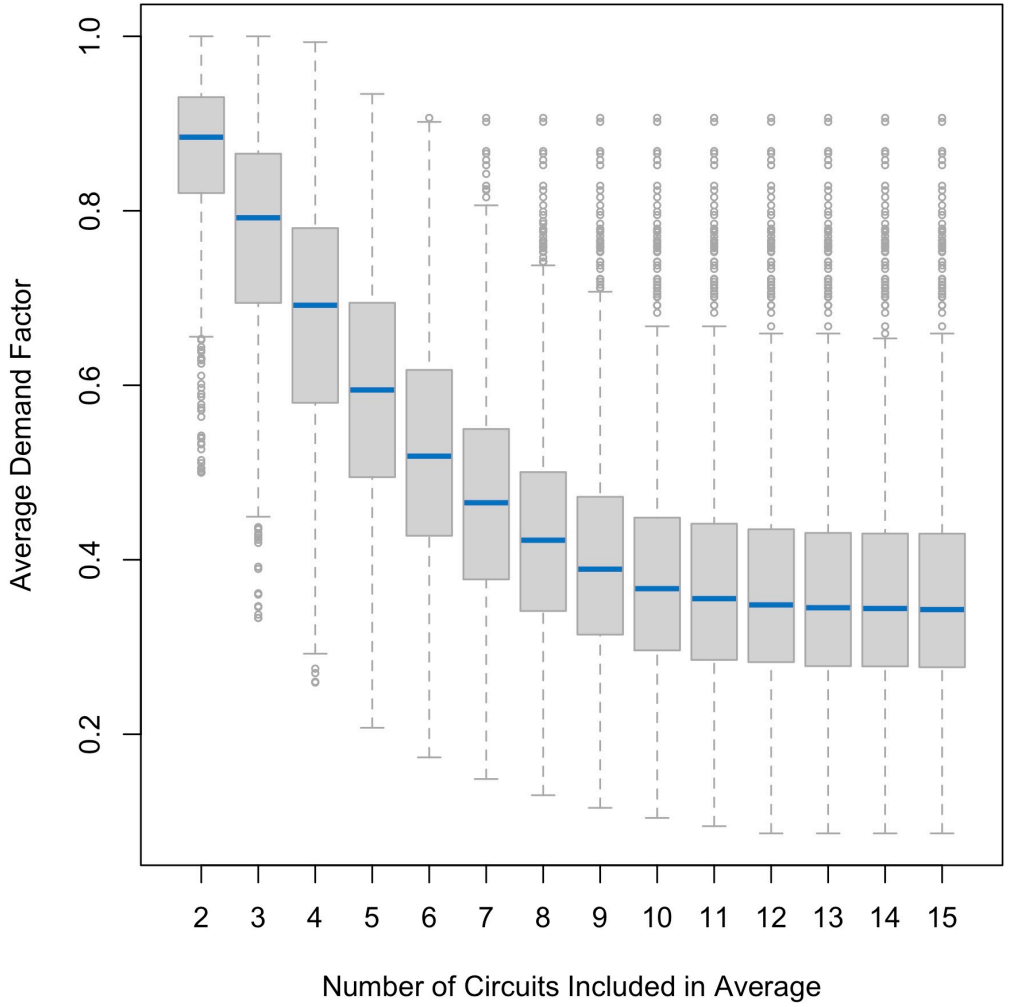
Dwelling peak that would have occurred without the AC installed ("pre-retrofit")



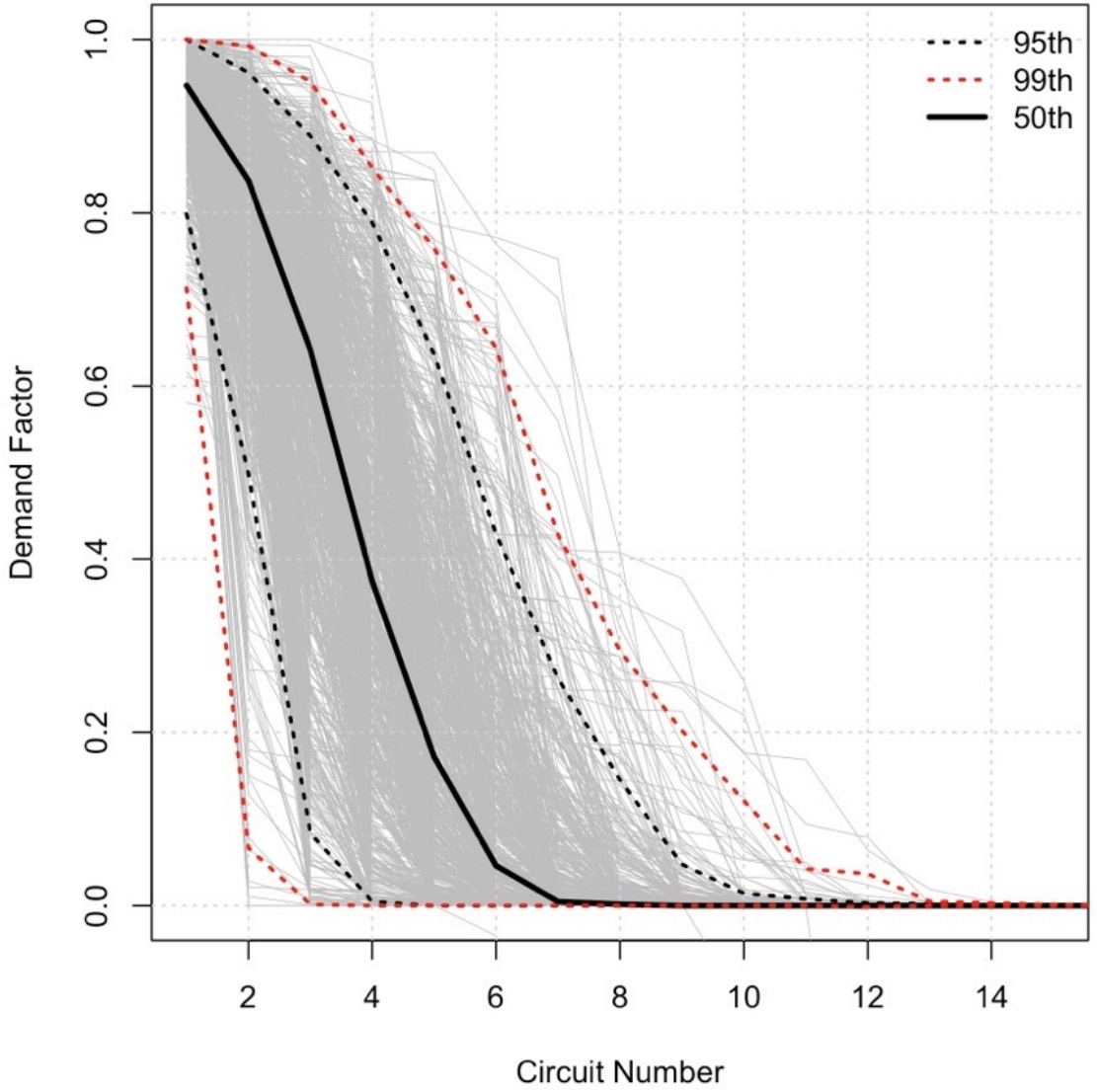
- Mains Peak
  - 2020-07-18 23:45
  - 2.82 kW
- AC max and peak
  - 2020-07-18 23:45
  - 1.84 kW
- Mains – AC peak
  - 2020-06-02 23:45
  - 1.38 kW
- AC Contribution to Peak
  - 2.82 – 1.38 = 1.44 kW
- Demand Factors
  - Existing Load: 1.84 / 1.84 = 100%
  - New Load: 1.44 / 1.84 = 78%

Load diversity is high in existing dwellings and increases with more connected loads

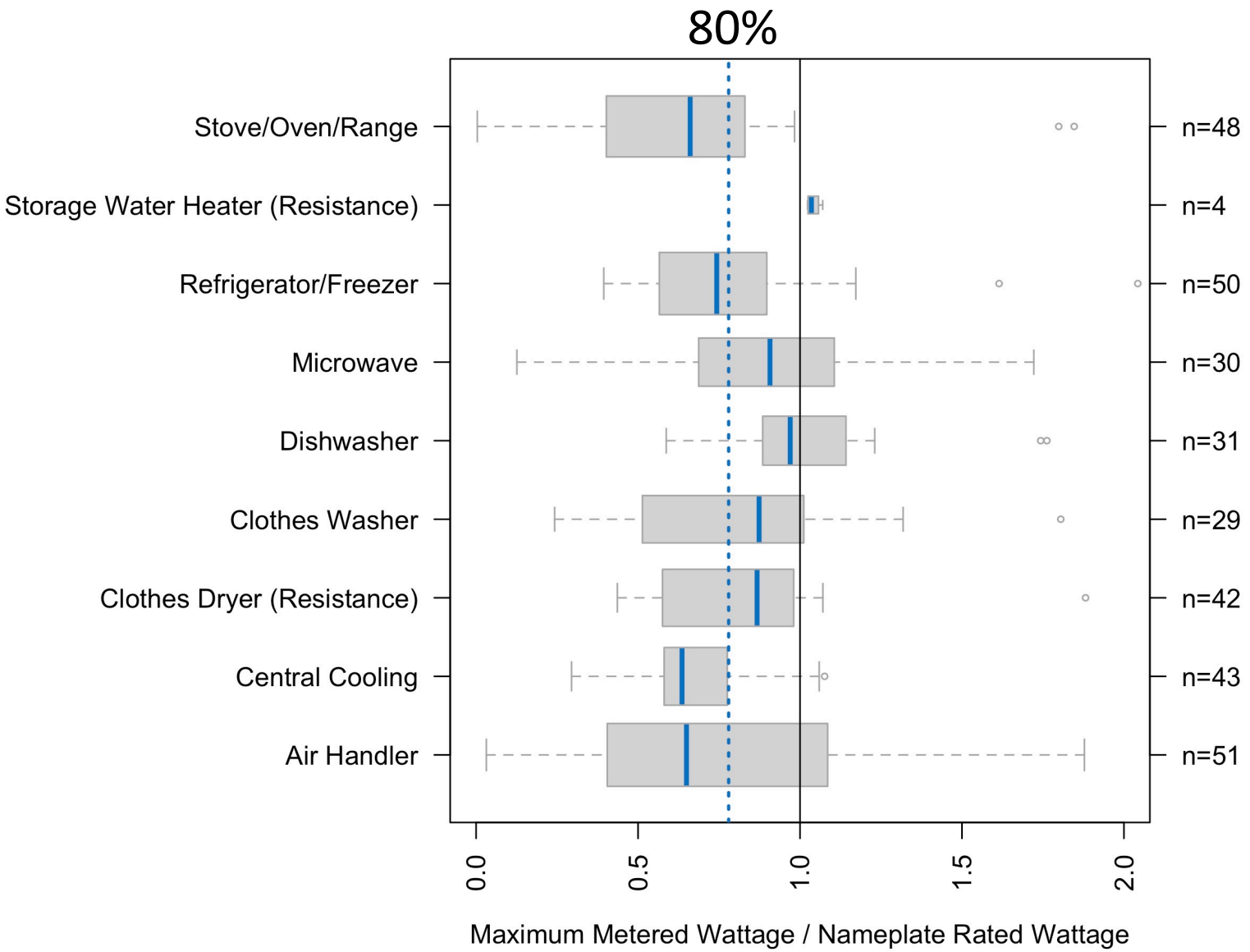




Never are more than four loads at or near 100% during dwelling maximum



Maximum Demand is < Nameplate Ratings



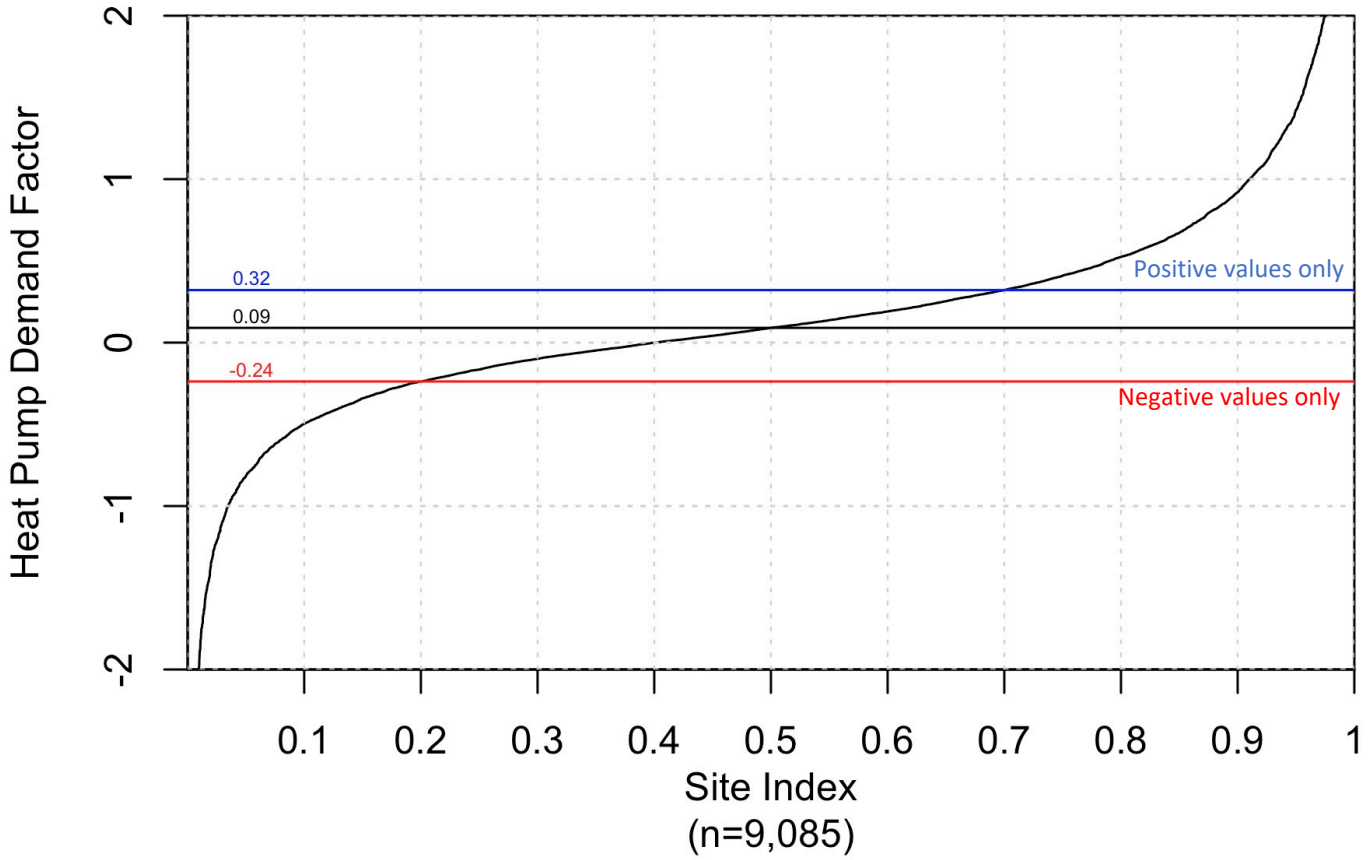
Regulation of General Service Lamps

- **10 CFR 430.32(dd)** (link). “Beginning July 25, 2022 the sale of any general service lamp that does not meet a minimum efficacy standard of 45 lumens per watt is prohibited.” [went into force in July 2023]

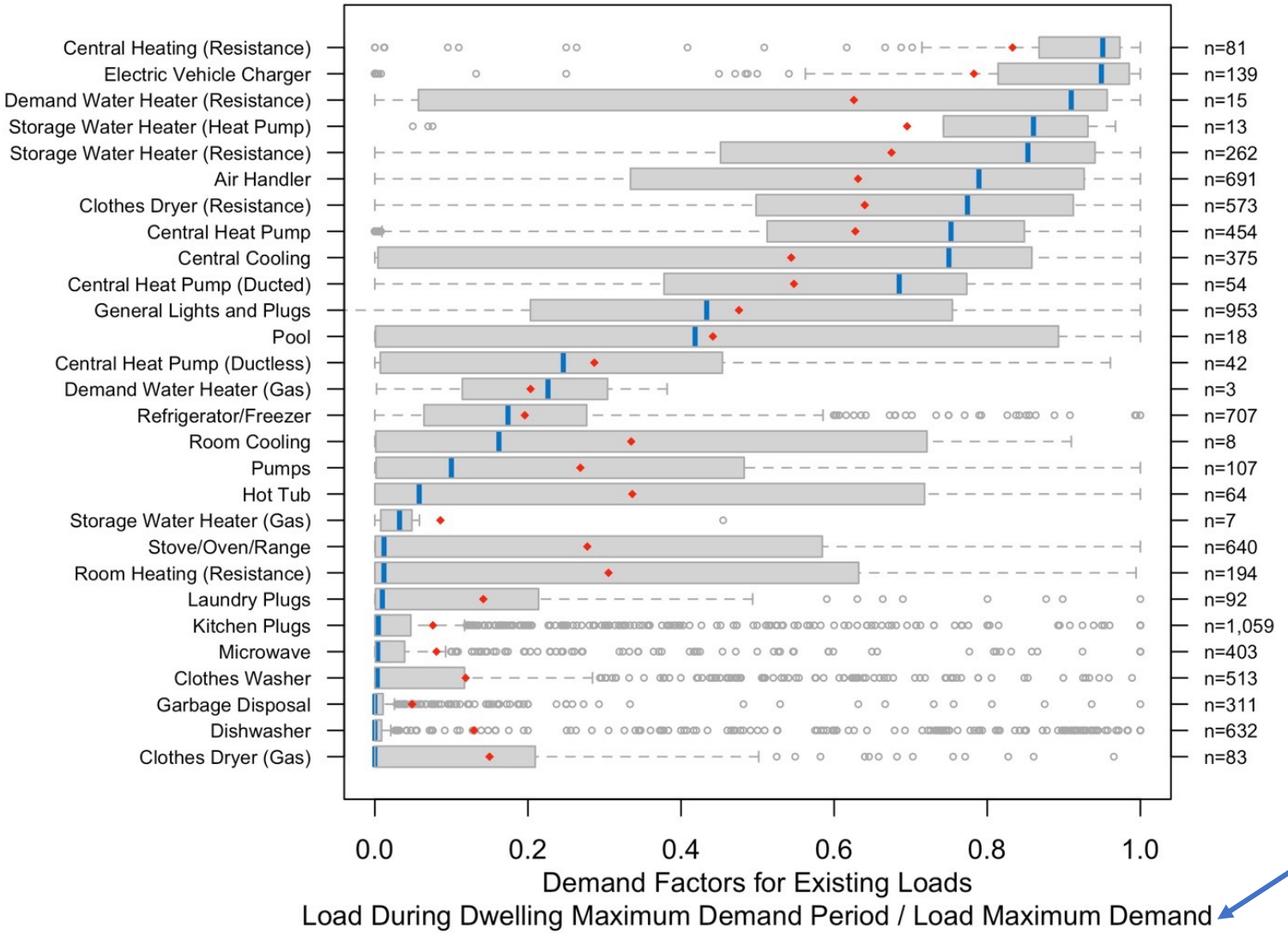
- **Definition:** *"General Service Lamps (GSLs) include general service incandescent lamps (GSILs), compact fluorescent lamps (CFLs), general service light-emitting diode (LED) lamps, organic light-emitting diode (OLED) lamps, and any other lamps that are used to satisfy lighting applications traditionally served by GSILs. GSLs are used in general lighting applications and account for the majority of installed lighting in the residential sector."*

HVAC Heat Pumps Do Not Add at 100%

- 9,085 cold climate heat pumps were installed in existing VT homes
  - Median 3.6 kW rated power
  - Median 0.4 kW increase in dwelling demand
- Very low demand factors (9%)
- Roughly ½ decreased maximum demand post-install

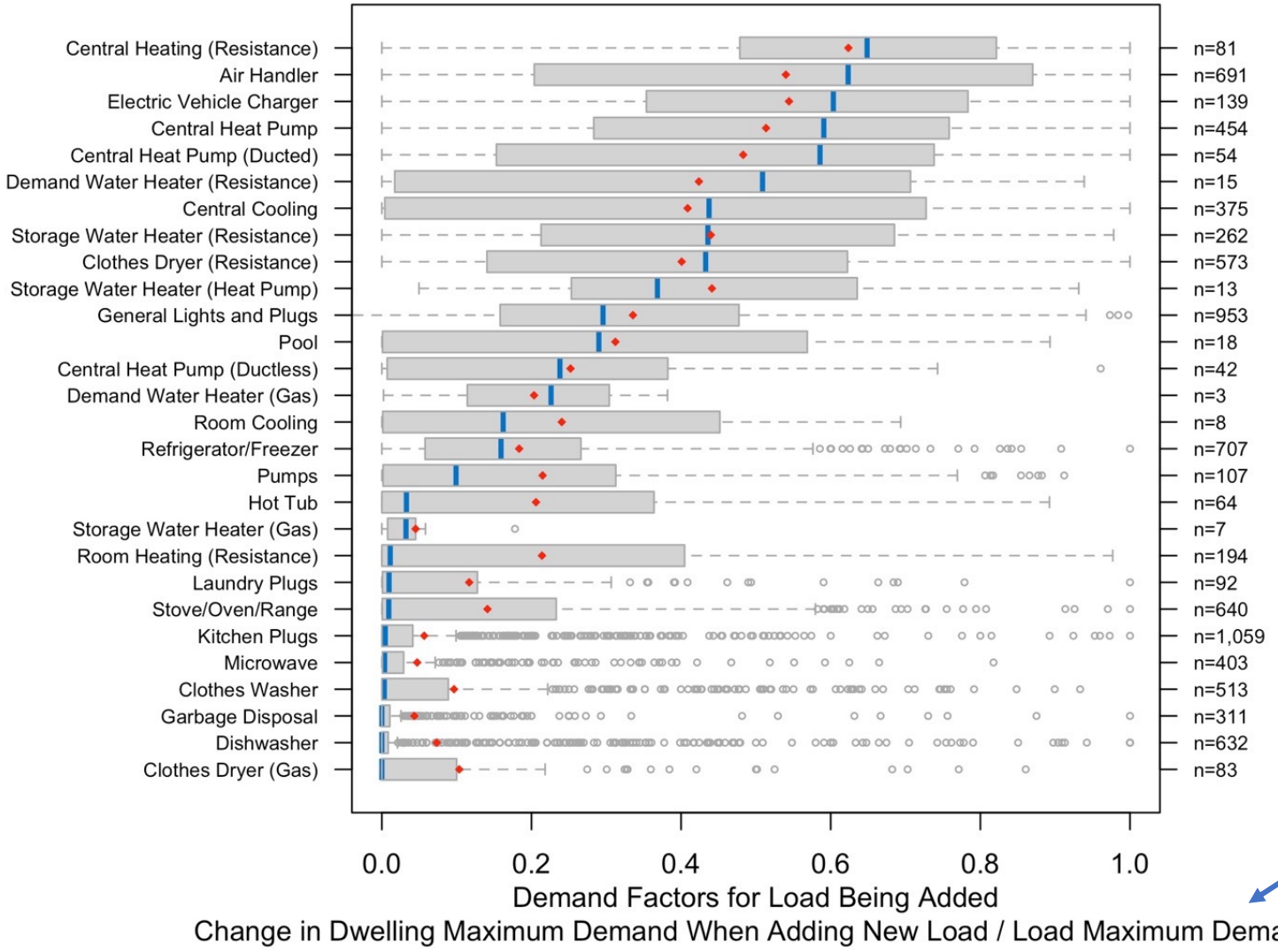


Demand Factors for Existing Loads



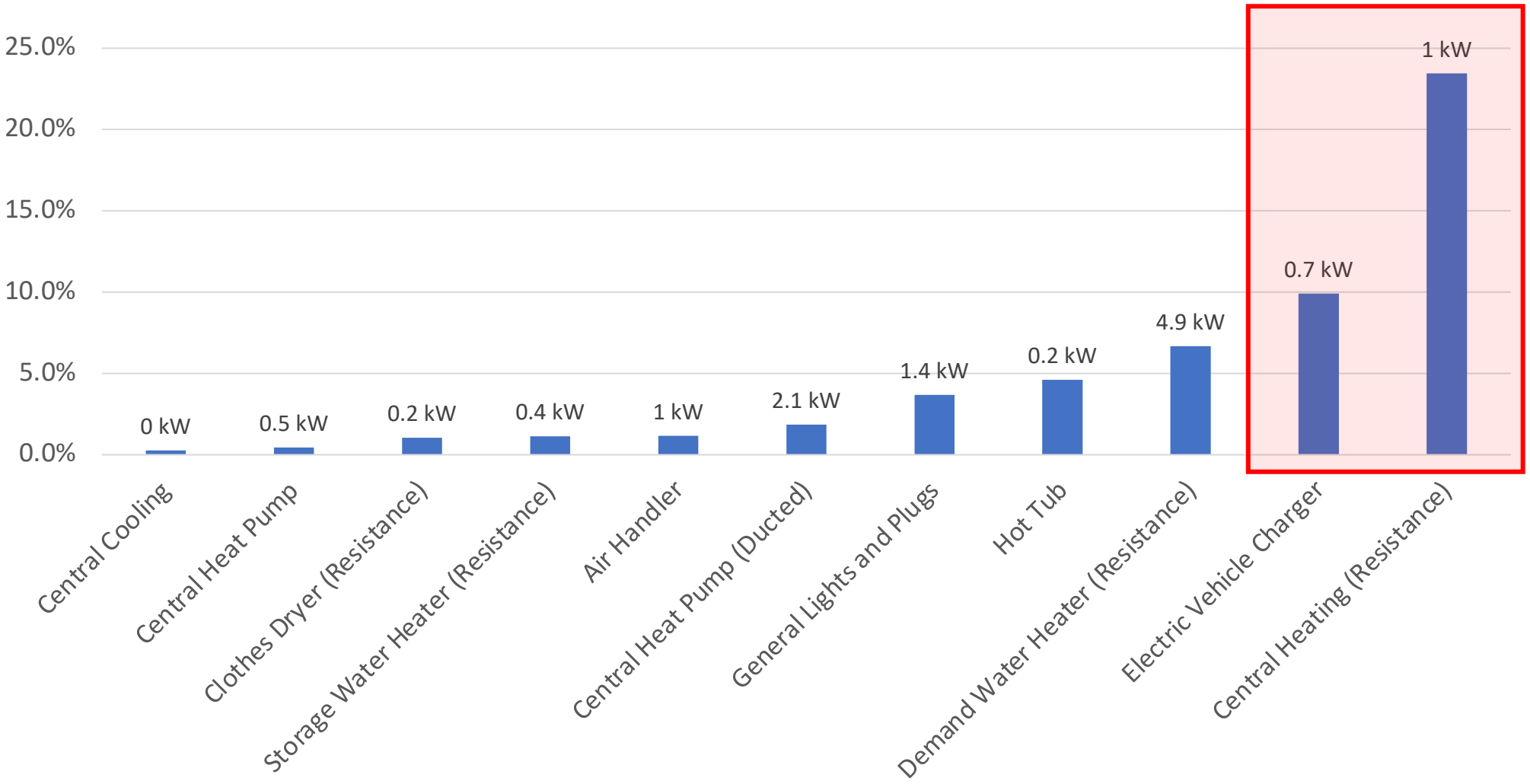
NOT adjusted as noted for light/plugs, kitchen/laundry circuits or div by 80%

Demand Factors for New Loads Being Added



NOT adjusted as noted for light/plugs, kitchen/laundry circuits or div by 80%

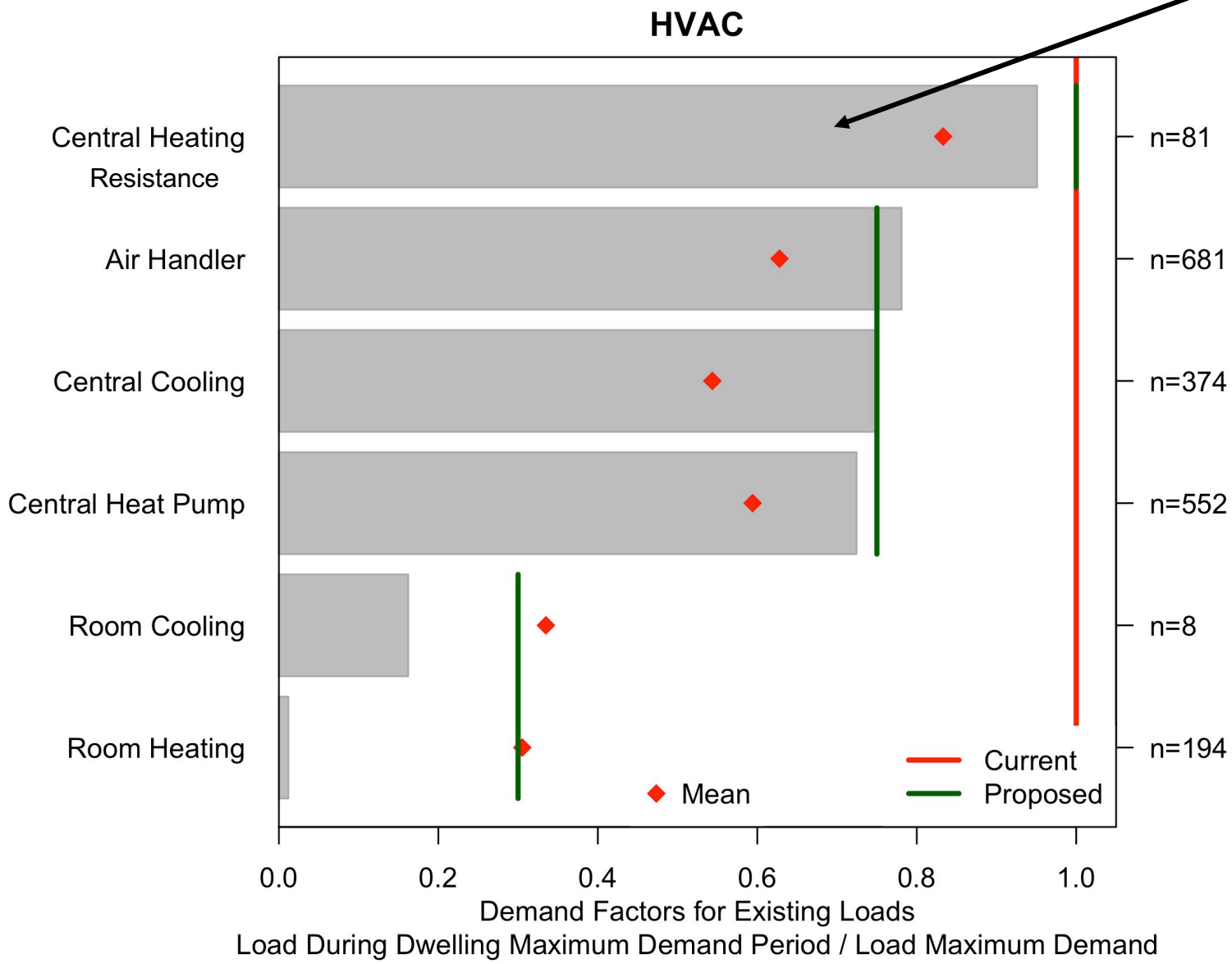
The 1% That Missed…



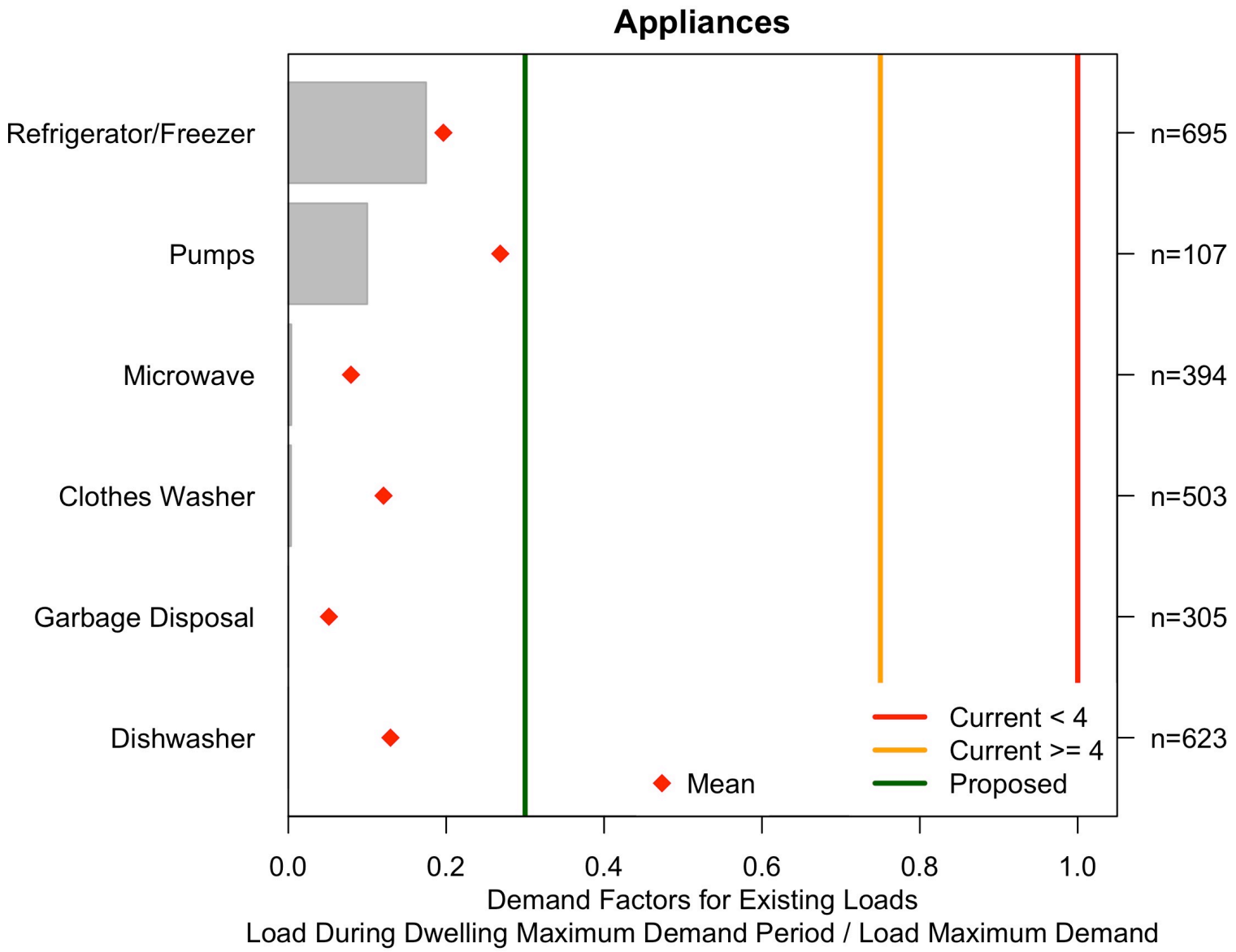
Special treatment in 220.83

HVAC Loads –220.51, 220.82

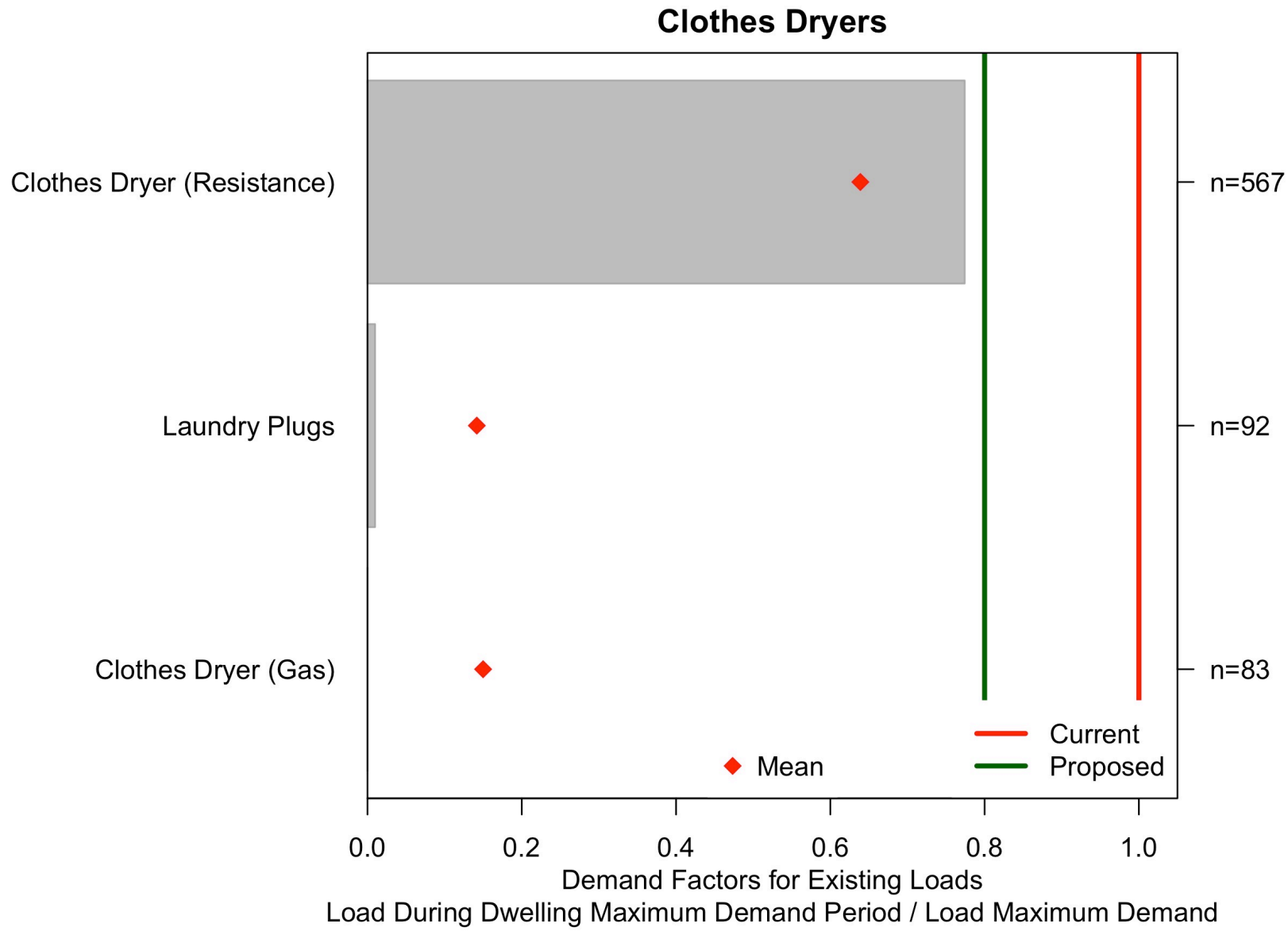
Grey bars = median



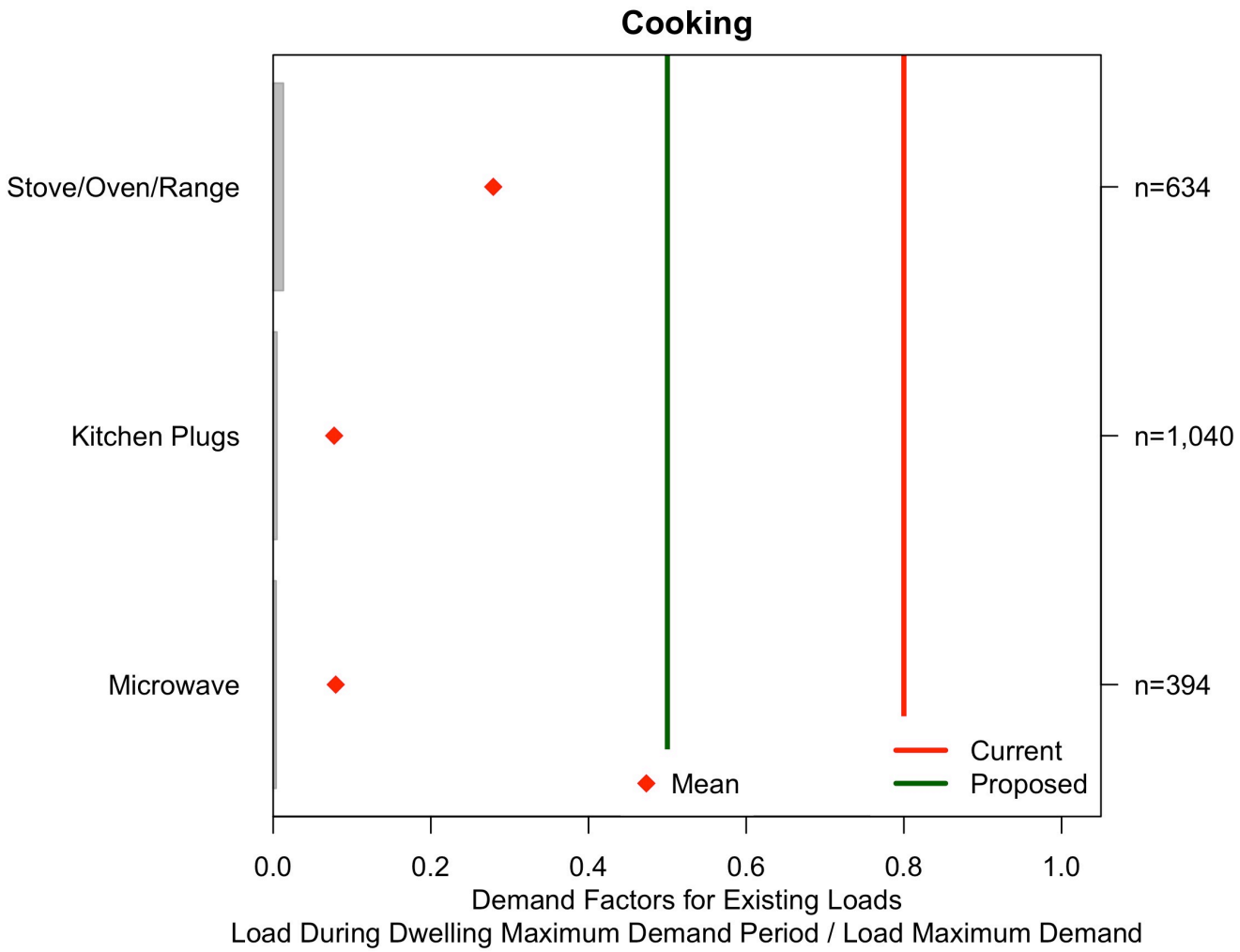
Appliance Loads – 220.53

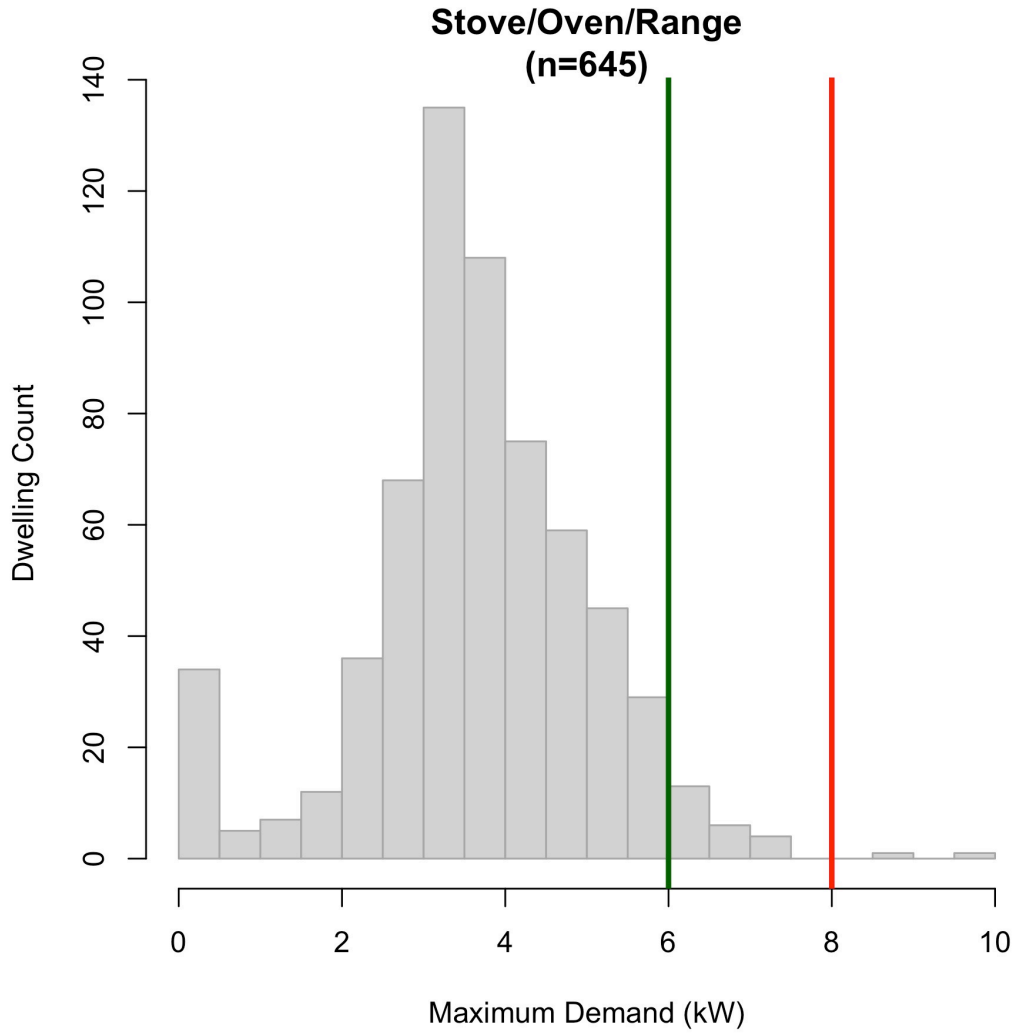


Clothes Dryer Loads – 220.54



Cooking Loads – 220.55





Should We Treat Each Load Using Worst-Case Assumptions?

- For branch circuit loads, **YES**, worst-case loading is appropriate

- For service and feeders, **NO**, using typical values works well
  - All loads are not coincident on service/feeders
  - Take advantage of load diversity (220 already does this)
  - The more loads we consider the less coincidence there is
  - Conservative assumptions throughout provide additional safety buffer
  - LBNL demand factors are biased high by ~20%, because they are based on maximum observed power, not on the larger nameplate ratings.

- We tested this for retrofits using 220.83 and 220.87 and found ~99% conservative predictions at the service level

ACBMA
American Circuit Breaker Manufacturers Association

Headquartered in Washington DC, the ACBMA is an association of American manufacturers of circuit breakers to represent and promote the mutual interests of American circuit breaker manufacturers in areas of codes and standards, applications, safety, and education. Members of the Association include:

ABB

Eaton Corporation

Siemens Industry, Inc.

Square D/Schneider Electric

Confidential Property of the ACBMA

ACBMA®
American Circuit Breaker Manufacturers Association

Comparison of Load Calculations

2023 NEC and 2026 NEC

Confidential Property of the ACBMA

ACBMA®
American Circuit Breaker Manufacturers Association

Compare…

- The current requirements of the 2023 NEC against the 2026 with the following public inputs for load calculations.
- The 2026 data is cumulative, with all of the public inputs applied

Confidential Property of the ACBMA

Public Inputs Considered

- **3236** 2 VA per square foot for lighting and general purpose receptacles
- **4361** heating: central 100%, heat pump 75%, room heating 30%
- **4144** 30% to appliances, remove the minimum number of 4
- **4151** 220.54, dryer table
- **4160** 220.55, range table

Confidential Property of the ACBMA

Single Family Loads

- 2 small appliance branch circuits
- 1 laundry circuit
- Dryer at 5000 VA
- Range Column C
- 4 appliances including water heater

- Total appliance load 7,226 VA
- Resistance heat loads 7.5 watts per square foot
- Heat Pump heat loads, 16 SEER at 1.88 watts per square foot, and fractional tonnage

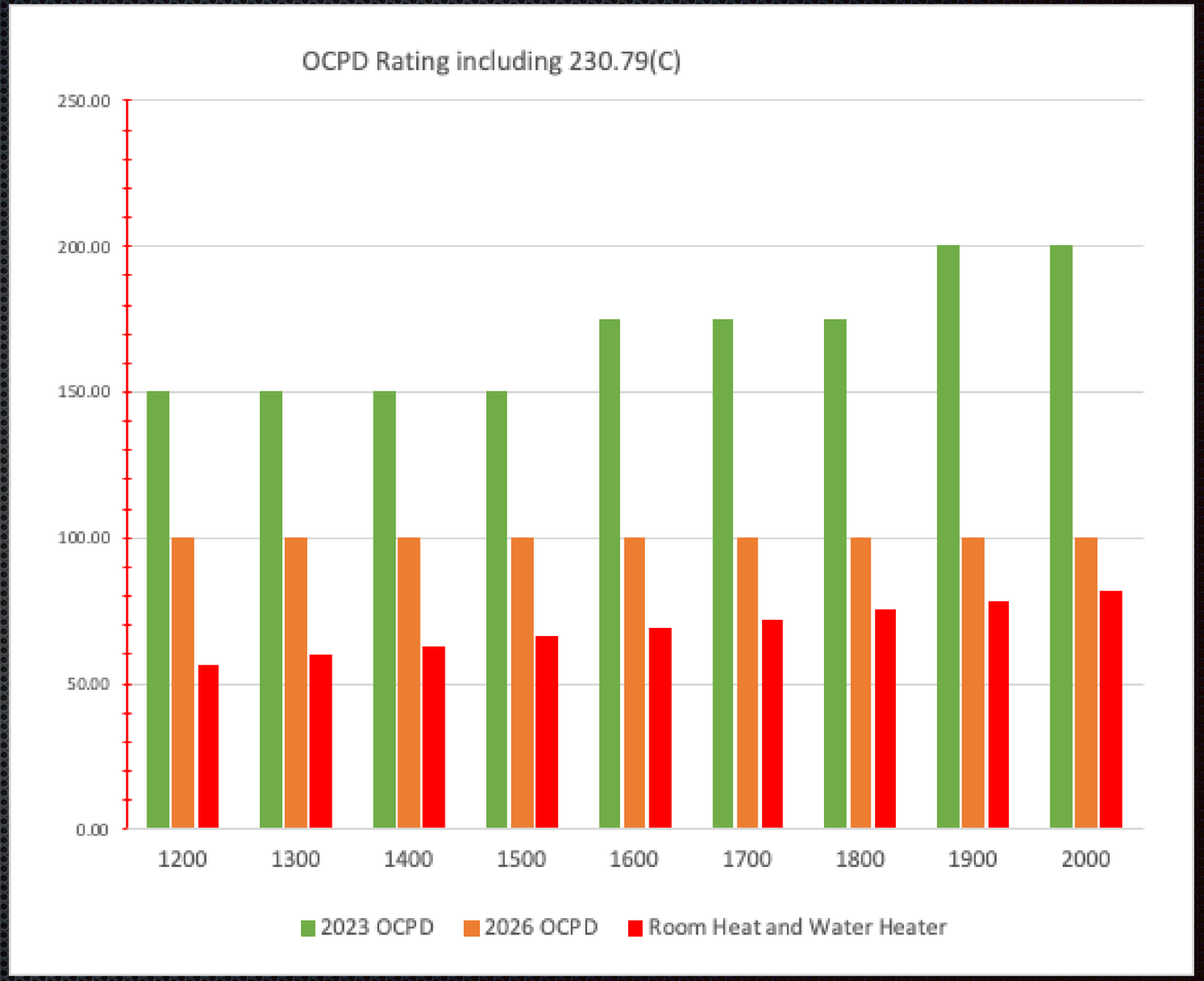
Confidential Property of the ACBMA

OCPD with Room Heat

As the square footage increases the effect is more clearly seen.

As of the 2023 NEC garages are included in square footage.

A two car garage is usually at least 400 square feet.



Confidential Property of the ACBMA

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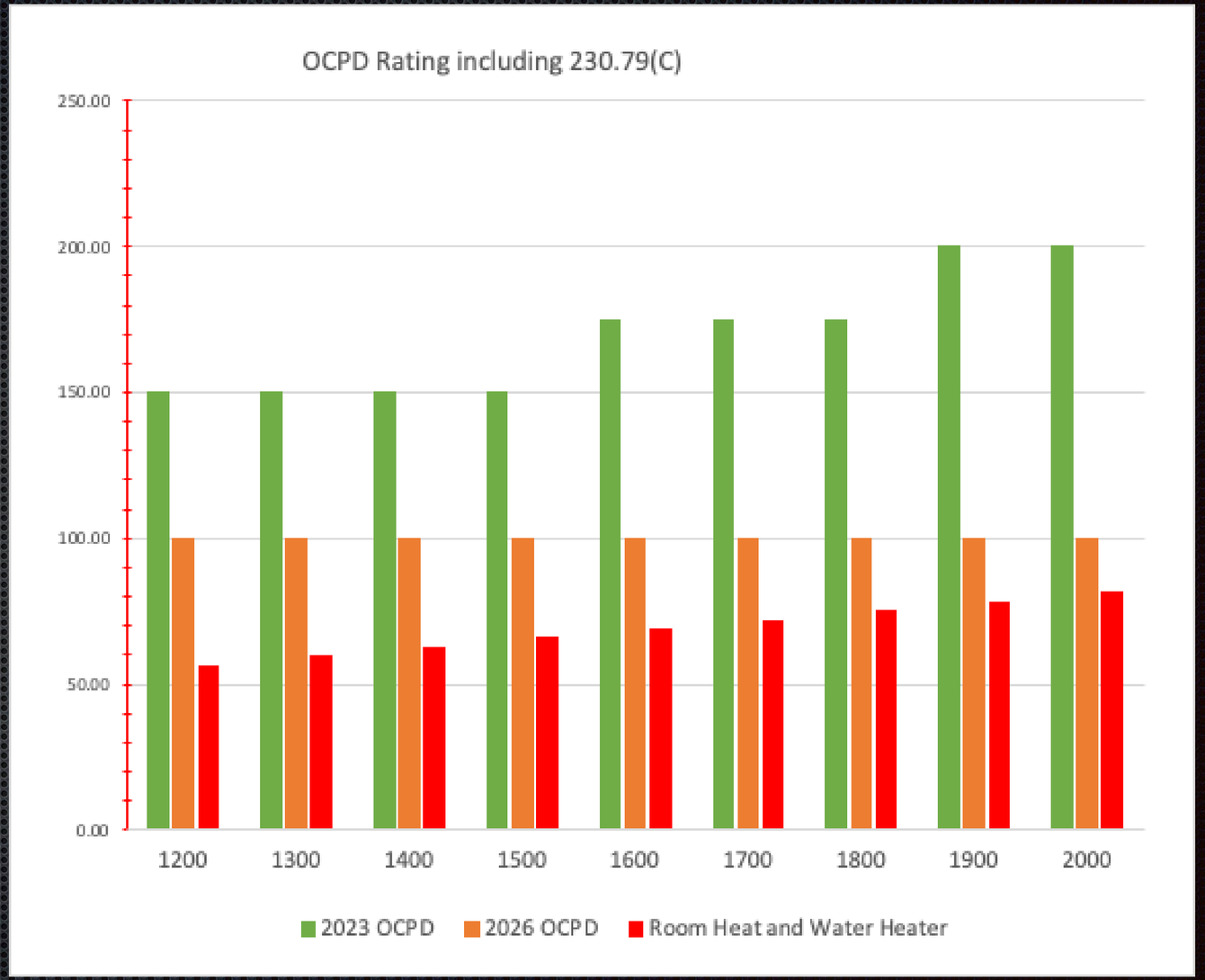
OCPD with Room Heat

A 2000 square foot home would have heat and water heat load equal to 81% of the OCPD rating.



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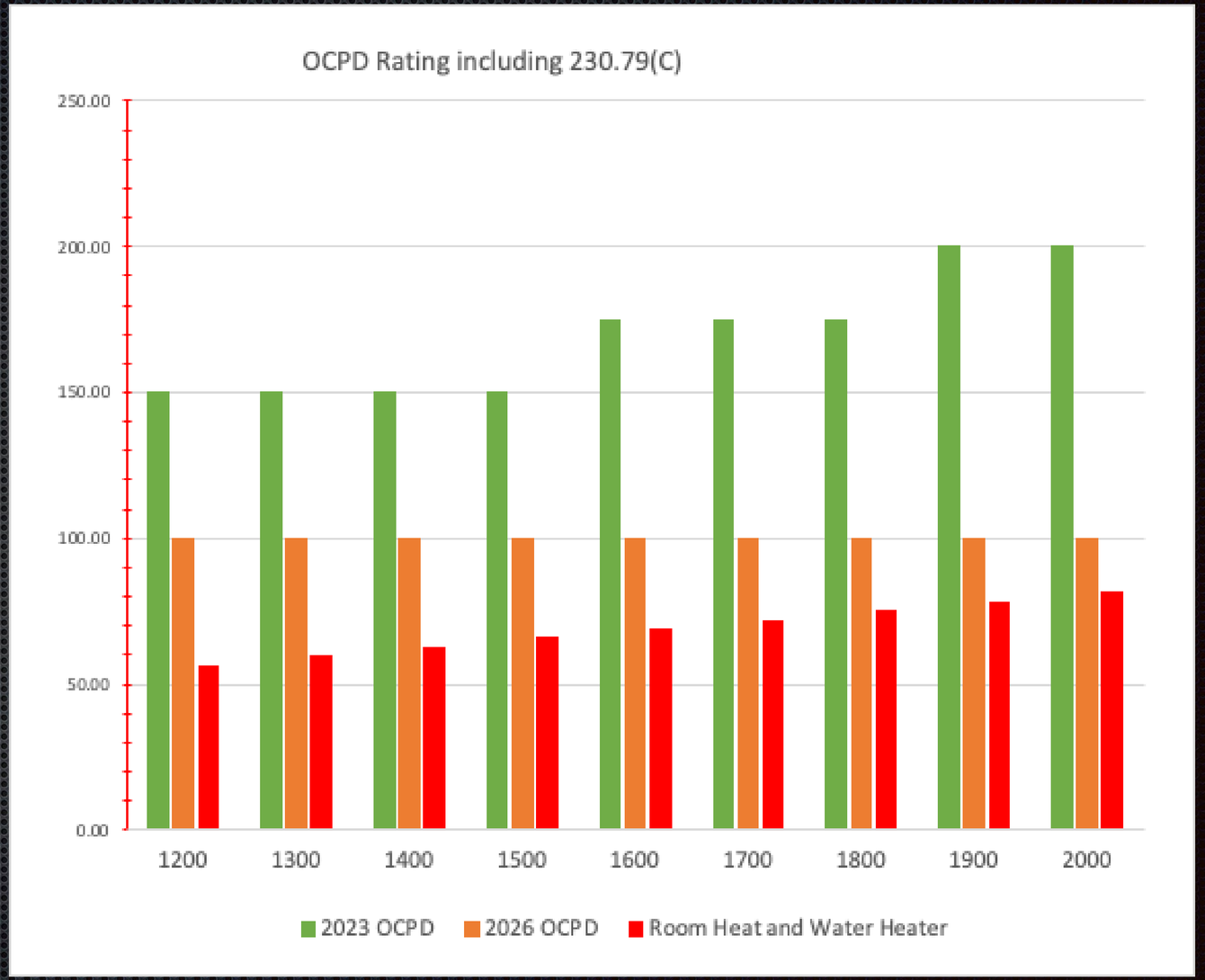
OCPD with Room Heat

Note that 310.12 would allow all of the 2026 homes to have a #4 copper as their service conductors



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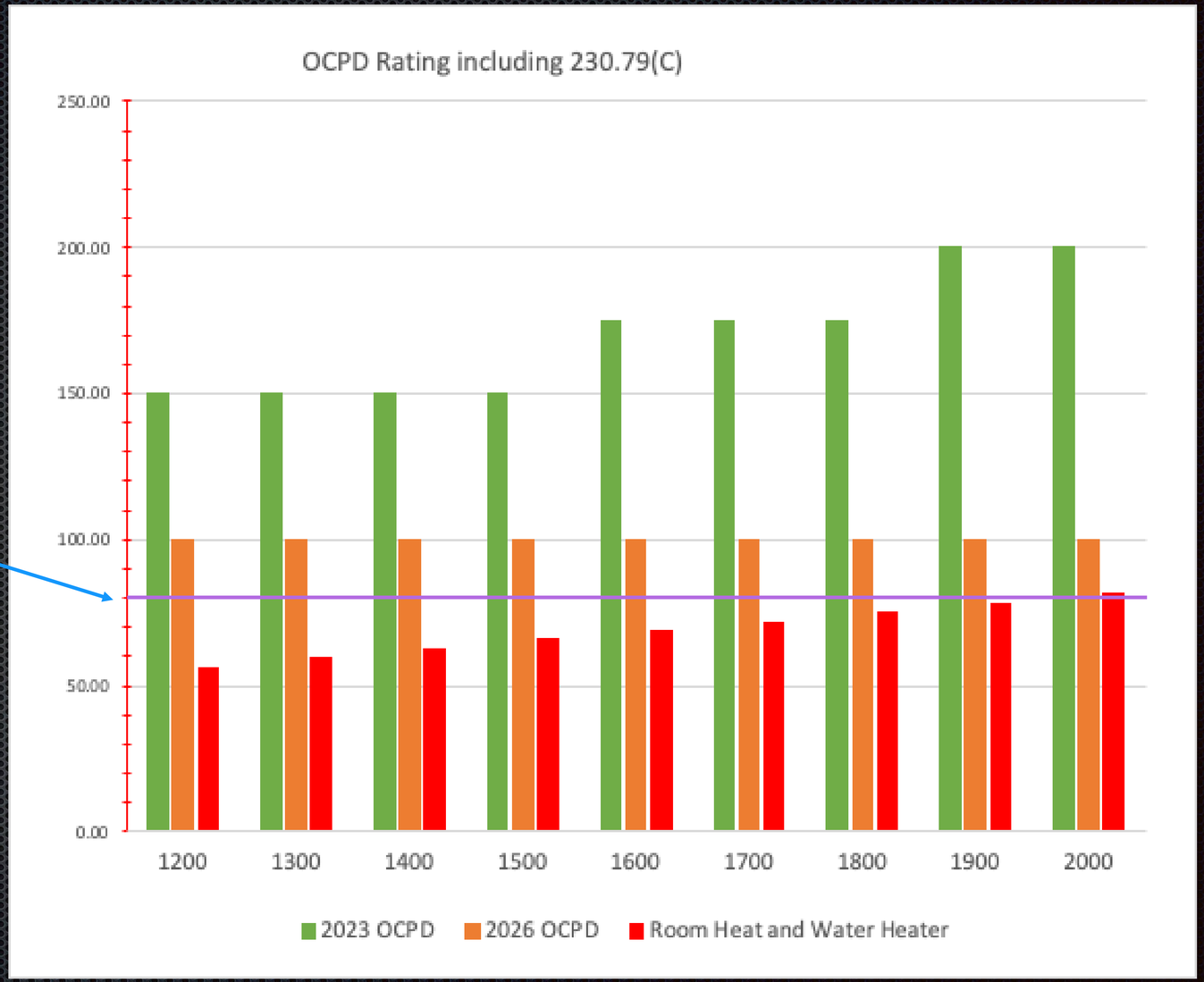
OCPD with Room Heat

The ampacity of a #4 copper is 85 amperes.



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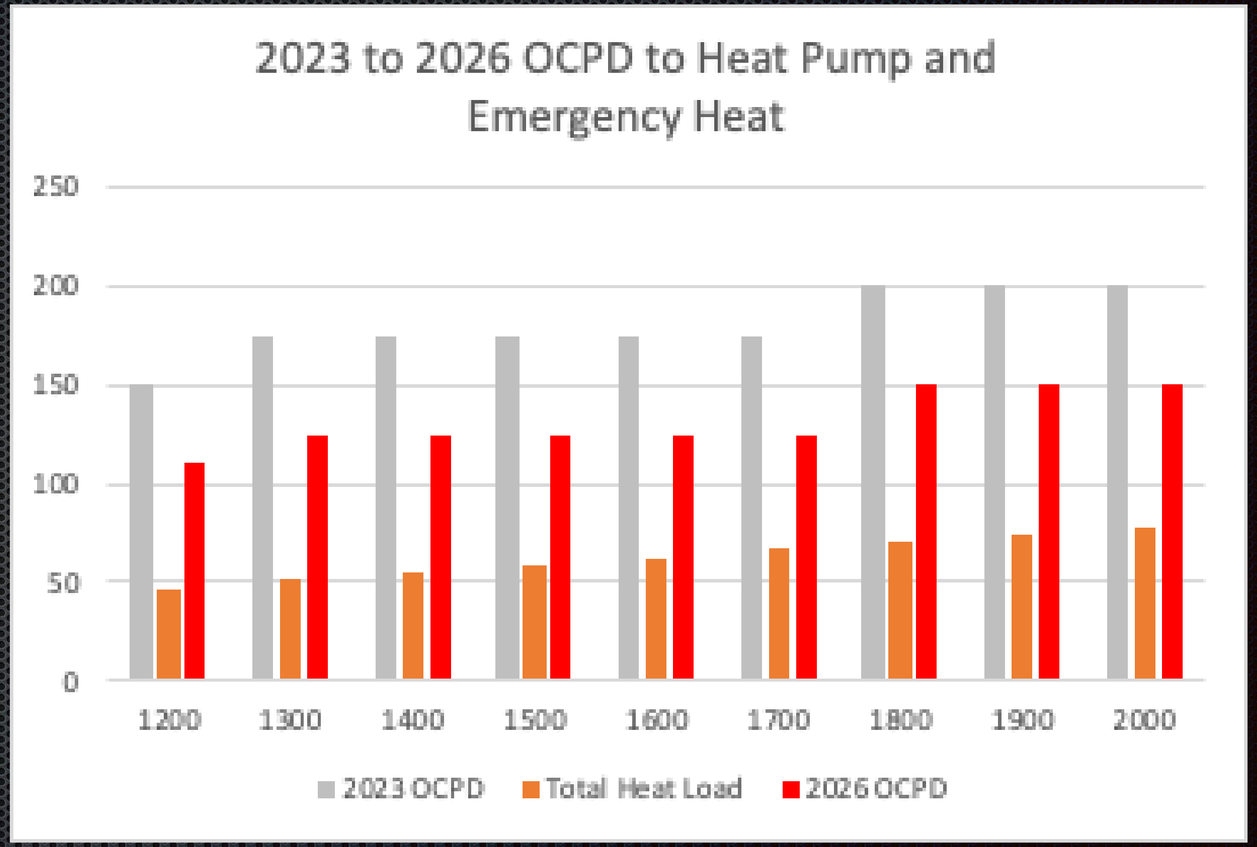
OCPD with Heat Pump

Heat pumps are extremely efficient.

Heat pumps also employ emergency heat



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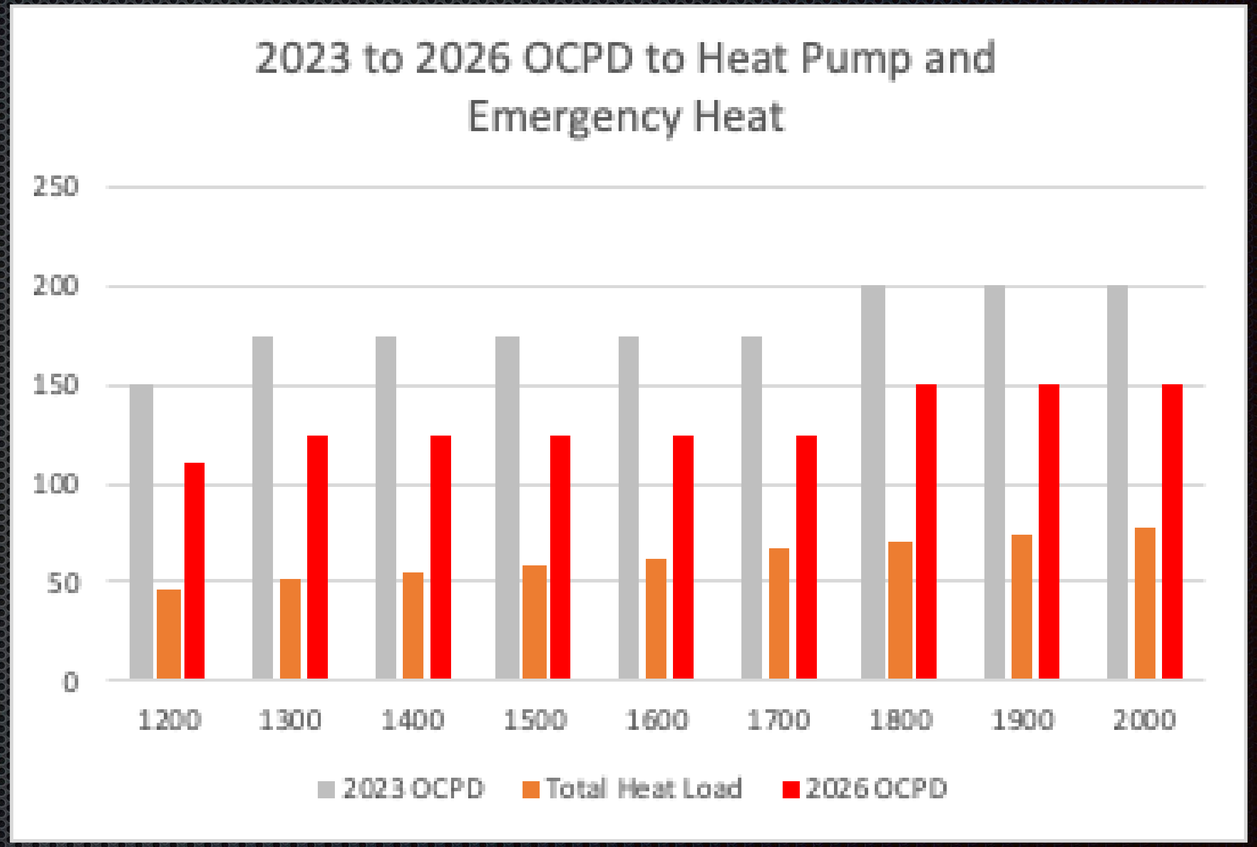
OCPD with Heat Pump

In the 2023 NEC all heat regardless of type is treated at 100%

PI 4361 calls for heat pumps to have a demand of 75%

Does this include emergency heat?



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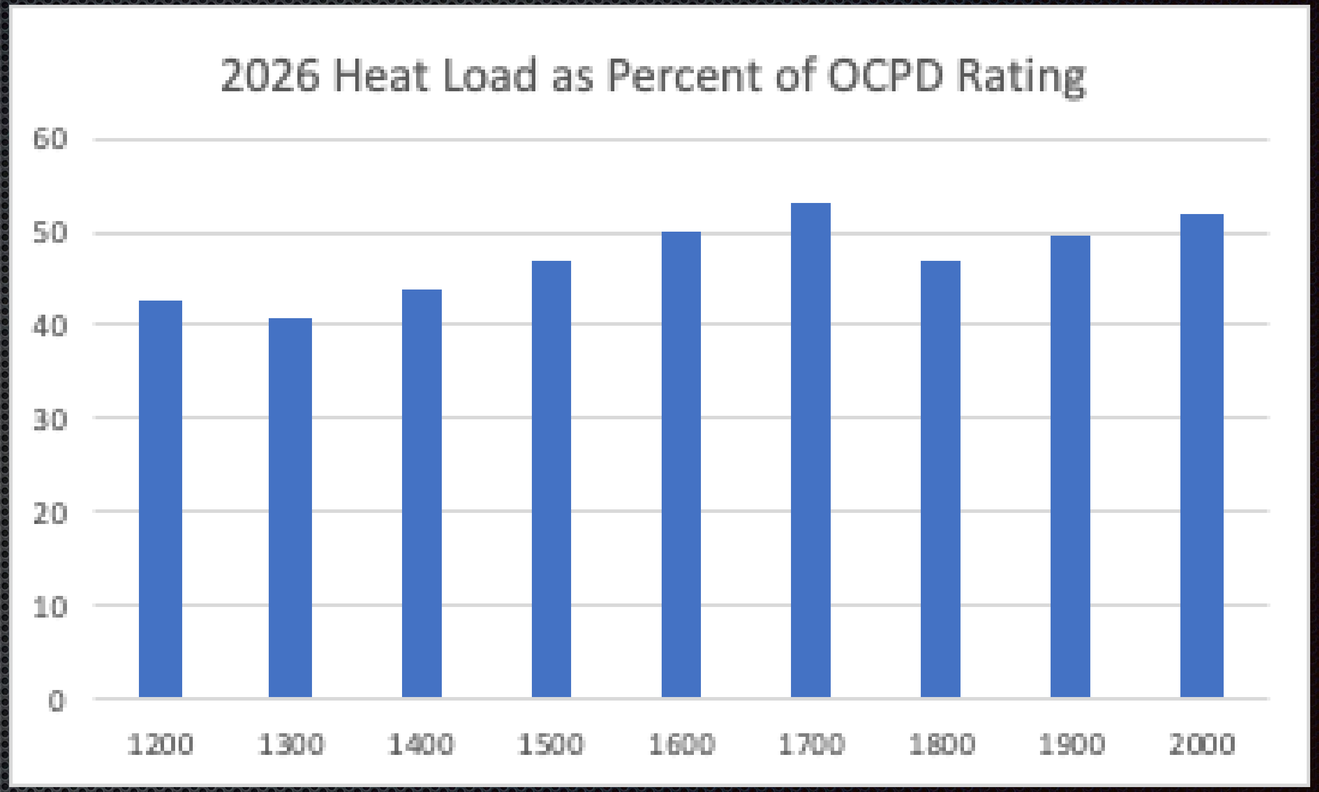
OCPD with Heat Pump

While the ratios are not as extreme, proposed language lacks clarity, where before all heating was at 100%.



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Multifamily Dwelling Unit Loads

- 2 small appliance branch circuits
- 1 laundry circuit
- Dryer at 5000 VA
- Range Column C
- 4 appliances including water heater
- 1100 square feet each
- Total appliance load 7,226 VA
- Heat 10kw (9 watts per square foot)
- Heat Pump heat loads, 16 SEER at 1.88 watts per square foot, and fractional tonnage

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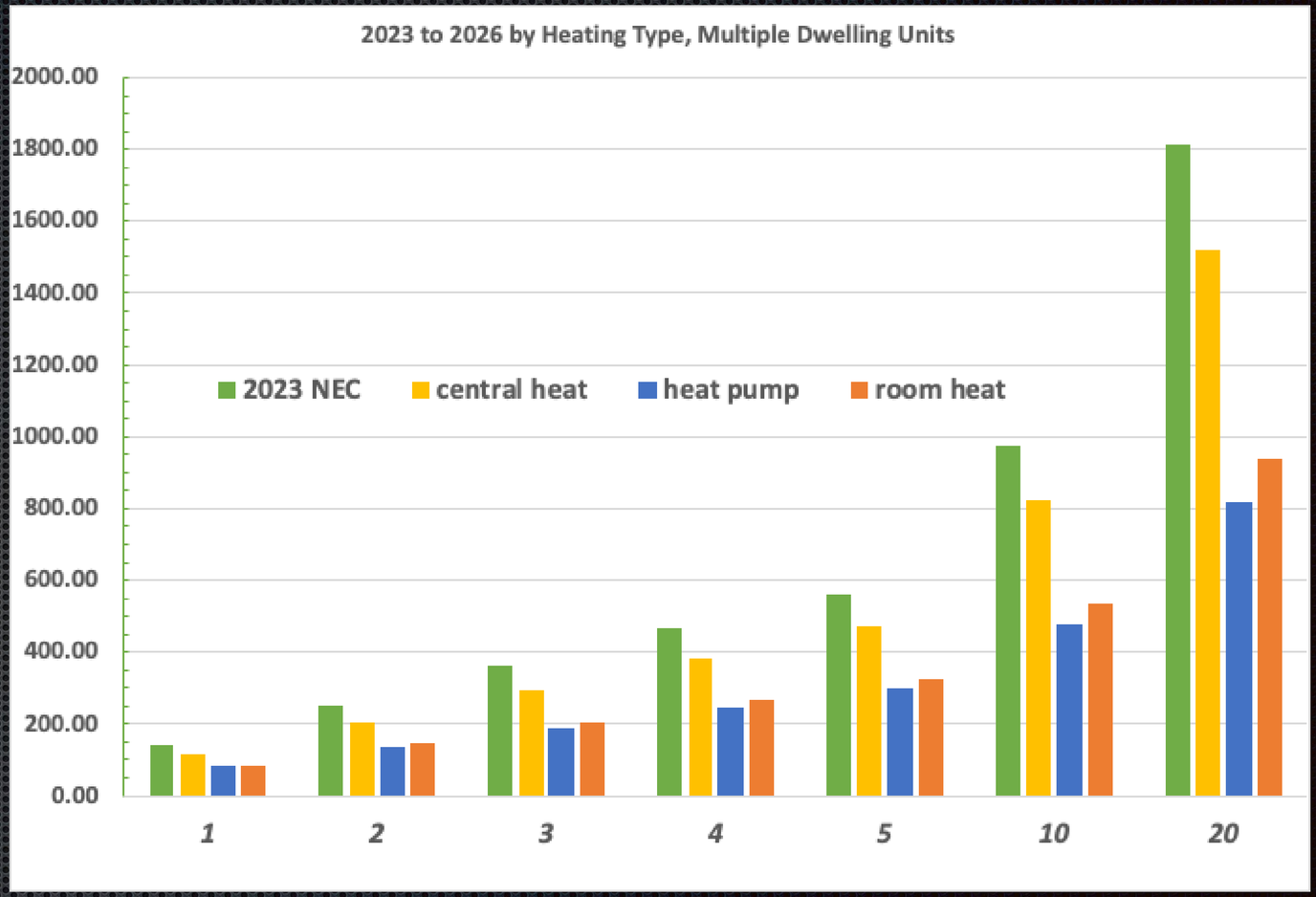
Compare by Heating Type

The demand factors for heating in Public Input 4361 result in extreme reductions of overcurrent protection.

The reduction from 2023 to 2026 central heat is due to lighting, dryer, appliance and range load reductions



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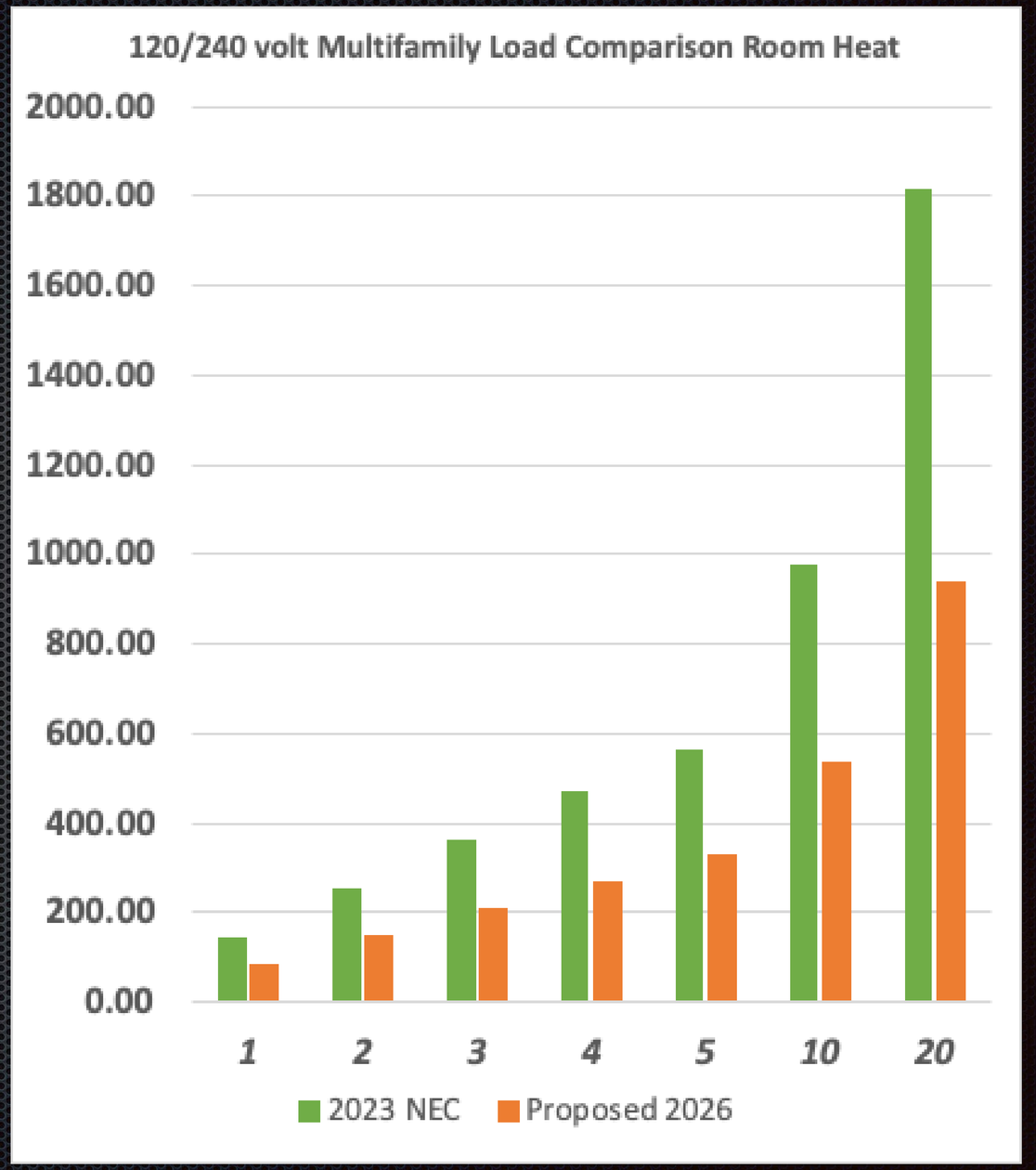
Compare by Heating Type

The demand factors for heating in Public Input 4361 result in extreme reductions of overcurrent protection.

This graph compares the 2023 to the proposed 2026 using room heating.



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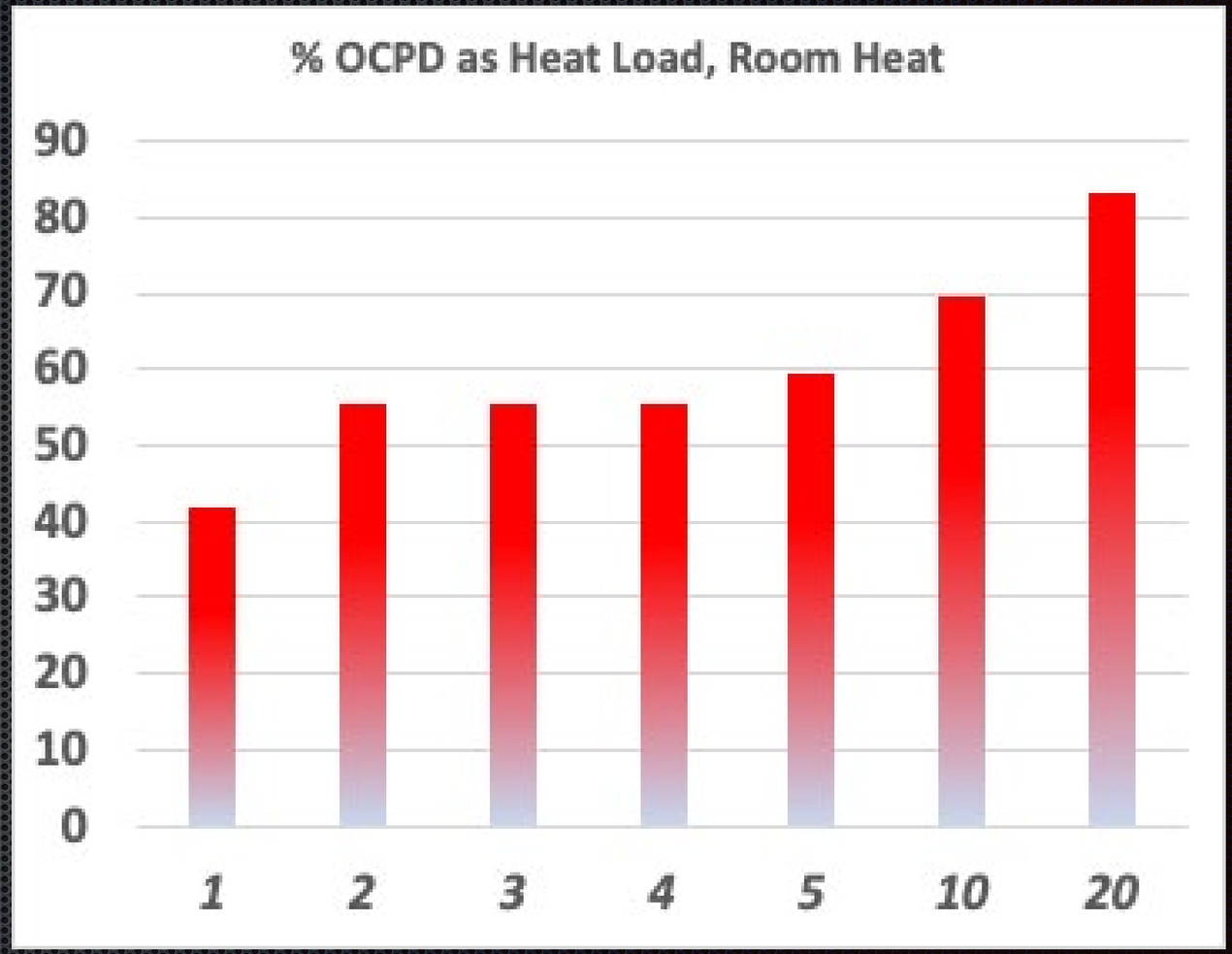
Total Load Vs OCPD Rating

This graph shows the percentage of heating load alone of the dwelling units compared to the rating of the MAIN SERVICE OCPD.

After a power failure, the 20 units will have 167 amperes to share before exceeding the rating of the main breaker.



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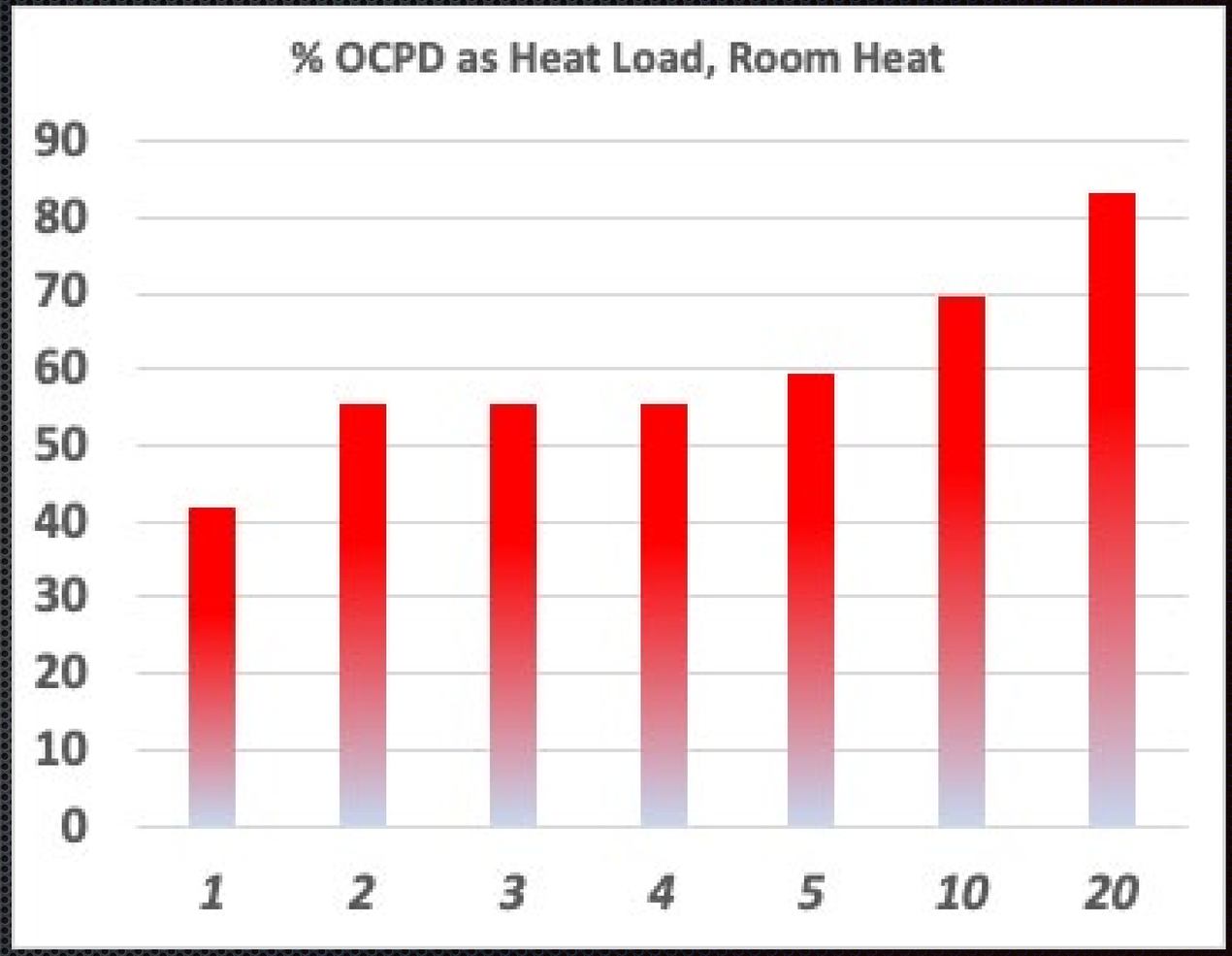
Optional is still optional

With these radical reductions in service sizes, the standard method is likely to become the method of choice and be compliant with these new requirements.



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Resolve

- **3236** 2 VA per square foot for lighting and general purpose receptacles
- **4361** heating: central 100%, heat pump 75%, room heating 30%
- **4144** 30% to appliances, remove the minimum number of 4
- **4151** 220.54, dryer table
- **4160** 220.55, range table

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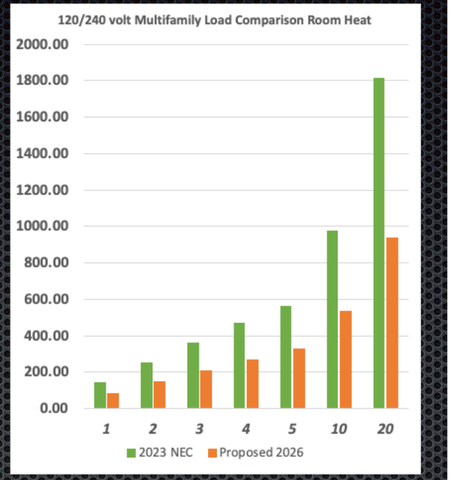
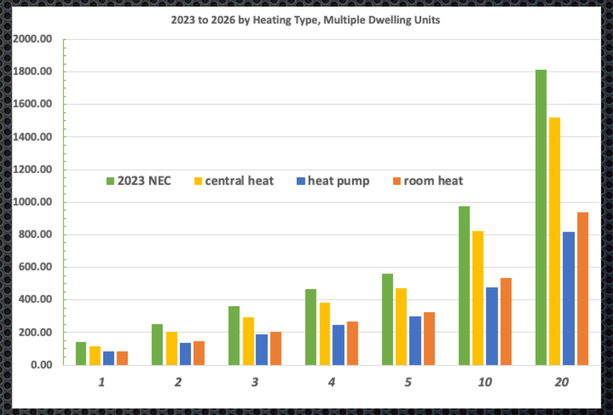
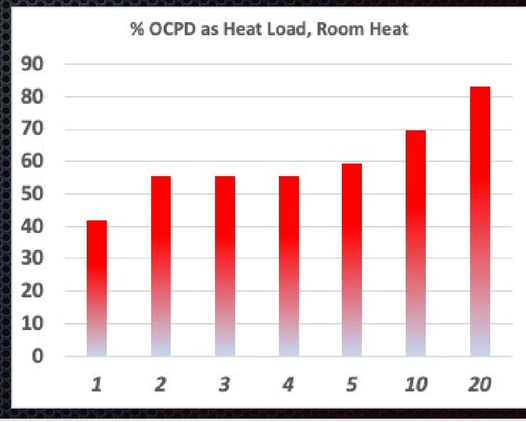
What is needed..

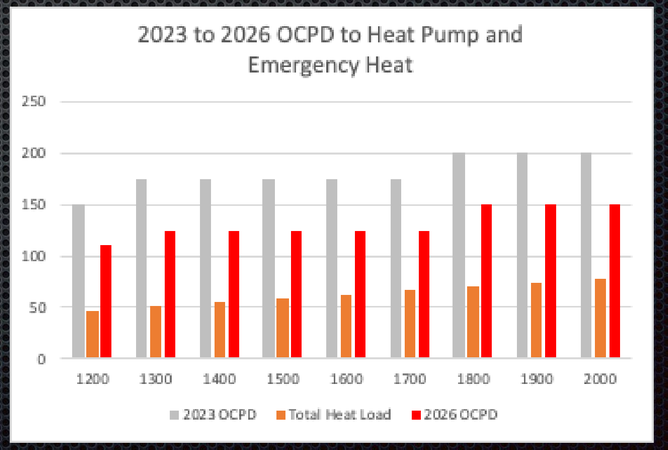
With increased electrification of dwellings, need to move forward on reliable foundations.

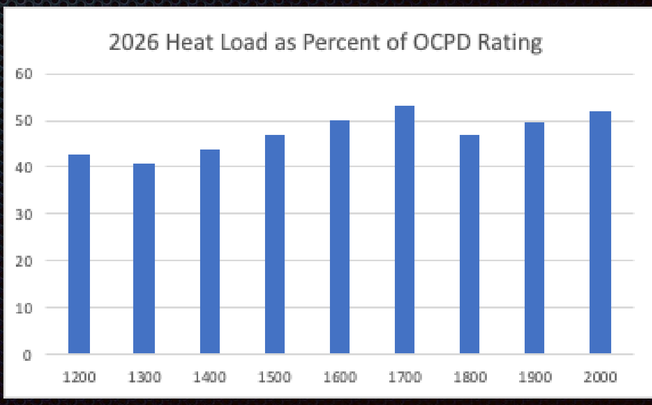
- Actual use cases for events such as power failure and restoration.











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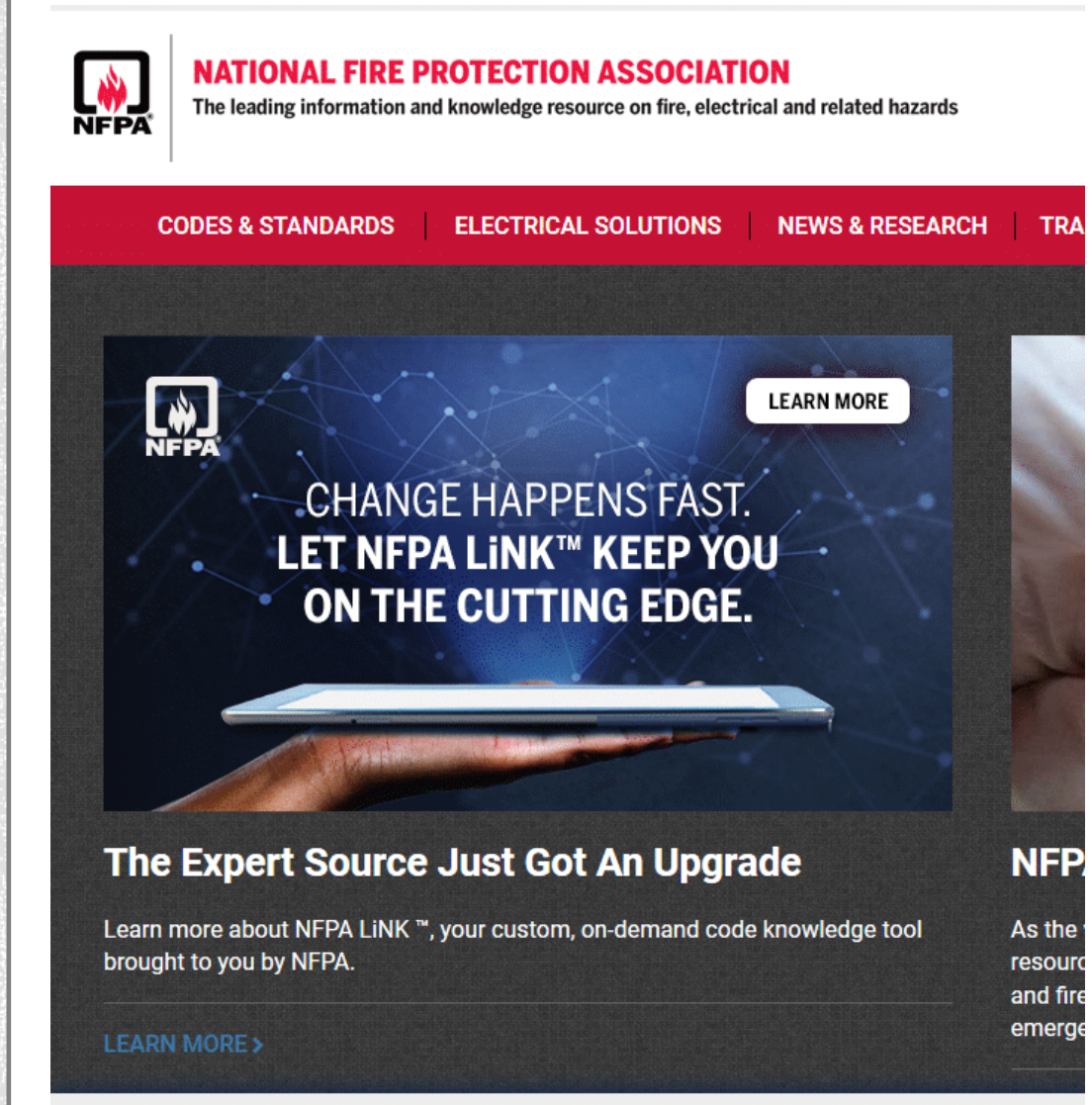
Founded to sell watches; evolved to sell everything	Founded to sell books; evolved to sell everything
1972	2017
sears	amazon
2 of every 3 Americans shopped in last 3 months	2 of every 3 Americans shopped in last 3 months
1987 Sales = 1% of GDP	2017 Sales = 1% of GDP

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

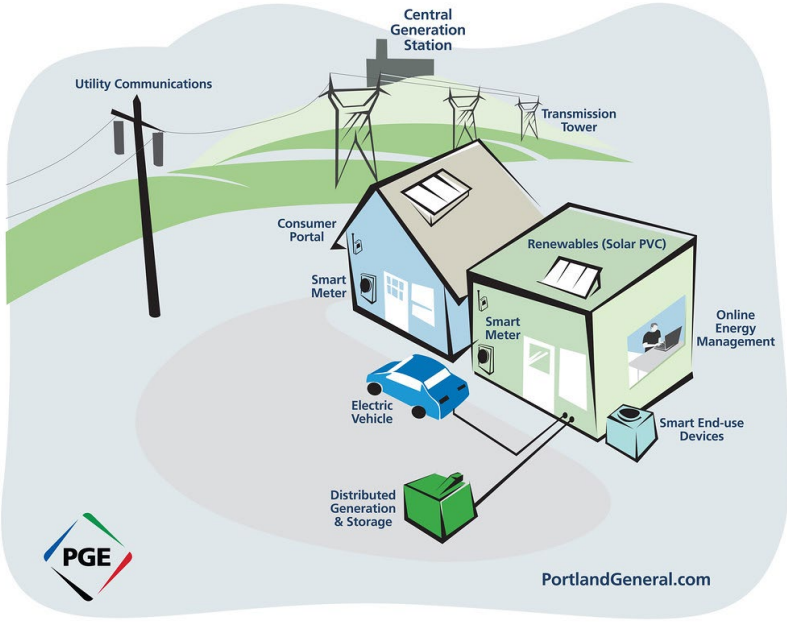
1937-2023 (35 editions):

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?

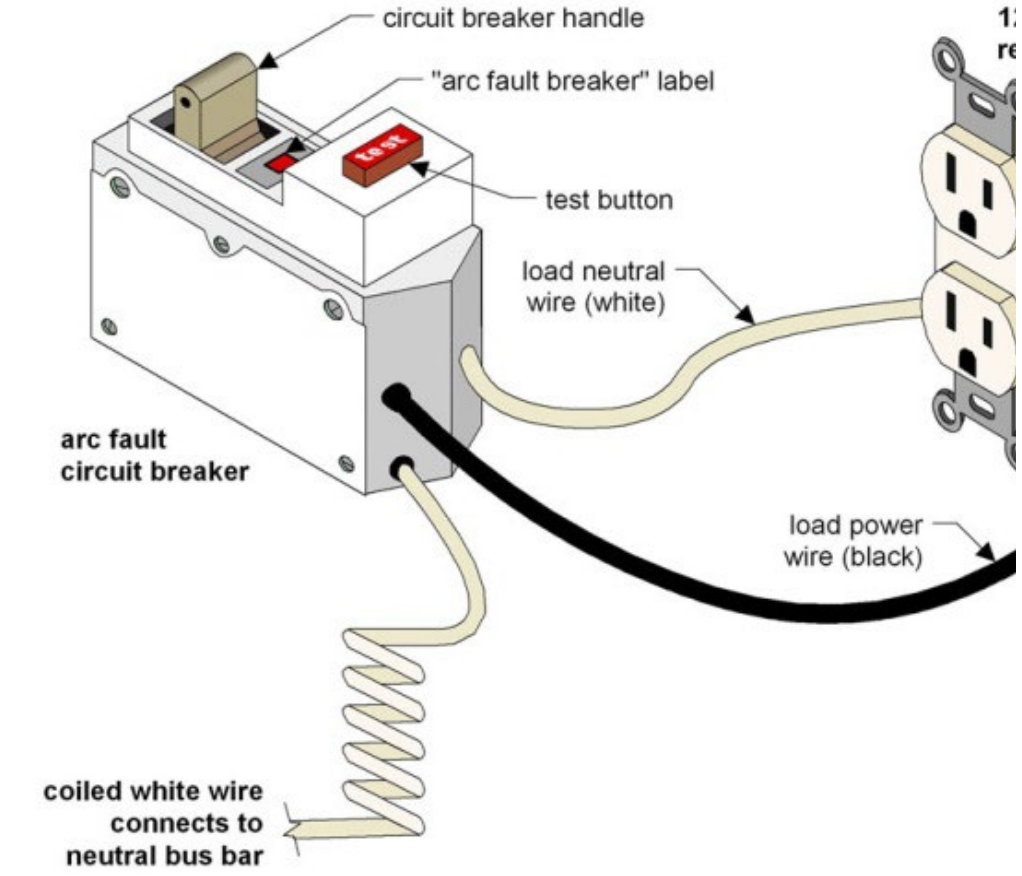
Future

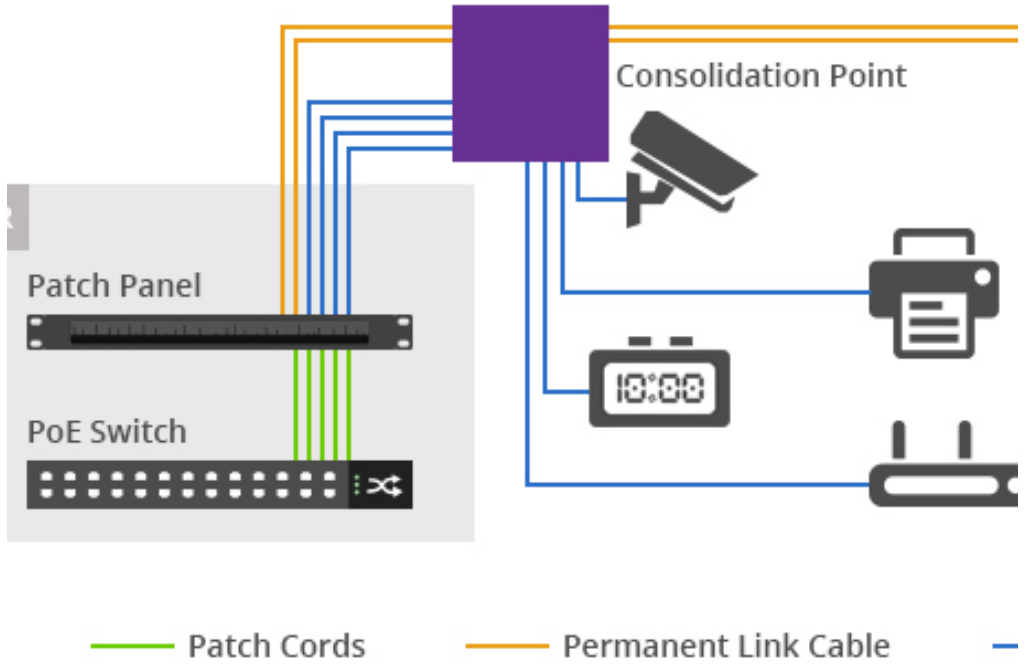
- Improve usability.
- Improve Terminology
- Create structure that is technology agnostic.
- Eliminate redundancy.
- Parallel Structure
- Everything communicates

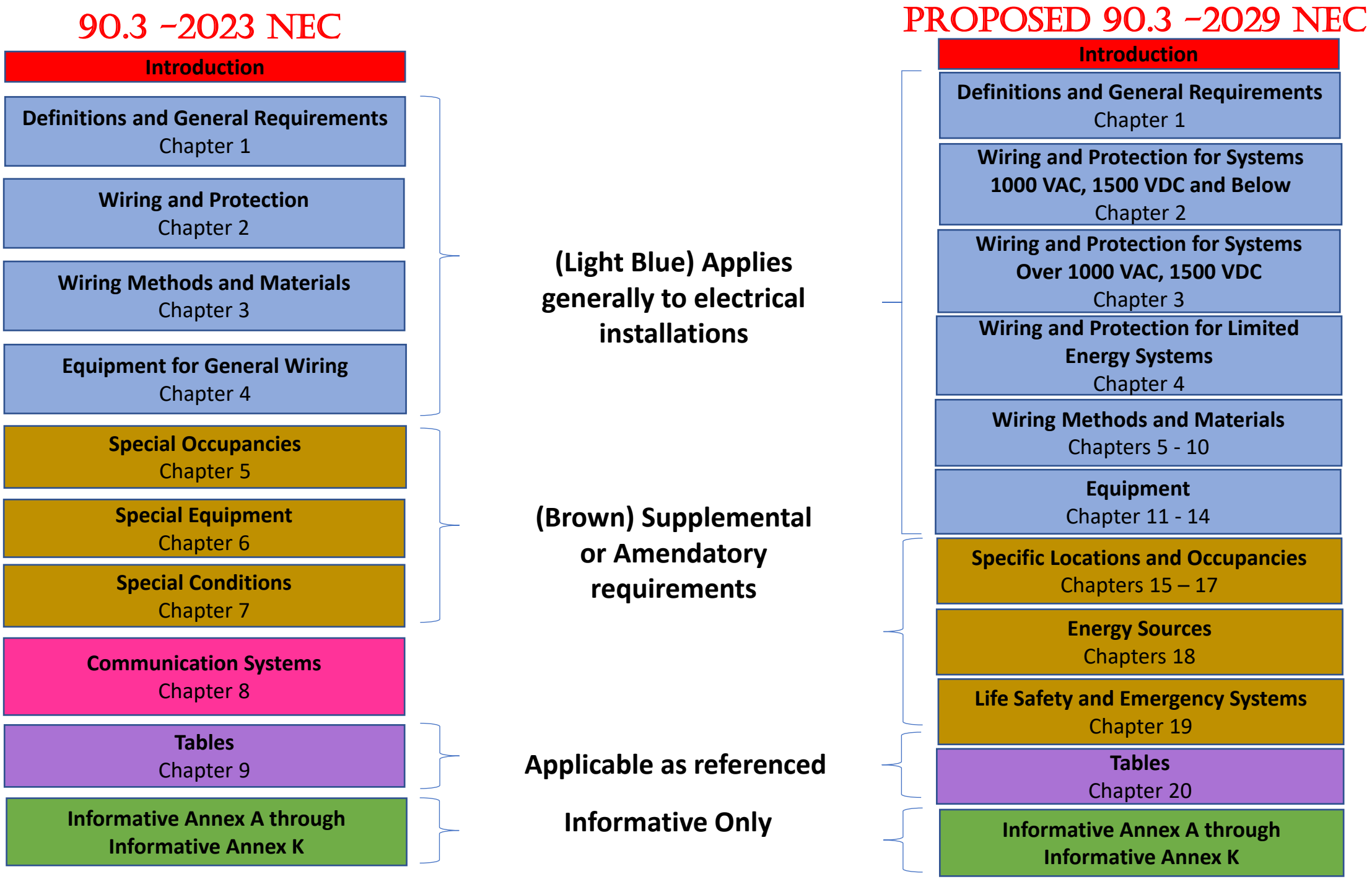
Short-Term Goals (2026)

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

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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

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Chapter 5 Enclosures and Wiring Support Structures				
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502	Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Handhole Enclosures	314	8	8
504	Cable Trays	392	8	8
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510	Nonmetallic Wireways	378	8	8
512	Nonmetallic Extensions	382	6	8
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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

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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
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804	Strut-Type Channel Raceway	384	8	8
806	Surface Metal Raceways	386	8	8
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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
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1002	Messenger-Supported Wiring	396	6	6
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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

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Chapter 12 Utilization Equipment				
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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

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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
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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				
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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
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Introduction

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Wiring and Protection
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Wiring Methods and Materials
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2026 NEC STRUCTURE

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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. 1642-NFPA 70-2024 [Global Input]

This Global Public Comment is for CMP-2 to review the use of the terms "overcurrent", "overcurrent protective devices" and "overcurrent protection".

Additional Proposed Changes

File Name	Description	Approved
CMP-2_OCPD_TG-4_CMP-10.pdf	CMP-2_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

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Submittal Date: Sun Aug 25 21:35:26 EDT 2024
Committee: NEC-P02

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-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. 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. 556-NFPA 70-2024 [Global Input]

220.5C took out the wording for the garage which is now included in the square footage for general lighting. However 220.82B1 still includes the wording that garages shall not be included in the square footage for general lighting. Is this an oversight?

Statement of Problem and Substantiation for Public Comment

Make the square footage calculation the same for both standard and optional methods.

Related Item

• Chapter 2

Submitter Information Verification

Submitter Full Name: Robert McChesney
Organization: Perry Technical Institute
Street Address:
City:
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Zip:

Submittal Date: Wed Jul 31 16:35:28 EDT 2024
Committee: NEC-P02

Public Comment No. 1020-NFPA 70-2024 [Definition: Ground-Fault Circuit Interrupter (GFCI).]

Ground-Fault Circuit Interrupter (GFCI), Class A .

A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a ground-fault current exceeds the values established for a Class A device. (CMP-2)

Informational Note: See UL 943, *Standard for Ground-Fault Circuit Interrupters*, for further information. Class A ground-fault circuit interrupters trip when the ground-fault current is 6 mA or higher and do not trip when the ground-fault current is less than 4 mA.

Statement of Problem and Substantiation for Public Comment

This PC is editorial and will only be needed if CMP-2 acts favorably on PCs 1018 and 1019, that proposed the addition of new individual definitions for GFCI Classes C, D, and E to improve code clarity and usability.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1018-NFPA 70-2024 [Definition: Ground-Fault Circuit Interrupter, Special Purpo...]	Complementary
Public Comment No. 1019-NFPA 70-2024 [New Definition after Definition: Ground-Fault Circuit Inter...]	Complementary
Public Comment No. 1018-NFPA 70-2024 [Definition: Ground-Fault Circuit Interrupter, Special Purpo...]	
Public Comment No. 1019-NFPA 70-2024 [New Definition after Definition: Ground-Fault Circuit Inter...]	

Related Item

- FR-7606

Submitter Information Verification

Submitter Full Name: Nehad El-Sherif
Organization: MNKYBR Technologies Inc.
Street Address:
City:
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Submittal Date: Sun Aug 11 05:26:53 EDT 2024
Committee: NEC-P02

Public Comment No. 1018-NFPA 70-2024 [Definition: Ground-Fault Circuit Interrupter, Special Purpo...]

Ground-Fault Circuit Interrupter, Special Purpose (SPGFCI). (Special Purpose Ground-Fault Circuit Interrupter)

A ~~device intended for the detection of ground-fault currents that functions to de-energize a circuit or portion of a circuit within an established period of time established for Class C, D, or E devices~~ term used by UL to refer to GFCI Classes C, D, and E . (CMP-2)

Informational Note: See UL 943C, *Outline of Investigation for Special Purpose Ground-Fault Circuit Interrupters*, for information on GFCI Classes C, D, ~~or E special purpose ground-fault circuit interrupters~~ and E .

Statement of Problem and Substantiation for Public Comment

The term SPGFCI is the title of UL 943C and not a defined term and is used in UL 943C to collectively refer to GFCI Classes C, D, and E. This PC is submitted along with other PCs to add definitions for GFCI Classes C, D, and E.

Adding individual definitions for GFCI classes will allow code making panels to specify the appropriate GFCI class to be used. Therefore, improving code clarity and usability by avoiding any confusion/uncertainty that may arise when deciding which GFCI class to install.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1019-NFPA 70-2024 [New Definition after Definition: Ground-Fault Circuit Inter...]	Complementary
Public Comment No. 1020-NFPA 70-2024 [Definition: Ground-Fault Circuit Interrupter (GFCI).]	Complementary
Public Comment No. 1019-NFPA 70-2024 [New Definition after Definition: Ground-Fault Circuit Inter...]	
Public Comment No. 1020-NFPA 70-2024 [Definition: Ground-Fault Circuit Interrupter (GFCI).]	

Related Item

• FR-7606

Submitter Information Verification

Submitter Full Name: Nehad El-Sherif
Organization: MNKYBR Technologies Inc.
Street Address:
City:
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Submittal Date: Sun Aug 11 04:43:36 EDT 2024
Committee: NEC-P02

Public Comment No. 1972-NFPA 70-2024 [Definition: Ground-Fault Circuit Interrupter, Special Purpo...]

Ground-Fault Circuit Interrupter, Special Purpose (SPGFCI). (Special Purpose Ground-Fault Circuit Interrupter)

A device intended for the ~~detection of ground-fault currents~~ protection of personnel that functions to de-energize a circuit or portion of a circuit within an established period of time when ground-fault current exceeds the values established for Class C, D, or E devices. (CMP-2)

Informational Note: See UL 943C, *Outline of Investigation for Special Purpose Ground-Fault Circuit Interrupters*, for information on Classes C, D, or E special purpose ground-fault circuit interrupters.

Statement of Problem and Substantiation for Public Comment

The Class C, D, and E Special-Purpose Ground-Fault Circuit-Interrupters are based on the same time/current protection curve outlined in UL 943 for Class A devices. While Class C, D, and E devices utilize a higher pickup level of 15-20 mA, they must also employ a ground monitor/interrupter circuit. SPGFIs rely on equipment grounding, in combination with the 15-20 mA ground-fault protection, to provide let-go protection. FR7606 for the SPGFCI definition was a good change to correct the issue with the voltage rating in the 2023 edition. This addition proposed here helps to clarify the protection offered by SPGFCI devices.

As a reference, this concept is also used for EV chargers with AC supply, as outlined in the UL 2231-1 and UL 2231-2 standards talking about personnel protection for EV supply circuits. In this application, charger manufacturers can choose to either utilize CCID5 standalone ground-fault protection (5 +/-1 MIU), or CCID20 ground-fault protection (15-20 MIU) with ground monitoring.

Related Item

• PI 4523

Submitter Information Verification

Submitter Full Name: Mark Pollock
Organization: Littelfuse
Street Address:
City:
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Zip:

Submittal Date: Wed Aug 28 13:36:57 EDT 2024
Committee: NEC-P02

Public Comment No. 967-NFPA 70-2024 [Definition: Ground-Fault Circuit Interrupter, Special Purpo...]

Ground-Fault Circuit Interrupter, Special Purpose (SPGFCI). (Special Purpose Ground-Fault Circuit Interrupter)

A device intended for the detection of ground-fault currents that functions to de-energize a circuit or portion of a circuit within ~~an established~~ a period of time established for Class C, D, or E devices. (CMP-2)

Informational Note: See UL 943C, *Outline of Investigation for Special Purpose Ground-Fault Circuit Interrupters*, for information on Classes C, D, or E special purpose ground-fault circuit interrupters.

Statement of Problem and Substantiation for Public Comment

This PI proposes to remove the redundantly stated word "established" to improve clarity of the definition.

Related Item

- FR 7606

Submitter Information Verification

Submitter Full Name: Vincent Della Croce
Organization: Siemens
Street Address:
City:
State:
Zip:

Submittal Date: Thu Aug 08 10:44:36 EDT 2024
Committee: NEC-P02

Public Comment No. 1019-NFPA 70-2024 [New Definition after Definition: Ground-Fault Circuit Inter...]

Ground-Fault Circuit Interrupter (GFCI), Class C.

A ground-fault circuit-interrupter that is intended to be used in circuits with no conductor over 300 V AC to ground where reliable equipment grounding or double insulation is provided.

Informational Note 1: See UL 943C, Outline of Investigation for Special-Purpose Ground-Fault Circuit Innterrupters. Class C ground-fault circuit interrupters trip when the ground-fault current is 20 mA or higher and do not trip when the ground-fault current is less than 15 mA.

Informational Note 2: To provide limited-let-go protection, Class C ground-fault circuit interrupters are permitted to have a trip threshold greater than 6 mA but less than 15 mA.

Ground-Fault Circuit Interrupter (GFCI), Class D.

A ground-fault circuit-interrupter that is intended to be used in circuits with one or more conductors over 300 volts to ground, and with specially sized, reliable grounding, to provide a low impedance path so that the voltage across the body during a fault does not exceed 150 volts.

Informational Note: See UL 943C, Outline of Investigation for Special-Purpose Ground-Fault Circuit Innterrupters. Class D ground-fault circuit interrupters trip when the ground-fault current is 20 mA or higher and do not trip when the ground-fault current is less than 15 mA.

Ground-Fault Circuit Interrupter (GFCI), Class E.

A ground-fault circuit-interrupter that is intended to be used in circuits with one or more conductors over 300 volts to ground but with conventional equipment grounding provided for the protected equipment in the system or double insulation. These ground-fault circuit-interrupters respond rapidly to open the circuit before the magnitude and duration of the current flowing through the person's body exceeds the limits for ventricular fibrillation.

Informational Note: See UL 943C, Outline of Investigation for Special-Purpose Ground-Fault Circuit Innterrupters. Class E ground-fault circuit interrupters trip when the ground-fault current is 20 mA or higher and do not trip when the ground-fault current is less than 15 mA.

Additional Proposed Changes

File Name	Description	Approved
UL_definitions_of_GFCI_Classes_C_D_E.png	GFCI Classes C, D, and E definitions in UL 943C	
Tripping_Range_of_Classes_C_D_E.png	GFCI Classes C, D, and E tripping range in UL 943C	

Statement of Problem and Substantiation for Public Comment

This PC adds individual definitions for GFCI Classes C, D, and E. These new definitions are adopted from UL 943C, the UL document that specifies the requirements for these GFCI classes.

Adding individual definitions for GFCI classes will allow code making panels to specify the appropriate GFCI class to be used. Therefore, improving code clarity and usability by avoiding any confusion/uncertainty that may arise when deciding which GFCI class to install.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1018-NFPA 70-2024 [Definition: Ground-Fault Circuit Interrupter, Special Purpo...]	Complementary
Public Comment No. 1020-NFPA 70-2024 [Definition: Ground-Fault Circuit Interrupter (GFCI).]	Complementary
Public Comment No. 1018-NFPA 70-2024 [Definition: Ground-Fault Circuit Interrupter, Special Purpo...]	
Public Comment No. 1020-NFPA 70-2024 [Definition: Ground-Fault Circuit Interrupter (GFCI).]	

Related Item

- FR-7606

Submitter Information Verification

Submitter Full Name: Nehad El-Sherif
Organization: MNKYBR Technologies Inc.
Street Address:
City:
State:
Zip:

Submittal Date: Sun Aug 11 05:05:53 EDT 2024
Committee: NEC-P02

Public Comment No. 1902-NFPA 70-2024 [New Definition after Definition: Ground-Fault Circuit Inter...]

Ground-Fault Circuit Interrupter, High Frequency (HF).

A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when the frequency weighted differential current exceeds the values established for a Class A device listed as High Frequency.

Informational Note: See UL 943, *Standard for Ground-Fault Circuit Interrupters* , for further information. High Frequency ground-fault circuit interrupters do not trip when the frequency weighted differential current is less than 4 mA.

Statement of Problem and Substantiation for Public Comment

The UL 943 standard for GFCIs is being updated to reduce nuisance tripping on loads which contain modernized electrical components such as LED drivers, switched-mode power supplies, and variable frequency drives.

In the UL 943 preliminary review draft (April 2024), this modernized GFCI was referred to as Class A-HF. The next version of the UL 943 draft (expected Q3/Q4 2024) will change Class A-HF to a High Frequency (HF) rating. Although the name is changing, the underlying technical specifications are not.

This change to the First Draft will better align language in the NEC with the latest language in UL standards work.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1900-NFPA 70-2024 [Section No. 422.5]	

Related Item

- FR 7788

Submitter Information Verification

Submitter Full Name: Greg Woyczynski
Organization: Association of Home Appliance
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 22:25:04 EDT 2024
Committee: NEC-P02

Public Comment No. 710-NFPA 70-2024 [Section No. 120.1]

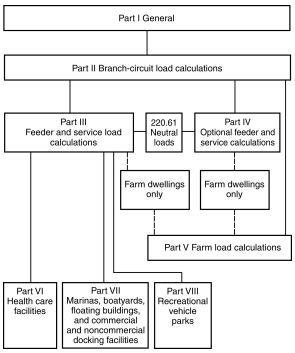
120.1 Scope.

This article provides requirements for calculating branch-circuit, feeder, and service loads. Part I provides general requirements for calculation methods. Part II provides calculation methods for branch-circuit loads. Part III and Part IV provide calculation methods for feeder and service loads. Part V provides calculation methods for farm loads. Part VI provides calculation methods for health care facilities. Part VII provides calculation methods for marinas, boatyards, floating buildings, and commercial and noncommercial docking facilities.

Informational Note No. 1: See Informative Annex D for examples.

Informational Note No. 2: See Figure Informational Note 120.1 for information on the organization of this article.

Figure Informational Note 120.1 Branch-Circuit, Feeder, and Service Load Calculation Methods.



Additional Proposed Changes

File Name	Description	Approved
CN_213.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 213 appeared in the First Draft Report.

The Correlating Committee directs CMP 2 to revise the scope as it relates to the addition of Article 220, Part VIII, Recreational Vehicle Parks. Additionally the phrase "commercial and noncommercial" needs to be revised in the scope and informational note figure for correlation with the title of Article 555.

Related Item

- Correlating Committee Note No. 213

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 02 14:11:25 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 213-NFPA 70-2024 [Section No. 220.1]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 11:59:26 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 2 to revise the scope as it relates to the addition of Article 220, Part VIII, Recreational Vehicle Parks. Additionally the phrase "commercial and noncommercial" needs to be revised in the scope and informational note figure for correlation with the title of Article 555.

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. 712-NFPA 70-2024 [Section No. 120.3]

120.3 Other Articles for Specific-Purpose Calculations.

Table 120.3 shall provide references for specific-purpose calculation requirements not located in Chapters 5, 6, or 7 that amend or supplement the requirements of this article.

Table 120.3 Specific-Purpose Calculation References

Calculation	Article	Section (or Part)
Air-conditioning and refrigerating equipment, branch-circuit conductor sizing	440	Part IV
Capacitors	460	460.8
Fixed electric heating equipment for pipelines and vessels, branch-circuit sizing	427	427.4
Fixed electric space-heating equipment, branch-circuit sizing	424	424.4
Fixed outdoor electric deicing and snow-melting equipment, branch-circuit sizing	426	426.4
Fixed resistance and electrode industrial process heating equipment	425	425.4
Motors, feeder demand factor	430	430.26
Motors, multimotor and combination-load equipment	430	430.25
Motors, several motors or a motor(s) and other load(s)	430	430.24
Over 1000-volt ac and 1500-volt dc branch-circuit calculations	235	235.19
Over 1000-volt feeder calculations	215	236.4
Phase converters, conductors	455	455.6
Storage-type water heaters	422	422.13

Additional Proposed Changes

File Name	Description	Approved
CN_216.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 216 appeared in the First Draft Report.

The Correlating Committee directs CMP-2 to review 220.3 and relocate this material to comply with Section 2.2.1 of the NEC Style Manual covering parallel numbering.

Related Item

• Correlating Committee Note No. 216

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
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Zip:
Submittal Date: Fri Aug 02 14:16:04 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 216-NFPA 70-2024 [Section No. 220.3]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 12:09:48 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-2 to review 220.3 and relocate this material to comply with Section 2.2.1 of the NEC Style Manual covering parallel numbering.

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. 1889-NFPA 70-2024 [Section No. 120.5(A)]

(A) Voltages.

Unless other voltages are specified, for purposes of calculating branch-circuit and feeder loads, nominal system voltages of 120, 120/240, 208Y/120, 240, 347, 416Y/240, 480Y/277, 480, 600Y/347, and 600 volts shall be used.

Informational Note: DC electrical systems are often described with a nominal voltage and a wide voltage band. For DC electrical systems with a wide voltage band, both the upper and lower limits of the bands are important considerations for load calculations.

Statement of Problem and Substantiation for Public Comment

This Public Comment is submitted on behalf of a Correlating Committee DC Task Group consisting of Danish Zia, Jason Fisher, Randy Dollar, Larry Wildermuth, Scott Higgins, Scott Harding, Mark Earley, Jason Hopkins, Chris Vance, Chad Kennedy and Derrick Atkins. This Public Comment, along with other Public Comments, was developed with the goal of improving usability and accuracy on requirements associated with DC circuits.

DC electrical systems may have a wide range of upper and lower voltage limits due to variable power generation, and the system may operate indefinitely under these conditions. Additionally, the load current drawn by the utilization equipment may be significantly different between the nominal, maximum or minimum voltages. Furthermore, the maximum current drawn by the utilization equipment may not occur at the maximum voltage. The proposed informational note provides the user with clarity that both the maximum and minimum voltage limits are important considerations when conducting load calculations for such DC electrical systems.

Related Item

• Public Input No. 4287-NFPA 70-2023

Submitter Information Verification

Submitter Full Name: Danish Zia
Organization: UL Solutions
Street Address:
City:
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Submittal Date: Tue Aug 27 21:11:57 EDT 2024
Committee: NEC-P02

Public Comment No. 1754-NFPA 70-2024 [Section No. 120.7]

120.7 Power Control System (PCS).

PCS compliant with Article 130 shall be permitted to be ~~used for~~ considered in branch-circuit, feeder, or service load calculations~~. When used in load calculations, the installation shall comply with 120.7(A) through 120.7(D)~~ .

~~**(A)** PCS Requirements.~~

~~The PCS shall comply with Article 130, Part II.~~

~~**(B)** PCS Current Setpoint.~~

~~The PCS current setpoint shall be determined by qualified personnel and shall be set to no greater than 80 percent of the rating of the overcurrent protective device for the circuit for which the PCS is providing overload control.~~

~~**(C)** Load Calculations Using PCS.~~

~~Load calculations that use PCS shall be based on the monitoring and control configuration of the PCS and shall comply with one or both of the following:~~

(1) ~~Monitoring only controlled loads: When the PCS monitors only controlled loads, the current setpoint of the PCS shall be used in place of the controlled loads in load calculations.~~

(2) ~~Monitoring controlled and noncontrolled loads: When the PCS monitors both controlled and noncontrolled loads, the minimum operating current of the controlled loads shall be used in load calculations.~~

~~Informational Note: Minimum operating current is a value greater than or equal to zero representing the minimum current allowed for each load by the PCS.~~

~~**(D)** Noncontrolled Loads.~~

~~The load calculations for loads that are not controlled by the PCS shall meet the requirements in Article 120, Parts II through VII~~

, provided that the PCS current setpoints were determined by qualified personnel and suitably labeled on the PCS equipment via a durable method. Loads controlled by the PCS the load shall be treated as 0 watts (volt-amperes) unless a higher minimum is described on the durable labeling. All non-controlled loads must be calculated per their usual methods .

Informational Note: See Informative Annex D, Examples ~~D14(a) through D14(d) for examples of load calculations with~~ D15 for loads managed by PCS.

Statement of Problem and Substantiation for Public Comment

As written, this seemed longer than needed to clearly state the intent.

The entire point of a PCS is to control loads. The 80% derating for continuous loads should be handled in Article 130, not here.
Not all PCS switched loads are continuous, and anyway the PCS is in the right place to switch loads on and off to ensure the intent of the 125%/80% rule for the upstream wiring is maintained regardless of conditions.

The real purpose of a PCS from a load calculation point of view is to ramp switched loads down to zero, which is what this rewrite intends to make clear with as little text as possible.

The full text without change bars is :

120.7 Power Control System (PCS).
PCS compliant with Article 130 shall be permitted to be considered in branch-circuit, feeder, or service load calculations, provided that the PCS current setpoint was determined by qualified personnel and suitably labeled on the PCS equipment via a durable method. Loads controlled by the PCS shall be treated as 0 watts (volt-amperes) unless a higher minimum is described on the durable labeling. All non-controlled loads must be calculated per their usual methods.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1753-NFPA 70-2024 [Section No. 120.57]	Related Item
• Public Input No. 4238-NFPA 70-2023 [Section No. 220.57] (for zeroing out loads)	• Public Input No. 3025-NFPA 70-2023 [Section No. 220.70] (for unmanaged loads)

Submitter Information Verification

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Submittal Date: Tue Aug 27 03:16:30 EDT 2024
Committee: NEC-P02

Public Comment No. 2001-NFPA 70-2024 [Section No. 120.7]

120.7 Power Control System (PCS).

PCS shall be permitted to be used for branch-circuit, feeder, or service load calculations. When used in load calculations, the installation shall comply with 120.7(A) through 120.7(D).

(A) PCS Requirements.

The PCS shall comply with Article 130, Part II.

(B) PCS ~~Current Setpoint.~~ Control Setting

The PCS ~~current setpoint~~ control setting shall be determined by qualified personnel and shall be set to no greater than 80 percent of the rating of the overcurrent protective device for the circuit for which the PCS is providing overload control.

(C) Load Calculations Using PCS.

Load calculations that use PCS shall be based on the monitoring and control configuration of the PCS and shall comply with one or both of the following:

(1) Monitoring only controlled loads: When the PCS monitors only controlled loads, the ~~current setpoint~~ control setting of the PCS shall be used in place of the controlled loads in load calculations.

(2) Monitoring controlled and noncontrolled loads: When the PCS monitors both controlled and noncontrolled loads, the ~~minimum operating current of~~ PCS control setting of the controlled loads shall be used in load calculations.

~~Informational Note: Minimum operating current is a value greater than or equal to zero representing the minimum current allowed for each load by the PCS.~~

(D) Noncontrolled Loads.

The load calculations for loads that are not controlled by the PCS shall meet the requirements in Article 120, Parts II through VII.

Informational Note: See Informative Annex D, Examples D14(a) through D14(d) for examples of load calculations with loads managed by PCS.

Statement of Problem and Substantiation for Public Comment

120.7(B) was revised to use UL 3141 terminology of "PCS control setting" rather than " PCS current setpoint" and "minimum operating current". Since "minimum operating current" is not a term used, the information note is not necessary.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1096-NFPA 70-2024 [Sections Part II., 130.50, 130.60, 130.70, 130.80]	

Related Item

• FR 8184

Submitter Information Verification

Submitter Full Name: Scott Picco
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Submittal Date: Wed Aug 28 14:54:24 EDT 2024
Committee: NEC-P02

Public Comment No. 706-NFPA 70-2024 [Section No. 120.7]

120.7 Power Control System (PCS).

PCS shall be permitted to be used for branch-circuit, feeder, or service load calculations. When used in load calculations, the installation shall comply with 120.7(A) through 120.7(D).

(A) PCS Requirements.

The PCS shall comply with Article 130, Part II.

(B) PCS Current Setpoint.

The PCS current setpoint shall be determined by qualified personnel and shall be set to no greater than 80 percent of the rating of the overcurrent protective device for the circuit for which the PCS is providing overload control.

(C) Load Calculations Using PCS.

Load calculations that use PCS shall be based on the monitoring and control configuration of the PCS and shall comply with one or both of the following:

(1) Monitoring only controlled loads: When the PCS monitors only controlled loads, the current setpoint of the PCS shall be used in place of the controlled loads in load calculations.

(2) Monitoring controlled and noncontrolled loads: When the PCS monitors both controlled and noncontrolled loads, the minimum operating current of the controlled loads shall be used in load calculations.

Informational Note: Minimum operating current is a value greater than or equal to zero representing the minimum current allowed for each load by the PCS.

(D) Noncontrolled Loads.

The load calculations for loads that are not controlled by the PCS shall meet the requirements in Article 120, Parts II through VII.

Informational Note: See Informative Annex D, Examples D14(a) through D14(d) for examples of load calculations with loads managed by PCS.

Additional Proposed Changes

File Name	Description	Approved
CN_206.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 206 appeared in the First Draft Report on First Revision No. 8184.

The requirements in this section should be revised to provide correct references and align the terminology with Article 750, Part II, “EMS with PCS”, as determined by CMP 13 in FR 8095. References to Article 750 should be adjusted based on the relocation to Chapter 1, Article 130.

Related Item

• First Revision No. 8184

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 02 14:05:41 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 206-NFPA 70-2024 [Section No. 220.7]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 11:29:12 EDT 2024

Committee Statement

Committee Statement: The requirements in this section should be revised to provide correct references and align the terminology with Article 750, Part II, “EMS with PCS”, as determined by CMP 13 in FR 8095. References to Article 750 should be adjusted based on the relocation to Chapter 1, Article 130.

First Revision No. 8184-NFPA 70-2024 [Section No. 220.70]

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. 1950-NFPA 70-2024 [Section No. 120.7(B)]

(B) PCS Current Setpoint.

The PCS current setpoint shall be determined by qualified personnel and shall be set to no greater than ~~80~~ 100 percent of the rating of the overcurrent protective device for the circuit for which the PCS is providing overload control.

Statement of Problem and Substantiation for Public Comment

Subsection 120.5(D) states that load calculations do not require a 125% continuous load multiplier. This means that the 125% (inverse of 80%) multiplier in the PCS load calculation language of 120.7 cannot be due to concerns about conductors heating while the PCS manages continuous loads. It appears that the 80% limitation may instead be due to a concern that the PCS will fail to control the load adequately and needs a margin of safety to ensure that an overload does not occur. This is arbitrary, encroaches on the responsibility of the relevant product listings, and is not reflective of the reliable characteristics of PCS technologies.

Limiting the current setpoint to 80% of the OCPD rating would not ensure a safer or more functional installation than a 100% setpoint. Any overload over the setpoint of the PCS due to a malfunctioning PCS would simply trip the circuit breaker, protecting the conductor. PCS do not function more reliably if the setpoint is exceeded by 25% than if it is exceeded by 1%, so the proposed 80% limitation seems arbitrary and unrelated to the safety of the installation.

Article 90 makes it clear that the code is not intended to be a design specification for equipment and that examinations and determinations of equipment safety are made by a qualified electrical testing laboratory. It is not the role of the electrical code to introduce a margin of safety requirement for the use of equipment.

Lumin's product is just one that could be adversely affected by this limitation. The Lumin Smart Panel monitors a setpoint and can react within seconds to shed load to limit current when the setpoint is surpassed. The response rapidity of a PCS is far more aggressive than the trip behavior of a standard thermal circuit breaker that will allow overages many times greater than the breaker rating for several seconds, often allow twice the rated current for 50 seconds, and will not trip at the rated current for three hours.

As we move toward more digitally managed electrical systems, we should rely on product standards and rigorous testing to ensure that Power Control Systems function properly and reliably while avoiding arbitrary and unnecessary code limitations on this important technology.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1957-NFPA 70-2024 [Section No. 210.19(A)]	linked concept
Public Comment No. 1961-NFPA 70-2024 [Section No. 215.4(A)(1)]	linked concept
Public Comment No. 1967-NFPA 70-2024 [Section No. 230.42(A) [Excluding any Sub-Sections]]	linked concept
Public Comment No. 1970-NFPA 70-2024 [Section No. 230.42(A)(1)]	linked concept
Public Comment No. 1957-NFPA 70-2024 [Section No. 210.19(A)]	
Public Comment No. 1961-NFPA 70-2024 [Section No. 215.4(A)(1)]	
Public Comment No. 1970-NFPA 70-2024 [Section No. 230.42(A)(1)]	

Related Item

- FR-8184

Submitter Information Verification

Submitter Full Name: Jeff Nicholson
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Submittal Date: Wed Aug 28 12:35:28 EDT 2024
Committee: NEC-P02

Public Comment No. 1974-NFPA 70-2024 [Section No. 120.7(B)]

(B) PCS Current Setpoint.

The PCS current setpoint shall be determined by qualified ~~personnel~~ persons and shall be set to no greater than 80 percent of the rating of the overcurrent protective device for the circuit for which the PCS is providing overload control.

Statement of Problem and Substantiation for Public Comment

"Qualified personnel" is not a defined term in Article 100, but "qualified person" is. To avoid ambiguity and inconsistency, the term "qualified persons" should be used in this setting.

Related Item

• FR-8184

Submitter Information Verification

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Submittal Date: Wed Aug 28 13:45:11 EDT 2024
Committee: NEC-P02

Public Comment No. 36-NFPA 70-2024 [Section No. 120.7(B)]

(B) PCS Current Setpoint.

The PCS current setpoint shall be determined by qualified personnel and shall be set to no greater than 80 percent of the rating of the overcurrent protective device for the circuit for which the PCS is providing overload control.

Exception: When all loads monitored or controlled by the PCS are noncontinuous, the PCS current setpoint shall be set to no greater than 100 percent of the rating of the overcurrent device for the circuit for which the PCS is providing overload control.

Statement of Problem and Substantiation for Public Comment

When all loads monitored or controlled by the PCS are noncontinuous, the PCS current setpoint shall be set to no greater than 100 percent of the rating of the overcurrent device for the circuit for which the PCS is providing overload control.

The intent of the 80% limitation on the PCS current setpoint relative to the OCPD rating is presumed to be that the various loads managed by a PCS would, in aggregate, effectively create a single PCS load that could at times behave like a continuous load. This is reasonable when the aggregate PCS load includes individual continuous loads, as PCS management does nothing to change their continuous nature. However, it is unduly restrictive when there are no continuous loads being monitored or managed by the PCS. A continuous load is defined in Article 100 as "a load where the maximum current is expected to continue for 3 hours or more." Noncontinuous loads are not defined but are clearly loads where maximum current is not expected to continue for 3 hours or more. A PCS managing only noncontinuous loads will never experience any managed load drawing maximum current for 3 hours; the demand from all loads in this scenario will by definition be variable over a 3-hour period. Thus, in aggregate these loads will never exhibit a steady-state current draw at the PCS current setpoint or any other value and the PCS load will not and cannot behave like a continuous load.

Adding this exception would bring the PCS load calculations in line with other aspects of load calculation and conductor sizing where an 80% derate/125% load multiplier is only required when loads are continuous. This proposal is more conservative than the existing feeder sizing rules found in 215(A)(1) as combinations of continuous and noncontinuous loads would not be permitted when utilizing 100% of the OCPD rating in the PCS current setpoint.

Related Item

• FR 8095

Submitter Information Verification

Submitter Full Name: David Kendall
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Submittal Date: Thu Jul 11 11:05:23 EDT 2024
Committee: NEC-P02

Public Comment No. 1939-NFPA 70-2024 [Section No. 120.7(C)]

(C) Load Calculations Using PCS.

Load calculations for circuits that use PCS shall be based on the monitoring and control configuration of the PCS and shall comply with one or both of the following:

(1) ~~Monitoring only controlled loads: When the PCS monitors only controlled loads, the current setpoint of the PCS shall be used in place of the controlled loads in load calculations.~~

(2) ~~Monitoring controlled and noncontrolled loads: When the PCS monitors both controlled and noncontrolled loads, the minimum operating current of the controlled loads shall be used in load calculations.~~

~~Informational Note: Minimum operating current is a value greater than or equal to zero representing the minimum current allowed for each load by the PCS.~~

(1) Total circuit load managed by PCS: Where the PCS monitors a complete circuit supplying only controlled loads, or any combination of controlled and uncontrolled loads, the value used in load calculations shall be the larger of the following:

(2) The PCS control setpoint

(3) The load calculated in 120.7(D) for the uncontrolled load

(4) Partial circuit load managed by PCS: Where the PCS monitors a portion of the connected load to a circuit, the value used in load calculations shall be the sum of the load calculated in 120.7(C)(1) plus the load calculated in 120.7(D).

Statement of Problem and Substantiation for Public Comment

While well intentioned, the use of the term "minimum operating current" in this section would create confusion and prevent the uniform application of these requirements to all PCS. This is because not all PCS will have a minimum operating current rating and most importantly, the standard to evaluate a PCS (UL 3141) does not include this term, nor any testing requirements to verify such a rating. Because of this, listed PCS equipment could be installed and approved with a false sense of security that the equipment will default to a particular low current value under malfunction or other conditions where there is a lack of monitoring or control, when in fact, there would be no guarantee that the equipment has been independently verified to do this.

With the recent changes to this code and the UL 3141 standard, there is no need for such provisions in this code. There are requirements in UL 3141 sufficient to evaluate any PCS for its particular application, while ensuring all PCS meet the same level of reliability during faults and failures reasonable to expect over the system's lifetime.

This proposal seeks to reorient the requirement in 120.7(C) away from how loads are controlled within a PCS but instead, to focus on the circuit that the PCS is providing overload control for. This is accomplished by the following:
- If the PCS is providing overload control for an entire circuit (with no loads connected "outside" of the PCS), then the value used for load calculations should be the PCS setting. This aligns with the 2023 language and UL3141.
-- To prevent someone from connecting an excess of noncontrolled load to the circuit, a requirement is included in new 120.7(C)(1)(2) that that calculation be performed for the noncontrolled load and that value be used if larger than the PCS setting.
- If the PCS is only providing overload control for a portion of the load on the circuit (i.e. a feeder or busbar "upstream" of a PCS where there are both PCS managed circuits and non PCS circuits connected) the practical solution is to simply to sum the two together, both the PCS load (from 120.7(C)(1)) and the load not within the PCS "boundary" (using 120.7(D)).
Note that this is how similar PCS applications for power sources have been addressed since the 2023 edition (see 705.28(A)).

The informative Annex D examples will need to be changed, but the good news is that they should be simplified, not made more complex.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1942-NFPA 70-2024 [Definition: Example D.15 Load Calculations Using Power Cont...]	Suggested changes to Annex D Examples
Public Comment No. 1942-NFPA 70-2024 [Definition: Example D.15 Load Calculations Using Power Cont...]	

Related Item

• FR-8184

Submitter Information Verification

Submitter Full Name: Jason Fisher
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Submittal Date: Wed Aug 28 11:24:53 EDT 2024
Committee: NEC-P02

Public Comment No. 1854-NFPA 70-2024 [Section No. 120.13]

120.13 Dwelling Units – Branch Circuit Loads.

In dwelling units, the minimum unit load shall be not less than ~~33~~ 43 volt-amperes/m^2 (~~3~~ 4 volt-amperes/ft^2) for calculating minimum branch circuits required.

Additional Proposed Changes

File Name	Description	Approved
PC_1854_substantiation.docx		

Statement of Problem and Substantiation for Public Comment

The proposed bedroom branch circuits in PI 3406, received comments from CMP2 that there was no substantiation that the bedroom receptacle outlets were the only location causing the documented overloads. Further overload research was done to indicate that indeed there is a balance between bedrooms, living rooms, basements, and garages for overload tripping activity with a slight majority being living rooms. Therefore, this public comment is submitted to allow the necessary circuits to be utilized in the best way possible to prevent overloads. Circuit calculation scenarios were developed for the following size homes based on 3VA/ft², 3.5/ft², and 4VA/ft².

	@3VA	@3.5VA	@4VA
1000 ft²	25A (2-15A Circuits)	29A (2-15A Circuits)	34A (3-15A 0r 2-20A Circuits)
1200 ft²	30A (2-15A Circuits)	35A (1-15A and 1-20A)	40A (3-15A or 2-20A circuits)
1600 ft²	40A (2-20A or 3-15A Circuits)	47A (add 1 Circuit)	54A (add 1-15A circuit)
2400 ft²	60A	70A (add 1 Circuit)	80A (add 1-20A circuit)

The load demand on receptacle outlets have become even more critical as we have seen an expansion of remote / home office applications, home fitness equipment, and the trend to more in-home medical recovery and the use of Durable Medical Equipment (DME). Many homes are wired with 15A circuits in the various rooms. If the home requires a hospital type bed that could take 6-10A itself thereby not providing additional load capacity. While these are the largest loads there are smaller DME loads that could add up. A CPAP is 2A, Oxygenator is 3A, and infusion pump is 1A. Another example is if a treadmill is installed it is required to be on a dedicated 20A receptacle. The load data and requirements came from the various manufacturer's documentation.

ESFI conducted a survey of electrical contractors in the Commonwealth of Massachusetts during 2022 asking about any various circuit breaker technology tripping issues. A large majority of tripping issues found were related to overloads/short circuits. This corresponds to the Customer Service call data that circuit breaker manufacturers are seeing. This Data reviewed from the last three years indicates that over 40% of customer phone calls related to residential circuit protection are a result of an overloaded circuit. The overload calls were almost 2 ½ times greater than the nearest other reason. This proposal seeks to address our documented concerns of homeowners where overloads have left them without power. These situations are based on the loads an individual home-owner may utilize establishing perceived 'nuisance' tripping events when the circuit was appropriately protected from an overload hazard. Similar results were found in a 2023 survey of Colorado, Georgia, Kentucky, Minnesota, Ohio, Texas, and Washington. The survey was taken again in 2024 for the State of California with the similar results.

Related Item

- PI 3406

Submitter Information Verification

Submitter Full Name: Keith Waters
Organization: Schneider Electric
Street Address:
City:
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Submittal Date: Tue Aug 27 17:50:25 EDT 2024
Committee: NEC-P02

PC No. 1854

120.13 Dwelling Units – Branch Circuit Loads.

In dwelling units, the minimum unit load shall be not less than ~~33~~ 43 volt-amperes/m2 (~~3~~ 4 volt-amperes/ft2) for calculating minimum branch circuits required.

Substantiation:

The proposed bedroom branch circuits in PI 3406, received comments from CMP2 that there was no substantiation for just using the bedroom receptacle outlets. Further overload research was done to indicate that indeed there is a balance between bedrooms, living rooms, basements, and garages for overload tripping activity with a slight majority being living rooms. Therefore, this public comment is submitted to allow the necessary circuits to be utilized in the best way possible to prevent overloads. Circuit calculation scenarios were developed for the following size homes based on 3VA/ft², 3.5/ft², and 4VA/ft².

	@3VA	@3.5VA	@4VA
1000 ft²	25A (2-15A Circuits)	29A (2-15A Circuits)	34A (3-15A 0r 2-20A Circuits)
1200 ft²	30A (2-15A Circuits)	35A (1-15A and 1-20A)	40A (3-15A or 2-20A circuits)
1600 ft²	40A (2-20A or 3-15A Circuits)	47A (add 1 Circuit)	54A (add 1-15A circuit)
2400 ft²	60A	70A (add 1 Circuit)	80A (add 1-20A circuit)

The load demand on receptacle outlets have become even more critical as we have seen an expansion of remote / home office applications, home fitness equipment, and the trend to more in-home medical recovery and the use of Durable Medical Equipment (DME). Many homes are wired with 15A circuits in the various rooms. If the home requires a hospital type bed that could take 6-10A itself thereby not providing additional

load capacity. While these are the largest loads there are smaller DME loads that could add up. A CPAP is 2A, Oxygenator is 3A, and infusion pump is 1A. Another example is if a treadmill is installed it is required to be on a dedicated 20A receptacle. The load data and requirements came from the various manufacturer's documentation.

Public

ESFI conducted a survey of electrical contractors in the Commonwealth of Massachusetts during 2022 asking about any various circuit breaker technology tripping issues. A large majority of tripping issues found were related to overloads/short circuits. This corresponds to the Customer Service call data that circuit breaker manufacturers are seeing. This Data reviewed from the last three years indicates that over 40% of customer phone calls related to residential circuit protection are a result of an overloaded circuit. The overload calls were almost 2 ½ times greater than the nearest other reason. This proposal seeks to address our documented concerns of homeowners where overloads have left them without power. These situations are based on the loads an individual home-owner may utilize establishing perceived 'nuisance' tripping events when the circuit was appropriately protected from an overload hazard. Similar results were found in a 2023 survey of Colorado, Georgia, Kentucky, Minnesota, Ohio, Texas, and Washington. The survey was taken again in 2024 for the State of California with the similar results.

Public Comment No. 1038-NFPA 70-2024 [Section No. 120.14(H)]

(H) Fixed Multioutlet Assemblies.

Fixed multioutlet assemblies used in other than dwelling units or the guest rooms or guest suites of hotels or motels shall be calculated in accordance with the following:

(1) Where ~~appliances are~~ utilization equipment is unlikely to be used simultaneously, each 1.5 m (5 ft) or fraction thereof of each separate and continuous length shall be considered as one outlet of not less than 180 volt-amperes.

(2) Where ~~appliances are likely~~ utilization equipment is likely to be used simultaneously, each 300 mm (1 ft) or fraction thereof shall be considered as an outlet of not less than 180 volt-amperes.

For the purposes of this section, the calculation shall be permitted to be based on the portion that contains receptacles.

Statement of Problem and Substantiation for Public Comment

The defined term "utilization equipment would be a better term

Related Item

• PI2210

Submitter Information Verification

Submitter Full Name: Dennis Querry
Organization: Trinity River Authority
Street Address:
City:
State:
Zip:

Submittal Date: Mon Aug 12 14:32:39 EDT 2024
Committee: NEC-P02

Public Comment No. 1160-NFPA 70-2024 [Section No. 120.14(H)]

(H) Fixed Multioutlet Assemblies.

Fixed multioutlet assemblies used in other than dwelling units or the guest rooms or guest suites of hotels or motels shall be calculated in accordance with the following:

(1) Where ~~appliances are unlikely to~~ equipment is unlikely to be used simultaneously, each 1.5 m (5 ft) or fraction thereof of each separate and continuous length shall be considered as one outlet of not less than 180 volt-amperes.

(2) Where ~~appliances are likely to~~ equipment is unlikely to be used simultaneously, each 300 mm (1 ft) or fraction thereof shall be considered as an outlet of not less than 180 volt-amperes.

For the purposes of this section, the calculation shall be permitted to be based on the portion that contains receptacles.

Statement of Problem and Substantiation for Public Comment

The public input used the word "Load" which the panel states was not a defined term. The word "Equipment" could be used to replace the word appliance is the sentence. The term Equipment is a defined term in Article 100. "Equipment- A general term, including fittings, devices, appliances, luminaires, apparatus, machinery, and the like used as a part of, or in connection with, an electrical installation." This covers any type of load that could be connected to a Multioutlet Assembly.

Related Item

• PI-2210

Submitter Information Verification

Submitter Full Name: David Hittinger
Organization: Independent Electrical Contractors
Affiliation: IEC Codes and Standards
Street Address:
City:
State:
Zip:

Submittal Date: Fri Aug 16 10:18:01 EDT 2024
Committee: NEC-P02

Public Comment No. 38-NFPA 70-2024 [Section No. 120.42(A)]

(A) General.

A unit load of not less than that specified in Table 120.42(A) for non-dwelling occupancies and the floor area determined in 120.5(C) shall be used to calculate the minimum lighting load. Motors rated less than ⅛ HP and connected to a lighting circuit shall be considered general lighting load.

Informational Note: The unit values of Table 120.42(A) are based on minimum load conditions and 80 percent power factor and might not provide sufficient capacity for the installation contemplated.

Table 120.42(A) General Lighting Loads by Non-Dwelling Occupancy

Type of Occupancy	Unit Load	
	Volt-amperes/ m^2	Volt-amperes/ ft^2
Automotive facility	~~16~~ 13	1.~~5~~ 2
Convention center	~~15~~ 12	1.~~4~~ 1
Courthouse	~~15~~ 12	1.~~4~~ 1
Dormitory	~~16~~ 13	1.~~5~~ 2
Exercise center	~~15~~ 12	1.~~4~~ 1
Fire station	~~14~~ 11	1.~~3~~ 0
Gymnasium[1]	~~18~~ 14	1.~~7~~ 3
Health care clinic	~~17~~ 14	1.6 3
Hospital	~~17~~ 14	1.6 3
Hotel or motel, or apartment house without provisions for cooking by tenants[2]	~~18~~ 14	1.~~7~~ 3
Library	~~16~~ 13	1.~~5~~ 2
Manufacturing facility[3]	~~24~~ 19	~~2~~ 1 .~~2~~ 8
Motion picture theater	~~17~~ 14	1.6 3
Museum	~~17~~ 14	1.6 3
Office[4]	~~14~~ 11	1.~~3~~ 0
Parking garage[5]	~~3~~ 2	0.~~3~~ 2
Penitentiary	~~13~~ 10	~~1~~ 0 .~~2~~ 9
Performing arts theater	~~16~~ 13	1.~~5~~ 2
Police station	~~14~~ 11	1.~~3~~ 0
Post office	~~17~~ 14	1.6 3
Religious facility	~~24~~ 19	~~2~~ 1 .~~2~~ 8
Restaurant[6]	~~16~~ 13	1.~~5~~ 2
Retail[7, 8]	~~20~~ 16	1.~~9~~ 5
School/university	~~16~~ 13	1.~~5~~ 2
Sports arena	~~16~~ 13	1.~~5~~ 2
Town hall	~~15~~ 12	1.~~4~~ 1
Transportation	~~13~~ 10	~~1~~ 0 .~~2~~ 9
Warehouse	~~13~~ 10	~~1~~ 0 .~~2~~ 9
Workshop	~~18~~ 14	1.~~7~~

~~Note: The 125 percent multiplier for a continuous load as specified in 210.20(A) is included, therefore no additional multiplier shall be required when using the unit loads in this table for calculating the minimum lighting load for a specified occupancy.~~

3

1 Armories and auditoriums are considered gymnasium-type occupancies.

2 Lodge rooms are similar to hotels and motels.

3 Industrial commercial loft buildings are considered manufacturing-type occupancies.

4 Banks are office-type occupancies.

5 Commercial (storage) garages are considered parking garage occupancies.

6 Clubs are considered restaurant occupancies.

7 Barber shops and beauty parlors are considered retail occupancies.

8 Stores are considered retail occupancies.

Statement of Problem and Substantiation for Public Comment

The table's inclusion of a 125% continuous load multiplier is in conflict with the new section 120.5(E). Therefore the table entries require adjustment to remove the 125% multiplier.

I have done this for the first column by taking the original value, multiplying by 0.8, and then rounding to the nearest integer. I then took the resulting values and divided by 3.28*3.28 to convert from VA/m^2 to VA/ft^2, and rounded the result to the nearest tenth to generate the new values for the second column.

Note that in a few cases, this resulted in a new second column value that is 0.1 less than the rounding of 0.8 times the original value. Such disparities are unavoidable when rounding. In these cases, if it is desired, the new values could be increased by 1 VA/m^2 and 0.1 VA/ft^2, which would result in the second column being the preferred data source, rather than the first column.

Related Item

• FR 8190-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Wayne Whitney
Organization: Whitney
Street Address:
City:
State:
Zip:

Submittal Date: Thu Jul 11 13:52:49 EDT 2024
Committee: NEC-P02

Public Comment No. 1693-NFPA 70-2024 [Section No. 120.54]

120.54 Electric Clothes Dryers — Dwelling Unit(s).

The load for household electric clothes dryers in a dwelling unit(s) shall be the nameplate rating when available or 5000 watts (volt-amperes), whichever is larger, for each dryer served. The use of the demand factors in Table 120.54 shall be permitted. Where two or more single-phase dryers are supplied by a 3-phase, 4-wire feeder or service, the total load shall be calculated on the basis of twice the maximum number connected between any two phases. Kilovolt-amperes (kVA) shall be considered equivalent to kilowatts (kW) for loads calculated in this section.

Table 120.54 Demand Factors for Household Electric Clothes Dryers

Number of Dryers	Demand Factor (%)
~~1–5~~ 1-2	~~80~~ 100
3- 5	~~85~~ 80
6	75
7	65
8	60
9	55
10	50
11	47
12–23	47% minus 1% for each dryer exceeding 11
24–42	35% minus 0.5% for each dryer exceeding 23
43 and over	25%

Statement of Problem and Substantiation for Public Comment

1. FR-8044 contains an error within the table regarding the dryer count:
- 1-5 dryers = 80%
- 5th dryer = 85%
- 5th dryer is referenced twice, and the demand factor percentages do not match.

2. Proposed Update to the below Demand factor % updates:
- 1-2 dryers = 100%.
- 3-5 dryers = 80%.
- Reason for proposed update: A Dwelling unit having 1-2 installed dryers is prevalent within the US. Many households may have 2 dryers that would be used simultaneously. Therefore, please consider updating 1-2 dryers to 100% Demand factor.

Related Item

• FR 8044

Submitter Information Verification

Submitter Full Name: Randy Dollar
Organization: Siemens Industry
Affiliation: American Circuit Breaker Manufacturers Association (ACBMA)
Street Address:
City:
State:
Zip:

Submittal Date: Mon Aug 26 12:23:12 EDT 2024
Committee: NEC-P02

Public Comment No. 1708-NFPA 70-2024 [Section No. 120.54]

120.54 Electric Clothes Dryers — Dwelling Unit(s).

The load for household electric clothes dryers in a dwelling unit(s) shall be the nameplate rating when available or 5000 watts (volt-amperes), ~~whichever is larger,~~ for each dryer served. The use of the demand factors in Table 120.54 shall be permitted. Where two or more single-phase dryers are supplied by a 3-phase, 4-wire feeder or service, the total load shall be calculated on the basis of twice the maximum number connected between any two phases. Kilovolt-amperes (kVA) shall be considered equivalent to kilowatts (kW) for loads calculated in this section.

Table 120.54 Demand Factors for Household Electric Clothes Dryers

Number of Dryers	Demand Factor (%)
~~1–5~~ 1–4	80
5	85
6	75
7	65
8	60
9	55
10	50
11	47
12–23	47% minus 1% for each dryer exceeding 11
24–42	35% minus 0.5% for each dryer exceeding 23
43 and over	25%

Statement of Problem and Substantiation for Public Comment

Right now, this code section has been revised instructing the user to use the "nameplate rating when available". But this code section also still says to use 5 kVA when larger than the nameplate. Based on the changes approved by the CMP in the FR, it appears that the "whichever is larger" language should have been struck from the section but was not. Otherwise, why were the words "nameplate rating when available" added, if the result is still to use the larger of the two? Also, Table 120.54 listed 5 dryers at both 80 and 85%, revised so 80% applies to only 1-4 dryers.

Many electric clothes drying solutions exist whose nameplate ratings are less than 5 kW. These include resistance condensing clothes dryers, heat pump dryers and many combination washer/dryer units. These devices should be treated at their actual loads. If branch circuit wiring is desired to be made robust for future changes, the 5 kW could be maintained for branch circuit calculations, while nameplate ratings are allowed for service and feeder loads.

Related Item

• This PC is related to FR 8044.

Submitter Information Verification

Submitter Full Name: Brennan Less
Organization: LBNL
Street Address:
City:
State:
Zip:

Submittal Date: Mon Aug 26 14:27:39 EDT 2024
Committee: NEC-P02

Public Comment No. 307-NFPA 70-2024 [Section No. 120.54]

120.54 Electric Clothes Dryers — Dwelling Unit(s).

The load for household electric clothes dryers in a dwelling unit(s) shall be the nameplate rating when available or 5000 watts (volt-amperes), whichever is larger, for each dryer served. The use of the demand factors in Table 120.54 shall be permitted. Where two or more single-phase dryers are supplied by a 3-phase, 4-wire feeder or service, the total load shall be calculated on the basis of twice the maximum number connected between any two phases. Kilovolt-amperes (kVA) shall be considered equivalent to kilowatts (kW) for loads calculated in this section.

Table 120.54 Demand Factors for Household Electric Clothes Dryers

Number of Dryers	Demand Factor (%)
1–5	80
~~5~~	~~85~~
6	75
7	65
8	60
9	55
10	50
11	47
12–23	47% minus 1% for each dryer exceeding 11
24–42	35% minus 0.5% for each dryer exceeding 23
43 and over	25%

Statement of Problem and Substantiation for Public Comment

The first line was revised from 1-4 dryers to 1-5 dryers. The second line for 5 dryers should have been deleted.

Related Item

• Public Input No. 4151-NFPA 70-2023

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: none
Street Address:
City:
State:
Zip:

Submittal Date: Mon Jul 29 12:29:46 EDT 2024
Committee: NEC-P02

Public Comment No. 37-NFPA 70-2024 [Section No. 120.54]

120.54 Electric Clothes Dryers — Dwelling Unit(s).

The load for household electric clothes dryers in a dwelling unit(s) shall be the nameplate rating when available or 5000 watts (volt-amperes), whichever is larger, for each dryer served. The use of the demand factors in Table 120.54 shall be permitted. Where two or more single-phase dryers are supplied by a 3-phase, 4-wire feeder or service, the total load shall be calculated on the basis of twice the maximum number connected between any two phases. Kilovolt-amperes (kVA) shall be considered equivalent to kilowatts (kW) for loads calculated in this section.

Table 120.54 Demand Factors for Household Electric Clothes Dryers

Number of Dryers	Demand Factor (%)
1–5	80
~~5~~	~~85~~
6	75
7	65
8	60
9	55
10	50
11	47
12–23	47% minus 1% for each dryer exceeding 11
24–42	35% minus 0.5% for each dryer exceeding 23
43 and over	25%

Statement of Problem and Substantiation for Public Comment

The first draft version of the table is clearly self-contradictory. Given the revisions that were made to the first row, I infer the intention is to delete the second row.

Related Item

• FR 8044-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Wayne Whitney
Organization: Whitney
Street Address:
City:
State:
Zip:

Submittal Date: Thu Jul 11 13:46:54 EDT 2024
Committee: NEC-P02

Public Comment No. 704-NFPA 70-2024 [Section No. 120.54]

120.54 Electric Clothes Dryers — Dwelling Unit(s).

The load for household electric clothes dryers in a dwelling unit(s) shall be the nameplate rating when available or 5000 watts (volt-amperes), whichever is larger, for each dryer served. The use of the demand factors in Table 120.54 shall be permitted. Where two or more single-phase dryers are supplied by a 3-phase, 4-wire feeder or service, the total load shall be calculated on the basis of twice the maximum number connected between any two phases. Kilovolt-amperes (kVA) shall be considered equivalent to kilowatts (kW) for loads calculated in this section.

Table 120.54 Demand Factors for Household Electric Clothes Dryers

Number of Dryers	Demand Factor (%)
1–5	80
5	85
6	75
7	65
8	60
9	55
10	50
11	47
12–23	47% minus 1% for each dryer exceeding 11
24–42	35% minus 0.5% for each dryer exceeding 23
43 and over	25%

Additional Proposed Changes

File Name	Description	Approved
CN_204.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 204 appeared in the First Draft Report on First Revision No. 8044.

The requirements in 220.54 and Table 220.54 do not align and should be reviewed and revised for installations with a single electric clothes dryer. Additionally, 220.54 should be reviewed for compliance with 3.5.4 of the NEC Style Manual. The use of “when” is limited to the expression of time and should be replaced with “if” for condition- based statements. CMP 2 should review the table based on ballot comments regarding two table rows covering 5 dryers.

Related Item

• First Revision No. 8044

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 02 14:01:59 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 204-NFPA 70-2024 [Section No. 220.54]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 11:19:52 EDT 2024

Committee Statement

Committee Statement: The requirements in 220.54 and Table 220.54 do not align and should be reviewed and revised for installations with a single electric clothes dryer. Additionally, 220.54 should be reviewed for compliance with 3.5.4 of the NEC Style Manual. The use of “when” is limited to the expression of time and should be replaced with “if” for condition- based statements. CMP 2 should review the table based on ballot comments regarding two table rows covering 5 dryers.

First Revision No. 8044-NFPA 70-2024 [Section No. 220.54]

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. 1713-NFPA 70-2024 [Section No. 120.57]

120.57 Electric Vehicle Supply Equipment (EVSE) Load.

~~The EVSE~~ For each EVSE served, the EVSE loads shall be calculated at ~~either 7200 watts (volt-amperes) or~~ the nameplate rating of the equipment, ~~whichever is larger, for each EVSE served, unless~~ including ratings modified by 625.42 . If the nameplate rating is unavailable, 240V EVSE shall be treated at 7200 watts (volt-amperes) and 120V EVSE on a dedicated branch circuit shall be treated at 1800 watts (volt-amperes).

Statement of Problem and Substantiation for Public Comment

In FR-8060, the CMP added language pointing to Section 625.42, which allows for EVSE ratings to be modified by EMS and by Adjustable Settings. This approach is appropriate and logical, as many EVSE will use managed charging and other features that reduce their impacts on service loads and on the distribution grid.

Unfortunately, this change leads to inconsistent treatment of managed and unmanaged EVSE loads.

As written, a low-cost, low-power EVSE with an unmanaged nameplate rating of 4 kW must be treated as 7.2 kW in service and feeder load calculations.

In contrast, a managed EVSE with current settings adjusted to 4 kW in accordance with 625.42(B) appears to be permitted to use 4 kW in service and feeder load calculations.

Similarly, an EVSE managed by an EMS to a current limit of 4 kW in accordance with 625.42(A) appears to be permitted to use 4 kW in service and feeder load calculations.

It does not make sense to permit these adjustments per 625.42, while also not permitting simple, low-power and low-cost EVSE to use their nameplate ratings in load calculations. And if these values from section 625.42 cannot be used in load calculations, then why do they exist in the first place? And why are they referenced here by the CMP? The current first draft language unnecessarily discourages and excludes use of low power level 2 charging solutions that do not leverage more expensive EMS or adjustable setting features.

The proposed language in this public comment provides equal treatment of unmanaged nameplate ratings and ratings adjusted by 625.42. The default kW value is then used only when the other values are unavailable/unknown. The proposed language also differentiates between 240V and 120V EVSE installations, with defaults of 7.2 and 1.8 kW, respectively.

Related Item

- FR 8060

Submitter Information Verification

Submitter Full Name: Brennan Less
Organization: LBNL
Street Address:
City:
State:
Zip:

Submittal Date: Mon Aug 26 14:44:33 EDT 2024
Committee: NEC-P02

Public Comment No. 1753-NFPA 70-2024 [Section No. 120.57]

120.57 Electric Vehicle Supply Equipment (EVSE) Load.

~~The~~ For each EVSE served, loads shall be calculated at ~~either 7200 watts~~ the 80% of the capacity of the attached receptacle, the nameplate rating for fixed equipment, or 6,240 VA (volt-amperes) ~~or~~ if the nameplate ~~rating of the equipment, whichever is larger, for each EVSE served, unless modified by 625.42~~ : is unknown or the circuit is reserved for future use.

Statement of Problem and Substantiation for Public Comment

Rewritten to clarify how multiple chargers, such as for apartments, would be calculated:

For large numbers of low power chargers, using a 7200VA default leads to the wrong value: a vast overstatement of the needed circuit capacity.

Like the author of 750-NFPA 70-2023 Wayne Whitney, I would prefer this section be based on Amps, not VA or Watts. Vehicle charging is current controlled independent of voltage. 208Y or 240V or 277V charging heads will all pull the same amps but a different number of volt-amperes. With the introduction of the new NACS connector 208V and 277V charging are likely to become reality, thus a standard based on 240V seems outdated. But for consistency with the existing approach, I have adopted Wayne's 6,240 VA value to at least accommodate 208V circuits.

Please consider that cost is an important element in housing. My area has high building costs and a dearth of affordable units. Every bit we can do to right size electrical helps. Removal of the 7200VA minimum is important for large low power L2 installations in apartments.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1754-NFPA 70-2024 [Section No. 120.7]	Same topic, same author.

Related Item

- First Revision No. 8060-NFPA 70-2024 [Section No. 220.57]
- Public Input No. 1439-NFPA 70-2023 [Section No. 220.57] (7200W minimum)
- Public Input No. 3145-NFPA 70-2023 [Section No. 220.57] (Brennan Less LBNL)
- Public Input No. 4238-NFPA 70-2023 [Section No. 220.57] (0 VA for Energy Management)
- Public Input No. 750-NFPA 70-2023 [Section No. 220.57] (Use Amps not VA, Wayne)

Submitter Information Verification

Submitter Full Name:	Bryce Nesbitt
Organization:	Obviously Inspects
Affiliation:	Based in part on comments and discussions with the NEC POWER group "Panel Optimization Work and Electrical Reassessments"
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Tue Aug 27 02:25:20 EDT 2024
Committee:	NEC-P02

Public Comment No. 2038-NFPA 70-2024 [Section No. 120.57]

120.57 Electric Vehicle Supply Equipment (EVSE) Load.

The EVSE loads shall be calculated ~~at either 7200 watts (volt-amperes) or~~ **per the nameplate rating of the equipment** ~~, whichever is larger,~~ **for each EVSE served,** ~~unless modified~~ **or as by 625.42 (A) . New construction reserved circuits for future EVSE shall be calculated at 30A or larger, regardless of voltage.**

Statement of Problem and Substantiation for Public Comment

Installation of large numbers of level 1 and or level 2 EVSEs should not be penalized with unfavorable load calculations.
Even this rewritten section is overly conservative. For parking lots over eight or so spaces, a load factor could apply as not all vehicles in a large installation will be plugged in, actually charging, charging at full rate, or even capable of charging.

Related Item

• First Revision No. 8060-NFPA 70-2024 [Section No. 220.57] • Public Input No. 3145-NFPA 70-2023 [Section No. 220.57]

Submitter Information Verification

Submitter Full Name: Sven Thesen
Organization: EVCAC
Affiliation: Electric Vehicle Charging for All Coalition, Co-Lead
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 16:33:02 EDT 2024
Committee: NEC-P02

Public Comment No. 399-NFPA 70-2024 [Section No. 120.57]

120.57 Electric Vehicle Supply Equipment (EVSE) Load.

The EVSE loads shall be calculated at either 7200 watts (volt-amperes) or the nameplate rating of the equipment, whichever is larger, for each EVSE served~~, unless modified by 625 , 42.~~

Statement of Problem and Substantiation for Public Comment

Section 90.3 allows for chapter 6 to modify chapter 2. Therefore, a forward reference in the code is not required and should not be made. If a reference to 625.42 is deemed useful, in accordance with 2.1.10 of the NEC Style Manual, a reference to this requirement could be made in an Informational Note.

Related Item

• FR8060

Submitter Information Verification

Submitter Full Name: Joseph Bablo
Organization: UL Solutions
Street Address:
City:
State:
Zip:

Submittal Date: Tue Jul 30 14:58:05 EDT 2024
Committee: NEC-P02

Public Comment No. 705-NFPA 70-2024 [Section No. 120.57]

120.57 Electric Vehicle Supply Equipment (EVSE) Load.

The EVSE loads shall be calculated at either 7200 watts (volt-amperes) or the nameplate rating of the equipment, whichever is larger, for each EVSE served, unless modified by 625.42.

Additional Proposed Changes

File Name	Description	Approved
CN_205.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 205 appeared in the First Draft Report on First Revision No. 8060.

The forward reference to 625.42 should be removed as the code arrangement in 90.3 permits Chapters 5 through 8 to modify the requirements of Chapters 1 through 4. The Correlating Committee directs that a task group consisting of members from CMP 2, CMP 12, and CMP 13 be formed to coordinate the requirements covering EVSE load calculations and their location in the code.

Related Item

• First Revision No. 8060

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 02 14:04:04 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 205-NFPA 70-2024 [Section No. 220.57]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 11:26:49 EDT 2024

Committee Statement

Committee Statement: The forward reference to 625.42 should be removed as the code arrangement in 90.3 permits Chapters 5 through 8 to modify the requirements of Chapters 1 through 4. The Correlating Committee directs that a task group consisting of members from CMP 2, CMP 12, and CMP 13 be formed to coordinate the requirements covering EVSE load calculations and their location in the code.

First Revision No. 8060-NFPA 70-2024 [Section No. 220.57]

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. 1566-NFPA 70-2024 [Section No. 120.61(B)(1)]

(1) Household Electric Ranges, Wall-Mounted Ovens, Counter-Mounted Cooking Units, and Dryers.

A demand factor of 70 percent shall be permitted to be applied to the portion of the feeder or service supplying household electric ranges, wall-mounted ovens, counter-mounted cooking units, and electric dryers, where the maximum unbalanced load has been determined in accordance with Table 120.55 for ranges and Table 120.54 for dryers.

Statement of Problem and Substantiation for Public Comment

As currently written, 220.61(B)(1) states that if there are ranges or dryers on a service or feeder, that a 70% demand factor is applied to the neutral of the entire feeder. This addition makes it more clear that the demand factor only applies to the part of the neutral load associated with the ranges and dryers.

Related Item

• PI 1540

Submitter Information Verification

Submitter Full Name: John McCamish
Organization: Eaton
Street Address:
City:
State:
Zip:

Submittal Date: Fri Aug 23 20:31:36 EDT 2024
Committee: NEC-P02

Public Comment No. 729-NFPA 70-2024 [Section No. 120.82(A)]

(A) Feeder and Service Load.

This section applies to a dwelling unit having the total connected load served by a single 120/240-volt or 208Y/120-volt set of 3-wire service or feeder conductors with an ampacity of 100 or greater. It shall be permissible to calculate the feeder and service loads in accordance with this section instead of the method specified in Article 120, Part III. The calculated load shall be the result of adding the loads from 120.82(B), 120.82(C), and 120.82(D) for each dwelling unit individually . Feeder and service-entrance conductors whose calculated load is determined by this optional calculation shall be permitted to have the neutral load determined by 120.61.

Statement of Problem and Substantiation for Public Comment

Consider a duplex with a single service that supplies two sets of service entrance conductors to two service disconnects, one for each dwelling unit. The service entrance conductors supplying just one dwelling unit can have their load computed using 120.82.

There is, however, some uncertainty as to whether the service conductors supplying both dwelling units may have their load calculated as the sum of those two 120.82 calculations. The current wording of 120.82 leads some AHJs to the interpretation that 120.82 only applies to conductors carrying the load of exactly one dwelling unit, and that the results of that computation can not be used for determining the load on any upstream conductors that supply more than one dwelling unit. This point of view is supported by the observation that 120.84 is available for conductors supplying 3 or more dwelling units, and that 120.85 is available for conductors supplying exactly 2 dwelling units.

However, it makes no sense to limit the calculation results from 120.82 to conductors that supply exactly one dwelling unit. Where a set of conductors supplies multiple other sets of conductors, it is is physically impossible for the load on those conductors to exceed the sum of the loads on the multiple other conductors supplied. Summing those individual loads is always a conservative overestimate of the load on the common supply conductors.

Therefore this change clarifies that conductors that supply multiple dwelling units may have their load determined by calculating the 120.82 load of each dwelling unit separately, and then adding those results.

Related Item

• Public Input No. 457-NFPA 70-2023

Submitter Information Verification

Submitter Full Name: Wayne Whitney
Organization: Whitney
Street Address:
City:
State:
Zip:

Submittal Date: Sun Aug 04 12:34:38 EDT 2024
Committee: NEC-P02

Public Comment No. 1480-NFPA 70-2024 [Section No. 120.83]

120.83 Existing Dwelling Unit.

This section shall be permitted to be used to determine if the existing service or feeder is of sufficient capacity to serve additional loads where the dwelling unit is served by a 120/240-volt or 208Y/120-volt, 3-wire service or feeder. The percentages listed in Table 120.83 shall be used for existing and additional new loads as indicated . The larger connected load of air-conditioning or space heating, but not both, shall be used in accordance with 120 .82(C).

Informational Note: When considering the installation of additional electrical loads to an existing dwelling unit, the respective age of the dwelling unit along with the condition and integrity of the electrical system must be taken into account. Also, due to the potential for coincidental operation of large electrical loads (such as EVSE, HVAC equipment, instantaneous water heaters, etc.), the implementation of EMS and PCS in accordance with article 130 and section 120.7 may be required.

Load calculations shall include the following:

(1) General lighting and general-use receptacles at 22 volt-amperes/m^2 or 2 volt-amperes/ft^2

(2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit covered in 210.11(C)(1) and 210.11(C)(2)

(3) The nameplate rating of the following:

(4) . All appliances that are fastened in place, permanently connected, or located to be on a specific circuit

(5) . Ranges, wall-mounted ovens, counter-mounted cooking units

(6) . Clothes dryers that are not connected to the laundry branch circuit specified in 120.83(2)

(7) . Water heaters

~~Electric~~

a. . Existing electric vehicle supply equipment (EVSE) supplied by an individual branch circuit in accordance with 120.57.

Table 120.83 Existing Dwelling Unit Load Percentages

~~80~~

Load (kVA)	Percent of Load
First 8 kVA of existing and new load	100
Remainder of existing load	40
New ~~EVSE~~	EVSE installed in accordance with 120.57
	100
New central electric resistance space heating	80
All other new loads	50

Additional Proposed Changes

File Name	Description	Approved
CONCERNS_with_the_proposed_section_120.83_2026_NEC_8-22-24.docx	Concerns with the proposed First Draft of Section 120.83	

Statement of Problem and Substantiation for Public Comment

Several conflicts arise correlating the proposed (First Draft) language and structure for section 120.83 with many other proposed sections of the 2026 NEC [specifically 120.57; 625.41; 625.42; 120.53; 120.82(D)]. Essentially, the proposed (First Draft) language and structure of section 120.83 is – open to misapplication of the standard in the field, highly open to misinterpretation, imposes conflicts with other sections of the NEC which will make it very difficult for AHJ enforcement, and is simply unsafe to universally apply to existing dwelling units. These proposed 2nd Draft changes are intended to mitigate the above concerns.

A top concern in the substantiation of the proposed (First Draft) of 120.83 (stated in Public Input No. 3028-NFPA 70-2023 [Section No. 220.83]) relates to the argument by LBNL stating that… "Millions of existing US dwelling units are going to undergo the electrification of fuel-fired end-uses in coming decades".

Since, the NEC is a living document that is constantly being review and revised to reflect actual new technologies, real world conditions, and changes which are imminent – the changes to the (2026) NEC must be applicable to such conditions that will be in effect and enforced by AHJs when the 2026 NEC is adopted (Not apply to 'potential' changes over the course of future decades).

There are significant variables and factors that don't seem to be seriously considered in the First Draft recommendation for 120.83. It's critical that the overall electrical safety of an existing dwelling unit (home) does not become compromised due to the installation of new high demand electrical loads which are likely to operate coincidentally, and in addition to existing general lighting and other appliance loads.

Giving serious consideration to current, real world conditions within states that are early adopters of the NEC (Texas, Nebraska, Michigan, Ohio, Minnesota, North Dakota, Massachusetts, Maine, Washington, etc.)... each of these states contain highly populated areas, have diverse demographics, have an abundance of older homes, are areas which commonly experience extreme seasonal weather conditions (winter and/or summer) and do experience coincidental operation of high demand loads – such as environmental air / central space heating systems and EVSE, for extended periods and not simply for hours periodically, but, often, for consecutive days and weeks, extending through months (daytime and night time).

Also taking into account the US regions which annually experience severe temperatures for several months (such as: Central and Southern California; the greater Reno & Las Vegas, Nevada areas; the greater Phoenix & Tucson, Arizona areas; Santa Fee and Albuquerque, New Mexico; also throughout Texas and Florida) – highly populated areas that will have HVAC equipment (etc.) operating coincidentally with EVSE when the homeowner's EV is the prime mode of transportation.

Furthermore, it's imprudent to presume a homeowner will upgrade their environmental air / central space heating equipment at the same time they purchase a new

EV and install new EVSE – let alone presume a homeowner will readily implement EMS / PCS technologies to either their environmental air / central space heating or EVSE (especially when seriously considering the US regions identified earlier).

When considering the installation of additional electrical loads to an existing dwelling unit, the respective age of the dwelling unit along with the condition and integrity of the electrical system must be taken into account. Also, due to the potential for coincidental operation of large electrical loads (such as EVSE, HVAC equipment, instantaneous water heaters, etc.), the implementation of EMS and PCS in accordance with article 130 and section 120.7 may be required.

Related Item

• Public Input No. 3028-NFPA 70-2023 [Section No. 220.83]

Submitter Information Verification

Submitter Full Name: Edmund T Ned Johns
Organization: Generac Power Systems Inc
Street Address:
City:
State:
Zip:

Submittal Date: Fri Aug 23 13:47:29 EDT 2024
Committee: NEC-P02

Several conflicts arise correlating this proposed language and structure for section 120.83 with many other proposed sections of the 2026 NEC [specifically 120.57; 625.41; 625.42; 120.53; 120.82(D)]. Also, the language proposed in 120.83 presents conflicts which can be misapplied or misinterpreted – creating difficulty with proper application of the standard in the field, as well as confusion at the level of jurisdictional enforcement.

Some of the concerns in context:

1. Section 120.57 essentially states EVSE load shall be 100% "… for each EVSE served, unless modified by 625.42."

2. The demand factor permitted in 120.53 does not apply to EVSE.

3. **Is** 120.83(3)(e) stating / implying that EVSE is existing (at 7200 Watts or Nameplate value @ 100%)?
    a. Then, is proposed Table 120.83 stating that installing an additional ("New") EVSE is permitted at 80%?
        i. OR
    b. **Is** the proposed Table 120.83 stating that ***regardless*** if the EVSE is "New" to the existing dwelling, or the EVSE is an additional ("New") EVSE to the existing dwelling = 80% is permitted?

4. **Is** the proposed 120.83 (and Table) then permitting the following on an existing dwelling unit @ 50%? :
    a. An existing 35 year old dwelling unit (home) in Wisconsin (in the outskirts of Milwaukee)
    b. Work is being done to convert an unfinished basement into a habitable / home office space, plus a bathroom
        i. Plans to install (2) each – 240V, 1350 Watt baseboard heaters (for the office) = NOT central heat
        ii. Plans to install (1) each – 240V, 1130 Watt heater (for the bathroom) = NOT central heat
        iii. Plans to install (1) each – Instant water heater (for the bathroom)

5. The proposed section 120.83 does not reference, nor does it provide informational notes which correspond to, sections 120.7; 130.30; and/or part II of article 130.

6. Impending difficulty correlating the application and enforcement of the proposed 120.83 with the sizing and installation of optional standby systems per 702.4(A).

A top concern in the substantiation of the proposed 120.83 relates to the argument by LBNL stating that… "Millions of existing US dwelling units are going to undergo the electrification of fuel-fired end-uses in coming decades".

Since, the NEC is a living document that is constantly being review and revised to reflect actual new technologies, real world conditions, and changes which are imminent – the changes to the (2026) NEC must be applicable to such conditions that will be in effect and enforced by AHJs when the 2026 NEC is adopted (Not apply to 'potential' changes over the course of future decades).

There are significant variables and factors that don't seem to be seriously considered in this recommendation for 120.83. It's critical that the overall electrical safety of an existing dwelling unit (home) does not become compromised due to the installation of new high demand electrical loads which are likely to operate coincidentally, and in addition to existing general lighting and other appliance loads.

Giving serious consideration to current, real world conditions within states that are early adopters of the NEC (Texas, Nebraska, Michigan, Ohio, Minnesota, North Dakota, Massachusetts, Maine, Washington, etc.)... each of these states contain highly populated areas, have diverse demographics, have an abundance of older homes, are areas which commonly experience extreme seasonal weather conditions (winter and/or summer) and do experience coincidental operation of high demand loads – such as environmental air / central space heating systems and EVSE, for extended periods and not simply for hours periodically, but, often, for consecutive days and weeks, extending through months (daytime and night time).

Also taking into account the US regions which annually experience severe temperatures for several months (such as: Central and Southern California; the greater Reno & Las Vegas, Nevada areas; the greater Phoenix & Tucson, Arizona areas; Santa Fee and Albuquerque, New Mexico; also throughout Texas and Florida) – highly populated areas that will have HVAC equipment (etc.) operating coincidentally with EVSE when the homeowner's EV is the prime mode of transportation.

Furthermore, it's imprudent to presume a homeowner will upgrade their environmental air / central space heating equipment at the same time they purchase a new EV and install new EVSE – let alone presume a homeowner will readily implement EMS / PCS technologies to either their environmental air / central space heating or EVSE (especially when seriously considering the US regions identified earlier).

SUMMARY: The proposed language and structure of section 120.83 is – open to misapplication in the field, highly open to misinterpretation, imposes conflicts with other sections of the NEC which will make it very difficult for AHJ enforcement, and is simply unsafe to universally apply to existing dwelling units.

Written by: Edmund T. (Ned) Johns – Technical Application Manager, Generac Power Systems, Inc. (8-22-2024)

Public Comment No. 1691-NFPA 70-2024 [Section No. 120.83]

120.83 Existing Dwelling Unit.

This section shall be permitted to be used to determine if the existing service or feeder is of sufficient capacity to serve additional loads where the dwelling unit is served by a 120/240-volt or 208Y/120-volt, 3-wire service or feeder. The percentages listed in Table 120.83 shall be used for existing and additional new loads. The larger connected load of air-conditioning or space heating, but not both, shall be used.

Load calculations shall include the following:

(1) General lighting and general-use receptacles at 22 volt-amperes/m^2 or 2 volt-amperes/ft^2

(2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit covered in 210.11(C)(1) and 210.11(C)(2)

(3) The nameplate rating of the following:

(4) All appliances that are fastened in place, permanently connected, or located to be on a specific circuit

(5) Ranges, wall-mounted ovens, counter-mounted cooking units

(6) Clothes dryers that are not connected to the laundry branch circuit specified in 120.83(2)

(7) Water heaters

(8) Electric vehicle supply equipment (EVSE) supplied by an individual branch circuit

Table 120.83 Existing Dwelling Unit Load Percentages

Load (kVA)	Percent of Load
First 8 kVA of existing and new load	100
Remainder of existing load	40
New EVSE	~~80~~ 100
New central electric resistance space heating	80
All other new loads	50

Statement of Problem and Substantiation for Public Comment

An EVSE load is the same whether the dwelling is new or existing. Section 120.82(D) states “The total load of an EVSE shall be calculated at 100 percent in accordance with 120.57.” The load percentage in 120.83 should align with 120.82.

Related Item

• FR 8188

Submitter Information Verification

Submitter Full Name: Randy Dollar
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Affiliation: American Circuit Breaker Manufacturers Association (ACBMA)
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Submittal Date: Mon Aug 26 12:16:52 EDT 2024
Committee: NEC-P02

Public Comment No. 707-NFPA 70-2024 [Section No. 120.83]

120.83 Existing Dwelling Unit.

This section shall be permitted to be used to determine if the existing service or feeder is of sufficient capacity to serve additional loads where the dwelling unit is served by a 120/240-volt or 208Y/120-volt, 3-wire service or feeder. The percentages listed in Table 120.83 shall be used for existing and additional new loads. The larger connected load of air-conditioning or space heating, but not both, shall be used.

Load calculations shall include the following:

(1) General lighting and general-use receptacles at 22 volt-amperes/m^2 or 2 volt-amperes/ft^2

(2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit covered in 210.11(C)(1) and 210.11(C)(2)

(3) The nameplate rating of the following:

a. All appliances that are fastened in place, permanently connected, or located to be on a specific circuit

b. Ranges, wall-mounted ovens, counter-mounted cooking units

c. Clothes dryers that are not connected to the laundry branch circuit specified in 120.83(2)

d. Water heaters

e. Electric vehicle supply equipment (EVSE) supplied by an individual branch circuit

Table 120.83 Existing Dwelling Unit Load Percentages

Load (kVA)	Percent of Load
First 8 kVA of existing and new load	100
Remainder of existing load	40
New EVSE	80
New central electric resistance space heating	80
All other new loads	50

Additional Proposed Changes

File Name	Description	Approved
CN_207.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 207 appeared in the First Draft Report on First Revision No. 8186.

This section should be reviewed for compliance with 3.5.4 of the NEC Style Manual. The use of “where” is limited to the expression of location and should be replaced with “if” for condition based statements.

Related Item

• First Revision No. 8186

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 02 14:07:11 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 207-NFPA 70-2024 [Section No. 220.83]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 11:30:46 EDT 2024

Committee Statement

Committee Statement: This section should be reviewed for compliance with 3.5.4 of the NEC Style Manual. The use of “where” is limited to the expression of location and should be replaced with “if” for condition based statements.

First Revision No. 8186-NFPA 70-2024 [Section No. 396.10(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. 84-NFPA 70-2024 [Section No. 120.83]

120.83 Existing Dwelling Unit.

This section shall be permitted to be used to determine if the existing service or feeder is of sufficient capacity to serve additional loads where the dwelling unit is served by a 120/240-volt or 208Y/120-volt, 3-wire service or feeder. The percentages listed in Table 120.83 shall be used for existing and additional new loads. The larger connected load of air-conditioning or space heating, but not both, shall be used.

Load calculations shall include the following:

(1) General lighting and general-use receptacles at 22 volt-amperes/m^2 or 2 volt-amperes/ft^2

(2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit covered in 210.11(C)(1) and 210.11(C)(2)

(3) The nameplate rating of the following equipment that are not connected to the branch circuits addressed in 120.83(1) or 120.83(2) :

(4) All appliances that are fastened in place, permanently connected, or located to be on a specific circuit

(5) Ranges, wall-mounted ovens, counter-mounted cooking units

(6) Clothes dryers

~~that are not connected to the laundry branch circuit specified in 120.83(2)~~

a.

b. Water heaters

c. Electric vehicle supply equipment (EVSE) supplied by an individual branch circuit

Table 120.83 Existing Dwelling Unit Load Percentages

Load (kVA)	Percent of Load
First 8 kVA of existing and new load	100
Remainder of existing load	40
New EVSE	80
New central electric resistance space heating	80
All other new loads	50

Additional Proposed Changes

File Name	Description	Approved
120.83_pc84_tracked_changes_text.docx	Terraview shows revision to the entire list in 120.83(3). The attached document more clearly shows the tracked changes for this public comment.	

Statement of Problem and Substantiation for Public Comment

For some loads, section 120.83 currently appears to require double-counting. This occurs when a load is treated using default values (in 120.83(1) and (2)) and is also required to use its nameplate value in 120.83(3). The load is added once using its default treatment and then added a second time using its nameplate rating. Currently, only clothes dryers have specific language to avoid this double-counting (see 120.83(3)(c)). The proposed language clarifies that loads connected to branch circuits already treated with default values are not to be double-counted in 120.83 calculations. It generalizes the clarity currently provided for clothes dryers.

Related Item

• This relates to PI 3319 and FR 8188, which are directed towards improving clarity and usability of 120.83 for existing dwellings, and which directly revised the list in 120.83(3).

Submitter Information Verification

Submitter Full Name: Brennan Less
Organization: LBNL
Street Address:
City:
State:
Zip:

Submittal Date: Tue Jul 16 10:42:32 EDT 2024
Committee: NEC-P02

120.83 Existing Dwelling Unit.

This section shall be permitted to be used to determine if the existing service or feeder is of sufficient capacity to serve additional loads where the dwelling unit is served by a 120/240-volt or 208Y/120-volt, 3-wire service or feeder. The percentages listed in Table 120.83 shall be used for existing and additional new loads. The larger connected load of air-conditioning or space heating, but not both, shall be used.

Load calculations shall include the following:

1) General lighting and general-use receptacles at 22 volt-amperes/m^2 or 2 volt-amperes/ft^2
2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit covered in 210.11(C)(1) and 210.11(C)(2)
3) The nameplate rating of the following equipment that are not connected to the branch circuits addressed in 120.83(1) or 120.83(2):
    a. All appliances that are fastened in place, permanently connected, or located to be on a specific circuit
    b. Ranges, wall-mounted ovens, counter-mounted cooking units
    c. Clothes dryers ~~that are not connected to the laundry branch circuit specified in 120.83(2)~~
    d. Water heaters
    e. Electric vehicle supply equipment (EVSE) supplied by an individual branch circuit

Public Comment No. 87-NFPA 70-2024 [Section No. 120.84]

120.84 Multifamily Dwelling.

(A) Feeder or Service Load.

It shall be permissible to calculate the load of a feeder or service that supplies three or more dwelling units of a multifamily dwelling in accordance with Table 120.84(~~B~~ C) instead of Article 120, Part III if all the following conditions are met:

(1) No dwelling unit is supplied by more than one feeder.

(2) Each dwelling unit is equipped with electric cooking equipment.

Exception: When the calculated load for multifamily dwellings without electric cooking in Article 120, Part III exceeds that calculated under Article 120, Part IV for the identical load plus electric cooking (based on 8 kW per unit), the lesser of the two loads shall be permitted to be used.

(3) Each dwelling unit is equipped with either electric space heating or air conditioning, or both. Feeders and service conductors whose calculated load is determined by this optional calculation shall be permitted to have the neutral load determined by 120.61.

(B) House Loads.

House loads shall be calculated in accordance with Article 120, Part III and shall be in addition to the dwelling unit loads calculated in accordance with Table 120.84(~~B~~ C).

~~Table 120.84~~

(

~~B) Optional Calculations — Demand Factors for Three or More Multifamily Dwelling Units Number of~~

~~Dwelling Units Demand Factor~~

~~(%) 3–5 45 6–7 44 8–10 43 11 42 12–13 41 14–15 40 16–17 39 18–20 38 21 37 22–23 36 24–25 35 26–27 34 28–30 33 31 32 32–33 31 34–36 30 37–38 29 39–42 28 43–45 27 46–50 26 51–55 25 56–61 24 62 and over 23~~

(C) Calculated Loads.

The calculated load to which the demand factors of Table 120.84(~~B~~ C) apply shall include the following:

(1) 22 volt-amperes/m^2 or 2 volt-amperes/ft^2 for general lighting and general-use receptacles

(2) 1500 volt-amperes for each 2-wire, 20-ampere small-appliance branch circuit and each laundry branch circuit covered in 210.11(C)(1) and 210.11(C)(2)

(3) The nameplate rating of the following:

(4) All appliances that are fastened in place, permanently connected, or located to be on a specific circuit

(5) Ranges, wall-mounted ovens, counter-mounted cooking units

(6) Clothes dryers that are not connected to the laundry branch circuit specified in 120.84(C)(2)

(7) Water heaters

(8) The nameplate ampere or kVA rating of all permanently connected motors not included in 120.84(C)(3)

(9) The larger of the air-conditioning load or the fixed electric space-heating load

Table 120.84(C) Optional Calculations — Demand Factors for Three or More Multifamily Dwelling Units

Number of Dwelling Units	Demand Factor (%)
3–5	45
6–7	44
8–10	43
11	42
12–13	41
14–15	40
16–17	39
18–20	38
21	37
22–23	36
24–25	35
26–27	34
28–30	33
31	32
32–33	31
34–36	30
37–38	29
39–42	28
43–45	27
46–50	26
51–55	25
56–61	24
62 and over	23

Statement of Problem and Substantiation for Public Comment

Apologies for the format of the tracked changes proposed here. This public comment addresses the fact that current Table 120.84(B) is located in the House Loads section where it is not used. The table is used for the Calculated Loads in 120.84(C). I believe the table should be re-located to the section that it applies to.

Related Item

• PIs # 3073 and 438

Submitter Information Verification

Submitter Full Name: Brennan Less
Organization: LBNL
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City:
State:
Zip:
Submittal Date: Tue Jul 16 13:34:07 EDT 2024
Committee: NEC-P02

Public Comment No. 90-NFPA 70-2024 [Section No. 120.84(A)]

(A) Feeder or Service Load.

It shall be permissible to calculate the load of a feeder or service that supplies three or more dwelling units of a multifamily dwelling in accordance with Table 120.84(B) instead of Article 120, Part III if all the following conditions are met:

(1) No dwelling unit is supplied by more than one feeder.

(2) Each dwelling unit is equipped with electric cooking equipment.

Exception: When the calculated load for multifamily dwellings without electric cooking in Article 120, Part III exceeds that calculated under Article 120, Part IV for the identical load plus electric cooking (based on 8 kW per unit), the lesser of the two loads shall be permitted to be used.

(3) Each dwelling unit is equipped with either electric space heating or air conditioning, or both. Feeders and service conductors whose calculated load is determined by this optional calculation shall be permitted to have the neutral load determined by 120.61.

(4) Where two or more single-phase 120/208V dwelling units are supplied by a 3-phase, 4-wire feeder or service, the total demand load shall be calculated on the basis of twice the maximum number dwelling units connected between any two phases.

Statement of Problem and Substantiation for Public Comment

The current language results in an undersized service for multifamily dwellings supplied by a three-phase service.
Current NEC Text
Example 1: A twenty-unit multifamily dwelling [each dwelling 20 kVA, 120/240V] on a 120/240V single-phase service will have a service demand load of 633A.
Service VA Load = 20,000 VA x 20 units x 38%
Service VA Load = 152,000 VA for two phases (76 VA per phase)
Service Size = 152,000 VA/240V
Service Size = 633A CORRECT

Example 2: A thirty-unit multifamily dwelling [each dwelling 20 kVA, 120/208V] on a 208Y/120V three-phase service will have a service demand load of 550A.
Note: There are 20 units on each of the three phases, not 30 units.
Service VA Load = 20,000 VA x 30 units x 33%
Service VA Load = 198,000 VA for three phases (66 VA per phase)
Service Size = 198,000 VA/(208V x 1.732)
Service Size = 550A, WRONG

Proposed NEC
Example: A thirty-unit multifamily dwelling [each dwelling 20 kVA, 120/208V] on a 208Y/120V three-phase service will have a service demand load of 633A. Based on 20 units per phase demand factor, not a 30-unit demand factor.
Service VA Load = 20,000 VA x 20 units x 38%
Service VA Load = 152,000 VA for two phases (76 VA per phase)
Service Size = 76,000 VA x 3 phases)/(208V x 1.732)
Service Size = 228,000 VA/(208V x 1.732)
Service Size = 633A CORRECT
Note: This concept is contained in 220.54 for Dryers and 220.55 for Ranges.

Related Item

• 3073

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
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City:
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Zip:

Submittal Date: Tue Jul 16 17:49:42 EDT 2024
Committee: NEC-P02

Public Comment No. 1121-NFPA 70-2024 [Section No. 120.87]

120.87 Determining Existing Loads.

The calculation of a feeder or service load for existing installations shall be permitted to use actual maximum demand to determine the existing load under all of the following conditions:

(1) The maximum demand data is available for a 1-year period.

Exception: If the maximum demand data for a 1-year period is not available, the calculated load shall be permitted to be based on the maximum demand (the highest average kilowatts reached and maintained for a 15-minute interval) continuously recorded over a minimum 30-day period using a recording ammeter or power meter connected to the highest loaded phase of the feeder or service, based on the initial loading at the start of the recording. The recording shall reflect the maximum demand of the feeder or service by being taken when the building or space is occupied and shall include by measurement or calculation the larger of the heating or cooling equipment load, and other loads that might be periodic in nature due to seasonal or similar conditions.~~ This exception shall not be permitted if the feeder or service has a~~ The maximum power production source output contribution from each interconnected renewable energy system (i.e., ~~solar photovoltaic~~ PV system, or wind electric system) shall be added to the maximum demand data. This exception shall not be permitted if the feeder or service employs any form of peak load shaving.

(2) The maximum demand at 125 percent plus the new load does not exceed the ampacity of the feeder or rating of the service.

(3) The feeder has overcurrent protection in accordance with 240.4, and the service has overload protection in accordance with 230.90.

Statement of Problem and Substantiation for Public Comment

Renewable energy system(s) connected to a feeder or service should not eliminate the ability to utilize this exception, provided the maximum power production source contribution of each renewable energy system is added to the feeder or service maximum demand data.

If a facility owner has existing electrical capacity in their power system, they should not be penalized for having or adding a renewable energy system.

The change in text does not alter the original exception's intent; however, it provides more flexibility when selecting an interconnection location for a renewable energy system.

Related Item

• PI-2855

Submitter Information Verification

Submitter Full Name: Duke Schamel
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Street Address:
City:
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Zip:

Submittal Date: Thu Aug 15 12:35:10 EDT 2024
Committee: NEC-P02

Public Comment No. 1611-NFPA 70-2024 [Section No. 120.87]

120.87 Determining Existing Loads.

The calculation of a feeder or service load for existing installations shall be permitted to use actual maximum demand to determine the existing load under all of the following conditions:

(1) The maximum demand data is available for a 1-year period.

Exception: If the maximum demand data for a 1-year period is not available, the calculated load shall be permitted to be based on the maximum demand ~~(the highest average kilowatts reached and maintained for a 15-minute interval)~~ continuously recorded over a minimum 30-day period using a recording ammeter or power meter connected to the highest loaded phase of the feeder or service, based on the initial loading at the start of the recording, provided that the data is recorded using a maximum 15-minute sampling interval . The recording shall reflect the maximum demand of the feeder or service by being taken when the building or space is occupied and shall include by measurement or calculation the larger of the heating or cooling equipment load, and other loads that might be periodic in nature due to seasonal or similar conditions. This exception shall not be permitted if the feeder or service has a renewable energy system (i.e., solar photovoltaic or wind electric) or employs any form of peak load shaving.

(2) The maximum demand at 125 percent plus the new load does not exceed the ampacity of the feeder or rating of the service.

(3) The feeder has overcurrent protection in accordance with 240.4, and the service has overload protection in accordance with 230.90.

Statement of Problem and Substantiation for Public Comment

The parenthetical "definition" of "maximum demand" in the Exception is confusing as currently written because it is unclear how that relates to the meaning of "maximum demand" in item (1) above. Moving the requirement to the main text of the sentence in the Exception increases clarity, in particular that the 15-minute requirement has nothing to do with the "maximum demand" in item (1). Indeed, by providing the 15 minute maximum in the Exception, but not in item (1), it becomes implicit that the sampling interval in item (1) may be longer than 15 minutes.

Related Item

• 349-NFPA 70-2023

Submitter Information Verification

Submitter Full Name: Wayne Whitney
Organization: Whitney
Street Address:
City:
State:
Zip:

Submittal Date: Sat Aug 24 15:18:22 EDT 2024
Committee: NEC-P02

Public Comment No. 1613-NFPA 70-2024 [Section No. 120.87]

120.87 Determining Existing Loads.

The calculation of a feeder or service load for existing installations shall be permitted to use actual maximum demand to determine the existing load under all of the following conditions:

(1) The maximum demand data is available for a 1-year period.

Exception: If the maximum demand data for a 1-year period is not available, the calculated load shall be permitted to be based on the maximum demand (the highest average kilowatts reached and maintained for a 15-minute interval) continuously recorded over a minimum 30-day period using a recording ammeter or power meter connected to the highest loaded phase of the feeder or service, based on the initial loading at the start of the recording. The recording shall reflect the maximum demand of the feeder or service by being taken when the building or space is occupied and shall include by measurement or calculation the larger of the heating or cooling equipment load, and other loads that might be periodic in nature due to seasonal or similar conditions. This exception shall not be permitted if the feeder or service has ~~a renewable energy system (i.e., solar photovoltaic or wind electric) or~~ an interconnected power source or employs any form of peak load shaving.

(2) The maximum demand at 125 percent plus the new load does not exceed the ampacity of the feeder or rating of the service.

(3) The feeder has overcurrent protection in accordance with 240.4, and the service has overload protection in accordance with 230.90.

Statement of Problem and Substantiation for Public Comment

The current language in the exception is clearly discriminatory against renewable power sources without any technical justification. Whatever confounding problems an interconnected solar or wind power source could cause in the use of the exception clearly would occur for any interconnected power source. E.g. a coil fired, steam powered rotary generator.

Further it seems to me that any such problems would be solved by requiring the metering and summation of all input power sources as proposed in Public Input 2855-NFPA 70-2023. So unless there is a technical issue that such a procedure would not overcome, I suggest the adoption of the language in that Public Input.

Related Item

• Public Input 2855-NFPA 70-2023

Submitter Information Verification

Submitter Full Name: Wayne Whitney
Organization: Whitney
Street Address:
City:
State:
Zip:

Submittal Date: Sat Aug 24 15:42:23 EDT 2024
Committee: NEC-P02

Public Comment No. 86-NFPA 70-2024 [Section No. 120.87]

120.87 Determining Existing Loads.

The calculation of a feeder or service load for existing installations shall be permitted to use actual maximum demand to determine the existing load under all of the following conditions:

(1) The maximum demand data is available for a 1-year period at a time interval no greater than 15-minutes .

Exception 1 : If the maximum demand data for a 1-year period is not available, the calculated load shall be permitted to be based on the maximum demand (the highest average kilowatts reached and maintained for a 15-minute interval) continuously recorded over a minimum 30-day period using a recording ammeter or power meter connected to the highest loaded phase or all phases of the feeder or service, based on the initial loading at the start of the recording. The recording shall reflect the maximum demand of the feeder or service by being taken when the building or space is occupied and shall include by measurement or calculation the larger of the heating or cooling equipment load, and other loads that might be periodic in nature due to seasonal or similar conditions. ~~This exception shall not be permitted if~~ When the feeder or service ~~has a renewable energy system (i.e.~~ is supplied by more than one electric power source (e.g. , solar photovoltaic~~or~~ , wind electric or energy storage system), or ~~employs any form of~~ when peak load shaving not treated in accordance with 120 .7 is present on the service or feeder, the maximum demand shall include by measurement or calculation the total demand of connected loads.

Exception 2: In dwelling units, a demand data time interval up to 60-minutes shall be permitted with the following adjustments. 60-minute maximum values less than or equal to 7.5 kW shall be multiplied by 140 percent plus 2.2 kW. All other 60-minute maximum values shall have 5.2 kW added.

(2) The maximum demand at 125 percent plus the ~~new load~~ sum of the new loads being added minus the sum of any existing loads being removed does not exceed the ampacity of the feeder or rating of the service. Loads being added or removed shall be permitted to be treated using values and percentages used for service and feeder load calculations in Parts III-IV of this article. The larger connected load of any air-conditioning or space heating equipment that is added or removed shall be used.

(3) The feeder has overcurrent protection in accordance with 240.4, and the service has overload protection in accordance with 230.90.

Additional Proposed Changes

File Name	Description	Approved
Panels_15min_vs_60min_scatterplot_proposedPiecewiseFunction.jpeg	Plot shows the proposed adjustment for hourly data from dwelling units (red line), overlaid on top of metered maximum demand data from 11,940 existing US dwellings.	

Statement of Problem and Substantiation for Public Comment

Change # 1: Addition of a 15-minute maximum time interval for demand data, plus an exception allowing adjusted 60-minute data for dwelling units.

As currently written, 120.87 does not specify an acceptable time interval for demand data recordings. This leads to inconsistent application and use of this code section. As currently written, one could use hourly, daily or even monthly demand data for this calculation. These values are not appropriate for a load calculation, and their use may lead to overload conditions. A maximum interval of 15 minutes is appropriate. It is the time period currently specified in the exception in this section It is commonly available from utility meter readings. It allows use of shorter time intervals if desired and available. And it aligns with the time-duration over which circuit breakers trip when in overload conditions of 100-150% of their rating.

The added second exception is needed for dwelling units, because utility meters in dwellings usually report only hourly demand data. This data can be safely used for load calculations if conservative adjustments are included. The proposed adjustments for hourly interval data were derived by comparing 15- and 60-minute maximum demand in 11,940 US dwellings. The adjustments provide a conservative estimate of 15-minute maximum demand in 99% of dwellings.

Change # 2: Allow metering of all phases, not just highest loaded phase in Exception 1.

The exception currently specifies metering the highest loaded phase, presumably so that only one CT device is required. Proposed language clarifies that metering all phases is also acceptable.

Change # 3: For exception 1, require users to account for parallel power sources and allow peak shaving that is part of 120.7 PCS control.

Exception 1 unnecessarily excludes millions of services and feeders with renewables and other power sources. Rather than exclude them, the proposed language requires users to account for parallel power sources (e.g., batteries, renewables, etc.), just as they are required to account for other large seasonal loads when using the exception. The proposed language allows for several compliance paths, such as calculation of gross demand based on net-metering data, or adding inverter output to the observed demand. Also, added clarifying language that permits use of the exception in cases where PCS are used for peak load shaving consistent with new section 120.7.

Change # 4: Loads being removed can be deducted from the metered demand data.

Currently, item (2) does not explicitly permit deductions for loads being removed. This is inconsistent with all other load calculation methods, where loads not present on the service are not included in the calculation. For example, when an HVAC heat pump replaces an existing air conditioner, section 120.83 would exclude the air conditioner from the load calculation. This is also the case when using Part III or Part IV optional calculations. Some users of this code section report deducting loads that are removed, while others interpret this as prohibited. The proposed language allows users to deduct loads being removed, making this section consistent with the rest of the code and avoiding different user interpretations.

Change # 5: Users can reference and use values and percentages from Parts III and IV of Section 120 for loads added or removed.

Currently, item (2) is unclear as to how new loads are accounted for, which leads to inconsistent interpretation and use. Some users report that new loads must be treated at 100% of nameplate for this calculation, while others report using values from throughout Parts III-IV of Section 120. For example, when adding a new cooking range, does the user apply 8 kW from Table 120.55 or the nameplate rating of 11 kW? Or when adding an electric dryer, is the user permitted to treat it at 80%, as specified in Table 120.54? To align 120.87 with the rest of the code and to clarify implementation, the proposed language permits users to use values and percentages from Parts III-IV.

Related Item

• This comment relates to my public input # 3320 and to inputs by others, including # 1234, 2855 and # 349.

Submitter Information Verification

Submitter Full Name: Brennan Less

Organization: LBNL
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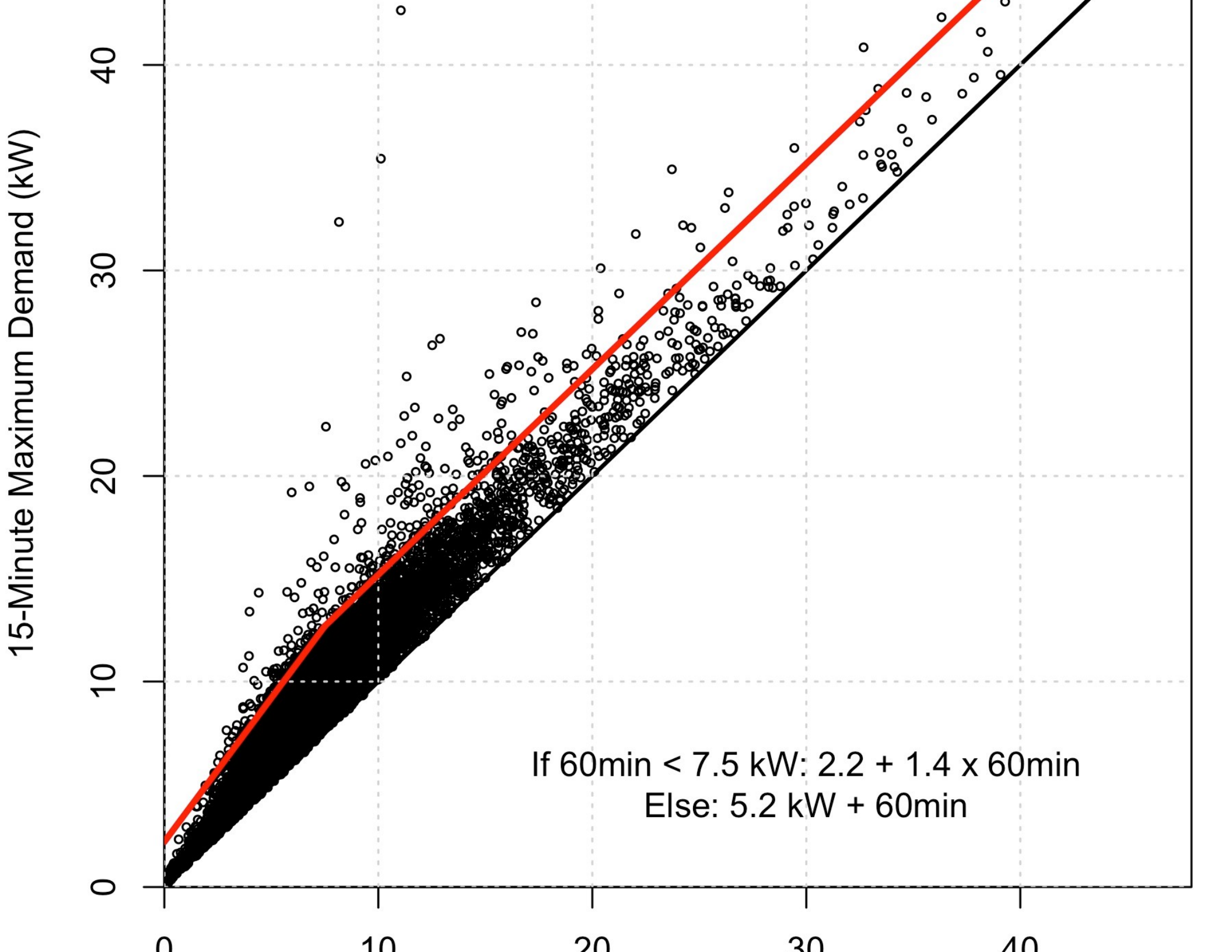
City:
State:
Zip:
Submittal Date: Tue Jul 16 11:50:50 EDT 2024
Committee: NEC-P02


15-Minute Maximum Demand (kW)
0
10
20
30
40
0
10
20
30
40
If 60min < 7.5 kW: 2.2 + 1.4 x 60min
Else: 5.2 kW + 60min

Porter, Christine T.

Schultheis, Timothy James

Williams, David A.

Public Comment No. 533-NFPA 70-2024 [Section No. 210.1]

210.1 Scope.

This article provides the general requirements for branch circuits not over 1000 volts ac, 1500 volts dc, nominal.

Informational Note: See Article 265, Part II for requirements for branch circuits over 1000 volts ac, 1500 volts dc, nominal.

Additional Proposed Changes

File Name	Description	Approved
CN_265.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 265 appeared in the First Draft Report on First Revision No. 7515.

The Correlating Committee directs CMP 2 to review the reference to Part II of Article 235 to revise the reference as the branch circuit requirements for branch circuits over 1000 volts ac, 1500 volts dc, nominal, are now located in Article 265.

Related Item

- First Revision No. 7515

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 23:20:59 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 265-NFPA 70-2024 [Section No. 210.1]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 17:50:47 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 2 to review the reference to Part II of Article 235 to revise the reference as the branch circuit requirements for branch circuits over 1000 volts ac, 1500 volts dc, nominal, are now located in Article 265.

First Revision No. 7515-NFPA 70-2024 [Section No. 210.1]

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. 136-NFPA 70-2024 [Section No. 210.3]

210.3 Reconditioned Equipment.

The following reconditioned equipment shall not be permitted or installed:

(1) Equipment that provides ground-fault circuit-interrupter protection for personnel

(2) Equipment that provides arc-fault circuit-interrupter protection

Statement of Problem and Substantiation for Public Comment

The existing proposed language allows electrical equipment to be reconditioned in place, as it only pertains to the installation process. The National Electrical Code (NEC) can apply to existing installations during modifications, additions, or other changes. It would be incorrect to suggest that the NEC only applies when a product is initially 'installed' into the circuit. Existing installations are often affected by such changes. This new language uses the phrase "shall not be permitted" as all inclusive addressing when an overcurrent device is installed and reconditioned in place.

Related Item

• FR 7517 • PI 1317

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
Organization: Eaton Corporation
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City:
State:
Zip:

Submittal Date: Mon Jul 22 07:07:00 EDT 2024
Committee: NEC-P02

Public Comment No. 460-NFPA 70-2024 [Section No. 210.3]

210.3 Reconditioned Equipment.

The following reconditioned equipment shall not be installed:

(1) Equipment that provides ground-fault circuit-interrupter protection for personnel

(2) Equipment that provides arc-fault circuit-interrupter protection

Additional Proposed Changes

File Name	Description	Approved
CN_108.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 108 appeared in the First Draft Report on First Revision No. 7517.

The Correlating Committee directs CMP 2 to reconsider the language in the requirement and consider the following: "The installation of the following reconditioned equipment shall not be permitted."

Related Item

• First Revision No. 7517

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 18:54:49 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 108-NFPA 70-2024 [Section No. 210.3]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 13:50:12 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 2 to reconsider the language in the requirement and consider the following: "The installation of the following reconditioned equipment shall not be permitted."

First Revision No. 7517-NFPA 70-2024 [Section No. 210.2]

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. 1052-NFPA 70-2024 [Section No. 210.5(C)(1)]

(1) Branch Circuits Supplied from One Nominal Voltage System.

Where the premises wiring system has branch circuits supplied from one nominal voltage system, branch circuit ungrounded conductors shall be identified ~~in accordance with 310.6(C)~~ by methods other than described by 200.7 for grounded conductors and 250.119 for equipment grounding conductors.

Statement of Problem and Substantiation for Public Comment

Code section 210.5(C)(1) refers to 310.6(C)(2) which refers right back to 210.5(C)(1). Neither location provides how to identify ungrounded conductors. Any color used to identify an ungrounded conductor shall not be the what is used for the grounded or equipment grounding conductor.

Related Item

• FR-7523

Submitter Information Verification

Submitter Full Name: David Hittinger
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Affiliation: IEC Codes and Standards
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City:
State:
Zip:

Submittal Date: Mon Aug 12 22:29:41 EDT 2024
Committee: NEC-P02

Public Comment No. 1890-NFPA 70-2024 [Section No. 210.8]

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.

A listed Class A or Class A-HF GFCI shall provide protection in accordance with 210.8(A) through 210.8(F) for ac circuits . The GFCI shall be installed in a readily accessible location. For dc circuits, equivalent protection shall be provided in accordance with 210.8(G) in a readily accessible location.

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

(A) Dwelling Units.

All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms

(2) Garages

(3) Accessory buildings not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use

(4) Outdoors

(5) Crawl spaces — at or below grade level

(6) Basements

(7) Kitchens

(8) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking

(9) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(10) Boathouses

(11) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

(12) Laundry areas

(13) Indoor damp

(14) Indoor wet locations

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: GFCI protection shall not be required for a receptacle supplying only a permanently installed premises security system.

Exception No. 3: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

(B) Other Than Dwelling Units.

All 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less, and all receptacles supplied by three-phase branch circuits rated 150 volts or less to ground, 100 amperes or less, installed in the following locations shall be provided with GFCI protection:

(1) Bathrooms

(2) Kitchens

(3) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking

(4) Buffet serving areas with permanent provisions for food serving, beverage serving, or cooking

(5) Rooftops

(6) Outdoors

(7) Sinks where receptacles or cord-and plug-connected fixed or stationary appliances are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(8) Indoor damp locations

(9) Indoor wet locations

(10) Locker rooms with associated showering facilities

(11) Garages, accessory buildings, service bays, and similar areas other than vehicle exhibition halls and showrooms

(12) Crawl spaces at or below grade level

(13) Unfinished areas of basements

(14) Aquariums, bait wells, and similar open aquatic vessels or containers, such as tanks or bowls, where receptacles are installed within 1.8 m (6 ft.) from the top inside edge or rim or from the conductive support framing of the vessel or container

(15) Laundry areas

(16) Bathtubs and shower stalls where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: At industrial establishments where conditions of maintenance and supervision ensure that only qualified personnel are involved, if a greater hazard is created by power interruption to outdoor fixed and stationary cord- and plug-connected equipment or that has a design that is not compatible with GFCI protection, an assured equipment grounding conductor program in accordance with 590.7(B)(2) shall be implemented and enforced in lieu of GFCI protection provided at the receptacle outlet.

Exception No. 3: Receptacles or cord- and plug-connected fixed and stationary appliances installed within 1.8 m (6 ft) from the top inside edge of a bowl of a sink shall not be required to be GFCI protected in industrial laboratories where the receptacles are used to supply equipment if removal of power would introduce a greater hazard.

Exception No. 4: Receptacles located in patient bed locations of Category 2 (general care) or Category 1 (critical care) spaces of health care facilities shall be permitted to comply with 517.21.

Exception No. 5: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of serving a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

(C) Crawl Space Lighting Outlets.

GFCI protection shall be provided for lighting outlets not exceeding 120 volts, nominal installed in crawl spaces.

(D) Specific Appliances.

GFCI protection shall be provided for the branch circuit or outlet supplying the following appliances rated 150 volts or less to ground and 60 amperes or less, single-phase or 100 amperes or less, 3-phase:

(1) Automotive vacuum machines

(2) Drinking water coolers and bottle fill stations

(3) High-pressure spray washing machines

(4) Tire inflation machines

(5) Vending machines

(6) Sump pumps

(7) Dishwashers

(8) Electric ranges

(9) Wall-mounted ovens

(10) Counter-mounted cooking units

(11) Clothes dryers

(12) Microwave ovens

(E) Equipment Requiring Servicing.

GFCI protection shall be provided for the receptacles required by 210.63.

(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:

(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

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

Effective September 1, 2026, GFCI or SPGFCI protection shall be provided for listed HVAC equipment.

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

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

(G) DC circuits.

A listed device providing ground-fault protection for personnel equivalent to a Class A GFCI shall be provided for the following dc circuits greater than 30 V dc:

(1) Receptacles rated installed in dwelling units in locations as specified in 210.8(A)(1) through (A)(14)

(2) Receptacles rated 100 amperes or less installed in other than dwelling units in locations as specified in 210.8(B)(1) through (B)(16)

(3) Crawl space lighting outlets

(4) Branch circuits and outlets for appliances, rated 60 amperes or less, installed in locations as specified in 210.8(D)(1) through (D)(12)

(5) Receptacles required by 210.63

(6) All outdoor outlets rated 50 amperes or less

Exception: Protection is not required for a Class 2, Class 3, Class 4 or communications circuit.

Statement of Problem and Substantiation for Public Comment

This Public Comment is submitted on behalf of a Correlating Committee DC Task Group consisting of Danish Zia, Jason Fisher, Randy Dollar, Larry Wildermuth, Scott Higgins, Scott Harding, Mark Earley, Jason Hopkins, Chris Vance, Chad Kennedy and Derrick Atkins. This Public Comment, along with other Public Comments, was developed with the goal of improving usability and accuracy on requirements associated with DC circuits.

The proposed updates to Section 210.8 are intended to provide lifesaving protection for personnel from electrical shock hazards originating from DC circuits. Although DC distribution circuits may not be prevalent at this time in the locations identified in 210.8(A) through (F), they are expected to be a growing alternative to AC circuits. This proposal closes a gap in the Code for DC circuits where similar hazards exist, but ground-fault protection may not be provided.

The committee statement by CMP2 for Public Input No. 4269 requested additional information concerning dc ground faults and let-go thresholds. According to the definition in UL 943, the Standard for Ground-Fault Circuit Interrupters, Class A GFCI for 60Hz AC circuits interrupt the circuit to the load when the ground-fault current is 6mA or more but not when the ground-fault current is 4mA or less. This provides the user with a level of protection against “let-go” (an effect of muscular tetanization in which there is an inability to let go of a gripped conductive part while current flows from the part into the hand) and more severe physiological effects.

Similar “let-go” effects occur with DC current above 30mA as referenced in IEC 60479-1:2018 “Effects of current on human beings and livestock – Part 1: General aspects”. This 30 mA current threshold is also the ground fault threshold presently required for DC rated CCID5 (Charging Circuit-Interrupting Device) covered in UL 2231-1 and UL 2231-2, the Standards for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits, and provide a similar level of protection. Ground fault threshold limits for DC and AC+DC waveforms are also specified in UL 1400-1, the Outline of Investigation for Fault-Managed Power Systems – Part 1: Safety, and utilized for Class 4 products on the market. These existing requirements may be used as a basis for equivalent criteria for providing Class A GFCI protection for DC circuits.

Related Item

• Public Input No. 4269-NFPA 70-2023

Submitter Information Verification

Submitter Full Name: Danish Zia
Organization: UL Solutions
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 21:14:15 EDT 2024
Committee: NEC-P02

Public Comment No. 461-NFPA 70-2024 [Section No. 210.8]

210.8 Ground-Fault Circuit-Interrupter Protection for Personnel.

A listed Class A or Class A-HF GFCI shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be installed in a readily accessible location.

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

(A) Dwelling Units.

All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms

(2) Garages

(3) Accessory buildings not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use

(4) Outdoors

(5) Crawl spaces — at or below grade level

(6) Basements

(7) Kitchens

(8) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking

(9) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(10) Boathouses

(11) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

(12) Laundry areas

(13) Indoor damp

(14) Indoor wet locations

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: GFCI protection shall not be required for a receptacle supplying only a permanently installed premises security system.

Exception No. 3: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

(B) Other Than Dwelling Units.

All 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less, and all receptacles supplied by three-phase branch circuits rated 150 volts or less to ground, 100 amperes or less, installed in the following locations shall be provided with GFCI protection:

(1) Bathrooms

(2) Kitchens

(3) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking

(4) Buffet serving areas with permanent provisions for food serving, beverage serving, or cooking

(5) Rooftops

(6) Outdoors

(7) Sinks where receptacles or cord-and plug-connected fixed or stationary appliances are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(8) Indoor damp locations

(9) Indoor wet locations

(10) Locker rooms with associated showering facilities

(11) Garages, accessory buildings, service bays, and similar areas other than vehicle exhibition halls and showrooms

(12) Crawl spaces at or below grade level

(13) Unfinished areas of basements

(14) Aquariums, bait wells, and similar open aquatic vessels or containers, such as tanks or bowls, where receptacles are installed within 1.8 m (6 ft.) from the top inside edge or rim or from the conductive support framing of the vessel or container

(15) Laundry areas

(16) Bathtubs and shower stalls where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: At industrial establishments where conditions of maintenance and supervision ensure that only qualified personnel are involved, if a greater hazard is created by power interruption to outdoor fixed and stationary cord- and plug-connected equipment or that has a design that is not compatible with GFCI protection, an assured equipment grounding conductor program in accordance with 590.7(B)(2) shall be implemented and enforced in lieu of GFCI protection provided at the receptacle outlet.

Exception No. 3: Receptacles or cord- and plug-connected fixed and stationary appliances installed within 1.8 m (6 ft) from the top inside edge of a bowl of a sink shall not be required to be GFCI protected in industrial laboratories where the receptacles are used to supply equipment if removal of power would introduce a greater hazard.

Exception No. 4: Receptacles located in patient bed locations of Category 2 (general care) or Category 1 (critical care) spaces of health care facilities shall be permitted to comply with 517.21.

Exception No. 5: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of serving a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

(C) Crawl Space Lighting Outlets.

GFCI protection shall be provided for lighting outlets not exceeding 120 volts, nominal installed in crawl spaces.

(D) Specific Appliances.

GFCI protection shall be provided for the branch circuit or outlet supplying the following appliances rated 150 volts or less to ground and 60 amperes or less, single-phase or 100 amperes or less, 3-phase:

(1) Automotive vacuum machines

(2) Drinking water coolers and bottle fill stations

(3) High-pressure spray washing machines

(4) Tire inflation machines

(5) Vending machines

(6) Sump pumps

(7) Dishwashers

(8) Electric ranges

(9) Wall-mounted ovens

(10) Counter-mounted cooking units

(11) Clothes dryers

(12) Microwave ovens

(E) Equipment Requiring Servicing.

GFCI protection shall be provided for the receptacles required by 210.63.

(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:

(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

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

Effective September 1, 2026, GFCI or SPGFCI protection shall be provided for listed HVAC equipment.

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

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

Additional Proposed Changes

File Name	Description	Approved
CN_109.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 109 appeared in the First Draft Report on First Revision No. 7788.

The Correlating Committee directs CMP-2 to consider including an informational note to this section or to the defined term GFCI, regarding Class A-HF, High Frequency.

Related Item

• First Revision No. 7788

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 18:57:02 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 109-NFPA 70-2024 [Section No. 210.8]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 13:56:04 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-2 to consider including an informational note to this section or to the defined term GFCI, regarding Class A-HF, High Frequency.

First Revision No. 7788-NFPA 70-2024 [Section No. 210.8 [Excluding any Sub-Sections]]

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. 1080-NFPA 70-2024 [Section No. 210.8(A)]

(A) Dwelling Units.

All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms
(2) Garages
(3) Accessory buildings not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use
(4) Outdoors
(5) Crawl spaces — at or below grade level
(6) Basements
(7) Kitchens
(8) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking
(9) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink
(10) Boathouses
(11) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall
(12) Laundry areas
(13) Indoor damp locations
(14) Indoor wet locations

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: GFCI protection shall not be required for a receptacle supplying only a permanently installed premises security system.

Exception No. 3: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

Added "locations" to list item 13. Thanks

Related Item

• FR-7908

Submitter Information Verification

Submitter Full Name: Daniel Naughton
Organization: JATC of Greater Boston
Affiliation: IBEW
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 14 07:09:06 EDT 2024
Committee: NEC-P02

Public Comment No. 1237-NFPA 70-2024 [Section No. 210.8(A)]

(A) Dwelling Units.

All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms

(2) Garages

(3) ~~Accessory~~ Areas of accessory buildings not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use

(4) Outdoors

(5) Crawl spaces — at or below grade level

(6) Basements

(7) Kitchens

(8) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking

(9) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(10) Boathouses

(11) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

(12) Laundry areas

(13) Indoor damp

(14) Indoor wet locations

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: GFCI protection shall not be required for a receptacle supplying only a permanently installed premises security system.

Exception No. 3: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

This comment should be viewed as editorial only. As written in the first draft, it appears that the entire accessory building must be GFCI protected if the entirety of the building is not intended as nonhabitable. For example, a two-story detached building will often have a garage on the main floor (GFCI should be required) and a living room above (GFCI should not be required). In such a building, the the draft language should be more clear on whether GFCI is required throughout, or in some locations, or not at all.

Related Item

• FR 7704

Submitter Information Verification

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

Submittal Date: Sun Aug 18 12:45:15 EDT 2024
Committee: NEC-P02

Public Comment No. 1344-NFPA 70-2024 [Section No. 210.8(A)]

(A) Dwelling Units.

All 125-volt through 250-~~volt receptacles installed~~ volt outlets or devices installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms
(2) Garages
(3) Accessory buildings not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use
(4) Outdoors
(5) Crawl spaces — at or below grade level
(6) Basements
(7) Kitchens
(8) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking
(9) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink
(10) Boathouses
(11) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall
(12) Laundry areas
(13) Indoor damp
(14) Indoor wet locations

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: GFCI protection shall not be required for a receptacle supplying only a permanently installed premises security system.

Exception No. 3: GFCI protection shall not be required for ~~listed weight~~ listed weight -supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Additional Proposed Changes

File Name	Description	Approved
.1724236124096	210.8 A revised 08 21 2024	

Statement of Problem and Substantiation for Public Comment

With the added language, it will provide GFCI protection to all 125-volt through 250-volt outlets and devices in locations specified in 210.8A to include USB ports in the following locations.

Related Item

• FR-7704

Submitter Information Verification

Submitter Full Name: Larry Wildermuth
Organization: Orange County Division Buildin
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 21 06:22:09 EDT 2024
Committee: NEC-P02

Public Comment No. 137-NFPA 70-2024 [Section No. 210.8(A)]

(A) Dwelling Units.

All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms
(2) Garages
(3) Accessory buildings not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use
(4) Outdoors
(5) Crawl spaces — at or below grade level
(6) Basements
(7) Kitchens
(8) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking
(9) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink
(10) Boathouses
(11) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall
(12) Laundry areas
(13) Indoor damp locations
(14) Indoor wet locations

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: GFCI protection shall not be required for a receptacle supplying only a permanently installed premises security system.

Exception No. 3: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

This comment adds the word "Locations" where it is needed to make this item make sense.

Related Item

• FR 7908

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
Organization: Eaton Corporation
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City:
State:
Zip:

Submittal Date: Mon Jul 22 07:20:59 EDT 2024
Committee: NEC-P02

Public Comment No. 1398-NFPA 70-2024 [Section No. 210.8(A)]

(A) Dwelling Units.

All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms
(2) Garages
(3) Accessory buildings not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use
(4) Outdoors
(5) Crawl spaces — at or below grade level
(6) Basements
(7) Kitchens
(8) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking
(9) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink
(10) Boathouses
(11) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall
(12) Laundry areas
(13) Indoor damp
(14) Indoor wet locations (protection provided for the supply conductors of floor receptacle outlets)

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: GFCI protection shall not be required for a receptacle supplying only a permanently installed premises security system.

Exception No. 3: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

All underground installations are considered wet locations per NEC 300.5 (B). This would require all ground level floor receptacle outlets to have GFCI protection for the portion of the branch circuit that is installed underground. The GFCI protection is needed for the portion of the line side of the branch circuit to the floor receptacle to insure no contact with energized conductors would occur. The potential hazard of floor receptacle outlets becoming wet (due to spillage) exists in all installations in floors of any and all locations. It seems as if the current code is intended for this protection to occur, however it has not been clearly written, understood, or enforced.

Related Item

• clarification of :GFCI Protection for Floor Outlet Receptacles (13) Floor outlet receptacles (protection provided for the circuit of the conductors feeding outlet) Aslo adding to 210.8(B) (16) Floor outlet receptacles (protection provided for the circuit of the conductors feeding outlet)

Submitter Information Verification

Submitter Full Name: Jason Scott
Organization: IES Residential
Affiliation: IEC
Street Address:
City:
State:
Zip:

Submittal Date: Thu Aug 22 08:59:35 EDT 2024
Committee: NEC-P02

Public Comment No. 1817-NFPA 70-2024 [Section No. 210.8(A)]

(A) Dwelling Units.

All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms
(2) Garages
(3) Accessory buildings not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use
(4) Outdoors
(5) Crawl spaces — at or below grade level
(6) Basements
(7) Kitchens
(8) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking
(9) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink
(10) Boathouses
(11) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall
(12) Laundry areas
(13) Indoor damp
(14) Indoor wet locations

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: GFCI protection shall not be required for a receptacle supplying only a permanently installed premises security system.

Exception No. 3: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

Exception No. 5: GFCI protection shall not be required for a single receptacle dedicated to serving an HVAC condensate pump. The receptacle shall be labeled "not GFCI protected" and another GFCI receptacle shall be located within three feet from the unprotected dedicated outlet. Any receptacles installed under this exception shall not be considered as meeting the requirements of 210.52(C) and (G).

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

GFCI receptacle nuisance trips interrupting power to indoor HVAC condensate pumps create three major life safety issues because the loss of pump function is required to shut down the HVAC system by building code. The three hazards are (1) occupant health due to exposure to extreme heat or cold, (2) occupant injury in attempts to find the issue by persons with agility issues, and (3) defeating the new flammability safety feature by interfering with the control systems which need blowers to operate in response to increasing A2L refrigerant concentrations to prevent potentially flammable A2L room concentrations. All residential split systems manufactured after 2025 will utilize A2L (“mildly flammable”) refrigerants to meet recently enacted federal low-Global Warming Potential (GWP) refrigerant limits.

CMP-2 rejected ACCA’s proposal last January because the suggested language could result in an unprotected receptacle located in the basement that can be used for other equipment or devices. ACCA’s comment proposes the addition of Exception No. 5, which allows for a single dedicated non-GFCI receptacle, as opposed to a duplex receptacle, and also requires it to be labeled. It also requires a GFCI receptacle to be within three feet so the occupant has no motive to remove the condensate pump cord and use the unprotected dedicated outlet. This addresses the concern of the receptacle being used as another outlet.

An HVAC condensate pump is a device installed and dedicated for the normal operation of a condensing furnace or air handler located in the basement. Building codes require that it shut down the HVAC system if the condensate reservoir reaches high level as occurs when a GFCI nuisance trips.

In addition, there were concerns noted that an HVAC condensate pump could be confused with a sump pump. ACCA does not believe an HVAC condensate pump can be mistaken for a sump pump.

The proposed language is also based on the State of Oregon’s broader exception allowing for non-GFCI receptacles for dedicated equipment and so labeled. At least five states (NC, ND, OH, OR and WI) have amended the NEC to include GFCI exemptions for sewer, sump and/or condensate pumps. The states took this action even before the A2L refrigerants were mandated and blower operation became part of a safety system.

There were comments made that ACCA’s condensate pump survey may have included GFCI tripping in response to a grounding situation. During its presentation last January, ACCA reported that its member survey involved only reports of nuisance tripping of condensate pumps that were connected to GFCI receptacles in basements per the NEC. The survey was ONLY focused on incidents within the past 12 months where the GFCI receptacle tripped and no defect or grounding condition was found.

Related Item

• Public Input No. 4381-NFPA 70-2023 [Section No. 210.8(A)]

Submitter Information Verification

Submitter Full Name: David Bixby
Organization: ACCA
Affiliation: ACCA
Street Address:
City:
State:

Zip:
Submittal Date: Tue Aug 27 14:54:57 EDT 2024
Committee: NEC-P02

Public Comment No. 1867-NFPA 70-2024 [Section No. 210.8(A)]

(A) Dwelling Units.

All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms
(2) Garages
(3) Accessory buildings not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use
(4) Outdoors
(5) Crawl spaces — at or below grade level
(6) Basements
(7) Kitchens
(8) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking
(9) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink
(10) Boathouses
(11) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall
(12) Laundry areas
(13) Indoor damp
(14) Indoor wet locations

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: GFCI protection shall not be required for a receptacle supplying only a permanently installed premises security system.

Exception No. 3: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

Exception No. 5: GFCI protection shall not be required for a refrigerator or HVAC appliance if all the following conditions are met:

a. The appliance is not portable

b. The appliance is on an individual branch-circuit

c. The receptacle is not installed within 1.8m (6 ft) of the top inside edge of the bowl of a sink

d. The receptacle is installed within 1.2m (4 ft) of the appliance enclosure

e. The receptacle is a single receptacle

This exception shall expire January 1, 2028

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

The First Draft allows the use of modernized GFCIs, termed Class A-HF. These modernized GFCIs are not required in the First Draft which means the higher risk of GFCI nuisance tripping remains if the appliance is connected to a non-modernized Class A GFCI.

The code should allow a proactive approach in preventing GFCI nuisance tripping by making an exception for appliances which present a lower risk of shock. Electrical risks of higher voltage loads will never be completely mitigated, even if such loads are connected to a GFCI. These conditions of acceptability mitigate risk until adequate solutions to the proven nuisance tripping problem have been addressed. Lower risk is achieved through five conditions of acceptability listed in (a.) through (e.) A number of these conditions were added and edited in response to comments provided during the First Draft meetings.

--The defined term “portable” has been added to address concerns regarding vague conditions of acceptability,
--A new condition of acceptability has been added regarding proximity to a sink to mitigate risk of splashing water,
--An expiration date has been added to motivate manufacturers of home appliances and GFCIs to work on effective UL standards which address nuisance tripping. AHAM hopes that, by 2028, modernization will be required in the UL 943 standard for all Class A GFCIs, not just GFCIs which meet an optional rating.

Resources on GFCI nuisance tripping can be seen at

UL:
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwif_5iL8fSGAxWgP2IAHZ21CaIQFnoECBMQAQ&url=https%3A%2F%2Fcrc.ul.com%2Fapp%2Fasset_files%2F54854%2

CPSC:
https://www.cpsc.gov/s3fs-public/CPSC-staff-comment-UL-101-Leakage-Current-0223.pdf?VersionId=zUbconvHu8Us1hLETgS3xztZRYhRcWhz

Related Item

• PI 4070 • FR 7788

Submitter Information Verification

Submitter Full Name: Greg Woyczynski
Organization: Association of Home Appliance
Street Address:
City:

State:
Zip:
Submittal Date: Tue Aug 27 18:56:27 EDT 2024
Committee: NEC-P02

Public Comment No. 1876-NFPA 70-2024 [Section No. 210.8(A)]

(A) Dwelling Units.

All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms
(2) Garages
(3) Accessory buildings not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use
(4) Outdoors
(5) Crawl spaces — at or below grade level
(6) Basements
(7) Kitchens
(8) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking
(9) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink
(10) Boathouses
(11) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall
(12) Laundry areas
(13) Indoor damp
(14) Indoor wet locations

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: GFCI protection shall not be required for a receptacle supplying only a permanently installed premises security system.

Exception No. 3: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

Exception No. 5: GFCI protection shall not be required for an electric range, wall-mounted oven, or counter-mounted cooking unit if all the following conditions are met:

a. The appliance is not portable

b. The receptacle is not installed within 1.8m (6 ft) of the top inside edge of the bowl of a sink

c. The receptacle is installed within 1.2m (4 ft) of the appliance enclosure

d. The receptacle is a single receptacle

This exception shall expire January 1, 2028

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

The First Draft allows the use of modernized GFCIs, termed Class A-HF. These modernized GFCIs are not required in the First Draft which means the higher risk of GFCI nuisance tripping remains if the appliance is connected to a non-modernized Class A GFCI.

The code should allow a proactive approach in preventing GFCI nuisance tripping by making an exception for appliances which present a lower risk of shock. This lower risk is achieved through four conditions of acceptability listed in (a.) through (d.) A number of these conditions were added and edited in response to comments provided during the First Draft meetings:

--The defined term “portable” has been added to address concerns regarding vague conditions of acceptability,
--A new condition of acceptability has been added regarding proximity to a sink to mitigate risk of splashing water,
--An expiration date has been added to motivate manufacturers of home appliances and GFCIs to work on effective UL standards which address nuisance tripping. AHAM hopes that, by 2028, modernization will be required in the UL 943 standard for all Class A GFCIs, not just GFCIs which meet an optional rating.

Resources on GFCI nuisance tripping can be seen at

UL:
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwif_5iL8fSGAxWgP2IAHZ21CaIQFnoECBMQAQ&url=https%3A%2F%2Fcrc.ul.com%2Fapp%2Fasset_files%2F54854%2

CPSC:
https://www.cpsc.gov/s3fs-public/CPSC-staff-comment-UL-101-Leakage-Current-0223.pdf?VersionId=zUbconvHu8Us1hLETgS3xztZRYhRcWhz

Related Item

• FR 7788 • PI 4107

Submitter Information Verification

Submitter Full Name: Greg Woyczynski
Organization: Association of Home Appliance
Street Address:
City:
State:

Zip:
Submittal Date: Tue Aug 27 19:31:04 EDT 2024
Committee: NEC-P02

Public Comment No. 1907-NFPA 70-2024 [Section No. 210.8(A)]

(A) Dwelling Units.

All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms
(2) Garages
(3) Accessory buildings not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use
(4) Outdoors
(5) Crawl spaces — at or below grade level
(6) Basements
(7) Kitchens
(8) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking
(9) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink
(10) Boathouses
(11) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall
(12) Laundry areas
(13) Indoor damp
(14) Indoor wet locations

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: GFCI protection shall not be required for a receptacle supplying only a permanently installed premises security system.

Exception No. 3: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

Exception No. 5: GFCI protection shall not be required for permanently connected appliances protected by a Class C SPGFCI.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

The First Draft allows the use of modernized GFCIs, termed Class A-HF. These modernized GFCIs are not required in the First Draft which means the higher risk of GFCI nuisance tripping remains if the appliance is connected to a non-modernized Class A GFCI.

The code should allow a proactive approach to prevent GFCI nuisance tripping by allowing a GFCI which is less sensitive but requires ground monitoring ensuring hazardous current has a safe path of least resistance.

Resources on Class A GFCI nuisance tripping can be seen at

UL:
https://www.google.com/url?
sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwif_5iL8fSGAxWgP2IAHZ21CaIQFnoECBMQAQ&url=https%3A%2F%2Fcrc.ul.com%2Fapp%2Fasset_files%2F54854%2

CPSC:
https://www.cpsc.gov/s3fs-public/CPSC-staff-comment-UL-101-Leakage-Current-0223.pdf?VersionId=zUbconvHu8Us1hLETgS3xztZRYhRcWhz

Related Item

• FR 7788

Submitter Information Verification

Submitter Full Name: Greg Woyczynski
Organization: Association of Home Appliance
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 22:58:36 EDT 2024
Committee: NEC-P02

Public Comment No. 462-NFPA 70-2024 [Section No. 210.8(A)]

(A) Dwelling Units.

All 125-volt through 250-volt receptacles installed in the following locations and supplied by single-phase branch circuits rated 150 volts or less to ground shall have ground-fault circuit-interrupter protection for personnel:

(1) Bathrooms

(2) Garages

(3) Accessory buildings not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use

(4) Outdoors

(5) Crawl spaces — at or below grade level

(6) Basements

(7) Kitchens

(8) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking

(9) Sinks — where receptacles are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(10) Boathouses

(11) Bathtubs or shower stalls — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

(12) Laundry areas

(13) Indoor damp

(14) Indoor wet locations

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: GFCI protection shall not be required for a receptacle supplying only a permanently installed premises security system.

Exception No. 3: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of supporting a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Exception No. 4: Factory-installed receptacles that are not readily accessible and are mounted internally to exhaust fan assemblies shall not require GFCI protection unless required by the installation instructions or listing.

Informational Note: See 760.41(B) and 760.121(B) for power supply requirements for fire alarm systems.

Additional Proposed Changes

File Name	Description	Approved
CN_110.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 110 appeared in the First Draft Report on First Revision No. 7908.

The Correlating Committee directs CMP-2 to reconsider the revised text to comply with the NEC Style Manual 3.5.4 for clarity and for parallel construction 3.5.5.
Consider adding the word “location” after “Indoor damp” for clarity.

The Correlating Committee also directs CMP-2 to reconsider the revised text to comply with the NEC Style Manual 3.5.3 for plural references of “receptacles” and “systems”.

Related Item

• First Revision No. 7908

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 18:58:31 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 110-NFPA 70-2024 [Section No. 210.8(A)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 13:57:30 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-2 to reconsider the revised text to comply with the NEC Style Manual 3.5.4 for clarity and for parallel construction 3.5.5. Consider adding the word “location” after “Indoor damp” for clarity.

The Correlating Committee also directs CMP-2 to reconsider the revised text to comply with the NEC Style Manual 3.5.3 for plural references of “receptacles” and “systems”.

First Revision No. 7908-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. 1297-NFPA 70-2024 [Section No. 210.8(B)]

(B) Other Than Dwelling Units.

All 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less, and all receptacles supplied by three-phase branch circuits rated 150 volts or less to ~~ground~~ ground on any one phase , 100 amperes or less, installed in the following locations shall be provided with GFCI protection:

(1) Bathrooms

(2) Kitchens

(3) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking

(4) Buffet serving areas with permanent provisions for food serving, beverage serving, or cooking

(5) Rooftops

(6) Outdoors

(7) Sinks where receptacles or cord-and plug-connected fixed or stationary appliances are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(8) Indoor damp locations

(9) Indoor wet locations

(10) Locker rooms with associated showering facilities

(11) Garages, accessory buildings, service bays, and similar areas other than vehicle exhibition halls and showrooms

(12) Crawl spaces at or below grade level

(13) Unfinished areas of basements

(14) Aquariums, bait wells, and similar open aquatic vessels or containers, such as tanks or bowls, where receptacles are installed within 1.8 m (6 ft.) from the top inside edge or rim or from the conductive support framing of the vessel or container

(15) Laundry areas

(16) Bathtubs and shower stalls where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: At industrial establishments where conditions of maintenance and supervision ensure that only qualified personnel are involved, if a greater hazard is created by power interruption to outdoor fixed and stationary cord- and plug-connected equipment or that has a design that is not compatible with GFCI protection, an assured equipment grounding conductor program in accordance with 590.7(B)(2) shall be implemented and enforced in lieu of GFCI protection provided at the receptacle outlet.

Exception No. 3: Receptacles or cord- and plug-connected fixed and stationary appliances installed within 1.8 m (6 ft) from the top inside edge of a bowl of a sink shall not be required to be GFCI protected in industrial laboratories where the receptacles are used to supply equipment if removal of power would introduce a greater hazard.

Exception No. 4: Receptacles located in patient bed locations of Category 2 (general care) or Category 1 (critical care) spaces of health care facilities shall be permitted to comply with 517.21.

Exception No. 5: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of serving a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Statement of Problem and Substantiation for Public Comment

This comment is being submitted on behalf of the Minnesota Department of Labor and Industry. Currently, the Department's inspection staff includes 14-office/field staff, 50-state field inspectors, 4-virtual inspectors and 22 plus contract electrical inspectors that complete over 170,000 electrical inspections annually.

Please revisit the resolution on PI 1897. For enforcement reasons, clarifying the "any one phase" will clarify that GFCI protection is required for those delta system high-leg receptacle installations where the voltage is over 150-volts to ground. We have encountered installations where it could be argued that with a high leg voltage, that the GFCI protection would not be required. Also, we are not understanding what the unintended consequences would be.

Clarification would help the enforcement community.

Related Item

• Public Input No. 1897-NFPA 70-2023 Section No. 210.8(B)

Submitter Information Verification

Submitter Full Name: Dean Hunter
Organization: Minnesota Department of Labor
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 20 12:43:05 EDT 2024
Committee: NEC-P02

Public Comment No. 1346-NFPA 70-2024 [Section No. 210.8(B)]

(B) Other Than Dwelling Units.

All 125-volt through 250-volt ~~receptacles~~ outlets or devices supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less, and all receptacles supplied by three-phase branch circuits rated 150 volts or less to ground, 100 amperes or less, installed in the following locations shall be provided with GFCI protection:

(1) Bathrooms

(2) Kitchens

(3) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking

(4) Buffet serving areas with permanent provisions for food serving, beverage serving, or cooking

(5) Rooftops

(6) Outdoors

(7) Sinks where receptacles or cord-and plug-connected fixed or stationary appliances are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(8) Indoor damp locations

(9) Indoor wet locations

(10) Locker rooms with associated showering facilities

(11) Garages, accessory buildings, service bays, and similar areas other than vehicle exhibition halls and showrooms

(12) Crawl spaces at or below grade level

(13) Unfinished areas of basements

(14) Aquariums, bait wells, and similar open aquatic vessels or containers, such as tanks or bowls, where receptacles are installed within 1.8 m (6 ft.) from the top inside edge or rim or from the conductive support framing of the vessel or container

(15) Laundry areas

(16) Bathtubs and shower stalls where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: At industrial establishments where conditions of maintenance and supervision ensure that only qualified personnel are involved, if a greater hazard is created by power interruption to outdoor fixed and stationary cord- and plug-connected equipment or that has a design that is not compatible with GFCI protection, an assured equipment grounding conductor program in accordance with 590.7(B)(2) shall be implemented and enforced in lieu of GFCI protection provided at the receptacle outlet.

Exception No. 3: Receptacles or cord- and plug-connected fixed and stationary appliances installed within 1.8 m (6 ft) from the top inside edge of a bowl of a sink shall not be required to be GFCI protected in industrial laboratories where the receptacles are used to supply equipment if removal of power would introduce a greater hazard.

Exception No. 4: Receptacles located in patient bed locations of Category 2 (general care) or Category 1 (critical care) spaces of health care facilities shall be permitted to comply with 517.21.

Exception No. 5: GFCI protection shall not be required for ~~listed weight~~ listed weight -supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of serving a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Additional Proposed Changes

File Name	Description	Approved
.1724236404707	210.8 B	

Statement of Problem and Substantiation for Public Comment

With the added language, it will provide GFCI protection to all 125-volt through 250-volt outlets and devices in locations specified in 210.8A to include USB ports in the following locations.

Related Item

• FR-7911

Submitter Information Verification

Submitter Full Name: Larry Wildermuth
Organization: Orange County Division Buildin
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 21 06:31:49 EDT 2024
Committee: NEC-P02

Public Comment No. 726-NFPA 70-2024 [Section No. 210.8(B)]

(B) Other Than Dwelling Units.

All 125-volt through 250-volt receptacles supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less, and all receptacles supplied by three-phase branch circuits rated 150 volts or less to ground, 100 amperes or less, installed in the following locations shall be provided with GFCI protection:

(1) Bathrooms

(2) Kitchens

(3) Areas with sinks and permanent provisions for food preparation, beverage preparation, or cooking

(4) Buffet serving areas with permanent provisions for food serving, beverage serving, or cooking

(5) Rooftops

(6) Outdoors

(7) Sinks where receptacles or cord-and plug-connected fixed or stationary appliances are installed within 1.8 m (6 ft) from the top inside edge of the bowl of the sink

(8) Indoor damp locations

(9) Indoor wet locations

(10) Locker rooms with associated showering facilities

(11) Garages, accessory buildings, service bays, and similar areas other than vehicle exhibition halls and showrooms

(12) Crawl spaces at or below grade level

(13) Unfinished areas of basements

(14) ~~Aquariums, bait wells, and similar open~~ Open aquatic vessels or containers, such as aquariums, bait wells, and similar tanks or bowls, where receptacles are installed within 1.8 m (6 ft.) from the top inside edge or rim or from the conductive support framing of the vessel or container

(15) Laundry areas

(16) Bathtubs and shower stalls where receptacles are installed within 1.8 m (6 ft) of the outside edge of the bathtub or shower stall

Exception No. 1: Receptacles that are not readily accessible and are supplied by a branch circuit dedicated to electric snow-melting, deicing, or pipeline and vessel heating equipment shall be permitted to be installed in accordance with 426.28 or 427.22, as applicable.

Exception No. 2: At industrial establishments where conditions of maintenance and supervision ensure that only qualified personnel are involved, if a greater hazard is created by power interruption to outdoor fixed and stationary cord- and plug-connected equipment or that has a design that is not compatible with GFCI protection, an assured equipment grounding conductor program in accordance with 590.7(B)(2) shall be implemented and enforced in lieu of GFCI protection provided at the receptacle outlet.

Exception No. 3: Receptacles or cord- and plug-connected fixed and stationary appliances installed within 1.8 m (6 ft) from the top inside edge of a bowl of a sink shall not be required to be GFCI protected in industrial laboratories where the receptacles are used to supply equipment if removal of power would introduce a greater hazard.

Exception No. 4: Receptacles located in patient bed locations of Category 2 (general care) or Category 1 (critical care) spaces of health care facilities shall be permitted to comply with 517.21.

Exception No. 5: GFCI protection shall not be required for listed weight-supporting ceiling receptacles (WSCR) utilized in combination with compatible weight-supporting attachment fittings (WSAF) installed for the purpose of serving a ceiling luminaire or ceiling-suspended fan. If a general-purpose convenience receptacle is integral to the ceiling luminaire or ceiling-suspended fan, GFCI protection shall be provided.

Statement of Problem and Substantiation for Public Comment

This revised language would make it clear when the code rule is to be applied to "open aquatic vessels or containers" not within 6 feet of aquariums or bait wells with a closed top or lid.

Related Item

• FR7911

Submitter Information Verification

Submitter Full Name: David Johnson
Organization: CenTex IEC
Affiliation: Independent Electrical Contractors
Street Address:
City:
State:
Zip:

Submittal Date: Sun Aug 04 12:19:42 EDT 2024
Committee: NEC-P02

Public Comment No. 1081-NFPA 70-2024 [Section No. 210.8(D)]

(D) Specific Appliances.

GFCI protection shall be provided for ~~the branch circuit or outlet supplying the following appliances rated 150 volts or less to ground and 60 amperes or less, single-phase or 100 amperes or less, 3-phase:~~

(1) ~~Automotive vacuum machines~~
(2) ~~Drinking water coolers and bottle fill stations~~
(3) ~~High-pressure spray washing machines~~
(4) ~~Tire inflation machines~~
(5) ~~Vending machines~~
(6) ~~Sump pumps~~
(7) ~~Dishwashers~~
(8) ~~Electric ranges~~
(9) ~~Wall-mounted ovens~~
(10) ~~Counter-mounted cooking units~~
(11) ~~Clothes dryers~~
(12) ~~Microwave ovens~~

specific appliances in accordance with 422.5(B), of a type and location in accordance with 422.5(C).

Statement of Problem and Substantiation for Public Comment

This public comment is a response to First Draft PI No. 195-NFPA 70-2023 [Section No. 210.8(D) which was resolved by CMP-2 and Public Input No. 1548-NFPA 70-2023 [Section No. 422.5(A)]which was resolved by CMP 17.

The logic behind both of these public inputs was to harmonize the requirements of 210.8(D) and 422.5(B). The list of appliances requiring GFCI protection and the specific requirements for GFCI protection should not be in two places in the Code, and the requirements should not differ.

Having two appliance lists requiring GFCI protection that don't match in Articles 210 and 422 is confusing and difficult for users of this Code to reconcile. This PC updates the language to harmonize the requirements of 210.8(D) and the requirements of 422(5). This public comment has a related PC #1082 to update the list of appliances in 422.5(C) to match the current list in 210.8(D). In addition, the allowance for type and location of GFCI protection in 422.2(C) is not currently the same as the requirements of 210.8(D). If there are indeed different location requirements for the list of appliances in 422 versus the list in 210, please make this clear to users of this Code by listing the appliances in 210 that should follow the requirements in 210 and a different (non-overlapping) list in 422 (if they actually do have different requirements or allowances). The overlapping but slightly different list and requirements is not currently clear or logical and will cause confusion with both users and enforcement.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1082-NFPA 70-2024 [Section No. 422.5(B)]	
Public Comment No. 1082-NFPA 70-2024 [Section No. 422.5(B)]	

Related Item

• PI 195, PI 1548

Submitter Information Verification

Submitter Full Name: Rebekah Hren
Organization: IPPNC LLC
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 14 09:47:01 EDT 2024
Committee: NEC-P02

Public Comment No. 1162-NFPA 70-2024 [Section No. 210.8(D)]

(D) Specific Appliances.

GFCI protection ~~shall be provided for the branch circuit or outlet supplying the following appliances rated 150 volts or less to ground and 60 amperes or less, single-phase or 100 amperes or less, 3-phase:~~

(1) ~~Automotive vacuum machines~~
(2) ~~Drinking water coolers and bottle fill stations~~
(3) ~~High-pressure spray washing machines~~
(4) ~~Tire inflation machines~~
(5) ~~Vending machines~~
(6) ~~Sump pumps~~
(7) ~~Dishwashers~~
(8) ~~Electric ranges~~
(9) ~~Wall-mounted ovens~~
(10) ~~Counter-mounted cooking units~~
(11) ~~Clothes dryers~~
(12) ~~Microwave ovens~~

for specific appliances shall be provided in accordance with 422.5.

Statement of Problem and Substantiation for Public Comment

Appliances requiring GFCI protection is already covered in 422.5
It is better to point people to the proper article rather than adding redundancies to the code. A companion PC 1164 will add list Items to 422.5(B).
FR7736 for 210.8(D) changed the circuit requirements to match FR8871 422.5 basically making the articles identical.
Dishwashers was moved from 210.8 to 422.5 recently and I think we should be consistent.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1164-NFPA 70-2024 [Section No. 422.5(B)]	
Public Comment No. 1164-NFPA 70-2024 [Section No. 422.5(B)]	

Related Item

• FR-7736, FR-8871

Submitter Information Verification

Submitter Full Name: David Hittinger
Organization: Independent Electrical Contractors
Affiliation: IEC Codes and Standards
Street Address:
City:
State:
Zip:

Submittal Date: Fri Aug 16 10:26:39 EDT 2024
Committee: NEC-P02

Public Comment No. 1273-NFPA 70-2024 [Section No. 210.8(D)]

(D) Specific Appliances.

GFCI protection ~~shall be provided for the branch circuit or outlet supplying the following appliances rated 150 volts or less to ground and 60 amperes or less, single-phase or 100 amperes or less, 3-phase:~~

(1) ~~Automotive vacuum machines~~
(2) ~~Drinking water coolers and bottle fill stations~~
(3) ~~High-pressure spray washing machines~~
(4) ~~Tire inflation machines~~
(5) ~~Vending machines~~
(6) ~~Sump pumps~~
(7) ~~Dishwashers~~
(8) ~~Electric ranges~~
(9) ~~Wall-mounted ovens~~
(10) ~~Counter-mounted cooking units~~
(11) ~~Clothes dryers~~
(12) ~~Microwave ovens~~

for specific appliances shall be provided in accordance with 422.5.

Statement of Problem and Substantiation for Public Comment

As requested by the Correlating Committee, a task group was created to address the correct location of the technical material currently found in both 210.8(D) and 422.5, with the aim of limiting that content to one location or the other. Unlike the GFCI requirements set forth in 210.8(A), (B), (C), (E), and (F), the requirements in (D) are not driven by physical location. They are specific to appliances, and therefore should reside in the appliance article.

The task group consisted of the following members of Code-Making Panel 2 and Code-Making Panel 17: David Johnson (Chair), Ryan Jackson, Robert DellaValle, Greg Woyczynski, and Larry Wildermuth. The chair appreciates the time and efforts put forth by these individuals.

A companion PC will add list items to 422.5(B).

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1275-NFPA 70-2024 [Section No. 422.5(B)]	PC #1275
Public Comment No. 1275-NFPA 70-2024 [Section No. 422.5(B)]	

Related Item

• FR7736, FR8871

Submitter Information Verification

Submitter Full Name: David Johnson
Organization: CenTex IEC
Affiliation: Tack Group for correlation of 210.8(D) and 422.5.
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 19 14:26:23 EDT 2024
Committee: NEC-P02

Public Comment No. 1737-NFPA 70-2024 [Section No. 210.8(D)]

(D) Specific Appliances.

GFCI protection shall be provided for the ~~branch circuit or~~ outlet supplying the following appliances rated 150 volts or less to ground and 60 amperes or less, single-phase or 100 amperes or less, 3-phase:

(1) Automotive vacuum machines
(2) Drinking water coolers and bottle fill stations
(3) High-pressure spray washing machines
(4) Tire inflation machines
(5) Vending machines
(6) Sump pumps
(7) Dishwashers
(8) Electric ranges
(9) Wall-mounted ovens
(10) Counter-mounted cooking units
(11) Clothes dryers
(12) Microwave ovens

Statement of Problem and Substantiation for Public Comment

There is no reason to say branch circuit or outlets since GFCI protection would provide personnel protection anywhere in the circuit to the outlet or utilization equipment.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 275-NFPA 70-2024 [Section No. 625.54]	625.54 doesn't need to have the word outlet added

Related Item

• PI #3158

Submitter Information Verification

Submitter Full Name: William Snyder
Organization: RCC Solutions
Affiliation: High Voltage Live Podcast
Street Address:
City:
State:
Zip:

Submittal Date: Mon Aug 26 20:44:28 EDT 2024
Committee: NEC-P02

Public Comment No. 1882-NFPA 70-2024 [Section No. 210.8(D)]

(D) Specific Appliances.

GFCI protection shall be provided for the branch circuit or outlet supplying the following appliances rated 150 volts or less to ground and 60 amperes or less, single-phase or 100 amperes or less, 3-phase:

(1) Automotive vacuum machines
(2) Drinking water coolers and bottle fill stations
(3) High-pressure spray washing machines
(4) Tire inflation machines
(5) Vending machines
(6) Sump pumps
(7) Dishwashers
(8) Electric ranges
(9) Wall-mounted ovens
(10) Counter-mounted cooking units
(11) Clothes dryers
(12) Microwave ovens

Exception No. 1: GFCI protection shall not be required for an electric range, wall-mounted oven, or counter-mounted cooking unit if all the following conditions are met:

a. The appliance is not portable
b. The receptacle is not installed within 1.8m (6 ft) of the top inside edge of the bowl of a sink
c. The receptacle is installed within 1.2m (4 ft) of the appliance enclosure
d. The receptacle is a single receptacle

This exception shall expire January 1, 2028

Statement of Problem and Substantiation for Public Comment

AHAM is against the presence of this list in Chapter 2 and supports PC 1273. If PC 1273 is accepted by CMP2, this PC should be withdrawn. However, if PC 1273 is rejected by CMP2, consumers must be protected from GFCI nuisance tripping on critical appliances.

The First Draft allows the use of modernized GFCIs, termed Class A-HF. These modernized GFCIs are not required in the First Draft which means the higher risk of GFCI nuisance tripping remains if the appliance is connected to a non-modernized Class A GFCI.

The code should allow a proactive approach in preventing GFCI nuisance tripping by making an exception for appliances which present a lower risk of shock. This lower risk is achieved through four conditions of acceptability listed in (a.) through (d.) A number of these conditions were added and edited in response to comments provided during the First Draft meetings.

An expiration date was also added in response to comments provided during the First Draft meeting. AHAM hopes that, by 2028, modernization will be required in the UL 943 standard for all Class A GFCIs, not just GFCIs which meet an optional rating.

Related Item

• FR 7788 • PI 4107

Submitter Information Verification

Submitter Full Name: Greg Woyczynski
Organization: Association of Home Appliance
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 19:53:18 EDT 2024
Committee: NEC-P02

Public Comment No. 45-NFPA 70-2024 [Section No. 210.8(D)]

(D) Specific Appliances.

~~GFCI protection shall be provided for the branch circuit or outlet supplying the following appliances rated~~ For branch circuits rated rated 150 volts or less to ground and 60 amperes or less, single-phase~~ or~~ , or 100 amperes or less, 3-phase~~:~~ , GFCI protection shall be provided for the branch circuit or outlet supplying the following appliances.

(1) Automotive vacuum machines
(2) Drinking water coolers and bottle fill stations
(3) High-pressure spray washing machines
(4) Tire inflation machines
(5) Vending machines
(6) Sump pumps
(7) Dishwashers
(8) Electric ranges
(9) Wall-mounted ovens
(10) Counter-mounted cooking units
(11) Clothes dryers
(12) Microwave ovens

Statement of Problem and Substantiation for Public Comment

This Public Comment is a follow up to Public Input 29 which I believe should have been accepted.
I respectfully disagree with the Panel's statement "The suggested language does not add clarity. The existing language ensures protection and is sufficient"

In fact, I believe the existing language inadvertently excludes appliances that the the CMP intended to be GFCI protected. Based on the present wording 240V appliances are excluded. 250V appliances are excluded. 208V appliances are excluded too. I do not believe the intent is to exclude these appliances. However, with the present wording the branch circuit voltage is completely irrelevant as it is never mentioned in this rule. Presently only the rating of the appliance matters. A 208V or 250V rated appliance installed on a branch circuit operating at 120V to ground is presently excluded based on the literal wording since the branch circuit operating voltage is not part of this requirement. The revisions proposed by PI 29 and this Public Comment with clarify the intent and include 208V appliances, 240V appliances, 250V appliances and other appliances that are presently not included in this requirement.

Related Item

• PI 29

Submitter Information Verification

Submitter Full Name: Russ Leblanc
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City:
State:
Zip:
Submittal Date: Fri Jul 12 07:03:02 EDT 2024
Committee: NEC-P02

Public Comment No. 1811-NFPA 70-2024 [New Section after 210.8(F)]

(G) Listed Equipment with Integral Personnel Protection

Listed equipment that provides listed personnel protection may be installed on branch circuits with regular breakers, provided the listed protection cannot be readily disabled, removed, substituted or otherwise rendered inactive. Such listed equipment may include a retry feature to re-establish the load after a delay compatible with the listing. Such equipment must include an alert, alarm, log or other indicator that the protection feature was engaged since last checked. The protection must be integral to the device, and not subject to simple swap to remove the listed protection. The equipment must be suitably and durably labeled and listed as to the protection provided.

As of September 1st 2028, installed control equipment for the following categories of equipment must be so listed:

(A) Electric Vehicle Service Equipment (EVSE)

(B) Sump pumps

As of September 1st 2029, installed control equipment for the following categories of equipment must be so listed:

(A) All electrical equipment for water features, spa and pool equipment.

(B) Line powered equipment containing water or hooked to domestic water pipes, such as water heating equipment.

Note: the listed personnel protection system may or may not include ground-fault detection, depending on the voltages and currents involved. For example a low voltage pool lighting system may achieve the safety goals via listed isolation means, not ground-fault detection.

Additional Proposed Changes

File Name	Description	Approved
Edison_Base_Fuses_30A_Screw_-_Like_a_GFCI_Breaker.pdf	Obsolete Edison base fuse, which like a modern GFCI can be swapped out by untrained persons	

Statement of Problem and Substantiation for Public Comment

We've had too many tragedies where innocent persons are electrocuted by touching a water feature or dipping in a pool, where the required upstream GFCI device was either never installed or was removed after it tripped.

"Five swimmers in Indiana were electrocuted in what police described as a 'freak accident' in a swimming pool Sunday afternoon." is the headline in my inbox from August 25th 2024.

It's not a freak accident, it's a result of an unsafe situation with GFCI protection in the NEC. It's exactly the same problem that circuit breakers originally solved, back when Edison base fuses could be readily swapped for different values, or for a penny ¢.

See also other tragedies such as the October 2023 Harbourside Place electrocution, where a report was prepared by the Jupiter FL police department.

This proposed section 210.8(G) recognizes devices with integral listed personnel protection devices. These can be tailored to the specific equipment and need. Most importantly such integral protection will be very hard to bypass. For example, EVSE has such protection where the device's relay is completely off until a signal is received from a vehicle. A sump pump with integral protection can balance electrical safety with environmental safety: automatically retrying after a fault event and remaining powered up enough in a fault condition to alert maintenance personnel. Equipment could shut down if tilted. A refrigerator with integral residual current detection or GFCI allows a service technician who has contacted the internal wiring to "release", yet a few minutes later return to cooling food. Listed systems could isolate a fault to a part of the equipment, and keep logs, in a way that becomes impossible with an upstream "non-integral" GFCI. High voltage and high leakage current systems such as high-power AC to DC systems can have thresholds appropriate to the equipment, and testable by the vendor in the factory rather than out in the field.

Importantly, this will allow the listed equipment to test the integrity of the equipment ground and case bonding without worry of tripping an upstream "non-integral" GFCI.

And finally, this proposal, if integrated well with vampire load standards, could save megawatts of power every year. Equipment that is "off" will draw no power to maintain a GFCI or AFCI equivalent function 24/7/365 .

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1740-NFPA 70-2024 [Section No. 625.2]	On listing
Public Comment No. 1730-NFPA 70-2024 [Section No. 625.54]	On GFCI for hardwired EVSE

Related Item

- 3619-NFPA 70-2023 Section No. 210.8(F) (GFCI incompatibility & timeline) LBA
- TIA 1748 Proposed
- Public Input No. 1802-NFPA 70-2023 [Section No. 625.54]
- Nuisance Tripping of Ground-Fault Circuit Interrupters (GFCIs) for Appliances - February 5, 2024 Association of Home Appliance Manufacturers AHAM

Submitter Information Verification

Submitter Full Name:	Bryce Nesbitt
Organization:	Obviously Inspects / Expert Witness / Electrical Designer
Affiliation:	Based in part on comments and discussions with the NEC POWER group "Panel Optimization Work and Electrical Reassessments"
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Tue Aug 27 13:57:58 EDT 2024

Committee: NEC-P02

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LISTED
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Public Comment No. 120-NFPA 70-2024 [Section No. 210.8(F)]

(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:

(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

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

Effective September 1, 2026, GFCI ~~or SPGFCI~~ protection shall be provided for listed HVAC equipment.

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

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

Statement of Problem and Substantiation for Public Comment

There are 3 fundamental issues with this proposal to allow an SPGFCI as an alternative to a traditional Class A GFCI.
1. As indicated in the informational note after the definition of SPGFCI in Chapter 1, the requirements used to certify a SPGFCI are contained in an Outline of Investigation. An Outline of Investigation (OOI) is not and ANSI standard which has gone through the ANSI consensus process for standards development. It is the requirements created by one certification company to certify the product. Other certification companies are NOT bound to follow the same criteria. The OOI will NOT be found on the list of standards a OSHA NRTL is permitted to certify products against. The OOI identified was originally written in 2012 and has not be worked on since. I spoke to the original author of the OOI and learned that the class of SPGFCI was created to address special needs to protect special equipment not accessible by the general public. Examples would include; decorative light/fountain shows such as those seen in Las Vegas, and lighting stanchions such as those found in sports stadiums.
2. The OOI lists three classes of SPGFCI (C,D,E) while the proposed change to the NEC simply states that a SPGFCI is acceptable without mention of class. Reading the OOI one will find that there are additional requirements for the installation and use of the different classes of SPGFCI. These additional requirements deal with size of grounding conductor and the use of ground monitors.
3. Will a SPGFCI actually protect the three major segments of people (Adult Male, Adult Female and Child). The values associated with a traditional Class A GFCI were selected so that the largest percentile of these segments would be protected against Let-go and fibrillation. Not a single line of data demonstrating that the most susceptible segment, children, would be protected against fibrillation should the threshold current be increase to 20mA. This is a major concern and is one which cannot be "fluffed" over. The original values were selected for a reason. If the panel takes the step to include a SPGFCI as equivalent to a Class A GFCI here, how long before it replaces Class A GFCIs in other applications? This is a very dangerous precedent the panel is suggesting.

Related Item

• First Revision 7913

Submitter Information Verification

Submitter Full Name: Donald Talka
Organization: DJT Advisory Services LLC
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City:
State:
Zip:

Submittal Date: Thu Jul 18 18:14:47 EDT 2024
Committee: NEC-P02

Public Comment No. 1738-NFPA 70-2024 [Section No. 210.8(F)]

(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:

(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

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

Effective September 1, 2026, GFCI or SPGFCI protection shall be provided for listed HVAC equipment.

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

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

Statement of Problem and Substantiation for Public Comment

This is completely unenforceable it is not ok to shove this false narrative of safety down everyone's throat when the units being replaced have no technical merit to require class A protection. The deletion of this will ensure safe installations on multi-family with in some cases 300-400 units to replace and incompatibility will still exist 1/26 when this code is set to be adopted in some places.

Related Item

• PI #3158

Submitter Information Verification

Submitter Full Name: William Snyder
Organization: RCC Solutions
Affiliation: High Voltage Live Podcast
Street Address:
City:
State:
Zip:

Submittal Date: Mon Aug 26 20:55:50 EDT 2024
Committee: NEC-P02

Public Comment No. 1761-NFPA 70-2024 [Section No. 210.8(F)]

(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:

(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

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

~~Effective September 1, 2026, GFCI or SPGFCI protection shall be provided for listed HVAC equipment.~~

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

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

~~2026~~

2029.

Statement of Problem and Substantiation for Public Comment

The TIA that originally proposed an exception to the requirement for GFCI protection for listed HVAC equipment for a limited period of time included the following language in the substantiation.

"With respect to the extension of the date, the Task Group understands that there may not be a resolution to the incompatibility associated with listed Class A GFCIs and the leakage current permitted for listed HVAC equipment. However, the Task Group has included the date so that the exemption is not continued for an undefined period of time and to encourage the affected parties to continue to work together to resolve the incompatibility issue. The Task Group acknowledges that the date may need to be re-evaluated in the future if the incompatibility issues are not resolved."

Our original Public Input (PI 3619) proposed an extension to January 1, 2028, which was chosen to be consistent with a TIA that was submitted by AHMA. However, that TIA was not issued so there is no need to correlate the dates. The GFCI standard, UL 943, must be updated to ensure that devices only trip when presented with a dangerous differential current. Once the UL standard is revised and issued, equipment will still need to be listed to the new standard. We are not convinced that this will occur by September 2026.

CMP2 resolved our PI saying that the date was being retained to "drive urgency in resolving the problem of incompatibility." This is not a valid technical reason. CMP2 offers no assurance or evidence that the issue of incompatibility, including revising the UL Standard, can be accomplished in this timeframe. In fact, UL has presented timelines that indicate that the standard will not be revised in a time period to allow equipment to be listed and for the equipment to be tested for compatibility with HVAC equipment by September 2026.

PI 4203 introduced the concept of using SPGFCI, but also extended the date to January 1, 2029. CMP2 accepted the concept of using SPGFCI but not the extension of the date. This is critical because PI 4203 submitted no testing or research to document that the SPGFCI would address the incompatibility issue. By extending the date, as proposed by the submitted of PI 4203 (a manufacturer of GFCIs) would provide time to verify that this is an acceptable solution. As it stands, it is unknown as to whether using a SPGFCI might also represent an incompatibility issue with an inadequate time to change the effective date. If the SPGFCI option is retained by CMP2, they should also include the extension of the exception as proposed in PI 4203.

Lastly, PI4203 made no reference to the substantial cost difference between a Class A GFCI and an SPGFCI. Our research has indicated that the devices themselves may cost in excess of $3000, a significant increase in construction cost, including the cost associated with replacing existing HVAC equipment, as compared to a Class A GFCI.

The lack of documentation that a SPGFCI will be compatible with listed HVAC equipment and the significant increase in cost associated with a SPGFCI warrants the need for a Second Revision by CMP2.

Related Item

• PI3619 • FR7748

Submitter Information Verification

Submitter Full Name: William Koffel
Organization: Koffel Associates, Inc.
Affiliation: Leading Builders of America
Street Address:
City:
State:
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Submittal Date: Tue Aug 27 08:29:36 EDT 2024
Committee: NEC-P02

Public Comment No. 1820-NFPA 70-2024 [Section No. 210.8(F)]

(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:

(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

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

Effective September 1, 2026, GFCI or SPGFCI protection shall be provided for listed HVAC equipment.

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

Exception No. 2: GFCI protection shall not be required for listed HVAC equipment. This exception shall expire September 1,~~2026~~ 2029 .

Statement of Problem and Substantiation for Public Comment

ACCA's reasons for extending Exception No. 2 to September 1, 2029, are the same as those presented to the CMP-2 at its January 2024 meeting in Charleston, SC. We urge extension of the deadline because the GFCI manufacturers have still not provided testing data showing the incompatibility of GFCI with HVAC units experienced frequently when 2020 NEC was initially adopted has been solved. There were no test results supporting the adoption in 2020 and there are none now. Municipalities and states experienced many cases of nuisance trips where the 2020 code was adopted, especially Texas. Some states deleted this section, such as Massachusetts. Some were modified to extend the effective date to September 1, 2026. The integrity of the NFPA process will be more suspect if the code panel again lacks proof of reliable operation but mandates the same application again

In addition, Phase 2 of the AHRI GFCI research project has been delayed for several reasons and has not been started yet, although funding is available. It is anticipated that the work statement will be available sometime in October 2024. In addition, the CMP-2's "solution" to the situation is to install either a Class A GFCI device or a Special Purpose GFCI (SPGFCI). Again, there was no testing data presented to prove that an SPGFCI will reduce the frequency of tripping let alone how it will interact with variable speed motors utilized on high efficiency heat pumps and air conditioners. Moreover, the HVACR industry has not had an opportunity to test such a device on their equipment to determine how it will interact. For these reasons one more extension is needed to give the related GFCI and HVACR industries more time to finish their development work and testing to support a permanent code solution. Pending such solutions, the market will need ample time to become familiar with the technology and devices needed to protect consumers and allow the equipment to operate safely. Again, allowing nuisance tripping to continue past September 1, 2026, without a proven solution will threaten the health of elderly and sensitive populations who will lose their heating and cooling as a result of constant tripping.

Related Item

• Public Input No. 4392-NFPA 70-2023 [Section No. 210.8(F)]

Submitter Information Verification

Submitter Full Name: David Bixby
Organization: ACCA
Affiliation: ACCA
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 15:13:55 EDT 2024
Committee: NEC-P02

Public Comment No. 2007-NFPA 70-2024 [Section No. 210.8(F)]

(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, ~~60~~ 50 amperes or less, shall be GFCI protected:

(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

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

Effective September 1, 2026, GFCI or SPGFCI protection shall be provided for listed HVAC equipment.

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

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

Statement of Problem and Substantiation for Public Comment

No rationale was provided for making the change from 50 to 60 amperes.

Related Item

• FR 7909

Submitter Information Verification

Submitter Full Name: Thomas Deary
Organization: AHRI
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 15:18:53 EDT 2024
Committee: NEC-P02

Public Comment No. 2030-NFPA 70-2024 [Section No. 210.8(F)]

(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:

(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

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

~~Effective September 1, 2026, GFCI or SPGFCI protection shall be provided for listed HVAC equipment.~~

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

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

~~2026.~~

2029.

Exception No. 3: Outdoor outlets shall not require field-supplied GFCI protection for equipment that is integrally equipped with a Class A or Class C GFCI circuit breaker.

Exception No. 4: Listed HVAC equipment with an integral ground monitoring system shall not require the use of other fault protection devices. The ground monitoring system shall be capable of disabling equipment operation when a fault is detected.

Statement of Problem and Substantiation for Public Comment

Extending Exception No. 2 until 2029 will allow time for SPGFCI to become available on the market and be tested with HVAC equipment. “Driving urgency,” as was previously cited by CMP-2 in its responses that accompanied the rejection of Public Inputs 3619, 4026, and 4392, does not constitute technical justification. These issues of incompatibility cannot be resolved when these GFCI products are not available to be tested with HVAC equipment. If manufacturers include GFCI integral to their products, the identification and certification of these products will take time, thus further emphasizing the need for the 2029 date. Additionally, Class C GFCIs currently available on the market are approximately 10 to 20 times more expensive than Class A GFCIs. This is further justification for why the extension to 2029 is critical – to allow for Class C GFCIs that are more cost effective to come to the market. Additionally, AHRI urges NFPA to require that installed cost information is included with all public comments. For example, ICC requires installed cost information for evaluating potential solutions during the code adoption process.

Related Item

• FR-7913

Submitter Information Verification

Submitter Full Name: Thomas Deary
Organization: AHRI
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City:
State:
Zip:

Submittal Date: Wed Aug 28 16:17:47 EDT 2024
Committee: NEC-P02

Public Comment No. 2035-NFPA 70-2024 [Section No. 210.8(F)]

(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:

(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

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

Effective September 1, 2026, GFCI or SPGFCI protection shall be provided for listed HVAC equipment. When SPGFCI is provided, the disconnect serving the HVAC equipment shall be marked "Warning: SPGFCI Protection Provided for HVAC Unit."

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

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

Statement of Problem and Substantiation for Public Comment

In support of permitting SPGFCI as an alternative to Class A GFCI, a warning marking is necessary for the installer and maintenance person to understand the protection provided on the circuit when it is not Class A GFCI protection. Without this marking it could be assumed that Class A GFCI protection is provided. It is critical for the installer to understand the protection being provided for appropriate installation requirements on the HVAC equipment and for the maintenance person to fully understand how he is being protected during trouble shooting activities.

Related Item

• FR7748

Submitter Information Verification

Submitter Full Name: Keith Waters
Organization: Schneider Electric
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 16:28:03 EDT 2024
Committee: NEC-P02

Public Comment No. 264-NFPA 70-2024 [Section No. 210.8(F)]

~~(F) Outdoor Outlets.~~

~~For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:~~

(1) ~~Garages that have floors located at or below grade level~~

(2) ~~Accessory buildings~~

(3) ~~Boathouses~~

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

~~Effective September 1, 2026, GFCI or SPGFCI protection shall be provided for listed HVAC equipment.~~

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

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

Additional Proposed Changes

File Name	Description	Approved
315553148_462641395978985_8355311864724243370_n.jpg		

Statement of Problem and Substantiation for Public Comment

#1 The example(s) of death by electrocution that were given in the substantiation was due to abnormal use of equipment in the tragic death used to add this reference the equipment was jumped on causing it to lose the EGC. #2 The example(s) of death by electrocution that were given in the substantiation was on an installation that was not compliant with the 2005 NEC which was the current code cycle at the time of the event.
#3. This reference was added to the 2020 NEC to include any utilization equipment installed on the exterior of a dwelling unit proper testing of compatibility was not done and even with the current proposed change to add SPGFCI there has not been testing on this either. Not all equipment will be compatible on 1/26 when the 2026 NEC will be adopted in some places and they will choose to not adopt this language as a whole.

Related Item

• 210.8(A)-(F) Exception #6 PI #3158

Submitter Information Verification

Submitter Full Name: William Snyder
Organization: RCC Solutions
Affiliation: High Voltage Live Podcast
Street Address:
City:
State:
Zip:

Submittal Date: Fri Jul 26 13:40:22 EDT 2024
Committee: NEC-P02

210.8(F) Ground-Fault Circuit-Interrupter Protection for Personnel: Outdoor Outlets

GFCI protection is required on dwelling unit outdoor outlets* supplied by single-phase branch circuits rated 150-volts or less to ground, and 50-amperes or less. NEC 210.8(F) is only applicable to readily accessible outdoor equipment outlets. The intent of the requirement is to protect individuals who may come into contact with outdoor equipment that is likely to become energized.

210.8(F) is ***not applicable*** to:

- Outdoor outlets that are not readily accessible such as a submersible well pumps, sewer lift pumps, load management controllers, surge protection devices, or similar equipment.
- Outdoor single-stage, two-stage, or power conversion HVAC equipment
- Outdoor lighting outlets
- Existing outdoor outlets and the supplied equipment:
    - Replacement or repair of existing outdoor readily accessible electrical equipment utilizing the same feeder or branch circuit conductors.

Public Comment No. 438-NFPA 70-2024 [Section No. 210.8(F)]

(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:

(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

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

Effective September 1, 2026, GFCI or SPGFCI protection shall be provided for listed HVAC equipment.

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

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

Exception No. 3: GFCI protection shall not be required for outlets intended for permanently connected electric vehicle power transfer system in accordance with 625.2.

Statement of Problem and Substantiation for Public Comment

Recognizing the introduction of GFCI protection to 210.8(F) was to address an incident related to an outdoor HVAC condenser unit. Unfortunately, the introduction of GFCI outlet protection has resulted in unforeseen consequences as it does not only specifically apply to HVAC applications. The requirement is broad, applicable to all outdoor outlet branch circuits. The following is an unintended consequence of outlet GFCI protection requirements.

Per Article 625.6 (2023), EVSEs shall be listed according to UL 2594, UL Standard for Electric Vehicle Supply Equipment. As part of the listing certification requirement, EVSEs are tested in accordance to UL 2231-1, -2, the UL standard for Personnel Protection Systems for Electric Vehicle Supply Circuits, as referenced per UL 2594 clause 9.2 and also according to article 625.22 (2023). This requires all EVSEs to have an integrated ground fault personnel protection called a charging current interrupting device (CCID) to detect and interrupt in case of ground fault for personnel. The requirement to require GFCI protection for outlets supplying dedicated permanently connected EVSEs with integral personnel protection (CCID) is unnecessary, equivalent, and redundant.

Furthermore, an outlet for hardwired, or permanently connected EVSE does not pose the same risk a receptacle. The output socket (terminals) of the vehicle connector are not energized until they are fully mated to the EV inlet. Once mated, the terminals are no longer accessible and energization will only occur after the EVSE successfully performs a series of checks required by the standards used to obtain the listing.

Related Item

• FR-7748

Submitter Information Verification

Submitter Full Name: Indra Wiryadinata
Organization: Tesla
Street Address:
City:
State:
Zip:

Submittal Date: Tue Jul 30 17:02:27 EDT 2024
Committee: NEC-P02

Public Comment No. 464-NFPA 70-2024 [Section No. 210.8(F)]

(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:

(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

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

Effective September 1, 2026, GFCI or SPGFCI protection shall be provided for listed HVAC equipment.

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

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

Additional Proposed Changes

File Name	Description	Approved
CN_111.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 111 appeared in the First Draft Report on First Revision No. 7909 and First Revision No. 7913.

The Correlating Committee directs CMP-2 to reconsider the action for correlation with existing Exception No. 2. Based on the charging statement for 210.8, CMP 2 should consider creating an exception for the permission to use SPGFCI protection in 210.8(F).

Related Item

• First Revision No. 7909 • First Revision No. 7913

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:06:13 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 111-NFPA 70-2024 [Section No. 210.8(F)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:13:20 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-2 to reconsider the action for correlation with existing Exception No. 2. Based on the charging statement for 210.8, CMP 2 should consider creating an exception for the permission to use SPGFCI protection in 210.8(F).

First Revision No. 7909-NFPA 70-2024 [Detail]

First Revision No. 7913-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. 969-NFPA 70-2024 [Section No. 210.8(F)]

(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A) Exception No. 1, including outdoor outlets installed at the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 60 amperes or less, shall be GFCI protected:

(1) Garages that have floors located at or below grade level

(2) Accessory buildings

(3) Boathouses

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

Effective September 1, 2026, GFCI or SPGFCI protection shall be provided for listed HVAC equipment.

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

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

Statement of Problem and Substantiation for Public Comment

The new text requiring either GFCI or SPGFCI for listed HVAC equipment eliminates the need for Exception #2.

Related Item

• First Revision No. 7748-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Don Ganiere
Organization: none
Street Address:
City:
State:
Zip:

Submittal Date: Thu Aug 08 13:29:20 EDT 2024
Committee: NEC-P02

Public Comment No. 112-NFPA 70-2024 [Section No. 210.8 [Excluding any Sub-Sections]]

A listed Class A ~~or Class A HF GFCI~~ GFCI shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be installed in a readily accessible location.

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

Statement of Problem and Substantiation for Public Comment

A Class A GFCI is intended to mitigate the effects of electric shock should the insulation system of connected equipment be compromised and an unsuspecting person comes in contact with exposed live parts. The sole purpose of the type HF GFCI is to deal with the unwanted tripping of a classical Class A GFCI when used with equipment producing and operating at frequencies other than pure 60Hz sine wave. The instructions of products operating at other than pure 60 Hz will inform the owner of the product to install on a circuit protected by a HF GFCI. The introduction of a second class of GFCI will lead to confusion in the field. When do you install a traditional class A device and when do you install an HF device? This becomes increasingly confusing when it is not known what will be plugged into the GFCI receptacle. Also we must also consider that as appliances and devices change, those not having a nuisance tripping problem now might have one in the future. Dual Class A GFCI devices having different performance characteristics will only lead to confusion.

The problem with this is that the ability of an HF GFCI to provide protection against the effects of electric shock at the frequencies/waveforms these products operate at is unknown. All that will be known is that the HF GFCI will not "nuisance" trip.

Traditionally when the external environment affects the ability of a safety device to function, the Safety Standard for that device is updated to take into account and address the changes. It does not create a second set of requirements only to address some of the changed environment. A recent examples of this is Smoke Alarms. When false tripping due to cooking smoke became an issue the standard for these products was revised though the ANSI consensus process and the requirements for product performance were increased across the board. Similar actions have been taken in other safety standards such as UL489 and UL1699.

It is also a concern that while it is recognized that a Class HF+ also needs to be developed , the motivation for actually developing this will be greatly reduced once the problem of nuisance tripping has been taken care of. In reality what needs to happen is the requirements for the basic Class A GFCI need to be updated so that will provide the anticipated protection across the spectrum of frequencies and waveforms in today's environment. The UL Researchers who produced the report showing the trip levels of present day GFCIs at different frequencies have also worked on defining the performance characteristics a GFCI should have, to provide protection, across these same frequencies. NFPA and this committee need to reach out to ULS&E (not ULS) to fast track the revision of UL943.

Related Item

• FR7910

Submitter Information Verification

Submitter Full Name: Donald Talka
Organization: DJT Advisory Services LLC
Street Address:
City:
State:
Zip:

Submittal Date: Thu Jul 18 12:22:11 EDT 2024
Committee: NEC-P02

Public Comment No. 1470-NFPA 70-2024 [Section No. 210.8 [Excluding any Sub-Sections]]

A listed ~~Class A or Class A-HF~~ Class A GFCI shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be installed in a readily accessible location.

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

Informational Note No. 2: Class A GFCI's marked "HF" or "HF+" are evaluated for use with loads having high frequency leakage currents from power conversion components, such as variable speed drives and inverters.

Additional Proposed Changes

File Name	Description	Approved
FR_7788_Class_A-HF_FINAL.docx		

Statement of Problem and Substantiation for Public Comment

A 'Class A HF/HF+' designation may deviate from OSHA reference for 'Class A'. To avoid confusion, the UL 943 proposals for HF have been revised to maintain the long-standing "Class A" designation as-is, and includes "HF" and "HF+" as a marked rating. This approach is consistent with other common ratings such as Tamper Resistant (TR), Hospital Grade, Weather Resistant (WR), Lamp Control Switching Duty (SWD), High Intensity Discharge (HID), Current Limiting Rating, Heating Air-Conditioning Refrigeration (HACR), and 25C or 40C rating. As a marked rating that is permitted to be used, there is no need to modify the requirement in 210.8. An Informational Note is added to explain the application for a Class A GFCI marked "HF" or "HF+".

Related Item

• FR 7788

Submitter Information Verification

Submitter Full Name: Frederick Reyes
Organization: UL Solutions
Street Address:
City:
State:
Zip:

Submittal Date: Fri Aug 23 10:59:05 EDT 2024
Committee: NEC-P02

First Revision No. 7788-NFPA 70-2024 [Section No. 210.8 [Excluding any Sub-Sections]]

A listed Class A or Class A-HF GFCI shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be installed in a readily accessible location.

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

Submitter Information Verification

Committee: NEC-P02

Submittal Date: Wed Jan 17 09:21:51 EST 2024

Committee Statement

Committee Statement: The exception for receptacles on rooftops was moved to the parent text of 210.8 as this exception applies regardless of what type of occupancy. Type of occupancy doesn't dictate the accessible nature of the receptacle.

Response Message: FR-7788-NFPA 70-2024. The following items from PI 264 were not accepted: 210.8(F): Section 210.8(F) suggested changes were not accepted as clarity is not added and the existing language is sufficient. The existing language does not indicate that GFCI protection must be provided as a wiring device only. The language uses the word "protection" which indicates protection is provided either at the device or upstream of the device. 210.8(A) and 210.8(B): The removal of Kitchens from list item (6) in 210.8(A) and list item (2) in 210.8(B) is not accepted as it could create confusion. Identifying "kitchens" clearly in 210.8 adds clarity and increases usablity of the Code. A kitchen is well defined and not in all cases does 210.8(A)(7) cover a kitchen. Not all of the criteria in 210.8(A)(7) are included for kitchens. 210.8(A)(7) says "or cooking" and the definition of a kitchen says "and cooking".

Public Input No. 264-NFPA 70-2023 [Section No. 210.8]

Ballot Results

This item has passed ballot

x

21 Eligible Voters

1 Not Returned

17 Affirmative All

2 Affirmative with Comments

1 Negative with Comments

0 Abstention

X

Not Returned

Velasquez, Oscar
X
Affirmative All
Ambrosino, John J.
Boynton, Charles L.
Buuck, Daniel
Doering, Tyler James
Domitrovich, Thomas A.
El-Sherif, Nehad
Humphrey, David G.
Johnson, David W.
Johnson, Brian H.
Kasznay, Andrew John
Libby, Arthur
Naughton, Daniel J.
Neubauer, Fred
Reyes, Frederick P.
Rhodes, Johnny
Tidd, Jeremy Mark
Woyczynski, Greg
X
Affirmative with Comment
Campolo, Steve
The UL-101 leakage standard has not been adopted (or proposed) for all utilization equipment standards including power tools which may be used on rooftops.
Cook, Mark Daniel
agree
X
Negative with Comment
Manche, Alan
We support adding the exception "Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop." We do not support adding the Class A-HF language. This needs to remain a Class A requirement to align with OSHA compliance. The recognition of high frequency performance should be designated through an HF rating. The committee could then require GFCIs with the HF rating on specific circuits.

Draft by FReyes 8.12.2024
FR-7788

Public Comment:

A 'Class A HF/HF+' designation may deviate from OSHA reference for 'Class A'. To avoid confusion, the UL 943 proposals for HF have been revised to maintain the long-standing "Class A" designation as-is, and includes "HF" and "HF+" as a marked rating. This approach is consistent with other common ratings such as Tamper Resistant (TR), Hospital Grade, Weather Resistant (WR), Lamp Control Switching Duty (SWD), High Intensity Discharge (HID), Current Limiting Rating, Heating Air-Conditioning Refrigeration (HACR), and 25C or 40C rating. As a marked rating that is permitted to be used, there is no need to modify the requirement in 210.8. An Informational Note is added to explain the application for a Class A GFCI marked "HF" or "HF+".

Proposed Revision:

210.8 A listed Class A ~~or Class A-HF~~ GFCI shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be installed in a readily accessible location.

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Informational Note No. 1: See 215.9 for GFCI protection on feeders.
Informational Note No. 2: Class A GFCI's marked "HF" or "HF+" are evaluated for use with loads having high frequency leakage currents from power conversion components, such as variable speed drives and inverters.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

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Public Comment No. 1679-NFPA 70-2024 [Section No. 210.8 [Excluding any Sub-Sections]]

A listed Class A or Class A-HF GFCI shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be listed, marked and rated for bidirectional use and installed in a readily accessible location.

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

Statement of Problem and Substantiation for Public Comment

It appears that GFCI requirements for bidirectional use were overlooked in the past. To assure the necessary shock protection and functionality for cord connected, bidirectional equipment like EV-Chargers, plug-In solar & battery based power appliances, it is necessary that GFCI breakers can perform with the current flowing in either direction.

Related Item

• FR-7788

Submitter Information Verification

Submitter Full Name: Achim Ginsberg-Klemmt
Organization: GismoPower LLC
Affiliation: GismoPower LLC
Street Address:
City:
State:
Zip:

Submittal Date: Mon Aug 26 10:09:30 EDT 2024
Committee: NEC-P02

Public Comment No. 1703-NFPA 70-2024 [Section No. 210.8 [Excluding any Sub-Sections]]

A listed Class A GFCI or ~~Class A HF GFCI~~ a listed Class A GFCI marked as HF shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be installed in a readily accessible location.

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

Statement of Problem and Substantiation for Public Comment

Since the January CMP meetings, there has been more discussion regarding the way in which high frequency leakage currents would be addressed in UL 943. In order to better align with OSHA requirements for a Class A GFCI, there is a push to use a rating to indicate a GFCI designed to have reduced sensitivity to high frequency leakage currents instead of creating an entirely new class of GFCI. The language in 210.8 has been modified to reflect that new direction. The “marked as HF” language is consistent with SWD and HID language in 240.83(D).

Related Item

• FR 7910

Submitter Information Verification

Submitter Full Name: Randy Dollar
Organization: Siemens Industry
Affiliation: American Circuit Breaker Manufacturers Association (ACBMA)
Street Address:
City:
State:
Zip:

Submittal Date: Mon Aug 26 13:15:52 EDT 2024
Committee: NEC-P02

Public Comment No. 1804-NFPA 70-2024 [Section No. 210.8 [Excluding any Sub-Sections]]

A listed Class A or Class A-HF GFCI shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be installed in a readily accessible location.

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

Additional Proposed Changes

File Name	Description	Approved
Doc1.docx	210.8 Comment	

Statement of Problem and Substantiation for Public Comment

Today, most GFCIs can function for bidirectional use, despite their labeling. However, UL testing has shown some to get damaged and cease to protect when subject to bidirectional power. Many emerging products such as balcony PV and V2G EV chargers will backfeed power into the home. People will purchase and use these regardless of UL listing or compliance; this is not something we can easily regulate. Nonetheless, with required bidirectional GFCI breakers and outlets, we will still protect the current and future occupants from shock due to damaged GFCIs.

Related Item

• FR-7788

Submitter Information Verification

Submitter Full Name: Daniel Gerber
Organization:
Affiliation: Lawrence Berkeley National Laboratory
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 13:28:00 EDT 2024
Committee: NEC-P02

A listed Class A or Class A-HF GFCI shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be rated and marked for bidirectional use and installed in a readily accessible location.

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

Public Comment No. 1857-NFPA 70-2024 [Section No. 210.8 [Excluding any Sub-Sections]]

A listed Class A ~~or Class A-HF~~ GFCI shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be installed in a readily accessible location. The GFCI may be listed and identified as High Frequency (HF).

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

Statement of Problem and Substantiation for Public Comment

The UL 943 standard for GFCIs is being updated to reduce nuisance tripping on loads which contain modernized electrical components such as LED drivers, switched-mode power supplies, and variable frequency drives.

In the UL 943 preliminary review draft (April 2024), this modernized GFCI was referred to as Class A-HF. The next version of the UL 943 draft (expected Q3/Q4 2024) will change Class A-HF to a High Frequency (HF) rating. Although the name is changing, the underlying technical specifications are not.

This change to the First Draft will better align language in the NEC with the latest language in UL standards work.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1865-NFPA 70-2024 [Section No. 422.5 [Excluding any Sub-Sections]]	

Related Item

- FR 7788

Submitter Information Verification

Submitter Full Name: Greg Woyczynski
Organization: Association of Home Appliance
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 18:10:00 EDT 2024
Committee: NEC-P02

Public Comment No. 1976-NFPA 70-2024 [Section No. 210.8 [Excluding any Sub-Sections]]

A listed Class A or Class A-HF GFCI shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be installed in a readily accessible location.

Exception: Receptacles on rooftops or for compliance with 210.63(A) shall not be required to be readily accessible other than from the ~~rooftop~~ level on which they are installed .

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

Statement of Problem and Substantiation for Public Comment

In dwelling units, furnaces are often installed in attics, and 210.63 requires a service receptacle on the same level as the furnace. If the attic is accessed via a portable ladder, a GFCI receptacle in that location does not comply with the definition of being readily accessible, whereas the identical situation is considered readily accessible if there is a permanent (pull-down) ladder. In either case, the safety objective is met by using a GFCI receptacle, rather than one at the source of the circuit. The proposed language would still allow a circuit breaker type GFCI, but would not require it.

Related Item

• PI #264 correctly moved this exception to 210.8 and out of 210.8(B)

Submitter Information Verification

Submitter Full Name: Douglas Hansen
Organization: Code Check
Affiliation: Self
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 13:46:53 EDT 2024
Committee: NEC-P02

Public Comment No. 2010-NFPA 70-2024 [Section No. 210.8 [Excluding any Sub-Sections]]

A listed Class A or Class A-HF GFCI shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be installed in a readily accessible location.

Exception: Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

[Comment: GFCI (Class A-HF) may be a solution, but the requirements for Class A-HF have not been adopted in UL 943 and thus manufacturers do not have the ability to identify a compatible Class A-HF device nor to perform testing.]

Statement of Problem and Substantiation for Public Comment

See comment.

Related Item

• FR-7910

Submitter Information Verification

Submitter Full Name: Thomas Deary
Organization: AHRI
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 15:22:13 EDT 2024
Committee: NEC-P02

Public Comment No. 274-NFPA 70-2024 [Section No. 210.8 [Excluding any Sub-Sections]]

A listed Class A or Class A-HF GFCI shall provide protection in accordance with 210.8(A) through 210.8(F). The GFCI shall be installed in a readily accessible location.

Exception 1 : Receptacles on rooftops shall not be required to be readily accessible other than from the rooftop.

Exception 6: Any equipment with integral personnel protection and documented compatibility issues with class A devices shall not be required to be installed on a GFCI device.

Informational Note: See 215.9 for GFCI protection on feeders.

For the purposes of this section, the distance from receptacles shall be measured as the shortest path the power supply cord connected to the receptacle would follow without piercing a floor, wall, ceiling, or fixed barrier.

Additional Proposed Changes

File Name	Description	Approved
315522135_562375592318221_2186616584159142738_n.1688922631723_1_.jpg	Tesla manufacturer's instructions indicate personnel protection provided integral and not compatible with Class A devices.	

Statement of Problem and Substantiation for Public Comment

Many types of modern equipment has been developed with safety in mind outside of the realm of GFCI protection. The statistics in the last decade and a half don't support the expansion of Class A protection. Compatibility has became a major concern with the expansion of GFCI protection. What is the solution from the Code Making Panel for equipment that is not compatible with Class A devices? It seems energy efficiency, innovations in lighting, and better testing from the manufacturers supports an overall exception for equipment that will not function on Class A devices.

Related Item

• Exception #6 PI #3158

Submitter Information Verification

Submitter Full Name: William Snyder
Organization: RCC Solutions
Affiliation: High Voltage Live Podcast
Street Address:
City:
State:
Zip:

Submittal Date: Fri Jul 26 19:28:46 EDT 2024
Committee: NEC-P02

Public Comment No. 465-NFPA 70-2024 [Section No. 210.11(A)]

(A) Number of Branch Circuits.

The minimum number of branch circuits shall be determined from the total calculated load and the size or rating of the circuits used. In all installations, the number of circuits shall be sufficient to supply the load served. In no case shall the load on any circuit exceed the maximum specified by 120.11.

Additional Proposed Changes

File Name	Description	Approved
CN_112.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 112 appeared in the First Draft Report.

The Correlating Committee directs CMP 2 to revise the language “In no case shall the load on any circuit exceed the maximum specified by 220.11” to: "the calculated load on any circuit shall not exceed the maximum specified by 220.11", for compliance with the NEC Style Manual requirement covering the use of mandatory text.

Related Item

• Correlating Committee Note No. 112

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:08:57 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 112-NFPA 70-2024 [Section No. 210.11(A)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:16:32 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 2 to revise the language “In no case shall the load on any circuit exceed the maximum specified by 220.11” to: "the calculated load on any circuit shall not exceed the maximum specified by 220.11", for compliance with the NEC Style Manual requirement covering the use of mandatory text.

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. 109-NFPA 70-2024 [Section No. 210.12]

210.12 Arc-Fault Circuit-Interrupter Protection.

Arc-fault circuit-interrupter (AFCI) protection shall be installed in accordance with 210.12(B) through 210.12(E) by any of the means described in 210.12(A) . The AFCI shall be listed and installed in a readily accessible location.

(A) Means of Protection.

AFCI protection shall be provided by any of the following means:

(1) A listed combination-type AFCI installed at the origin of the branch circuit to protect the entire branch circuit

(2) A listed branch/feeder-type AFCI installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box, which is marked to indicate that it is the first outlet of the branch circuit

(3) A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box if all of the following conditions are met:

(4) The branch-circuit wiring shall be continuous from the branch-circuit OCPD to the outlet branch-circuit AFCI.

(5) The maximum length of the branch-circuit wiring from the branch-circuit OCPD to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

(6) The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.

(7) A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch-circuit OCPD if all of the following conditions are met:

(8) The branch-circuit wiring shall be continuous from the branch-circuit OCPD to the outlet branch-circuit AFCI.

(9) The maximum length of the branch-circuit wiring from the branch-circuit OCPD to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

(10) The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.

(11) The combination of the branch-circuit OCPD and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and listed as such.

(12) If metal raceway, metal wireways, metal auxiliary gutters, or Type MC or Type AC cable meeting the applicable requirements of 250.118 , with metal boxes, metal conduit bodies, and metal enclosures are installed for the portion of the branch circuit between the branch-circuit OCPD and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet to protect the remaining portion of the branch circuit

(13) Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit OCPD and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet to protect the remaining portion of the branch circuit

Informational Note: See UL 1699-2011, *Standard for Arc-Fault Circuit-Interrupters* , for information on combination-type and branch/feeder-type AFCI devices. See UL Subject 1699A, *Outline of Investigation for Outlet Branch Circuit Arc-Fault Circuit-Interrupters* , for information on outlet branch-circuit type AFCI devices. See UL Subject 1699C, *Outline of Investigation for System Combination Arc-Fault Circuit Interrupters* , for information on system combination AFCIs.

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A) :

(1) Kitchens

(2) Family rooms

(3) Dining rooms

(4) Living rooms

(5) Parlors

(6) Libraries

(7) Dens

(8) Bedrooms

(9) Sunrooms

(10) Recreation rooms

(11) Closets

(12) Hallways

(13) Laundry areas

(14) Similar areas

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B) . The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118 , with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72* -2025, *National Fire Alarm and Signaling Code* , 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

(C) Dormitories.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A) :

(1) Bedrooms

(2) Living rooms

(3) Hallways

(4) Closets

(5) Bathrooms

(6) Similar rooms

(D) Other Occupancies.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A) :

(1) Guest rooms and guest suites of hotels and motels

(2) Areas used exclusively as patient sleeping rooms in nursing homes and limited-care facilities

(3) Areas designed for use exclusively as sleeping quarters in fire stations, police stations, ambulance stations, rescue stations, ranger stations, and similar locations

(E) Branch Circuit Wiring Extensions, Modifications, or Replacements.

If branch-circuit wiring for any of the areas specified in 210.12(B) , 210.12(C) , or 210.12(D) is modified, replaced, or extended, the branch circuit shall be protected by one of the following:

(1) By any of the means described in 210.12(A)

(2) A listed outlet branch-circuit-type AFCI located at the first receptacle outlet or switch of the existing branch circuit

Exception: AFCI protection shall not be required where the extension of the existing branch-circuit conductors is not more than 1.8 m (6 ft) and does not include any additional outlets or devices, other than splicing devices. This measurement shall not include the conductors inside an enclosure, cabinet, or junction box.

Statement of Problem and Substantiation for Public Comment

The data submitted with Public Input No. 3155 which became FR 8195 after the First-Draft meeting provides clear data to show that AFCI devices are not providing the protection with which they're said to provide. This data was convincing enough that 50% of the voting members of this panel agreed that at the very least an exception should be added for kitchens and laundry areas.

The data clearly shows that AFCI's have not helped with fire prevention, and they along with everything else have gotten very expensive. If they don't work, which the data with the above mentioned PI and FR clearly show that they don't, then it is this panels responsibility to get them out of the code and to quit forcing consumers to pay for a defective product.

Related Item

• Public Input 3155 • First Revison 8195

Submitter Information Verification

Submitter Full Name: Jesse Duvuvei

Organization:	North Strabane Township
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Wed Jul 17 18:29:45 EDT 2024
Committee:	NEC-P02

Public Comment No. 1892-NFPA 70-2024 [Section No. 210.12]

210.12 Arc-Fault Circuit-Interrupter Protection.

Arc-fault circuit-interrupter (AFCI) protection shall be installed in accordance with 210.12(B) through 210.12(~~E~~ F) by any of the means described in 210.12(A). The AFCI shall be listed and installed in a readily accessible location.

(A) Means of Protection.

AFCI protection shall be provided by any of the following means:

(1) A listed combination-type AFCI installed at the origin of the branch circuit to protect the entire branch circuit

(2) A listed branch/feeder-type AFCI installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box, which is marked to indicate that it is the first outlet of the branch circuit

(3) A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box if all of the following conditions are met:

(4) . The branch-circuit wiring shall be continuous from the branch-circuit OCPD to the outlet branch-circuit AFCI.

(5) . The maximum length of the branch-circuit wiring from the branch-circuit OCPD to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

(6) The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.

(7) A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch-circuit OCPD if all of the following conditions are met:

(8) . The branch-circuit wiring shall be continuous from the branch-circuit OCPD to the outlet branch-circuit AFCI.

(9) . The maximum length of the branch-circuit wiring from the branch-circuit OCPD to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

(10) . The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.

(11) . The combination of the branch-circuit OCPD and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and listed as such.

(12) If metal raceway, metal wireways, metal auxiliary gutters, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, metal conduit bodies, and metal enclosures are installed for the portion of the branch circuit between the branch-circuit OCPD and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet to protect the remaining portion of the branch circuit

(13) Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit OCPD and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet to protect the remaining portion of the branch circuit

Informational Note: See UL 1699-2011, *Standard for Arc-Fault Circuit-Interrupters*, for information on combination-type and branch/feeder-type AFCI devices. See UL Subject 1699A, *Outline of Investigation for Outlet Branch Circuit Arc-Fault Circuit-Interrupters*, for information on outlet branch-circuit type AFCI devices. See UL Subject 1699C, *Outline of Investigation for System Combination Arc-Fault Circuit Interrupters*, for information on system combination AFCIs.

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

(1) Kitchens

(2) Family rooms

(3) Dining rooms

(4) Living rooms

(5) Parlors

(6) Libraries

(7) Dens

(8) Bedrooms

(9) Sunrooms

(10) Recreation rooms

(11) Closets

(12) Hallways

(13) Laundry areas

(14) Similar areas

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

(C) Dormitories.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

(1) Bedrooms

(2) Living rooms

(3) Hallways

(4) Closets

(5) Bathrooms

(6) Similar rooms

(D) Other Occupancies.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

(1) Guest rooms and guest suites of hotels and motels

(2) Areas used exclusively as patient sleeping rooms in nursing homes and limited-care facilities

(3) Areas designed for use exclusively as sleeping quarters in fire stations, police stations, ambulance stations, rescue stations, ranger stations, and similar locations

(E) DC circuits.

Effective January 1, 2029: All dc branch circuits greater than 30 V dc supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A)(1), (A)(2), (A)(5) and (A)(6) or a listed device providing arc-fault protection equivalent to an AFCI:

(1) Branch circuits supplying dwelling units installed in locations as specified in 210.12(B)(1) through (B)(14)

(2) Branch circuits supplying dormitory units installed in locations as specified in 210.12(C)(1) through (C)(6)

(3) Branch circuits supplying other occupancies installed in locations as specified in 210.12(D)(1) through (D)(3)

Exception: AFCI protection shall not be required for a Class 2, Class 3, Class 4 or communications circuit.

(F) Branch Circuit Wiring Extensions, Modifications, or Replacements.

If branch-circuit wiring for any of the areas specified in 210.12(B), 210.12(C), ~~or~~ 210.12(D) ~~is~~ , or 210.12(E) is modified, replaced, or extended, the branch circuit shall be protected by one of the following:

(1) By any of the means described in 210.12(A)

(2) Effective January 1, 2029: By any of the means described in 210.12(A)(1), (A)(2), (A)(5) and (A)(6) for dc circuits

(3) A listed outlet branch-circuit-type AFCI located at the first receptacle outlet or switch of the existing branch circuit

Exception: AFCI protection shall not be required where the extension of the existing branch-circuit conductors is not more than 1.8 m (6 ft) and does not include any additional outlets or devices, other than splicing devices. This measurement shall not include the conductors inside an enclosure, cabinet, or junction box.

Additional Proposed Changes

File Name	Description	Approved
PC_210.12_Proposed_Changes.docx	Proposed Text	

Statement of Problem and Substantiation for Public Comment

This Public Comment is submitted on behalf of a Correlating Committee DC Task Group consisting of Danish Zia, Jason Fisher, Randy Dollar, Larry Wildermuth, Scott Higgins, Scott Harding, Mark Earley, Jason Hopkins, Chris Vance, Chad Kennedy and Derrick Atkins. This Public Comment, along with other Public Comments, was developed with the goal of improving usability and accuracy on requirements associated with DC circuits.

The requirements of Section 210.12 are intended to provide protection from arcing faults which can result in fires in areas occupied by personnel. The requirements are currently applied to AC circuits only, even though the potential for arcing faults also exist in DC circuits and the hazards may be more significant due to the lack of a zero crossing in DC waveforms. As there is continued expansion of DC throughout the electrical infrastructure it is necessary to ensure the same level of protection is provided from arcing faults occurring in these locations. This proposal closes a gap in the Code for DC circuits where similar hazards exist but arc fault circuit interrupter protection may not be provided for the same locations currently addressed in 210.12.

Although as mentioned in the committee statement to Public Input No. 4276 there are presently no listed products commercially available for this purpose, there are several listed DC rated arc-fault circuit protection devices for PV applications available on the market. These have been evaluated to UL 1699B, the Standard for Photovoltaic (PV) DC Arc-Fault Circuit Protection and the protection requirements are based on limiting the total arcing energy in the fault. Similarly, UL 1400-1, the Outline of Investigation for Fault-Managed Power Systems – Part 1: Safety, includes protection requirements for DC and AC+DC arc-faults based on limiting total arcing energy. The same protection concept could be utilized for the development of new requirements for DC arc-fault protection for the circuits and locations referenced in the proposal. An effective date of January 1, 2029 could be considered to allow the industry to develop devices for this specific purpose.

Additional note - No changes are being made to 210.12(A)(3) or 210.12(A)(4) and any changes shown are due to TerraView formatting issues. See attached document for changes proposed.

Related Item

• Public Input No. 4276-NFPA 70-2023

Submitter Information Verification

Submitter Full Name: Danish Zia
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 27 21:18:22 EDT 2024
Committee: NEC-P02

210.12 Arc-Fault Circuit-Interrupter Protection.

Arc-fault circuit-interrupter (AFCI) protection shall be installed in accordance with 210.12(B) through 210.12(~~E~~F) by any of the means described in 210.12(A). The AFCI shall be listed and installed in a readily accessible location.

(A) Means of Protection.

AFCI protection shall be provided by any of the following means:

1. A listed combination-type AFCI installed at the origin of the branch circuit to protect the entire branch circuit
2. A listed branch/feeder-type AFCI installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box, which is marked to indicate that it is the first outlet of the branch circuit
3. A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box if all of the following conditions are met:
    1. The branch-circuit wiring shall be continuous from the branch-circuit OCPD to the outlet branch-circuit AFCI.
    2. The maximum length of the branch-circuit wiring from the branch-circuit OCPD to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.
    3. The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.
4. A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch-circuit OCPD if all of the following conditions are met:
    1. The branch-circuit wiring shall be continuous from the branch-circuit OCPD to the outlet branch-circuit AFCI.
    2. The maximum length of the branch-circuit wiring from the branch-circuit OCPD to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.
    3. The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.
    4. The combination of the branch-circuit OCPD and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and listed as such.
5. If metal raceway, metal wireways, metal auxiliary gutters, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, metal conduit bodies, and metal enclosures are installed for the portion of the branch circuit between the branch-circuit OCPD and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet to protect the remaining portion of the branch circuit
6. Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit OCPD and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet to protect the remaining portion of the branch circuit

Informational Note: See UL 1699-2011, *Standard for Arc-Fault Circuit-Interrupters*, for information on combination-type and branch/feeder-type AFCI devices. See UL Subject 1699A, *Outline of Investigation for Outlet Branch Circuit Arc-Fault Circuit-Interrupters*, for information on outlet branch-circuit type AFCI devices. See UL Subject 1699C, *Outline of Investigation for System Combination Arc-Fault Circuit Interrupters*, for information on system combination AFCIs.

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

1. Kitchens
2. Family rooms
3. Dining rooms
4. Living rooms
5. Parlors
6. Libraries
7. Dens
8. Bedrooms
9. Sunrooms
10. Recreation rooms
11. Closets
12. Hallways
13. Laundry areas
14. Similar areas

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

(C) Dormitories.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

1. Bedrooms
2. Living rooms
3. Hallways
4. Closets
5. Bathrooms
6. Similar rooms

(D) Other Occupancies.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

1. Guest rooms and guest suites of hotels and motels
2. Areas used exclusively as patient sleeping rooms in nursing homes and limited-care facilities
3. Areas designed for use exclusively as sleeping quarters in fire stations, police stations, ambulance stations, rescue stations, ranger stations, and similar locations

(E) DC circuits.

Effective January 1, 2029: All dc branch circuits greater than 30 V dc supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A)(1), (A)(2), (A)(5) and (A)(6) or a listed device providing arc-fault protection equivalent to an AFCI:

1. Branch circuits supplying dwelling units installed in locations as specified in 210.12(B)(1) through (B)(14)
2. Branch circuits supplying dormitory units installed in locations as specified in 210.12(C)(1) through (C)(6)
3. Branch circuits supplying other occupancies installed in locations as specified in 210.12(D)(1) through (D)(3)

Exception: AFCI protection shall not be required for a Class 2, Class 3, Class 4 or communications circuit.

(~~E~~F) Branch Circuit Wiring Extensions, Modifications, or Replacements.
If branch-circuit wiring for any of the areas specified in 210.12(B), 210.12(C), ~~or~~ 210.12(D), or 210.12(E) is modified, replaced, or extended, the branch circuit shall be protected by one of the following:

1. By any of the means described in 210.12(A) for ac circuits
2. ~~1.~~ Effective January 1, 2029: By any of the means described in 210.12(A)(1), (A)(2), (A)(5) and (A)(6) for dc circuits
3. ~~2.~~ A listed outlet branch-circuit-type AFCI located at the first receptacle outlet or switch of the existing branch circuit

Exception: AFCI protection shall not be required where the extension of the existing branch-circuit conductors is not more than 1.8 m (6 ft) and does not include any additional outlets or devices, other than splicing devices. This measurement shall not include the conductors inside an enclosure, cabinet, or junction box.

Public Comment No. 1433-NFPA 70-2024 [Section No. 210.12(A)]

(A) Means of Protection.

AFCI protection shall be provided by any of the following means:

(1) A listed combination-type AFCI installed at the origin of the branch circuit to protect the entire branch circuit

(2) A listed branch/feeder-type AFCI installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box, which is marked to indicate that it is the first outlet of the branch circuit

(3) A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box if all of the following conditions are met:

(4) . The branch-circuit wiring shall be continuous from the branch-circuit OCPD to the outlet branch-circuit AFCI.

(5) . The maximum length of the branch-circuit wiring from the branch-circuit OCPD to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

(6) The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.

(7) . A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch-circuit overcurrent protective device if all of the following conditions are met :

(8) . The branch-circuit wiring shall be unspliced and untapped from the branch-circuit overcurrent device to the outlet branch-circuit AFCI .

(9) . The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 13.7 m (45 ft) for a 14 AWG copper conductor or 18.3 m (60 ft) for a 12 AWG copper conductor .

(10) . The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit .

(11) . The branch-circuit circuit breaker shall be a listed single pole thermal-magnetic circuit breaker .

(12) The branch-circuit circuit breaker shall not be of the high-magnetic trip-type.

(13) . A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch-circuit OCPD if all of the following conditions are met:

(14) . The branch-circuit wiring shall be continuous from the branch-circuit OCPD to the outlet branch-circuit AFCI.

(15) . The maximum length of the branch-circuit wiring from the branch-circuit OCPD to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

(16) . The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.

(17) . The combination of the branch-circuit OCPD and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and listed as such.

(18) If metal raceway, metal wireways, metal auxiliary gutters, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, metal conduit bodies, and metal enclosures are installed for the portion of the branch circuit between the branch-circuit OCPD and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet to protect the remaining portion of the branch circuit

(19) Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit OCPD and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet to protect the remaining portion of the branch circuit

Informational Note: See UL 1699-2011, *Standard for Arc-Fault Circuit-Interrupters*, for information on combination-type and branch/feeder-type AFCI devices. See UL Subject 1699A, *Outline of Investigation for Outlet Branch Circuit Arc-Fault Circuit-Interrupters*, for information on outlet branch-circuit type AFCI devices. See UL Subject 1699C, *Outline of Investigation for System Combination Arc-Fault Circuit Interrupters*, for information on system combination AFCIs.

Additional Proposed Changes

File Name	Description	Approved
LegrandPC1433OBCAFCI.docx	Legrand Public Comment 1433 OBC AFCI	

Statement of Problem and Substantiation for Public Comment

Public Comment No. 1433-NFPA 70-2024
STATEMENT OF PROBLEM AND SUBSTANTIATION FOR PUBLIC INPUT.

Additional and readily available outlet based AFCI protection options for installers and homeowners are necessary to ensure that confidence in the electrical industry is not undermined. AFCI devices continue to experience nuisance tripping problems, although expansion is not recommended, this Public Comment seeks to mitigate issues by providing an immediate remedy and mitigation option.

Resetting an AFCI/GFCI breaker is the first response to nuisance tripping Ref1, typically sending residents to the basement or outside and creating risk of a trip and fall, especially for the over 335 million US residents over age 65 Ref2. The CDC reports that there about 3 million emergency room visits annually by older people due to falls Ref3. After multiple nuisance tripping events, the next typical solution involves replacing an AFCI/GFCI breaker with a standard breaker resulting in the elimination of both AFCI and proven lifesaving GFCI protection.

Allowing a practical, outlet-based solution to be installed without the unneeded and overconservative requirements previously considered will spur adoption and provide end users an easily accessible, yet safe alternative to circuit breaker-based solutions. Studies by Parks Ref4 and UL Ref5&Ref6 have demonstrated that only the installation guidelines stated within this proposal are required to ensure protection equivalent to current options.

Note that the only changes proposed are the addition of new 210.12(A)(4) and associated editorial numbering changes. There are no technical changes proposed to 210.12(A)(1) through (3) and (5) through (7). Any unintended underlining and renumbering were caused by issues with Terra. A clean copy of the proposed changes is provided in the attachment.

210.12 Arc-Fault Circuit-Interrupter Protection. Arc-fault circuit-interrupter (AFCI) protection shall be installed in accordance with 210.12(B) through (E) by any of

the means described in 210.12(A). The AFCI shall be listed and installed in a readily accessible location.
(A) Means of Protection. AFCI protection shall be provided by any of the following means:
(1) A listed combination-type AFCI installed to provide protection of the entire branch circuit.

(2) A listed branch/feeder-type AFCI installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box, which shall be marked to indicate that it is the first outlet of the branch circuit.

(3) A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box if all of the following conditions are met:
a. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit AFCI.
b. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.
c. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit.

(4) A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch-circuit overcurrent protective device if all of the following conditions are met:
a. The branch-circuit wiring shall be unspliced and untapped from the branch-circuit overcurrent device to the outlet branch-circuit AFCI.
b. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 13.7 m (45 ft) for a 14 AWG copper conductor or 18.3 m (60 ft) for a 12 AWG copper conductor.
c. The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.
d. The branch-circuit circuit breaker shall be a listed single pole thermal-magnetic circuit breaker.
e. The branch-circuit circuit breaker shall not be of the high-magnetic trip-type.

(5) A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch- circuit overcurrent protective device if all of the following conditions are met:
a. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit AFCI.
b. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.
c. The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.
d. The combination of the branch-circuit overcurrent device and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and listed as such.

(6) If metal raceway, metal wireways, metal auxiliary gutters, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, metal conduit bodies, and metal enclosures are installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a listed outlet branch-circuit-type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

(7) Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a listed outlet branch-circuit-type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.
Informational Note: See UL 1699-2011, Standard for Arc-Fault Circuit Interrupters, for information on combination-type and branch/feeder-type AFCI devices. See UL Subject 1699A, Outline of Investigation for Outlet Branch Circuit Arc-Fault Circuit-Interrupters, for information on outlet branch-circuit type AFCI devices. See UL Subject 1699C, Outline of Investigation for System Combination Arc-Fault Circuit Interrupters, for information on system combination AFCIs.

References:

Ref1 AFCI and Nuisance Tripping Research study, Dr. Steven W. Schmidt, Dr. Xi Lin, East Carolina University, August 15, 2023

Ref2 US Census Bureau 4/8/2024, 8/23/2024,
https://www.census.gov/quickfacts/fact/table/US/AGE775223

Ref3 Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web–based Injury Statistics Query and Reporting System (WISQARS) [online]. Accessed March 11, 2024. https://www.cdc.gov/falls/data-research/facts-stats/index.html

Ref4 Short Circuit Fault Current Study, Parks Associates, August 2012

Ref5 Evaluation of Run Length and Available Current on Breaker Ability to Mitigate Parallel Arcing Faults, UL, Paul W. Brazis Jr., PhD and David A. Dini, PE

Ref6 Effectiveness of Circuit Breakers in Mitigating Parallel Arcing Faults in the Home Run, UL, Paul W. Brazis Jr., PhD and Fan He, PhD

Related Item

• PI2794

Submitter Information Verification

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Committee: NEC-P02

Public Comment No. 1433-NFPA 70-2024

STATEMENT OF PROBLEM AND SUBSTANTIATION FOR PUBLIC INPUT.

Additional and readily available outlet based AFCI protection options for installers and homeowners are necessary to ensure that confidence in the electrical industry is not undermined. AFCI devices continue to experience nuisance tripping problems, although expansion is not recommended, this Public Comment seeks to mitigate issues by providing an immediate remedy and mitigation option.

Resetting an AFCI/GFCI breaker is the first response to nuisance tripping[1], typically sending residents to the basement or outside and creating risk of a trip and fall, especially for the over 335 million US residents over age 65[2]. The CDC reports that there about 3 million emergency room visits annually by older people due to falls[3]. After multiple nuisance tripping events, the next typical solution involves replacing an AFCI/GFCI breaker with a standard breaker resulting in the elimination of both AFCI and proven lifesaving GFCI protection.

Allowing a practical, outlet-based solution to be installed without the unneeded and overconservative requirements previously considered will spur adoption and provide end users an easily accessible, yet safe alternative to circuit breaker-based solutions. Studies by Parks[4] and UL[5,6] have demonstrated that only the installation guidelines stated within this proposal are required to ensure protection equivalent to current options.

Note that the only changes proposed are the addition of new 210.12(A)(4) and associated editorial numbering changes. There are no technical changes proposed to 210.12(A)(1) through (3) and (5) through (7). Any unintended underlining and renumbering were caused by issues with Terra. A clean copy of the proposed changes is provided in the attachment.

210.12 Arc-Fault Circuit-Interrupter Protection. Arc-fault circuit-interrupter (AFCI) protection shall be installed in accordance with 210.12(B) through (E) by any of the means described in 210.12(A). The AFCI shall be listed and installed in a readily accessible location.

(A) Means of Protection. AFCI protection shall be provided by any of the following means:

(1) A listed combination-type AFCI installed to provide protection of the entire branch circuit.

(2) A listed branch/feeder-type AFCI installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box, which shall be marked to indicate that it is the first outlet of the branch circuit.

(3) A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box if all of the following conditions are met:

a. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit AFCI.
b. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.
c. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit.

(4) A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch-circuit overcurrent protective device if all of the following conditions are met:

a. The branch-circuit wiring shall be unspliced and untapped from the branch-circuit overcurrent device to the outlet branch-circuit AFCI.

b. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 13.7 m (45 ft) for a 14 AWG copper conductor or 18.3 m (60 ft) for a 12 AWG copper conductor.

c. The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.

d. The branch-circuit circuit breaker shall be a listed single pole thermal-magnetic circuit breaker.

e. The branch-circuit circuit breaker shall not be of the high-magnetic trip-type.

(5) A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch- circuit overcurrent protective device if all of the following conditions are met:

a. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit AFCI.
b. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.
c. The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.
d. The combination of the branch-circuit overcurrent device and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and listed as such.

(6)~~(5)~~ If metal raceway, metal wireways, metal auxiliary gutters, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, metal conduit bodies, and metal enclosures are installed for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a listed outlet branch-circuit-type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

(7) ~~(6)~~ Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a listed outlet branch-circuit-type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

Informational Note: See UL 1699-2011, *Standard for Arc-Fault Circuit Interrupters*, for information on combination-type and branch/feeder-type AFCI devices. See UL Subject 1699A, *Outline of Investigation for Outlet Branch Circuit Arc-Fault Circuit-Interrupters*, for information on outlet branch-circuit type AFCI devices. See UL Subject 1699C, *Outline of Investigation for System Combination Arc-Fault Circuit Interrupters*, for information on system combination AFCIs.

References

[1] AFCI and Nuisance Tripping Research study, Dr. Steven W. Schmidt, Dr. Xi Lin, East Carolina University, August 15, 2023

AFCI 2023 Final 08-15-23.pdf

[2] US Census Bureau 4/8/2024, 8/23/2024,

https://www.census.gov/quickfacts/fact/table/US/AGE775223

[3] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Web–based Injury Statistics Query and Reporting System (WISQARS) [online]. Accessed March 11, 2024. https://www.cdc.gov/falls/data-research/facts-stats/index.html

[4] Short Circuit Fault Current Study, Parks Associates, August 2012

PARKS_Short Circuit Fault Current Study

[5] Evaluation of Run Length and Available Current on Breaker Ability to Mitigate Parallel Arcing Faults, UL, Paul W. Brazis Jr., PhD and David A. Dini, PE

Breaker_Mitigation_ Run_Length.pdf

[6] Effectiveness of Circuit Breakers in Mitigating Parallel Arcing Faults in the Home Run, UL, Paul W. Brazis Jr., PhD and Fan He, PhD

BreakerMitigationofArcFaults.pdf

Public Comment No. 188-NFPA 70-2024 [Section No. 210.12(A)]

(A) Means of Protection.

AFCI protection shall be provided by any of the following means:

(1) A listed combination-type AFCI installed at the origin of the branch circuit to protect the entire branch circuit

(2) A listed branch/feeder-type AFCI installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box, which is marked to indicate that it is the first outlet of the branch circuit

(3) A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box if all of the following conditions are met:

(4) . The branch-circuit wiring shall be continuous from the branch-circuit OCPD to the outlet branch-circuit AFCI.

(5) . The maximum length of the branch-circuit wiring from the branch-circuit OCPD to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

(6) The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.

(7) A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch-circuit OCPD if all of the following conditions are met:

(8) . The branch-circuit wiring shall be continuous from the branch-circuit OCPD to the outlet branch-circuit AFCI.

(9) . The maximum length of the branch-circuit wiring from the branch-circuit OCPD to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

(10) . The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.

(11) . The combination of the branch-circuit OCPD and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and listed as such.

(12)

A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch-circuit overcurrent protective device if all of the following conditions are met:

a. The branch-circuit wiring shall be unspliced and untapped from the branch-circuit overcurrent device to the outlet branch-circuit AFCI.

b. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 13.7 m (45 ft) for a 14 AWG copper conductor or 18.3 m (60 ft) for a 12 AWG copper conductor.

c. The available short circuit current at the line side of the branch circuit panelboard where the branch circuit overcurrent device is installed shall be a minimum of 3000 amps.

d. The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.

e. The branch-circuit circuit breaker shall be a listed single pole thermal-magnetic circuit breaker.

f. The branch-circuit circuit breaker shall not be of the high-magnetic trip-type.

(13) If metal raceway, metal wireways, metal auxiliary gutters, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, metal conduit bodies, and metal enclosures are installed for the portion of the branch circuit between the branch-circuit OCPD and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet to protect the remaining portion of the branch circuit

(14) Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit OCPD and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet to protect the remaining portion of the branch circuit

Informational Note: See UL 1699-2011, *Standard for Arc-Fault Circuit-Interrupters*, for information on combination-type and branch/feeder-type AFCI devices. See UL Subject 1699A, *Outline of Investigation for Outlet Branch Circuit Arc-Fault Circuit-Interrupters*, for information on outlet branch-circuit type AFCI devices. See UL Subject 1699C, *Outline of Investigation for System Combination Arc-Fault Circuit Interrupters*, for information on system combination AFCIs.

Additional Proposed Changes

File Name	Description	Approved
NEC_PC_188_John_Kovacik_Submission.docx		
Attachment_No._1_-_Bentley_Systems_Report_8_18_2023.pdf		
Attachment_No._2_-_Expanded_tables_from_Bentley_Report.pdf		

Statement of Problem and Substantiation for Public Comment

The only changes proposed are the addition of new 210.12(A)(5) and associated editorial numbering changes. There are no technical changes proposed to 210.12(A)(1) through (4) and existing (5) and (6). Any spurious underlining and renumbering were caused by a problematic Terra. A clean copy of the proposed changes is provided in the attachments.

Based on Panel input and a review of data with UL, this PC has improvements from the original PI which are detailed below. Unchanged supporting data and test results for the original PI 2794 are identified in the reference section at the end of the substantiation and available in the public domain. This includes several 3rd party test reports, including UL test reports, the Parks report and the Bentley report. The Bentley report is attached to this Public Comment for convenience.

It is important to have multiple options available to installers for providing arc-fault protection. This Public Comment provides a real, and immediately available, alternative for arc-fault protection with many years of proven service.

In the following substantiation, the term “home run” is defined as the conductor from the overcurrent device to the first outlet in the branch circuit, and the term “OBC” refers to the outlet branch circuit AFCI.

PC OVERVIEW
Feedback from the Panel during the First Draft meeting was used to resolve questions raised for this new additional method of AFCI protection. Several

requirements were rolled into a simple, measurable requirement for available fault current that replaces utility transformer characteristics, length of service conductors, and other factors ultimately affecting available fault current.

Additional substantiation has been provided to address the questions of the high-magnetic trip-type circuit breaker as well as a more conservative allowable conductor length of the home run.

TRANSFORMER CHARACTERISTICS AND SERVICE CONDUCTORS
Requirements for transformer characteristics and the length of service entrance conductors are no longer addressed as they were in the PI. These requirements are now unnecessary as there is a blanket requirement in the PC conditions for a minimum of 3000 amps of available fault current at the line side of the branch circuit panelboard. Equipment and conductors installed ahead of the branch circuit panelboard are no longer a factor. The new requirement states “The available short circuit current at the line side of the branch circuit panelboard where the branch circuit overcurrent device is installed shall be a minimum of 3000 amps”. Including this condition eliminates the need to rely on transformer characteristics or the service entrance conductors that were included in the PI.

Although the transformer may be replaced, due to electrification trends, the expectation is that higher capacity and higher efficiency transformers will be used as replacements. This assumption is based on the 2008 Parks Study and the 2005 US Department of Energy mandates that were cited in the original PI 2794. It is important when drafting code requirements to not consider potential future temporary supply chain issues in a long-standing requirement.

CIRCUIT BREAKER TRIPPING CHARACTERISTICS:
HIGH MAG HAS A “DE FACTO” INDUSTRY DEFINITION
Concerns were raised about only allowing standard circuit breakers; it is noted that anywhere in the code, where circuit breakers are permitted for branch circuit protection, they are assumed to be standard trip-type breakers, but “high mag” trip-type breakers are not specifically prohibited. This PC specifically prohibits the use of high mag breakers to provide protection from parallel arc faults in the home run. The likelihood of using high-mag breakers with the OBC is no different than the likelihood of using high mag breakers to satisfy requirements in other parts of the code.

Breakers are used as established practice for validating acceptable performance of products, including GFCIs, receptacles, surge protectors, etc. The consistent low trip characteristics are relied upon to protect the downstream equipment. The product standards are silent about what circuit breaker trip characteristics are used. There is no additional risk for using the same methodology with the OBC option.

The following table shows a sampling of manufacturers’ published data demonstrating that circuit breaker manufacturers already closely control their magnetic trip levels. Although not a “formal” definition, the industry has already created their own “de-facto” standard shown in the table as follows:

Manufacturer	Amperage	Trip Max (amps)	Mag Trip
A	15	225	Standard
A	15	525	High
B	15	255	Standard
B	15	600	High
C	15	225	Standard
C	15	600	High

In every case a high magnetic trip breaker has additional nomenclature in the catalog number to clearly differentiate it from the standard breaker. Additionally, high magnetic trip breakers are generally quite a bit more expensive (up to 10x more expensive), so these breakers would not be used in residential panelboards in lieu of standard breakers.

LENGTH OF THE HOME RUN CONDUCTOR MADE MORE CONSERVATIVE
This PC includes a revision to the lengths of the home run based on input and calculations from UL. Although the original lengths of 50’ for 14 AWG, and 70’ for 12 AWG were quite conservative, consideration has been given for the conductors to be exposed to higher temperatures which would affect conductor resistance. Taking this into account, the lengths of the home run have been recalculated assuming a maximum operating temperature of 90 C and added a 1.25 multiplier to the conductor resistance which would increase with a corresponding rise in the operating temperature. The maximum length of the home run has been changed from 50’ to 45’ for 14 AWG, and 70’ to 60’ for 12 AWG.

OVERALL IMPACT OF CHANGES FROM THE FIRST DRAFT
The changes outlined (shortening the home run length and specifying 3000-amps) result in a more conservative approach to ensure protection from a parallel arc fault in the home run. The requirement of the 3000 amps of available fault current is now specified in the PC to improve code usability and simplify the inspection process. These revisions are supported by the Parks Study, statements from the Edison Electric Institute (EEI) and a UL study.

1) The Parks Study shows the average available fault current for new construction is over 6000 amps
2) Written statements from EEI noted that available fault currents in new residential housing developments provide typically over 3000 amperes of fault current which is more than the minimum needed to cause the thermal magnetic breaker to trip with the home run wire lengths specified in the proposed text
3) The home run lengths were derived from the equations found in the UL study, “Effectiveness of Circuit Breakers in Mitigating Parallel Arcing”

EFFECT OF FIRST REVISION 9155
As a result of the CMP 10 First Revision 9155, the term “service equipment” was changed to “branch circuit panelboard”.

CMP 10 has approved FR 9155, which will require the service disconnect for a one- and two-family dwelling to be located in a readily accessible outdoor location, so that it may additionally serve as an “Emergency Disconnect”. The result is that it might be less common that the branch breakers will be located in the service equipment. PI 2794 required the branch-circuit overcurrent device to be located in the service equipment. In lieu of referring to service equipment, the term “branch circuit panelboard” is used in condition (5)c. and the reference to the location of the branch circuit breaker in condition (5)f has been removed.

OVERVIEW OF CURRENT INSTALLATION OPTIONS.
Reviewing the existing installation options in 210.12(A) we see that a viable option would be advantageous to installers and homeowners to provide a choice in how to provide AFCI protection in their electrical systems:
210.12(A) (1) - This option is predominantly used
210.12(A) (2) - This option is commercially unavailable
210.12(A) (3) - This option addresses technology that was never brought to the market
210.12(A) (4) – This option is continually debated about its commercial availability and viability
210.12(A) (5) – This option is a viable option only for locations where Type NM wiring is prohibited
210.12(A) (6) – This option is to encase the home run in concrete and is impractical for most residential installations

SUMMARY
This Public Comment supports the use of AFCI protection to protect both property and people. This issue has been well researched by UL, concluding that OBC AFCIs provide reliable AFCI protection when used in combination with a common thermal-magnetic circuit breaker within the specified limited home run lengths.

The acceptance of the proposed text will result in increased safety through increased adoption by offering installers a reasonable alternative to AFCI breakers. This option offers equivalent protection and provides homeowners more ready access to AFCI TEST and RESET functionality. As has been noted by Panel 2 members, there is more innovation in products developed by having alternatives, and acceptance of this PC adds another safe alternative. This is presented as an additional alternative installation method and does not change any existing methods; if for any reason the AHJ cannot verify any of the required conditions, then the AHJ shall not approve that installation.

REFERENCES
Brazis, P.W., Dini, D.A., He, Fan (2012). Evaluation of Run Length and Available Current on Breaker Ability to Mitigate Parallel Arcing Faults, Part II: Effect of Run

Length with 500A Available at the Panelboard. UL, Northbrook, IL, USA.
Brazis, P.W., He, Fan (2012). Effectiveness of Circuit Breakers in Mitigating Parallel Arcing Faults in the Home Run. UL, Northbrook, IL, USA.
Brazis, P.W., He Fan (2012). Effectiveness of Circuit Breakers in Mitigating Parallel Arcing Faults in the Home Run, Revised 11 January 2012
Campbell, R. (2017). Electrical Fires. NFPA, Quincy, MA, USA, Tech Rep. USS12A.
Campbell, R. (2019). Home Electrical Fires. NFPA, Quincy, MA, USA, NFPA No. USS37.
Kerber, T. (2012). Short Circuit Fault Current Study, Parks Associates, Dallas, TX.
Bentley Systems Report, August 18, 2023. Bentley Systems is the provider of the EasyPower™ power system analysis software and provides engineering services using the EasyPower™ software.

Related Item

• PI 2794

Submitter Information Verification

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Committee: NEC-P02

PC 188 - NFPA 70-2026 [Section 210.12(A)]

210.12 Arc-Fault Circuit-Interrupter Protection. Arc-fault circuit-interrupter (AFCI) protection shall be installed in accordance with 210.12(B) through (E) by any of the means described in 210.12(A). The AFCI shall be listed and installed in a readily accessible location.

(A) Means of Protection. AFCI protection shall be provided by any of the following means:

(1) A listed combination-type AFCI installed to provide protection of the entire branch circuit.

(2) A listed branch/feeder-type AFCI installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box, which shall be marked to indicate that it is the first outlet of the branch circuit.

(3) A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box if all of the following conditions are met:

a. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit AFCI.
b. The maximum length of the branch-circuit wiring from the branch-circuit overcurrent device to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.
c. The first outlet box in the branch circuit shall be marked to indicate that it is the first outlet of the circuit.

(4) A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch- circuit overcurrent protective device if all of the following conditions are met:

a. The branch-circuit wiring shall be continuous from the branch-circuit overcurrent device to the outlet branch-circuit AFCI.
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d. The combination of the branch-circuit overcurrent device and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and listed as such.

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a. The branch-circuit wiring shall be unspliced and untapped from the branch-circuit overcurrent device to the outlet branch-circuit AFCI.

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e. The branch-circuit circuit breaker shall be a listed single pole thermal-magnetic circuit breaker.

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(7) ~~(6)~~ Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit overcurrent device and the first outlet, it shall be permitted to install a listed outlet branch-circuit-type AFCI at the first outlet to provide protection for the remaining portion of the branch circuit.

Informational Note: See UL 1699-2011, *Standard for Arc-Fault Circuit Interrupters*, for information on combination-type and branch/feeder-type AFCI devices. See UL Subject 1699A, *Outline of Investigation for Outlet Branch Circuit Arc-Fault Circuit-Interrupters*, for information on outlet branch-circuit type AFCI devices. See UL Subject 1699C, *Outline of Investigation for System Combination Arc-Fault Circuit Interrupters*, for information on system combination AFCIs.

STATEMENT OF PROBLEM AND SUBSTANTIATION FOR PUBLIC INPUT.

The only changes proposed are the addition of new 210.12(A)(5) and associated editorial numbering changes. There are no technical changes proposed to 210.12(A)(1) through (4) and existing (5) and (6). Any spurious underlining and renumbering were caused by a problematic Terra. A clean copy of the proposed changes is provided in the attachment.

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It is important to have multiple options available to installers for providing arc-fault protection. This Public Comment provides a real, and immediately available, alternative for arc-fault protection with many years of proven service.

In the following substantiation, the term “home run” is defined as the conductor from the overcurrent device to the first outlet in the branch circuit, and the term “OBC” refers to the outlet branch circuit AFCI.

PC OVERVIEW
Feedback from the Panel during the First Draft meeting was used to resolve questions raised for this new additional method of AFCI protection. Several requirements were rolled into a simple, measurable requirement for available fault current that replaces utility transformer characteristics, length of service conductors, and other factors ultimately affecting available fault current.

Additional substantiation has been provided to address the questions of the high-magnetic trip-type circuit breaker as well as a more conservative allowable conductor length of the home run.

TRANSFORMER CHARACTERISTICS AND SERVICE CONDUCTORS

Requirements for transformer characteristics and the length of service entrance conductors are no longer addressed as they were in the PI. These requirements are now unnecessary as there is a blanket requirement in the PC conditions for a minimum of 3000 amps of available fault current at the line side of the branch circuit panelboard. Equipment and conductors installed ahead of the branch circuit panelboard are no longer a factor. The new requirement states "The available short circuit current at the line side of the branch circuit panelboard where the branch circuit overcurrent device is installed shall be a minimum of 3000 amps". Including this condition eliminates the need to rely on transformer characteristics or the service entrance conductors that were included in the PI.

Although the transformer may be replaced, due to electrification trends, the expectation is that higher capacity and higher efficiency transformers will be used as replacements. This assumption is based on the 2008 Parks Study and the 2005 US Department of Energy mandates that were cited in the original PI 2794. It is important when drafting code requirements to not consider potential future temporary supply chain issues in a long-standing requirement.

CIRCUIT BREAKER TRIPPING CHARACTERISTICS:

HIGH MAG HAS A "DE FACTO" INDUSTRY DEFINITION

Concerns were raised about only allowing standard circuit breakers; it is noted that anywhere in the code, where circuit breakers are permitted for branch circuit protection, they are assumed to be standard trip-type breakers, but "high mag" trip-type breakers are not specifically prohibited. This PC specifically prohibits the use of high mag breakers to provide protection from parallel arc faults in the home run. The likelihood of using high-mag breakers with the OBC is no different than the likelihood of using high mag breakers to satisfy requirements in other parts of the code.

Breakers are used as established practice for validating acceptable performance of products, including GFCIs, receptacles, surge protectors, etc. The consistent low trip characteristics are relied upon to protect the downstream equipment. The product standards are silent about what circuit breaker trip characteristics are used. There is no additional risk for using the same methodology with the OBC option.

The following table shows a sampling of manufacturers' published data demonstrating that circuit breaker manufacturers already closely control their magnetic trip levels. Although not a "formal" definition, the industry has already created their own "de-facto" standard shown in the table as follows:

Manufacturer	Amperage	Trip Max (amps)	Mag Trip
A	15	225	Standard
A	15	525	High
B	15	255	Standard
B	15	600	High
C	15	225	Standard
C	15	600	High

In every case a high magnetic trip breaker has additional nomenclature in the catalog number to clearly differentiate it from the standard breaker. Additionally, high magnetic trip breakers are generally quite a bit more expensive (up to 10x more expensive), so these breakers would not be used in residential panelboards in lieu of standard breakers.

LENGTH OF THE HOME RUN CONDUCTOR MADE MORE CONSERVATIVE

This PC includes a revision to the lengths of the home run based on input and calculations from UL. Although the original lengths of 50' for 14 AWG, and 70' for 12 AWG were quite conservative, consideration has been given for the conductors to be exposed to higher temperatures which would affect conductor resistance. Taking this into account, the lengths of the home run have been recalculated assuming a maximum operating temperature of 90 C and added a 1.25 multiplier to the conductor resistance which would increase with a corresponding rise in the operating temperature. The maximum length of the home run has been changed from 50' to 45' for 14 AWG, and 70' to 60' for 12 AWG.

OVERALL IMPACT OF CHANGES FROM THE FIRST DRAFT

The changes outlined (shortening the home run length and specifying 3000-amps) result in a more conservative approach to ensure protection from a parallel arc fault in the home run. The requirement of the 3000 amps of available fault current is now specified in the PC to improve code usability and simplify the inspection process. These revisions are supported by the Parks Study, statements from the Edison Electric Institute (EEI) and a UL study.

1) The Parks Study shows the average available fault current for new construction is over 6000 amps
2) Written statements from EEI noted that available fault currents in new residential housing developments provide typically over 3000 amperes of fault current which is more than the minimum needed to cause the thermal magnetic breaker to trip with the home run wire lengths specified in the proposed text
3) The home run lengths were derived from the equations found in the UL study, "Effectiveness of Circuit Breakers in Mitigating Parallel Arcing"

EFFECT OF FIRST REVISION 9155

As a result of the CMP 10 First Revision 9155, the term “service equipment” was changed to “branch circuit panelboard”.

CMP 10 has approved FR 9155, which will require the service disconnect for a one- and two-family dwelling to be located in a readily accessible outdoor location, so that it may additionally serve as an “Emergency Disconnect”. The result is that it might be less common that the branch breakers will be located in the service equipment. PI 2794 required the branch-circuit overcurrent device to be located in the service equipment. In lieu of referring to service equipment, the term “branch circuit panelboard” is used in condition (5)c. and the reference to the location of the branch circuit breaker in condition (5)f has been removed.

OVERVIEW OF CURRENT INSTALLATION OPTIONS.

Reviewing the existing installation options in 210.12(A) we see that a viable option would be advantageous to installers and homeowners to provide a choice in how to provide AFCI protection in their electrical systems:

210.12(A) (1) - This option is predominantly used

210.12(A) (2) - This option is commercially unavailable

210.12(A) (3) - This option addresses technology that was never brought to the market

210.12(A) (4) – This option is continually debated about its commercial availability and viability

210.12(A) (5) – This option is a viable option only for locations where Type NM wiring is prohibited

210.12(A) (6) – This option is to encase the home run in concrete and is impractical for most residential installations

SUMMARY

This Public Comment supports the use of AFCI protection to protect both property and people. This issue has been well researched by UL, concluding that OBC AFCIs provide reliable AFCI protection when used in combination with a common thermal-magnetic circuit breaker within the specified limited home run lengths.

The acceptance of the proposed text will result in increased safety through increased adoption by offering installers a reasonable alternative to AFCI breakers. This option offers equivalent protection and provides homeowners more ready access to AFCI TEST and RESET functionality. As has been noted by Panel 2 members, there is more innovation in products developed by having alternatives, and acceptance of this PC adds another safe alternative. This is presented as an additional alternative installation method and does not change any existing methods; if for any reason the AHJ cannot verify any of the required conditions, then the AHJ shall not approve that installation.

REFERENCES

Brazis, P.W., Dini, D.A., He, Fan (2012). Evaluation of Run Length and Available Current on Breaker Ability to Mitigate Parallel Arcing Faults, Part II: Effect of Run Length with 500A Available at the Panelboard. UL, Northbrook, IL, USA.

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Bentley Systems Report, August 18, 2023. Bentley Systems is the provider of the EasyPower™ power system analysis software and provides engineering services using the EasyPower™ software.

EasyPower®

A Memo for:

The Arc Fault Circuit Interrupter Wiring Device Joint Research and Development Consortium

» » »

Single-phase Short Circuit Calculations

Bentley®

August 18, 2023

Mr. Eric J. Munoz
The Arc Fault Circuit Interrupter Wiring Device Joint Research and Development Consortium ("AFCI Consortium")
55 E. Monroe Street, Suite 3440
Chicago, IL 60603

Dear Eric,

INTRODUCTION

Bentley Systems (Bentley) was asked to perform single-phase short calculations to aid the AFCI Consortium in their comment process for the latest revision to NFPA 70 National Electrical Code (NEC). Specifically, AFCI Consortium is interested in comparing single-phase short circuit calculations performed using the EasyPower® software on the secondary sides of service entrance transformers of varying impedances and secondary cable lengths/sizes with results obtained using the point-point short circuit calculation procedure. Figure 1 shows an example of the EasyPower® software one-line diagram used for single-phase short circuit calculations.

CRITICAL NOTES AND ASSUMPTIONS

The following apply to the analytical study results included with this memo:

- Infinite bus utility source impedance assumed (100,000 MVA with X/R = 150).
- Pre-fault bus voltages were 1.0 p.u. for all short circuit calculations.
- All service entrance transformer secondary cables were modeled as aluminum conductor installed in PVC conduit, except for selected steel conduit short circuit cases contained in Table 1.

ANALYSIS AND RESULTS

Attached to this memo is an Excel printout containing the results of single-phase short circuit calculations performed using the EasyPower® software compared against similar values obtained using the point-point short circuit calculation procedure. A native copy of the Excel file will be provided as an addendum to this memo. Additionally, Table 1 below compares single-phase short circuit calculations performed at the service conductor end for one (1) utility service entrance transformer configuration, with the service conductor raceway material changed from PVC conduit to steel conduit. The intent of Table 1 is to illustrate the impact of raceway material on single-phase short circuit calculations performed at the end of the service entrance cables due to inductive coupling between the cable and raceway material.

TABLE 1: COMPARISON OF SERVICE ENTRANCE SINGLE-PHASE SHORT CIRCUIT CALCULATIONS - PVC VS STEEL CONDUIT

Configuration	PVC Conduit – LL	Steel Conduit – LL	PVC Conduit – LN	Steel Conduit - LN
Z=1.0% @ 75 kVA 200 ft. 3/0 AWG	4,471 amps	4,373 amps	2,404 amps	2,357 amps

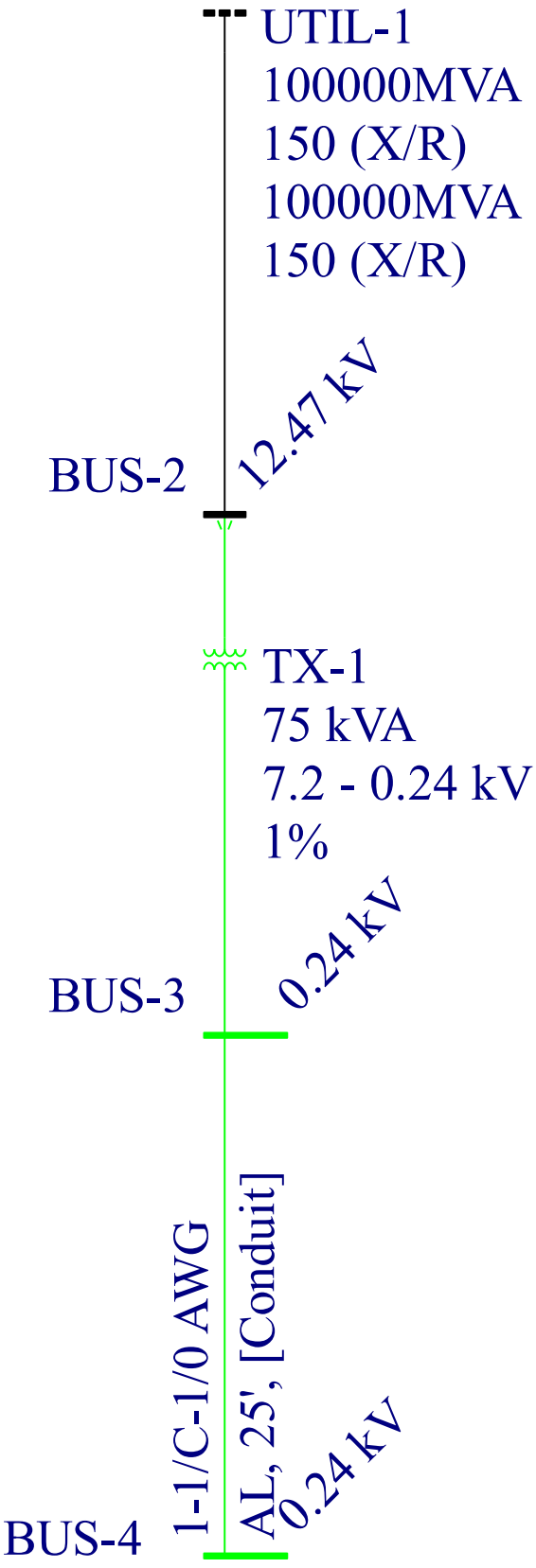

FIGURE 1: EASYPOWER® SOFTWARE ONE-LINE DIAGRAM EXAMPLE

Figure 1 shows an example of the EasyPower® software one-line diagram used for single-phase short circuit calculations. To produce the various short circuit calculation results, transformer impedances and secondary service entrance cable values were adjusted in the EasyPower® software prior to each calculation, as required.

CONCLUSION

Thank you for collaborating with Bentley. If you have questions or require additional information, please do not hesitate to get in touch.

Regards,

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Residential Service Fault Currents w/1/0 AWG

Transformer KVA - Single Phase 240/120 Volts	Transformer Impedance	Full Load Current @ 240 Volts Single Phase	Available Fault Current Phase to Phase		Available Fault Current Phase to Neutral		Available Fault Current Phase to Phase, 200 Amp Service, 1/0 Aluminum Service Conductor length (feet)								Available Fault Current Phase to Neutral, 200 Amp Service, 1/0 Aluminum Service Conductor length (feet)							
							25		50		100		200		25		50		100		200	
25	1.00	104	10,420	10,416	15,630	16,116	7,596	7,963	5,976	6,279	4,189	4,317	2,622	2,611	7,388	7,637	4,837	4,846	2,862	2,774	1,576	1,490
	1.25		8,336	8,333	12,504	12,893	6,425	6,709	5,227	5,500	3,806	3,957	2,467	2,485	6,607	6,881	4,490	4,547	2,736	2,679	1,537	1,463
	1.5		6,947	6,944	10,421	10,744	5,567	5,792	4,644	4,884	3,488	3,646	2,329	2,368	5,976	6,254	4,189	4,279	2,622	2,589	1,500	1,437
	1.75		5,954	5,952	8,931	9,209	4,910	5,093	4,179	4,389	3,219	3,375	2,205	2,259	5,454	5,726	3,926	4,037	2,516	2,504	1,465	1,402
	2.00		5,210	5,208	7,815	8,058	4,393	4,543	3,798	3,982	2,988	3,140	2,094	2,159	5,016	5,276	3,694	3,818	2,419	2,423	1,431	1,387
	2.25		4,631	4,629	6,947	7,163	3,974	4,099	3,481	3,642	2,788	2,933	1,994	2,065	4,644	4,890	3,488	3,621	2,329	2,346	1,398	1,363
37,5	1.00	156	15,630	15,623	23,445	24,243	10,033	10,586	7,388	7,718	4,837	4,902	2,862	2,798	8,771	8,939	5,395	5,309	3,048	2,913	1,629	1,528
	1.25		12,504	12,499	18,756	19,395	8,647	9,108	6,607	6,943	4,490	4,601	2,736	2,705	8,020	8,260	5,100	5,077	2,952	2,845	1,602	1,510
	1.5		10,420	10,416	15,630	16,163	7,596	7,982	5,976	6,298	4,189	4,329	2,622	2,616	7,388	7,667	4,837	4,860	2,862	2,779	1,576	1,492
	1.75		8,931	8,928	13,397	13,854	6,772	7,097	5,454	5,755	3,926	4,083	2,516	2,532	6,849	7,147	4,601	4,658	2,777	2,716	1,549	1,474
	2.00		7,815	7,812	11,723	12,122	6,111	6,386	5,016	5,293	3,694	3,859	2,419	2,451	6,383	6,688	4,386	4,470	2,697	2,655	1,524	1,457
	2.25		6,947	6,944	10,421	10,775	5,567	5,803	4,644	4,897	3,488	3,656	2,329	2,374	5,976	6,281	4,189	4,294	2,622	2,595	1,500	1,439
50	1.00	208	20,830	20,831	31,245	32,410	11,948	12,630	8,376	8,681	5,243	5,243	3,000	2,898	9,673	9,747	5,724	5,568	3,149	2,986	1,659	1,547
	1.25		16,664	16,665	24,996	25,929	10,450	11,059	7,612	7,958	4,933	4,992	2,895	2,826	8,979	9,153	5,472	5,381	3,072	2,934	1,637	1,534
	1.5		13,887	13,888	20,831	21,608	9,285	9,819	6,974	7,333	4,656	4,759	2,797	2,755	8,376	8,617	5,243	5,203	2,998	2,883	1,616	1,520
	1.75		11,903	11,904	17,855	18,521	8,355	8,820	6,436	6,790	4,410	4,542	2,707	2,687	7,851	8,134	5,032	5,034	2,928	2,833	1,594	1,506
	2.00		10,415	10,416	15,623	16,206	7,593	7,999	5,974	6,315	4,188	4,340	2,621	2,621	7,387	7,696	4,837	4,873	2,861	2,784	1,575	1,493
	2.25		9,258	9,259	13,887	14,405	6,959	7,315	5,574	5,898	3,988	4,153	2,541	2,558	6,974	7,299	4,656	4,721	2,797	2,737	1,555	1,480
75	1.00	313	31,250	31,244	46,875	48,831	14,775	15,554	9,675	9,863	5,722	5,618	3,150	3,002	10,786	10,681	6,094	5,846	3,258	3,061	1,687	1,567
	1.25		25,000	24,996	37,500	39,066	13,213	13,993	8,980	9,264	5,473	5,435	3,073	2,953	10,200	10,222	5,903	5,714	3,203	3,026	1,673	1,558
	1.5		20,833	20,831	31,250	32,556	11,950	12,691	8,377	8,720	5,242	5,260	2,998	2,904	9,675	9,763	5,722	5,585	3,150	2,991	1,659	1,549
	1.75		17,857	17,855	26,786	27,905	10,907	11,594	7,852	8,226	5,032	5,092	2,929	2,856	9,198	9,392	5,553	5,461	3,096	2,957	1,645	1,540
	2.00		15,625	15,623	23,438	24,417	10,031	10,662	7,388	7,777	4,838	4,932	2,861	2,809	8,758	9,018	5,393	5,340	3,047	2,923	1,629	1,531
	2.25		13,889	13,888	20,834	21,705	9,286	9,862	6,975	7,369	4,657	4,778	2,797	2,763	8,377	8,668	5,242	5,224	2,998	2,890	1,615	1,522

240 Volt Line to Line Service	120 Volt Line to Neutral Service
Maximum Length 1/0 Aluminum Service Conductor for 3000 Amps (feet)	Maximum Length 1/0 Aluminum Service Conductor for 3000 Amps (feet)
(Isca-Iscb)*C*n*Ell/(2*Isca*Iscb)	(Isca-Iscb)*C*n*Eln/(2*Isca*Iscb)
166	94
149	89
133	83
116	78
99	72
82	66
189	102
177	98
166	94
155	91
144	87
133	83
200	106
191	103
183	100
175	97
166	94
158	92
211	109
205	107
200	106
194	104
189	102
183	100

Calculations using client's point to point method

Calculations using EasyPower software

Isca = Line to Line Fault Current at transformer		Isca = Line to neutral Fault Current at transformer	
Iscb = final line to line fault current at service fixed at	3000	Iscb = final line to neutral fault current at service fixed at	3000
n = number of conductors per phase, fixed at 1		n = number of conductors per phase, fixed at 1	
Ell = Line to line voltage fixed at 240		Eln = Line to neutral voltage fixed at 120	
C = impedance constant for Aluminum 1/0 =	5838	C = impedance constant for Aluminum 1/0 =	5838

Residential Service Fault Currents w/3/0 AWG

Transformer KVA - Single Phase 240/120 Volts	Transformer Impedance	Full Load Current @ 240 Volts Single Phase	Available Fault Current Phase to Phase		Available Fault Current Phase to Neutral		Available Fault Current Phase to Phase, 200 Amp Service, 3/0 Aluminum Service Conductor length (feet)								Available Fault Current Phase to Neutral, 200 Amp Service, 3/0 Aluminum Service Conductor length (feet)							
							25		50		100		200		25		50		100		200	
25	1.00	104	10,420	10,416	15,630	16,116	8,415	8,647	7,056	7,296	5,335	5,476	3,586	3,593	9,114	9,394	6,433	6,480	4,050	3,960	2,326	2,216
	1.25		8,336	8,333	12,504	12,893	7,643	7,172	6,506	6,234	5,014	4,876	3,437	3,338	8,496	8,236	6,118	5,927	3,923	3,755	2,284	2,153
	1.5		6,947	6,944	10,421	10,744	5,995	6,124	5,272	5,436	4,247	4,388	3,059	3,114	7,097	7,325	5,336	5,455	3,588	3,568	2,165	2,092
	1.75		5,954	5,952	8,931	9,209	5,240	5,343	4,680	4,817	3,855	3,985	2,850	2,915	6,341	6,592	4,916	5,049	3,391	3,397	2,093	2,035
	2.00		5,210	5,208	7,815	8,058	4,656	4,737	4,208	4,323	3,528	3,648	2,668	2,738	5,757	5,991	4,557	4,697	3,217	3,240	2,025	1,980
	2.25		4,631	4,629	6,947	7,163	4,187	4,255	3,822	3,921	3,253	3,362	2,507	2,580	5,272	5,488	4,247	4,389	3,059	3,096	1,961	1,928
37.5	1.00	156	15,630	15,623	23,445	24,243	11,515	11,911	9,114	9,428	6,433	6,537	4,050	3,993	11,315	11,564	7,456	7,402	4,433	4,272	2,448	2,307
	1.25		12,504	12,499	18,756	19,395	9,724	10,033	7,955	8,243	5,833	5,973	3,804	3,789	10,096	10,395	6,906	6,926	4,233	4,116	2,386	2,262
	1.5		10,420	10,416	15,630	16,163	8,415	8,661	7,056	7,313	5,335	5,490	3,586	3,601	9,114	9,431	6,433	6,502	4,050	3,969	2,326	2,219
	1.75		8,931	8,928	13,397	13,854	7,416	7,616	6,341	6,567	4,916	5,075	3,391	3,428	8,307	8,625	6,019	6,123	3,882	3,831	2,269	2,177
	2.00		7,815	7,812	11,723	12,122	6,630	6,794	5,757	5,956	4,557	4,714	3,217	3,268	7,632	7,941	5,656	5,782	3,728	3,701	2,217	2,136
	2.25		6,947	6,944	10,421	10,775	5,995	6,132	5,272	5,447	4,247	4,399	3,059	3,122	7,057	7,355	5,336	5,475	3,586	3,578	2,165	2,096
50	1.00	208	20,830	20,831	31,245	32,410	14,108	14,658	10,667	11,007	7,170	7,217	4,331	4,222	12,864	13,044	8,099	7,955	4,652	4,443	2,512	2,355
	1.25		16,664	16,665	24,996	25,929	12,066	12,518	9,457	9,800	6,601	6,708	4,116	4,054	11,663	11,936	7,606	7,549	4,484	4,319	2,465	2,320
	1.5		13,887	13,888	20,831	21,608	10,540	10,913	8,492	8,819	6,117	6,258	3,922	3,896	10,668	10,990	7,170	7,176	4,331	4,200	2,416	2,287
	1.75		11,903	11,904	17,855	18,521	9,356	9,667	7,707	8,008	5,698	5,859	3,746	3,748	9,829	10,175	6,781	6,835	4,185	4,086	2,369	2,254
	2.00		10,415	10,416	15,623	16,206	8,411	8,674	7,054	7,329	5,334	5,504	3,585	3,608	9,111	9,467	6,432	6,522	4,049	3,978	2,326	2,222
	2.25		9,258	9,259	13,887	14,405	7,841	7,864	6,504	6,753	5,012	5,186	3,437	3,477	8,492	8,847	6,117	6,234	3,922	3,874	2,283	2,190
75	1.00	313	31,250	31,244	46,875	48,831	18,225	18,981	12,863	13,157	8,100	8,025	4,653	4,471	14,911	14,908	8,864	8,582	4,894	4,626	2,583	2,404
	1.25		25,000	24,996	37,500	39,066	15,908	16,590	11,663	12,025	7,605	7,618	4,485	4,350	13,811	13,961	8,464	8,275	4,770	4,538	2,546	2,381
	1.5		20,833	20,831	31,250	32,556	14,110	14,714	10,669	11,055	7,171	7,243	4,329	4,233	12,863	13,115	8,100	7,985	4,653	4,453	2,513	2,358
	1.75		17,857	17,855	26,786	27,905	12,678	13,208	9,828	10,218	6,780	6,898	4,186	4,120	12,038	12,357	7,763	7,712	4,540	4,371	2,480	2,335
	2.00		15,625	15,623	23,438	24,417	11,513	11,974	9,113	9,491	6,431	6,579	4,050	4,012	11,311	11,674	7,456	7,454	4,432	4,291	2,447	2,313
	2.25		13,889	13,888	20,834	21,705	10,542	10,948	8,493	8,855	6,117	6,285	3,922	3,909	10,669	11,058	7,169	7,211	4,329	4,213	2,417	2,291

	240 Volt Line to Line Service		120 Volt Line to Neutral Service
	Maximum Length 3/0 Aluminum Service Conductor for 3000 Amps (feet)		Maximum Length 3/0 Aluminum Service Conductor for 3000 Amps (feet)
	(Isca-Iscb)*C*n*Ell/(2*Isca*Iscb)		(Isca-Iscb)*C*n*Eln/(2*Isca*Iscb)
	259		147
	233		138
	207		130
	181		121
	155		112
	128		104
	294		159
	277		153
	259		147
	242		141
	225		136
	207		130
	312		165
	299		160
	286		156
	273		152
	259		147
	246		143
	329		171
	321		168
	312		165
	303		162
	294		159
	286		156

Calculations using client's point to point method

Calculations using EasyPower software

Isca = Line to Line Fault Current at transformer		Isca = Line to neutral Fault Current at transformer	
Iscb = final line to line fault current at service fixed at	3000	Iscb = final line to neutral fault current at service fixed at	3000
n = number of conductors per phase, fixed at 1		n = number of conductors per phase, fixed at 1	
Ell = Line to line voltage fixed at 240		Eln = Line to neutral voltage fixed at 120	
C = impedance constant for Aluminum 3/0 =	9110	C = impedance constant for Aluminum 3/0 =	9110

Residential Service Fault Currents w/3/0 AWG

Transformer KVA - Single Phase 240/120 Volts	Transformer Impedance	Full Load Current @ 240 Volts Single Phase	Available Fault Current Phase to Phase		Available Fault Current Phase to Neutral		Available Fault Current Phase to Phase, 200 Amp Service, 3/0 Aluminum Service Conductor length (feet)								Available Fault Current Phase to Neutral, 200 Amp Service, 3/0 Aluminum Service Conductor length (feet)							
							25		50		100		200		25		50		100		200	
25	1.00	104	10,420	10,416	15,630	16,116	8,415	8,647	7,056	7,296	5,335	5,476	3,586	3,593	9,114	9,394	6,433	6,480	4,050	3,960	2,326	2,216
	1.25		8,336	8,333	12,504	12,893	7,643	7,172	6,506	6,234	5,014	4,876	3,437	3,338	8,496	8,236	6,118	5,927	3,923	3,755	2,284	2,153
	1.5		6,947	6,944	10,421	10,744	5,995	6,124	5,272	5,436	4,247	4,388	3,059	3,114	7,097	7,325	5,336	5,455	3,586	3,568	2,165	2,092
	1.75		5,954	5,952	8,931	9,209	5,240	5,343	4,680	4,817	3,855	3,985	2,850	2,915	6,341	6,592	4,916	5,049	3,391	3,397	2,093	2,035
	2.00		5,210	5,208	7,815	8,058	4,656	4,737	4,208	4,323	3,528	3,648	2,668	2,738	5,757	5,991	4,557	4,697	3,217	3,240	2,025	1,980
	2.25		4,631	4,629	6,947	7,163	4,187	4,255	3,822	3,921	3,253	3,362	2,507	2,580	5,272	5,488	4,247	4,389	3,059	3,096	1,961	1,928
37.5	1.00	156	15,630	15,623	23,445	24,243	11,515	11,911	9,114	9,428	6,433	6,537	4,050	3,993	11,315	11,564	7,456	7,402	4,433	4,272	2,448	2,307
	1.25		12,504	12,499	18,756	19,395	9,724	10,033	7,955	8,243	5,833	5,973	3,804	3,789	10,096	10,395	6,906	6,926	4,233	4,116	2,386	2,262
	1.5		10,420	10,416	15,630	16,163	8,415	8,661	7,056	7,313	5,335	5,490	3,586	3,601	9,114	9,431	6,433	6,502	4,050	3,969	2,326	2,219
	1.75		8,931	8,928	13,397	13,854	7,416	7,616	6,341	6,567	4,916	5,075	3,391	3,428	8,307	8,625	6,019	6,123	3,882	3,831	2,269	2,177
	2.00		7,815	7,812	11,723	12,122	6,630	6,794	5,757	5,956	4,557	4,714	3,217	3,268	7,632	7,941	5,656	5,782	3,728	3,701	2,217	2,136
	2.25		6,947	6,944	10,421	10,775	5,995	6,132	5,272	5,447	4,247	4,399	3,059	3,122	7,057	7,355	5,336	5,475	3,586	3,578	2,165	2,096
50	1.00	208	20,830	20,831	31,245	32,410	14,108	14,658	10,667	11,007	7,170	7,217	4,331	4,222	12,864	13,044	8,099	7,955	4,652	4,443	2,512	2,355
	1.25		16,664	16,665	24,996	25,929	12,066	12,518	9,457	9,800	6,601	6,708	4,116	4,054	11,663	11,936	7,606	7,549	4,484	4,319	2,465	2,320
	1.5		13,887	13,888	20,831	21,608	10,540	10,913	8,492	8,819	6,117	6,258	3,922	3,896	10,668	10,990	7,170	7,176	4,331	4,200	2,416	2,287
	1.75		11,903	11,904	17,855	18,521	9,356	9,667	7,707	8,008	5,698	5,859	3,746	3,748	9,829	10,175	6,781	6,835	4,185	4,086	2,369	2,254
	2.00		10,415	10,416	15,623	16,206	8,411	8,674	7,054	7,329	5,334	5,504	3,585	3,608	9,111	9,467	6,432	6,522	4,049	3,978	2,326	2,222
	2.25		9,258	9,259	13,887	14,405	7,641	7,864	6,504	6,753	5,012	5,186	3,437	3,477	8,492	8,847	6,117	6,234	3,922	3,874	2,283	2,190
75	1.00	313	31,250	31,244	46,875	48,831	18,225	18,981	12,863	13,157	8,100	8,025	4,653	4,471	14,911	14,908	8,864	8,582	4,894	4,626	2,583	2,404
	1.25		25,000	24,996	37,500	39,066	15,908	16,590	11,663	12,025	7,605	7,618	4,485	4,350	13,811	13,961	8,464	8,275	4,770	4,538	2,546	2,381
	1.5		20,833	20,831	31,250	32,556	14,110	14,714	10,669	11,055	7,171	7,243	4,329	4,233	12,863	13,115	8,100	7,985	4,653	4,453	2,513	2,358
	1.75		17,857	17,855	26,786	27,905	12,678	13,208	9,828	10,218	6,780	6,898	4,186	4,120	12,038	12,357	7,763	7,712	4,540	4,371	2,480	2,335
	2.00		15,625	15,623	23,438	24,417	11,513	11,974	9,113	9,491	6,431	6,579	4,050	4,012	11,311	11,674	7,456	7,454	4,432	4,291	2,447	2,313
	2.25		13,889	13,888	20,834	21,705	10,542	10,948	8,493	8,855	6,117	6,285	3,922	3,909	10,669	11,058	7,169	7,211	4,329	4,213	2,417	2,291

Calculations using client's point to point method

Calculations using EasyPower software

240 Volt Line to Line Service	120 Volt Line to Neutral Service
Maximum Length 3/0 Aluminum Service Conductor for 3000 Amps (feet)	Maximum Length 3/0 Aluminum Service Conductor for 3000 Amps (feet)
(Isca-Iscb)*C*n*Ell/(2*Isca*Iscb)	(Isca-Iscb)*C*n*Eln/(2*Isca*Iscb)
259	147
233	138
207	130
181	121
155	112
128	104
294	159
277	153
259	147
242	141
225	136
207	130
312	165
299	160
286	156
273	152
259	147
246	143
329	171
321	168
312	165
303	162
294	159
286	156

Isca = Line to Line Fault Current at transformer		Isca = Line to neutral Fault Current at	Isca = Line to neutral Fault Current at transformer
Iscb = final line to line fault current at service fixed at	3000	Iscb = final line to neutral fault curre	Iscb = final line to neutral fault curre 3000
n = number of conductors per phase, fixed at 1		n = number of conductors per phase	n = number of conductors per phase, fixed at 1
Ell = Line to line voltage fixed at 240		Eln = Line to neutral voltage fixed at	Eln = Line to neutral voltage fixed at 120
C = impedance constant for Aluminum 3/0 =	9110	C = impedance constant for Aluminu	C = impedance constant for Aluminu 9110

Residential Service Fault Currents w/3/0 AWG

Transformer KVA - Single Phase 240/120 Volts	Transformer Impedance	Full Load Current @ 240 Volts Single Phase	Available Fault Current Phase to Phase		Available Fault Current Phase to Neutral		Available Fault Current Phase to Phase, 200 Amp Service, 3/0 Aluminum Service Conductor length (feet)								Available Fault Current Phase to Neutral, 200 Amp Service, 3/0 Aluminum Service Conductor length (feet)							
							25		50		100		200		25		50		100		200	
25	1.00	104	10,420	10,416	15,630	16,116	8,415	8,647	7,056	7,296	5,335	5,476	3,586	3,593	9,114	9,394	6,433	6,480	4,050	3,960	2,326	2,216
	1.25		8,336	8,333	12,504	12,893	7,643	7,172	6,506	6,234	5,014	4,876	3,437	3,338	8,496	8,236	6,118	5,927	3,923	3,755	2,284	2,153
	1.5		6,947	6,944	10,421	10,744	5,995	6,124	5,272	5,436	4,247	4,388	3,059	3,114	7,097	7,325	5,336	5,455	3,586	3,568	2,165	2,092
	1.75		5,954	5,952	8,931	9,209	5,240	5,343	4,680	4,817	3,855	3,985	2,850	2,915	6,341	6,592	4,916	5,049	3,391	3,397	2,093	2,035
	2.00		5,210	5,208	7,815	8,058	4,656	4,737	4,208	4,323	3,528	3,648	2,668	2,738	5,757	5,991	4,557	4,697	3,217	3,240	2,025	1,980
	2.25		4,631	4,629	6,947	7,163	4,187	4,255	3,822	3,921	3,253	3,362	2,507	2,580	5,272	5,488	4,247	4,389	3,059	3,096	1,961	1,928
37.5	1.00	156	15,630	15,623	23,445	24,243	11,515	11,911	9,114	9,428	6,433	6,537	4,050	3,993	11,315	11,564	7,456	7,402	4,433	4,272	2,448	2,307
	1.25		12,504	12,499	18,756	19,395	9,724	10,033	7,955	8,243	5,833	5,973	3,804	3,789	10,096	10,395	6,906	6,926	4,233	4,116	2,386	2,262
	1.5		10,420	10,416	15,630	16,163	8,415	8,661	7,056	7,313	5,335	5,490	3,586	3,601	9,114	9,431	6,433	6,502	4,050	3,969	2,326	2,219
	1.75		8,931	8,928	13,397	13,854	7,416	7,616	6,341	6,567	4,916	5,075	3,391	3,428	8,307	8,625	6,019	6,123	3,882	3,831	2,269	2,177
	2.00		7,815	7,812	11,723	12,122	6,630	6,794	5,757	5,956	4,557	4,714	3,217	3,268	7,632	7,941	5,656	5,782	3,728	3,701	2,217	2,136
	2.25		6,947	6,944	10,421	10,775	5,995	6,132	5,272	5,447	4,247	4,399	3,059	3,122	7,057	7,355	5,336	5,475	3,586	3,578	2,165	2,096
50	1.00	208	20,830	20,831	31,245	32,410	14,108	14,658	10,667	11,007	7,170	7,217	4,331	4,222	12,864	13,044	8,099	7,955	4,652	4,443	2,512	2,355
	1.25		16,664	16,665	24,996	25,929	12,066	12,518	9,457	9,800	6,601	6,708	4,116	4,054	11,663	11,936	7,606	7,549	4,484	4,319	2,465	2,320
	1.5		13,887	13,888	20,831	21,608	10,540	10,913	8,492	8,819	6,117	6,258	3,922	3,896	10,668	10,990	7,170	7,176	4,331	4,200	2,416	2,287
	1.75		11,903	11,904	17,855	18,521	9,356	9,667	7,707	8,008	5,698	5,859	3,746	3,748	9,829	10,175	6,781	6,835	4,185	4,086	2,369	2,254
	2.00		10,415	10,416	15,623	16,206	8,411	8,674	7,054	7,329	5,334	5,504	3,585	3,608	9,111	9,467	6,432	6,522	4,049	3,978	2,326	2,222
	2.25		9,258	9,259	13,887	14,405	7,641	7,864	6,504	6,753	5,012	5,186	3,437	3,477	8,492	8,847	6,117	6,234	3,922	3,874	2,283	2,190
75	1.00	313	31,250	31,244	46,875	48,831	18,225	18,981	12,863	13,157	8,100	8,025	4,653	4,471	14,911	14,908	8,864	8,582	4,894	4,626	2,583	2,404
	1.25		25,000	24,996	37,500	39,066	15,908	16,590	11,663	12,025	7,605	7,618	4,485	4,350	13,811	13,961	8,464	8,275	4,770	4,538	2,546	2,381
	1.5		20,833	20,831	31,250	32,556	14,110	14,714	10,669	11,055	7,171	7,243	4,329	4,233	12,863	13,115	8,100	7,985	4,653	4,453	2,513	2,358
	1.75		17,857	17,855	26,786	27,905	12,678	13,208	9,828	10,218	6,780	6,898	4,186	4,120	12,038	12,357	7,763	7,712	4,540	4,371	2,480	2,335
	2.00		15,625	15,623	23,438	24,417	11,513	11,974	9,113	9,491	6,431	6,579	4,050	4,012	11,311	11,674	7,456	7,454	4,432	4,291	2,447	2,313
	2.25		13,889	13,888	20,834	21,705	10,542	10,948	8,493	8,855	6,117	6,285	3,922	3,909	10,669	11,058	7,169	7,211	4,329	4,213	2,417	2,291

Calculations using client's point to point method

Calculations using EasyPower software

Residential Service Fault Currents w/1/0 AWG

Transformer KVA - Single Phase 240/120 Volts	Transformer Impedance	Full Load Current @ 240 Volts Single Phase	Available Fault Current Phase to Phase		Available Fault Current Phase to Neutral		Available Fault Current Phase to Phase, 200 Amp Service, 1/0 Aluminum Service Conductor length (feet)								Available Fault Current Phase to Neutral, 200 Amp Service, 1/0 Aluminum Service Conductor length (feet)							
							25		50		100		200		25		50		100		200	
25	1.00	104	10,420	10,416	15,630	16,116	7,596	7,963	5,976	6,279	4,189	4,317	2,622	2,611	7,388	7,637	4,837	4,846	2,862	2,774	1,576	1,490
	1.25		8,336	8,333	12,504	12,893	6,425	6,709	5,227	5,500	3,806	3,957	2,467	2,485	6,607	6,881	4,490	4,547	2,736	2,679	1,537	1,463
	1.5		6,947	6,944	10,421	10,744	5,567	5,792	4,644	4,884	3,488	3,646	2,329	2,368	5,976	6,254	4,189	4,279	2,622	2,589	1,500	1,437
	1.75		5,954	5,952	8,931	9,209	4,910	5,093	4,179	4,389	3,219	3,375	2,205	2,259	5,454	5,726	3,926	4,037	2,516	2,504	1,465	1,402
	2.00		5,210	5,208	7,815	8,058	4,393	4,543	3,798	3,982	2,988	3,140	2,094	2,159	5,016	5,276	3,694	3,818	2,419	2,423	1,431	1,387
	2.25		4,631	4,629	6,947	7,163	3,974	4,099	3,481	3,642	2,788	2,933	1,994	2,065	4,644	4,890	3,488	3,621	2,329	2,346	1,398	1,363
37.5	1.00	156	15,630	15,623	23,445	24,243	10,033	10,586	7,388	7,718	4,837	4,902	2,862	2,798	8,771	8,939	5,395	5,309	3,048	2,913	1,629	1,528
	1.25		12,504	12,499	18,756	19,395	8,647	9,108	6,607	6,943	4,490	4,601	2,736	2,705	8,020	8,260	5,100	5,077	2,952	2,845	1,602	1,510
	1.5		10,420	10,416	15,630	16,163	7,596	7,982	5,976	6,298	4,189	4,329	2,622	2,616	7,388	7,667	4,837	4,860	2,862	2,779	1,576	1,492
	1.75		8,931	8,928	13,397	13,854	6,772	7,097	5,454	5,755	3,926	4,083	2,516	2,532	6,849	7,147	4,601	4,658	2,777	2,716	1,549	1,474
	2.00		7,815	7,812	11,723	12,122	6,111	6,386	5,016	5,293	3,694	3,859	2,419	2,451	6,383	6,688	4,386	4,470	2,697	2,655	1,524	1,457
	2.25		6,947	6,944	10,421	10,775	5,567	5,803	4,644	4,897	3,488	3,656	2,329	2,374	5,976	6,281	4,189	4,294	2,622	2,595	1,500	1,439
50	1.00	208	20,830	20,831	31,245	32,410	11,948	12,630	8,376	8,681	5,243	5,243	3,000	2,898	9,673	9,747	5,724	5,568	3,149	2,986	1,659	1,547
	1.25		16,664	16,665	24,996	25,929	10,450	11,059	7,612	7,958	4,933	4,992	2,895	2,826	8,979	9,153	5,472	5,381	3,072	2,934	1,637	1,534
	1.5		13,887	13,888	20,831	21,608	9,285	9,819	6,974	7,333	4,656	4,759	2,797	2,755	8,376	8,617	5,243	5,203	2,998	2,883	1,616	1,520
	1.75		11,903	11,904	17,855	18,521	8,355	8,820	6,436	6,790	4,410	4,542	2,707	2,687	7,851	8,134	5,032	5,034	2,928	2,833	1,594	1,506
	2.00		10,415	10,416	15,623	16,206	7,593	7,999	5,974	6,315	4,188	4,340	2,621	2,621	7,387	7,696	4,837	4,873	2,861	2,784	1,575	1,493
	2.25		9,258	9,259	13,887	14,405	6,959	7,315	5,574	5,898	3,988	4,153	2,541	2,558	6,974	7,299	4,656	4,721	2,797	2,737	1,555	1,480
75	1.00	313	31,250	31,244	46,875	48,831	14,775	15,554	9,675	9,863	5,722	5,618	3,150	3,002	10,766	10,681	6,094	5,846	3,258	3,061	1,687	1,567
	1.25		25,000	24,996	37,500	39,066	13,213	13,993	8,980	9,264	5,473	5,435	3,073	2,953	10,200	10,222	5,903	5,714	3,203	3,026	1,673	1,558
	1.5		20,833	20,831	31,250	32,556	11,950	12,691	8,377	8,720	5,242	5,260	2,998	2,904	9,675	9,763	5,722	5,585	3,150	2,991	1,659	1,549
	1.75		17,857	17,855	26,786	27,905	10,907	11,594	7,852	8,226	5,032	5,092	2,929	2,856	9,198	9,392	5,553	5,461	3,096	2,957	1,645	1,540
	2.00		15,625	15,623	23,438	24,417	10,031	10,662	7,388	7,777	4,838	4,932	2,861	2,809	8,768	9,018	5,393	5,340	3,047	2,923	1,629	1,531
	2.25		13,889	13,888	20,834	21,705	9,286	9,862	6,975	7,369	4,657	4,778	2,797	2,763	8,377	8,668	5,242	5,224	2,998	2,890	1,615	1,522

Calculations using client's point to point method

Calculations using EasyPower software

240 Volt Line to Line Service		120 Volt Line to Neutral Service	
Maximum Length 1/0 Aluminum Service Conductor for 3000 Amps (feet)		Maximum Length 1/0 Aluminum Service Conductor for 3000 Amps (feet)	
(Isca-Iscb)*C*n*Ell/(2*Isca*Iscb)		(Isca-Iscb)*C*n*Eln/(2*Isca*Iscb)	
166		94	
149		89	
133		83	
116		78	
99		72	
82		66	
189		102	
177		98	
166		94	
155		91	
144		87	
133		83	
200		106	
191		103	
183		100	
175		97	
166		94	
158		92	
211		109	
205		107	
200		106	
194		104	
189		102	
183		100	

Isca = Line to Line Fault Current at transformer		Isca = Line to neutral Fault Current	Isca = Line to neutral Fault Current at transforme	
Iscb = final line to line fault current at service fixed at	3000	Iscb = final line to neutral fault curre	Iscb = final line to neutral fault curre	3000
n = number of conductors per phase, fixed at 1		n = number of conductors per phas	n = number of conductors per phase, fixed at 1	
Ell = Line to line voltage fixed at 240		Eln = Line to neutral voltage fixed a	Eln = Line to neutral voltage fixed at 120	
C = impedance constant for Aluminum 1/0 =	5838	C = impedance constant for Alumin	C = impedance constant for Alumin	5838

Residential Service Fault Currents w/1/0 AWG

Transformer KVA - Single Phase 240/120 Volts	Transformer Impedance	Full Load Current @ 240 Volts Single Phase	Available Fault Current Phase to Phase		Available Fault Current Phase to Neutral		Available Fault Current Phase to Phase, 200 Amp Service, 1/0 Aluminum Service Conductor length (feet)								Available Fault Current Phase to Neutral, 200 Amp Service, 1/0 Aluminum Service Conductor length (feet)							
							25		50		100		200		25		50		100		200	
25	1.00	104	10,420	10,416	15,630	16,116	7,596	7,963	5,976	6,279	4,189	4,317	2,622	2,611	7,388	7,637	4,837	4,846	2,862	2,774	1,576	1,490
	1.25		8,336	8,333	12,504	12,893	6,425	6,709	5,227	5,500	3,806	3,957	2,467	2,485	6,607	6,881	4,490	4,547	2,736	2,679	1,537	1,463
	1.5		6,947	6,944	10,421	10,744	5,567	5,792	4,644	4,884	3,488	3,646	2,329	2,368	5,976	6,254	4,189	4,279	2,622	2,589	1,500	1,437
	1.75		5,954	5,952	8,931	9,209	4,910	5,093	4,179	4,389	3,219	3,375	2,205	2,259	5,454	5,726	3,926	4,037	2,516	2,504	1,465	1,402
	2.00		5,210	5,208	7,815	8,058	4,393	4,543	3,798	3,982	2,988	3,140	2,094	2,159	5,016	5,276	3,694	3,818	2,419	2,423	1,431	1,387
	2.25		4,631	4,629	6,947	7,163	3,974	4,099	3,481	3,642	2,788	2,933	1,994	2,065	4,644	4,890	3,488	3,621	2,329	2,346	1,398	1,363
37.5	1.00	156	15,630	15,623	23,445	24,243	10,033	10,586	7,388	7,718	4,837	4,902	2,862	2,798	8,771	8,939	5,395	5,309	3,048	2,913	1,629	1,528
	1.25		12,504	12,499	18,756	19,395	8,647	9,108	6,607	6,943	4,490	4,601	2,736	2,705	8,020	8,260	5,100	5,077	2,952	2,845	1,602	1,510
	1.5		10,420	10,416	15,630	16,163	7,596	7,982	5,976	6,298	4,189	4,329	2,622	2,616	7,388	7,667	4,837	4,860	2,862	2,779	1,576	1,492
	1.75		8,931	8,928	13,397	13,854	6,772	7,097	5,454	5,755	3,926	4,083	2,516	2,532	6,849	7,147	4,601	4,658	2,777	2,716	1,549	1,474
	2.00		7,815	7,812	11,723	12,122	6,111	6,386	5,016	5,293	3,694	3,859	2,419	2,451	6,383	6,688	4,386	4,470	2,697	2,655	1,524	1,457
	2.25		6,947	6,944	10,421	10,775	5,567	5,803	4,644	4,897	3,488	3,656	2,329	2,374	5,976	6,281	4,189	4,294	2,622	2,595	1,500	1,439
50	1.00	208	20,830	20,831	31,245	32,410	11,948	12,630	8,376	8,681	5,243	5,243	3,000	2,898	9,673	9,747	5,724	5,568	3,149	2,986	1,659	1,547
	1.25		16,664	16,665	24,996	25,929	10,450	11,059	7,612	7,958	4,933	4,992	2,895	2,826	8,979	9,153	5,472	5,381	3,072	2,934	1,637	1,534
	1.5		13,887	13,888	20,831	21,608	9,285	9,819	6,974	7,333	4,656	4,759	2,797	2,755	8,376	8,617	5,243	5,203	2,998	2,883	1,616	1,520
	1.75		11,903	11,904	17,855	18,521	8,355	8,820	6,436	6,790	4,410	4,542	2,707	2,687	7,851	8,134	5,032	5,034	2,928	2,833	1,594	1,506
	2.00		10,415	10,416	15,623	16,206	7,593	7,999	5,974	6,315	4,188	4,340	2,621	2,621	7,387	7,696	4,837	4,873	2,861	2,784	1,575	1,493
	2.25		9,258	9,259	13,887	14,405	6,959	7,315	5,574	5,898	3,988	4,153	2,541	2,558	6,974	7,299	4,656	4,721	2,797	2,737	1,555	1,480
75	1.00	313	31,250	31,244	46,875	48,831	14,775	15,554	9,675	9,863	5,722	5,618	3,150	3,002	10,786	10,681	6,094	5,846	3,258	3,061	1,687	1,567
	1.25		25,000	24,996	37,500	39,066	13,213	13,993	8,980	9,264	5,473	5,435	3,073	2,953	10,200	10,222	5,903	5,714	3,203	3,026	1,673	1,558
	1.5		20,833	20,831	31,250	32,556	11,950	12,691	8,377	8,720	5,242	5,260	2,998	2,904	9,675	9,763	5,722	5,585	3,150	2,991	1,659	1,549
	1.75		17,857	17,855	26,786	27,905	10,907	11,594	7,852	8,226	5,032	5,092	2,929	2,856	9,198	9,392	5,553	5,461	3,096	2,957	1,645	1,540
	2.00		15,625	15,623	23,438	24,417	10,031	10,662	7,388	7,777	4,838	4,932	2,861	2,809	8,768	9,018	5,393	5,340	3,047	2,923	1,629	1,531
	2.25		13,889	13,888	20,834	21,705	9,286	9,862	6,975	7,369	4,657	4,778	2,797	2,763	8,377	8,668	5,242	5,224	2,998	2,890	1,615	1,522

Calculations using client's point to point method

Calculations using EasyPower software

Public Comment No. 466-NFPA 70-2024 [Section No. 210.12(A)]

(A) Means of Protection.

AFCI protection shall be provided by any of the following means:

(1) A listed combination-type AFCI installed at the origin of the branch circuit to protect the entire branch circuit

(2) A listed branch/feeder-type AFCI installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box, which is marked to indicate that it is the first outlet of the branch circuit

(3) A listed supplemental arc protection circuit breaker installed at the origin of the branch circuit in combination with a listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet box if all of the following conditions are met:

a. The branch-circuit wiring shall be continuous from the branch-circuit OCPD to the outlet branch-circuit AFCI.

b. The maximum length of the branch-circuit wiring from the branch-circuit OCPD to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

c. The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.

(4) A listed outlet branch-circuit-type AFCI installed on the branch circuit at the first outlet in combination with a listed branch-circuit OCPD if all of the following conditions are met:

a. The branch-circuit wiring shall be continuous from the branch-circuit OCPD to the outlet branch-circuit AFCI.

b. The maximum length of the branch-circuit wiring from the branch-circuit OCPD to the first outlet shall not exceed 15.2 m (50 ft) for a 14 AWG conductor or 21.3 m (70 ft) for a 12 AWG conductor.

c. The first outlet box shall be marked to indicate that it is the first outlet of the branch circuit.

d. The combination of the branch-circuit OCPD and outlet branch-circuit AFCI shall be identified as meeting the requirements for a system combination-type AFCI and listed as such.

(5) If metal raceway, metal wireways, metal auxiliary gutters, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, metal conduit bodies, and metal enclosures are installed for the portion of the branch circuit between the branch-circuit OCPD and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet to protect the remaining portion of the branch circuit

(6) Where a listed metal or nonmetallic conduit or tubing or Type MC cable is encased in not less than 50 mm (2 in.) of concrete for the portion of the branch circuit between the branch-circuit OCPD and the first outlet, a listed outlet branch-circuit-type AFCI installed at the first outlet to protect the remaining portion of the branch circuit

Informational Note: See UL 1699-2011, *Standard for Arc-Fault Circuit-Interrupters*, for information on combination-type and branch/feeder-type AFCI devices. See UL Subject 1699A, *Outline of Investigation for Outlet Branch Circuit Arc-Fault Circuit-Interrupters*, for information on outlet branch-circuit type AFCI devices. See UL Subject 1699C, *Outline of Investigation for System Combination Arc-Fault Circuit Interrupters*, for information on system combination AFCIs.

Additional Proposed Changes

File Name	Description	Approved
CN_113.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 113 appeared in the First Draft Report on First Revision No. 8032.

The Correlating Committee directs CMP-2 to revise the phrase “meeting the applicable requirements of” with “in accordance with” to comply with the NEC Style Manual 4.1.3.

Related Item

• First Revision No. 8032

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:11:39 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 113-NFPA 70-2024 [Section No. 210.12(A)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:20:37 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-2 to revise the phrase “meeting the applicable requirements of” with “in accordance with” to comply with the NEC Style Manual 4.1.3.

First Revision No. 8032-NFPA 70-2024 [Section No. 210.12(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. 1066-NFPA 70-2024 [Section No. 210.12(B)]

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices ~~installed in the following locations~~ shall be protected by any of the means described in 210.12(A).

- ~~Kitchens~~
- ~~Family rooms~~
- ~~Dining rooms~~
- ~~Living rooms~~
- ~~Parlors~~
- ~~Libraries~~
- ~~Dens~~
- ~~Bedrooms~~
- ~~Sunrooms~~
- ~~Recreation rooms~~
- ~~Closets~~
- ~~Hallways~~
- ~~Laundry areas~~
- ~~Similar areas~~

~~Exception No. 1~~ Exception No. 1: AFCI protection shall not be required in garages, detached buildings, and outdoors.

Exception No. 2 : AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. ~~2~~ 3 : AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

The changes that where proposed did requires AFCI protection in the entire dwelling but without a long ever growing list. The new proposed exception1 - exempts the garage, detached buildings and outdoors which weren't on the original list. I believe this simplifies the goal for AFCI protection in the entire house. After reading the Committee statement I think they misunderstood the intention of the change. This Change will increase coverage and protection.

Committee StatementResolution: CI-8195-NFPA 70-2024
Statement: The section has been revised to make the NEC more user-friendly. Expansion to the remaining circuits of dwelling units, except for garages, continues the incremental steps to protect the entire dwelling as electrical fires can occur on these 10-A, 15-A, and 20-A circuits regardless of the area or room they serve. The entire length of conductors presents opportunities for causing an electrical fire. This Arc-fault protection expansion to all dwelling unit 10-A, 15-A, and 20-A branch circuits increases safety by reducing the likelihood of electrical fires.
Electrical fire statistics demonstrate that electrical fires exist in dwelling units that might have been prevented by AFCI protection.
Kitchens, Laundry areas, and Listed HVAC equipment have been excepted from AFCI protection due to incompatibility concerns.

Related Item

• PI 1438

Submitter Information Verification

Submitter Full Name: David Hittinger
Organization: Independent Electrical Contractors
Affiliation: IEC Codes and Standards
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 13 12:42:59 EDT 2024
Committee: NEC-P02

Public Comment No. 1157-NFPA 70-2024 [Section No. 210.12(B)]

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

(1) Kitchens
(2) Family rooms
(3) Dining rooms
(4) Living rooms
(5) Parlors
(6) Libraries
(7) Dens
(8) Bedrooms
(9) Sunrooms
(10) Recreation rooms
(11) Closets
(12) Hallways
(13) Laundry areas
(14) Similar areas
(15) Bathrooms

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

CMP 2 accepted the addition of bathrooms when reorganizing 210.12 in FR 8195. However, with the failure of the FR, this PC is needed to bring bathrooms into 210.12 (B). A presentation was provided detailing the interoperability testing without any negative feedback from CMP2 members.

Electrical malfunction (Per NFPA, home fires due to electrical failure or malfunction primarily involve some form of arcing, which results from an unintentional discharge of electrical current between conductors.) caused bathroom fires at an annual average of 2300/yr. and 10 deaths, 50 injuries, & $48M per NFPA 2021 Home Electrical Fires Table 8. A reduction of these fires, deaths, injuries, and financial impact is the focus of this public input. There have been significant AFCI testing done on bathroom cord/plug appliances as well as the major manufacturers of bathroom fans including humidity level testing in order to prevent unwanted tripping. This testing covers over 100,000 test cases, over 1,000 use cases, and over 300 appliance brands.

Example of some fires that started in bathrooms:

https://www.khq.com/news/bathroom-ceiling-fan-causing-electrical-fire-at-spokane-valley-home/article_4f2baa5e-add7-11eb-90b0-ff1f3e70dfea.html

https://www.theoaklandpress.com/news/two-fires-start-from-faulty-bathroom-exhaust-fans/article_35d3003c-ef71-11e9-aea7-63cc0011aca1.html

https://fox59.com/news/family-loses-everything-after-fire-started-by-bathroom-exhaust-fan/

The Commonwealth of Massachusetts has required AFCI protection on all circuits since their adoption of the 2020 NEC with this amendment on January 1, 2020. There has not been any reports of unwanted tripping or other issues related to the use of AFCI's across all 15-20A circuits. ESFI conducted a survey of electrical contractors during 2022 and found that there were no specified issues related to AFCI's causing tripping issues. The vast majority of tripping issues found were related to overloads/short circuits.

Additionally, concerns related to interoperability lead to additional testing of bathroom fans in a humidity chamber as presented to CMP-2 during the First Draft Meeting. Their testing covered 11 different fans from 6 different manufacturers utilizing Conditions of 120Vac, +32C (+90F), and Relative Humidity 20% - 93%. Three different manufacturers of current dual function circuit breakers were used and none of the devices tripped. Similar tests were run on 5 Radon Fans without any tripping of the dual function circuit breakers.

Related Item

• PI3408 • FR8195

Submitter Information Verification

Submitter Full Name: Megan Hayes
Organization: NEMA
Street Address:
City:
State:
Zip:

Submittal Date: Fri Aug 16 09:47:11 EDT 2024
Committee: NEC-P02

Public Comment No. 1158-NFPA 70-2024 [Section No. 210.12(B)]

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

(1) Kitchens
(2) Family rooms
(3) Dining rooms
(4) Living rooms
(5) Parlors
(6) Libraries
(7) Dens
(8) Bedrooms
(9) Sunrooms
(10) Recreation rooms
(11) Closets
(12) Hallways
(13) Laundry areas
(14) Similar areas
(15) Attics

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

CMP 2 accepted the addition of attics when reorganizing 210.12 in FR 8195. However, with the failure of the FR, this PC is needed to bring attics into 210.12 (B).

Electrical malfunction (Per NFPA, home fires due to electrical failure or malfunction primarily involve some form of arcing, which results from an unintentional discharge of electrical current between conductors.) is a major contributor to fires starting in attics with an annual average of 4600/yr. with 10 deaths, 70 injuries, & $194M in damage per NFPA 2021 Home Electrical Fires Table 8. While some of these fires are caused by circuits running through the attic, the branch circuits feeding the attic are subject to the same damage and other causes of arcing. The dangers that these unprotected circuits could create should not be ignored. The following recent attic fires are what this PI will prevent.

https://5280fire.com/2023-incidents/lakewood-west-5th-ave-attic-fire/

https://www.nbc15.com/2023/02/10/attic-fire-causes-estimated-50k-damage-monona-home/

https://roscoenews.com/g/rockton-il/n/127798/attic-fire-rockton-was-put-out-quickly

https://www.recordcourier.com/news/2022/may/13/firefighters-douse-main-street-attic-blaze/

While these fires caused damage with few injuries, that is not always the case as the NFPA Report indicates. In February of 2020, an attic fire in Clinton, MS took the lives of 7 people mostly children. The Mississippi fire marshals reported that the house fire that killed seven people was accidental, and it started with an electrical issue in the attic. It is understood that this report doesn't say that an arcing event started the fire in the attic, but there are limited electrical fire ignition options in an attic. Expanding this fire reducing technology will help save lives.

The Commonwealth of Massachusetts has required AFCI protection on all circuits since their adoption of the 2020 NEC with this amendment on January 1, 2020. There has not been any reports of unwanted tripping or other issues related to the use of AFCI's
across all 15-20A circuits. ESFI conducted a survey of electrical contractors during 2022 and found that there were no specified issues related to AFCI's causing tripping issues.

The vast majority of tripping issues found were related to overloads/short circuits.
Concerns related to interoperability lead to additional testing of attic fans in a humidity chamber. Their testing covered 5 different fans from 5 different manufacturers utilizing Conditions of 120Vac, and +54C (+130F). Three different manufacturers of current dual
function circuit breakers were used and none of the devices tripped.

Related Item

• PI3407 • FR8195

Submitter Information Verification

Submitter Full Name: Megan Hayes
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City:
State:

Zip:
Submittal Date: Fri Aug 16 09:53:20 EDT 2024
Committee: NEC-P02

Public Comment No. 1677-NFPA 70-2024 [Section No. 210.12(B)]

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

(1) ~~Kitchens~~
(2) Family rooms
(3) Dining rooms
(4) Living rooms
(5) Parlors
(6) Libraries
(7) Dens
(8) Bedrooms
(9) Sunrooms
(10) Recreation rooms
(11) Closets
(12) Hallways
(13) ~~Laundry areas~~
(14) Similar areas

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Additional Proposed Changes

File Name	Description	Approved
PI_8195_AFCI_Public_Comment_-_Buuck-v.1.0.pdf		

Statement of Problem and Substantiation for Public Comment

The First Draft panel meeting resulted in multiple changes to 210.12(B). Some changes added areas of the home where AFCIs would be required, and some removed areas. It would help to get a clearer picture of where the Panel stands if each change were balloted separately. This PC is an attempt to ballot one item from the failed FR.
This PC removes kitchens and laundry areas from the list of areas where AFCIs are required. As stated in my presentation to CMP-2 in January, national fire data does not support the continued expansion of AFCIs. Tens of millions of AFCI devices have been installed, and we are still seeing upticks in electrical fires (see attachment). This is very different from the clear reduction in electrocutions that were recorded over the first decades where GFCIs were introduced.
Note that TerraView incorrectly shows “family rooms” and “similar areas” as underlined. They were not added, and the underlining should be ignored.

Related Item

• CI 8195

Submitter Information Verification

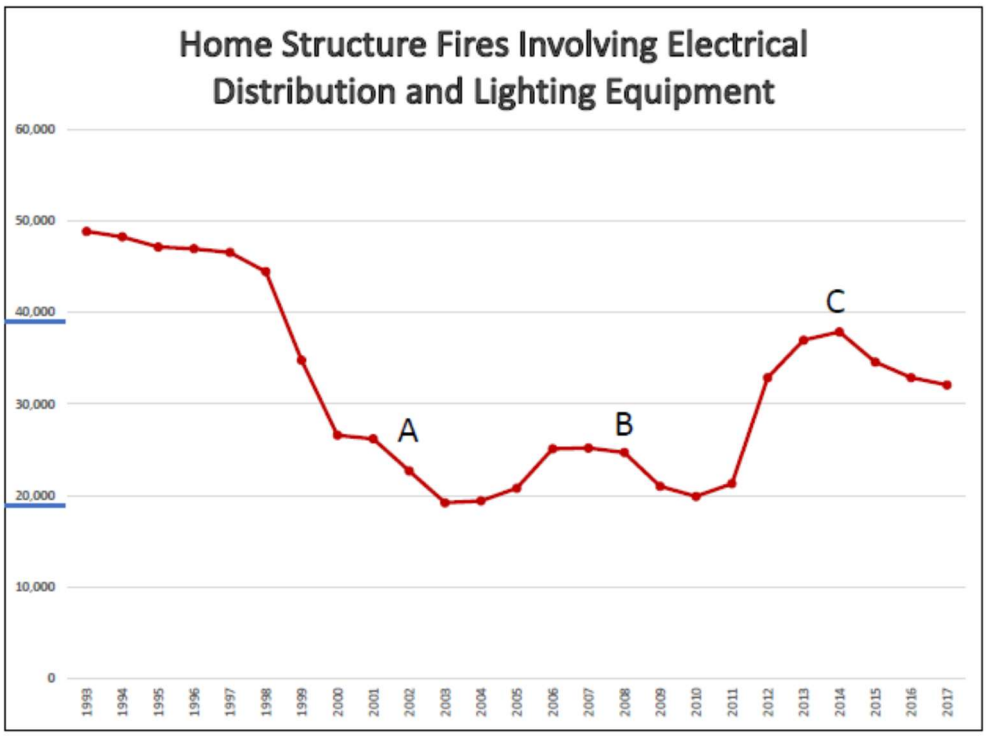
Submitter Full Name: Daniel Buuck
Organization: National Association of Home Builders
Street Address:
City:
State:
Zip:

Submittal Date: Mon Aug 26 10:00:03 EDT 2024
Committee: NEC-P02

The First Draft panel meeting resulted in multiple changes to 210.12(B). Some changes added areas of the home where AFCIs would be required, and some removed areas. It would help to get a clearer picture of where the Panel stands if each change were balloted separately. This PC is an attempt to ballot one item from the failed FR.

This PC removes kitchens and laundry areas from the list of areas where AFCIs are required. As stated in my presentation to CMP-2 in January, national fire data does not support the continued expansion of AFCIs. Tens of millions of AFCI devices have been installed, and we are still seeing upticks in electrical fires (see below). This is very different from the clear reduction in electrocutions that were recorded over the first decades where GFCIs were introduced.

Note that TerraView incorrectly shows “family rooms” and “similar areas” as underlined. They were not added, and the underlining should be ignored.



Source: Home Fires Caused by Electrical Distribution and Lighting Equipment: Supporting Tables, Feb. 2022, NFPA
Note: Because of low participation in NFIRS Version 5.0 during 1999-2001, data from these years is not considered reliable.

AFCIs: Required Locations

- **A** Bedrooms (2002)
- **B** Family rooms, dining rooms, living rooms, parlors, libraries, dens, sunrooms, recreation rooms, closets, hallways similar rooms or areas (2008)
- **C** Kitchens, laundry areas (2014)

2003: Approx. 6 million AFCI devices installed*
2023: 10s of millions
* Presentation to CPSC on 9/23/2003

Public Comment No. 1681-NFPA 70-2024 [Section No. 210.12(B)]

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

(1) Kitchens
(2) Family rooms
(3) Dining rooms
(4) Living rooms
(5) Parlors
(6) Libraries
(7) Dens
(8) Bedrooms
(9) Sunrooms
(10) Recreation rooms
(11) Closets
(12) Hallways
(13) Laundry areas
(14) Similar areas
(15) Attics

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

CMP 2 accepted the addition of attics when reorganizing 210.12 in FR 8195. However, with the failure of the FR, this PC is needed to bring attics into 210.12 (B).

Electrical malfunction is a major contributor to fires starting in attics with an annual average of 4600/yr. with 10 deaths and 70 injuries per NFPA 2021 Home Electrical Fires Table 8. While some of these fires are caused by circuits running through the attic, the branch circuits feeding the attic are subject to the same damage and other causes of arcing. The dangers that these unprotected circuits could create should not be ignored. The following recent attic fires are what this PI will prevent.

https://roscoenews.com/g/rockton-il/n/127798/attic-fire-rockton-was-put-out-quickly

https://www.khon2.com/local-news/electrical-short-possible-cause-of-pahoa-attic-fire/

https://www.recordcourier.com/news/2022/may/13/firefighters-douse-main-street-attic-blaze/

While these fires caused damage with few injuries, that is not always the case as the NFPA Report indicates. In February of 2020, an attic fire in Clinton, MS took the lives of 7 people mostly children. The Mississippi fire marshal's reported that the house fire that killed seven people was accidental and it started with an electrical issue in the attic. The forensic report stated that the only ignition source in the attic was the electrical wiring. What caused the electrical wiring to ignite fire was undetermined as the wiring had been melted away. However, electrical wiring failure is usually caused by overloads or arcing faults. The overcurrent protective device would normally trip under and overload condition, so it is extremely likely the fault was an arcing type. Expanding the use of AFCI's as a fire reducing technology will help save lives.

The Commonwealth of Massachusetts has required AFCI protection on all circuits since their adoption of the 2020 NEC with this amendment on January 1, 2020. There has not been any reports of unwanted tripping or other issues related to the use of AFCI's across all 15-20A circuits. ESFI conducted a survey of electrical contractors during 2022 and found that there were no specified issues related to AFCI's causing tripping issues. The vast majority of tripping issues found were related to overloads/short circuits.

There are some who say unwanted tripping of appliances is a major issue, but when you calculate the number of homes and multi-family units built between 2014 and 2021 you find that over 60,000,000 appliances are loads on AFCI protected branch circuits. Based on data ACBMA has on unwanted tripping calls we have found .0078% of AFCI's shipped are reported as tripped. When investigations are conducted it is found that a lot of things cause these trips, wiring issues, installation issues, short circuit/overload trips, inoperable AFCI's, and the smallest percentage being interoperability issues.

AFCI's work to protect branch circuits from arcing faults that can create fires.

Related Item

• FR 8195

Submitter Information Verification

Submitter Full Name: Randy Dollar
Organization: Siemens Industry

Affiliation: American Circuit Breaker Manufacturers Association (ACBMA)
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 26 10:57:50 EDT 2024
Committee: NEC-P02

Public Comment No. 1683-NFPA 70-2024 [Section No. 210.12(B)]

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

(1) Kitchens
(2) Family rooms
(3) Dining rooms
(4) Living rooms
(5) Parlors
(6) Libraries
(7) Dens
(8) Bedrooms
(9) Sunrooms
(10) Recreation rooms
(11) Closets
(12) Hallways
(13) Laundry areas
(14) Similar areas
(15) Bathrooms

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Additional Proposed Changes

File Name	Description	Approved
Photo_1.docx	Photo 1	

Statement of Problem and Substantiation for Public Comment

CMP 2 accepted the addition of bathrooms when reorganizing 210.12 in FR 8195. However, with the failure of the FR, this PC is needed to bring bathrooms into 210.12 (B). A presentation was provided detailing the interoperability testing without any negative feedback from CMP2 members.

Electrical malfunction (Per NFPA, home fires due to electrical failure or malfunction primarily involve some form of arcing, which results from an unintentional discharge of electrical current between conductors.) caused bathroom fires at an annual average of 2300/yr. and 10 deaths along with 50 injuries per NFPA 2021 Home Electrical Fires Table 8. There have been significant AFCI testing done on bathroom cord/plug appliances as well as the major manufacturers of bathroom fans including humidity level testing in order to prevent unwanted tripping. This testing covers over 100,000 test cases, over 1,000 use cases, and over 300 appliance brands.

Example: See Photo 1

Here are some fires that started in bathrooms:

https://www.khq.com/news/bathroom-ceiling-fan-causing-electrical-fire-at-spokane-valley-home/article_4f2baa5e-add7-11eb-90b0-ff1f3e70dfea.html

https://www.theoaklandpress.com/news/two-fires-start-from-faulty-bathroom-exhaust-fans/article_35d3003c-ef71-11e9-aea7-63cc0011aca1.html

https://fox59.com/news/family-loses-everything-after-fire-started-by-bathroom-exhaust-fan/

The Commonwealth of Massachusetts has required AFCI protection on all circuits since their adoption of the 2020 NEC with this amendment on January 1, 2020. There has not been any reports of unwanted tripping or other issues related to the use of AFCI's across all 15-20A circuits. ESFI conducted a survey of electrical contractors during 2022 and found that there were no specified issues related to AFCI's causing tripping issues. A large majority of tripping issues found were related to overloads/short circuits.

There are some who say unwanted tripping of appliances is a major issue, but when you calculate the number of homes and multi-family units built between 2014 and 2021 you find that over 60,000,000 appliances are loads on AFCI protected branch circuits. Based on data ACBMA has on unwanted tripping calls we have found .0078% of AFCI's shipped are reported as tripped. When investigations are conducted it is found that a lot of things cause these trips, wiring issues, installation issues, short circuit/overload trips, inoperable AFCI's, and the smallest percentage actually being interoperability issues.

AFCI's work to protect branch circuits from arcing faults that can create fires.

CPSC data shows that many bathroom fires are ignited from the bathroom fan.

Additionally, concerns related to interoperability lead to additional testing of bathroom fans in a humidity chamber as presented to CMP-2 during the First Draft

Meeting. There testing covered 11 different fans from 6 different manufacturers utilizing Conditions of 120Vac, +32C (+90F), and Relative Humidity 20% - 93%. Three of the fans utilized ECMs in their design. Three different manufacturers of current dual function circuit breakers were used and none of the devices tripped. Similar tests were run on 5 Radon Fans without any tripping of the dual function circuit breakers.

Related Item

• FR 8195

Submitter Information Verification

Submitter Full Name: Randy Dollar
Organization: Siemens Industry
Affiliation: American Circuit Breaker Manufacturers Association (ACBMA)
Street Address:
City:
State:
Zip:

Submittal Date: Mon Aug 26 11:05:32 EDT 2024
Committee: NEC-P02

Bathroom fans tested at cycling humidity and temp

No nuisance tripping registered

The test included fan samples with and without Humidity sensors.

Test setup is was done using 1P AFCI CB and 1P DF (AFCI/GFCI) CB.

Humidity was cycled 90/40 RH

Confidential Property of Schneider Electric |

Public Comment No. 1741-NFPA 70-2024 [Section No. 210.12(B)]

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

(1) Kitchens
(2) Family rooms
(3) Dining rooms
(4) Living rooms
(5) Parlors
(6) Libraries
(7) Dens
(8) Bedrooms
(9) Sunrooms
(10) Recreation rooms
(11) Closets
(12) Hallways
(13) Laundry areas
(14) Similar areas
(15) Attics

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

CMP 2 accepted the addition of attics when reorganizing 210.12 in FR 8195. However, with the failure of the FR, this PC is needed to bring attics into 210.12 (B).

While Attic fires mostly caused damage with few injuries, that is not always the case as the NFPA Report listed below indicates. In February of 2020, an attic fire in Clinton, MS took the lives of 7 people mostly children. The Mississippi fire marshal's reported that the house fire that killed seven people was accidental and it started with an electrical issue in the attic. The forensic report stated that the only ignition source in the attic was the electrical wiring. While the damage didn't allow for determining why the wiring caused the fire, there are two options arcing or overload. The OCPD would most likely clear any overload leaving arcing as the most likely cause of the fire. Expanding this fire reducing technology will help save lives.

The Commonwealth of Massachusetts has required AFCI protection on all circuits since their adoption of the 2020 NEC w/ this amendment on January 1, 2020. There has not been any reports of unwanted tripping or other issues related to the use of AFCI's across all 15-20A circuits. ESFI conducted a survey of electrical contractors during 2022 and found that there were no specified issues related to AFCI's causing tripping issues. The vast majority of tripping issues found were related to overloads/short circuits.

Concerns related to interoperability lead to additional testing of attic fans in a humidity chamber. There testing covered 5 different fans from 5 different manufacturers utilizing Conditions of 120Vac, and +54C (+130F). Three different manufacturers of current dual function circuit breakers were used and none of the devices tripped. See ECM article "A Deep Dive into Interoperability Testing for Residential Fans with Advanced Function Circuit Breakers" detailing residential fan testing and the results. https://www.ecmweb.com/safety/article/55130752/a-deep-dive-into-interoperability-testing-for-residential-fans-with-advanced-function-circuit-breakers

Electrical malfunction (Per NFPA, home fires due to electrical failure or malfunction primarily involve some form of arcing, which results from an unintentional discharge of electrical current between conductors.) is a major contributor to fires starting in attics with an annual average of 4600/yr. with 10 deaths, 70 injuries, & $194M in damage per NFPA 2021 Home Electrical Fires Table 8. While some of these fires are caused by circuits running through the attic, the branch circuits feeding the attic are subject to the same damage and other causes of arcing. The dangers that these unprotected circuits could create should not be ignored.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1742-NFPA 70-2024 [Section No. 210.12(B)]	

Related Item

• FR-9195 • PI No. 3407

Submitter Information Verification

Submitter Full Name: Keith Waters
Organization: Schneider Electric
Street Address:
City:
State:
Zip:

Submittal Date: Mon Aug 26 21:43:49 EDT 2024
Committee: NEC-P02

Public Comment No. 1742-NFPA 70-2024 [Section No. 210.12(B)]

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

(1) Kitchens
(2) Family rooms
(3) Dining rooms
(4) Living rooms
(5) Parlors
(6) Libraries
(7) Dens
(8) Bedrooms
(9) Sunrooms
(10) Recreation rooms
(11) Closets
(12) Hallways
(13) Laundry areas
(14) Similar areas
(15) Bathrooms

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Additional Proposed Changes

File Name	Description	Approved
Bathroom_Fan_June_2023.jpg	Bathroom Fan Testing Set up	

Statement of Problem and Substantiation for Public Comment

CMP 2 accepted the addition of bathrooms when reorganizing 210.12 in FR 8195. However, with the failure of the FR, this PC is needed to bring bathrooms into 210.12 (B). A presentation was provided detailing the interoperability testing without any negative feed back from CMP2 members during the first draft meeting.

The Commonwealth of Massachusetts has required AFCI protection on all circuits since their adoption of the 2020 NEC w/ this amendment on January 1, 2020. There has not been any reports of unwanted tripping or other issues related to the use of AFCI's feeding any 15-20A bathroom circuits. ESFI conducted a survey of electrical contractors during 2022 and found that there were no specified issues related to AFCI's causing tripping issues. The vast majority of tripping issues found were related to overloads/short circuits.

Concerns related to interoperability led to additional testing of bathroom fans in a humidity chamber as presented to CMP-2 during the First Draft Meeting. There testing covered 11 different fans from 6 different manufacturers utilizing Conditions of 120Vac, +32C (+90F), and Relative Humidity 20% - 93%. Three different manufacturers of current dual function circuit breakers were used and none of the devices tripped. Similar tests were run on 5 Radon Fans without any tripping of the dual function circuit breakers. See EC&M Article "A Deep Dive into Interoperability Testing for Residential Fans with Advanced Function Circuit Breakers" for more details on the testing. https://www.ecmweb.com/safety/article/55130752/a-deep-dive-into-interoperability-testing-for-residential-fans-with-advanced-function-circuit-breakers

Electrical malfunction (Per NFPA, home fires due to electrical failure or malfunction primarily involve some form of arcing, which results from an unintentional discharge of electrical current between conductors.) caused bathroom fires at an annual average of 2300/yr. and 10 deaths, 50 injuries, & $48M per NFPA 2021 Home Electrical Fires Table 8. A reduction of these fires, deaths, injuries, and financial impact is the focus of this public input. Per Ciba insurance services, The three most common causes of bathroom exhaust fan fires are faulty wiring, running it for extended periods of time, and failing to clean and maintain the fan. Accumulated dust, lint, and debris in exhaust fans can lead to overheating and pose a serious fire risk. There have been significant AFCI testing done on bathroom cord/plug appliances as well as the major manufacturers of bathroom fans including humidity level testing in order to prevent unwanted tripping. This testing covers over 100,000 test cases, over 1,000 use cases, and over 300 appliance brands.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1741-NFPA 70-2024 [Section No. 210.12(B)]	

Related Item

• FR 8195 • PI 3408 • P I3380

Submitter Information Verification

Submitter Full Name: Keith Waters
Organization: Schneider Electric
Street Address:

City:
State:
Zip:
Submittal Date: Mon Aug 26 21:54:28 EDT 2024
Committee: NEC-P02

Public Comment No. 1913-NFPA 70-2024 [Section No. 210.12(B)]

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

(1) Kitchens
(2) Family rooms
(3) Dining rooms
(4) Living rooms
(5) Parlors
(6) Libraries
(7) Dens
(8) Bedrooms
(9) Sunrooms
(10) Recreation rooms
(11) Closets
(12) Hallways
(13) Laundry areas
(14) Similar areas

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Exception No. 3: AFCI protection shall not be required for listed HVAC equipment.

Statement of Problem and Substantiation for Public Comment

The First Draft panel meeting resulted in multiple changes to 210.12(B). Some changes added areas of the home where AFCIs would be required, and some removed areas. It would help to get a clearer picture of where the Panel stands if each change were balloted separately. This PC is an attempt to ballot one item from the failed FR.
HVAC equipment can be located in areas where AFCIs are required, such as closets. And there is a concern about the compatibility between AFCI devices and HVAC equipment.

Related Item

• CI 8195

Submitter Information Verification

Submitter Full Name: Daniel Buuck
Organization: National Association of Home Builders
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 28 08:34:08 EDT 2024
Committee: NEC-P02

Public Comment No. 467-NFPA 70-2024 [Section No. 210.12(B)]

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or devices installed in the following locations shall be protected by any of the means described in 210.12(A).

(1) Kitchens
(2) Family rooms
(3) Dining rooms
(4) Living rooms
(5) Parlors
(6) Libraries
(7) Dens
(8) Bedrooms
(9) Sunrooms
(10) Recreation rooms
(11) Closets
(12) Hallways
(13) Laundry areas
(14) Similar areas

Exception No. 1: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. 2: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Additional Proposed Changes

File Name	Description	Approved
CN_114.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 114 appeared in the First Draft Report on First Revision No. 8197.

The Correlating Committee directs CMP-2 to revise the phrase in Exception No.1 “meeting the applicable requirements of” with “in accordance with” to comply with the NEC Style Manual 4.1.3.

The Correlating Committee also directs CMP-2 to revise Exception 2 to remove the word “its” in two places.

Related Item

• First Revision No. 8197

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:13:59 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 114-NFPA 70-2024 [Section No. 210.12(B)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:25:42 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-2 to revise the phrase in Exception No.1 “meeting the applicable requirements of” with “in accordance with” to comply with the NEC Style Manual 4.1.3.

The Correlating Committee also directs CMP-2 to revise Exception 2 to remove the word “its” in two places.

First Revision No. 8197-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. 730-NFPA 70-2024 [Section No. 210.12(B)]

(B) Dwelling Units.

All 120-volt, nominal, single-phase, 10-, 15-, and 20-ampere branch circuits supplying outlets or ~~devices installed in the following locations shall~~ devices shall be protected by any of the means described in 210.12(A).

- ~~Kitchens~~
- ~~Family rooms~~
- ~~Dining rooms~~
- ~~Living rooms~~
- ~~Parlors~~
- ~~Libraries~~
- ~~Dens~~
- ~~Bedrooms~~
- ~~Sunrooms~~
- ~~Recreation rooms~~
- ~~Closets~~
- ~~Hallways~~
- ~~Laundry areas~~
- ~~Similar areas~~

Exception No. 1: AFCI protection shall not be required in garages, detached buildings or outdoors.

Exception No. 2: AFCI protection shall not be required for an individual branch circuit supplying a fire alarm system installed in accordance with 760.41(B) or 760.121(B). The branch circuit shall be installed in a metal raceway, metal auxiliary gutter, steel-armored cable, or Type MC or Type AC cable meeting the applicable requirements of 250.118, with metal boxes, conduit bodies, and enclosures.

Exception No. ~~2~~ 3: AFCI protection shall not be required for the individual branch circuit supplying an outlet for arc welding equipment in a dwelling unit, its garages, and its accessory buildings.

Informational Note No. 1: See *NFPA 72*-2025, *National Fire Alarm and Signaling Code*, 29.9.4(5) for information on secondary power source requirements for smoke alarms installed in dwelling units.

Informational Note No. 2: See 760.41(B) and 760.121(B) for power source requirements for fire alarm systems.

Statement of Problem and Substantiation for Public Comment

This revised language was essentially agreed upon by the code panel to include AFCI protection of all areas of a dwelling unit except garages, detached buildings and outdoors however Exception No. 1 was amended to remove AFCI protection for the Kitchen and Laundry areas of the dwelling which have been in the code for several cycles. This revised language will simplify the requirements for AFCI protection within the dwelling unit without a long ever growing list of rooms and areas. Lets stop the area name game, is this a master "bedroom" or "owner suite" which is not on the list.

Related Item

• PI 1438 • CI 8195

Submitter Information Verification

Submitter Full Name: David Johnson
Organization: CenTex IEC
Affiliation: Independent Electrical Contractors
Street Address:
City:
State:
Zip:

Submittal Date: Sun Aug 04 12:36:02 EDT 2024
Committee: NEC-P02

Public Comment No. 1182-NFPA 70-2024 [Section No. 210.13]

210.13 Ground-Fault Protection of Equipment.

Each branch-circuit disconnecting means rated 1000 amperes or more and installed on solidly grounded wye electrical systems of more than 150 volts to ground, but not exceeding 1000 volts phase-to-phase, shall be provided with ground-fault protection of equipment in accordance with 230.95.

Informational Note: See 517.17 for requirements on buildings that contain health care occupancies.

Exception No. 1: This section shall not apply to a disconnecting means for a continuous industrial process where a nonorderly shutdown will introduce additional or increased hazards.

Exception No. 2: This section shall not apply if ground-fault protection of equipment is provided on the supply side of the branch circuit and on the load side of any transformer supplying the branch circuit.

~~*Exception No. 3: For fused disconnects, where the available fault current, at the fused disconnect, is 10,000 amperes or greater, the ground-fault protection provisions of this section shall not apply if the fuses have a clearing time of 0.07 seconds or less at the lower of the calculated minimum available arcing current or 38 percent of the available fault current , or if the disconnect switch complies with 240.67(B)(1) , 240.67(B)(3) , or 240.67(B)(4) and is set to operate at the lower of the calculated minimum arcing current or 38 percent of the available fault current.*~~

~~*Exception No. 4: For circuit breakers, where the available fault current, at the circuit breaker, is 10,000 amperes or greater, the ground-fault protection provisions of this section shall not apply if the circuit breaker complies with 240.87(B)(2) , 240.87(B)(4) , 240.87(B)(5) , or 240.87(B)(6) and is set to operate at the lower of the calculated minimum arcing current or 38 percent of the available fault current.*~~

Statement of Problem and Substantiation for Public Comment

Exceptions No. 3 and 4, added by FR 7565, were in reference to PI 1633. The CMP 2 statement for FR 7565 is “This FR revision correlates with changes to 215.10(PI#1641) and 230.95(PI#1645)…”. However, CMP10 did not accept these changes to 215.10 and 230.95 and instead resolved PI’s 1641 & 1645. The CMP10 Resolve statement is as follows: “Even with the limitations proposed in the new exceptions, the arc energy reduction technologies may not operate above the pickup current levels specified in 230.95(A), but below the minimum arcing current. Ground-fault currents may exist in this range, and the arc energy reduction technology may not operate on this current unless the resulting damage to equipment leads to a higher current arcing fault. Additionally, differential relaying and energy-reducing active arc-flash mitigation system options would not protect any downstream conductors or equipment, and only provide protection within the equipment boundary. This may ultimately reduce the level of protection currently provided by GFPE, or by a combination of GFPE and arc energy reduction technology, as applicable.”

Based on the resolve action taken by CMP 10, and to achieve correlation, this PC proposes to delete Exception No.3 and 4.

Related Item

• FR-7565

Submitter Information Verification

Submitter Full Name: Steve Chutka
Organization: Siemens
Affiliation: Siemens
Street Address:
City:
State:
Zip:

Submittal Date: Fri Aug 16 14:32:03 EDT 2024
Committee: NEC-P02

Public Comment No. 1894-NFPA 70-2024 [Section No. 210.13]

210.13 Ground-Fault Protection of Equipment.

(A) Each branch-circuit disconnecting means rated 1000 amperes or more and installed on solidly grounded wye electrical systems of more than 150 volts to ground, but not exceeding 1000 volts phase-to-phase, shall be provided with ground-fault protection of equipment in accordance with 230.95.

(B) Each branch-circuit disconnecting means rated 1000 amperes or more and installed on solidly grounded dc electrical systems of more than 150 volts to ground, but not exceeding 1500 volts line-to-line, shall be provided with ground-fault protection of equipment in accordance with 230.95.

Informational Note: See 517.17 for requirements on buildings that contain health care occupancies.

Exception No. 1: This section shall not apply to a disconnecting means for a continuous industrial process where a nonorderly shutdown will introduce additional or increased hazards.

Exception No. 2: This section shall not apply if ground-fault protection of equipment is provided on the supply side of the branch circuit and on the load side of any transformer supplying the branch circuit.

Exception No. 3: For fused disconnects, where the available fault current, at the fused disconnect, is 10,000 amperes or greater, the ground-fault protection provisions of this section shall not apply if the fuses have a clearing time of 0.07 seconds or less at the lower of the calculated minimum available arcing current or 38 percent of the available fault current , or if the disconnect switch complies with 240.67(B)(1), 240.67(B)(3), or 240.67(B)(4) and is set to operate at the lower of the calculated minimum arcing current or 38 percent of the available fault current.

Exception No. 4: For circuit breakers, where the available fault current, at the circuit breaker, is 10,000 amperes or greater, the ground-fault protection provisions of this section shall not apply if the circuit breaker complies with 240.87(B)(2), 240.87(B)(4), 240.87(B)(5), or 240.87(B)(6) and is set to operate at the lower of the calculated minimum arcing current or 38 percent of the available fault current.

Statement of Problem and Substantiation for Public Comment

This Public Comment is submitted on behalf of a Correlating Committee DC Task Group consisting of Danish Zia, Jason Fisher, Randy Dollar, Larry Wildermuth, Scott Higgins, Scott Harding, Mark Earley, Jason Hopkins, Chris Vance, Chad Kennedy and Derrick Atkins. This Public Comment, along with other Public Comments, was developed with the goal of improving usability and accuracy on requirements associated with DC circuits.

DC residential and commercial installations are emerging in the electrical infrastructure and are expected to be a growing alternative to the traditional AC only utility fed building. Examples include the US DOE Grid-interactive Efficient Buildings project1, the Purdue University RENEWW house2, and a DC Microgrid community in Vermont3. These installations may involve buildings that are distributed entirely with DC, or with an AC/DC hybrid distribution.

The requirements of Section 210.13 address ground-faults on equipment which could propagate into a larger arcing fault, potentially causing significant loss of property and life. However, the requirements of Section 210.13 are currently limited to solidly grounded wye AC circuits only. The hazards addressed by this type of protection also exist in grounded DC circuits, and a resulting arcing fault may be more severe due to a lack of zero cross-over in DC waveforms. As there is continued expansion of DC throughout the infrastructure it is necessary to ensure that the same level of protection is provided.

This proposal aligns 210.13 with the first draft action CMP10 took on 215.10, 230.95 and 240.13, and closes a gap in the Code for DC circuits where similar hazards exist but ground-fault protection of equipment may not be provided.

Note 1 - https://www.energy.gov/sites/default/files/2020/09/f79/bto-geb-project-summary-093020.pdf
Note 2 - https://engineering.purdue.edu/ME/News/2022/purdue-house-runs-entirely-on-dc-power
Note 3 - https://www.efficiencyvermont.com/Media/Default/docs/white-papers/Energy_Resilience.pdf

Related Item

• Public Input No. 4287-NFPA 70-2023 • First Revision No. 9007-NFPA 70-2024 • First Revision No. 9176-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Danish Zia
Organization: UL Solutions
Street Address:
City:
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Zip:

Submittal Date: Tue Aug 27 21:31:21 EDT 2024
Committee: NEC-P02

Public Comment No. 459-NFPA 70-2024 [Section No. 210.13]

210.13 Ground-Fault Protection of Equipment.

Each branch-circuit disconnecting means rated 1000 amperes or more and installed on solidly grounded wye electrical systems of more than 150 volts to ground, but not exceeding 1000 volts phase-to-phase, shall be provided with ground-fault protection of equipment in accordance with 230.95.

Informational Note: See 517.17 for requirements on buildings that contain health care occupancies.

Exception No. 1: This section shall not apply to a disconnecting means for a continuous industrial process where a nonorderly shutdown will introduce additional or increased hazards.

Exception No. 2: This section shall not apply if ground-fault protection of equipment is provided on the supply side of the branch circuit and on the load side of any transformer supplying the branch circuit.

Exception No. 3: For fused disconnects, where the available fault current, at the fused disconnect, is 10,000 amperes or greater, the ground-fault protection provisions of this section shall not apply if the fuses have a clearing time of 0.07 seconds or less at the lower of the calculated minimum available arcing current or 38 percent of the available fault current , or if the disconnect switch complies with 240.67(B)(1), 240.67(B)(3), or 240.67(B)(4) and is set to operate at the lower of the calculated minimum arcing current or 38 percent of the available fault current.

Exception No. 4: For circuit breakers, where the available fault current, at the circuit breaker, is 10,000 amperes or greater, the ground-fault protection provisions of this section shall not apply if the circuit breaker complies with 240.87(B)(2), 240.87(B)(4), 240.87(B)(5), or 240.87(B)(6) and is set to operate at the lower of the calculated minimum arcing current or 38 percent of the available fault current.

Additional Proposed Changes

File Name	Description	Approved
CN_107.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 107 appeared in the First Draft Report on First Revision No. 7565.

The Correlating Committee directs CMP 2 to consider the comments expressed in the negative votes and also the actions taken by CMP 10 on PIs 1641 and 1645 for similar requirements in 215.10 and 230.95.

Related Item

• First Revision No. 7565

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 18:53:33 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 107-NFPA 70-2024 [Section No. 210.13]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 13:45:07 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 2 to consider the comments expressed in the negative votes and also the actions taken by CMP 10 on PIs 1641 and 1645 for similar requirements in 215.10 and 230.95.

First Revision No. 7565-NFPA 70-2024 [Section No. 210.13]

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. 468-NFPA 70-2024 [Section No. 210.14]

210.14 Other Articles for Specific-Purpose Branch Circuits.

Table 210.14 lists references for specific equipment and applications not located in Chapters 5, 6, and 7 that amend or supplement the requirements of this article.

Table 210.14 Specific-Purpose Branch Circuits

Equipment	Article	Section
Air-conditioning and refrigerating equipment		440.6, 440.31, and 440.32
Busways		368.17
Central heating equipment other than fixed electric space-heating equipment		422.12
Fixed electric heating equipment for pipelines and vessels		427.4
Fixed electric space-heating equipment		424.4
Fixed outdoor electrical deicing and snow-melting equipment		426.4
Infrared lamp industrial heating equipment		422.48 and 424.4
Motors, motor circuits, and controllers	430	Parts III and IV
Switchboards and panelboards		408.52

Additional Proposed Changes

File Name	Description	Approved
CN_115.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 115 appeared in the First Draft Report on First Revision No. 7520.

The Correlating Committee directs CMP-2 to consider the title of the section to comply with the NEC Style Manual 4.1.5, “Other Requirements” instead of “other articles”.

Related Item

• First Revision No. 7520

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:16:42 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 115-NFPA 70-2024 [Section No. 210.14]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:27:41 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-2 to consider the title of the section to comply with the NEC Style Manual 4.1.5, “Other Requirements” instead of “other articles”.

First Revision No. 7520-NFPA 70-2024 [Section No. 210.3]

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. 469-NFPA 70-2024 [Section No. 210.17]

210.17 Guest Rooms and Guest Suites.

Guest rooms and guest suites in the following occupancies that are provided with permanent provisions for cooking shall have branch circuits installed to meet the rules for dwelling units:

(1) Hotels

(2) Motels

(3) Assisted living facilities

(4) Dormitories

Informational Note No. 1: See 210.11(C)(2) and 210.52(F) Exception No. 2 for information on laundry branch circuits and receptacle outlets.

Informational Note No. 2: See NFPA 101-2024, *Life Safety Code*, 3.3.205.12 and A.3.3.205.12(5) for the definition of *assisted living facilities*.

Additional Proposed Changes

File Name	Description	Approved
CN_116.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 116 appeared in the First Draft Report on First Revision No. 7568.

The Correlating Committee directs CMP 2 to consider revising the word “rules” to “requirements” in the first sentence for consistency of terminology.

Related Item

• First Revision No. 7568

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:18:24 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 116-NFPA 70-2024 [Section No. 210.17]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:28:47 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 2 to consider revising the word “rules” to “requirements” in the first sentence for consistency of terminology.

First Revision No. 7568-NFPA 70-2024 [Section No. 210.17]

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. 144-NFPA 70-2024 [Section No. 210.19(A)]

(A) General.

Branch-circuit conductors shall have an ampacity not less than the larger of the following and comply with 110.14(C) for equipment terminations:

(1) Where a branch circuit supplies continuous loads or any combination of continuous and noncontinuous loads, the minimum branch-circuit conductor size shall have an ~~ampacity~~ ampacity without application of any adjustment or correction factors not less than the noncontinuous load plus 125 percent of the continuous load in accordance with 310.14.

Exception to (1): If the assembly, including the branch-circuit OCPDs, is listed for operation at 100 percent of its rating, the ampacity of the branch-circuit conductors shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load in accordance with 110.14(C).

(2) The minimum branch-circuit conductor size shall have an ampacity not less than the maximum load to be served after the application of any adjustment or correction factors in accordance with 310.15.

Exception to (1) and (2): Where a portion of a branch circuit is connected at both its supply and load ends to separately installed pressure connections as covered in 110.14(C)(2), an allowable ampacity in accordance with 310.15 not less than the sum of the continuous load plus the noncontinuous load shall be permitted. No portion of a branch circuit installed under this exception shall extend into an enclosure containing either the branch-circuit supply or the branch-circuit load terminations.

Statement of Problem and Substantiation for Public Comment

This section uses the word "ampacity" to mean two different things, which is confusing and is not in accordance with the Article 100 definition.

Subsection (1) uses "ampacity" to refer to a value directly from the relevant table in Article 310. Subsection (2) uses "ampacity" to refer to the final value after the application of any adjustment or correction factors to that table value.

The definition of "ampacity" specifies that it is a current that a conductor may carry "under the conditions of use," and as such, it already means a value after the application of any adjustment or correction factors. The usage of "ampacity" in subsection (2) is in accordance with the definition, and the modifiers "after the application of any adjustment or correction factors as determined by section 310.15" are redundant.

In contrast, the usage of "ampacity" in subsection (1) is not in accordance with the definition. Divining the correct meaning of "ampacity" in subsection (1) currently requires reading it in contrast to subsection (2), noting the lack of the redundant modifiers that are in subsection (2), noting that the phrase "in accordance with 310.14" could implicitly mean "and not in accordance with 310.15," and inferring that "ampacity" is being used in a manner different from its Article 100 definition.

Obviously all defined terms should be used in accordance with their definitions. Therefore the term "ampacity" in subsection (1) requires modifiers or a change. I have suggested the modifier "without application of any adjustment or correction factors" for parallelism with subsection (2). This phrase could be added at the end of the sentence instead of immediately after the term "ampacity" if preferred.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 146-NFPA 70-2024 [Section No. 215.4(A)]	Identical change for feeders
Public Comment No. 150-NFPA 70-2024 [Section No. 230.42(A)]	Identical change for service entrance conductors
Public Comment No. 146-NFPA 70-2024 [Section No. 215.4(A)]	
Public Comment No. 150-NFPA 70-2024 [Section No. 230.42(A)]	

Related Item

• Public Input No. 471-NFPA 70-2023

Submitter Information Verification

Submitter Full Name: Wayne Whitney
Organization: Whitney
Street Address:
City:
State:
Zip:

Submittal Date: Mon Jul 22 11:49:21 EDT 2024
Committee: NEC-P02

Public Comment No. 1957-NFPA 70-2024 [Section No. 210.19(A)]

(A) General.

Branch-circuit conductors shall have an ampacity not less than the larger of the following and comply with 110.14(C) for equipment terminations:

(1) Where a branch circuit supplies continuous loads or any combination of continuous and noncontinuous loads, the minimum branch-circuit conductor size shall have an ampacity not less than the noncontinuous load plus 125 percent of the continuous load in accordance with 310.14.

~~Exception to~~ Exception No. 1 to (1): If the assembly, including the branch-circuit OCPDs, is listed for operation at 100 percent of its rating, the ampacity of the branch-circuit conductors shall be permitted to be not less than the sum of the continuous load plus the noncontinuous load in accordance with 110.14(C).

Exception No. 2 to (1):

Where Exception No. 1 does not apply and a Power Control System is used to prevent overloading of branch-circuit conductors supplying both continuous and noncontinuous loads per Section 120.7, the minimum branch-circuit conductor size shall have an ampacity not less than 125 percent of the PCS current setpoint.

Where a Power Control System is used to prevent overloading of branch-circuit conductors supplying only noncontinuous loads per Section 120.7, the minimum branch-circuit conductor size shall have an ampacity not less than 100 percent of the PCS current setpoint.

(2) The minimum branch-circuit conductor size shall have an ampacity not less than the maximum load to be served after the application of any adjustment or correction factors in accordance with 310.15.

Exception to (1) and (2): Where a portion of a branch circuit is connected at both its supply and load ends to separately installed pressure connections as covered in 110.14(C)(2), an allowable ampacity in accordance with 310.15 not less than the sum of the continuous load plus the noncontinuous load shall be permitted. No portion of a branch circuit installed under this exception shall extend into an enclosure containing either the branch-circuit supply or the branch-circuit load terminations.

Statement of Problem and Substantiation for Public Comment

This addition is necessitated by the First Draft's removal of continuous load considerations from the load calculation language (formerly Article 220, now Article 120). As continuous load factors are now addressed as part of conductor sizing, this language needs to be updated to reflect the use of EMS with PCS in lieu of traditional load calculation to determine conductor ampacity requirements. These changes explicitly enable EMS with PCS to be used to avoid upsizing conductors while also ensuring that service conductors controlled by a PCS and supplying continuous loads are properly sized. Without this revision, the existing rule (conductor ampacity must equal or exceed 100 of continuous loads plus 125% of noncontinuous loads) cannot be sensibly applied to situations where the PCS current setpoint is used in place of a traditional load calculation per 120.7. In cases where no continuous loads are being controlled or monitored by the PCS, there is no continuous load thermal concern and the conductor does not need an ampacity greater than the current setpoint of the PCS.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1950-NFPA 70-2024 [Section No. 120.7(B)]	linked concept
Public Comment No. 1961-NFPA 70-2024 [Section No. 215.4(A)(1)]	linked concept
Public Comment No. 1970-NFPA 70-2024 [Section No. 230.42(A)(1)]	linked concept
Public Comment No. 1950-NFPA 70-2024 [Section No. 120.7(B)]	
Public Comment No. 1961-NFPA 70-2024 [Section No. 215.4(A)(1)]	
Public Comment No. 1970-NFPA 70-2024 [Section No. 230.42(A)(1)]	

Related Item

- FR-8184

Submitter Information Verification

Submitter Full Name: Jeff Nicholson
Organization: Lumin
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 12:49:00 EDT 2024
Committee: NEC-P02

Public Comment No. 470-NFPA 70-2024 [Section No. 210.20(C)]

(C) Equipment.

The rating or setting of the branch-circuit OCPD shall not exceed that specified in the applicable articles for equipment.

Additional Proposed Changes

File Name	Description	Approved
CN_117.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 117 appeared in the First Draft Report on First Revision No. 8024.

The Correlating Committee directs CMP-2 to reconsider 210.20(C) because the previous section and Table 240.3 were deleted by CMP-10.

Related Item

• First Revision No. 8024

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:20:12 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 117-NFPA 70-2024 [Section No. 210.20(C)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:30:32 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-2 to reconsider 210.20(C) because the previous section and Table 240.3 were deleted by CMP-10.

First Revision No. 8024-NFPA 70-2024 [Section No. 210.20 [Excluding any Sub-Sections]]

Ballot Results

This item has passed ballot

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

Not Returned

McDaniel, Roger D.

Affirmative All

Ayer, Lawrence S.

Hickman, Palmer L.

Holub, Richard A.

Jackson, Peter D.

Kendall, David H.

Manche, Alan

Porter, Christine T.

Schultheis, Timothy James

Williams, David A.

Negative with Comment

Bowmer, Trevor N.

The correction has already been made in Terra. The reference to Table 240.3 has already been removed.

Osborne, Robert D.

It appears that the reference to Table 240.3 has already been removed; therefore, the CC Note is unnecessary.

Public Comment No. 134-NFPA 70-2024 [Section No. 210.21(B)(1)]

(1) Single Receptacle on an Individual Branch Circuit.

A single receptacle installed on an individual branch circuit shall have an ampere rating ~~not less than~~ equal to that of the branch circuit.

Exception No. 1: A receptacle installed in accordance with 430.81(B).

Exception No. 2: A receptacle installed exclusively for the use of a cord-and-plug-connected arc welder shall be permitted to have an ampere rating not less than the minimum branch-circuit conductor ampacity determined by 630.11(A) for arc welders.

Informational Note: See Article 100 for the definition of *receptacle*.

Statement of Problem and Substantiation for Public Comment

There is belief that higher ampacity rated receptacles equate to a safer or more "industrial" version. The current code language permits larger receptacles than the branch circuit over protection device. For instance, you can install a 14-50 receptacle on a 20-amp branch circuit with 12 AWG wiring. The 14-50R creates the apperance of a 50-amp circuit and leads to the end user thinking it is safe to connect a load that takes a 14-50P cord to the receptacle.

On a single receptacle circuit, this is simply unnecessary and creates a safety issue of repeately overloading the wiring or worse (overcurrent protection device fails to trip or the end user swaps out the breaker for a larger size one - thinking they have a larger circuit).

The code should match the receptacle rating to that of the branch circuit so that the receptacle itself is physically incapable of accepting a plug larger than the rating of the circuit.

Related Item

• Safety

Submitter Information Verification

Submitter Full Name: James Kerins
Organization: James Kerins
Street Address:
City:
State:
Zip:

Submittal Date: Sun Jul 21 19:33:37 EDT 2024
Committee: NEC-P02

Public Comment No. 2026-NFPA 70-2024 [Section No. 210.21(B)(3)]

(3) Receptacle Ratings.

Where connected to a branch circuit supplying two or more receptacles or outlets, receptacle ratings shall ~~not be less than~~ conform to the values listed in Table 210.21(B)(3), or, where rated higher than 50 amperes, the receptacle rating shall not be less than the branch-circuit rating.

Exception No. 1: Receptacles installed exclusively for the use of cord-and-plug-connected arc welders shall be permitted to have ampere ratings not less than the minimum branch-circuit conductor ampacity determined by 630.11(A) or 630.11(B) for arc welders.

Exception No. 2: The ampere rating of a receptacle installed for electric discharge lighting shall be permitted to be based on 410.62(C).

Table 210.21(B)(3) Receptacle Ratings for Circuits Serving More Than One Receptacle or Receptacle Outlet

Circuit Rating (Amperes)	Receptacle Rating (Amperes)
15	15
20	15 or 20
30	30
40	40 or 50
50	50

Statement of Problem and Substantiation for Public Comment

This section was revised in the 2023 edition. It now allows the possibility of installing 20-amp rated receptacles on 15-amp circuits. The purpose of the configuration of 20-amp receptacles is to restrict their use to circuits capable of supplying the load that necessitated the use of a 20-amp attachment plug, such as some portable air conditioners.

Related Item

• PI 2459

Submitter Information Verification

Submitter Full Name: Douglas Hansen
Organization: Code Check
Affiliation: Self
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 16:11:54 EDT 2024
Committee: NEC-P02

Public Comment No. 184-NFPA 70-2024 [Section No. 210.22]

210.22 Permissible Loads, Individual Branch Circuits.

An individual branch circuit shall be permitted to supply any load for which it is rated, but in no case shall the load exceed the branch-circuit ampere rating.

Exception: A 10-ampere individual branch circuit shall not be permitted to supply a 125-Volt through 250-Volt receptacle outlet rated 15-Ampere and larger .

Statement of Problem and Substantiation for Public Comment

This change recognizes that there are some receptacles that could be applied on a 10-Ampere rated branch circuit but yet are prohibited by the existing language. A wiring device that is limited to only supply class 2 power through a USB type interface is a "receptacle." This suggested language change will ensure the prohibition only applies to those types of receptacles that CMP-2 discussed. The concern that was expressed by the CMP was placing a 15-Ampere or 20-Ampere 125-Volt receptacle on a 10-Ampere circuit leading to overload and finally tripping of the overcurrent protective device at the origin of the branch circuit. This proposed language would not impact the concern yet permit a valid technology to be applied.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 232-NFPA 70-2024 [Section No. 210.24]	

Related Item

- FR 7635

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
Organization: Eaton Corporation
Street Address:
City:
State:
Zip:

Submittal Date: Tue Jul 23 15:12:52 EDT 2024
Committee: NEC-P02

Public Comment No. 471-NFPA 70-2024 [Section No. 210.22]

210.22 Permissible Loads, Individual Branch Circuits.

An individual branch circuit shall be permitted to supply any load for which it is rated, but in no case shall the load exceed the branch-circuit ampere rating.

Exception: A 10-ampere individual branch circuit shall not be permitted to supply a receptacle outlet.

Additional Proposed Changes

File Name	Description	Approved
CN_118.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 118 appeared in the First Draft Report on First Revision No. 7635.

The Correlating Committee directs CMP 2 to consider the following revision for clarity: “An individual branch circuit shall be permitted to supply any load for which itis rated”.

The Correlating Committee also directs CMP 2 to reconsider the wording in the exception to be concise and to comply with the NEC Style Manual 3.5.3 for the use of plural terms.

Related Item

• First Revision No. 7635

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:22:16 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 118-NFPA 70-2024 [Section No. 210.22]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:32:08 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 2 to consider the following revision for clarity: “An individual branch circuit shall be permitted to supply any load for which it is rated”.

The Correlating Committee also directs CMP 2 to reconsider the wording in the exception to be concise and to comply with the NEC Style Manual 3.5.3 for the use of plural terms.

First Revision No. 7635-NFPA 70-2024 [Section No. 210.22]

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. 472-NFPA 70-2024 [Section No. 210.23]

210.23 Permissible Loads, Multiple-Outlet Branch Circuits.

In no case shall the load exceed the branch-circuit ampere rating. A branch circuit supplying two or more outlets or receptacles shall supply only the loads specified according to its size in accordance with 210.23(A) through 210.23(E) and as summarized in 210.24.

(A) 10-Ampere Branch Circuits.

10-ampere branch circuits shall be limited to supply any of the following:

(1) Lighting outlets

(2) Dwelling unit exhaust fans on bathroom and laundry room lighting circuits

(B) 15- and 20-Ampere Branch Circuits.

A 15- or 20-ampere branch circuit shall be permitted to supply lighting outlets, lighting units, or other utilization equipment, or any combination of them, and shall comply with 210.23(B)(1) and 210.23(B)(2).

Exception: The small-appliance branch circuits, laundry branch circuits, and bathroom branch circuits required in a dwelling unit(s) by 210.11(C)(1), 210.11(C)(2), and 210.11(C)(3) shall supply only the receptacle outlets specified in that section.

(1) Cord-and-Plug-Connected Equipment Not Fastened in Place.

The rating of any one cord-and-plug-connected utilization equipment not fastened in place shall not exceed 80 percent of the branch-circuit ampere rating.

(2) Utilization Equipment Fastened in Place.

The total rating of utilization equipment fastened in place, other than luminaires, shall not exceed 50 percent of the branch-circuit ampere rating where lighting units, cord-and-plug-connected utilization equipment not fastened in place, or both, are also supplied.

(C) 30-Ampere Branch Circuits.

A 30-ampere branch circuit shall be permitted to supply fixed lighting units with heavy-duty lampholders in other than a dwelling unit(s) or utilization equipment in any occupancy. The rating of any one cord-and-plug-connected utilization equipment shall not exceed 80 percent of the branch-circuit ampere rating.

(D) 40- and 50-Ampere Branch Circuits.

A 40- or 50-ampere branch circuit shall be permitted to supply cooking appliances that are fastened in place in any occupancy. In other than dwelling units, such circuits shall be permitted to supply fixed lighting units with heavy-duty lampholders, infrared heating units, or other utilization equipment.

(E) Branch Circuits Larger Than 50 Amperes.

Branch circuits larger than 50 amperes shall supply only nonlighting outlet loads.

Additional Proposed Changes

File Name	Description	Approved
CN_119.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 119 appeared in the First Draft Report on First Revision No. 7637.

The Correlating Committee directs CMP-2 to reconsider the wording of “In no case shall” and consider the following text: “Branch circuit loads shall not exceed the branch-circuit ampere rating.”

Related Item

• First Revision No. 7637

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:24:17 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 119-NFPA 70-2024 [Section No. 210.23]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:34:06 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-2 to reconsider the wording of “In no case shall” and consider the following text: “Branch circuit loads shall not exceed the branch-circuit ampere rating.”

FR-7637-NFPA 70-2024

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. 185-NFPA 70-2024 [Section No. 210.23(A)]

(A) 10-Ampere Branch Circuits.

10-ampere branch circuits shall be limited to supply any of the following:

(1) Lighting outlets

(2) Dwelling unit exhaust fans on bathroom and laundry room lighting circuits

(3) Receptacles that exclusively supply Class-2 power

Statement of Problem and Substantiation for Public Comment

This change recognizes that there are some receptacles that could be applied on a 10-Ampere rated branch circuit but yet are prohibited by the existing language. A wiring device that is limited to only supply class 2 power through a USB type interface is a "receptacle." This suggested language change will ensure the prohibition only applies to those types of receptacles that CMP-2 discussed. The concern that was expressed by the CMP was placing a 15-Ampere or 20-Ampere 125-Volt receptacle on a 10-Ampere circuit leading to overload and finally tripping of the overcurrent protective device at the origin of the branch circuit. This proposed language would not impact the concern yet permit a valid technology to be applied.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 232-NFPA 70-2024 [Section No. 210.24]	

Related Item

• FR 7637

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
Organization: Eaton Corporation
Street Address:
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Zip:

Submittal Date: Tue Jul 23 15:15:05 EDT 2024
Committee: NEC-P02

Public Comment No. 232-NFPA 70-2024 [Section No. 210.24]

210.24 Branch-Circuit Requirements — Summary.

The requirements for circuits that have two or more outlets or receptacles, other than the receptacle circuits of 210.11(C)(1), 210.11(C)(2), and 210.11(C)(3), are summarized in Table 210.24(1) for copper conductors and Table 210.24(2) for aluminum and copper-clad aluminum conductors. Table 210.24(1) and Table 210.24(2) provide only a summary of minimum requirements. See 210.19, 210.20, and 210.21 for the specific requirements applying to branch circuits.

Table 210.24(1) Summary of Branch-Circuit Requirements — Copper Conductors

Circuit Rating	10 A	15 A	20 A	30 A	40 A	50 A
Conductors (min. size):	-	-	-	-	-	-
Circuit wires	14	14	12	10	8	6
Taps	14	14	14	14	12	12
Fixture wires and cords			See 240.5.	-	-	-
Overcurrent Protection	**10 A**	**15 A**	**20 A**	**30 A**	**40 A**	**50 A**
Outlet devices:	-	-	-	-	-	-
Lampholders permitted	Any type	Any type	Any type	Heavy duty	Heavy duty	Heavy duty
Receptacle rating[1]	Not applicable[2]	15 max. A	15 A or 20 A	30 A	40 A or 50 A	50 A
Maximum Load	**10 A**	**15 A**	**20 A**	**30 A**	**40 A**	**50 A**
Permissible load	See 210.23(A).	See 210.23(B).	See 210.23(B).	See 210.23(C).	See 210.23(D).	See 210.23(D).

[1]For receptacle rating of cord-connected electric-discharge luminaires, see 410.62(C).

[2]Branch circuits rated 10-amperes shall not supply 125-Volt through 250-Volt receptacle outlets rated 15-Amperes and larger .

Table 210.24(2) Summary of Branch-Circuit Requirements — Aluminum and Copper-Clad Aluminum Conductors

Circuit Rating	10 A	15 A	20 A	30 A	40 A	50 A	
Conductors (min. size):	-	-	-	-	-	-	
Circuit wires	12	12	10	8	6	4	
Taps	12	12	12	12	10	10	
Fixture wires and cords	-	-	-				See 240.5. - -
Overcurrent Protection	**10 A**	**15 A**	**20 A**	**30 A**	**40 A**	**50 A**	
Outlet devices:	-	-	-	-	-	-	
Lampholders permitted	Any type	Any type	Any type	Heavy duty	Heavy duty	Heavy duty	
Receptacle rating[1]	Not applicable[2]	15 max. A	15 A or 20 A	30 A	40 A or 50 A	50 A	
Maximum Load	**10 A**	**15 A**	**20 A**	**30 A**	**40 A**	**50 A**	
Permissible load	See 210.23(A).	See 210.23(B).	See 210.23(B).	See 210.23(C).	See 210.23(D).	See 210.23(D).	

[1]For receptacle rating of cord-connected electric-discharge luminaires, see 410.62(C).

[2]Branch circuits rated 10-amperes shall not supply 125-Volt through 250-Volt receptacle outlets rated 15-Amperes and larger .

Statement of Problem and Substantiation for Public Comment

This change recognizes that there are some receptacles that could be applied on a 10-Ampere rated branch circuit but yet are prohibited by the existing language. A wiring device that is limited to only supply class 2 power through a USB type interface is a "receptacle." This suggested language change will ensure the prohibition only applies to those types of receptacles that CMP-2 discussed. The concern that was expressed by the CMP was placing a 15-Ampere or 20-Ampere 125-Volt receptacle on a 10-Ampere circuit leading to overload and finally tripping of the overcurrent protective device at the origin of the branch circuit. This proposed language would not impact the concern yet permit a valid technology to be applied.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 184-NFPA 70-2024 [Section No. 210.22]	
Public Comment No. 185-NFPA 70-2024 [Section No. 210.23(A)]	
Public Comment No. 135-NFPA 70-2024 [Section No. 210.52(A)(2)]	

Related Item

• FR 8192

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
Organization: Eaton Corporation
Street Address:
City:
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Zip:

Submittal Date: Wed Jul 24 14:12:20 EDT 2024
Committee: NEC-P02

Public Comment No. 473-NFPA 70-2024 [Section No. 210.24]

210.24 Branch-Circuit Requirements — Summary.

The requirements for circuits that have two or more outlets or receptacles, other than the receptacle circuits of 210.11(C)(1), 210.11(C)(2), and 210.11(C)(3), are summarized in Table 210.24(1) for copper conductors and Table 210.24(2) for aluminum and copper-clad aluminum conductors. Table 210.24(1) and Table 210.24(2) provide only a summary of minimum requirements. See 210.19, 210.20, and 210.21 for the specific requirements applying to branch circuits.

Table 210.24(1) Summary of Branch-Circuit Requirements — Copper Conductors

Circuit Rating	10 A	15 A	20 A	30 A	40 A	50 A
Conductors (min. size):						
Circuit wires	14	14	12	10	8	6
Taps	14	14	14	14	12	12
Fixture wires and cords			See 240.5.			
Overcurrent Protection	**10 A**	**15 A**	**20 A**	**30 A**	**40 A**	**50 A**
Outlet devices:						
Lampholders permitted	Any type	Any type	Any type	Heavy duty	Heavy duty	Heavy duty
Receptacle rating[1]	Not applicable[2]	15 max. A	15 A or 20 A	30 A	40 A or 50 A	50 A
Maximum Load	**10 A**	**15 A**	**20 A**	**30 A**	**40 A**	**50 A**
Permissible load	See 210.23(A).	See 210.23(B).	See 210.23(B).	See 210.23(C).	See 210.23(D).	See 210.23(D).

[1]For receptacle rating of cord-connected electric-discharge luminaires, see 410.62(C).

[2]Branch circuits rated 10-amperes shall not supply receptacle outlets.

Table 210.24(2) Summary of Branch-Circuit Requirements — Aluminum and Copper-Clad Aluminum Conductors

Circuit Rating	10 A	15 A	20 A	30 A	40 A	50 A
Conductors (min. size):						
Circuit wires	12	12	10	8	6	4
Taps	12	12	12	12	10	10
Fixture wires and cords				See 240.5.		
Overcurrent Protection	**10 A**	**15 A**	**20 A**	**30 A**	**40 A**	**50 A**
Outlet devices:						
Lampholders permitted	Any type	Any type	Any type	Heavy duty	Heavy duty	Heavy duty
Receptacle rating[1]	Not applicable[2]	15 max. A	15 A or 20 A	30 A	40 A or 50 A	50 A
Maximum Load	**10 A**	**15 A**	**20 A**	**30 A**	**40 A**	**50 A**
Permissible load	See 210.23(A).	See 210.23(B).	See 210.23(B).	See 210.23(C).	See 210.23(D).	See 210.23(D).

[1]For receptacle rating of cord-connected electric-discharge luminaires, see 410.62(C).

[2]Branch circuits rated 10-amperes shall not supply receptacle outlets.

Additional Proposed Changes

File Name	Description	Approved
CN_120.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 120 appeared in the First Draft Report on First Revision No. 8257.

The Correlating Committee directs CMP 2 to correlate the minimum wire size for 10 ampere branch circuits in Tables 210.24(1) and (2) based on the CMP 6 revisions to Table 310.16.

Related Item

• First Revision No. 8257

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:25:53 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 120-NFPA 70-2024 [Section No. 210.24]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:38:25 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 2 to correlate the minimum wire size for 10 ampere branch circuits in Tables 210.24(1) and (2) based on the CMP 6 revisions to Table 310.16.

First Revision No. 8257-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. 474-NFPA 70-2024 [Section No. 210.50]

210.50 Receptacle Outlets.

Receptacle outlets shall be installed as specified in 210.52 through 210.65.

Informational Note: See Informative Annex J for information regarding ADA accessibility design.

(A) Cord Pendants.

A cord connector that is supplied by a permanently connected cord pendant shall be considered a receptacle outlet.

(B) Cord Connections.

A receptacle outlet shall be installed wherever flexible cords with attachment plugs are used. Where flexible cords are permitted to be permanently connected, receptacles shall be permitted to be omitted for such cords.

(C) Appliance Receptacle Outlets.

Appliance receptacle outlets installed in a dwelling unit for specific appliances, such as laundry equipment, shall be installed within 1.8 m (6 ft) of the intended location of the appliance.

Additional Proposed Changes

File Name	Description	Approved
CN_121.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 121 appeared in the First Draft Report on First Revision No. 8898.

The Correlating Committee directs CMP-2 to review the action for correlation with the Informational Note in 210.50 on Informative Annex J, because the annex text was deleted by CMP-1.

Related Item

- First Revision No. 8898

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:27:17 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 121-NFPA 70-2024 [Section No. 210.50]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:40:23 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-2 to review the action for correlation with the Informational Note in 210.50 on Informative Annex J, because the annex text was deleted by CMP-1.

First Revision No. 8898-NFPA 70-2024 [Annex J]

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. 16-NFPA 70-2024 [Section No. 210.50 [Excluding any Sub-Sections]]

Receptacle outlets shall be installed as specified in 210.52 through 210.65.

~~Informational Note:~~ ~~See Informative Annex J~~ See ICC A117.1-2017, Accessible and Usable Buildings and Facilities, for information regarding ~~ADA~~ accessibility ~~design~~ for people with disabilities .

Statement of Problem and Substantiation for Public Comment

The NFPA Disability Access Review and Advisory Committee (DARAC) requests an update to this section. Annex J is proposed to be removed (See FR 8898 for explanation).

This Informational note points readers to up-to-date guidance and information regarding accessible design. Omitting direct reference to “ADA” will clarify that the code official enforces the accessibility requirements of the applicable code, not the Americans with Disabilities Act (ADA). The ADA is a federal civil rights law enforced at the federal level and is not a state or local code.

Related Item

• FR8898, FR8909, PC9, PC12

Submitter Information Verification

Submitter Full Name: Jessica Hubert
Organization: Guardian Services Inc.
Affiliation: Disability Access Review Advisory Committee
Street Address:
City:
State:
Zip:

Submittal Date: Wed Jul 10 10:52:44 EDT 2024
Committee: NEC-P02

Public Comment No. 178-NFPA 70-2024 [New Section after 210.52]

210.53 USB Receptacle

A receptacle that provides class 2 power shall be installed to serve island and peninsular countertops and work surfaces in kitchens, pantries, breakfast rooms, dining rooms, and similar areas of dwelling units and shall meet the requirements of 210.53(A) and (B). This section shall be required as of January 1, 2029.

Informational Note: A USB receptacle is an example of a receptacle that provides class 2 power.

(A) Location

Receptacles required per 210.53 installed within 610 mm (24 in.) of the countertop or work surface shall be considered as serving the countertop or work surface and shall be permitted to be installed below the countertop or work surface.

(B) Branch Circuit Rating

Where the receptacle required by 210.53 is located below the countertop or work surface, the branch circuit supplying the receptacle shall be a 10 Ampere branch circuit.

Statement of Problem and Substantiation for Public Comment

1.Addresses the desire to put a receptacle on an island / peninsular
2.Fills the need to charge equipment and possibly power computers etc that do not have the same safety hazard as a cooking appliance that is cord/plug connected draping over the edge.
3.Recognizes that 210.52 does not apply to a USB receptacle so it is already permitted to be installed below the countertop. This adds clarity and will restrict that circuit to a 10A circuit when the receptacle is installed below the countertop to reduce the likelihood of future modifications.
4.If the installation uses a receptacle and meets the requirments of 210.52(C), a 15A / 20A 120V receptacle that additionally provides Class 2 power would meet the requirements found in 210.53.
5.Explain that a single yoke with 2 15A receptacles and 2 USB receptacles is a multi-receptacle, a total of 4 receptacles on the same yoke. You would not be permitted ot place a device like this below the countertop because of the requirements in 210.52(C).

Related Item

- FR 8192

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
Organization: Eaton Corporation
Street Address:
City:
State:
Zip:

Submittal Date: Tue Jul 23 14:48:16 EDT 2024
Committee: NEC-P02

Public Comment No. 1239-NFPA 70-2024 [Section No. 210.52(A)(2)]

(2) Wall Space.

As used in this section, a wall space shall include the following:

(1) Any space 600 mm (2 ft) or more in width (including space measured around corners) and unbroken along the floor line by doorways and similar openings, fireplaces, stationary appliances, and fixed cabinets that do not have countertops or similar work surfaces

(2) The space occupied by fixed panels in walls, excluding sliding panels

(3) The space afforded by fixed room dividers, such as freestanding bar-type counters or railings. Receptacle outlets beneath countertops shall not be located within 610 mm (24 in.) of the countertop or worksurface.

Statement of Problem and Substantiation for Public Comment

This is a companion comment to relocate the (First Draft) exception to 210.52(C)(1) to this location, where it makes more sense. As I indicated in the comment to that section, this text does not except out any requirements found in 210.52(C)(1) and therefore cann;t be an exception to that section because it is excepting out a rule that doesn't exist.
Also note that this comment not only moves the exception, but also revises it slightly. As it appears in the first draft, and as alluded to by the Correlating Committee, the text seems to prohibit receptacles above the countertop unless they are at least 24" above it. My revised text clarifies that only receptacles underneath the countertop should be limited by that vertical dimension.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1238-NFPA 70-2024 [Section No. 210.52(C)(1)]	
Public Comment No. 1238-NFPA 70-2024 [Section No. 210.52(C)(1)]	
Public Comment No. 1241-NFPA 70-2024 [Section No. 210.52(C)(4)]	

Related Item

• FR 8192 •

Submitter Information Verification

Submitter Full Name: Ryan Jackson
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City:
State:
Zip:
Submittal Date: Sun Aug 18 13:14:10 EDT 2024
Committee: NEC-P02

Public Comment No. 135-NFPA 70-2024 [Section No. 210.52(A)(2)]

(2) Wall Space.

As used in this section, a wall space shall include the following:

(1) Any space 600 mm (2 ft) or more in width (including space measured around corners) and unbroken along the floor line by doorways and similar openings, fireplaces,~~- stationary appliances, and~~ and fixed cabinets~~- that do not have countertops or similar work surfaces~~

(2) The space occupied by fixed panels in walls, excluding sliding panels

(3) The space afforded by fixed room dividers, such as freestanding bar-type counters or railings

Statement of Problem and Substantiation for Public Comment

This public input proposes the removal of the term "stationary appliances" due to its problematic nature. Retaining "stationary appliances" in this context could exempt locations designated for appliances like refrigerators from requiring receptacles because these spaces would not be counted as part of the required wall space. Historically, previous editions of the NEC mandated receptacles in such locations. However, no substantiation has been provided to justify the removal of this requirement.

Furthermore, this proposal also seeks to eliminate the last sentence of (1) to address unintended consequences. This sentence, when introduced, could require receptacles in areas such as kitchens, contrary to the provisions of 210.52(A)(4) which specify that receptacles for countertop and similar work surfaces under 210.52(C) do not fulfill the receptacle requirements of 210.52(A). There is insufficient substantiation to necessitate additional receptacles beyond those required by 210.52(C) for locations such as kitchens, family rooms, dining rooms, living rooms, parlors, librarys, dens, sunrooms, bedrooms, recreation rooms, or similar rooms or areas of dwelling units.

This public input might be regarded as new material. My intention is to introduce this language for discussion, as it may necessitate a Temporary Interim Amendment (TIA). At the very least, this public input will ensure the topic is considered in the next revision cycle.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 232-NFPA 70-2024 [Section No. 210.24]	

Related Item

- FR 7607

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
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Street Address:
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Zip:

Submittal Date: Mon Jul 22 06:42:52 EDT 2024
Committee: NEC-P02

Public Comment No. 48-NFPA 70-2024 [Section No. 210.52(A)(4)]

~~(4) Countertop and Similar Work Surface Receptacle Outlets.~~

~~Receptacles installed for countertop and similar work surfaces as specified in 210.52(C) shall not be considered as the receptacle outlets required by 210.52(A) .~~

Additional Proposed Changes

File Name	Description	Approved
210.52_A_and_C_.pdf	wall space receptacles	

Statement of Problem and Substantiation for Public Comment

This Public Comment is a follow up to PI 322 and 321

I respectfully disagree with the Panel's statement for PI 322 "Cabinets with countertops are not considered wall space as found in 210.52(A)(4)"

210.52(A)(2) clearly states "As used in this section, a wall space SHALL INCLUDE the following:
(1) Any space 600 mm (2 ft) or more in width (including space measured around corners) and unbroken along the floor line by doorways and similar openings, fireplaces, stationary appliances, and fixed cabinets that DO NOT HAVE countertops or similar work surfaces'

This means that wall spaces having cabinets that DO HAVE countertops or similar work surfaces are INCLUDED in the requirements to have wall receptacles installed.

But, according to 210.52(A)(4) and 210.52(C), Receptacles installed for countertop and similar work surfaces SHALL NOT be considered as the wall space receptacle outlets required by 210.52(A).

So, on a wall having cabinets WITH countertops or similar work surfaces where do we install the wall receptacles required by 210.52(A)? On the floor as permitted by 210.52(A)(3)? This would not work because most cabinets are 24" deep and would mean floor receptacles would be too far from wall to satisfy 210.52(A)(3). Cord drops as permitted by 210.50(A)? This would be impractical because cords would interfere with opening the upper cabinet doors! How about below the countertops on the face of the cabinets? Is this even permitted? Where is the wording that permits these wall spaces to be omitted from the 210.52(A) requirements? The fact is, there isn't any wording that permits these wall spaces to be omitted from this requirement!
This literally means receptacle outlets must be installed for the WALL SPACES at cabinets having countertops or work surfaces BUT the receptacle outlets installed to serve the countertops or work surfaces cannot be used to satisfy this requirements!!!!!! That is quite the conundrum!

Here is a very simple solution to this conundrum. If 210.52(A)(4) is deleted and 210.52(C) revised as proposed, then the countertop receptacle outlets can also be used to satisfy the requirement for wall space receptacle outlets. Problem solved!

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 46-NFPA 70-2024 [Section No. 210.52(C) [Excluding any Sub-Sections]]	wall spaces at cabinets with work surfaces or countertops
Public Comment No. 46-NFPA 70-2024 [Section No. 210.52(C) [Excluding any Sub-Sections]]	

Related Item

- PI 321

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: LeBlanc Consulting Services
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City:
State:
Zip:

Submittal Date: Fri Jul 12 07:47:12 EDT 2024
Committee: NEC-P02

Public Comment No. 1348-NFPA 70-2024 [Section No. 210.52(C)]

(C) Countertops and Work Surfaces.

In kitchens, pantries, breakfast rooms, dining rooms, and similar areas of dwelling units, receptacle outlets for countertop and work surfaces that are 300 mm (12 in.) or wider shall be installed in accordance with 210.52(C)(1) through 210.52(C)(3) and shall not be considered as the receptacle outlets required by 210.52(A).

For the purposes of this section, where using multioutlet assemblies, each 300 mm (12 in.) of multioutlet assembly containing two or more receptacles installed in individual or continuous lengths shall be considered to be one receptacle outlet.

(1) Wall Spaces.

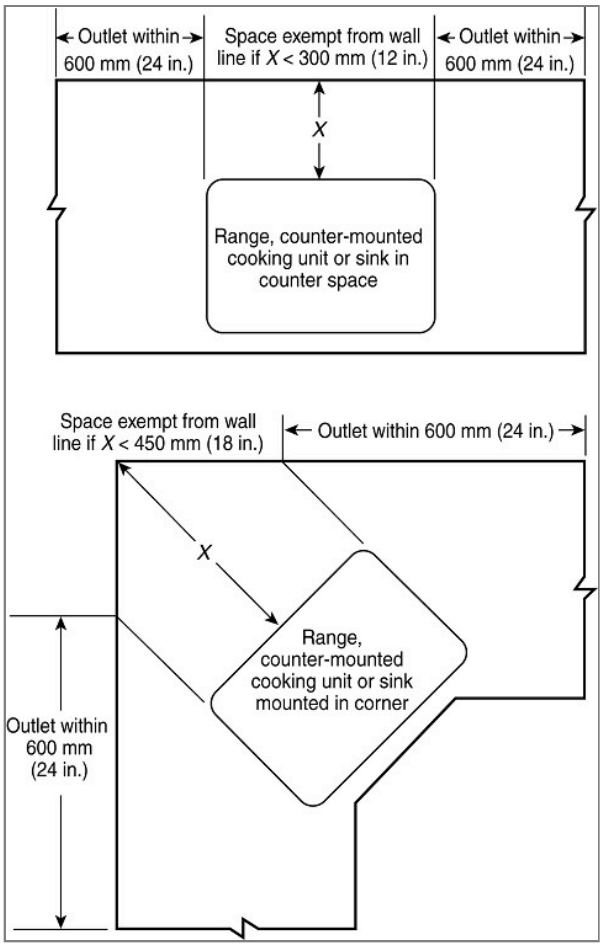
Receptacle outlets shall be installed so that no point along the wall line is more than 600 mm (24 in.) measured horizontally from a receptacle outlet in that space. The location of the receptacles shall be in accordance with 210.52(C)(3) and (4) .

Exception No. 1: Receptacle outlets shall not be required directly behind a range, counter-mounted cooking unit, or sink in the installation described in Figure 210.52(C)(1).

Exception No. 2: Where a required receptacle outlet cannot be installed in the wall areas shown in Figure 210.52(C)(1), the receptacle outlet shall be permitted to be installed as close as practicable to the countertop area to be served. The total number of receptacle outlets serving the countertop shall not be less than the number needed to satisfy 210.52(C)(1). These outlets shall be located in accordance with 210.52(C)(3).

~~*Exception No. 3: Receptacle outlets located in the specified location in 210.52(A)(2)(3) shall not be located within 610 mm (24 in.) of the countertop or worksurface.*~~

Figure 210.52(C)(1) Determination of Area Behind a Range, Counter-Mounted Cooking Unit, or Sink.



(2) Island and Peninsular Countertops and Work Surfaces.

If provided to serve an island or peninsular countertop or work surface, receptacle outlets shall be installed in accordance with 210.52(C)(3) and 210.52(C)(4) . If a receptacle outlet is not provided to serve an island or peninsular countertop or work surface, electrical provisions shall be provided at the island or peninsula for future addition of a receptacle outlet to serve the island or peninsular countertop or work surface.

(3) Receptacle Outlet Location.

Receptacle outlets shall be located in one or more of the following:

(1) On or above, but not more than 500 mm (20 in.) above, a countertop or work surface

(2) In a countertop using receptacle outlet assemblies listed for use in countertops

(3) In a work surface using receptacle outlet assemblies listed for use in work surfaces or listed for use in countertops

Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, sinks, or rangetops as covered in 210.52(C)(1) Exception No. 1 or appliances occupying assigned spaces shall not be considered as these required outlets.

Informational Note No. 1: See 406.14(E) for installation of receptacles in countertops and 406.14(F) for installation of receptacles in work surfaces. See 380.10 for installation of multioutlet assemblies.

Informational Note No. 2: See

~~Informative Annex J and ANSI/~~

ICC A117.1-2017,

~~Standard on~~

Accessible and Usable Buildings and Facilities , for

~~additional~~

information regarding accessibility for people with disabilities .

(4) Receptacle Outlet Locations Prohibited.

Required and permitted receptacle outlets

~~shall not be~~

installed on cabinet sides or wall surfaces that are below countertops and work surfaces

~~. Required and permitted receptacle outlets~~

shall comply with the following.

(1) Outlets shall not be installed on adjacent walls extending from the base cabinets within 610 mm (24 in.) horizontally

~~and downward from the countertop and work surface edge within 610 mm (24 in.) vertically~~

(1) .

(2) Outlets shall not be installed more than 500 mm (20 in.) above the floor .

Exception No. 1: *Receptacle outlets installed in a drawer shall be permitted to be installed below countertops and work surfaces.*

Exception No. 2: *Receptacle outlets located in the specified location in 210.52(A)(2) shall not be located within 610 mm (24 in.) of the countertop or worksurface.*

Additional Proposed Changes

File Name	Description	Approved
FR_8192_Public_Comment_-_Buuck-v1.1.docx		

Statement of Problem and Substantiation for Public Comment

See the attachment for a clean version of the change and for the reason statement.

Related Item

• FR 8192 • FR 8898

Submitter Information Verification

Submitter Full Name: Daniel Buuck
Organization: National Association of Home Builders
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 21 08:13:41 EDT 2024
Committee: NEC-P02

210.52(C) Countertops and Work Surfaces.

For the purposes of this section, where using multioutlet assemblies, each 300 mm (12 in.) of multioutlet assembly containing two or more receptacles installed in individual or continuous lengths shall be considered to be one receptacle outlet.

(1) Wall Spaces.

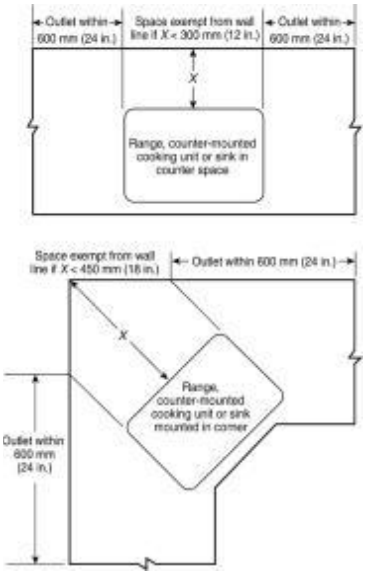
Receptacle outlets shall be installed so that no point along the wall line is more than 600 mm (24 in.) measured horizontally from a receptacle outlet in that space. The location of the receptacles shall be in accordance with 210.52(C)(3) and (4).

Exception No. 1: Receptacle outlets shall not be required directly behind a range, counter-mounted cooking unit, or sink in the installation described in Figure 210.52(C)(1).

Exception No. 2: Where a required receptacle outlet cannot be installed in the wall areas shown in Figure 210.52(C)(1), the receptacle outlet shall be permitted to be installed as close as practicable to the countertop area to be served. The total number of receptacle outlets serving the countertop shall not be less than the number needed to satisfy 210.52(C)(1). These outlets shall be located in accordance with 210.52(C)(3).

~~*Exception No. 3: Receptacle outlets located in the specified location in 210.52(A)(2)(3) shall not be located within 610 mm (24 in.) of the countertop or worksurface.*~~

Figure 210.52(C)(1) Determination of Area Behind a Range, Counter-Mounted Cooking Unit, or Sink.



(2) Island and Peninsular Countertops and Work Surfaces.

If provided to serve an island or peninsular countertop or work surface, receptacle outlets shall be installed in accordance with 210.52(C)(3) and (4). If a receptacle outlet is not provided to serve an island or peninsular countertop or work surface, electrical provisions shall be provided at the island or peninsula for future addition of a receptacle outlet to serve the island or peninsular countertop or work surface.

(3) Receptacle Outlet Location.

Receptacle outlets shall be located in one or more of the following:

(1) On or above, but not more than 500 mm (20 in.) above, a countertop or work surface

(2) In a countertop using receptacle outlet assemblies listed for use in countertops
(3) In a work surface using receptacle outlet assemblies listed for use in work surfaces or listed for use in countertops

Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, sinks, or rangetops as covered in 210.52(C)(1), Exception No. 1, or appliances occupying assigned spaces shall not be considered as these required outlets.

Informational Note No. 1: See 406.5(E) for installation of receptacles in countertops and 406.5(F) for installation of receptacles in work surfaces. See 380.10 for installation of multioutlet assemblies.

Informational Note No. 2: See ~~Informative Annex J and ANSI/~~ICC A117.1-2017, ~~*Standard on*~~ *Accessible and Usable Buildings and Facilities*, for ~~additional~~ information regarding accessibility for people with disabilities.

(4) Receptacle Outlet Locations Prohibited.

Required and permitted receptacle outlets ~~shall not be~~ installed on cabinet sides or wall surfaces that are below countertops and work surfaces shall comply with the following.

(1) ~~Required and permitted receptacle outlets~~ Outlets ~~shall~~ not be installed on adjacent walls extending from the base cabinets within 610 mm (24 in.) horizontally. ~~and downward from the countertop and work surface edge within 610 mm (24 in.) vertically~~
(2) Outlets shall not be installed more than 500 mm (20 in.) above the floor.

Exception No. 1: Receptacle outlets installed in a drawer shall be permitted to be installed below countertops and work surfaces.

Exception No. 2: Receptacle outlets located in the specified location in 210.52(A)(2)(3) shall not be located within 610 mm (24 in.) of the countertop or worksurface.

Reason:

The language in Exception No. 3 under 210.52(C)(1) and 210.52(C)(4) conflict with accessibility requirements in ICC A117.1 as well as federal accessibility standards. Requiring receptacle outlets to be at least 24 in. below the countertop or work surface places them outside the reach range for accessibility for a standard 36-inch counter height. (See the figures below from A117.1.) Since receptacles are required under a counter that creates wall space (see 210.52(A)(2), Item (3)), this will cause irreconcilable conflicts in the field between this code and federal law if not changed.

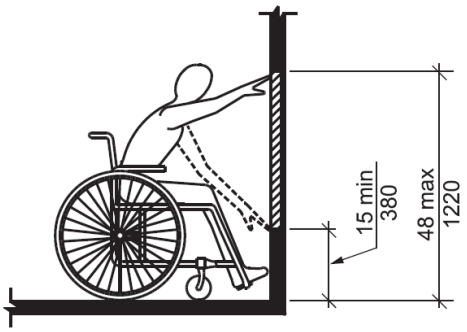


FIGURE 308.2.1
UNOBSTRUCTED FORWARD REACH

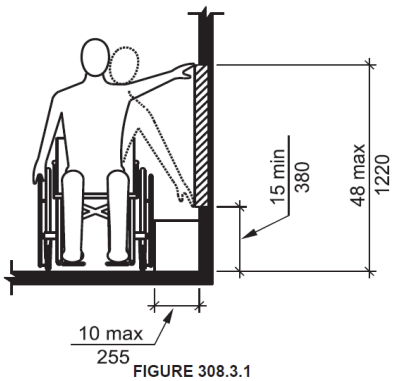


FIGURE 308.3.1
UNOBSTRUCTED SIDE REACH

The height of 20 inches above the floor was chosen to allow for a 5-inch dimension where a duplex receptacle can be installed. This is a small area for compliant installation considering construction tolerances and possible material changes.

A pointer to (4) was added under 210.52(C)(1) which eliminates the need for Exception No. 3 under that section.

210.52(C)(4) was modified to fix the apparent conflict between the first and second sentences. The format of the section was changed for ease of use.

Informational Note No. 2 under 210.52(C)(3) was changed to match the draft PC from the NFPA Disability Access Review and Advisory Committee (DARAC). Annex J was deleted by CMP-1 (See FR 8898), so this language needs to be updated.

The NFPA Disability Access Review Advisory Committee (DARAC: www.nfpa.org/darac) has reviewed this proposal, and by letter ballot, concurs with the technical changes and the substantiation provided.

Public Comment No. 475-NFPA 70-2024 [Section No. 210.52(C)]

(C) Countertops and Work Surfaces.

In kitchens, pantries, breakfast rooms, dining rooms, and similar areas of dwelling units, receptacle outlets for countertop and work surfaces that are 300 mm (12 in.) or wider shall be installed in accordance with 210.52(C)(1) through 210.52(C)(3) and shall not be considered as the receptacle outlets required by 210.52(A).

For the purposes of this section, where using multioutlet assemblies, each 300 mm (12 in.) of multioutlet assembly containing two or more receptacles installed in individual or continuous lengths shall be considered to be one receptacle outlet.

(1) Wall Spaces.

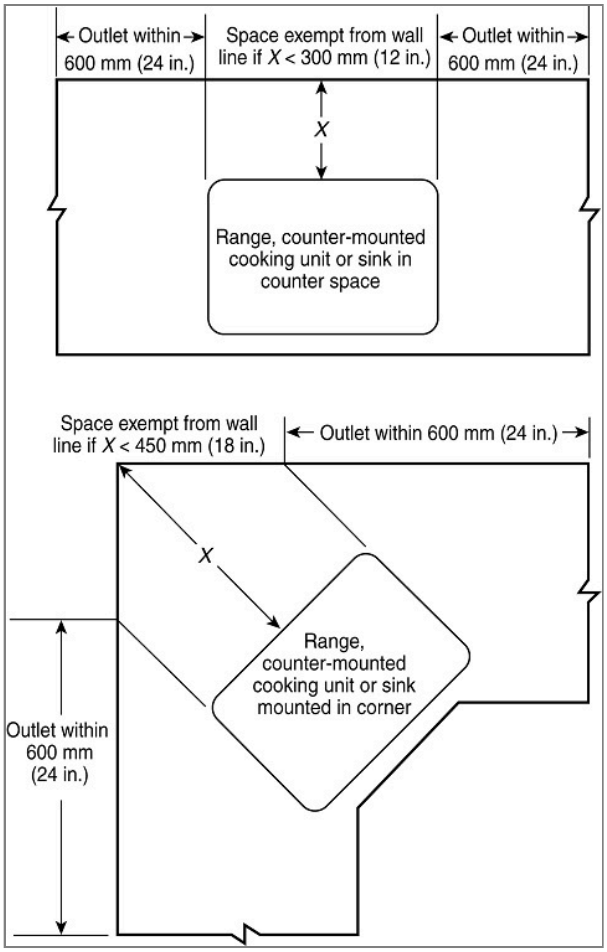
Receptacle outlets shall be installed so that no point along the wall line is more than 600 mm (24 in.) measured horizontally from a receptacle outlet in that space. The location of the receptacles shall be in accordance with 210.52(C)(3).

Exception No. 1: Receptacle outlets shall not be required directly behind a range, counter-mounted cooking unit, or sink in the installation described in Figure 210.52(C)(1).

Exception No. 2: Where a required receptacle outlet cannot be installed in the wall areas shown in Figure 210.52(C)(1), the receptacle outlet shall be permitted to be installed as close as practicable to the countertop area to be served. The total number of receptacle outlets serving the countertop shall not be less than the number needed to satisfy 210.52(C)(1). These outlets shall be located in accordance with 210.52(C)(3).

Exception No. 3: Receptacle outlets located in the specified location in 210.52(A)(2)(3) shall not be located within 610 mm (24 in.) of the countertop or worksurface.

Figure 210.52(C)(1) Determination of Area Behind a Range, Counter-Mounted Cooking Unit, or Sink.



(2) Island and Peninsular Countertops and Work Surfaces.

If provided to serve an island or peninsular countertop or work surface, receptacle outlets shall be installed in accordance with 210.52(C)(3) and 210.52(C)(4). If a receptacle outlet is not provided to serve an island or peninsular countertop or work surface, electrical provisions shall be provided at the island or peninsula for future addition of a receptacle outlet to serve the island or peninsular countertop or work surface.

(3) Receptacle Outlet Location.

Receptacle outlets shall be located in one or more of the following:

(1) On or above, but not more than 500 mm (20 in.) above, a countertop or work surface

(2) In a countertop using receptacle outlet assemblies listed for use in countertops

(3) In a work surface using receptacle outlet assemblies listed for use in work surfaces or listed for use in countertops

Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, sinks, or rangetops as covered in 210.52(C)(1) Exception No. 1 or appliances occupying assigned spaces shall not be considered as these required outlets.

Informational Note No. 1: See 406.14(E) for installation of receptacles in countertops and 406.14(F) for installation of receptacles in work surfaces. See 380.10 for installation of multioutlet assemblies.

Informational Note No. 2: See Informative Annex J and ANSI/ICC A117.1-2017, *Standard on Accessible and Usable Buildings and Facilities*, for additional information.

(4) Receptacle Outlet Locations Prohibited.

Required and permitted receptacle outlets shall not be installed on cabinet sides or wall surfaces that are below countertops and work surfaces. Required and permitted receptacle outlets shall not be installed on adjacent walls extending from the base cabinets within 610 mm (24 in.) horizontally and downward from the countertop and work surface edge within 610 mm (24 in.) vertically.

Exception No. 1: Receptacle outlets installed in a drawer shall be permitted to be installed below countertops and work surfaces.

Exception No. 2: Receptacle outlets located in the specified location in 210.52(A)(2) shall not be located within 610 mm (24 in.) of the countertop or worksurface.

Additional Proposed Changes

File Name	Description	Approved
CN_122.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 122 appeared in the First Draft Report on First Revision No. 8192 and First Revision No. 8898.

The Correlating Committee directs CMP 2 to review the action for correlation with the Informational Note 2 in 210.52(C)(3) on Informative Annex J as the annex text was deleted by CMP-1. The Correlating Committee also directs CMP 2 to reconsider the wording of Exception No. 2 for clarity. This exception could be interpreted to specify that a receptacle cannot be installed on the counter if it is within 24” of the counter.

Related Item

• First Revision No. 8192 • First Revision No. 8898

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:28:39 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 122-NFPA 70-2024 [Section No. 210.52(C)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:42:09 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 2 to review the action for correlation with the Informational Note 2 in 210.52(C)(3) on Informative Annex J as the annex text was deleted by CMP-1.

The Correlating Committee also directs CMP 2 to reconsider the wording of Exception No. 2 for clarity. This exception could be interpreted to specify that a receptacle cannot be installed on the counter if it is within 24” of the counter.

First Revision No. 8192-NFPA 70-2024 [Section No. 210.52(C)]

First Revision No. 8898-NFPA 70-2024 [Annex J]

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. 1238-NFPA 70-2024 [Section No. 210.52(C)(1)]

(1) Wall Spaces.

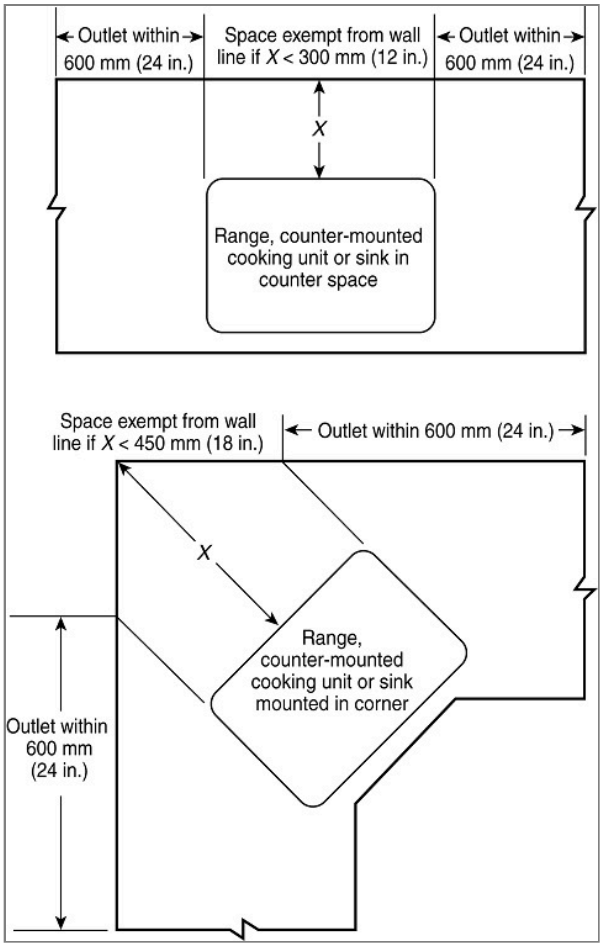
Receptacle outlets shall be installed so that no point along the wall line is more than 600 mm (24 in.) measured horizontally from a receptacle outlet in that space. The location of the receptacles shall be in accordance with 210.52(C)(3).

Exception No. 1: Receptacle outlets shall not be required directly behind a range, counter-mounted cooking unit, or sink in the installation described in Figure 210.52(C)(1).

Exception No. 2: Where a required receptacle outlet cannot be installed in the wall areas shown in Figure 210.52(C)(1), the receptacle outlet shall be permitted to be installed as close as practicable to the countertop area to be served. The total number of receptacle outlets serving the countertop shall not be less than the number needed to satisfy 210.52(C)(1). These outlets shall be located in accordance with 210.52(C)(3).

~~*Exception No. 3: Receptacle outlets located in the specified location in 210.52(A)(2)(3) shall not be located within 610 mm (24 in.) of the countertop or worksurface.*~~

Figure 210.52(C)(1) Determination of Area Behind a Range, Counter-Mounted Cooking Unit, or Sink.



Statement of Problem and Substantiation for Public Comment

This public comment seeks to relocate the exception to 210.52(A)(2)(3). The exception does not remove any requirements to section 210.52(C)(1), it specifies location requirements for 210.52(A)(2)(3). See my companion comment to that section.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1239-NFPA 70-2024 [Section No. 210.52(A)(2)]	
Public Comment No. 1239-NFPA 70-2024 [Section No. 210.52(A)(2)]	
Public Comment No. 1241-NFPA 70-2024 [Section No. 210.52(C)(4)]	

Related Item

• FR 8192

Submitter Information Verification

Submitter Full Name: Ryan Jackson

Organization:	Self-employed
Street Address:	
City:	
State:	
Zip:	
Submittal Date:	Sun Aug 18 13:11:20 EDT 2024
Committee:	NEC-P02

Public Comment No. 1992-NFPA 70-2024 [Section No. 210.52(C)(1)]

(1) Wall Spaces.

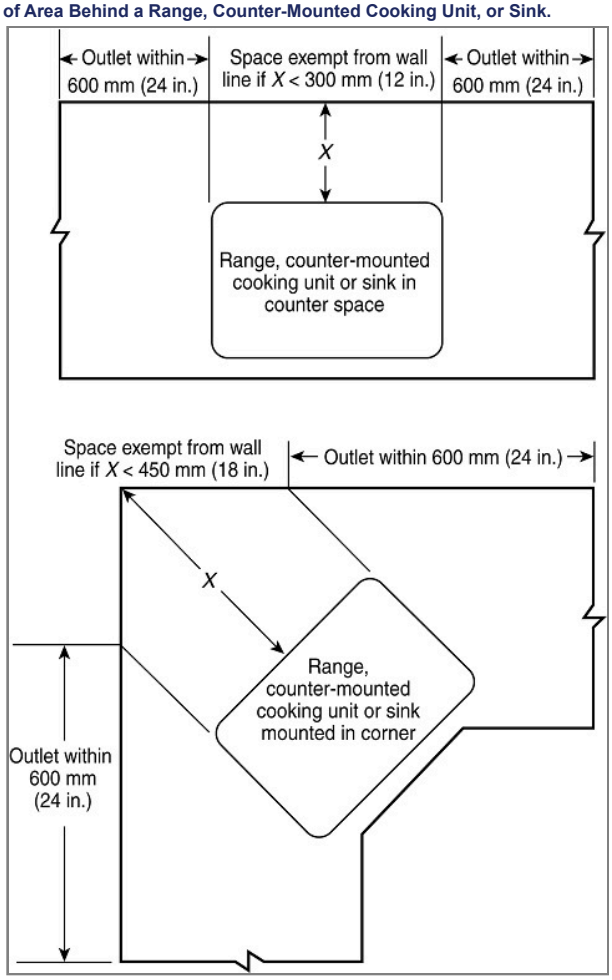
Receptacle outlets shall be installed so that no point along the wall line is more than 600 mm (24 in.) measured horizontally from a receptacle outlet in that space. The location of the receptacles shall be in accordance with 210.52(C)(3).

Exception No. 1: Receptacle outlets shall not be ~~required~~ allowed directly behind a range, counter-mounted cooking unit, or sink in the installation described in Figure 210.52(C)(1).

Exception No. 2: Where a required receptacle outlet cannot be installed in the wall areas shown in Figure 210.52(C)(1), the receptacle outlet shall be permitted to be installed as close as practicable to the countertop area to be served. The total number of receptacle outlets serving the countertop shall not be less than the number needed to satisfy 210.52(C)(1). These outlets shall be located in accordance with 210.52(C)(3).

Exception No. 3: Receptacle outlets located in the specified location in 210.52(A)(2)(3) shall not be located within 610 mm (24 in.) of the countertop or worksurface.

Figure 210.52(C)(1) Determination of Area Behind a Range, Counter-Mounted Cooking Unit, or Sink.



Statement of Problem and Substantiation for Public Comment

Receptacle outlets are very commonly installed directly behind counter-mounted cooktops, especially in remodels. The reason that a wall receptacle outlet is not required when the space behind the range is less than 12 inches is because the appliance cord would of necessity travel across a burner. For this same reason, such installations should be prohibited. The addition of 210.52(C)(4) expands the scope of 210.52(C) to include areas where receptacles are prohibited.

Related Item

• PI 318 and the committee response

Submitter Information Verification

Submitter Full Name: Douglas Hansen
Organization: Code Check
Affiliation: Self
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 14:31:02 EDT 2024
Committee: NEC-P02

Public Comment No. 1912-NFPA 70-2024 [Section No. 210.52(C)(2)]

(2) Island and Peninsular Countertops and Work Surfaces.

~~If provided to~~ At least one receptacle outlet shall be installed to serve an island or peninsular countertop or work surface, receptacle outlets shall be installed in accordance with 210.52(C)(3) and 210.52(C)(4).~~ If a receptacle outlet is not provided to serve an island or peninsular countertop or work surface, electrical provisions shall be provided at the island or peninsula for future addition of a receptacle outlet to serve the island or peninsular countertop or work surface.~~

Statement of Problem and Substantiation for Public Comment

The current wording referencing “if provided” and “electrical provisions shall be provided” are an enforcement nightmare. The panel did not provide clarity on what the “provision of” would. need to include and leaves installers and AHJ’s trying to figure how to apply and enforce this provision.
Requiring at least one receptacle will provide clarity and enforceability.

Related Item

• FR 8192 • PI 1155 • PI 4408

Submitter Information Verification

Submitter Full Name: David Williams
Organization: Delta Charter Township
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 08:29:14 EDT 2024
Committee: NEC-P02

Public Comment No. 18-NFPA 70-2024 [Section No. 210.52(C)(3)]

(3) Receptacle Outlet Location.

Receptacle outlets shall be located in one or more of the following:

(1) On or above, but not more than 500 mm (20 in.) above, a countertop or work surface

(2) In a countertop using receptacle outlet assemblies listed for use in countertops

(3) In a work surface using receptacle outlet assemblies listed for use in work surfaces or listed for use in countertops

Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, sinks, or rangetops as covered in 210.52(C)(1) Exception No. 1 or appliances occupying assigned spaces shall not be considered as these required outlets.

Informational Note No. 1: See 406.14(E) for installation of receptacles in countertops and 406.14(F) for installation of receptacles in work surfaces. See 380.10 for installation of multioutlet assemblies.

Informational Note No. 2: ~~See Informative Annex J and~~ See ANSI/ICC A117.1-2017, *Standard on Accessible and Usable Buildings and Facilities*, for ~~additional~~ information regarding accessibility for people with disabilities .

Statement of Problem and Substantiation for Public Comment

The NFPA Disability Access Review and Advisory Committee (DARAC) requests an update to this section. Annex J is proposed to be removed (See FR 8898 for explanation). This Informational note points readers to up-to-date guidance and information regarding accessible design. Omitting direct reference to “ADA” will clarify that the code official enforces the accessibility requirements of the applicable code, not the Americans with Disabilities Act (ADA). The ADA is a federal civil rights law enforced at the federal level and is not a state or local code. Also, the edition of ICC A117 has been updated for consistency throughout the document.

Related Item

• FR8909, FR8898

Submitter Information Verification

Submitter Full Name: Jessica Hubert
Organization: Guardian Services Inc.
Affiliation: Disability Access Review Advisory Committee
Street Address:
City:
State:
Zip:

Submittal Date: Wed Jul 10 10:57:44 EDT 2024
Committee: NEC-P02

Public Comment No. 50-NFPA 70-2024 [Sections 210.52(C)(3), 210.52(C)(4)]

Sections 210.52(C)(3), 210.52(C)(4)

(3) Receptacle Outlet Location.

Receptacle outlets shall be located in one or more of the following:

(1) On or above, but not more than 500 mm (20 in.) above, a countertop or work surface

(2) In a countertop using receptacle outlet assemblies listed for use in countertops

(3) In a work surface using receptacle outlet assemblies listed for use in work surfaces or listed for use in countertops

Receptacle outlets rendered not readily accessible by appliances fastened in place, appliance garages, sinks, or rangetops as covered in 210.52(C)(1) Exception No. 1 or appliances occupying assigned spaces shall not be considered as these required outlets.

Informational Note No. 1: See 406.14(E) for installation of receptacles in countertops and 406.14(F) for installation of receptacles in work surfaces. See 380.10 for installation of multioutlet assemblies.

Informational Note No. 2: See Informative Annex J and ANSI/ICC A117.1-2017, *Standard on Accessible and Usable Buildings and Facilities*, for additional information.

(4) Receptacle Outlet Locations Prohibited.

Required and permitted receptacle outlets shall not be installed on cabinet sides or wall surfaces that are below countertops and work surfaces. Required and permitted receptacle outlets shall not be installed on adjacent walls extending from the base cabinets within 610 mm (24 in.) horizontally and downward from the countertop and work surface edge within 610 mm (24 in.) vertically.

Exception No. 1: Receptacle outlets installed in a drawer shall be permitted to be installed below countertops and work surfaces.

Exception No. 2: Receptacle outlets located in the specified location in 210.52(A)(2) shall not be located within 610 mm (24 in.) of the countertop or worksurface.

It is my belief that this change was extremely shortsighted. You have now created a situation where occupants are using extension cords draped across walkways because they still want that island/peninsula countertop space to be usable. Not only are they using extension cords, but logic would tell you that they are using vastly undersized cords (most likely the standard brown/white 16ga ungrounded style) and using them for things like toasters, roasters, and crock pots which all have a high wattage draw. This is just asking for more accidents, fires, and who knows what else. I strongly urge to to reconsider this change as the bad and inevitable vastly outweigh the good.

Statement of Problem and Substantiation for Public Comment

Not requiring accessible receptacles on islands and peninsulas leads to increased use of what is very likely undersized extension cords draped across walkways. Not only is this a fire/overheating hazard, but it has done nothing to solve the original intent and has actually increased the hazard of someone pulling the appliance off the countertop.

Related Item

• Island and Peninsular Receptacles

Submitter Information Verification

Submitter Full Name: Shannon Gatewood
Organization: Gatewood Superior Inspections
Street Address:
City:
State:
Zip:

Submittal Date: Fri Jul 12 10:00:22 EDT 2024
Committee: NEC-P02

Public Comment No. 1241-NFPA 70-2024 [Section No. 210.52(C)(4)]

(4) Receptacle Outlet Locations Prohibited.- ~~Required and permitted receptacle outlets shall not be installed on cabinet sides or wall surfaces that are below countertops and work surfaces. Required and permitted receptacle outlets shall not be installed on adjacent~~ walls extending from the base cabinets within 610 mm (24 in.) horizontally and downward from the countertop and work surface edge within 610 mm (24 in.) vertically.

Exception No. 1: Receptacle outlets installed in a drawer shall be permitted to be installed below countertops and work surfaces.

~~*Exception No. 2: Receptacle outlets located in the specified location in 210.52(A)(2) shall not be located within 610 mm (24 in.) of the countertop or worksurface.*~~

Additional Proposed Changes

File Name	Description	Approved
210.52_C_Work_Surfaace.jpg	Receptacles in the knee hole space should be permitted.	
210.52_A_cabinets.JPG	This is a violation of the first draft (if in a kitchen). It should not be.	

Statement of Problem and Substantiation for Public Comment

As written in the first draft, a receptacle under a sink for a disposer is a violation. So is a receptacle in the kneehole space (the space typically consumed by a chair) beneath a work surface, such as those commonly found for built-in desks. See attached photos
The concern is receptacles within 24" beneath the countertop. There is no reason to prohibit receptacles below the countertop if they are more than 24" below the top of it.
The second exception is marked for deletion because the revised language in this comment removes the need for it, and a companion comment seeks to relocte the 210.52(C)(1) exception to 210.52(A)(2).

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1238-NFPA 70-2024 [Section No. 210.52(C)(1)]	
Public Comment No. 1239-NFPA 70-2024 [Section No. 210.52(A)(2)]	
Public Comment No. 1240-NFPA 70-2024 [Part III.]	

Related Item

- FR 8192

Submitter Information Verification

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

Submittal Date: Sun Aug 18 13:34:54 EDT 2024
Committee: NEC-P02

Public Comment No. 1986-NFPA 70-2024 [Section No. 210.52(C)(4)]

~~(4) Receptacle Outlet Locations Prohibited.~~

~~Required and permitted receptacle outlets shall not be installed on cabinet sides or wall surfaces that are below countertops and work surfaces. Required and permitted receptacle outlets shall not be installed on adjacent walls extending from the base cabinets within 610 mm (24 in.) horizontally and downward from the countertop and work surface edge within 610 mm (24 in.) vertically.~~

~~*Exception No. 1: Receptacle outlets installed in a drawer shall be permitted to be installed below countertops and work surfaces.*~~

~~*Exception No. 2: Receptacle outlets located in the specified location in 210.52(A)(2) shall not be located within 610 mm (24 in.) of the countertop or worksurface.*~~

Statement of Problem and Substantiation for Public Comment

The proposed text contradicts the scoping provision of part III of article 210. A more appropriate location for this language would be in article 406, which has restrictions on locations of receptacle outlets.

Related Item

• PI 3995

Submitter Information Verification

Submitter Full Name: Douglas Hansen
Organization: Code Check
Affiliation: Self
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 14:07:34 EDT 2024
Committee: NEC-P02

Public Comment No. 173-NFPA 70-2024 [Section No. 210.52(C) [Excluding any Sub-Sections]]

In ~~kitchens, pantries, breakfast rooms, dining rooms, and similar areas of~~ dwelling units, receptacle outlets for countertop and work surfaces that are 300 mm (12 in.) or wider shall be installed in accordance with 210.52(C)(1) through 210.52(C)(3) and shall not be considered as the receptacle outlets required by 210.52(A).

For the purposes of this section, where using multioutlet assemblies, each 300 mm (12 in.) of multioutlet assembly containing two or more receptacles installed in individual or continuous lengths shall be considered to be one receptacle outlet.

Statement of Problem and Substantiation for Public Comment

There is no reason to limit this requirement to just kitchens, pantries, breakfast rooms, dining rooms, and similar areas of dwelling units. If it is a work surface our countertop a receptacle should be required for all of the same reasons we have it required in the stated locations of dwelling units. This could very well be considered new material but I am placing this on the table for discussion and to be held for next revision cycle.

Related Item

• FR 8192

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
Organization: Eaton Corporation
Street Address:
City:
State:
Zip:

Submittal Date: Tue Jul 23 14:21:28 EDT 2024
Committee: NEC-P02

Public Comment No. 46-NFPA 70-2024 [Section No. 210.52(C) [Excluding any Sub-Sections]]

In kitchens, pantries, breakfast rooms, dining rooms, and similar areas of dwelling units, receptacle outlets for countertop and work surfaces that are 300 mm (12 in.) or wider shall be installed in accordance with 210.52(C)(1) through 210.52(C)(3)~~- and shall not be considered as the receptacle outlets required by- 210 .52(A) -~~.

For the purposes of this section, where using multioutlet assemblies, each 300 mm (12 in.) of multioutlet assembly containing two or more receptacles installed in individual or continuous lengths shall be considered to be one receptacle outlet.

Additional Proposed Changes

File Name	Description	Approved
210.52_A_and_C_.pdf	Wall Receptcales	

Statement of Problem and Substantiation for Public Comment

This Public Comment is a follow up to PI 322.

I respectfully disagree with the Panel's statement "Cabinets with countertops are not considered wall space as found in 210.52(A)(4)"

210.52(A)(2) clearly states "As used in this section, a wall space SHALL INCLUDE the following:
(1) Any space 600 mm (2 ft) or more in width (including space measured around corners) and unbroken along the floor line by doorways and similar openings, fireplaces, stationary appliances, and fixed cabinets that DO NOT HAVE countertops or similar work surfaces'

This means that wall spaces having cabinets that DO HAVE countertops or similar work surfaces are INCLUDED in the requirements to have wall receptacles installed!

But, according to 210.52(A)(4) and 210.52(C), Receptacles installed for countertop and similar work surfaces SHALL NOT be considered as the wall space receptacle outlets required by 210.52(A).

So, on a wall having cabinets WITH countertops or similar work surfaces where do we install the wall receptacles required by 210.52(A)? On the floor as permitted by 210.52(A)(3)? This would not work because most cabinets are 24" deep and would mean floor receptacles would be too far from wall to satisfy 210.52(A)(3). Cord drops as permitted by 210.50(A)? This would be impractical because cords would interfere with opening the upper cabinet doors! How about below the countertops on the face of the cabinets? Is this even permitted? Where is the wording that permits these wall spaces to be omitted from the 210.52(A) requirements? The fact is, there isn't any wording that permits these wall spaces to be omitted from this requirement!
This literally means receptacle outlets must be installed for the WALL SPACES at cabinets having countertops or work surfaces BUT the receptacle outlets installed to serve the countertops or work surfaces cannot be used to satisfy this requirements!!!!!! That is quite the conundrum!

Here is a very simple solution to this conundrum. If 210.52(A)(4) is deleted and 210.52(C) revised as proposed, then the countertop receptacle outlets can also be used to satisfy the requirement for wall space receptacle outlets. Problem solved!

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 48-NFPA 70-2024 [Section No. 210.52(A)(4)]	wall spaces at cabinets with work surfaces or countertops
Public Comment No. 48-NFPA 70-2024 [Section No. 210.52(A)(4)]	

Related Item

- PI 322

Submitter Information Verification

Submitter Full Name: Russ Leblanc
Organization: LeBlanc Consulting Services
Street Address:
City:
State:
Zip:

Submittal Date: Fri Jul 12 07:28:02 EDT 2024
Committee: NEC-P02

Public Comment No. 476-NFPA 70-2024 [Section No. 210.52(D)]

(D) Bathrooms.

Receptacle outlets shall be installed in accordance with 210.52(D)(1) through 210.52(D)(3).

(1) Receptacle Outlet Requirement.

At least one receptacle outlet shall be installed in bathrooms within 900 mm (3 ft) of the outside edge of each sink.

(2) Receptacle Outlet Location.

The receptacle outlet shall be located on a wall or partition that is adjacent to the sink or sink countertop, located on the countertop, or installed on the side or face of the sink cabinet. In no case shall the receptacle be located more than 300 mm (12 in.) below the top of the sink or sink countertop.

(3) Countertops.

Receptacle outlet assemblies listed for use in countertops shall be permitted to be installed in the countertop.

Informational Note: See 406.14(E) and 406.14(G) for requirements on installation of receptacles in countertops.

Additional Proposed Changes

File Name	Description	Approved
CN_123.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 123 appeared in the First Draft Report on First Revision No. 8037.

The Correlating Committee directs CMP-2 to reconsider the wording of “In no case shall” and consider the following language, “Receptacles shall not be located more than 300 mm (12 in.) below the top of the sink or sink countertop”.

Related Item

- First Revision No. 8037

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:30:10 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 123-NFPA 70-2024 [Section No. 210.52(D)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:44:32 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-2 to reconsider the wording of “In no case shall” and consider the following language, “Receptacles shall not be located more than 300 mm (12 in.) below the top of the sink or sink countertop”.

First Revision No. 8037-NFPA 70-2024 [Section No. 210.52(D)]

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. 477-NFPA 70-2024 [Section No. 210.60]

210.60 Guest Rooms and Guest Suites of Hotels, Motels, and Dormitories.

(A) General.

Guest rooms or guest suites in hotels, motels, and dormitories shall have receptacle outlets installed in accordance with 210.52(A) and 210.52(D). Guest rooms or guest suites provided with permanent provisions for cooking shall have receptacle outlets installed in accordance with all of the applicable rules in 210.52.

(B) Receptacle Placement.

The total number of receptacle outlets shall not be less than required in 210.52(A). These receptacle outlets shall be permitted to be located conveniently for permanent furniture layout. At least two receptacle outlets shall be readily accessible. Where receptacles are installed behind the bed, the receptacle shall be located to prevent the bed from contacting any attachment plug that may be installed or the receptacle shall be provided with a suitable guard.

Additional Proposed Changes

File Name	Description	Approved
CN_124.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 124 appeared in the First Draft Report on First Revision No. 7982.

The Correlating Committee directs CMP 2 to revise the phrase “in accordance with all of the applicable rules in” to “in accordance with” to comply with the NEC Style Manual 4.1.3 as follows:
Guest rooms or guest suites in hotels, motels and dormitories shall have receptacle outlets installed in accordance with 210.52(A) and 210.52(D).
Guest rooms or guest suites provided with permanent provisions for cooking shall have receptacle outlets installed in accordance with 210.52.
The Correlating Committee also directs CMP 2 to review FR 7982 with respect to “suitable guard” that is not in compliance with the NEC Style Manual 3.2.1.regarding vague and unenforceable language.

Related Item

• First Revision No. 7982

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:31:27 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 124-NFPA 70-2024 [Section No. 210.60]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:46:49 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 2 to revise the phrase “in accordance with all of the applicable rules in” to “in accordance with” to comply with the NEC Style Manual 4.1.3 as follows:

Guest rooms or guest suites in hotels, motels and dormitories shall have receptacle outlets installed in accordance with 210.52(A) and 210.52(D).

Guest rooms or guest suites provided with permanent provisions for cooking shall have receptacle outlets installed in accordance with 210.52.

The Correlating Committee also directs CMP 2 to review FR 7982 with respect to “suitable guard” that is not in compliance with the NEC Style Manual 3.2.1.regarding vague and unenforceable language.

First Revision No. 7982-NFPA 70-2024 [Section No. 210.60]

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. 1864-NFPA 70-2024 [Sections 210.60(A), 210.60(B)]

Sections 210.60(A), 210.60(B)

(A) General.

Guest rooms or guest suites in hotels, motels, and dormitories shall have receptacle outlets installed in accordance with 210.52(A) and 210.52(D).

(B) Cooking Provisions.

Guest rooms or guest suites provided with permanent provisions for cooking shall have receptacle outlets installed in accordance with all of the applicable rules in 210.52.

~~(B) Receptacle Placement.~~

~~The total number of receptacle outlets shall not be less than required in~~

C) Permanent Furniture

Permanent furniture that is fixed in place shall be considered a break along the floor line for the purpose of determining wall space in accordance with 210.52(A) ~~. These receptacle outlets shall be permitted to be located conveniently for permanent furniture layout. At least two receptacle outlets shall be readily accessible. Where receptacles are installed behind the bed, the receptacle shall be located to prevent the bed from contacting any attachment plug that may be installed or the receptacle shall be provided with a suitable guard~~ (2)(a) .

Statement of Problem and Substantiation for Public Comment

This public comment is submitted in response to the committee statement and resolution of PI-1600 and PI-1602. The purpose of these PIs/PCs is to correlate and simplify the application of receptacle requirements in habitable type occupancies. Currently Section 210.60 references 210.52 with slight modifications. The language proposed in the PC makes the requirement for hotel rooms, dormitories, etc. the same as a dwelling unit sleeping room, living room, or in the applicable case with permanent cooking provisions a dwelling unit kitchen. This would not result in less receptacles in these 210.60 spaces as cited in the committee statement. Additionally, the term "conveniently" can be subjective and potentially cause confusion for the enforcer. By aligning the requirements for a wall spacing in hotels, dormitories, etc., the language for receptacle spacing in all habitable type occupancies is consistent. Adding the language to address the furniture fixed in place in 210.52 would make it clear that when determining wall space in rooms where the furniture is fixed to the structure, the receptacle spacing would be treated like any other break in the wall requiring a receptacle within 6ft of that break (similar to a fireplace or built-in hutch or china cabinet).

Related Item

• PI-1600 • PI-1602

Submitter Information Verification

Submitter Full Name: Jeff Noren
Organization: National Electrical Contractors Association
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 18:41:19 EDT 2024
Committee: NEC-P02

Public Comment No. 1805-NFPA 70-2024 [Section No. 210.63(A)]

(A) Heating, Air-Conditioning, and Refrigeration Equipment.

The required receptacle outlet shall be located on the same level as the heating, air-conditioning, and refrigeration equipment. The receptacle outlet shall not be connected to the load side of the equipment's branch-circuit disconnecting means.

Exception: A receptacle outlet shall not be required at one~~.~~ , two and ~~two~~ three -family dwellings~~. for the service of evaporative coolers~~ .

Statement of Problem and Substantiation for Public Comment

In California we have accessory dwelling rules that can result in three units at an otherwise single-family residence. This change moves the threshold to four-unit apartments and up, to avoid impacting too many non-commercial occupancies.

Note that over time this required receptacle may become less relevant as battery operated tools or power sources continue to improve.

Related Item

• Public Input No. 1498-NFPA 70-2023 [Section No. 210.63(A)]

Submitter Information Verification

Submitter Full Name: Bryce Nesbitt
Organization: Obviously Inspects / Expert Witness
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 13:29:00 EDT 2024
Committee: NEC-P02

Public Comment No. 478-NFPA 70-2024 [Section No. 210.63(B)]

(B) Other Electrical Equipment.

In other than within a dwelling unit, a receptacle outlet shall be required for premises wiring systems that include a solidly grounded system operating at less than 150 volts to ground. The receptacle outlet shall be located within the same room or area as indoor switchboards, switchgear, panelboards, motor control centers, and service equipment.

Additional Proposed Changes

File Name	Description	Approved
CN_125.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 125 appeared in the First Draft Report on First Revision No. 8191.

The Correlating Committee directs CMP-2 to review FR 8191 with respect to providing clarity and usability for voltage levels, outlet locations and the use of "premises wiring systems".

Related Item

• First Revision No. 8191

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 19:32:51 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 125-NFPA 70-2024 [Section No. 210.63(B)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Wed May 08 14:50:22 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-2 to review FR 8191 with respect to providing clarity and usability for voltage levels, outlet locations and the use of “premises wiring systems”.

First Revision No. 8191-NFPA 70-2024 [Section No. 210.63(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. 261-NFPA 70-2024 [Section No. 210.65(B)(2)]

(2) Floor Outlets.

A meeting room with any floor dimension that is 3.7 m (12 ft) or greater in any direction and that has a floor area of at least 20 m^2 (215 ft^2) shall have at least one floor receptacle outlet, or at least one floor outlet to serve a receptacle(s), located at a distance not less than 1.8 m (6 ft) from any fixed wall for each 20 m^2 (215 ft^2) or fraction thereof.

Informational Note No. 1: See 314.27(C) for requirements on floor boxes used for receptacles located in the floor.

Informational Note No. 2: See 518.1 for requirements on assembly occupancies designed for 100 or more persons.

Exception to (2): The installation of floor outlets shall not be required as a part of modifications or alterations within historical buildings. The quantity of outlets which would be required shall be added to the quantity required by 210.51(B)(1).

Statement of Problem and Substantiation for Public Comment

Installation of floor outlets during renovations causes significant damage to historic buildings, including cutting/drilling, damage to ceilings below, or the use of adhesives to install surface mounted products. The required quantity of receptacle outlets is added to part (1) to ensure sufficient availability of receptacles.

Related Item

• Public Input No. 1579-NFPA 70-2023

Submitter Information Verification

Submitter Full Name: Edward Henderson
Organization: [Not Specified]
Street Address:
City:
State:
Zip:

Submittal Date: Fri Jul 26 11:18:51 EDT 2024
Committee: NEC-P02

Public Comment No. 262-NFPA 70-2024 [Section No. 210.65(B)(2)]

(2) Floor Outlets.

A meeting room with any floor dimension that is 3.7 m (12 ft) or greater in any ~~direction~~ plan dimension and that has a floor area of at least 20 m^2 (215 ft^2) shall have at least one floor receptacle outlet, or at least one floor outlet to serve a receptacle(s), located at a distance not less than 1.8 m (6 ft) from any fixed wall ~~for~~ , or as far from all fixed walls as practical where meeting room plan dimension does not exceed 3.7 m (12 ft), for each 20 m^2 (215 ft^2) or fraction thereof.

Informational Note No. 1: See 314.27(C) for requirements on floor boxes used for receptacles located in the floor.

Informational Note No. 2: See 518.1 for requirements on assembly occupancies designed for 100 or more persons.

Statement of Problem and Substantiation for Public Comment

1) Current language of "in any direction" invites unintended diagonal measurements. The term "Plan Dimension" is borrowed from the International Building Code.

2) Current language cannot be complied with in certain room geometries. For example, an 18'-0" x 12'-0" rectangular meeting room has no point at which a receptacle can be mounted not less than 6 feet from all walls. The use of the word "practical" is intended to allow minor leeway to coordinate the floor outlet location with the legs of planned large furniture, such as conference tables.

Related Item

• Public Input No. 1578-NFPA 70-2023

Submitter Information Verification

Submitter Full Name: Edward Henderson
Organization: [Not Specified]
Street Address:
City:
State:
Zip:

Submittal Date: Fri Jul 26 11:28:55 EDT 2024
Committee: NEC-P02

Public Comment No. 2082-NFPA 70-2024 [Section No. 210.70]

210.70 Lighting Outlets Required.

Lighting outlets shall be installed where specified in 210.70(A), 210.70(B), and 210.70(C).

(A) Dwelling Units.

In dwelling units, lighting outlets shall be installed in accordance with 210.70(A)(1) and 210.70(A)(2).

(1) Habitable Rooms, Kitchens, Laundry Areas, and Bathrooms.

At least one lighting outlet controlled by a wall switch or listed wall-mounted control device shall be installed in every habitable room, kitchen, laundry area, and bathroom. The wall switch or wall-mounted control device shall be located near an entrance to the room on a wall.

Exception No. 1: In other than kitchens, laundry areas, and bathrooms, one or more receptacles controlled by a wall switch or listed wall-mounted control device shall be permitted in lieu of lighting outlets.

Exception No. 2: Lighting outlets shall be permitted to be controlled by occupancy sensors that are (1) in addition to wall switches or listed wall-mounted control devices or (2) located at a customary wall switch location and equipped with a manual override that will allow the sensor to function as a wall switch.

(2) Additional Locations.

Additional lighting outlets shall be installed in accordance with the following:

(1) At least one lighting outlet controlled by a wall switch or listed wall-mounted control device shall be installed in hallways, stairways, attached garages, detached garages, and accessory buildings with electric power.

(2) For dwelling units, attached garages, and detached garages with electric power, at least one exterior lighting outlet controlled by a wall switch or listed wall-mounted control device shall be installed to provide illumination on the exterior side of outdoor entrances or exits with grade-level access. A vehicle door in a garage shall not be considered as an outdoor entrance or exit.

Exception to (2): For an outdoor, grade-level bulkhead door with stairway access to a sub-grade-level basement, the required lighting outlet that provides illumination on the stairway steps shall be permitted to be located in the basement interior within 1.5 m (5 ft) horizontally of the bottommost stairway riser. This interior lighting outlet shall be permitted to be controlled by a wall switch or listed wall-mounted control device or by a unit switch of the interior luminaire or interior lampholder.

(3) Where lighting outlets are installed for an interior stairway with six or more risers between floor levels, there shall be a wall switch or listed wall-mounted control device at each floor level and at each landing level that includes a stairway entry to control the lighting outlets.

Exception to (1), (2), and (3): Remote, central, or automatic control of lighting shall be permitted in hallways, in stairways, and at outdoor entrances.

(4) Dimmer control of lighting outlets installed in accordance with 210.70(A)(2)(3) shall not be permitted unless the listed control devices can provide dimming control to maximum brightness at each control location for the interior stairway illumination.

(B) Guest Rooms or Guest Suites.

In hotels, motels, or similar occupancies, guest rooms or guest suites shall have at least one lighting outlet controlled by a wall switch or listed wall-mounted control device installed in every habitable room and bathroom.

Exception No. 1: In other than bathrooms and kitchens where provided, one or more receptacles controlled by a wall switch or listed wall-mounted control device shall be permitted in lieu of lighting outlets.

Exception No. 2: Lighting outlets shall be permitted to be controlled by occupancy sensors that are (1) in addition to wall switch or listed wall-mounted control devices or (2) located at a customary wall switch location and equipped with a manual override that allows the sensor to function as a wall switch.

(C) All Occupancies.

For attics and underfloor spaces, utility rooms, and basements, at least one lighting outlet containing a switch or controlled by a wall switch or listed wall-mounted control device shall be installed where these spaces are used for storage or contain equipment requiring servicing and shall comply with the following:.

(1) A point of control shall be at each entry that permits access to the attic and underfloor space, utility room, or basement.

(2) Where a lighting outlet is installed for equipment requiring service, the lighting outlet shall be installed at or near the equipment.

(3) Control by automatic means shall not be permitted to control all illumination in attics, underfloor spaces, or utility rooms unless a manual means to bypass the control is provided.

Additional Proposed Changes

File Name	Description	Approved
TIA_70_23_15.pdf	TIA 23-15 (Log No. 1753)	

Statement of Problem and Substantiation for Public Comment

NOTE: This public comment originates from Tentative Interim Amendment No. 23-15 (Log No. 1753) issued by the Standards Council on November 30, 2023 and per the NFPA Regs., needs to be reconsidered by the Code Making Panel for the next edition of the Document. This TIA was issued after the Public Input closing date and was emulated as a Public Comment.

Substantiation: Section 210.70 addresses the locations where lighting outlets are required. In the panel statement addressing the revision that would require a lighting outlet to automatically energize upon battery failure, CMP-2 states “The committee recognizing the need to support illumination upon failure of the control device powered exclusively by a battery that could impede safe egress. The failure mode of a battery powered device must ensure illumination.”. The proposed TIA text addresses this safety concern by prohibiting the lighting control in these locations from being an exclusively battery powered control device, unless the control device gives a positive indication when it is approaching battery exhaustion, much like a smoke or carbon monoxide alarm. If, for instance, a battery-operated wall-mounted control were to flash a LED when the battery was expiring, the occupants would be notified to change the battery before the control lost functionality. The proposed revision not only ensures illumination in critical locations, but it also eliminates the electric shock hazard created by a control device unexpectedly energizing a lighting outlet while being serviced.

Emergency Nature: The proposed TIA intends to correct a previously unknown existing hazard.

Related Item

• Issued TIA No. 23-15

Submitter Information Verification

Submitter Full Name: NFPA TIA
Organization: Code-Making Panel 2
Street Address:
City:
State:
Zip:

Submittal Date: Thu Aug 29 09:32:00 EDT 2024
Committee: NEC-P02

Tentative Interim Amendment

NFPA® 70®

National Electrical Code®

2023 Edition

Reference: 210.70
TIA 23-15
(SC 23-11-10/ TIA Log #1753)

Pursuant to Section 5 of the NFPA *Regulations Governing the Development of NFPA Standards*, the National Fire Protection Association has issued the following Tentative Interim Amendment to NFPA 70®, *National Electrical Code*®, 2023 edition. The TIA was processed by the NEC Code-Making Panel 2, and the Correlating Committee on National Electrical Code and was issued by the Standards Council on November 30, 2023, with an effective date of December 20, 2023.

1. Revise section 210.70 to read as follows:

210.70 Lighting Outlets Required. Lighting outlets shall be installed where specified in 210.70(A), (B), and (C). The switch or listed wall-mounted control device shall not rely exclusively on ~~a~~ battery power unless ~~a~~ it incorporates a positive means of notification of impending battery depletion. ~~is provided for automatically energizing the lighting outlets upon battery failure.~~

Issue Date: November 30, 2023

Effective Date: December 20, 2023

(Note: For further information on NFPA Codes and Standards, please see www.nfpa.org/docinfo**)**

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NATIONAL FIRE PROTECTION ASSOCIATION

Public Comment No. 1304-NFPA 70-2024 [Section No. 210.70(A)(1)]

(1) Habitable Rooms, Kitchens, Laundry Areas, and Bathrooms.

At least one lighting outlet controlled by a wall switch or listed wall-mounted control device shall be installed in every habitable room, kitchen, laundry area, and bathroom. The wall switch or wall-mounted control device shall be located near an entrance to the room on a wall.

Exception No. 1: In other than kitchens, laundry areas, and bathrooms, one or more receptacles controlled by a wall switch or listed wall-mounted control device shall be permitted in lieu of lighting outlets.

Exception No. 2: Lighting outlets shall be permitted to be controlled by occupancy sensors that are (1) in addition to wall switches or listed wall-mounted control devices or (2) located at a customary wall switch location and equipped with a manual override that will allow the sensor to function as a wall switch.

Exception No. 3: L ig hting outlets for closet ty pe laundry area shall be permitted to be outside the closet to provide adequate illumination.

Statement of Problem and Substantiation for Public Comment

This comment is being submitted on behalf of the Minnesota Department of Labor and Industry. Currently, the Department's inspection staff includes 14-office/field staff, 50-state field inspectors, 4-virtual inspectors and 22 plus contract electrical inspectors that complete over 170,000 electrical inspections annually.

Please revisit PI 1902 for consideration. Without a definition for "laundry area", enforcement of what is considered the "laundry area" can be challenging. The exception allows the illumination outside the laundry area when a luminaire can't be mounted in the small area or closet space.

Related Item

• Public Input No. 1902-NFPA 70-2023 Section No. 210.70(A)(1)

Submitter Information Verification

Submitter Full Name: Dean Hunter
Organization: Minnesota Department of Labor
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 20 13:12:38 EDT 2024
Committee: NEC-P02

Public Comment No. 528-NFPA 70-2024 [Annex D]

Informative Annex D Examples

This informative annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

Selection of Conductors. In the following examples, the results are generally expressed in amperes (A). To select conductor sizes, refer to the 0 through 2000 volt (V) ampacity tables of Article 310 and the rules of 310.14 that pertain to these tables.

Voltage. For uniform application of Articles 210, 215, and 120, a nominal voltage of 120, 120/240, 240, and 208Y/120 V is used in calculating the ampere load on the conductor.

Fractions of an Ampere. Except where the calculations result in a major fraction of an ampere (0.5 or larger), such fractions are permitted to be dropped.

Power Factor. Calculations in the following examples are based, for convenience, on the assumption that all loads have the same power factor (PF).

Ranges. For the calculation of the range loads in these examples, Column C of Table 120.55 has been used. For optional methods, see Columns A and B of Table 120.55. Except where the calculations result in a major fraction of a kilowatt (0.5 or larger), such fractions are permitted to be dropped.

SI Units. For metric conversions, 0.093 m^2 = 1 ft^2 and 0.3048 m = 1 ft.

Example D1(a) One-Family Dwelling

The dwelling has a floor area of 1500 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. Appliances are a 12-kW, 120/240 volt range and a 5.5-kW, 120/240 volt dryer. Assume range and dryer kW ratings equivalent to kVA ratings in accordance with 120.54 and 120.55.

Calculated Load

(see 120.40)

General Lighting Load

1500 ft^2 at 3 VA/ft^2 = 4500 VA

Minimum Number of Branch Circuits Required

[see 210.11(A)]

General Lighting Load:

4500 VA ÷ 120 V = 38 A

This requires three 15-A, 2-wire or two 20-A, 2-wire circuits.

Small-Appliance Load: Two 2-wire, 20-A circuits *[see 210.11(C)(1)]*

Laundry Load: One 2-wire, 20-A circuit *[see 210.11(C)(2)]*

Bathroom Branch Circuit: One 2-wire, 20-A circuit (no additional load calculation is required for this circuit) *[see 210.11(C)(3)]*

Minimum Size Feeder Required

[see 120.40]

General Lighting		4,500 VA
Small Appliance		3,000 VA
Laundry		1,500 VA
	Total	9,000 VA
3000 VA at 100%		3,000 VA
9000 VA – 3000 VA = 6000 VA at 35%		2,100 VA
	Net Load	5,100 VA
Range *(see Table 120.55)*		8,000 VA
Dryer Load *(see Table 120.54)*		5,500 VA
Net Calculated Load		18,600 VA

Net Calculated Load for 120/240-V, 3-wire, single-phase service or feeder

18,600 VA ÷ 240 V = 78 A

Sections 230.42(B) and 230.79 require service conductors and disconnecting means rated not less than 100 amperes.

Calculation for Neutral for Feeder and Service

Lighting and Small-Appliance Load		5,100 VA
Range: 8000 VA at 70% *(see 120.61)*		5,600 VA
Dryer: 5500 VA at 70% *(see 120.61)*		3,850 VA
	Total	14,550 VA

Calculated Load for Neutral

14,550 VA ÷ 240 V = 61 A

Example D1(b) One-Family Dwelling

Assume same conditions as Example No. D1(a), plus addition of one 6-A, 230-V, room air-conditioning unit and one 12-A, 115-V, room air-conditioning unit,* one 8-A, 115-V, rated waste disposer, and one 10-A, 120-V, rated dishwasher. See Article 430 for general motors and Article 440, Part VII, for air-conditioning equipment. Motors have nameplate ratings of 115 V and 230 V for use on 120-V and 240-V nominal voltage systems.

*(For feeder neutral, use larger of the two appliances for unbalance.)

From Example D1(a), feeder current is 78 A (3-wire, 240 V).

-	Line A	Neutral	Line B
Amperes from Example D1(a)	78	61	78
One 230-V air conditioner	6	—	6
One 115-V air conditioner and 120-V dishwasher	12	12	10
One 115-V disposer	—	8	8
25% of air-conditioner *(see 440.33)*	3	3	2
Total amperes per conductor	99	84	104

Therefore, the service would be rated 110 A.

Example D2(a) Optional Calculation for One-Family Dwelling, Heating Larger Than Air Conditioning

(see 120.82)

The dwelling has a floor area of 1500 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. It has a 12-kW range, a 2.5-kW water heater, a 1.2-kW dishwasher, 9 kW of electric space heating installed in five rooms, a 5-kW clothes dryer, and a 6-A, 230-V, room air-conditioning unit. Assume range, water heater, dishwasher, space heating, and clothes dryer kW ratings equivalent to kVA.

Air Conditioner kVA Calculation

6 A × 230 V ÷ 1000 = 1.38 kVA

This 1.38 kVA [item 1 from 120.82(C)] is less than 40% of 9 kVA of separately controlled electric heat [item 6 from 120.82(C)], so the 1.38 kVA need not be included in the service calculation.

General Load

1500 ft^2 at 3 VA		4,500 VA
Two 20-A appliance outlet circuits at 1500 VA each		3,000 VA
Laundry circuit		1,500 VA
Range (at nameplate rating)		12,000 VA
Water heater		2,500 VA
Dishwasher		1,200 VA
Clothes dryer		5,000 VA
	Total	29,700 VA

Application of Demand Factor

[see 120.82(B)]

First 10 kVA of general load at 100%		10,000 VA
Remainder of general load at 40% (19.7 kVA × 0.4)		7,880 VA
	Total of general load	17,880 VA
9 kVA of heat at 40% (9000 VA × 0.4) =		3,600 VA
	Total	21,480 VA

Calculated Load for Service Size

21.48 kVA = 21,480 VA

21,480 VA ÷ 240 V = 90 A

Therefore, the minimum service rating would be 100 A in accordance with 230.42 and 230.79.

Feeder Neutral Load in Accordance with 120.61

1500 ft^2 at 3 VA		4,500 VA
Three 20-A circuits at 1500 VA		4,500 VA
	Total	9,000 VA
3000 VA at 100%		3,000 VA
9000 VA - 3000 VA = 6000 VA at 35%		2,100 VA
	Subtotal	5,100 VA
Range: 8 kVA at 70%		5,600 VA
Clothes dryer: 5 kVA at 70%		3,500 VA
Dishwasher		1,200 VA
	Total	15,400 VA

Calculated Load for Neutral

15,400 VA ÷ 240 V= 64 A

Example D2(b) Optional Calculation for One-Family Dwelling, Air Conditioning Larger Than Heating

[see 120.82(A) and 120.82(C)]

The dwelling has a floor area of 1500 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. It has two 20-A small appliance circuits, one 20-A laundry circuit, two 4-kW wall-mounted ovens, one 5.1-kW counter-mounted cooking unit, a 4.5-kW water heater, a 1.2-kW dishwasher, a 5-kW combination clothes washer and dryer, six 7-A, 230-V room air-conditioning units, and a 1.5-kW permanently installed bathroom space heater. Assume wall-mounted ovens, counter-mounted cooking unit, water heater, dishwasher, and combination clothes washer and dryer kW ratings equivalent to kVA.

Air Conditioning kVA Calculation

Total amperes = 6 units × 7 A = 42 A

42 A × 240 V ÷ 1000 = 10.08 kVA (assume PF = 1.0)

Load Included at 100%

Air Conditioning: Included below *[see item 1 in 120.82(C)]*

Space Heater:

Omit *[see item 5 in 120.82(C)]*

General Load

1500 ft^2 at 3 VA		4,500 VA
Two 20-A small-appliance circuits at 1500 VA each		3,000 VA
Laundry circuit		1,500 VA
Two ovens		8,000 VA
One cooking unit		5,100 VA
Water heater		4,500 VA
Dishwasher		1,200 VA
Washer/dryer		5,000 VA
	Total general load	32,800 VA
First 10 kVA at 100%		10,000 VA
Remainder at 40% (22.8 kVA × 0.4 × 1000)		9,120 VA
	Subtotal general load	19,120 VA
Air conditioning		10,080 VA
	Total	29,200 VA

Calculated Load for Service

29,200 VA ÷ 240 V = 122 A (service rating)

Feeder Neutral Load, in accordance with 120.61

Assume that the two 4-kVA wall-mounted ovens are supplied by one branch circuit, the 5.1-kVA counter-mounted cooking unit by a separate circuit.

1500 ft^2 at 3 VA		4,500 VA
Three 20-A circuits at 1500 VA		4,500 VA
	Subtotal	9,000 VA
3000 VA at 100%		3,000 VA
9000 VA - 3000 VA = 6000 VA at 35%		2,100 VA
	Subtotal	5,100 VA

Two 4-kVA ovens plus one 5.1-kVA cooking unit = 13.1 kVA. Table 120.55 permits 55% demand factor or 13.1 kVA × 0.55 = 7.2 kVA feeder capacity.

	Subtotal from above	5,100 VA
Ovens and cooking unit: 7200 VA × 70% for neutral load		5,040 VA
Clothes washer/dryer: 5 kVA × 70% for neutral load		3,500 VA
Dishwasher		1,200 VA
	Total	14,840 VA

Calculated Load for Neutral

14,840 VA ÷ 240 V = 62

Example D2(c) Optional Calculation for One-Family Dwelling with Heat Pump (Single-Phase, 240/120-Volt Service)

(see 120.82)

The dwelling has a floor area of 2000 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. It has a 12-kW range, a 4.5-kW water heater, a 1.2-kW dishwasher, a 5-kW clothes dryer, and a 2½-ton (24-A) heat pump with 15 kW of backup heat.

Heat Pump kVA Calculation

24 A × 240 V ÷ 1000 = 5.76 kVA

This 5.76 kVA is less than 15 kVA of the backup heat; therefore, the heat pump load need not be included in the service calculation *[see 120.82(C)]*.

General Load

2000 ft^2 at 3 VA		6,000 VA
Two 20-A appliance outlet circuits at 1500 VA each		3,000 VA
Laundry circuit		1,500 VA
Range (at nameplate rating)		12,000 VA
Water heater		4,500 VA
Dishwasher		1,200 VA
Clothes dryer		5,000 VA
	Subtotal general load	33,200 VA
First 10 kVA at 100%		10,000 VA
Remainder of general load at 40% (23,200 VA × 0.4)		9,280 VA
	Total net general load	19,280 VA

Heat Pump and Supplementary Heat*

240 V × 24 A = 5760 VA

15 kW Electric Heat:

5760 VA + (15,000 VA × 65%) = 5.76 kVA + 9.75 kVA = 15.51 kVA

***If supplementary heat is not on at same time as heat pump, heat pump kVA need not be added to total.**

Totals

Net general load		19,280 VA
Heat pump and supplementary heat		15,510 VA
	Total	34,790 VA

Calculated Load for Service

34.79 kVA × 1000 ÷ 240 V= 145 A

Therefore, this dwelling unit would be permitted to be served by a 150-A service.

Example D3 Store Building

A store 80 ft by 60 ft, or 4,800 ft^2, has 30 ft of show window. There are a total of 80 duplex receptacles. The service is 120/240 V, single phase 3-wire service. Actual connected lighting load is 7,000 VA, all of which for this example is considered continuous. All calculations are rounded up or down as permitted in 120.5(B).

Calculated Load

(see 120.40)

Noncontinuous Loads

Receptacle Load *(see 120.47)*		
80 receptacles at 180 VA		14,400 VA
10,000 VA at 100%		10,000 VA
14,400 VA - 10,000 VA = 4,400 VA at 50%		2,200 VA
	Subtotal	12,200 VA

Continuous Loads

General Lighting*		
4,800 ft^2 at 1.9 VA/ft^2		9,120 VA
Show Window Lighting Load		
30 ft at 200 VA/ft *[see 120.14(G)]*		6,000 VA
Outside Sign Circuit *[see 120.14(F)]*		1,200 VA
	Subtotal	16,320 VA
	Subtotal from noncontinuous	12,200 VA
	Total noncontinuous loads + continuous loads =	28,520 VA

*In the example, the actual connected lighting load at 125% (7,000 VA × 1.25 VA) is less than the load from Table 120.42(A), so the required minimum lighting load from Table 120.42(A) is used in the calculation. Had the actual lighting load × 125% been greater than the value calculated from Table 120.42(A), the actual connected lighting load would have been used.

Minimum Number of Branch Circuits Required

General Lighting: Branch circuits need only be installed to supply the actual connected load *[see 210.11(B)]*.

7,000 VA × 1.25 = 8,750 VA

8,750 VA ÷ 240 V = 36.45 A for 3-wire, 120/240 V

8,750 VA ÷ 120 V = 72.92 A

The lighting load would be permitted to be served by 2-wire or 3-wire, 15- or 20-A circuits with combined capacity equal to 36 A or greater for 3-wire circuits or 73 A or greater for 2-wire circuits. The feeder capacity as well as the number of branch-circuit positions available for lighting circuits in the panelboard must reflect the full calculated load of 9,120 VA. Lighting loads from Table 120.42(A) already include 125% for continuous load. See note at bottom of Table 120.42(A).

Show Window

6,000 VA × 1.25 = 7,500 VA

7,500 VA ÷ 240 V = 31.25 A for 3-wire, 120/240 V

7,500 VA ÷ 120 V = 62.5 A for 2-wire, 120 V

The show window lighting is permitted to be served by 2-wire or 3-wire circuits with a capacity equal to 31 A or greater for 3-wire circuits or 63 A or greater for 2-wire circuits.

Receptacles required by 210.62 are assumed to be included in the receptacle load above if these receptacles do not supply the show window lighting load.

Receptacles

Receptacle Load:

14,400 VA ÷ 240 V = 60 A for 3-wire, 120/240 V

14,400 VA ÷ 120 V = 120 A for 2-wire, 120 V

The receptacle load would be permitted to be served by 2-wire or 3-wire circuits with a capacity equal to 60 A or greater for 3-wire circuits or 120 A or greater for 2-wire circuits.

Minimum Size Feeder (or Service) Overcurrent Protection

(see 215.5 or 230.90)

Subtotal noncontinuous loads		12,200 VA
Subtotal continuous loads not from Table 120.42(A) at 125% (7,200 VA × 1.25) (sign and show window)		9,000 VA
Subtotal of calculated continuous loads with 125% already included		9,120 VA
	Total	30,320 VA

30,320 VA ÷ 240 V = 126 A

The next higher standard size is 150 A *(see 240.6)*.

Minimum Size Feeders (or Service Conductors) Required

[see 215.4, 230.42(A)]

For 120/240 V, 3-wire system,

30,320 VA ÷ 240 V = 126 A Service or feeder conductor is 1 AWG Cu in accordance with 215.5 and Table 310.16 (with 75°C terminations).

Example D3(a) Industrial Feeders in a Common Raceway

An industrial multi-building facility has its service at the rear of its main building, and then provides 480Y/277-volt feeders to additional buildings behind the main building in order to segregate certain processes. The facility supplies its remote buildings through a partially enclosed access corridor that extends from the main switchboard rearward along a path that provides convenient access to services within 15 m (50 ft) of each additional building supplied. Two building feeders share a common raceway for approximately 45 m (150 ft) and run in the access corridor along with process steam and control and communications cabling. The steam raises the ambient temperature around the power raceway to as much as 35°C. At a tee fitting, the individual building feeders then run to each of the two buildings involved. The feeder neutrals are not connected to the equipment grounding conductors in the remote buildings. All distribution equipment terminations are listed as being suitable for 75°C connections.

Each of the two buildings has the following loads:

Lighting, 11,600 VA, comprised of electric-discharge luminaires connected at 277 V

Receptacles, 22 125-volt, 20-ampere receptacles on general-purpose branch circuits, supplied by separately derived systems in each of the buildings

1 Air compressor, 460 volt, three phase, 5 hp

1 Grinder, 460 volt, three phase, 1.5 hp

3 Welders, AC transformer type (nameplate: 23 amperes, 480 volts, 60 percent duty cycle)

3 Industrial Process Dryers, 480 volt, three phase, 15 kW each (assume continuous use throughout certain shifts)

Determine the overcurrent protection and conductor size for the feeders in the common raceway, assuming the use of XHHW-2 insulation (90°C):

Calculated Load

{Note: For reasonable precision, volt-ampere calculations are carried to three significant figures only; where loads are converted to amperes, the results are rounded to the nearest ampere *[see 120.5(B)]*}.

Noncontinuous Loads		
Receptacle Load *(see 120.47)*		
22 receptacles at 180 VA		3,960 VA
Welder Load *[see 630.11(A), Table 630.11(A)]*		
Each welder: 480V × 23A × 0.78 = 8,610 VA		
All 3 welders *[see 630.11(B)]* (demand factors 100%, 100%, 85% respectively)		
8,610 VA + 8,610 VA + 7,320 VA =		24,500 VA
Subtotal, Noncontinuous Loads		**28,500 VA**
Motor Loads*(see 430.24, Table 430.250)*		
Air compressor: 7.6 A × 480 V × √3 =		6,310 VA
Grinder: 3 A × 480 V × √3 =		2,490 VA
Largest motor, additional 25%:		1,580 VA
Subtotal, Motor Loads		**10,400 VA**
By using 430.24, the motor loads and the noncontinuous loads can be combined for the remaining calculation.		
Subtotal for load calculations, Noncontinuous Loads		**38,900 VA**
Continuous Loads		
General Lighting		11,600 VA
3 Industrial Process Dryers	15 kW each	45,000 VA
Subtotal, Continuous Loads:		**56,600 VA**

Overcurrent protection

(see 215.5)

The branch-circuit OCPD must accommodate 125 percent of the continuous load, plus the noncontinuous load:

Continuous load	56,600 VA
Noncontinuous load	38,900 VA
Subtotal, actual load [actual load in amperes]	**95,500 VA**
[99,000 VA ÷ (480V × √3) = 119 A]	
(25% of 56,600 VA) (*See 215.5*)	**14,200 VA**
Total VA	**109,700 VA**

Conversion to amperes using three significant figures: 109,700 VA / (480V × √3) = 132 A

Minimum size branch-circuit OCPD: 132 A

Minimum standard size branch-circuit OCPD *(see 240.6)*: 150 amperes

Where the branch-circuit OCPD and its assembly are listed for operation at 100 percent of its rating, a 125 ampere branch-circuit OCPD would be permitted. However, branch-circuit OCPD assemblies listed for 100 percent of their rating are typically not available at the 125-ampere rating. *(See 215.5 Exception.)*

Ungrounded Feeder Conductors

The conductors must independently meet requirements for (1) terminations, and (2) conditions of use throughout the raceway run.

Minimum size conductor at the branch-circuit OCPD termination *[see 110.14(C) and 215.4(A), using 75°C ampacity column in Table 310.16]*: 1/0 AWG.

Minimum size conductors in the raceway based on actual load *[see Article 100 for the definition of ampacity, and 310.15(C)(1) and correction factors to Table 310.16]*:

95,500 VA ÷ 0.7 ÷ 0.96 = 142,000 VA

[70% = 310.15(C)(1)] and [0.96 = Correction factors to Table 310.16]

Conversion to amperes:

142,000 VA ÷ (480 V × √3) = 171 A

Note that the neutral conductors are counted as current-carrying conductors *[see 310.15(E)(1)(3)]* in this example because the discharge lighting has substantial nonlinear content. This requires a 2/0 AWG conductor based on the 90°C column of Table 310.16. Therefore, the worst case is given by the raceway conditions, and 2/0 AWG conductors must be used. If the utility corridor were at normal temperatures [(30°C (86°F)], and if the lighting at each building were supplied from the local separately derived system (thus requiring no neutrals in the supply feeders), the raceway result (95,500 VA ÷ 0.8 = 119,000 VA; 119,000 VA ÷ (480 V × √3) = 143 A, or a 1 AWG conductor @ 90°C) could not be used, because the termination result (1/0 AWG) based on the 75°C column of Table 310.16 would become the worst case, requiring the larger conductor.

In every case, the branch-circuit OCPD shall provide overcurrent protection for the feeder conductors in accordance with their ampacity as provided by this code *(see 240.4)*. A 90°C 2/0 AWG conductor has a Table 310.16 ampacity of 195 amperes. Adjusting for the conditions of use (35°C ambient temperature, 8 current-carrying conductors in the common raceway),

195 A × 0.96 × 0.7 = 131 A

The 150-ampere circuit breaker protects the 2/0 AWG feeder conductors, because 240.4(B) permits the use of the next higher standard size branch-circuit OCPD. Note that the feeder layout precludes the application of 310.14(A)(2) Exception.

Feeder Neutral Conductor

(see 120.61)

Because 210.11(B) does not apply to these buildings, the load cannot be assumed to be evenly distributed across phases. Therefore, the maximum imbalance must be assumed to be the full lighting load in this case, or 11,600 VA. (11,600 VA ÷ 277 V = 42 A.) The ability of the neutral-to-return fault current *[see 250.32(B) Exception No. 2]* is not a factor in this calculation.

Because the neutral runs between the main switchboard and the building panelboard, likely terminating on a busbar at both locations, and not on branch-circuit OCPD, the effects of continuous loading can be disregarded in evaluating its terminations *[see 215.4(A)(1) Exception No. 3]*. That calculation is (11,600 VA ÷ 277 V = 42 A), to be evaluated under the 75°C column of Table 310.16. The minimum size of the neutral might seem to be 8 AWG, but that size would not be sufficient to be depended upon in the event of a line-to-neutral fault *[see 215.4(B), second paragraph]*. Therefore, because the minimum size equipment grounding conductor for a 150 ampere circuit wired with 2/0 AWG conductors, as covered in Table 250.122(A), is 6 AWG, that is the minimum neutral size required for this feeder.

Example D4(a) Multifamily Dwelling

A multifamily dwelling has 40 dwelling units.

Meters are in two banks of 20 each with individual feeders to each dwelling unit.

One-half of the dwelling units are equipped with 120/240 volt electric ranges not exceeding 12 kW each. Assume range kW rating equivalent to kVA rating in accordance with 120.55. Other half of ranges are gas ranges.

Area of each dwelling unit is 840 ft^2.

Laundry facilities on premises are available to all tenants. Add no circuit to individual dwelling unit.

Calculated Load for Each Dwelling Unit

(see Article 120)

General Lighting: 840 ft^2 at 3 VA/ft^2 = 2520 VA

Special Appliance: Electric range *(see 120.55)* = 8000 VA

Minimum Number of Branch Circuits Required for Each Dwelling Unit

[see 210.11(A)]

General Lighting Load: 2520 VA ÷ 120 V = 21 A or two 15-A, 2-wire circuits; or two 20-A, 2-wire circuits

Small-Appliance Load: Two 2-wire circuits of 12 AWG wire *[see 210.11(C)(1)]*

Range Circuit: 8000 VA ÷ 240 V = 33 A or a circuit of two 8 AWG conductors and one 10 AWG conductor in accordance with 210.19(C)

Minimum Size Feeder Required for Each Dwelling Unit

(see 215.4)

Calculated Load *(see Article 120)*:

General Lighting		2,520 VA
Small Appliance (two 20-ampere circuits)		3,000 VA
	Subtotal Calculated Load (without ranges)	5,520 VA

Application of Demand Factor

(see Table 120.45)

First 3000 VA at 100%		3,000 VA
5520 VA - 3000 VA = 2520 VA at 35%		882 VA
	Net Calculated Load (without ranges)	3,882 VA
Range Load		8,000 VA
	Net Calculated Load (with ranges)	11,882 VA

Size of Each Feeder

(see 215.4)

For 120/240-V, 3-wire system (without ranges)

Net calculated load of 3882 VA ÷ 240 V = 16 A

For 120/240-V, 3-wire system (with ranges)

Net calculated load, 11,882 VA ÷ 240 V = 50 A

Feeder Neutral

Lighting and Small-Appliance Load		3,882 VA
Range Load: 8000 VA at 70% *(see 120.61)*		5,600 VA
(only for apartments with electric range)		5,600 VA
	Net Calculated Load (neutral)	9,482 VA

Calculated Load for Neutral

9482 VA ÷ 240 V= 39.5 A

Minimum Size Feeders Required from Service Equipment to Meter Bank (For 20 Dwelling Units — 10 with Ranges)

Total Calculated Load:		
Lighting and Small Appliance		
20 units × 5520 V		110,400 VA
Application of Demand Factor		
First 3000 VA at 100%		3,000 VA
110,400 VA - 3000 VA = 107,400 VA at 35%		37,590 VA
	Net Calculated Load	40,590 VA
Range Load: 10 ranges (not over 12 kVA) *(see Col. C, Table 120.55,25 kW)*		25,000 VA
	Net Calculated Load (with ranges)	65,590 VA

Net calculated load for 120/240-V, 3-wire system,

65,590 VA ÷ 240 V = 273 A

Feeder Neutral

Lighting and Small-Appliance Load		40,590 VA
Range Load: 25,000 VA at 70% *[see 120.61(B)]*		17,500 VA
	Calculated Load (neutral)	58,090 VA

Calculated Load for Neutral

58,090 VA ÷ 240 V = 242 A

Further Demand Factor

[120.61(B)]

200 A at 100%		200 A
242 A - 200 A = 42 A at 70%		29 A
	Net Calculated Load (neutral)	229 A

Minimum Size Main Feeders (or Service Conductors) Required (Less House Load) (For 40 Dwelling Units — 20 with Ranges)

Total Calculated Load:		
Lighting and Small-Appliance Load		
40 units × 5520 V		220,800 VA

Application of Demand Factor

(from Table 120.45)

First 3000 VA at 100%		3,000 VA
Next 120,000 VA - 3000 VA = 117,000 VA at 35%		40,950 VA
Remainder 220,800 VA - 120,000 VA = 100,800 VA at 25%		25,200 VA
	Net Calculated Load	69,150 VA
Range Load: 20 ranges (less than 12 kVA)		
(see Col. C, Table 120.55)		35,000 VA
	Net Calculated Load	104,150 VA

For 120/240-V, 3-wire system

Net calculated load of 104,150 VA ÷ 240 V = 434 A

Feeder Neutral

Lighting and Small-Appliance Load		69,150 VA
Range: 35,000 VA at 70% *[see 120.61(B)]*		24,500 VA
	Calculated Load (neutral)	93,650 VA

93,650 VA ÷ 240 V = 390 A

Further Demand Factor

[see 120.61(B)]

200 A at 100%		200 A
390 A − 200 A = 190 A at 70%		133 A
	Net Calculated Load (neutral)	333 A

[See Table 310.16 through Table 310.21, and 310.15(B), (C), and (E).]

Example D4(b) Optional Calculation for Multifamily Dwelling

A multifamily dwelling equipped with electric cooking and space heating or air conditioning has 40 dwelling units.

Meters are in two banks of 20 each plus house metering and individual feeders to each dwelling unit.

Each dwelling unit is equipped with an electric range of 8-kW, 120/240 volt nameplate rating, four 1.5-kW separately controlled 240 volt electric space heaters, and a 2.5-kW, 240 volt electric water heater. Assume range, space heater, and water heater kW ratings equivalent to kVA. Calculate the load for the individual dwelling unit by the standard calculation (Article 120, Part III).

A common laundry facility is available to all tenants *[see 210.52(F) Exception No. 1]*.

Area of each dwelling unit is 840 ft^2.

Calculated Load for Each Dwelling Unit

(see Part II and Part III of Article 120)

General Lighting Load:		
840 ft^2 at 3 VA/ft^2		2,520 VA
Electric range		8,000 VA
Electric heat: 6 kVA (or air conditioning if larger)		6,000 VA
Electric water heater		2,500 VA

Minimum Number of Branch Circuits Required for Each Dwelling Unit

General Lighting Load: 2520 VA ÷ 120 V = 21 A or two 15-A, 2-wire circuits, or two 20-A, 2-wire circuits
Small-Appliance Load: Two 2-wire circuits of 12 AWG *[see 210.11(C)(1)]*
Range Circuit *(See Table 120.55, Column B)*:

8000 VA × 80% ÷ 240 V = 27 A on a circuit of three

10 AWG conductors in accordance with 210.19(C)
Space Heating: 6000 VA ÷ 240 V = 25 A Number of circuits *(see 210.11)*

Minimum Size Feeder Required for Each Dwelling Unit

(see 215.4)

Calculated Load *(see Article 120):*		
General Lighting		2,520 VA
Small Appliance (two 20-A circuits)		3,000 VA
	Subtotal Calculated Load (without range and space heating)	5,520 VA

Application of Demand Factor

First 3000 VA at 100%		3,000 VA
5520 VA - 3000 VA = 2520 VA at 35%		882 VA
	Net Calculated Load (without range and space heating)	3,882 VA
Range		6,400 VA
Space Heating *(see 120.51)*		6,000 VA
Water Heater		2,500 VA
	Net Calculated Load (for individual dwelling unit)	18,782 VA

Size of Each Feeder

For 120/240-V, 3-wire system,

Net calculated load of 18,782 VA ÷ 240 V = 78 A

Feeder Neutral

(see 120.61)

Lighting and Small Appliance		3,882 VA
Range Load: 6400 VA at 70% *[see 120.61(B)]*		4,480 VA
Space and Water Heating (no neutral): 240 V		0 VA
	Net Calculated Load (neutral)	8,362 VA

Calculated Load for Neutral

8362 VA ÷ 240 V = 35 A

Minimum Size Feeder Required from Service Equipment to Meter Bank (For 20 Dwelling Units)

Total Calculated Load:		
Lighting and Small-Appliance Load		
20 units × 5520 V		110,400 VA
Water and Space Heating Load		
20 units × 8500 V		170,000 VA
Range Load: 20 × 8000 V		160,000 VA
	Net Calculated Load (20 dwelling units)	440,400 VA
Net Calculated Load Using Optional Calculation *(see Table 120.84(B))*		
440,400 VA × 0.38		167,352 VA

167,352 VA ÷ 240 V = 697 A

Minimum Size Main Feeder Required (Less House Load) (For 40 Dwelling Units)

Calculated Load:		
Lighting and Small-Appliance Load		
40 units × 5520 V		220,800 VA
Water and Space Heating Load 40 units × 8500 V		340,000 VA
Range: 40 ranges × 8000 V		320,000 VA
	Net Calculated Load (40 dwelling units)	880,800 VA

Net Calculated Load Using Optional Calculation *(see Table 120.84(B))*

880,800 VA × 0.28 = 246,624 VA

246,624 VA ÷ 240 V = 1028 A

Feeder Neutral Load for Feeder from Service Equipment to Meter Bank (For 20 Dwelling Units)

Lighting and Small-Appliance Load		
20 units × 5520 V		110,400 VA
First 3000 VA at 100%		3,000 VA
110,400 VA - 3000 VA = 107,400 VA at 35%		37,590 VA
	Net Calculated Load	40,590 VA
20 ranges: 35,000 VA at 70% *[see Table 120.55 and 120.61(B)]*		24,500 VA
	Total	65,090 VA

65,090 VA ÷ 240 V = 271 A

Further Demand Factor

[see 120.61(B)]

First 200 A at 100%		200 A
Balance: 271 A - 200 A = 71 A at 70%		50 A
	Total	250 A

Feeder Neutral Load of Main Feeder (Less House Load)(For 40 Dwelling Units)

Lighting and Small-Appliance Load		
40 units × 5520 V		220,800 VA
First 3000 VA at 100%		3,000 VA
Next 120,000 VA - 3000 VA = 117,000 VA at 35%		40,950 VA
Remainder 220,800 VA - 120,000 VA = 100,800 VA at 25%		25,200 VA
	Net Calculated Load	69,150 VA
40 ranges: 55,000 VA at 70% *[see Table 120.55 and 120.61(B)]*		38,500 VA
	Total	107,650 VA

107,650 VA ÷ 240 V = 449 A

Further Demand Factor

[see 120.61(B)]

First 200 A at 100%		200 A
Balance: 449 - 200 A = 249 A at 70%		174 A
	Total	374 A

Example D5(a) Multifamily Dwelling Served at208Y/120 Volts, Three Phase

All conditions and calculations are the same as for the multifamily dwelling [Example D4(a)] served at 120/240 V, single phase except as follows:

Service to each dwelling unit would be two phase legs and neutral.

Minimum Number of Branch Circuits Required for Each Dwelling Unit

(see 210.11)

Range Circuit: 8000 VA ÷ 208 V = 38 A or a circuit of two 8 AWG conductors and one 10 AWG conductor in accordance with 210.19(C)

Minimum Size Feeder Required for Each Dwelling Unit

(see 215.4)

For 120/208-V, 3-wire system (without ranges),

Net calculated load of 3882 VA ÷ 2 legs ÷ 120 V/leg = 16 A

For 120/208-V, 3-wire system (with ranges),

Net calculated load (range) of 8000 VA ÷ 208 V = 39 A

Total load (range + lighting) = 39 A + 16 A = 55 A

Reducing the neutral load on the feeder to each dwelling unit is not permitted *[see 120.61(C)(1)].*

Minimum Size Feeders Required from Service Equipment to Meter Bank (For 20 Dwelling Units — 10 with Ranges)

For 208Y/120-V, 3-phase, 4-wire system,

Ranges: Maximum number between any two phase legs = 4

2 × 4 = 8.

Table 120.55 demand = 23,000 VA

Per phase demand = 23,000 VA ÷ 2 = 11,500 VA

Equivalent 3-phase load = 34,500 VA

Net Calculated Load (total):

40,590 VA + 34,500 VA = 75,090 VA

75,090 VA ÷ (208 V×1.732) = 208 A

Feeder Neutral Size

Net Calculated Lighting and Appliance Load & Equivalent Range Load:

40,590 VA + (34,500 VA at 70%) = 64,700 VA

Net Calculated Neutral Load:

64,700 VA ÷ (208 V×1.732) = 180 A

Minimum Size Main Feeder (Less House Load) (For 40 Dwelling Units — 20 with Ranges)

For 208Y/120-V, 3-phase, 4-wire system,

Ranges:

Maximum number between any two phase legs = 7

2 × 7 = 14.

Table 120.55 demand = 29,000 VA

Per phase demand = 29,000 VA ÷ 2 = 14,500 VA

Equivalent 3-phase load = 43,500 VA

Net Calculated Load (total):

69,150 VA + 43,500 VA = 112,650 VA

112,650 VA ÷ (208 V×1.732) = 313 A

Main Feeder Neutral Size:

69,150 VA + (43,500 VA at 70%) = 99,600 VA

99,600 VA ÷ (208 V×1.732) = 277 A

Further Demand Factor

(see 120.61)

200 A at 100%	200.0 A
277 A - 200 A = 77 A at 70%	54 A
Net Calculated Load (neutral)	254 A

Example D5(b) Optional Calculation for Multifamily Dwelling Served at 208Y/120 Volts, Three Phase

All conditions and calculations are the same as for Optional Calculation for the Multifamily Dwelling [Example D4(b)] served at 120/240 V, single phase except as follows:

Service to each dwelling unit would be two phase legs and neutral.

Minimum Number of Branch Circuits Required for Each Dwelling Unit

(see 210.11)

Range Circuit *(see Table 120.55, Column B):* 8000 VA at 80%÷ 208 V = 31 A or a circuit of two 8 AWG conductors and one 10 AWG conductor in accordance with 210.19(C)

Space Heating: 6000 VA ÷ 208 V = 29 A

Two 20-ampere, 2-pole circuits required, 12 AWG conductors

Minimum Size Feeder Required for Each Dwelling Unit

120/208-V, 3-wire circuit

Net calculated load of 18,782 VA ÷ 208 V = 90 A

Net calculated load (lighting line to neutral):

3882 VA ÷ 2 legs ÷ 120 V per leg = 16.2 A

Line to line = 14,900 VA ÷ 208 V = 71.6 A

Total load = 16.2 A + 71.6 A = 88 A

Minimum Size Feeder Required for Service Equipment to Meter Bank (for 20 Dwelling Units)

Net Calculated Load

167,352 VA ÷ (208 V×1.732) = 465 A

Feeder Neutral

Load for Feeder from Service Equipment to Meter Bank (for 20 Dwelling Units)

Lighting and Small-Appliance Load

20 units × 5520 VA = 110,400 VA first 3000 VA at 100% = 3000 VA

110,400 VA − 3000 VA = 107,400 VA at 35% = 37,590 VA

Net Calculated Load: 40,590 VA

Minimum Size Main Feeder (Less House Load) (for 20 Dwelling Units – 20 Ranges) for 208Y/120-V, 3-Phase, 4-Wire System

Ranges:

Maximum number between any two phase legs = 7

2 × 7 = 14

Table 120.55 demand = 29,000 VA

Per phase demand = 29,000 VA ÷ 2 = 14,500 VA

Equivalent 3-phase load = 43,500 VA

Net Calculated Neutral Load (total): 40,590 VA + 43,500 VA = 84,090 VA

84,090 VA ÷ (208 V×1.732) = 234 A

Minimum Size Service Required (Less House Load) (for 40 Dwelling Units) (Assume Balanced Load)

Net Calculated Load:

246,624 VA ÷ (208 V×1.732) = 685 A

Feeder Neutral Load for Feeder from Service Equipment to Meter Bank (for 40 Dwelling Units)

Lighting and Small-Appliance Load

40 units × 5520 VA = 220,800 VA

First 3000 VA at 100% = 3000 VA

Next 120,000 VA − 3000 VA = 117,000 VA

117,000 VA at 35% = 40,950 VA

Remainder 220,800 VA − 120,000 VA = 100,800 VA at 25% = 25,200 VA

Net Calculated Load: 69,150 VA

Minimum Size Main Feeder (Less House Load) (for 40 Dwelling Units — 40 with Ranges) for 208Y/120-V, 3-Phase, 4-Wire System

Ranges:

Maximum number between any two phase legs = 14

2 × 14 = 28

Table 120.55 demand = 15,000 VA + (1000 VA × 28) = 43,000 VA per phase

Demand = 43,000 VA ÷ 2 = 21,500 VA

Equivalent 3-phase load = 21,500 VA × 3 = 64,500 VA

Neutral Load = 64,500 VA at 70% [See Table 120.55 and 120.61(B)] Neutral Load = 45,150 VA

Net Calculated Neutral Load (total): 69,150 VA + 45,150 VA = 114,300 VA

114,300 VA ÷ (208 V×1.732) = 317 A

Further Demand Factor

[see 120.61(B)]

200 A at 100%		200 A
317 A − 200 A = 117 A at 70%		82 A
	Net Calculated Load (neutral)	282 A

Example D6 Maximum Demand for Range Loads

Table 120.55, Column C, applies to ranges not over 12 kW. The application of Note 1 to ranges over 12 kW (and not over 27 kW) and Note 2 to ranges over 8¾ kW (and not over 27 kW) is illustrated in the following two examples.

A. Ranges All the Same Rating*(see Table 120.55, Note 1)*

Assume 24 ranges, each rated 16 kW.

From Table 120.55, Column C, the maximum demand for 24 ranges of 12-kW rating is 39 kW. 16 kW exceeds 12 kW by 4.

5% × 4 = 20% (5% increase for each kW in excess of 12)

39 kW × 20% = 7.8 kW increase

39 + 7.8 = 46.8 kW (value to be used in selection of feeders)

B. Ranges of Unequal Rating*(see Table 120.55, Note 2)*

Assume 5 ranges, each rated 11 kW; 2 ranges, each rated 12 kW; 20 ranges, each rated 13.5 kW; 3 ranges, each rated 18 kW.

5 ranges	× 12 kW =	60 kW (use 12 kW for range rated less than 12)
2 ranges	× 12 kW =	24 kW
20 ranges	× 13.5 kW =	270 kW
3 ranges	× 18 kW =	54 kW
30 ranges, Total kW =		408 kW

408 ÷ 30 ranges = 13.6 kW (average to be used for calculation)

From Table 120.55, Column C, the demand for 30 ranges of 12-kW rating is 15 kW + 30 (1 kW × 30 ranges) = 45 kW. 13.6 kW exceeds 12 kW by 1.6 kW (use 2 kW).

5% × 2 = 10% (5% increase for each kW in excess of 12 kW)

45 kW × 10% = 4.5 kW increase

45 kW + 4.5 kW = 49.5 kW (value to be used in selection of feeders)

Example D7 Sizing of Service Conductors for Dwelling(s)

Service conductors and feeders for certain dwellings are permitted to be sized in accordance with 310.12.

The terminal temperature rating is assumed to be 75°C (167°F) for the example.

With No Required Adjustment or Correction Factors. If a 175-ampere service rating is selected, a service conductor for a single-phase dwelling is then sized as follows per 310.12(A):

The single-phase dwelling service rating is calculated:

175 amperes × 0.83 = 145.25 amperes.

If no other adjustments or corrections are required for the installation, then, in accordance with Table 310.16, a 1/0 AWG Cu or a 3/0 AWG Al meets this rating at 75°C (167°F).

With Required Temperature Correction Factor.

If a 175-ampere service rating is selected, a service conductor for a single-phase dwelling is then sized as follows per 310.12(A):

First, the single phase dwelling service rating is calculated:

175 amperes × 0.83 = 145.25 amperes.

If the conductors are installed in an ambient temperature of 49°C (120°F), the conductor ampacity must be multiplied by the appropriate correction factor in Table 310.15(B)(1)(1). In this example, using an XHHW-2 conductor (Temperature Rating = 90°C (194°F)), will require a correction factor of 0.82 to obtain the corrected conductor ampacity for this installation:

Per 110.14(C) and 310.15(A), compare the corrected conductor ampacity based upon the conductor temperature rating with the conductor ampacity based upon the termination temperature rating and use the smaller of the two values. For the purposes of this calculation, no adjustment or correction factors are applied to the conductor ampacity that is based upon the termination temperature rating.

Starting with the sizes determined above, the corrected conductor ampacities are:

For 1/0 AWG Cu XHHW-2 at 90°C (194°F): 170 amperes x 0.82 = 139.4 amperes

For 3/0 AWG Al XHHW-2 at 90°C (194°F): 175 amperes x 0.82 = 143.5 amperes

The conductor ampacities for the termination temperature rating are:

For 1/0 AWG Cu XHHW-2 at 75°C (167°F): 150 amperes

For 3/0 AWG Al XHHW-2 at 75°C (167°F): 155 amperes

Choosing the smaller of these values:

For 1/0 AWG Cu: 139.4 amperes

For 3/0 AWG Al: 143.5 amperes

Since these results are below the single-phase dwelling service rating calculated above (145.25 amperes), try the next larger size:

For 2/0 AWG Cu XHHW-2 at 90°C (194°F): 195 amperes x 0.82 = 159.9 amperes

For 4/0 AWG Al XHHW-2 at 90°C (194°F): 205 amperes x 0.82 = 168.1 amperes

The conductor ampacities for the termination temperature rating are:

For 2/0 AWG Cu XHHW-2 at 75°C (167°F): 175 amperes

For 4/0 AWG Al XHHW-2 at 75°C (167°F): 180 amperes

Choosing the smaller of these values:

For 2/0 AWG Cu: 159.9 amperes

For 4/0 AWG Al: 168.1 amperes

These results are above the single-phase dwelling service rating calculated earlier (145.25 amperes), so the required conductor size is a 2/0 AWG Cu or a 4/0 AWG Al.

If no temperature correction or ampacity adjustment factors are required, the following table includes conductor sizes calculated using the requirements in 310.12. This table is based on 75°C terminations and without any adjustment or correction factors.

Table D.7 Single-Phase Dwelling Services and Feeders

Service or Feeder Rating (Amperes)	Conductor (AWG or kcmil)	
	Copper	Aluminum or Copper-Clad Aluminum
100	4	2
110	3	1
125	2	1/0
150	1	2/0
175	1/0	3/0
200	2/0	4/0
225	3/0	250
250	4/0	300
300	250	350
350	350	500
400	400	600

Example D8 Motor Circuit Conductors, Overload Protection, and Short-Circuit and Ground-Fault Protection

(see 240.6, 430.6, 430.22, 430.23, 430.24, 430.32, 430.52, and 430.62, Table 430.52(C)(1), and Table 430.250)

Determine the minimum required conductor ampacity, the motor overload protection, the branch-circuit short-circuit and ground-fault protection, and the feeder protection, for three induction-type motors on a 480-V, 3-phase feeder, as follows:

(a) One 25-hp, 460-V, 3-phase, squirrel-cage motor, nameplate full-load current 32 A, Design B, Service Factor 1.15

(b) Two 30-hp, 460-V, 3-phase, wound-rotor motors, nameplate primary full-load current 38 A, nameplate secondary full-load current 65 A, 40°C rise

Conductor Ampacity

The full-load current value used to determine the minimum required conductor ampacity is obtained from Table 430.250*[see 430.6(A)]* for the squirrel-cage motor and the primary of the wound-rotor motors. To obtain the minimum required conductor ampacity, the full-load current is multiplied by 1.25 *[see 430.22 and 430.23(A)]*.

For the 25-hp motor,

34 A × 1.25 = 43 A

For the 30-horsepower motors,

40 A × 1.25 = 50 A

65 A × 1.25 = 81 A

Motor Overload Protection

Where protected by a separate overload device, the motors are required to have overload protection rated or set to trip at not more than 125% of the nameplate full-load current *[see 430.6(A) and 430.32(A)(1)]*.

For the 25-hp motor,

32 A × 1.25 = 40.0 A

For the 30-hp motors,

38 A × 1.25 = 48 A

Where the separate overload device is an overload relay (not a fuse or circuit breaker), and the overload device selected at 125% is not sufficient to start the motor or carry the load, the trip setting is permitted to be increased in accordance with 430.32(C).

Branch-Circuit Short-Circuit and Ground-Fault Protection

The selection of the rating of the protective device depends on the type of motor and the protective device selected, in accordance with 430.52 and Table 430.52(C)(1). The following is for the 25-hp squirrel-cage motor:

(a) Nontime-Delay Fuse: The fuse rating is 300% × 34 A = 102 A. The next larger standard fuse is 110 A *[see 240.6 and 430.52(C)(1)(a)]*. If the motor will not start with a 110-A nontime-delay fuse, the fuse rating is permitted to be increased to 125 A because this rating does not exceed 400% *[see 430.52(C)(1)(b)]*.

(b) Time-Delay Fuse: The fuse rating is 175% × 34 A = 59.5 A. The next larger standard fuse is 60 A *[see 240.6 and 430.52(C)(1)(a)]*. If the motor will not start with a 60-A time-delay fuse, the fuse rating is permitted to be increased to 70 A because this rating does not exceed 225% *[see 430.52(C)(1)(b)]*.

The following is for the 30-hp wound-rotor motors:

(a) Nontime-Delay Fuse: The fuse rating is 150% × 40 A = 60 A. If the motor will not start with a 60-A nontime-delay fuse, the fuse rating is permitted to be increased to 150 A because this rating does not exceed 400% *[see 430.52(C)(1)(b)]*.

(b) Time-Delay Fuse: The fuse rating is 150% × 40 A = 60 A. If the motor will not start with a 60-A time-delay fuse, the fuse rating is permitted to be increased to 90 A because this rating does not exceed 225% *[see 430.52(C)(1)(b)]*.

(c) Inverse Time Circuit Breaker: The breaker rating is 150% × 40 A = 60 A. If the motor will not start with a 60-A breaker, the breaker rating is permitted to be increased to 150 A because this rating does not exceed 400% *[see 430.52(C)(1)(b), for motor full-load currents of 100 A or less]*.

Feeder Short-Circuit and Ground-Fault Protection

(a) Example using nontime-delay fuse. The rating of the feeder protective device is based on the sum of the largest branch-circuit protective device for the specific type of device protecting the feeder. In the previous step above, the calculation for the 25 hp squirrel-cage motor results in the largest branch-circuit protective device: 300% × 34 A = 102 A (therefore the next largest standard size, 110 A, would be used) plus the sum of the full-load currents of the other motors, or 110 A + 40 A + 40 A = 190 A. The nearest standard fuse that does not exceed this value is 175 A *[see 240.6, Table 430.52(C)(1), and 430.62(A)]*.

(b) Example using inverse time circuit breaker. The largest branch-circuit protective device for the specific type of device protecting the feeder. The calculation for the 25-hp squirrel-cage motor results in the largest branch-circuit protective device, 250% × 34 A = 85. The next larger standard size is 90 A, plus the sum of the full-load currents of the other motors, or 90 A + 40 A + 40 A = 170 A. The nearest standard inverse time circuit breaker that does not exceed this value is 150 A *[see 240.6, Table 430.52(C)(1), and 430.62(A)]*.

Example D9 Feeder Ampacity Determination for Generator Field Control

[see 215.4, 430.24, 430.24 Exception No. 1, 620.13, 620.14, 620.61, and Table 430.22(E)]

Determine the conductor ampacity for a 460-V 3-phase, 60-Hz ac feeder supplying a group of six elevators. The 460-V ac drive motor nameplate rating of the largest MG set for one elevator is 40 hp and 52 A, and the remaining elevators each have a 30-hp, 40-A, ac drive motor rating for their MG sets. In addition to a motor controller, each elevator has a separate motion/operation controller rated 10 A continuous to operate microprocessors, relays, power supplies, and the elevator car door operator. The MG sets are rated continuous.

Conductor Ampacity

Conductor ampacity is determined as follows:

(a) In accordance with 620.13(D) and 620.61(B)(1), use Table 430.22(E), for intermittent duty (elevators). For intermittent duty using a continuous rated motor, the percentage of nameplate current rating to be used is 140%.

(b) For the 30-hp ac drive motor,

140% × 40 A = 56 A

(c) For the 40-hp ac drive motor,

140% × 52 A = 73 A(I)

(d) The total conductor ampacity is the sum of all the motor currents:

(1 motor × 73 A) + (5 motors × 56 A) = 353 A

(e) In accordance with 620.14 and Table 620.14, the conductor (feeder) ampacity would be permitted to be reduced by the use of a demand factor. Constant loads are not included *(see Table 620.14)*. For six elevators, the demand factor is 0.79. The feeder diverse ampacity is, therefore, 0.79 × 353 A = 279 A.

(f) In accordance with 430.24 and 215.5, the controller continuous current is 125% × 10 A = 13 A

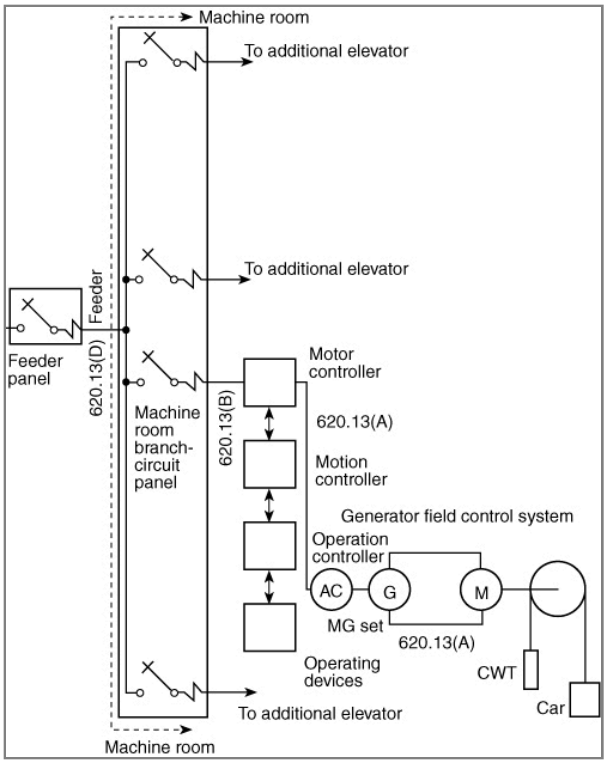
(g) The total feeder ampacity is the sum of the diverse current and all the controller continuous current.

I_{total} = 279 A + (6 elevators × 12.5 A) = 354 A

(h) This ampacity would be permitted to be used to select the wire size.

See Figure D9.

Figure D9 Generator Field Control.



Example D10 Feeder Ampacity Determination for Adjustable Speed Drive Control [see 215.4, 430.24, 620.13, 620.14, 620.61, and Table 430.22(E)]

Determine the conductor ampacity for a 460-V, 3-phase, 60-Hz ac feeder supplying a group of six identical elevators. The system is adjustable-speed SCR dc drive. The power transformers are external to the drive (motor controller) cabinet. Each elevator has a separate motion/operation controller connected to the load side of the main line disconnect switch rated 10 A continuous to operate microprocessors, relays, power supplies, and the elevator car door operator. Each transformer is rated 95 kVA with an efficiency of 90%.

Conductor Ampacity

Conductor ampacity is determined as follows:

(a) Calculate the nameplate rating of the transformer:

$$I = \frac{95\ \text{kVA} \times 1000}{\sqrt{3} \times 460\ \text{V} \times 0.90_{\text{eff.}}} = 133\ \text{A} \qquad \textbf{[D10]}$$

(b) In accordance with 620.13(D), for six elevators, the total conductor ampacity is the sum of all the currents.

6 elevators × 133 A = 798 A

(c) In accordance with 620.14 and Table 620.14, the conductor (feeder) ampacity would be permitted to be reduced by the use of a demand factor. Constant loads are not included *(see 620.13, Informational Note No. 2)*. For six elevators, the demand factor is 0.79. The feeder diverse ampacity is, therefore, 0.79 × 798 A = 630 A.

(d) In accordance with 430.24 and 215.5, the controller continuous current is 125% × 10 A = 13 A.

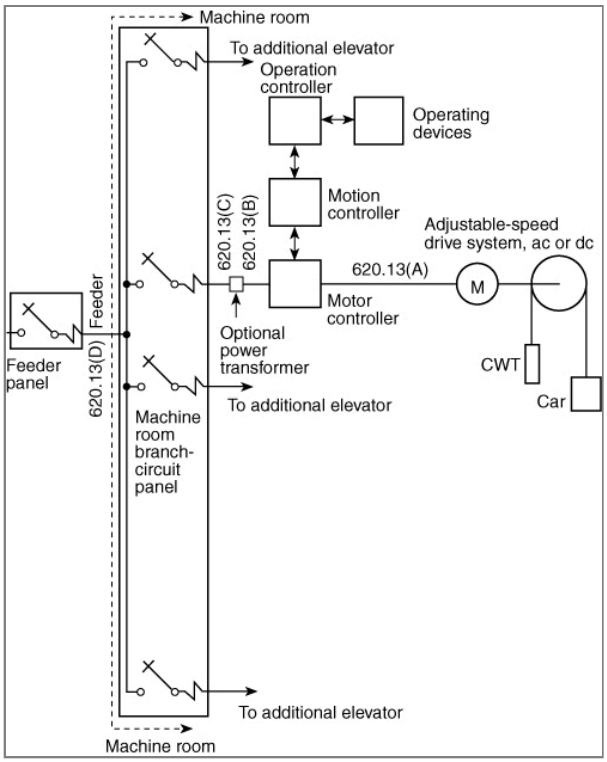
(e) The total feeder ampacity is the sum of the diverse current and all the controller constant current.

I_{total} = 630 A + (6 elevators × 12.5 A) = 705 A

(f) This ampacity would be permitted to be used to select the wire size.

See Figure D10.

Figure D10 Adjustable Speed Drive Control.



Example D11 Mobile Home

(see 550.18)

A mobile home floor is 70 ft by 10 ft and has two small appliance circuits; a 1000-VA, 240-V heater; a 200-VA, 120-V exhaust fan; a 400-VA, 120-V dishwasher; and a 7000-VA electric range.

Lighting and Small-Appliance Load

Lighting (70 ft × 10 ft × 3 VA per ft^2)		2,100 VA
Small-appliance (1500 VA× 2 circuits)		3,000 VA
Laundry (1500 VA × 1 circuit)		1,500 VA
	Subtotal	6,600 VA
First 3000 VA at 100%		3,000 VA
Remainder (6600 VA – 3000 VA = 3600 VA) × 35%		1,260 VA
	Total	4,260 VA

4260 VA ÷ 240 V = 17.75 A per leg

Amperes per Leg	Leg A	Leg B
Lighting and appliances	18	18
Heater (1000 VA ÷ 240 V)	4	4
Fan (200 VA × 125% ÷ 120 V)	2	—
Dishwasher (400 VA ÷ 120 V)	—	3
Range (7000 VA × 0.8 ÷ 240 V)	23	23
Total amperes per leg	47	48

Based on the higher current calculated for either leg, a minimum 50-A supply cord would be required.

For SI units, 0.093 m^2 = 1 ft^2 and 0.3048 m = 1 ft.

Example D12 Park Trailer

(see 552.47)

A park trailer floor is 40 ft by 10 ft and has two small appliance circuits, a 1000-VA, 240-V heater, a 200-VA, 120-V exhaust fan, a 400-VA, 120-V dishwasher, and a 7000-VA electric range.

Lighting and Small-Appliance Load		
Lighting (40 ft × 10 ft × 3 VA per ft^2)		1,200 VA
Small-appliance (1500 VA× 2 circuits)		3,000 VA
Laundry (1500 VA × 1 circuit)		1,500 VA
	Subtotal	5,700 VA
First 3000 VA at 100%		3,000 VA
Remainder (5700 VA – 3000 VA = 2700 VA) × 35%		945 VA
	Total	3,945 VA

3945 VA÷ 240 V = 16.44 A per leg

Amperes per Leg	Leg A	Leg B
Lighting and appliances	16	16
Heater (1000 VA ÷ 240 V)	4	4
Fan (200 VA × 125% ÷ 120 V)	2	—
Dishwasher (400 VA ÷ 120 V)	—	3
Range (7000 VA × 0.8 ÷ 240 V)	23	23
Totals	45	46

Based on the higher current calculated for either leg, a minimum 50-A supply cord would be required.

For SI units, 0.093 m^2 = 1 ft^2 and 0.3048 m = 1 ft.

Example D13 Cable Tray Calculations

(See Article 392)

Multiconductor Cables 4/0 AWG and Larger

Use: *NEC*392.22(A)(1)(a)

Cable tray must have an inside width equal to or greater than the sum of the diameters (Sd) of the cables, which must be installed in a single layer.

Example: Cable tray width is obtained as follows:

Cable Size Being Used	(OD) Cable Outside Diameters (in.)	(N) Number of Cables	SD = (OD) × (N) (Sum of the Cable Diameters) (in.)
3–conductor Type MC cable — 4/0 AWG	1.57	12	18.84

The sum of the diameters (Sd) of all cables = 18.84 in., therefore a cable tray with an inside width of at least 18.84 in. is required.

Note: Cable outside diameter is a nominal diameter from catalog data.

Multiconductor Cables Smaller Than 4/0 AWG

Use: *NEC*392.22(A)(1)(b)

The sum of the cross-sectional areas of all the cables to be installed in the cable tray must be equal to or less than the allowable cable area for the tray width, as indicated in Table 392.22(A)(1), Column 1.

Table D13(b) from Table 392.22(A), Column 1

Inside Width of Cable Tray (in.)	Allowable Cable Area ($in.^2$)
6	7.0
9	10.5
12	14.0
18	21.0
24	28.0
30	35.0
36	42.0

Example: Cable tray width is obtained as follows:

Cable Size Being Used	(A) Cable Cross-Sectional Area ($in.^2$)	(N) Number of Cables	Multiply (A) × (N) (Which Is a Total Cable Cross-Sectional Area in $in.^2$)
4-conductor Type MC cable — 1 AWG	1.1350	9	12.15

The total cable cross-sectional area is 12.15 $in.^2$. Using Table D13(b) above, the next higher allowable cable area must be used, which is 14.0 $in.^2$. The table specifies that the cable tray inside width for an allowable cable area of 14.0 $in.^2$ is 12 in.

Note: Cable cross-sectional area is a nominal area from catalog data.

Single Conductor Cables 1/0 AWG through 4/0 AWG

Use: *NEC*392.22(B)(1)(d)

Cable tray must have an inside width equal to or greater than the sum of the diameters (Sd) of the cables. The cables must be evenly distributed across the cable tray.

Example: Cable tray width is obtained as follows:

Single Conductor Cable Size Being Used	(OD) Cable Outside Diameters (in.)	(N) Number of Cables	Sd = (OD) × (N) (Sum of the Cable Diameters) (in.)
THHN — 4/0 AWG	0.642	18	11.556

The sum of the diameters (Sd) of all cables = 11.56 in., therefore, a cable tray with an inside width of at least 11.56 in. is required.

Note: Cable outside diameter from Chapter 9, Table 5.

Single Conductor Cables 250 kcmil through 900 kcmil

Use: *NEC*392.22(B)(1)(b)

The sum of the cross-sectional areas of all the cables to be installed in the cable tray must be equal to or less than the allowable cable area for the tray width, as indicated in Table 392.22(B)(1), Column 1.

Table D13(d) from Table 392.22(B)(1), Column 1

Inside Width of Cable Tray (in.)	Allowable Cable Area ($in.^2$)
6	6.5
9	9.5
12	13.0
18	19.5
24	26.0
30	32.5
36	39.0

Example: Cable tray width is obtained as follows:

Cable Size Being Used	(A) Cable Cross-Sectional Area ($in.^2$)	(N) Number of Cables	Multiply (A) × (N) (Which Is a Total Cable Cross-Sectional Area in $in.^2$)
THHN — 500 kcmil	0.707	9	6.36

The total cable cross-sectional area is 6.36 $in.^2$. Using Table D13(d), the next higher allowable cable area must be used, which is 6.5 $in.^2$. The table specifies that the cable tray inside width for an allowable cable area of 6.5 $in.^2$ is 6 in.

Note: Single-conductor cable cross-sectional area from Chapter 9, Table 5.

Example D14 Grounded Service Conductor

[see 250.24(D)]

A service installation has four parallel sets of 350 kcmil ungrounded service entrance conductors. All conductors are copper. No additional considerations for adjustments or corrections are included.

(A) Parallel Grounded Service Conductors in a Single Raceway/Wireway

Section 250.24(D)(1) requires a single grounded conductor to be installed in the raceway and be not smaller than specified in Table 250.102(C)(2). The size of the grounded conductor is based off the size of the equivalent area for parallel conductors.

350 kcmil × 4 = 1400 kcmil of equivalent area

According to Table 250.102(C)(2), Note 1, the grounded conductor is required not be smaller than 12.5 percent of the equivalent area of the parallel ungrounded conductors.

1400 kcmil × 12.5% = 175 kcmil

The smallest standard size wire that meets this criteria is 4/0 AWG copper.

(B) Parallel Grounded Service Conductors in Four Separate Raceways/Wireways

Section 250.24(D) states that a grounded conductor is to be routed with the ungrounded service conductors. There will be four grounded service conductors in total, one in each raceway or wireway. Section 250.24(D)(2) requires that each grounded conductor be sized in accordance with Table 250.102(C)(2), based on the size of the largest ungrounded conductor in the raceway, and not smaller than 1/0 AWG. See 310.10(G) for the requirements of circuit conductors installed in parallel. For this installation, Table 250.102(C)(2) would require the installation of a #2 conductor in each raceway. However, 250.24(D)(2) states that the grounded conductor installed is required not be smaller than 1/0 AWG. A 1/0 AWG copper grounded service conductor is required to be installed in each of the four raceways containing ungrounded service conductors.

(C) Parallel Grounded Service Conductors in Two Separate Raceways/Wireways

As noted in D14(B), a grounded conductor is required to be routed with the ungrounded service conductors. In this example, two parallel sets of the 350 kcmil ungrounded service conductors will be installed in each raceway or wireway. There will be two grounded service conductors in total, one in each raceway or wireway. Section 250.24(D)(2) applies, as well as the rules in 310.10(G). With two sets installed in one raceway, the size of the grounded conductor is required to be sized in accordance with Table 250.102(C)(2), and based off the equivalent area of the two sets of 350 kcmil ungrounded service conductors, or 700 kcmil. A 2/0 AWG grounded service conductor is required to be installed in each of the two raceways containing ungrounded service conductors.

Example D.15 Load Calculations Using Power Control Systems (PCS)

A new dwelling has a total service load of 29,040 volt-amperes (121 amperes, 240 volts) calculated according to Article 120, Parts III through VII. The available service from the electric utility is limited to 100 amperes. In order to accommodate the connected loads on the 100 ampere service, a power control system is used in accordance with 120.7. Examples D14(a) through D14(d) illustrate treatment of different PCS configurations in load calculations for the service.

Example D15(a) Monitoring Controlled and Noncontrolled Loads, 50 Ampere EVSE

The EVSE rated at 12,000 volt-amperes (50 amperes, 240 volts) is controlled by a PCS. The PCS is configured to monitor the service and to modulate the EVSE demand whenever the service exceeds the current setpoint of the PCS. The minimum operating current of the EVSE is 0 amperes. The PCS current setpoint is established by qualified personnel at 80 amperes, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors both controlled and noncontrolled loads, so the controlled EVSE is treated using the minimum operating current of the PCS. The noncontrolled loads are treated as specified in Article 120, Parts III through VII.

Total Load Before Application of the PCS

29,040 volt amperes (121 amperes, 240 volts)

Example D15(a) Monitoring Controlled and Noncontrolled Loads, 50 A EVSE

The EVSE rated at 12,000 volt-amperes (50 amperes, 240 volts) is controlled by a PCS. The PCS is configured to monitor the service and to modulate the EVSE demand whenever the service exceeds the current setpoint of the PCS. The minimum operating current of the EVSE is 0 A. The PCS current setpoint is established by qualified personnel at 80 A, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors both controlled and noncontrolled loads, so the controlled EVSE is treated using the minimum operating current of the PCS. The noncontrolled loads are treated as specified in Article 120, Parts III through VII.

Total Load Before Application of the PCS

29,040 volt amperes (121 amperes, 240 volts)

Application of the PCS

Noncontrolled loads: Treated according to Article 120, Parts III through VII = 17,040 volt-amperes (71 amperes, 240 volts)

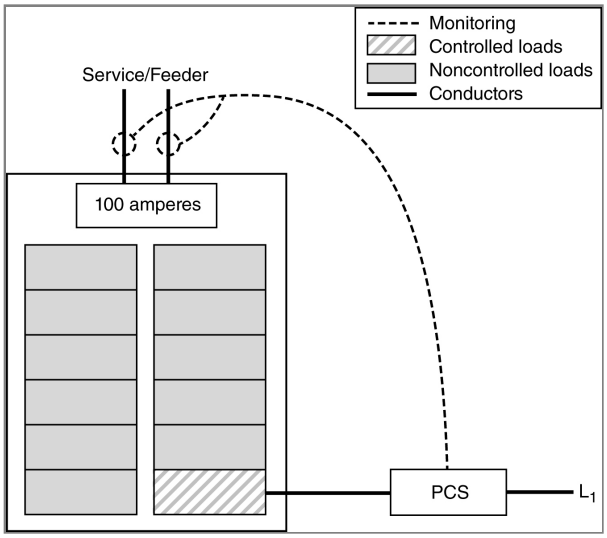
Controlled loads: Treated at minimum operating current of PCS = 0 volt-amperes (0 amperes, 240 volts)

Total Load After Application of the PCS

Total service load is noncontrolled plus controlled loads = 17,040 volt-amperes (71 amperes, 240 volts)

See Figure D.15(a).

Figure D.15(a) Monitoring Controlled and Noncontrolled Loads, 50 Amperes EVSE.



Example D15(b) Monitoring Controlled and Noncontrolled Loads, 30 Amperes EVSE

The EVSE rated at 7,200 volt-amperes (30 amperes, 240 volts) is controlled by a PCS. The PCS is configured to monitor the service and to modulate the EVSE demand whenever the service exceeds the current setpoint of the PCS. The minimum operating current of the EVSE is 8 amperes. The PCS current setpoint is established by qualified personnel at 80 amperes, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors both controlled and noncontrolled loads, so the controlled EVSE is treated using the minimum operating current of the PCS. The noncontrolled loads are treated as specified in Article 120, Parts III through VII.

Total Load Before Application of the PCS

29,040 volt-amperes (121 amperes, 240 volts)

Application of the PCS

Noncontrolled loads: Treated according to Article 120, Parts III through VII = 21,840 volt-amperes (91 amperes, 240 volts)

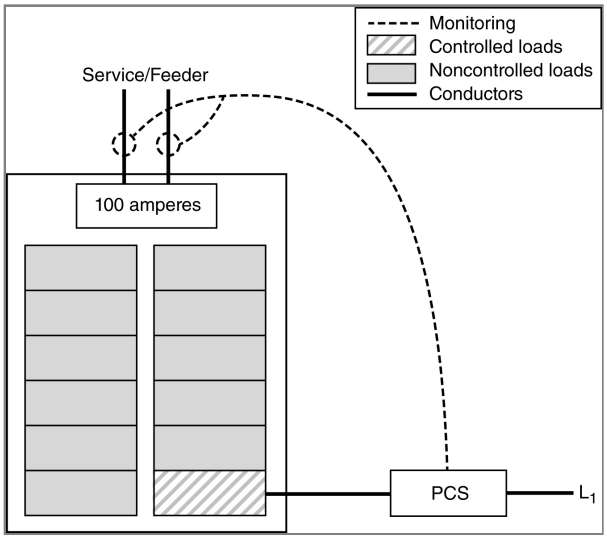
Controlled loads: Treated at minimum operating current of PCS = 1,920 volt-amperes (8 amperes, 240 volts)

Total Load After Application of the PCS

Total service load is noncontrolled plus controlled loads = 23,760 volt-amperes (99 amperes, 240 volts)

See Figure D.15(b).

Figure D.15(b) Monitoring Controlled and Noncontrolled Loads, 30 Amperes EVSE.



Example D15(c) Monitoring Only Controlled Loads, 35 Amperes EVSE, 20 Amperes Pool Pump, and 30 Amperes HVAC Heat Pump

The EVSE rated at 8,400 volt-amperes (35 amperes, 240 volts), pool pump rated at 4,800 volt-amperes (20 amperes, 240 volts) and HVAC heat pump rated at 7,200 volt-amperes (30 amperes, 240 volts) are all placed under PCS control. The PCS is configured to monitor each of the branch circuits serving the three loads being controlled. The PCS modulates the EVSE, pool pump and HVAC heat pump loads to ensure that their combined demand does not exceed the current setpoint of the PCS. The PCS current setpoint is established by qualified personnel at 35 amperes, which is less than the maximum 80 percent of the 100 ampere OCPD protecting the service. Each individual branch circuit remains protected by its own OCPD. In this configuration, the PCS monitors only the controlled loads, so the controlled EVSE, pool pump, and HVAC heat pump are treated in service load calculations using the PCS current setpoint of 35 amperes. The noncontrolled loads are treated as specified in Article 120, Parts III through VII.

Total Load Before Application of the PCS

29,040 volt amperes (121 amperes, 240 volts)

Application of the PCS

Noncontrolled loads: Treated according to Article 120, Parts III through VII = 14,640 volt-amperes (61 amperes, 240 volts)

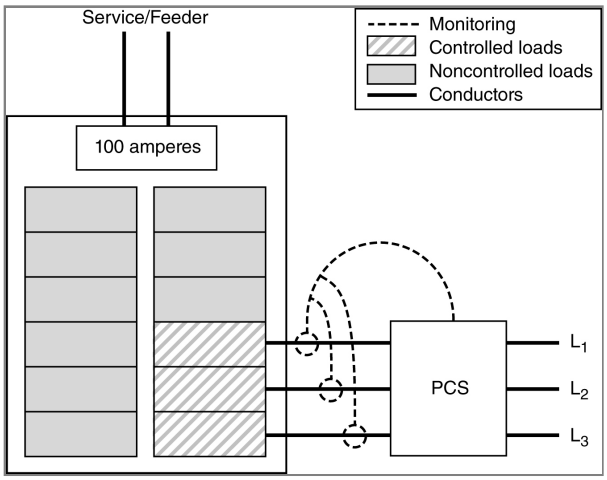
Controlled loads: Treated at current setpoint of PCS = 8,400 volt-amperes (35 amperes, 240 volts)

Total Load After Application of the PCS

Total service load is noncontrolled plus controlled loads = 23,040 volt-amperes (96 amperes, 240 volts)

See Figure D.15(c).

Figure D.15(c) Monitoring Only Controlled Loads, 35 Amperes EVSE, 20 Amperes Pool Pump, and 30 Amperes HVAC Heat Pump.



Example D15(d) Monitoring Only Controlled Loads, All Loads Controlled

The PCS is configured to monitor the service and to modulate all loads. The PCS current setpoint is established by qualified personnel at 80 amperes, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors only controlled loads, so the controlled loads are treated in service load calculations using the PCS current setpoint of 80 amperes.

Total Load Before Application of the PCS

29,040 volt amperes (121 amperes, 240 volts)

Application of the PCS

Noncontrolled loads: Treated according to Article 120, Parts III through VII = 0 volt-amperes (0 amperes, 240 volts)

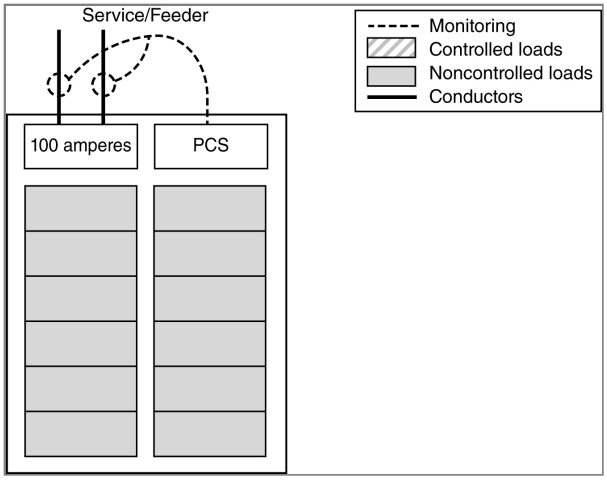
Controlled loads: Treated at current setpoint current of PCS = 19,200 volt-amperes (80 amperes, 240 volt)

Total Load After Application of the PCS

Total service load is noncontrolled plus controlled loads = 19,200 volt-amperes (80 amperes, 240 volt)

See Figure D.15(d).

Figure D.15(d) Monitoring Only Controlled Loads, All Loads Controlled.



Additional Proposed Changes

File Name	Description	Approved
CN_215.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 215 appeared in the First Draft Report.

The Correlating Committee directs CMP 2 to review the examples in Annex D to ensure the examples accurately reflect the revisions made to Article 220 requirements in the first draft.

Related Item

• Correlating Committee Note No. 215

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
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Submittal Date: Tue Jul 30 23:11:18 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 215-NFPA 70-2024 [Annex D]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 12:08:42 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP 2 to review the examples in Annex D to ensure the examples accurately reflect the revisions made to Article 220 requirements 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. 1942-NFPA 70-2024 [Definition: Example D.15 Load Calculations Using Power Cont...]

Example D.15 Load Calculations Using Power Control Systems (PCS)

A new dwelling has a total service load of 29,040 volt-amperes (121 amperes, 240 volts) calculated according to Article 120, Parts III through VII. The available service from the electric utility is limited to 100 amperes. In order to accommodate the connected loads on the 100 ampere service, a power control system is used in accordance with 120.7. Examples ~~D14~~ D15 (a) through ~~D14~~ D15 (~~d~~ c) illustrate treatment of different PCS configurations in load calculations for the service.

Example D15(a) ~~Monitoring Controlled and Noncontrolled Loads, 50 Ampere EVSE~~ Total Circuit Load Managed by a PCS, with Noncontrolled Loads

The EVSE rated at 12,000 volt-amperes (50 amperes, 240 volts) is controlled by a PCS. A part of its PCS evaluation, the EVSE has the ability to reduce its load down to 0A as commanded by the PCS control system. The PCS is configured to monitor the service and to modulate the EVSE demand whenever the service exceeds the current setpoint of the PCS. ~~The minimum operating current of the EVSE is 0 amperes. The PCS current setpoint~~ The PCS control setpoint is established by qualified personnel at 80 amperes, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors both controlled and noncontrolled loads ~~, so the controlled EVSE is treated using the minimum operating current of the PCS. The~~ on the service/feeder conductors, and will adjust the controlled EVSE load to prevent overload of those conductors. The noncontrolled loads are treated as specified in Article 120, Parts III through VII.

Total Load Before Application of the PCS

29,040 volt amperes (121 amperes, 240 volts)

~~***Example D15(a) Monitoring Controlled and Noncontrolled Loads, 50 A EVSE***~~

~~The EVSE rated at 12,000 volt-amperes (50 amperes, 240 volts) is controlled by a PCS. The PCS is configured to monitor the service and to modulate the EVSE demand whenever the service exceeds the current setpoint of the PCS. The minimum operating current of the EVSE is 0 A. The PCS current setpoint is established by qualified personnel at 80 A, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors both controlled and noncontrolled loads, so the controlled EVSE is treated using the minimum operating current of the PCS. The noncontrolled loads are treated as specified in Article 120 , Parts III through VII.~~

~~***Total Load Before Application of the PCS***~~

~~29,040 volt amperes (121 amperes~~

Application of the PCS

PCS control setpoint: 19,200 volt-amperes (80A , 240 volts)

~~***Application of the PCS***~~

Noncontrolled loads: Treated according to Article 120, Parts III through VII = 17,040 volt-amperes (71 amperes, 240 volts)

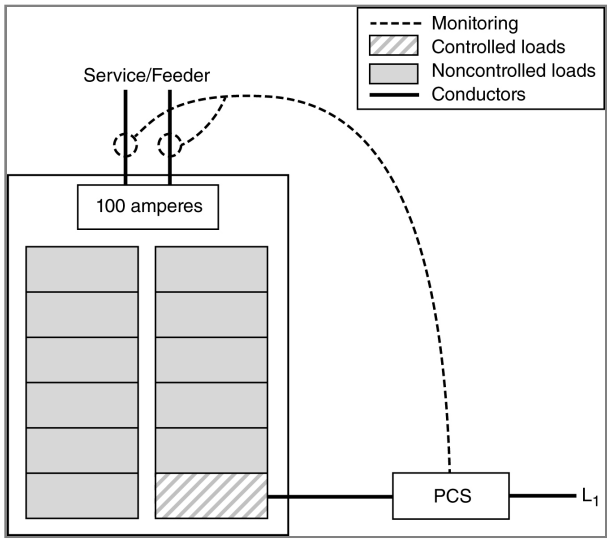
~~Controlled loads: Treated at minimum operating current of PCS = 0 volt-amperes (0 amperes, 240 volts)~~

Total Load After Application of the PCS

~~Total~~ Since the PCS control setpoint is greater than the total connected noncontrolled load, the total service load is ~~noncontrolled plus controlled loads~~ = ~~17~~ 19 ,~~040~~ 200 volt-amperes (~~71 amperes~~ 80 amperes , 240 volts)

See Figure D.15(a).

Figure D.15(a) ~~Monitoring Controlled and Noncontrolled Loads, 50 Amperes EVSE~~ Example Total Circuit Load Managed by a PCS .



Example D15(b)

Monitoring Controlled and Noncontrolled Loads, 30 Amperes EVSE

The EVSE rated at 7,200 volt-amperes (30 amperes, 240 volts) is controlled by a PCS. The PCS is configured to monitor the service and to modulate the EVSE demand whenever the service exceeds the current setpoint of the PCS. The minimum operating current of the EVSE is 8 amperes. The PCS current setpoint is established by qualified personnel at 80 amperes, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors both controlled and noncontrolled loads, so the controlled EVSE is treated using the minimum operating current of the PCS. The noncontrolled loads are treated as specified in Article 120 , Parts III through VII.

Total Load Before Application of the PCS

29,040 volt-amperes (121 amperes, 240 volts)

Application of the PCS

Noncontrolled loads: Treated according to Article 120 , Parts III through VII = 21,840 volt-amperes (91 amperes, 240 volts)

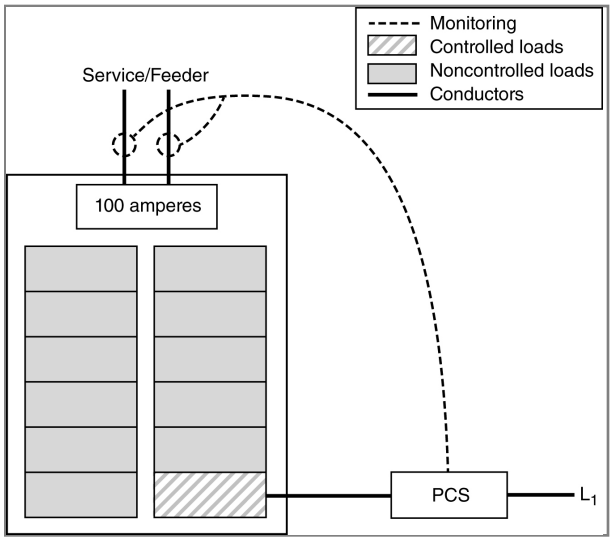
Controlled loads: Treated at minimum operating current of PCS = 1,920 volt-amperes (8 amperes, 240 volts)

Total Load After Application of the PCS

Total service load is noncontrolled plus controlled loads = 23,760 volt-amperes (99 amperes, 240 volts)

See Figure D.15(b) .

Figure D.15(b) Monitoring Controlled and Noncontrolled Loads, 30 Amperes EVSE.



Example D15(c) Monitoring Only Controlled Loads, 35 Amperes EVSE, 20 Amperes Pool Pump, and 30 Amperes HVAC Heat Pump

Partial Circuit Load Managed by PCS , with both PCS and Noncontrolled Loads

The EVSE rated at 8,400 volt-amperes (35 amperes, 240 volts), pool pump rated at 4,800 volt-amperes (20 amperes, 240 volts) and HVAC heat pump rated at 7,200 volt-amperes (30 amperes, 240 volts) are all placed under PCS control. The PCS is configured to monitor each of the branch circuits serving the three loads being controlled. The PCS modulates the EVSE, pool pump and HVAC heat pump loads to ensure that their combined demand does not exceed the current setpoint of the PCS. The PCS current setpoint is established by qualified personnel at 35 amperes, which is less than the maximum 80 percent of the 100 ampere OCPD protecting the service. Each individual branch circuit remains protected by its own OCPD. In this configuration, the PCS monitors only

~~the controlled loads~~

a portion of the connected load to the service , so the controlled EVSE, pool pump, and HVAC heat pump are treated in service load calculations using the PCS current setpoint of 35 amperes. The noncontrolled loads are treated as specified in Article 120 , Parts III through VII.

Total Load Before Application of the PCS

29,040 volt amperes (121 amperes, 240 volts)

Application of the PCS

Noncontrolled loads: Treated according to Article 120 , Parts III through VII = 14,640 volt-amperes (61 amperes, 240 volts)

~~Controlled loads: Treated at current setpoint of PCS =~~

PCS control setpoint: 8,400 volt-amperes (35 amperes, 240 volts)

Total Load After Application of the PCS

Total service load is noncontrolled plus

~~controlled loads~~

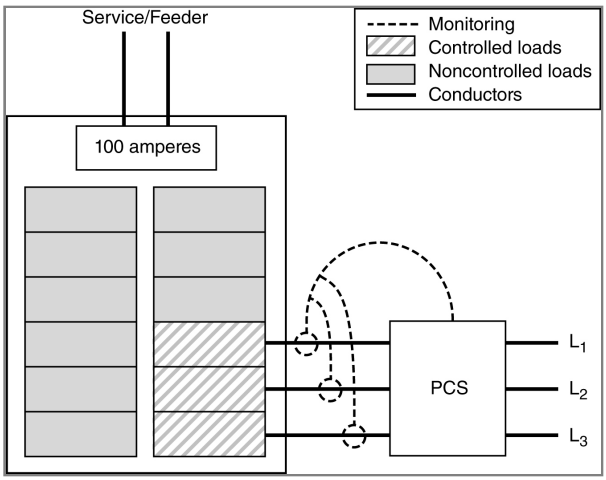
the PCS control setpoint = 23,040 volt-amperes (96 amperes, 240 volts)

See Figure D.15(c) .

Figure D.15(

~~c) Monitoring Only Controlled Loads, 35 Amperes EVSE, 20 Amperes Pool Pump, and 30 Amperes HVAC Heat Pump~~

b) Partial Circuit Load Managed by PCS, with both PCS and Noncontrolled Loads .



Example D15(

~~d) Monitoring Only Controlled Loads, All Loads Controlled~~

c) . Total Circuit Load Managed by a PCS, with No Noncontrolled Loads

The PCS is configured to monitor the service and to modulate all loads. The PCS current setpoint is established by qualified personnel at 80 amperes, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors

~~only controlled~~

the entire load on the service, and there are no noncontrolled loads, so the

~~controlled~~

total of all connected loads are treated in service load calculations using the PCS current setpoint of 80 amperes.

Total Load Before Application of the PCS

29,040 volt amperes (121 amperes, 240 volts)

Application of the PCS

Noncontrolled loads: Treated according to Article 120 , Parts III through VII = 0 volt-amperes (0 amperes, 240 volts)

~~Controlled loads: Treated at current setpoint current of PCS = 19~~

PCS control setpoint: 19 ,200 volt-amperes (80 amperes, 240 volt)

Total Load After Application of the PCS

~~Total service load is noncontrolled plus controlled loads~~

Since the PCS control setpoint is greater than the total connected noncontrolled load, the total service load is = 19,200 volt-amperes (80 amperes, 240 volt)

See Figure D.15(

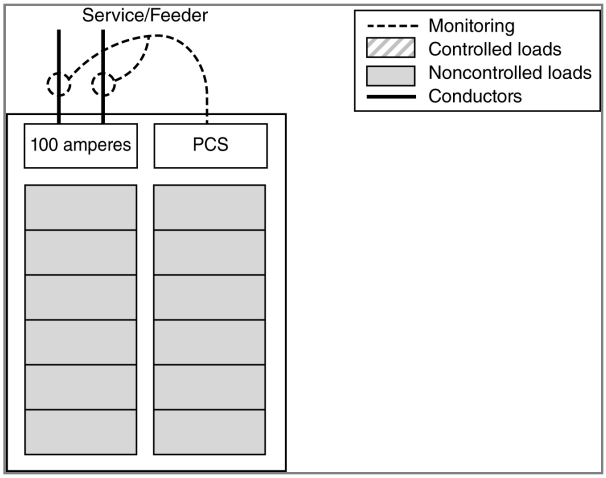
~~d~~

c) .

Figure D.15(

~~d) Monitoring Only Controlled Loads, All Loads Controlled.~~

c) Total Circuit Load Managed by a PCS, with No Noncontrolled Loads



Statement of Problem and Substantiation for Public Comment

The changes suggested to this section are intended to align with the changes proposed to section 120.7(C) in my related PC 1939.
While it appears that I have made many changes, the actual results are the same or similar to the first draft examples.
The need for these changes is to better align with different types of PCS applications and how they are addressed in related articles such as in 705.13, and most importantly, to align with the product standard that will be used for the listing of these systems UL 3141.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1939-NFPA 70-2024 [Section No. 120.7(C)]	Requirements covered in these examples
Public Comment No. 1939-NFPA 70-2024 [Section No. 120.7(C)]	

Related Item

- FR-8204

Submitter Information Verification

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Submittal Date: Wed Aug 28 11:59:35 EDT 2024
Committee: NEC-P02

Public Comment No. 526-NFPA 70-2024 [Definition: Example D.15 Load Calculations Using Power Cont...]

Example D.15 Load Calculations Using Power Control Systems (PCS)

A new dwelling has a total service load of 29,040 volt-amperes (121 amperes, 240 volts) calculated according to Article 120, Parts III through VII. The available service from the electric utility is limited to 100 amperes. In order to accommodate the connected loads on the 100 ampere service, a power control system is used in accordance with 120.7. Examples D14(a) through D14(d) illustrate treatment of different PCS configurations in load calculations for the service.

Example D15(a) Monitoring Controlled and Noncontrolled Loads, 50 Ampere EVSE

The EVSE rated at 12,000 volt-amperes (50 amperes, 240 volts) is controlled by a PCS. The PCS is configured to monitor the service and to modulate the EVSE demand whenever the service exceeds the current setpoint of the PCS. The minimum operating current of the EVSE is 0 amperes. The PCS current setpoint is established by qualified personnel at 80 amperes, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors both controlled and noncontrolled loads, so the controlled EVSE is treated using the minimum operating current of the PCS. The noncontrolled loads are treated as specified in Article 120, Parts III through VII.

Total Load Before Application of the PCS

29,040 volt amperes (121 amperes, 240 volts)

Example D15(a) Monitoring Controlled and Noncontrolled Loads, 50 A EVSE

The EVSE rated at 12,000 volt-amperes (50 amperes, 240 volts) is controlled by a PCS. The PCS is configured to monitor the service and to modulate the EVSE demand whenever the service exceeds the current setpoint of the PCS. The minimum operating current of the EVSE is 0 A. The PCS current setpoint is established by qualified personnel at 80 A, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors both controlled and noncontrolled loads, so the controlled EVSE is treated using the minimum operating current of the PCS. The noncontrolled loads are treated as specified in Article 120, Parts III through VII.

Total Load Before Application of the PCS

29,040 volt amperes (121 amperes, 240 volts)

Application of the PCS

Noncontrolled loads: Treated according to Article 120, Parts III through VII = 17,040 volt-amperes (71 amperes, 240 volts)

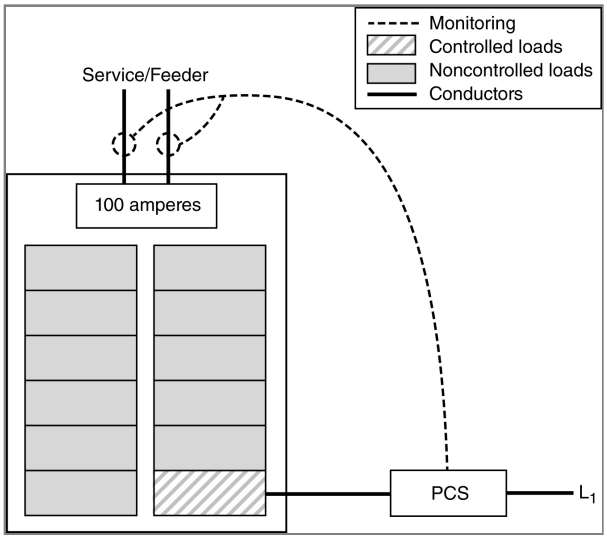
Controlled loads: Treated at minimum operating current of PCS = 0 volt-amperes (0 amperes, 240 volts)

Total Load After Application of the PCS

Total service load is noncontrolled plus controlled loads = 17,040 volt-amperes (71 amperes, 240 volts)

See Figure D.15(a).

Figure D.15(a) Monitoring Controlled and Noncontrolled Loads, 50 Amperes EVSE.



Example D15(b) Monitoring Controlled and Noncontrolled Loads, 30 Amperes EVSE

The EVSE rated at 7,200 volt-amperes (30 amperes, 240 volts) is controlled by a PCS. The PCS is configured to monitor the service and to modulate the EVSE demand whenever the service exceeds the current setpoint of the PCS. The minimum operating current of the EVSE is 8 amperes. The PCS current setpoint is established by qualified personnel at 80 amperes, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors both controlled and noncontrolled loads, so the controlled EVSE is treated using the minimum operating current of the PCS. The noncontrolled loads are treated as specified in Article 120, Parts III through VII.

Total Load Before Application of the PCS

29,040 volt-amperes (121 amperes, 240 volts)

Application of the PCS

Noncontrolled loads: Treated according to Article 120, Parts III through VII = 21,840 volt-amperes (91 amperes, 240 volts)

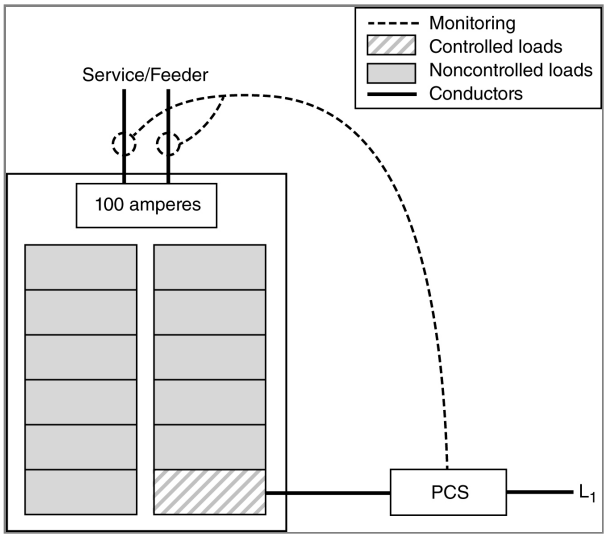
Controlled loads: Treated at minimum operating current of PCS = 1,920 volt-amperes (8 amperes, 240 volts)

Total Load After Application of the PCS

Total service load is noncontrolled plus controlled loads = 23,760 volt-amperes (99 amperes, 240 volts)

See Figure D.15(b).

Figure D.15(b) Monitoring Controlled and Noncontrolled Loads, 30 Amperes EVSE.



Example D15(c) Monitoring Only Controlled Loads, 35 Amperes EVSE, 20 Amperes Pool Pump, and 30 Amperes HVAC Heat Pump

The EVSE rated at 8,400 volt-amperes (35 amperes, 240 volts), pool pump rated at 4,800 volt-amperes (20 amperes, 240 volts) and HVAC heat pump rated at 7,200 volt-amperes (30 amperes, 240 volts) are all placed under PCS control. The PCS is configured to monitor each of the branch circuits serving the three loads being controlled. The PCS modulates the EVSE, pool pump and HVAC heat pump loads to ensure that their combined demand does not exceed the current setpoint of the PCS. The PCS current setpoint is established by qualified personnel at 35 amperes, which is less than the maximum 80 percent of the 100 ampere OCPD protecting the service. Each individual branch circuit remains protected by its own OCPD. In this configuration, the PCS monitors only the controlled loads, so the controlled EVSE, pool pump, and HVAC heat pump are treated in service load calculations using the PCS current setpoint of 35 amperes. The noncontrolled loads are treated as specified in Article 120, Parts III through VII.

Total Load Before Application of the PCS

29,040 volt amperes (121 amperes, 240 volts)

Application of the PCS

Noncontrolled loads: Treated according to Article 120, Parts III through VII = 14,640 volt-amperes (61 amperes, 240 volts)

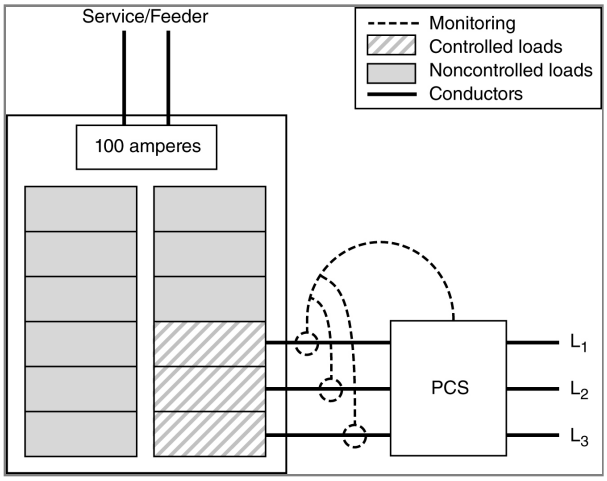
Controlled loads: Treated at current setpoint of PCS = 8,400 volt-amperes (35 amperes, 240 volts)

Total Load After Application of the PCS

Total service load is noncontrolled plus controlled loads = 23,040 volt-amperes (96 amperes, 240 volts)

See Figure D.15(c).

Figure D.15(c) Monitoring Only Controlled Loads, 35 Amperes EVSE, 20 Amperes Pool Pump, and 30 Amperes HVAC Heat Pump.



Example D15(d) Monitoring Only Controlled Loads, All Loads Controlled

The PCS is configured to monitor the service and to modulate all loads. The PCS current setpoint is established by qualified personnel at 80 amperes, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors only controlled loads, so the controlled loads are treated in service load calculations using the PCS current setpoint of 80 amperes.

Total Load Before Application of the PCS

29,040 volt amperes (121 amperes, 240 volts)

Application of the PCS

Noncontrolled loads: Treated according to Article 120, Parts III through VII = 0 volt-amperes (0 amperes, 240 volts)

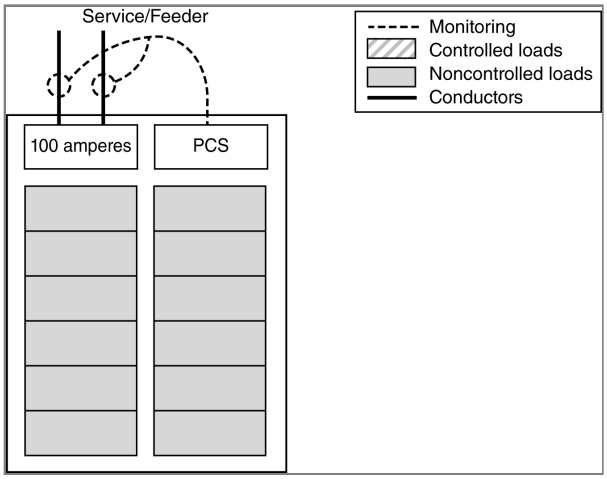
Controlled loads: Treated at current setpoint current of PCS = 19,200 volt-amperes (80 amperes, 240 volt)

Total Load After Application of the PCS

Total service load is noncontrolled plus controlled loads = 19,200 volt-amperes (80 amperes, 240 volt)

See Figure D.15(d).

Figure D.15(d) Monitoring Only Controlled Loads, All Loads Controlled.



Additional Proposed Changes

File Name	Description	Approved
CN_210.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 210 appeared in the First Draft Report on First Revision No. 8204.

The requirements in this section should be revised to correct references and align the terminology with Article 750, Part II, “EMS with PCS”, as determined by CMP 13 in FR 8095. References to Article 750 should be adjusted based on the relocation to Chapter 1, Article 130.

Related Item

• First Revision No. 8204

Submitter Information Verification

Submitter Full Name: CC Notes
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Submittal Date: Tue Jul 30 23:06:25 EDT 2024
Committee: NEC-P02

Correlating Committee Note No. 210-NFPA 70-2024 [Definition: Example D.15 Load Calculations Using Power Cont...]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 11:46:45 EDT 2024

Committee Statement

Committee Statement: The requirements in this section should be revised to correct references and align the terminology with Article 750, Part II, “EMS with PCS”, as determined by CMP 13 in FR 8095. References to Article 750 should be adjusted based on the relocation to Chapter 1, Article 130.

First Revision No. 8204-NFPA 70-2024 [New Definition after Definition: Example D13 Cable Tray Cal...]

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. 1078-NFPA 70-2024 [Definition: Example D1(b) One-Family Dwelling]

Example D1(b) One-Family Dwelling

Assume same conditions as Example No. D1(a), plus addition of one 6-A, 230-V, room air-conditioning unit and one 12-A, 115-V, room air-conditioning unit,* one 8-A, 115-V, rated waste disposer, and one 10-A, 120-V, rated dishwasher. See Article 430 for general motors and Article 440, Part VII, for air-conditioning equipment. Motors have nameplate ratings of 115 V and 230 V for use on 120-V and 240-V nominal voltage systems.

*(For feeder neutral, use larger of the two appliances for unbalance.)

From Example D1(a), feeder current is ~~78 A~~ 72 A (3-wire, 240 V).

	-	Line A	Neutral	Line B
Amperes from Example D1(a)	~~78~~ 72	~~61~~ 56	~~78~~ 72	
One 230-V air conditioner	6	—	6	
One 115-V air conditioner and 120-V dishwasher	12	12	10	
One 115-V disposer	—	8	8	
25% of air-conditioner *(see 440.33)*	3	3	2	
Total amperes per conductor	~~99~~ 93	~~84~~ 79	~~104~~ 98	

Therefore, the service would be rated

~~110 A~~

100 A .

Additional Proposed Changes

File Name	Description	Approved
Example_D1_for_PC.docx		

Statement of Problem and Substantiation for Public Comment

Although I do not agree with the reduction of VA per Sq Ft in a dwelling, Example D1 must be amended to reflect these changes. D1 is a commonly used example for users and the result of the changes made at First Revision should be shown.

An attached word document is provided if needed.

Thank You

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1345-NFPA 70-2024 [Definitions (D): General Loa... to Calculated ...]	
Public Comment No. 1347-NFPA 70-2024 [Definitions (D): General Loa... to Calculated ...]	

Related Item

• FR-8013

Submitter Information Verification

Submitter Full Name: Daniel Naughton
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State:
Zip:
Submittal Date: Wed Aug 14 06:17:11 EDT 2024
Committee: NEC-P02

Example D1(a) One-Family Dwelling

The dwelling has a floor area of 1500 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. Appliances are a 12-kW, 120/240 volt range and a 5.5-kW, 120/240volt dryer. Assume range and dryer kW ratings equivalent to kVA ratings in accordance with 1~~2~~20.54 and 1~~2~~20.55.

Calculated Load

(see 1~~2~~20.40)

General Lighting Load

1500 ft^2 at 2 ~~3~~ VA/ft^2 = ~~4500~~ 3,000 VA

Minimum Number of Branch Circuits Required

[see 210.11(A)]

General Lighting Load:

~~4500~~ 3,000 VA ÷ 120 V = ~~38~~ 25 A

This requires ~~three~~ two15-A~~, 2-wire or two one 20-A,~~ 2-wire circuits.

Small-Appliance Load: Two 2-wire, 20-A circuits *[see 210.11(C)(1)]*

Laundry Load: One 2-wire, 20-A circuit *[see 210.11(C)(2)]*

Bathroom Branch Circuit: One 2-wire, 20-A circuit (no additional load calculation is required for this circuit) *[see 210.11(C)(3)]*

Minimum Size Feeder Required

[see 1~~2~~20.40]

General Lighting		~~4,500~~ 3,000 VA
Small Appliance		3,000 VA
Laundry		1,500 VA
	Total	~~9,000~~ 7,500 VA
3000 VA at 100%		3,000 VA
~~9000~~ 7500 VA – 3000 VA = ~~6000~~ 4500 VA at 35%		~~2,100~~ 1,575 VA
	Net Load	~~5,100~~ 4,575 VA
Range *(see Table 1~~2~~20.55)*		8,000 VA
Dryer Load *(see Table 1~~2~~20.54)(assuming 85%)*		~~5,500~~ 4,675 VA
Net Calculated Load		~~18,600~~ 17,250 VA

Net Calculated Load for 120/240-V, 3-wire, single-phase service or feeder

~~18,600~~ 17,250 VA ÷ 240 V = ~~78~~ 71.875 or 72 A

Sections 230.42(B) and 230.79(C) require service conductors and disconnecting means rated not less than 100 amperes.

Calculation for Neutral for Feeder and Service

Lighting and Small-Appliance Load		~~5,100~~ 4,575 VA
Range: 8000 VA at 70% *(see 1~~2~~20.61)*		5,600 VA
Dryer: ~~5500~~ 4,675 VA at 70% *(see 1~~2~~20.61)*		~~3,850~~ 3,273 VA
	Total	~~14,550~~ 13,448 VA

Calculated Load for Neutral

~~14,550~~ 13,448 VA ÷ 240 V = ~~61~~ 56 A

Example D1(b) One-Family Dwelling

Assume same conditions as Example No. D1(a), plus addition of one 6-A, 230-V, room air-conditioning unit and one 12-A, 115-V, room air-conditioning unit,* one 8-A, 115-V, rated waste disposer, and one 10-A, 120-V, rated dishwasher. See Article 430 for general motors and Article 440, Part VII, for air-conditioning equipment. Motors have nameplate ratings of 115 V and 230 V for use on 120-V and 240-V nominal voltage systems.

*(For feeder neutral, use larger of the two appliances for unbalance.)

From Example D1(a), feeder current is ~~78~~ 72A (3-wire, 240 V).

	Line A	Neutral	Line B
Amperes from Example D1(a)	~~78~~ 72	~~61~~ 56	~~78~~ 72
One 230-V air conditioner	6	—	6
One 115-V air conditioner and 120-V dishwasher	12	12	10
One 115-V disposer	—	8	8
25% of air-conditioner *(see 440.33)*	3	3	2
Total amperes per conductor	9~~9~~3	84~~7~~9	~~10~~4~~9~~8

Therefore, the service would be rated ~~110~~ 100 A.

Example D2(a) Optional Calculation for One-Family Dwelling, Heating Larger Than Air Conditioning
(see 120.82)

The dwelling has a floor area of 1500 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. It has a 12-kW range, a 2.5-kW water heater, a 1.2-kW dishwasher, 9 kW of electric space heating installed in five rooms, a 5-kW clothes dryer, and a 6-A, 230-V, room air-conditioning unit. Assume range, water heater, dishwasher, space heating, and clothes dryer kW ratings equivalent to kVA.

Air Conditioner kVA Calculation

6 A × 230 V ÷ 1000 = 1.38 kVA

This 1.38 kVA [item 1 from 120.82(C)] is less than 40% of 9 kVA of separately controlled electric heat [item 6 from 120.82(C)], so the 1.38 kVA need not be included in the service calculation.

General Load

1500 ft^2 at ~~3~~2 VA		~~4,500~~ 3,000 VA
Two 20-A appliance outlet circuits at 1500 VA each		3,000 VA
Laundry circuit		1,500 VA
Range (at nameplate rating)		12,000 VA
Water heater		2,500 VA
Dishwasher		1,200 VA
Clothes dryer		5,000 VA
	Total	~~29,700~~ 28,200 VA

Application of Demand Factor
[see 120.82(B)]

First ~~10~~ 8 kVA of general load at 100%		~~10,000~~ 8,000 VA
Remainder of general load at 40% (~~19.7 k~~ 20,200 VA × 0.4)		~~7,880~~ 8,080 VA
	Total of general load	~~17,880~~ 16,080 VA
9 kVA of heat at 40% (9000 VA × 0.4) =		3,600 VA
	Total	~~21,480~~ 19,680 VA

Calculated Load for Service Size

~~21.48 kVA = 21,480 VA~~

~~21,480~~ 19,680 VA ÷ 240 V = ~~90~~ 82 A

Therefore, the minimum service rating would be 100 A in accordance with 230.42 and 230.79.

Feeder Neutral Load in Accordance with 120.61

1500 ft^2 at ~~3~~ 2 VA		~~4,500~~ 3,000 VA
Three 20-A circuits at 1500 VA		4,500 VA
	Total	~~9,000~~ 7,500 VA
3000 VA at 100%		3,000 VA
~~9000~~ 7,500 VA - 3000 VA = ~~6000~~ 4,500 VA at 35%		~~2,100~~ 1,575 VA
	Subtotal	~~5,100~~ 4,575 VA
Range: 8 kVA at 70%		5,600 VA
Clothes dryer: 5 kVA at 70%		3,500 VA
Dishwasher		1,200 VA

Total	~~15,400~~ 14,875 VA	

Calculated Load for Neutral
~~15,400~~ 14,875 VA ÷ 240 V= ~~64~~ 62 A

Public Comment No. 1079-NFPA 70-2024 [Definition: Example D2(a) Optional Calculation for One-Fami...]

Example D2(a) Optional Calculation for One-Family Dwelling, Heating Larger Than Air Conditioning

(see 120.82)

The dwelling has a floor area of 1500 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. It has a 12-kW range, a 2.5-kW water heater, a 1.2-kW dishwasher, 9 kW of electric space heating installed in five rooms, a 5-kW clothes dryer, and a 6-A, 230-V, room air-conditioning unit. Assume range, water heater, dishwasher, space heating, and clothes dryer kW ratings equivalent to kVA.

Air Conditioner kVA Calculation

6 A × 230 V ÷ 1000 = 1.38 kVA

This 1.38 kVA [item 1 from 120.82(C)] is less than 40% of 9 kVA of separately controlled electric heat [item 6 from 120.82(C)], so the 1.38 kVA need not be included in the service calculation.

General Load

1500 ft^2 at ~~3 VA~~ 2 VA		~~4~~ 3 ,~~500 VA~~ 000 VA
Two 20-A appliance outlet circuits at 1500 VA each		3,000 VA
Laundry circuit		1,500 VA
Range (at nameplate rating)		12,000 VA
Water heater		2,500 VA
Dishwasher		1,200 VA
Clothes dryer		5,000 VA
	Total	~~29~~ 28 ,~~700 VA~~ 200 VA

Application of Demand Factor

[see 120.82(B)]

First ~~10 kVA~~ 8 kVA of general load at 100%		~~10~~ 8 ,~~000 VA~~ 000 VA
Remainder of general load at 40%		
		~~7~~ 8 ,~~880 VA~~ 080 VA
(~~19.7 kVA~~ 20,200 VA × 0.4)		
	Total of general load	~~17~~ 16 ,~~880 VA~~ 080 VA
9 kVA of heat at 40% (9000 VA × 0.4) =		3,600 VA
	Total	~~21~~ 19 ,~~480 VA~~ 680 VA

Calculated Load for Service Size

~~21.48 kVA = 21,480 VA~~

~~21,480 VA~~ 19,680 VA ÷ 240 V = ~~90 A~~ 82 A

Therefore, the minimum service rating would be 100 A in accordance with 230.42 and 230.79.

Feeder Neutral Load in Accordance with 120.61

1500 ft^2 at ~~3 VA~~ 2 VA		~~4~~ 3 ,~~500 VA~~ 000 VA
Three 20-A circuits at 1500 VA		4,500 VA
	Total	~~9~~ 7 ,~~000 VA~~ 500 VA
3000 VA at 100%		3,000 VA
~~9000 VA~~ 7500 VA - 3000 VA = ~~6000 VA~~ 4500 VA at 35%		~~2~~ 1 ,~~100 VA~~ 575 VA
	Subtotal	~~5~~ 4 ,~~100 VA~~ 575 VA
Range: 8 kVA at 70%		5,600 VA
Clothes dryer: 5 kVA at 70%		3,500 VA
Dishwasher		1,200 VA
	Total	~~15~~ 14 ,~~400 VA~~ 875 VA

Calculated Load for Neutral

~~15~~ 14 ,~~400 VA~~ 875 VA ÷ 240 V= ~~64 A~~ 62 A

Additional Proposed Changes

File Name	Description	Approved
Example_D1_for_PC.docx		

Statement of Problem and Substantiation for Public Comment

Although I do not agree with the reduction of VA per Sq Ft in a dwelling, Example D1 must be amended to reflect these changes. D1 is a commonly used example for users and the result of the changes made at First Revision should be shown.

An attached word document is provided if needed.

Thank You

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1345-NFPA 70-2024 [Definitions (D): General Loa... to Calculated ...]	
Public Comment No. 1347-NFPA 70-2024 [Definitions (D): General Loa... to Calculated ...]	

Related Item

- FR 8013

Submitter Information Verification

Submitter Full Name: Daniel Naughton
Organization: JATC of Greater Boston
Affiliation: IBEW
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City:
State:
Zip:

Submittal Date: Wed Aug 14 06:29:42 EDT 2024
Committee: NEC-P02

Example D1(a) One-Family Dwelling

The dwelling has a floor area of 1500 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. Appliances are a 12-kW, 120/240 volt range and a 5.5-kW, 120/240volt dryer. Assume range and dryer kW ratings equivalent to kVA ratings in accordance with 1~~2~~20.54 and 1~~2~~20.55.

Calculated Load

(see 1~~2~~20.40)

General Lighting Load

1500 ft^2 at 2 ~~3~~ VA/ft^2 = ~~4500~~ 3,000 VA

Minimum Number of Branch Circuits Required

[see 210.11(A)]

General Lighting Load:

~~4500~~ 3,000 VA ÷ 120 V = ~~38~~ 25 A

This requires ~~three~~ two15-A~~, 2-wire or two one 20-A,~~ 2-wire circuits.

Small-Appliance Load: Two 2-wire, 20-A circuits *[see 210.11(C)(1)]*

Laundry Load: One 2-wire, 20-A circuit *[see 210.11(C)(2)]*

Bathroom Branch Circuit: One 2-wire, 20-A circuit (no additional load calculation is required for this circuit) *[see 210.11(C)(3)]*

Minimum Size Feeder Required

[see 1~~2~~20.40]

General Lighting		~~4,500~~ 3,000 VA
Small Appliance		3,000 VA
Laundry		1,500 VA
	Total	~~9,000~~ 7,500 VA
3000 VA at 100%		3,000 VA
~~9000~~ 7500 VA – 3000 VA = ~~6000~~ 4500 VA at 35%		~~2,100~~ 1,575 VA
	Net Load	~~5,100~~ 4,575 VA
Range *(see Table 1~~2~~20.55)*		8,000 VA
Dryer Load *(see Table 1~~2~~20.54)(assuming 85%)*		~~5,500~~ 4,675 VA
Net Calculated Load		~~18,600~~ 17,250 VA

Net Calculated Load for 120/240-V, 3-wire, single-phase service or feeder

~~18,600~~ 17,250 VA ÷ 240 V = ~~78~~ 71.875 or 72 A

Sections 230.42(B) and 230.79(C) require service conductors and disconnecting means rated not less than 100 amperes.

Calculation for Neutral for Feeder and Service

Lighting and Small-Appliance Load		~~5,100~~ 4,575 VA
Range: 8000 VA at 70% *(see 1~~2~~20.61)*		5,600 VA
Dryer: ~~5500~~ 4,675 VA at 70% *(see 1~~2~~20.61)*		~~3,850~~ 3,273 VA
	Total	~~14,550~~ 13,448 VA

Calculated Load for Neutral

~~14,550~~ 13,448 VA ÷ 240 V = ~~61~~ 56 A

Example D1(b) One-Family Dwelling

Assume same conditions as Example No. D1(a), plus addition of one 6-A, 230-V, room air-conditioning unit and one 12-A, 115-V, room air-conditioning unit,* one 8-A, 115-V, rated waste disposer, and one 10-A, 120-V, rated dishwasher. See Article 430 for general motors and Article 440, Part VII, for air-conditioning equipment. Motors have nameplate ratings of 115 V and 230 V for use on 120-V and 240-V nominal voltage systems.

*(For feeder neutral, use larger of the two appliances for unbalance.)

From Example D1(a), feeder current is ~~78~~ 72A (3-wire, 240 V).

	Line A	Neutral	Line B
Amperes from Example D1(a)	~~78~~ 72	~~61~~ 56	~~78~~ 72
One 230-V air conditioner	6	—	6
One 115-V air conditioner and 120-V dishwasher	12	12	10
One 115-V disposer	—	8	8
25% of air-conditioner *(see 440.33)*	3	3	2
Total amperes per conductor	9~~9~~3	84~~7~~9	~~10~~4~~9~~8

Therefore, the service would be rated ~~110~~ 100 A.

Example D2(a) Optional Calculation for One-Family Dwelling, Heating Larger Than Air Conditioning
(see 120.82)

The dwelling has a floor area of 1500 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. It has a 12-kW range, a 2.5-kW water heater, a 1.2-kW dishwasher, 9 kW of electric space heating installed in five rooms, a 5-kW clothes dryer, and a 6-A, 230-V, room air-conditioning unit. Assume range, water heater, dishwasher, space heating, and clothes dryer kW ratings equivalent to kVA.

Air Conditioner kVA Calculation

6 A × 230 V ÷ 1000 = 1.38 kVA

This 1.38 kVA [item 1 from 120.82(C)] is less than 40% of 9 kVA of separately controlled electric heat [item 6 from 120.82(C)], so the 1.38 kVA need not be included in the service calculation.

General Load

1500 ft^2 at ~~3~~2 VA		~~4,500~~ 3,000 VA
Two 20-A appliance outlet circuits at 1500 VA each		3,000 VA
Laundry circuit		1,500 VA
Range (at nameplate rating)		12,000 VA
Water heater		2,500 VA
Dishwasher		1,200 VA
Clothes dryer		5,000 VA
	Total	~~29,700~~ 28,200 VA

Application of Demand Factor
[see 120.82(B)]

First ~~10~~ 8 kVA of general load at 100%		~~10,000~~ 8,000 VA
Remainder of general load at 40% (~~19.7 k~~ 20,200 VA × 0.4)		~~7,880~~ 8,080 VA
	Total of general load	~~17,880~~ 16,080 VA
9 kVA of heat at 40% (9000 VA × 0.4) =		3,600 VA
	Total	~~21,480~~ 19,680 VA

Calculated Load for Service Size

~~21.48 kVA = 21,480 VA~~

~~21,480~~ 19,680 VA ÷ 240 V = ~~90~~ 82 A

Therefore, the minimum service rating would be 100 A in accordance with 230.42 and 230.79.

Feeder Neutral Load in Accordance with 120.61

1500 ft^2 at ~~3~~ 2 VA		~~4,500~~ 3,000 VA
Three 20-A circuits at 1500 VA		4,500 VA
	Total	~~9,000~~ 7,500 VA
3000 VA at 100%		3,000 VA
~~9000~~ 7,500 VA - 3000 VA = ~~6000~~ 4,500 VA at 35%		~~2,100~~ 1,575 VA
	Subtotal	~~5,100~~ 4,575 VA
Range: 8 kVA at 70%		5,600 VA
Clothes dryer: 5 kVA at 70%		3,500 VA
Dishwasher		1,200 VA

Total	~~15,400~~ 14,875 VA	

Calculated Load for Neutral
~~15,400~~ 14,875 VA ÷ 240 V= ~~64~~ 62 A

Public Comment No. 1887-NFPA 70-2024 [Definition: Heat Pump kVA Calculation]

Heat Pump kVA Calculation

24 A × 240 V ÷ 1000 = 5.76 kVA

This 5.

~~76 kVA is less than 15 kVA~~
76 kVA load is combined with 65% of the backup heat

~~; therefore, the heat pump load need not be included in the service calculation [see 120~~
.
5.76kVA + (65% x 15kVA) = 5.76kVA + 9.75kVA = HVAC load is 15.51kVA

[see 220.82(C)(3)] .

Statement of Problem and Substantiation for Public Comment

To align the heat pump calculation in D2(c) with the requirements in Article 220.82(C)(3)

Related Item

• Correction of calculation method

Submitter Information Verification

Submitter Full Name: Steve Parnell
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Submittal Date: Tue Aug 27 20:58:42 EDT 2024
Committee: NEC-P02

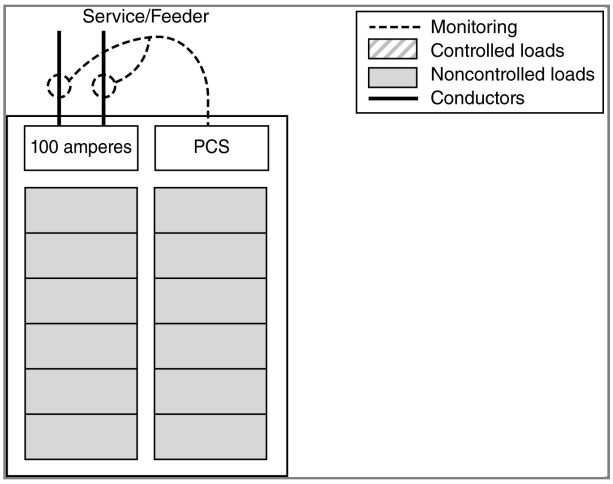
Public Comment No. 88-NFPA 70-2024 [Definition: Total Load After Application of the PCS]

Total Load After Application of the PCS

Total service load is noncontrolled plus controlled loads = 19,200 volt-amperes (80 amperes, 240 volt)

See Figure D.15(d).

Figure D.15(d) Monitoring Only Controlled Loads, All Loads Controlled.



Statement of Problem and Substantiation for Public Comment

Figure D.15(d) appears to be incorrect, in that the figure shows all branch circuits as Noncontrolled Loads (solid grey), while the example text clearly states that the PCS monitors only controlled loads, which means all branch circuits should be revised to use the diagonal grey and white coloring.

Related Item

• FR-8204

Submitter Information Verification

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Submittal Date: Tue Jul 16 13:45:14 EDT 2024
Committee: NEC-P02

Public Comment No. 992-NFPA 70-2024 [Definitions (D): General Lig... to Calculated ...]

Definitions (D): General Lig... to Calculated ...

General Lighting Load

1500 ft^2 at ~~3 VA~~ 2 VA /ft^2 = ~~4500 VA~~ 3,000 VA

Minimum Number of Branch Circuits Required

[see 210.11(A)]

General Lighting Load:

~~4500 VA~~ 3,000 VA ÷ 120 V = ~~38 A~~ 25 A

This requires ~~three 15~~ two 15 -A,~~-2~~ 2 -wire ~~or two 20-A, 2-wire~~ circuits.

Small-Appliance Load: Two 2-wire, 20-A circuits *[see 210.11(C)(1)]*

Laundry Load: One 2-wire, 20-A circuit *[see 210.11(C)(2)]*

Bathroom Branch Circuit: One 2-wire, 20-A circuit (no additional load calculation is required for this circuit) *[see 210.11(C)(3)]*

Minimum Size Feeder Required

[see 120.40]

General Lighting		~~4~~ 3 ,~~500 VA~~ 000 VA	
Small Appliance		3,000 VA	
Laundry		1,500 VA	
	Total	~~9~~ 7 ,500 VA	
3, 000 VA	~~3000 VA~~ at 100%		3,000 VA
~~9000 VA – 3000 VA = 6000 VA~~ 7,500 VA – 3,000 VA = 4,500 VA at 35%		~~2~~ 1 ,~~100 VA~~ 575 VA	
	Net Load	~~5~~ 4 ,~~100 VA~~ 575 VA	
Range *(see Table 120.55)*		8,000 VA	
Dryer Load *(see Table 120.54)(@85%)*		~~5~~ 4 ,~~500 VA~~ 675 VA	
Net Calculated Load		~~18~~ 17 ,~~600 VA~~ 250 VA	

Net Calculated Load for 120/240-V, 3-wire, single-phase service or feeder

~~18~~ 17 ,~~600 VA~~ 250 VA ÷ 240 V = ~~78 A~~ 71.875 or 72 A

Sections 230.42(B) and 230.79(C) require service conductors and disconnecting means rated not less than 100 amperes.

Calculation for Neutral for Feeder and Service

Lighting and Small-Appliance Load		~~5~~ 4 ,~~100 VA~~ 575 VA
Range: ~~8000 VA~~ 8,000 VA at 70% *(see 120.61)*		5,600 VA
Dryer: ~~5500 VA~~ 4,675 VA at 70% *(see 120.61)*		3,~~850 VA~~ 273 VA
	Total	~~14~~ 13 ,~~550 VA~~ 448 VA

Calculated Load for Neutral

~~14~~ 13 ,~~550 VA~~ 448 VA ÷ 240 V = ~~61 A~~ 56 A

Additional Proposed Changes

File Name	Description	Approved
Example_D1_for_PC.docx	Word Version of proposed changes	

Statement of Problem and Substantiation for Public Comment

Although I do not agree with the reduction of VA per Sq Ft in a dwelling, Example D1 must be amended to reflect these changes. D1 is a commonly used example for users and the result of the changes made at First Revision should be shown.

Please note that there is an assumption that the dryer will be calculated at 85% due to an issue in First Revision 8044 (220.54). If that is not the case, those numbers will need to be adjusted.

Thanks

Related Item

• FR-8013 • FR-8044

Submitter Information Verification

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Submittal Date: Fri Aug 09 14:14:57 EDT 2024
Committee: NEC-P02

Example D1(a) One-Family Dwelling

The dwelling has a floor area of 1500 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. Appliances are a 12-kW, 120/240 volt range and a 5.5-kW, 120/240volt dryer. Assume range and dryer kW ratings equivalent to kVA ratings in accordance with 1~~2~~20.54 and 1~~2~~20.55.

Calculated Load

(see 1~~2~~20.40)

General Lighting Load

1500 ft^2 at 2 ~~3~~ VA/ft^2 = ~~4500~~ 3,000 VA

Minimum Number of Branch Circuits Required

[see 210.11(A)]

General Lighting Load:

~~4500~~ 3,000 VA ÷ 120 V = ~~38~~ 25 A

This requires ~~three~~ two15-A~~, 2-wire or two one 20-A,~~ 2-wire circuits.

Small-Appliance Load: Two 2-wire, 20-A circuits *[see 210.11(C)(1)]*

Laundry Load: One 2-wire, 20-A circuit *[see 210.11(C)(2)]*

Bathroom Branch Circuit: One 2-wire, 20-A circuit (no additional load calculation is required for this circuit) *[see 210.11(C)(3)]*

Minimum Size Feeder Required

[see 1~~2~~20.40]

General Lighting		~~4,500~~ 3,000 VA
Small Appliance		3,000 VA
Laundry		1,500 VA
	Total	~~9,000~~ 7,500 VA
3000 VA at 100%		3,000 VA
~~9000~~ 7500 VA – 3000 VA = ~~6000~~ 4500 VA at 35%		~~2,100~~ 1,575 VA
	Net Load	~~5,100~~ 4,575 VA
Range *(see Table 1~~2~~20.55)*		8,000 VA
Dryer Load *(see Table 1~~2~~20.54)(assuming 85%)*		~~5,500~~ 4,675 VA
Net Calculated Load		~~18,600~~ 17,250 VA

Net Calculated Load for 120/240-V, 3-wire, single-phase service or feeder

~~18,600~~ 17,250 VA ÷ 240 V = ~~78~~ 71.875 or 72 A

Sections 230.42(B) and 230.79(C) require service conductors and disconnecting means rated not less than 100 amperes.

Calculation for Neutral for Feeder and Service

Lighting and Small-Appliance Load		~~5,100~~ 4,575 VA
Range: 8000 VA at 70% *(see 1~~2~~20.61)*		5,600 VA
Dryer: ~~5500~~ 4,675 VA at 70% *(see 1~~2~~20.61)*		~~3,850~~ 3,273 VA
	Total	~~14,550~~ 13,448 VA

Calculated Load for Neutral

~~14,550~~ 13,448 VA ÷ 240 V = ~~61~~ 56 A

Example D1(b) One-Family Dwelling

Assume same conditions as Example No. D1(a), plus addition of one 6-A, 230-V, room air-conditioning unit and one 12-A, 115-V, room air-conditioning unit,* one 8-A, 115-V, rated waste disposer, and one 10-A, 120-V, rated dishwasher. See Article 430 for general motors and Article 440, Part VII, for air-conditioning equipment. Motors have nameplate ratings of 115 V and 230 V for use on 120-V and 240-V nominal voltage systems.

*(For feeder neutral, use larger of the two appliances for unbalance.)

From Example D1(a), feeder current is ~~78~~ 72A (3-wire, 240 V).

	Line A	Neutral	Line B
Amperes from Example D1(a)	~~78~~ 72	~~61~~ 56	~~78~~ 72
One 230-V air conditioner	6	—	6
One 115-V air conditioner and 120-V dishwasher	12	12	10
One 115-V disposer	—	8	8
25% of air-conditioner *(see 440.33)*	3	3	2
Total amperes per conductor	9~~9~~3	84~~7~~9	~~10~~4~~9~~8

Therefore, the service would be rated ~~110~~ 100 A.

Example D2(a) Optional Calculation for One-Family Dwelling, Heating Larger Than Air Conditioning
(see 120.82)

The dwelling has a floor area of 1500 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. It has a 12-kW range, a 2.5-kW water heater, a 1.2-kW dishwasher, 9 kW of electric space heating installed in five rooms, a 5-kW clothes dryer, and a 6-A, 230-V, room air-conditioning unit. Assume range, water heater, dishwasher, space heating, and clothes dryer kW ratings equivalent to kVA.

Air Conditioner kVA Calculation

6 A × 230 V ÷ 1000 = 1.38 kVA

This 1.38 kVA [item 1 from 120.82(C)] is less than 40% of 9 kVA of separately controlled electric heat [item 6 from 120.82(C)], so the 1.38 kVA need not be included in the service calculation.

General Load

1500 ft^2 at ~~3~~2 VA		~~4,500~~ 3,000 VA
Two 20-A appliance outlet circuits at 1500 VA each		3,000 VA
Laundry circuit		1,500 VA
Range (at nameplate rating)		12,000 VA
Water heater		2,500 VA
Dishwasher		1,200 VA
Clothes dryer		5,000 VA
	Total	~~29,700~~ 28,200 VA

Application of Demand Factor
[see 120.82(B)]

First ~~10~~ 8 kVA of general load at 100%		~~10,000~~ 8,000 VA
Remainder of general load at 40% (~~19.7 k~~ 20,200 VA × 0.4)		~~7,880~~ 8,080 VA
	Total of general load	~~17,880~~ 16,080 VA
9 kVA of heat at 40% (9000 VA × 0.4) =		3,600 VA
	Total	~~21,480~~ 19,680 VA

Calculated Load for Service Size

~~21.48 kVA = 21,480 VA~~

~~21,480~~ 19,680 VA ÷ 240 V = ~~90~~ 82 A

Therefore, the minimum service rating would be 100 A in accordance with 230.42 and 230.79.

Feeder Neutral Load in Accordance with 120.61

1500 ft^2 at ~~3~~ 2 VA		~~4,500~~ 3,000 VA
Three 20-A circuits at 1500 VA		4,500 VA
	Total	~~9,000~~ 7,500 VA
3000 VA at 100%		3,000 VA
~~9000~~ 7,500 VA - 3000 VA = ~~6000~~ 4,500 VA at 35%		~~2,100~~ 1,575 VA
	Subtotal	~~5,100~~ 4,575 VA
Range: 8 kVA at 70%		5,600 VA
Clothes dryer: 5 kVA at 70%		3,500 VA
Dishwasher		1,200 VA

Total	~~15,400~~ 14,875 VA	

Calculated Load for Neutral
~~15,400~~ 14,875 VA ÷ 240 V= ~~64~~ 62 A

Public Comment No. 1345-NFPA 70-2024 [Definitions (D): General Loa... to Calculated ...]

Definitions (D): General Loa... to Calculated ...

General Load

~~10,000 VA~~

1500 ft^2 at ~~3 VA~~ 2 VA		~~4~~ 3 ,~~500 VA~~ 000 VA	
Two 20-A small-appliance		-	
circuits at 1500 VA each		3,000 VA	
Laundry circuit		1,500 VA	
Two ovens		8,000 VA	
One cooking unit		5,100 VA	
Water heater		4,500 VA	
Dishwasher		1,200 VA	
Washer/dryer		5,000 VA	
	Total general load	~~32~~ 31 ,~~800 VA~~ 300 VA	
First ~~10 kVA~~ 8 kVA at 100%	120.82(B)		8,000 VA
Remainder at 40%		-	
~~(22.8 kVA ×~~ (23,300 VA × 0.4 ~~× 1000~~)		9,~~120 VA~~ 320 VA	
	Subtotal general load	~~19~~ 17 ,~~120 VA~~ 320 VA	
Air conditioning		10,080 VA	
	Total	~~29~~ 27 ,~~200 VA~~ 400 VA	

Calculated Load for Service

~~29~~ 27 ,~~200 VA~~ 400 VA ÷ 240 V = ~~122 A~~ 114 A (service rating)

Feeder Neutral Load, in accordance with 120.61

Assume that the two 4-kVA wall-mounted ovens are supplied by one branch circuit, the 5.1-kVA counter-mounted cooking unit by a separate circuit.

1500 ft^2 at ~~3 VA~~ 2 VA		~~4~~ 3 ,~~500 VA~~ 000 VA
Three 20-A circuits at 1500 VA		4,500 VA
	Subtotal	~~9~~ 7 ,~~000 VA~~ 500 VA
3000 VA at 100%		3,000 VA
~~9000 VA~~ 7500 VA - 3000 VA = ~~6000 VA~~ 4500 VA at 35%		~~2~~ 1 ,~~100 VA~~ 575 VA
	Subtotal	~~5~~ 4 ,~~100 VA~~ 575 VA

Two 4-kVA ovens plus one 5.1-kVA cooking unit = 13.1 kVA. Table 120.55 permits 55% demand factor or 13.1 kVA × 0.55 = 7.2 kVA feeder capacity.

	Subtotal from above	~~5~~ 4 ,~~100 VA~~ 575 VA
Ovens and cooking unit: 7200 VA × 70% for neutral load		5,040 VA
Clothes washer/dryer: 5 kVA × 70% for neutral load		3,500 VA
Dishwasher		1,200 VA
	Total	14,~~840 VA~~ 315 VA

Calculated Load for Neutral

14,~~840 VA~~ 315 VA ÷ 240 V = ~~62~~ 60

Additional Proposed Changes

File Name	Description	Approved
Example_D2_for_PC.docx	Example D2 for PC	

Statement of Problem and Substantiation for Public Comment

Although I do not agree with the reduction of VA per Sq Ft in a dwelling, Example D2 must be amended to reflect these changes. D2 is a commonly used example for users and the result of the changes made at First Revision should be shown.

An attached word document is provided if needed.

Thank You

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1078-NFPA 70-2024 [Definition: Example D1(b) One-Family Dwelling]	
Public Comment No. 1079-NFPA 70-2024 [Definition: Example D2(a) Optional Calculation for One-Fami...]	
Public Comment No. 1347-NFPA 70-2024 [Definitions (D): General Loa... to Calculated ...]	

Related Item

- FR 8082

Submitter Information Verification

Submitter Full Name: Daniel Naughton
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Submittal Date: Wed Aug 21 06:25:23 EDT 2024
Committee: NEC-P02

Example D2(b) Optional Calculation for One-Family Dwelling, Air Conditioning Larger Than Heating

[see 120.82(A) and 120.82(C)]

The dwelling has a floor area of 1500 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. It has two 20-A small appliance circuits, one 20-A laundry circuit, two 4-kW wall-mounted ovens, one 5.1-kW counter-mounted cooking unit, a 4.5-kW water heater, a 1.2-kW dishwasher, a 5-kW combination clothes washer and dryer, six 7-A, 230-V room air-conditioning units, and a 1.5-kW permanently installed bathroom space heater. Assume wall-mounted ovens, counter-mounted cooking unit, water heater, dishwasher, and combination clothes washer and dryer kW ratings equivalent to kVA.

Air Conditioning kVA Calculation

Total amperes = 6 units × 7 A = 42 A

42 A × 240 V ÷ 1000 = 10.08 kVA (assume PF = 1.0)

Load Included at 100%

Air Conditioning: Included below *[see item 1 in 120.82(C)]*

Space Heater:

Omit *[see item 5 in 120.82(C)]*

General Load

1500 ft^2 at ~~3~~2 VA		~~4,500~~3,000 VA
Two 20-A small-appliance circuits at 1500 VA each		3,000 VA
Laundry circuit		1,500 VA
Two ovens		8,000 VA
One cooking unit		5,100 VA
Water heater		4,500 VA
Dishwasher		1,200 VA
Washer/dryer		5,000 VA
	Total general load	~~32,800~~31,300 VA
First ~~10~~ 8 kVA at 100% 120.82(B)		~~10,000~~ 8,000 VA
Remainder at 40% (~~22.8 k~~23,300 VA × 0.4 ~~× 1000~~)		~~9,120~~ 9,320 VA
	Subtotal general load	~~19,120~~ 17,320 VA
Air conditioning		10,080 VA
	Total	~~29,200~~ 27,400 VA

Calculated Load for Service

~~29,200~~ 27,400 VA ÷ 240 V = ~~122~~ 114 A (service rating)

Feeder Neutral Load, in accordance with ~~2~~120.61

Assume that the two 4-kVA wall-mounted ovens are supplied by one branch circuit, the 5.1-kVA counter-mounted cooking unit by a separate circuit.

1500 ft^2 at ~~3~~ 2 VA	~~4,500~~ 3,000 VA
Three 20-A circuits at 1500 VA	4,500 VA
Subtotal	~~9,000~~ 7,500 VA
3000 VA at 100%	3,000 VA
~~9000~~ 7500 VA - 3000 VA = ~~6000~~ 4500 VA at 35%	~~2,100~~ 1,575 VA
Subtotal	~~5,100~~ 4,575 VA

Two 4-kVA ovens plus one 5.1-kVA cooking unit = 13.1 kVA. Table 120.55 permits 55% demand factor or 13.1 kVA × 0.55 = 7.2 kVA feeder capacity.

Subtotal from above	~~5,100~~ 4,575 VA
Ovens and cooking unit: 7200 VA × 70% for neutral load	5,040 VA
Clothes washer/dryer: 5 kVA × 70% for neutral load	3,500 VA
Dishwasher	1,200 VA
Total	~~14,840~~ 14,315 VA

Calculated Load for Neutral

~~14,840~~ 14,315 VA ÷ 240 V = ~~62~~ 60

Example D2(c) Optional Calculation for One-Family Dwelling with Heat Pump (Single-Phase, 240/120-Volt Service)

(see 120.82)
The dwelling has a floor area of 2000 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. It has a 12-kW range, a 4.5-kW water heater, a 1.2-kW dishwasher, a 5-kW clothes dryer, and a 2½-ton (24-A) heat pump with 15 kW of backup heat.

Heat Pump kVA Calculation

24 A × 240 V ÷ 1000 = 5.76 kVA
This 5.76 kVA is less than 15 kVA of the backup heat; therefore, the heat pump load need not be included in the service calculation *[see 120.82(C)]*.

General Load

2000 ft^2 at ~~3~~ 2 VA	~~6,000~~ 4,000 VA
Two 20-A appliance outlet circuits at 1500 VA each	3,000 VA
Laundry circuit	1,500 VA
Range (at nameplate rating)	12,000 VA
Water heater	4,500 VA
Dishwasher	1,200 VA

Clothes dryer		5,000 VA
	Subtotal general load	~~33,200~~ 31,200VA
First 10 kVA at 100%		10,000 VA
Remainder of general load at 40% (~~23,200~~ 21,200 VA × 0.4)		~~9,280~~ 8,480 VA
	Total net general load	~~19,280~~ 18,480 VA

*Heat Pump and Supplementary Heat**

240 V × 24 A = 5760 VA

15 kW Electric Heat:

5760 VA + (15,000 VA × 65%) = 5.76 kVA + 9.75 kVA = 15.51 kVA

***If supplementary heat is not on at same time as heat pump, heat pump kVA need not be added to total.**

Totals

Net general load		~~19,280~~ 18,480 VA
Heat pump and supplementary heat		15,510 VA
	Total	~~34,790~~ 33,990 VA

Calculated Load for Service

~~34.79 k~~33,990 VA ~~× 1000~~ ÷ 240 V= ~~145~~ 142 A

Therefore, this dwelling unit would be permitted to be served by a 150-A service.

Public Comment No. 1347-NFPA 70-2024 [Definitions (D): General Loa... to Calculated ...]

Definitions (D): General Loa... to Calculated ...

General Load

2000 ft^2 at ~~3 VA~~ 2 VA		~~6~~ 4 ,~~000 VA~~ 000 VA
Two 20-A appliance outlet circuits at 1500 VA each		3,000 VA
Laundry circuit		1,500 VA
Range (at nameplate rating)		12,000 VA
Water heater		4,500 VA
Dishwasher		1,200 VA
Clothes dryer		5,000 VA
	Subtotal general load	~~33~~ 31 ,~~200 VA~~ 200 VA
First ~~10 kVA~~ 8 kVA at 100%		~~10~~ 8 ,000 VA
Remainder of general load at 40% (23,200 VA × 0.4)		9,280 VA
	Total net general load	~~19~~ 17 ,280 VA

Heat Pump and Supplementary Heat*

240 V × 24 A = 5760 VA

15 kW Electric Heat:

5760 VA + (15,000 VA × 65%) = 5.76 kVA + 9.75 kVA = 15.51 kVA

***If supplementary heat is not on at same time as heat pump, heat pump kVA need not be added to total.**

Totals		
Net general load		~~19~~ 17 ,280 VA
Heat pump and supplementary heat		15,510 VA
	Total	~~34~~ 32 ,790 VA

Calculated Load for Service

~~34.79 kVA × 1000 ÷~~ 32,790 VA ÷ 240 V= ~~145 A~~ 137 A

Therefore, this dwelling unit would be permitted to be served by a 150-A service.

Additional Proposed Changes

File Name	Description	Approved
Example_D2_for_PC.docx	Example D2 for PC	

Statement of Problem and Substantiation for Public Comment

Although I do not agree with the reduction of VA per Sq Ft in a dwelling, Example D2 must be amended to reflect these changes. D2 is a commonly used example for users and the result of the changes made at First Revision should be shown.

An attached word document is provided if needed.

Thank You

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1079-NFPA 70-2024 [Definition: Example D2(a) Optional Calculation for One-Fami...]	
Public Comment No. 1078-NFPA 70-2024 [Definition: Example D1(b) One-Family Dwelling]	
Public Comment No. 1345-NFPA 70-2024 [Definitions (D): General Loa... to Calculated ...]	

Related Item

- FR 8082

Submitter Information Verification

Submitter Full Name: Daniel Naughton
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Zip:
Submittal Date: Wed Aug 21 06:49:21 EDT 2024
Committee: NEC-P02

Example D2(b) Optional Calculation for One-Family Dwelling, Air Conditioning Larger Than Heating

[see 120.82(A) and 120.82(C)]

The dwelling has a floor area of 1500 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. It has two 20-A small appliance circuits, one 20-A laundry circuit, two 4-kW wall-mounted ovens, one 5.1-kW counter-mounted cooking unit, a 4.5-kW water heater, a 1.2-kW dishwasher, a 5-kW combination clothes washer and dryer, six 7-A, 230-V room air-conditioning units, and a 1.5-kW permanently installed bathroom space heater. Assume wall-mounted ovens, counter-mounted cooking unit, water heater, dishwasher, and combination clothes washer and dryer kW ratings equivalent to kVA.

Air Conditioning kVA Calculation

Total amperes = 6 units × 7 A = 42 A

42 A × 240 V ÷ 1000 = 10.08 kVA (assume PF = 1.0)

Load Included at 100%

Air Conditioning: Included below *[see item 1 in 120.82(C)]*

Space Heater:

Omit *[see item 5 in 120.82(C)]*

General Load

1500 ft^2 at ~~3~~2 VA		~~4,500~~3,000 VA
Two 20-A small-appliance circuits at 1500 VA each		3,000 VA
Laundry circuit		1,500 VA
Two ovens		8,000 VA
One cooking unit		5,100 VA
Water heater		4,500 VA
Dishwasher		1,200 VA
Washer/dryer		5,000 VA
	Total general load	~~32,800~~31,300 VA
First ~~10~~ 8 kVA at 100% 120.82(B)		~~10,000~~ 8,000 VA
Remainder at 40% (~~22.8 k~~23,300 VA × 0.4 ~~× 1000~~)		~~9,120~~ 9,320 VA
	Subtotal general load	~~19,120~~ 17,320 VA
Air conditioning		10,080 VA
	Total	~~29,200~~ 27,400 VA

Calculated Load for Service

~~29,200~~ 27,400 VA ÷ 240 V = ~~122~~ 114 A (service rating)

Feeder Neutral Load, in accordance with ~~2~~120.61

Assume that the two 4-kVA wall-mounted ovens are supplied by one branch circuit, the 5.1-kVA counter-mounted cooking unit by a separate circuit.

1500 ft^2 at ~~3~~ 2 VA	~~4,500~~ 3,000 VA
Three 20-A circuits at 1500 VA	4,500 VA
Subtotal	~~9,000~~ 7,500 VA
3000 VA at 100%	3,000 VA
~~9000~~ 7500 VA - 3000 VA = ~~6000~~ 4500 VA at 35%	~~2,100~~ 1,575 VA
Subtotal	~~5,100~~ 4,575 VA

Two 4-kVA ovens plus one 5.1-kVA cooking unit = 13.1 kVA. Table 120.55 permits 55% demand factor or 13.1 kVA × 0.55 = 7.2 kVA feeder capacity.

Subtotal from above	~~5,100~~ 4,575 VA
Ovens and cooking unit: 7200 VA × 70% for neutral load	5,040 VA
Clothes washer/dryer: 5 kVA × 70% for neutral load	3,500 VA
Dishwasher	1,200 VA
Total	~~14,840~~ 14,315 VA

Calculated Load for Neutral

~~14,840~~ 14,315 VA ÷ 240 V = ~~62~~ 60

Example D2(c) Optional Calculation for One-Family Dwelling with Heat Pump (Single-Phase, 240/120-Volt Service)

(see 120.82)
The dwelling has a floor area of 2000 ft^2, exclusive of an unfinished cellar not adaptable for future use, unfinished attic, and open porches. It has a 12-kW range, a 4.5-kW water heater, a 1.2-kW dishwasher, a 5-kW clothes dryer, and a 2½-ton (24-A) heat pump with 15 kW of backup heat.

Heat Pump kVA Calculation

24 A × 240 V ÷ 1000 = 5.76 kVA
This 5.76 kVA is less than 15 kVA of the backup heat; therefore, the heat pump load need not be included in the service calculation *[see 120.82(C)]*.

General Load

2000 ft^2 at ~~3~~ 2 VA	~~6,000~~ 4,000 VA
Two 20-A appliance outlet circuits at 1500 VA each	3,000 VA
Laundry circuit	1,500 VA
Range (at nameplate rating)	12,000 VA
Water heater	4,500 VA
Dishwasher	1,200 VA

Clothes dryer		5,000 VA
	Subtotal general load	~~33,200~~ 31,200VA
First ~~10~~ 8 kVA at 100%		~~10,000~~ 8,000 VA
Remainder of general load at 40% (23,200 VA × 0.4)		9,280 VA
	Total net general load	~~19,280~~ 17,280 VA

*Heat Pump and Supplementary Heat**

240 V × 24 A = 5760 VA

15 kW Electric Heat:

5760 VA + (15,000 VA × 65%) = 5.76 kVA + 9.75 kVA = 15.51 kVA

***If supplementary heat is not on at same time as heat pump, heat pump kVA need not be added to total.**

Totals

Net general load		~~19,280~~ 17,280 VA
Heat pump and supplementary heat		15,510 VA
	Total	~~34,790~~ 32,790 VA

Calculated Load for Service

~~34.79 k~~32,790 VA ~~× 1000~~ ÷ 240 V= ~~145~~ 137 A

Therefore, this dwelling unit would be permitted to be served by a 150-A service.

Public Comment No. 1850-NFPA 70-2024 [Definition: Example D15(b) Monitoring Controlled and Noncon...]

~~The~~ Three EVSE rated at 7,200 volt-amperes (30 amperes, 240 volts) ~~is~~ are controlled by a PCS. The PCS is configured to monitor the service and to modulate the EVSE demand whenever the service exceeds the current setpoint of the PCS. The minimum operating current of ~~the~~ each EVSE is 8 amperes. The PCS current setpoint is established by qualified personnel at 80 amperes, based on the maximum 80 percent of the 100 ampere OCPD protecting the service. In this configuration, the PCS monitors both controlled and noncontrolled loads, so the controlled EVSE is treated using the minimum operating current of the PCS. The noncontrolled loads are treated as specified in Article 120, Parts III through VII.

Additional Proposed Changes

File Name	Description	Approved
NEC_Anned_D_G70-679.jpg	Amended diagram showing the PCS using one breaker, but managing 3 loads.	

Statement of Problem and Substantiation for Public Comment

A quite typical use of PCS is to have a single breaker used to manage more than one load.
The diagram has been updated to show three loads.

In this case the PCS may offer up to 100A if there's no load on the main. That current may flow to one or more loads.
Or, offer 8A to each of the three EVSE if there's capacity.
Or, hard shutdown and offer 0A.

See attached diagram which is like the supplied diagram except with L1, L2 and L3 on the output side.

Related Public Comments for This Document

Related Comment	Relationship
Public Comment No. 1833-NFPA 70-2024 [Section No. 625.42(B)]	

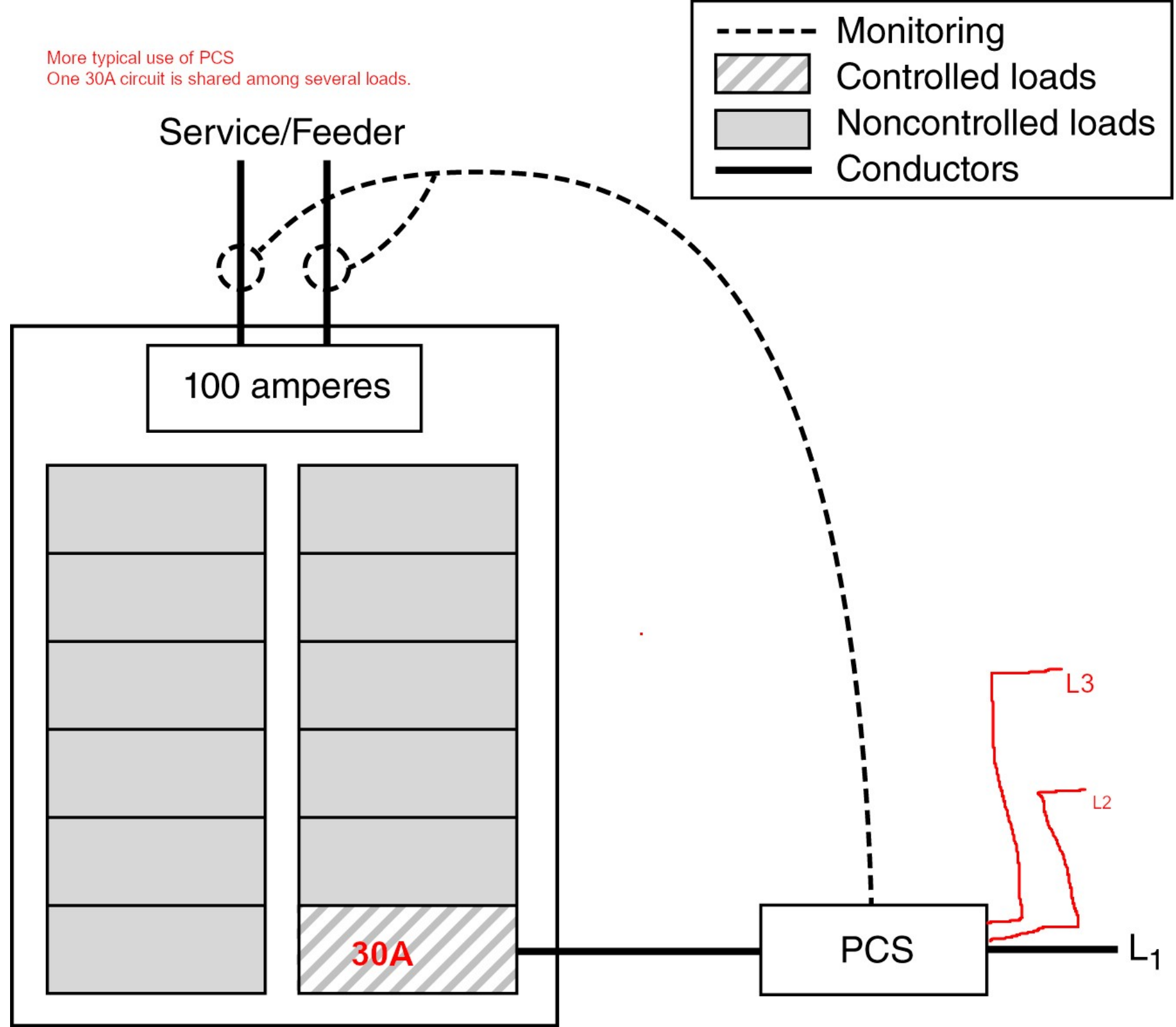
Related Item

• Correlating Committee Note No. 210-NFPA 70-2024 • First Revision No. 8204-NFPA 70-2024

Submitter Information Verification

Submitter Full Name:	Bryce Nesbitt
Organization:	Obviously Inspects
Affiliation:	Member of the EV Charging for All Coalition (EVCAC) and the Panel Optimization Work and Electrical Reassessments (POWER) group
Street Address:	
City:	
State:	
Zip:	

Submittal Date:	Tue Aug 27 17:26:41 EDT 2024
Committee:	NEC-P02


More typical use of PCS
One 30A circuit is shared among several loads.
Monitoring
Controlled loads
Noncontrolled loads
Conductors
Service/Feeder
100 amperes
30A
PCS
L3
L2
L1

Public Comment No. 1240-NFPA 70-2024 [Part III.]

Part III. ~~Required~~ Outlets

Statement of Problem and Substantiation for Public Comment

Accepted language in 210.52(C)(4) expands Part III to include nonrequired outlets. That is a good change and it was necessary. Part of the reason it was necessary is the title of Part III. The title of this Part needs to change now.

Related Item

• FR 8192

Submitter Information Verification

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

Submittal Date: Sun Aug 18 13:25:45 EDT 2024
Committee: NEC-P02

Public Comment No. 2066-NFPA 70-2024 [Definition: Branch Circuit, Individual. (Individual Branch ...]

Branch Circuit, Individual. (Individual Branch Circuit)

A branch circuit that supplies only one utilization equipment (outlet) . (CMP-2)

Statement of Problem and Substantiation for Public Comment

The proposed revision clarifies that an outlet is always present.

Related Item

• PI #1344

Submitter Information Verification

Submitter Full Name: James Stallcup
Organization: Stallcup Electrical Education
Affiliation: Stallcup Electrical Education
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 28 17:45:51 EDT 2024
Committee: NEC-P02

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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

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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

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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

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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. 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

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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
Organization: Intertek Testing Services
Street Address:
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Submittal Date: Fri Aug 02 09:19:44 EDT 2024
Committee: NEC-P01

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Public Comment No. 708
Assigned to CMP- 15, Referred to CMP 2

Public Comment No. 708-NFPA 70-2024 [Section No. 120.110]

120.110 Receptacle Loads.

Receptacle loads calculated in accordance with 120.14(H) and 120.14(I) and supplied by branch circuits not exceeding 150 volts to ground shall be permitted to be subjected to the demand factors provided in Table 120.110 for health care facilities.

Informational Note No. 1: See Article 100 for the definitions of patient care space categories.

Informational Note No. 2: See 120.14(I) for the calculation of receptacle outlet loads.

Table 120.110 Demand Factors for Receptacles Supplied by General-Purpose Branch Circuits in Health Care Facilities

Portion of Receptacle Load to Which Demand Factor Applies (Volt-Amperes)	Demand Factor (%)
First 10,000 or less	100
Remainder over 10,000	20

Additional Proposed Changes

File Name	Description	Approved
CN_208.pdf		✓

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 208 appeared in the First Draft Report on First Revision No. 9203.

The chairs of CMP 2 and CMP 15 are directed to form a task group to review general purpose receptacle demand factors. CMP 2 has purview for general purpose receptacle demand in all occupancies. Any data supporting proposed revisions to receptacle demand factors must be provided for public review.
The Correlating Committee directs the panel to consider Informational Note No.1 for compliance with 2.1.10.1 of the NEC® Style Manual. The panel should confirm the need for Informational Note No. 1, given this first revision which eliminates the Category 1, 2, 3, or 4 restrictions to the use of this demand factor table and instead applies this table to all health care facilities.

Related Item

• First Revision No. 9203

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 02 14:08:38 EDT 2024

Committee: NEC-P15

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Correlating Committee Note No. 208-NFPA 70-2024 [Section No. 220.110]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 11:35:55 EDT 2024

Committee Statement

Committee Statement: The chairs of CMP 2 and CMP 15 are directed to form a task group to review general purpose receptacle demand factors. CMP 2 has purview for general purpose receptacle demand in all occupancies. Any data supporting proposed revisions to receptacle demand factors must be provided for public review.

The Correlating Committee directs the panel to consider Informational Note No.1 for compliance with 2.1.10.1 of the NEC® Style Manual. The panel should confirm the need for Informational Note No. 1, given this first revision which eliminates the Category 1, 2, 3, or 4 restrictions to the use of this demand factor table and instead applies this table to all health care facilities.

First Revision No. 9203-NFPA 70-2024 [Section No. 220.110]

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. 709
Assigned to CMP- 15, Referred to CMP 2

Public Comment No. 709-NFPA 70-2024 [Section No. 120.111]

120.111 Specific Appliance Loads.

Receptacle loads calculated in accordance with 120.14(A) and supplied by branch circuits not exceeding 150 volts to ground shall be permitted to be subjected to the demand factors provided in Table 120.111 for health care facilities.

Table 120.111 Specific Appliance Demand Factor for Health Care Facilities

Number of Circuits	Demand Factor (%)
0–10	100
11 or more	30

Additional Proposed Changes

File Name	Description	Approved
CN_209.pdf		✓

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 209 appeared in the First Draft Report on First Revision No. 9204.

The chairs of CMP 2 and CMP 15 are directed to form a task group to review the load calculations for specific appliance loads. CMP 2 has purview for specific appliance demand in all occupancies. Any data supporting proposed revisions to receptacle demand factors must be provided for public review.

Related Item

• First Revision No. 9204

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 02 14:09:56 EDT 2024
Committee: NEC-P15

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Correlating Committee Note No. 209-NFPA 70-2024 [Section No. 220.111]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 11:39:10 EDT 2024

Committee Statement

Committee Statement: The chairs of CMP 2 and CMP 15 are directed to form a task group to review the load calculations for specific appliance loads. CMP 2 has purview for specific appliance demand in all occupancies. Any data supporting proposed revisions to receptacle demand factors must be provided for public review.

First Revision No. 9204-NFPA 70-2024 [New Section after 220.110]

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.