Public Comment No. 1644-NFPA 70-2024 [Global Input]

This Global Public Comment is for CMP-4 to review the use of the terms **"overcurrent", "overcurrent protective devices" and "overcurrent protection".**

Additional Proposed Changes

File Name	Description	Approved
CMP-4_OCPD_TG-4_CMP-10.pdf	CMP-4_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 21:40:29 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7573-NFPA 70-2024
Statement: Changes were made to align references related to overcurrent protective devices with their defined terms and acronyms. This is related to the resolutions of PC 1644.

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-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. 506-NFPA 70-2024 [Definition: Power Production Source (Power Source).]

Power Production Source (Power Source).

Electrical power production equipment other than a utility service, up to the source system disconnecting means. (CMP-4)

Informational Note: Examples of power production sources include engine and wind generators, solar photovoltaic systems, fuel cells, and energy storage systems.

Additional Proposed Changes

File Name	Description	Approved
CN_184.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 184 appeared in the First Draft Report on First Revision No. 8280.

The revision of the definition “Power Production Equipment” to “Power Production Source” should be reviewed by each code making panel to ensure alignment and consistent use of terminology. The alternate term “power source” should be reviewed
by CMP 4 for revision or deletion as this term is used extensively in the code.

Related Item

• First Revision No. 8280

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 22:33:54 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: The alternate term “power source” is used extensively in Article 705. The global definition of primary source distinguishes between a primary source (utility) and power production sources. While the term “power source” is occasionally - but not frequently - used in other articles, the surrounding phrases and the article scope make the context clear. If the term “power source” is used in other Articles to reference utility supply it should be replaced with “primary source” per Article 100 definitions. Replacing each occurrence of “power source” in Article 705 with “power production source” would add unnecessary verbiage to the code without adding clarity. Hyperlinking defined terms would add more clarity for users. The defined term "power sources" is constrained to Article 517 and would not be applicable to where the term is used in the articles for this panel.

Correlating Committee Note No. 184-NFPA 70-2024 [Definition: Power Production EquipmentSource (Power Source).]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 10:00:51 EDT 2024

Committee Statement

Committee Statement: The revision of the definition “Power Production Equipment” to “Power Production Source” should be reviewed by each code making panel to ensure alignment and consistent use of terminology. The alternate term “power source” should be reviewed by CMP 4 for revision or deletion as this term is used extensively in the code.

First Revision No. 8280-NFPA 70-2024 [Definition: Power Production Equipment.]

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. 501-NFPA 70-2024 [Definition: PV Module (Module) (Solar PV Module).]

PV Module (Module) (Solar PV Module).

A complete, environmentally protected unit consisting of solar cells and other components designed to produce dc power. (CMP-4)

Additional Proposed Changes

File Name	Description	Approved
CN_151.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 151 appeared in the First Draft Report on First Revision No. 8274.

The Correlating Committee directs CMP-4 to review the definition “PV Module” and consider the need for the phrase “environmentally protected” for usability and interpretation.

Related Item

- First Revision No. 8274

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 22:23:30 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7504-NFPA 70-2024
Statement: The phrase “environmentally protected” has been deleted as unnecessarily vague language. PV modules are tested and listed for specific environmental conditions.

Correlating Committee Note No. 151-NFPA 70-2024 [Definition: PV Module (Module) (Solar PV Module).]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 08:06:25 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs CMP-4 to review the definition “PV Module” and consider the need for the phrase “environmentally protected” for usability and interpretation.

First Revision No. 8274-NFPA 70-2024 [Definition: PV Module (Module).]

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. 507-NFPA 70-2024 [Section No. 690.1]

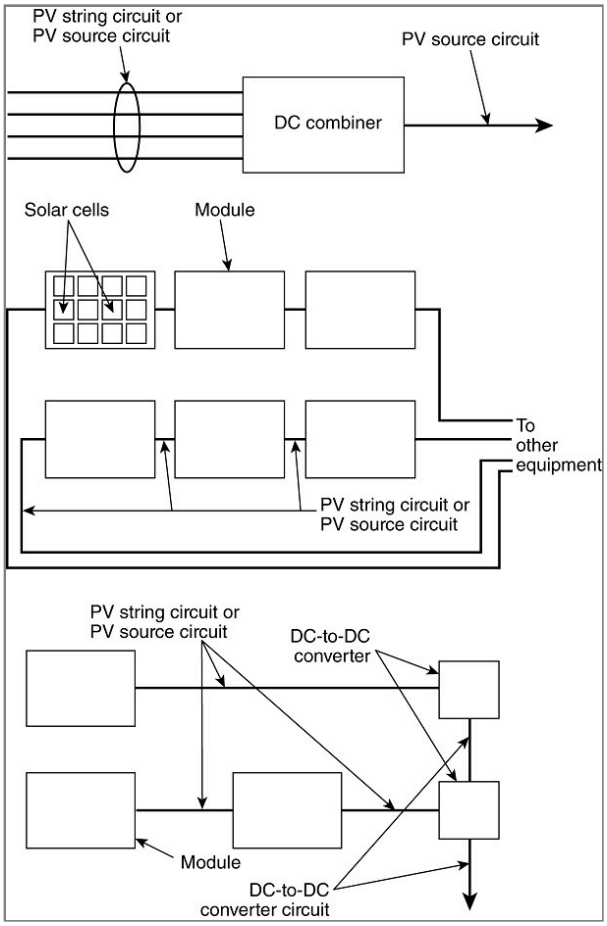
690.1 Scope.

This article applies to solar PV systems, other than those described in 691.4. The systems covered by this article include those interactive with other electric power production sources or stand-alone, or both. These PV systems could have ac or dc output for utilization.

Informational Note No. 1: See Figure Informational Note 690.1.

Informational Note No. 2: Article 691 covers the installation of large-scale PV electric supply stations.

Figure Informational Note 690.1 Illustration of PV System DC Circuits and PV System Components in a Typical PV Installation.



Additional Proposed Changes

File Name	Description	Approved
CN_185.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 185 appeared in the First Draft Report on First Revision No. 8295.

The article scope reference to Section 691.4 should be reviewed for clarity and usability. CMP 4 should consider referring to the title “Large-Scale Photovoltaic (PV) Electric Supply Stations” to differentiate the requirements within this article.

Related Item

• First Revision No. 8295

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 22:35:36 EDT 2024

Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7510-NFPA 70-2024

Statement: The scope reference to 691.4 is revised to the title of Article 691, Large-Scale Photovoltaic (PV) Electric Supply Stations, to increase clarity and useability.

Correlating Committee Note No. 185-NFPA 70-2024 [Section No. 690.1]

Submitter Information Verification

Committee: NEC-AAC

Submittal Date: Thu May 09 10:03:20 EDT 2024

Committee Statement and Meeting Notes

Committee Statement: The article scope reference to Section 691.4 should be reviewed for clarity and usability. CMP 4 should consider referring to the title “Large-Scale Photovoltaic (PV) Electric Supply Stations” to differentiate the requirements within this article.

First Revision No. 8295-NFPA 70-2024 [Section No. 690.1]

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. 1481-NFPA 70-2024 [Section No. 690.2]

690.2 Equipment.

The following equipment, and any associated retrofit kits, shall be listed or be evaluated for the application and have a field label applied:

(1) Electronic power converters
(2) Motor generators
(3) PV modules
(4) ac modules
(5) ac module systems
(6) PV dc overcurrent protective devices
(7) dc combiners
(8) PV rapid shutdown equipment (PVRSE)
(9) PV hazard control equipment (PVHCE)
(10) PV hazard control systems (PVHCSs)
(11) dc circuit controllers
(12) Charge controllers
(13) PV , grounding and bonding equipment
(14) PV Wire and PV wire harnesses
(15) PV connectors
(16) Wire positioning devices

Statement of Problem and Substantiation for Public Comment

Substantiation – The list of PV equipment required to be listed under 690.2 is incomplete. This public comment adds multiple items to the list under 690.2 as their certification is critical to the safety of the overall PV installation.

Related Item

• First Revision No. 8314-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Timothy Zgonena
Organization: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 23 13:48:34 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7576-NFPA 70-2024
Statement: Title is changed to comply with the NEC Style Manual for this section. Motor Generators is removed from this list as those are covered in article 445.

Changes were made to align references related to overcurrent protective devices with their defined terms and acronyms. This is related to the resolution of PC 1644.

Additional items are added to this list moving all listing requirements into a single list from other sections.

The list item for DC combiners was updated to DC combiners with OCPD to indicate that DC combiners without OCPD do not always require a specific listing.

Manufactured distributed generation wiring harnesses addresses those wiring harnesses that need to meet UL 9703 and does not extend to those wiring harnesses that are field assembled using listed components.

Public Comment No. 529-NFPA 70-2024 [Section No. 690.2]

690.2 Equipment.

The following equipment, and any associated retrofit kits, shall be listed or be evaluated for the application and have a field label applied:

(1) Electronic power converters
(2) Motor generators
(3) PV modules
(4) ac modules
(5) ac module systems
(6) PV dc overcurrent protective devices
(7) dc combiners
(8) PV rapid shutdown equipment (PVRSE)
(9) PV hazard control equipment (PVHCE)
(10) PV hazard control systems (PVHCSs)
(11) dc circuit controllers
(12) Charge controllers

Additional Proposed Changes

File Name	Description	Approved
CN_217.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 217 appeared in the First Draft Report on First Revision No. 8314.

The Correlating Committee directs CMP 4 to review 690.2. The requirements in NEC Style Manual Section 2.2.1 specify the xxx.2 section be reserved for equipment that is required to be listed. The title of this section is required to be “Listing Requirements”. The list item (2) for motor generators should also be reviewed for redundancy and conflict with the requirements in 445.2. Consider the following wording: "690.2 Listing Requirement. The following equipment, and any associated retrofit kits, shall be listed for the application or be field evaluated."

Related Item

• First Revision No. 8314

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 23:13:05 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7576-NFPA 70-2024
Statement: Title is changed to comply with the NEC Style Manual for this section. Motor Generators is removed from this list as those are covered in article 445.

Changes were made to align references related to overcurrent protective devices with their defined terms and acronyms. This is related to the resolution of PC 1644.

Additional items are added to this list moving all listing requirements into a single list from other sections.

The list item for DC combiners was updated to DC combiners with OCPD to indicate that DC combiners without OCPD do not always require a specific listing.

Manufactured distributed generation wiring harnesses addresses those wiring harnesses that need to meet UL 9703 and does not extend to those wiring harnesses that are field assembled using listed components.

Correlating Committee Note No. 217-NFPA 70-2024 [Section No. 690.2]

Submitter Information Verification

Committee: NEC-AAC

Submittal Date: Thu May 09 12:13:20 EDT 2024

Committee Statement and Meeting Notes

Committee Statement: The Correlating Committee directs CMP 4 to review 690.2. The requirements in NEC Style Manual Section 2.2.1 specify the xxx.2 section be reserved for equipment that is required to be listed. The title of this section is required to be “Listing Requirements”. The list item (2) for motor generators should also be reviewed for redundancy and conflict with the requirements in 445.2. Consider the following wording: "690.2 Listing Requirement. The following equipment, and any associated retrofit kits, shall be listed for the application or be field evaluated."

First Revision No. 8314-NFPA 70-2024 [Section No. 690.4(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. 1457-NFPA 70-2024 [New Section after 690.4(G)]

TITLE OF NEW CONTENT

Type your content here ...

690.5. Cybersecurity

PV systems , directly supplying life safety-related infrastructures, that are connected to a communication network and have the capability to be controlled or permit control of any portion of the premises shall comply with either of the following:

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

(2) The PV systems are connected through a networked interface complying with both of the following methods:

a. The PV systems are identified as being evaluated for cybersecurity.

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

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

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

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

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

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

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

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

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

Statement of Problem and Substantiation for Public Comment

Let's review the Code Making Panel Statement to resolve Public Input 1247, one sentence at a time.

The first sentence is "NEC 90.2(A) defines the purpose of the code to protect from hazards related to the use of electricity, not control systems." The text in this Public Comment is exactly related to the use of electricity and focused solely on PV systems. This Comment is not limited to industrial control systems. Attacks on industrial control systems are simply given as examples of the frequency of cyber incidents. Most types of electrical equipment/systems, if connected to the internet, and unprotected against cyber attack, are vulnerable, not just industrial control systems.

The first half of the second sentence reads "The proposal is outside the scope of the NEC". If the intent of the Panel Statement were that the proposal was outside the scope of Article 690, that would be unclear because it reads "This article applies to solar PV systems, other than those covered by Article 691, including the array circuit(s), inverters, and controller(s) for such systems. The systems covered by this article include those interactive with other electric power production sources or stand-alone, or both. These PV systems may have ac or dc output for utilization." There is nothing in Public Input 1247 or in this Public Comment that is outside of that scope.

The second half of the second sentence reads "and is also addressed by communication standards such as IEEE 2030.5 which are required for UL1741 / IEEE 1547 listing". The fact that cybersecurity is addressed in IEEE standards and UL Product Standards does not put requirements into the NEC. In order to assure that PV systems, directly serving life safety-related infrastructures, are cyber secure when installed, the requirements must be in the NEC, not in an IEEE Standard or UL Product Standard.

This Public Comment limits the suggested cybersecurity requirement to PV systems directly supplying life safety-related infrastructures and Informational Note No. 5 is added, providing examples of life safety-related infrastructure.

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

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

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

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

Let's look at an example of a financial center. 110.3(A)(8) currently requires that a fire alarm system in the financial center, because it is life safety equipment, be evaluated in light of cybersecurity. However, there is no requirement for the other non-life safety equipment/systems within or directly supplying the financial center,

such as internet-connected PV systems, which could easily be compromised by a cyber attack. The proposed text in this Public Comment addresses this vulnerability.

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

THIS PUBLIC COMMENT SIMPLY REQUIRES THAT PV SYSTEMS, DIRECTLY SUPPLYING LIFE SAFETY-RELATED INFRASTRUCTURES, EITHER NOT BE CONNECTED TO THE INTERNET, OR IF THEY ARE CONNECTED TO THE INTERNET, THAT THEY BE “IDENTIFIED” FOR CYBERSECURITY AND THAT AN ASSESSMENT IS PROVIDED.

Related Item

• PI 1247

Submitter Information Verification

Submitter Full Name: Vincent Saporita
Organization: Saporita Consulting
Street Address:
City:
State:
Zip:

Submittal Date: Fri Aug 23 09:18:25 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: CMP4 does agree that cybersecurity for certain critical systems and life safety systems are important. However, the cybersecurity scope of the NEC in general has already been established in 110.3(A)(8) and by other Articles such as 708 for Critical Operations Power Systems. CMP4 will rely on the work of CMP1 with input from the NFPA Cybersecurity Advisory Committee for the wording of 110.3(A)(8) and any related terms and definitions. As stated in 90.3, Chapters 1 through 4 generally apply to all electrical installations and subsequent Chapters may supplement or modify. Therefore, if a power production system covered by this Article was considered as part of life safety equipment or system, then 110.3(A)(8) would already apply. If it was part of a critical operation power system, then in addition to this Article, other Articles such as 708 would apply. Per the NEC style manual, general requirements from Chapters 1 through 4 shall not be repeated in other Articles.

690.7 Maximum dc Voltage.

The maximum dc voltage shall be used to determine the voltage and voltage to ground of circuits in the application of this code. Maximum voltage shall be used for conductors, cables, equipment, working space, and other applications where voltage limits and ratings are used. The maximum voltage of PV system dc circuits shall be the highest voltage between any two conductors of a circuit or any conductor and ground and comply with the following:

(1) Not exceed 1000 volts within or originating from arrays located on or attached to buildings and PV system dc circuits inside buildings

(2) Not exceed 600 volts on or in one- and two-family dwellings

Circuits exceeding 1000 volts shall comply with 690.31(G).

(A) Photovoltaic Source Circuits.

The maximum dc voltage for PV source circuits shall be the sum of the series-connected PV module rated open-circuit voltages adjusted using one of the following methods:

(1) Corrected for the lowest expected ambient temperature using the open-circuit voltage temperature coefficients in accordance with the instructions included in the listing or labeling of the module

(2) For crystalline and multicrystalline silicon modules, corrected for the lowest expected ambient temperature using the correction factors provided in Table 690.7(A)

(3) Documented and stamped PV system design, using an industry standard method maximum voltage calculation provided by a licensed professional electrical engineer

Informational Note No. 1: The chapter titled “Extreme Annual Mean Minimum Design Dry Bulb Temperature” in the *ASHRAE Handbook — Fundamentals* (2017) is one source for lowest-expected, ambient temperature design data for various locations. Such temperature data can be used to calculate maximum voltage.

Informational Note No. 2: See SAND 2004-3535, *Photovoltaic Array Performance Model*, for one industry standard method for calculating maximum voltage of a PV system.

Table 690.7(A) Voltage Correction Factors for Crystalline and Multicrystalline Silicon Modules, Ambient Temperatures Below 25°C (77°F)

Ambient Temperature (°C)	Factor	Ambient Temperature (°F)
24 to 20	1.02	76 to 68
19 to 15	1.04	67 to 59
14 to 10	1.06	58 to 50
9 to 5	1.08	49 to 41
4 to 0	1.10	40 to 32
–1 to –5	1.12	31 to 23
–6 to –10	1.14	22 to 14
–11 to –15	1.16	13 to 5
–16 to –20	1.18	4 to –4
–21 to –25	1.20	–5 to –13
–26 to –30	1.21	–14 to –22
–31 to –35	1.23	–23 to –31
–36 to –40	1.25	–32 to –40

Note: Multiply the rated open-circuit voltage by the appropriate correction factor provided.

(B) dc-to-dc Converter Circuits.

In PV dc-to-dc converter circuits, maximum voltage shall be calculated in accordance with 690.7(B)(1) or 690.7(B)(2).

(1) Single dc-to-dc Converter.

For circuits connected to the output of single dc-to-dc converters, maximum voltage shall be determined in accordance with the instructions included in the listing or labeling of the dc-to-dc converters. If the instructions do not provide a method to determine the maximum voltage, the maximum voltage shall be the maximum rated voltage output of the dc-to-dc converters.

(2) Two or More Series-Connected DC-to-DC Converters.

For circuits connected to the output of two or more series-connected dc-to-dc converters, maximum voltage shall be determined in accordance with the instructions included in the listing or labeling of the dc-to-dc converters. If the instructions do not provide a method to determine the maximum voltage, the maximum voltage shall be the sum of the maximum rated voltage output of the dc-to-dc converters in series.

(C) Bipolar PV Source Circuits.

For monopole subarrays in bipolar systems, maximum voltage shall be the highest voltage between the monopole circuit conductors where one conductor of the monopole circuit is connected to the functionally grounded reference. To prevent overvoltage in the event of a ground fault or arc fault, monopole circuits shall be isolated from ground.

(D) Marking DC PV Circuits.

Permanent readily visible labels indicating the highest maximum dc voltage in PV systems shall be provided by installers at one of the following locations:

(1) DC PV system disconnecting means

(2) PV system electronic power conversion equipment

(3) Distribution equipment associated with PV systems

Informational Note: Rounding up to a value greater than the calculated PV dc circuit maximum voltage (e.g., 600 volts dc, 1000 volts dc, or 1500 volts dc) allows standardized labeling. Equipment manufacturers often provide permanent visible labels on electronic power conversion equipment.

Additional Proposed Changes

File Name	Description	Approved
CN_186.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 186 appeared in the First Draft Report on First Revision No. 8332.

The informational note in 690.7(D) should be reviewed for inclusion as a permitted provision.

Related Item

• First Revision No. 8332

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 22:37:13 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7524-NFPA 70-2024
Statement: Allowance previously stated in the informational note is moved into positive text to align with rules for informational notes in this code.

Correlating Committee Note No. 186-NFPA 70-2024 [Section No. 690.7]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 10:24:23 EDT 2024

Committee Statement and Meeting Notes

Committee Statement: The informational note in 690.7(D) should be reviewed for inclusion as a permitted provision.

First Revision No. 8332-NFPA 70-2024 [Section No. 690.7]

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. 148-NFPA 70-2024 [Section No. 690.7(A)]

(A) Photovoltaic Source Circuits.

The maximum dc voltage for PV source circuits shall be the sum of the series-connected PV module rated open-circuit ~~voltages adjusted using~~ voltages corrected for ambient temperature using one of the following methods:

(1) Corrected for the lowest expected ambient temperature using the open-circuit voltage temperature coefficients in accordance with the instructions included in the listing or labeling of the module

(2) For crystalline and multicrystalline silicon modules, corrected for the lowest expected ambient temperature using the correction factors provided in Table 690.7(A)

(3) Documented and stamped PV system design, using an industry standard method maximum voltage calculation provided by a licensed professional electrical engineer

Informational Note No. 1: The chapter titled “Extreme Annual Mean Minimum Design Dry Bulb Temperature” in the *ASHRAE Handbook — Fundamentals* (2017) is one source for lowest-expected, ambient temperature design data for various locations. Such temperature data can be used to calculate maximum voltage.

Informational Note No. 2: See SAND 2004-3535, *Photovoltaic Array Performance Model*, for one industry standard method for calculating maximum voltage of a PV system.

Table 690.7(A) Voltage Correction Factors for Crystalline and Multicrystalline Silicon Modules, Ambient Temperatures Below 25°C (77°F)

Ambient Temperature (°C)	Factor	Ambient Temperature (°F)
24 to 20	1.02	76 to 68
19 to 15	1.04	67 to 59
14 to 10	1.06	58 to 50
9 to 5	1.08	49 to 41
4 to 0	1.10	40 to 32
–1 to –5	1.12	31 to 23
–6 to –10	1.14	22 to 14
–11 to –15	1.16	13 to 5
–16 to –20	1.18	4 to –4
–21 to –25	1.20	–5 to –13
–26 to –30	1.21	–14 to –22
–31 to –35	1.23	–23 to –31
–36 to –40	1.25	–32 to –40

Note: Multiply the rated open-circuit voltage by the appropriate correction factor provided.

Statement of Problem and Substantiation for Public Comment

Suggesting possible alternate language for increased clarity. "Adjusted" is changed to "corrected" to corelate with text of (A)(1) & (A)(2). Also added "ambient temperature" to (A) for clarity as to what we are adjusting or correcting for.

Related Item

• FR 8332

Submitter Information Verification

Submitter Full Name: Peter Jackson
Organization: City of Bakersfield, Californi
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jul 22 12:50:44 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7521-NFPA 70-2024
Statement: The language of 690.7(A) is revised for correlation and clarity. “Adjusted” is changed to “corrected” in the charging paragraph to correlate with the test of (A)(1) and (A)(2). “Ambient temperature” was also added to the charging paragraph as that is the subject of the requirement.

The referenced document was an out of date publication, so the note has been updated to be consistent without changing the intent or meaning of the information.

Public Comment No. 152-NFPA 70-2024 [Section No. 690.8(A)(2)]

(2) Circuits Terminating ~~on the~~ to the Input of Electronic Power Converters (EPCs).

Where a circuit is terminated ~~at~~ to the input of an electronic power converter (EPC), the maximum current shall be permitted to be the rated input current of the ~~EPC input to which it is terminated if one of~~ EPC in accordance with any of the following conditions~~ is met~~:

(1) The circuit terminated ~~at the~~ to the input of the EPC is protected at its source of supply with an overcurrent device not exceeding the conductor ampacity.

(2) The circuit complies with 690.9(A)(1) for the maximum current as calculated in 690.8(A)(1).

(3) The circuit complies with 690.9(A)(3).

Informational Note: EPCs have rated maximum input short-circuit ratings. See 110.3(B).

Statement of Problem and Substantiation for Public Comment

Suggesting revised language for CMP 4 to consider for the purpose of increased clarity:

"at" and "on" are revised to "to" for consistency throughout
The redundant language related to "input of EPC" is removed as the subject of the Section is already in regard to circuits that terminate to the input of an EPC. Do we need to restate in 3 separate locations?
Finally, "...if one of the following conditions is met" is revised to achieve consistent language with other similar requirements (see 690.8(A)(1) for example. "one" is changed to "any" because more than one condition may be present. We would not want to inadvertantly communicate that only one condition is permitted (exclusive).

Related Item

• FR 8343

Submitter Information Verification

Submitter Full Name: Peter Jackson
Organization: City of Bakersfield, Californi
Street Address:
City:
State:
Zip:
Submittal Date: Mon Jul 22 13:04:38 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7533-NFPA 70-2024
Statement: Changes were made to align references related to overcurrent protective devices with their defined terms and acronyms. This is related to the resolution of PC 1644.

Public Comment No. 1914-NFPA 70-2024 [Section No. 690.8(A)(2)]

(2) Circuits Terminating on the Input of Electronic Power Converters (EPCs).

Where a ~~circuit~~ PV DC circuit is terminated at the input of an electronic power converter (EPC), the maximum current shall be permitted to be the rated input current of the EPC input to which it is terminated if one of the following conditions is met:

(1) The circuit terminated at the input of the EPC is protected at its source of supply with an overcurrent device not exceeding the conductor ampacity.

(2) The circuit complies with 690.9(A)(1) for the maximum current as calculated in 690.8(A)(1).

(3) The circuit complies with 690.9(A)(3).

Informational Note: EPCs have rated maximum input short-circuit ratings. See 110.3(B).

Statement of Problem and Substantiation for Public Comment

Adding the defined term to this section to further specify the types of circuits covered by this section.

Related Item

• FR-8343

Submitter Information Verification

Submitter Full Name: Jason Fisher
Organization: Solar Technical Consulting LLC
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 08:42:25 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected
Resolution: This section could apply to AC and DC circuits and changing the term would unnecessarily limit the requirement.

Public Comment No. 1915-NFPA 70-2024 [Section No. 690.8(C)]

(C) Systems with Multiple ~~Direct-Current~~ Dc Voltages.

For a PV power source that has multiple ~~output~~ PV dc circuit voltages and employs a common-return conductor, the ampacity of the common-return conductor shall not be less than the sum of the ampere ratings of the overcurrent devices of the individual ~~output~~ circuits.

Statement of Problem and Substantiation for Public Comment

This is an editorial change suggestion based on actions taken during the 2023 revision of this code to the definitions of PV dc circuits (FR 9429 and SR 8293) that removed the term "output" from these circuits. This change does not alter the requirements but adds clarity to further ensure the uniform application of this code across all users..

Related Item

• FR-8295

Submitter Information Verification

Submitter Full Name: Jason Fisher
Organization: Solar Technical Consulting LLC
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 08:48:09 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7533-NFPA 70-2024
Statement: Changes were made to align references related to overcurrent protective devices with their defined terms and acronyms. This is related to the resolution of PC 1644.

Public Comment No. 1320-NFPA 70-2024 [Section No. 690.9]

690.9 Overcurrent Protection.

(A) Circuits and Equipment.

PV system dc circuit and inverter output conductors and equipment shall be protected against overcurrent. Each circuit shall be protected from overcurrent in accordance with 690.9(A)(1), 690.9(A)(2), or 690.9(A)(3).

(1) Circuits Where Overcurrent Protection Not Required.

Overcurrent protective devices shall not be required where both of the following conditions are met:

(1) The conductors have sufficient ampacity for the maximum circuit current.

(2) The currents from all sources do not exceed the maximum overcurrent protective device rating specified for the PV module or electronic power converter.

(2) Circuits Where Overcurrent Protection is Required on One End.

A circuit conductor connected at one end to a current-limited supply, where the conductor is rated for the maximum circuit current from that supply, and also connected to sources having an available maximum circuit current greater than the ampacity of the conductor, shall be protected from overcurrent at the point of connection to the higher current source.

Informational Note: Photovoltaic system dc circuits and electronic power converter outputs powered by these circuits are current-limited and in some cases do not need overcurrent protection. Where these circuits are connected to higher current sources, such as parallel-connected PV system dc circuits, energy storage systems, or a utility service, the overcurrent device is often installed at the higher current source end of the circuit conductor.

(3) Other Circuits.

Circuits that do not comply with 690.9(A)(1) or 690.9(A)(2) shall be protected with one of the following methods:

(1) Conductors not greater than 3 m (10 ft) in length and not in buildings, protected from overcurrent on one end

(2) Conductors not greater than 3 m (10 ft) in length and in buildings, protected from overcurrent on one end and in a raceway or metal clad cable

(3) Conductors protected from overcurrent on both ends

(4) Conductors not installed on or in buildings are permitted to be protected from overcurrent on one end of the circuit where the circuit complies with all of the following conditions:

a. The conductors are installed in metal raceways or metal-clad cables, or installed in enclosed metal cable trays, or underground, or where directly entering pad-mounted enclosures.

b. The conductors for each circuit terminate on one end at a single circuit breaker or a single set of fuses that limit the current to the ampacity of the conductors.

c. The overcurrent device for the conductors is an integral part of a disconnecting means or shall be located within 3 m (10 ft) of conductor length of the disconnecting means.

d. The disconnecting means for the conductors is installed outside of a building, or at a readily accessible location nearest the point of entrance of the conductors inside of a building, including installations complying with 230.6.

(B) Device Ratings.

Electronic devices that are listed to prevent backfeed current in PV system dc circuits shall be permitted to prevent overcurrent of conductors on the PV array side of the devices. Overcurrent devices, where required, shall be rated in accordance with one of the following and permitted to be rounded up to the next higher standard size in accordance with 240.4(B):

(1) Overcurrent devices shall be rated at not less than 125 percent of the maximum currents calculated in 690.8(A).

(2) An assembly, together with its overcurrent device(s), that is listed for continuous operation at 100 percent of its rating shall be permitted to be used at 100 percent of its rating.

Informational Note: Some electronic devices prevent backfeed current which, in some cases, is the only source of overcurrent in PV system dc circuits.

(C) PV System DC Circuits.

A single overcurrent protective device, where required, shall be permitted to protect the PV modules, dc-to-dc converters, and conductors of each circuit. Where single overcurrent protection devices are used to protect circuits, all overcurrent devices shall be placed in the same polarity for all circuits within a PV system. The overcurrent devices shall be accessible but shall not be required to be readily accessible.

Informational Note: Due to improved ground-fault protection required in PV systems by 690.41(B), a single overcurrent protective device in either the positive or negative conductors of a PV system in combination with this ground-fault protection provides adequate overcurrent protection.

-

(D) Marking.

Overcurrent protective devices used in PV system dc circuits shall be marked Photovoltaic or PV.

Statement of Problem and Substantiation for Public Comment

The removal of “Overcurrent devices used in PV source circuits shall be listed for use in PV systems.” from 690.9(B) and relocation to 690.2 as “listed for the application” opens up the opportunity for installer’s and AHJ’s to misapply overcurrent protection in PV circuits. They may assume that a proper voltage and amp rating for an OCPD mean they are listed for application. However, PV dc OCPDs that are listed and marked for PV have additional testing criteria, including, but not limited to, the ability to withstand high ambient temperatures and safely interrupt the low level fault currents characteristics in PV circuits. The Code should still specifically call out the need for specific PV OCPDs to ensure the proper protection of the PV system.
The UL listings for PV fuses and breakers require they be marked “PV,” “gPV”, and/or “Photovoltaic” so all listed PV OCPDs would have this marking.

Related Item

• FR-8356 • Public Input No. 4153-NFPA 70-2023

Submitter Information Verification

Submitter Full Name: Christy McElhinny
Organization: Eaton
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 20 15:26:20 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7538-NFPA 70-2024

Statement: New subdivision D is added to clarify that OCPDs used in PV system dc circuits must be marked as stated to meet the requirements in this article.

Changes were made to align references related to overcurrent protective devices with their defined terms and acronyms. This is related to the resolution of PC 1644.

Public Comment No. 1826-NFPA 70-2024 [Section No. 690.12(B)(2)]

(2) Inside the Array Boundary.

~~The~~ PV ~~system shall comply with 690.12(B)(2)(a) or 690.12(B)(2)(b) :The PV system shall~~ systems shall provide shock hazard control for firefighters ~~through the~~ in accordance with either of the following:

(1) Through the use of a PVHCS installed in accordance with the following:

a. The instructions included with the listing or field labeling.

~~Where a PVHCS requires initiation to transition to a controlled state,~~

b. Use of the rapid shutdown initiation device required in 690.12(C)

~~shall perform this initiation~~
, if the PVHCS requires initiation to transition to a controlled state .

Informational Note: See UL 3741-2020, *Photovoltaic Hazard Control* , A listed or field-labeled PVHCS is comprised of either an individual piece of equipment that fulfills the necessary functions or multiple pieces of equipment coordinated to perform the functions as described in the installation instructions to reduce the risk of electric shock hazard within a damaged PV array for firefighters.

~~The PV system shall provide shock hazard control for firefighters by~~
(2) By limiting the highest voltage inside equipment or between any two conductors of a circuit or any conductor and ground inside array boundary to not more than 80 volts within 30 seconds of rapid shutdown initiation.

Informational Note: Common methods include the use of PV equipment with a limited maximum voltage of 80 volts as determined by 690.7 , PVRSE, PVHCE, or any combination of these.

Statement of Problem and Substantiation for Public Comment

This proposal is not a change to the requirements, but rather a reorganization of the requirements to return to a numbered subdivision within the NEC Style Manual rules.
During the First Draft when minor changes were made to this section, the NFPA system changed the subdivisions into alphanumeric identifiers. Through conversations with NFPA staff, I believe this reformatting will be acceptable and return the previous items #1 and #2 back to numeric format. This is desirable since this section has been in this code in a numbered format since the 2017 edition and has been one of the most commonly referenced sections in this industry since then.

Related Item

• FR-9270

Submitter Information Verification

Submitter Full Name: Jason Fisher
Organization: Solar Technical Consulting LLC
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 15:53:43 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7597-NFPA 70-2024
Statement: Editorial changes were made that do not change the technical requirements in this section however realign the text to comply with the rules in the NEC Style Manual allowing the fourth level subdivisions to be numbered, as these requirements have been for several cycles. This maintains consistency with previous editions to improve usability.

Public Comment No. 1659-NFPA 70-2024 [Section No. 690.12(D) [Excluding any Sub-Sections]]

Buildings with PV systems shall have a permanent label located at each service equipment location to which the PV systems are connected or at an approved readily visible location and shall indicate the location of rapid shutdown initiation devices. The label shall include a simple diagram of a building with a roof and shall include the following words:

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN.

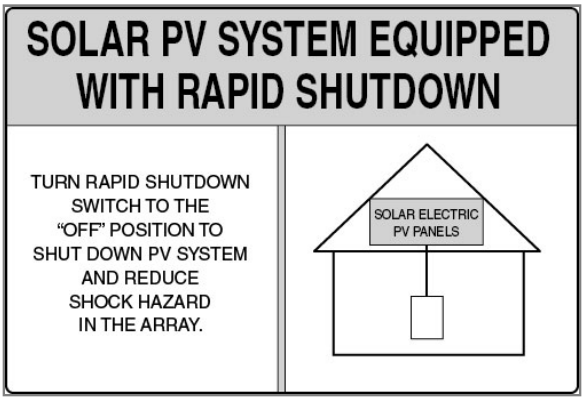
TURN RAPID SHUTDOWN SWITCH TO THE “OFF” POSITION TO SHUT DOWN

PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY.

The letters for the text “SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN” shall be capitalized and have a minimum height of 9.5 mm (⅜ in.). All text shall be legible and contrast the background.

Informational Note: See Figure Informational Note 690.12(D).

Figure Informational Note 690.12(D) Label for Roof-Mounted PV Systems with Rapid Shutdown.



Statement of Problem and Substantiation for Public Comment

Wording in text and picture should be aligned. (1) Adding "THE " to the text or (2) removing "THE " in the picture.

Related Item

- FR-8377

Submitter Information Verification

Submitter Full Name: Christian Eder
Organization: Fronius USA LLC
Street Address:
City:
State:
Zip:
Submittal Date: Mon Aug 26 02:58:22 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: This language remains consistent with the language published since the 2017 edition of this code. Since informational notes are not requirements, any differences do not conflict, so the required language is not changed. The example shown in the IN is in compliance with the requirements.

Public Comment No. 509-NFPA 70-2024 [Section No. 690.13]

690.13 Photovoltaic System Disconnecting Means.

PV system disconnecting means shall be installed in accordance with 705.20.

(A) Type of Disconnect.

PV system disconnecting means shall simultaneously disconnect PV system conductors that are not solidly grounded from all conductors of other wiring systems.

(B) Lockable Open.

PV system disconnecting means or their remote operating devices or the enclosures providing access to the disconnecting means shall be lockable open in accordance with 110.25.

(C) Marking.

Each PV system disconnecting means shall be permanently marked “PV SYSTEM DISCONNECT” or equivalent.

(D) Maximum Number of Disconnects.

Each PV system disconnecting means shall consist of not more than six switches or six sets of circuit breakers, or a combination of not more than six switches and sets of circuit breakers, mounted in a single enclosure, or in a group of separate enclosures. A single PV system disconnecting means shall be permitted for the combined ac output of one or more inverters or ac modules.

Informational Note: This requirement does not limit the number of PV systems connected to a service. This requirement allows up to six disconnecting means to disconnect a single PV system. For PV systems where all power is converted through interactive inverters, a dedicated circuit breaker is an example of a single PV system disconnecting means.

Additional Proposed Changes

File Name	Description	Approved
CN_187.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 187 appeared in the First Draft Report on First Revision No. 8434.

The informational note should be reviewed for compliance with NEC Style Manual Section 2.1.10.2. Informational notes are not permitted to provide interpretations of the requirement.

Related Item

• First Revision No. 8434

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 22:38:19 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7542-NFPA 70-2024
Statement: Text was added to reference 690.4(C) which allowed the deletion of the previous informational note.

Correlating Committee Note No. 187-NFPA 70-2024 [Section No. 690.13]

Submitter Information Verification

Committee: NEC-AAC

Submittal Date: Thu May 09 10:25:58 EDT 2024

Committee Statement and Meeting Notes

Committee Statement: The informational note should be reviewed for compliance with NEC Style Manual Section 2.1.10.2. Informational notes are not permitted to provide interpretations of the requirement.

First Revision No. 8434-NFPA 70-2024 [Section No. 690.13]

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. 1356-NFPA 70-2024 [New Section after 690.31]

690.31(H) Thermal Expansion of Long Conduit Runs

Where conduit is exposed to direct sunlight as on rooftops, accomodation for thermal expansion and contraction must be provided where the length changes in conduit exceeds 1.00 inch per 100 feet. Solutions may include floating (non-anchored) but supported conduit and the use of expansion fittings as stated in 300.7(B) Expansion, Expansion-Deflection, and Deflection Fittings. A nominal number for steel conduit can be determined by multiplying the expansion length in Table 352.44 by 0.20.

Statement of Problem and Substantiation for Public Comment

Commercial, industrial and community solar PV installations that are installed on flat rooftops often include very long pipe runs of over 100 feet. For this reason, clarification and guidance should be provided in 690.31 for the proper use of expansion fittings or other accomodation for expansion and contraction. I have been involved with a number of large rooftop PV systems by different contractors and there seems to be much confusion around the proper use of expansion fittings. In many cases these fittings are not used at all due to lack of understanding of thermal expansion and contraction and because the NEC does not specifically state when they should be used. Section 300.7 and Table 352.44 (for PVC) does try to address this issue, but simply stating that "Raceways shall be provided with expansion, expansion deflection, or deflection fittings where necessary" doesn't go far enough. It is not clear what change in length is acceptable and specifically when expansion fittings should be used.

Related Item

• first draft report

Submitter Information Verification

Submitter Full Name: Jeff Gilbert
Organization: Azimuth Solar LLC
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 21 11:39:58 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: The proposed material is already included as a general requirement of Chapter 3 (300.7). The NEC Style Manual(4.1.1) prevents the requirements of chapters 1 through 4 being repeated in other Articles.

Public Comment No. 1932-NFPA 70-2024 [Section No. 690.31(B)(1)]

(1) Conductors of Different Systems.

PV system dc circuits shall not occupy the same equipment wiring enclosures, cables, or raceways as other non-PV systems or inverter output circuits unless installed in accordance with one or more of the following:

(1) A barrier or partition separates the PV system dc circuits from the other circuits.

(2) The installation of other circuit conductors is permitted by the equipment listing.

(3) ~~All conductors or cables have an insulation rating equal to at least the maximum circuit voltage applied to any conductor installed within the same wiring method and the PV system dc circuits are identified and grouped as required by~~ ~~690.31(B)(2)~~ ~~and~~ ~~690.31(B)(3)~~ ~~.~~

(4) . The other circuit conductors are part of a multiconductor jacketed cable with a jacket insulation rating equal to at least the maximum circuit voltage applied to any conductor installed within the same wiring method, and are used for remote control, signaling, or a Class 1 power-limited circuit associated with the PV system or energy management system.

Statement of Problem and Substantiation for Public Comment

This change was made without the benefit of any public input it was made by the task group and it was not individually discussed during the panel meeting for the first revision. Containing both DC circuit conductors and AC circuit conductors could lead to catastrophic failures and fires within the array if there were an insulation failure. At a minimum this change should be discussed by the entire panel.

Related Item

• FR8449

Submitter Information Verification

Submitter Full Name: James Rogers
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 28 10:52:21 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: The language in the second draft matches the changes made during the first draft as a result of the committee discussions and related balloting. The requirements remain consistent with the allowances previously included in the multiple exceptions published in the previous code edition. The requirements for both identification and grouping remain for installations seeking to apply list item 3.

Public Comment No. 1937-NFPA 70-2024 [Section No. 690.31(C)]

(C)– Wires and Cables.

PV ~~wires or cables~~ Wire and distributed generation (DG) ~~cables shall~~ cables shall be listed. PV ~~wires or cables~~ Wire shall be permitted in all locations where RHW-2 is permitted.

Informational Note: See UL 4703, *Standard for Photovoltaic Wire*, for PV ~~wires and~~ Wire and UL 3003, *Distributed Generation Cables*, for DG cables. PV wires and cables and DG cables have nonstandard outer diameters.

(1) Single-Conductor Wires and Cables.

Single-conductor wires and cables shall comply with 690.31(C)(1)(a) through 690.31(C)(1)(c).

(a) Single-conductor wires and cables in exposed outdoor locations in PV system dc circuits within PV arrays shall be permitted to be one of the following:

~~PV wires or cables~~

(1) PVWire

(2) Single-conductor wires or cables marked sunlight resistant and Type USE-2 and Type RHW-2

(b) Exposed cables shall be supported and secured by cable ties or fittings that are listed or identified for securement and support in outdoor locations.

(c) ~~Cables~~ Wires and cables sized larger than 8 AWG shall be supported and secured at intervals not to exceed 1400 mm (54 in.).

Exception: PV systems meeting the requirements of 691.4 shall be permitted to have support and securement intervals as defined in the engineered design.

(2) Cable Trays.

Single-conductor PV ~~wires or cables~~ Wire of all sizes or DG cables of all sizes, with or without cable tray ratings, shall be permitted in cable trays installed in outdoor locations if the cables are supported at intervals not to exceed 300 mm (12 in.) and secured at intervals not to exceed 1400 mm (54 in.).

Where installed in uncovered cable trays, ampacity of single-conductor PV ~~wire~~ Wire smaller than 1/0 AWG, the adjustment factors for 1/0 AWG single conductor cable in 392.80(A)(2) shall be permitted to be used.

Where single-~~conductor~~ conductors of Type PV ~~wires~~ Wire smaller than 1/0 AWG are installed in ladder or ventilated trough cable trays, the following shall apply:

(1) All single conductors shall be installed in a single layer.

(2) Conductors that are bound together to comprise each circuit pair shall be permitted to be installed in other than a single layer.

(3) The sum of diameters of all single conductor cables shall not exceed the cable tray width.

(3) Multiconductor Jacketed Cables.

Where part of a listed PV assembly, multiconductor jacketed cables shall be installed in accordance with the included instructions. Where not part of a listed assembly, or where not otherwise covered in this code, multiconductor jacketed cables, including DG cables, shall be permitted in PV systems if installed in accordance with the product listing and in accordance with the following:

(1) In raceways, where on or in buildings other than rooftops

(2) Where not in raceways, in accordance with the following:

(3) Marked sunlight resistant in exposed outdoor locations

(4) Protected or guarded, where subject to physical damage

(5) Closely following the surface of support structures

(6) Secured at intervals not exceeding 1.8 m (6 ft)

(7) Secured within 600 mm (24 in.) of mating connectors or entering enclosures

(8) Marked direct burial, where buried in the earth

(4) Flexible Cords and Cables Connected to Tracking PV Arrays.

Flexible cords and flexible cables, where connected to moving parts of tracking PV arrays, shall comply with Article 400 and the following:

(1) Be identified as a hard service cord type or portable power cable type

(2) Be suitable for extra-hard usage

(3) Be listed for outdoor use

(4) Be water and sunlight resistant

Allowable ampacities shall be in accordance with 400.5. Stranded copper PV wire shall be permitted to be connected to moving parts of tracking PV arrays in accordance with the minimum number of strands specified in Table 690.31(C)(4).

Table 690.31(C)(4) Minimum PV Wire Strands

PV Wire AWG	Minimum Strands
18	17
16–10	19
8–4	49
2	130
1 AWG–1000 kcmil	259

(5) Flexible, Fine-Stranded Cables.

Flexible, fine-stranded cables shall be terminated only with terminals, lugs, devices, or connectors in accordance with 110.14.

(6) Single-Conductor Cables.

Single-conductor cables listed for outdoor use that are sunlight resistant and moisture resistant in sizes 16 AWG and 18 AWG shall be permitted for module interconnections where such cables meet the ampacity requirements of 400.5. Section 310.14 shall be used to determine the cable ampacity adjustment and correction factors.

Statement of Problem and Substantiation for Public Comment

The title of 690.31(C) should be changed from "Cables" to "Wires and Cables". The UL 4703 standard for PV Wire designates PV Wire as a "wire" and not a "cable". Similarly, references to "Single-Conductor Cables" in 690.31(C)(1) and 690.31(C)(1)(a) should be changed to "Single-Conductor Wires and Cables". All references to "PV wires or cables" (C)(1) and 690.31(C)(2) should be changed to "PV Wire" to be consistent with UL 4703, and to emphasize that "PV Wire" is a type designation. Also note that the applicable UL standards refer to single conductor Types USE-2 and DG as "cable" and RHW-2 as "wire", therefore "wires and cables" should also be added to 690.31(C)(1)(b). Note that TerraView formatting resulted in a missing space in 690.31(C)(1)(a), which should say "PV Wire" and not "PVWire".

Related Item

• FR 9275 • PI 4242 • PI 4159 • PI 4161

Submitter Information Verification

Submitter Full Name: Colleen OBrien
Organization: UL LLC
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 11:11:06 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7549-NFPA 70-2024

Statement: Wire and cable types in first sentence have been moved to 690.2. See SR 7576. Reference to specific types of wires and cables throughout this section have been edited to align with their designations and marking used in their listings. Where requirements apply more generally, terms have been adjusted to refer to conductors without the used of specific wire or cable types.

Details have been added to C(1) addressing supports of conductors. The requirement for maximum distance between supports for 8 AWG and below has been added back after inadvertently being deleted during the first draft of this cycle.

Changes made to C(4) to remove the use of the undefined term "tracking" to better address the need to provide appropriate wiring characteristics where regular movement between parts of PV arrays is expected. Reorganized into two new subsections for improved use and clarity. Added DG Cable that is recognized for use with these systems provided it meets the same minimum strands as are already allowed for PV Wire. Changed table to clarify this minimum stranding applies to any conductor used in these conditions.

Public Comment No. 113-NFPA 70-2024 [Section No. 690.31(C)(1)]

(1) Single-Conductor Cables.

Single-conductor cables shall comply with 690.31(C)(1)(a) through 690.31(C)(1)(c).

(a) Single-conductor cables in exposed outdoor locations in PV system dc circuits within PV arrays shall be permitted to be one of the following:

(2) PV wires or cables

(3) Single-conductor cables marked sunlight resistant and Type USE-2 and Type RHW-2

(d) Exposed cables shall be supported and secured by listed cable ties or other fittings that are listed or identified for securement and support in outdoor locations.

(e) Cables sized larger than 8 AWG shall be supported and secured at intervals not to exceed 1400 mm (54 in.).

Exception: PV systems meeting the requirements of 691.4 shall be permitted to have support and securement intervals as defined in the engineered design.

Additional Proposed Changes

File Name	Description	Approved
System_Modules.JPG	Approximately 50% of the unlisted cable ties used to support & secure the source string conductors failed within 1 year.	
Target_PV_Fire_058.jpg	Approximately 50% of the unlisted cable ties used to support & secure the source string conductors failed within 1 year.	
Target_PV_Fire_003.jpg	Faulted source string conductors were a likely contributing factor to this fire.	
Modules_2.JPG	Faulted source string conductors were a likely contributing factor to this fire.	

Statement of Problem and Substantiation for Public Comment

The language is revised to clarify that cable ties must be listed for the environment. Up to 50% of the unlisted cable ties failed within 1-year of installation on a large rooftop array in 2009. Faulted source string conductors were a likely contributing factor to a fire within the same array. This jurisdiction has not seen widespread failures of listed and correctly installed cable ties used to support & secure source string conductors within rooftop arrays since 2009.

Please see the comments by Mr. Zgonena to FR 9275:

The change from "listed and identified" to “listed or identified” will permit cable ties and securement fittings to be used for wire securement outdoor without meeting US consensus safety requirements. This could create a safety hazard, therefore this PI should be rejected.

Related Item

• FR 9275

Submitter Information Verification

Submitter Full Name: Peter Jackson
Organization: City of Bakersfield, Californi
Street Address:
City:
State:
Zip:

Submittal Date: Thu Jul 18 13:52:16 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7549-NFPA 70-2024

Statement: Wire and cable types in first sentence have been moved to 690.2. See SR 7576. Reference to specific types of wires and cables throughout this section have been edited to align with their designations and marking used in their listings. Where requirements apply more generally, terms have been adjusted to refer to conductors without the used of specific wire or cable types.

Details have been added to C(1) addressing supports of conductors. The requirement for maximum distance between supports for 8 AWG and below has been added back after inadvertently being deleted during the first draft of this cycle.

Changes made to C(4) to remove the use of the undefined term "tracking" to better address the need to provide appropriate wiring characteristics where regular movement between parts of PV arrays is expected. Reorganized into two new subsections for improved use and clarity. Added DG Cable that is recognized for use with these systems provided it meets the same minimum strands as are already allowed for PV Wire. Changed table to clarify this minimum stranding applies to any conductor used in these conditions.


04/05/2009







Public Comment No. 1317-NFPA 70-2024 [Section No. 690.31(C)(1)]

(1) Single-Conductor Cables.

Single-conductor cables shall comply with 690.31(C)(1)(a) through 690.31(C)(1)(c).

(a) Single-conductor cables in exposed outdoor locations in PV system dc circuits within PV arrays shall be permitted to be one of the following:

(2) PV wires or cables

(3) Single-conductor cables marked sunlight resistant and Type USE-2 and Type RHW-2

(d) Exposed cables sized 8 AWG and smaller shall be supported and secured ~~by~~ at intervals not to exceed 600 mm (24") by cable ties or fittings that are listed or identified for securement and support in outdoor locations.

(e) Cables sized larger than 8 AWG shall be supported and secured at intervals not to exceed 1400 mm (54 in.).

Exception: PV systems meeting the requirements of 691.4 shall be permitted to have support and securement intervals as defined in the engineered design.

Statement of Problem and Substantiation for Public Comment

There was absolutely no PI, substantiation, or committee statement provided in the first draft to remove the language regarding 8 AWG or smaller wires and the 24" supporting and securing requirement. I believe this was a mistake made during the first draft meeting when we were moving language in this section and the deletion was accidental, not purposeful. In addition, the requirements of the section no longer make sense without this language. There is no logic to having an exception for 691 systems for securing and supporting intervals when we deleted those intervals for 8 AWG and smaller (by accident). It was not very noticeable during balloting because of the other deletions and movements made to this section.

Related Item

• PI 4161

Submitter Information Verification

Submitter Full Name: Rebekah Hren
Organization: IPPNC LLC
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 20 14:11:33 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7549-NFPA 70-2024

Statement: Wire and cable types in first sentence have been moved to 690.2. See SR 7576. Reference to specific types of wires and cables throughout this section have been edited to align with their designations and marking used in their listings. Where requirements apply more generally, terms have been adjusted to refer to conductors without the used of specific wire or cable types.

Details have been added to C(1) addressing supports of conductors. The requirement for maximum distance between supports for 8 AWG and below has been added back after inadvertently being deleted during the first draft of this cycle.

Changes made to C(4) to remove the use of the undefined term "tracking" to better address the need to provide appropriate wiring characteristics where regular movement between parts of PV arrays is expected. Reorganized into two new subsections for improved use and clarity. Added DG Cable that is recognized for use with these systems provided it meets the same minimum strands as are already allowed for PV Wire. Changed table to clarify this minimum stranding applies to any conductor used in these conditions.

Public Comment No. 1963-NFPA 70-2024 [Section No. 690.31(C)(1)]

(1) Single-Conductor Cables.

Single-conductor cables shall comply with 690.31(C)(1)(a) through 690.31(C)(1)(c).
(a) Single-conductor cables in exposed outdoor locations in PV system dc circuits within PV arrays shall be permitted to be one of the following:

(1) PV wires or cables

(2) Single-conductor cables marked sunlight resistant and Type USE-2 and Type RHW-2

(b) Exposed cables shall be supported and secured by one of the following methods:

(1) cable ties

~~or fittings~~
that are listed or identified for securement and support in outdoor locations

(2) Straps, hangers or similar fittings or other approved means, designed and installed so as not to damage the cable

(c) Cables sized larger than 8 AWG shall be supported and secured at intervals not to exceed 1400 mm (54 in.).

Exception: PV systems meeting the requirements of 691.4 shall be permitted to have support and securement intervals as defined in the engineered design.

Additional Proposed Changes

File Name	Description	Approved
SSIF_690-31-C-1.jpg	Actual tracked changes	

Statement of Problem and Substantiation for Public Comment

NOTE: Not all text shown as changes in Terra has been changed. See screenshot attached for actual changes proposed.

The committee statement related to 690.31(C)(1)(b)(1) under FR 9275 noted that “Some of the examples for suitable supports have been removed with the general term kept to better capture the range of suitable supports. The use of “and” was changed to “or” since some supports may only be individually recognized as part of a listed mounting system. In those cases, they will need to be identified through the system listing.” However, the FR 9275 change from “listed and identified” to “listed or identified” would permit cable ties to be used for wire securement outdoors without meeting safety requirements. Cable tie failures have been observed after a short period of exposure in cases where unlisted cable ties were installed to support single-conductor cable. Additionally, the removal of the examples for suitable supports and leaving a reference only to “fittings” renders the language unclear since the industry commonly refers to the applicable components as straps, hangers and similar fittings. This public comment addresses these issues by differentiating between requirements for cable ties and other types of securement and supporting means, and maintaining the current requirement for cable ties to be listed and identified.

The Solar and Storage Industry Forum (SSIF) is a coalition of individuals and organizations convened by the Solar Energy Industry Association (SEIA) to organize, support, and mentor renewable energy industry professionals in codes and standards development . Our objective is to submit industry consensus-based recommendations for changes to the National Electrical Code. We believe that this effort improves the Code-making process by consolidating multiple industry member's points of view into fewer, common proposals. SSIF members are dedicated to continually improving the installation safety of PV and storage systems in the U.S. A list of members can be found here: https://www.seia.org/industry-forum

Related Item

• FR-9275

Submitter Information Verification

Submitter Full Name: Evelyn Butler
Organization: Solar Energy Industries Assn
Affiliation: SSIF
Street Address:
City:
State:
Zip:

Submittal Date: Wed Aug 28 13:06:47 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7549-NFPA 70-2024

Statement: Wire and cable types in first sentence have been moved to 690.2. See SR 7576. Reference to specific types of wires and cables throughout this section have been edited to align with their designations and marking used in their listings. Where requirements apply more generally, terms have been adjusted to refer to conductors without the used of specific wire or cable types.

Details have been added to C(1) addressing supports of conductors. The requirement for maximum distance between supports for 8 AWG and below has been added back after inadvertently being deleted during the first draft of this cycle.

Changes made to C(4) to remove the use of the undefined term "tracking" to better address the need to provide appropriate wiring characteristics where regular movement between parts of PV arrays is expected. Reorganized into two new subsections for improved use and clarity. Added DG Cable that is recognized for use with these systems provided it meets the same minimum strands as are already allowed for PV Wire. Changed table to clarify this minimum stranding applies to any conductor used in these conditions.

(1) Single-Conductor Cable.
Single-conductor cables shall comply with 690.31(C)(1)(a) through (C)(1)(c).

(a) Single-conductor cables in exposed outdoor locations in PV system dc circuits within the PV array shall be permitted to be one of the following:

(1) PV wires or cables

(2) Single-conductor cable marked sunlight resistant and Type USE-2 and Type RHW-2

(b) Exposed cables shall be supported and secured by one of the following methods:

(1) cable ties that are listed and identified for securement and support in outdoor locations
(2) Straps, hangers or similar fittings or other approved means, designed and installed so as not to damage the cable
~~or fittings that are listed or identified for securement and support in outdoor locations.~~

Public Comment No. 1917-NFPA 70-2024 [Section No. 690.31(C)(4)]

(4) ~~Flexible Cords and Cables Connected to Tracking~~ Circuits Connected to Moving Parts of PV Arrays.

~~Flexible cords and flexible cables, where~~ Where connected to moving parts of ~~tracking~~ PV arrays, cables shall comply with ~~Article 400~~ 690.31(C)(4)(A) or 690.31(C)(4)(B):

(A) A flexible cord or flexible cable complying with 400.4 and the following:

(1) Be identified as a hard service cord type or portable power cable type

(2) Be suitable for extra-hard usage

(3) Be listed for outdoor use

(4) Be water and sunlight resistant

~~Allowable ampacities shall be in~~

(1) Have ampacities in accordance with 400.5 .

(B) Stranded copper PV wire ~~shall be permitted to be connected to moving parts of tracking PV arrays in accordance~~ and DG cable with the minimum number of strands specified in Table 690.31(C)(4).

Table 690.31(C)(4) Minimum ~~PV Wire Strands~~ Conductor Strands

~~PV Wire~~ AWG	Minimum Strands
18	17
16–10	19
8–4	49
2	130
1 AWG–1000 kcmil	259

Additional Proposed Changes

File Name	Description	Approved
690-31_C_4_.jpg	Showing clean text as proposed.	

Statement of Problem and Substantiation for Public Comment

Removed use of the term "tracking" as unnecessary since this term is not defined in this code and what matters is the need to accommodate movement.
Reorganized into two new subsections for improved use and clarity. The reorganization of this section in the first draft improved some, but there are still two separate allowances in this single subsection and the separation of these is not clear in the first draft alone. This change does not change the requirements, just reorganizes them.
Added a recognition for DG Cable that is recognized for use with these systems (690.31(C)(3)) are environmental conditions provided it meets the same minimum strands as are already allowed for PV wire. DG cable was recently added to this article so this is continued cleanup and alignment of this article.

Related Item

• FR-9275

Submitter Information Verification

Submitter Full Name: Jason Fisher
Organization: Solar Technical Consulting LLC
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 28 09:12:43 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7549-NFPA 70-2024

Statement: Wire and cable types in first sentence have been moved to 690.2. See SR 7576. Reference to specific types of wires and cables throughout this section have been edited to align with their designations and marking used in their listings. Where requirements apply more generally, terms have been adjusted to refer to conductors without the used of specific wire or cable types.

Details have been added to C(1) addressing supports of conductors. The requirement for maximum distance between supports for 8 AWG and below has been added back after inadvertently being deleted during the first draft of this cycle.

Changes made to C(4) to remove the use of the undefined term "tracking" to better address the need to provide appropriate wiring characteristics where regular movement between parts of PV arrays is expected. Reorganized into two new subsections for improved use and clarity. Added DG Cable that is recognized for use with these systems provided it meets the same minimum strands as are already allowed for PV Wire. Changed table to clarify this minimum stranding applies to any conductor used in these conditions.

(4) Circuits Connected to Moving Parts of PV Arrays.

Where connected to moving parts of PV arrays, cables shall comply with 690.31(C)(4)(A) or 690.31(C)(4)(B):

(A) A flexible cord or flexible cable complying with 400.4 and the following:

(1) Be identified as a hard service cord type or portable power cable type
(2) Be suitable for extra-hard usage
(3) Be listed for outdoor use
(4) Be water and sunlight resistant
(5) Have ampacities in accordance with 400.5.

(B) Stranded copper PV wire and DG cable with the minimum number of strands specified in Table 690.31(C)(4).

Table 690.31(C)(4) Minimum Conductor Strands

AWG
18
16–10

Public Comment No. 510-NFPA 70-2024 [Section No. 690.41(A)]

(A) PV System DC Circuit Grounding Configurations.

One or more of the following system configurations shall be employed for PV system dc circuits:

(1) Functionally grounded circuits

(2) Circuits not isolated from the grounded inverter output circuits

(3) Ungrounded circuits

(4) Solidly grounded circuits as permitted in 690.41(B)

(5) Circuits protected by equipment listed and identified for the use

Additional Proposed Changes

File Name	Description	Approved
CN_188.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 188 appeared in the First Draft Report on First Revision No. 8492.

List items (3) and (4) should be reviewed for redundancy in accordance with NEC Style Manual Section 4.1.1. General requirements contained in Chapters 1 through 4 should not be repeated in other articles.

Related Item

• First Revision No. 8492

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 22:39:40 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7566-NFPA 70-2024

Statement: List has been consolidated to better identify the three general allowances for PV system dc circuits with respect to their ground reference. Previous list items 2 and 5 have been struck as they are more accurately covered under the modified list item 1. Previous list items 3 and 4 remain as they are permitted, however there are unique restrictions in this article limiting these methods.

Correlating Committee Note No. 188-NFPA 70-2024 [Section No. 690.41(A)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 10:32:36 EDT 2024

Committee Statement

Committee Statement: List items (3) and (4) should be reviewed for redundancy in accordance with NEC Style Manual Section 4.1.1. General requirements contained in Chapters 1 through 4 should not be repeated in other articles.

First Revision No. 8492-NFPA 70-2024 [Section No. 690.41(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. 1482-NFPA 70-2024 [Section No. 690.43(E)]

(E) Flexible Equipment Grounding and Bonding Conductors Connected to Tracking PV Arrays.

Where connected to moving parts of tracking PV arrays ~~, wire~~ equipment grounding and bonding conductors shall comply with (1),(2) or (3):

(1) Wire ~~-~~type equipment grounding conductors ~~- shall be~~ installed in accordance with 690.31(C)(4).

(2) Flexible braided bonding straps listed as suitable for the application.

(3) Other equipment listed as suitable for the application.

Statement of Problem and Substantiation for Public Comment

The first revision only permits field installed, wire based grounding and does not include an allowance for braided bonding straps or other grounding means that may be listed as suitable for the application.

The first revision did not address bonding connections between moving parts of tracking PV array equipment and stationary portions of that equipment including the pile supports, which is a critical portion of this requirement.

Related Item

• First Revision No. 8512-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Timothy Zgonena
Organization: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 23 14:03:03 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7570-NFPA 70-2024
Statement: Changes made to remove the use of the undefined term "tracking" to better address the need to provide appropriate wiring characteristics where regular movement between parts of PV arrays is expected. This pertains to tracking systems but also floating systems where regular cyclical movement is expected.

Public Comment No. 165-NFPA 70-2024 [Section No. 690.43(E)]

(E) Flexible Equipment Grounding and Bonding Conductors Connected to Tracking PV Arrays.

Where connected to moving parts of tracking PV arrays ~~, wire~~ equipment grounding or bonding conductors shall comply with (1) or (2):

(1) Wire -type equipment grounding conductors ~~shall be~~ installed in accordance with 690.31(C)(4).

(2) Flexible braided bonding straps identified as suitable for the application.

Additional Proposed Changes

File Name	Description	Approved
Braided_Bond_Straps.jpg	Braided bonding straps on a moveable array.	

Statement of Problem and Substantiation for Public Comment

Wire type equipment grounding conductors connected to movable arrays must be flexible just as with ungrounded conductors. Flexible braided bonding straps are also used to bond the structural metal components of movable arrays as provided in PI 3919 but were not included in FR 8512. The used of flexible braided bonding straps in this application should continue to be permitted.

Please see the ballot comments by Mr. Zgonena to FR 8512 for additional reference:

The revision does not capture the intent of submitter to ensure the effectiveness of the equipment grounding path. It is bonding jumpers and not EGCs that are typically connected to moving parts of trackers, and bonding jumpers are not typically of the wire type covered by 690.31(C)(4)

Related Item

• FR 8512

Submitter Information Verification

Submitter Full Name: Peter Jackson
Organization: City of Bakersfield, Californi
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 23 13:10:07 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7570-NFPA 70-2024
Statement: Changes made to remove the use of the undefined term "tracking" to better address the need to provide appropriate wiring characteristics where regular movement between parts of PV arrays is expected. This pertains to tracking systems but also floating systems where regular cyclical movement is expected.


Serial No: VE7D 2206 2048

Public Comment No. 1478-NFPA 70-2024 [Section No. 691.11]

691.11 Bonding and Grounding.

Exposed non-current carrying conductive parts shall be grounded and bonded in accordance with 691.11 (A) and 691.11(B).

(A) Grounding Electrode System.

G rounding and bonding connections between the grounding electrode system and PV module frames, electrical equipment and conductor enclosures of PV systems shall comply with 690.43. Details of the grounding electrode system shall be included in the documentation required by 691.6.

Informational Note: Grounding requirements for personnel and equipment safety for large-scale PV electric supply stations are designed under engineering supervision based on site-specific geotechnical data. See IEEE 2778-2020, *Guide for Solar Power Plant Grounding for Personnel Protection*.

(B) Fence Bonding and Grounding.

Fence bonding and grounding requirements and details shall be included in the documentation required by 691.6.

Informational Note: See 270.14 for fence bonding and grounding requirements enclosing substation portions of an electric supply station. Grounding requirements for other portions of electric supply station fencing are assessed based on the presence of overhead conductors, proximity to generation and distribution equipment, and associated step and touch potential.

Statement of Problem and Substantiation for Public Comment

The CMP statement acknowledges that below-ground structural components can be relied upon as part of a grounding electrode system in large scale PV arrays. However the statement does not address the connections between the below-ground components (such as steel piles) and listed PV system equipment such as mounting systems and module frames. To address this critical concern the engineered design (691.6) must account for the PV mounting system specific requirements and instructions for proper grounding and bonding as is required by 690.43 to prevent premature grounding and bonding failures that can cause shock and fire hazards.

The additional sentence clarifies that connections between the grounding electrode system and PV system equipment such as module frames and the mounting system need to comply with 690.43 to ensure the compatibility with listed equipment.

In addtion the requriement needs to define what parts of the system shall be grounded and bonded.

Related Item

• First Revision No. 8793-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Timothy Zgonena
Organization: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 23 13:39:12 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected
Resolution: 691.6 already covers the requirements for compliance with Article 690. This section applies to grounding electrode systems and not to equipment grounding.

Public Comment No. 511-NFPA 70-2024 [Section No. 691.11]

691.11 Bonding and Grounding.

(A) Grounding Electrode System.

Details of the grounding electrode system shall be included in the documentation required by 691.6.

Informational Note: Grounding requirements for personnel and equipment safety for large-scale PV electric supply stations are designed under engineering supervision based on site-specific geotechnical data. See IEEE 2778-2020, *Guide for Solar Power Plant Grounding for Personnel Protection*.

(B) Fence Bonding and Grounding.

Fence bonding and grounding requirements and details shall be included in the documentation required by 691.6.

Informational Note: See 270.14 for fence bonding and grounding requirements enclosing substation portions of an electric supply station. Grounding requirements for other portions of electric supply station fencing are assessed based on the presence of overhead conductors, proximity to generation and distribution equipment, and associated step and touch potential.

Additional Proposed Changes

File Name	Description	Approved
CN_189.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 189 appeared in the First Draft Report on First Revision No. 8793.

The informational note reference to IEEE 2778-2020 should include an explanation for the reference in accordance with NEC Style Manual Section 2.1.10.3. Additionally the format of the informational note should be revised for compliance with NEC Style Manual Section 2.1.10.3.

Related Item

- First Revision No. 8793

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 22:41:52 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7611-NFPA 70-2024
Statement: The informational note order is revising per the CC Note to conform with the NEC Style Manual.

Correlating Committee Note No. 189-NFPA 70-2024 [Section No. 691.11]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 10:34:42 EDT 2024

Committee Statement

Committee Statement: The informational note reference to IEEE 2778-2020 should include an explanation for the reference in accordance with NEC Style Manual Section 2.1.10.3. Additionally the format of the informational note should be revised for compliance with NEC Style Manual Section 2.1.10.3.

First Revision No. 8793-NFPA 70-2024 [Section No. 691.11]

Ballot Results

✔ **This item has passed ballot**

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

Not Returned

McDaniel, Roger D.

Affirmative All

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

Public Comment No. 1467-NFPA 70-2024 [New Section after 691.11(B)]

TITLE OF NEW CONTENT

Type your content here ...

691.12. Cybersecurity

Large-Scale Photovoltaic (PV) Electric Supply Stations , directly supplying life safety-related infrastructures, that are connected to a communication network and have the capability to be controlled or permit control of any portion of the premises shall comply with either of the following:

(1) The ability to control the Large-Scale Photovoltaic (PV) Electric Supply Stations is limited to a direct connection through a local nonnetworked interface.

(2) The Large-Scale Photovoltaic (PV) Electric Supply Stations are connected through a networked interface complying with both of the following methods:

a. The Large-Scale Photovoltaic (PV) Electric Supply Stations are identified as being evaluated for cybersecurity.

b. A cybersecurity assessment of the Large-Scale Photovoltaic (PV) Electric Supply Station is completed and documentation of the assessment and certification is available to those authorized to inspect, operate, and maintain the system.

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

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

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

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

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

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

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

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

Statement of Problem and Substantiation for Public Comment

Let's examine the Panel Statement to resolve Public Input 1248 one sentence at a time.

The first sentence is "NEC 90.2(A) defines the purpose of the code to protect from hazards related to the use of electricity, not control systems." The text in this Public Comment is exactly related to the use of electricity and is focused solely on Large-Scale Photovoltaic (PV) Electric Supply Stations. Attacks on industrial control systems are simply given as examples of the frequency of cyber incidents. Most types of electrical equipment/systems, if connected to the internet, and unprotected against cyber attack, are vulnerable, not just industrial control systems.

The first half of the second sentence reads "The proposal is outside the scope of the NEC". If the intent of the Panel Statement were that the proposal was outside the scope of Article 691, that would be confusing because it reads "This article covers the installation of large-scale PV electric supply stations not under exclusive utility control." There is nothing in Public Input 1249 or in this Public Comment that is outside of that scope.

The second half of the second sentence reads "and is also addressed by communication standards such as IEEE 2030.5 which are required for UL1741 / IEEE 1547 listing". The fact that cybersecurity is addressed in IEEE and UL Product Standards does not put requirements into the NEC. In order to assure that Large-Scale Photovoltaic (PV) Electric Supply Stations, directly serving life safety-related infrastructure, are cyber secure when installed, the requirements must be in the NEC, not in an IEEE or UL Product Standard.

This Public Comment limits the suggested cybersecurity requirement to Large-Scale Photovoltaic (PV) Electric Supply Stations directly supplying life safety-related infrastructures and Informational Note No. 5 is added, providing examples of life safety-related infrastructure.

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

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

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

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

Let’s look at an example of a financial center. 110.3(A)(8) currently requires that a fire alarm system in the financial center, because it is life safety equipment, be evaluated in light of cybersecurity. However, there is no requirement for the other non-life safety equipment/systems within or directly supplying the financial center, such as internet-connected Large-Scale Photovoltaic (PV) Electric Supply Stations, which could easily be compromised by a cyber attack. The proposed text in this Public Comment addresses this vulnerability.

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

THIS PUBLIC COMMENT SIMPLY REQUIRES THAT LARGE-SCALE PHOTOVOLTAIC (PV) ELECTRIC SUPPLY STATIONS, DIRECTLY SUPPLYING LIFE SAFETY-RELATED INFRASTRUCTURES, EITHER NOT BE CONNECTED TO THE INTERNET, OR IF THEY ARE CONNECTED TO THE INTERNET, THAT THEY BE “IDENTIFIED” FOR CYBERSECURITY AND THAT AN ASSESSMENT IS PROVIDED.

Related Item

• PI 1248

Submitter Information Verification

Submitter Full Name: Vincent Saporita
Organization: Saporita Consulting
Street Address:
City:
State:
Zip:

Submittal Date: Fri Aug 23 09:52:14 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: CMP4 does agree that cybersecurity for certain critical systems and life safety systems are important. However, the cybersecurity scope of the NEC in general has already been established in 110.3(A)(8) and by other Articles such as 708 for Critical Operations Power Systems. CMP4 will rely on the work of CMP1 with input from the NFPA Cybersecurity Advisory Committee for the wording of 110.3(A)(8) and any related terms and definitions. As stated in 90.3, Chapters 1 through 4 generally apply to all electrical installations and subsequent Chapters may supplement or modify. Therefore, if a power production system covered by this Article was considered as part of life safety equipment or system, then 110.3(A)(8) would already apply. If it was part of a critical operation power system, then in addition to this Article, other Articles such as 708 would apply. Per the NEC style manual, general requirements from Chapters 1 through 4 shall not be repeated in other Articles.

Public Comment No. 1568-NFPA 70-2024 [New Section after 692.4(C)]

TITLE OF NEW CONTENT

Type your content here ..

692.5. Cybersecurity

Fuel cell systems , directly supplying life safety-related infrastructures , that are connected to a communication network and have the capability to be controlled or permit control of any portion of the premises shall comply with either of the following:

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

(2) The fuel cell systems are connected through a networked interface complying with both of the following methods:

a. The fuel cell systems are identified as being evaluated for cybersecurity.

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

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

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

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

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

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

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

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

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

Statement of Problem and Substantiation for Public Comment

Let's review the Code Making Panel Statement to resolve Public Input 1249, one sentence at a time.

The first sentence is "NEC 90.2(A) defines the purpose of the code to protect from hazards related to the use of electricity, not control systems." The text in this Public Comment is exactly related to the use of electricity and focused solely on fuel cell systems. This Comment is not focused on industrial control systems. Attacks on industrial control systems are simply given as examples of the frequency of cyber incidents. Most types of electrical equipment/systems, if connected to the internet, and unprotected against cyber attack, are vulnerable, not just industrial control systems.

The first half of the second sentence reads "The proposal is outside the scope of the NEC". If the intent of the Panel Statement were that the proposal was outside the scope of Article 692, that would be confusing because it reads "This article applies to the installation of fuel cell systems." There is nothing in Public Input 1249 or in this Public Comment that is outside of that scope.

The second half of the second sentence reads "and is also addressed by communication standards such as IEEE 2030.5 which are required for UL1741 / IEEE 1547 listing". The fact that cybersecurity is addressed in IEEE and UL Product Standards does not put requirements into the NEC. In order to assure that Large-Scale Photovoltaic (PV) Electric Supply Stations, directly serving life safety-related infrastructure, are cyber secure when installed, the requirements must be in the NEC, not in an IEEE or UL Product Standard.

This Public Comment limits the suggested cybersecurity requirement to Fuel Cell Systems directly supplying life safety-related infrastructures and Informational Note No. 5 is added, providing examples of life safety-related infrastructure.

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

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

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

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

Let's look at an example of a financial center. 110.3(A)(8) currently requires that a fire alarm system in the financial center, because it is life safety equipment, be evaluated in light of cybersecurity. However, there is no requirement for the other non-life safety equipment/systems within or directly supplying the financial center, such as internet-connected Fuel Cell Systems, which could easily be compromised by a cyber attack. The proposed text in this Public Comment addresses this vulnerability.

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

THIS PUBLIC COMMENT SIMPLY REQUIRES THAT FUEL CELL SYSTEMS, DIRECTLY SUPPLYING LIFE SAFETY-RELATED INFRASTRUCTURES, EITHER NOT BE CONNECTED TO THE INTERNET, OR IF THEY ARE CONNECTED TO THE INTERNET, THAT THEY BE “IDENTIFIED” FOR CYBERSECURITY AND THAT AN ASSESSMENT IS PROVIDED.

Related Item

• PI 1249

Submitter Information Verification

Submitter Full Name: Vincent Saporita
Organization: Saporita Consulting
Street Address:
City:
State:
Zip:
Submittal Date: Sat Aug 24 07:40:28 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: CMP4 does agree that cybersecurity for certain critical systems and life safety systems are important. However, the cybersecurity scope of the NEC in general has already been established in 110.3(A)(8) and by other Articles such as 708 for Critical Operations Power Systems. CMP4 will rely on the work of CMP1 with input from the NFPA Cybersecurity Advisory Committee for the wording of 110.3(A)(8) and any related terms and definitions. As stated in 90.3, Chapters 1 through 4 generally apply to all electrical installations and subsequent Chapters may supplement or modify. Therefore, if a power production system covered by this Article was considered as part of life safety equipment or system, then 110.3(A)(8) would already apply. If it was part of a critical operation power system, then in addition to this Article, other Articles such as 708 would apply. Per the NEC style manual, general requirements from Chapters 1 through 4 shall not be repeated in other Articles.

Public Comment No. 1569-NFPA 70-2024 [New Section after 694.2]

TITLE OF NEW CONTENT

Type your content here ...

694.5. Cybersecurity

Wind electric systems , directly supplying life safety-related infrastructures, that are connected to a communication network and have the capability to be controlled or permit control of any portion of the premises shall comply with either of the following:

(1) The ability to control wind electric systems is limited to a direct connection through a local nonnetworked interface.

(2) The wind electric systems are connected through a networked interface complying with both of the following methods:

a. The wind electric systems are identified as being evaluated for cybersecurity.

b. A cybersecurity assessment of wind electric systems is completed and documentation of the assessment and certification is available to those authorized to inspect, operate, and maintain the system.

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

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

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

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

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

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

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

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

Statement of Problem and Substantiation for Public Comment

Let's examine the Panel Statement to resolve Public Input 1250 one sentence at a time.

The first sentence is "NEC 90.2(A) defines the purpose of the code to protect from hazards related to the use of electricity, not control systems." The text in this Public Comment is exactly related to the use of electricity and focused solely on wind electric systems. This Comment is not focused on industrial control systems. Attacks on industrial control systems are simply given as examples of the frequency of cyber incidents. Most types of electrical equipment/systems, if connected to the internet, and unprotected against cyber attack, are vulnerable, not just industrial control systems.

The first half of the second sentence reads "The proposal is outside the scope of the NEC". If the intent of the Panel Statement were that the proposal was outside the scope of Article 694, that would be unclear because it reads "This article applies to wind (turbine) electric systems that consist of one or more wind electric generators and their related alternators, generators, inverters, controllers, and associated equipment." There is nothing in Public Input 1250 or in this Public Comment that is outside of that scope.

The second half of the second sentence reads "and is also addressed by communication standards such as IEEE 2030.5 which are required for UL1741 / IEEE 1547 listing". The fact that cybersecurity is addressed in IEEE and UL Product Standards does not put requirements into the NEC. In order to assure that wind electric systems, directly serving life safety-related infrastructure, are cyber secure when installed, the requirements must be in the NEC, not in an IEEE or UL Product Standard.

This Public Comment limits the suggested cybersecurity requirement to wind electric systems directly supplying life safety-related infrastructures.

Informational Note No. 5 provides examples of life safety-related infrastructure.

Most of the cybersecurity focus has been on IT systems. There has been very little public discussion about cybersecurity for Operational Technology (OT), but cyber attacks on OT occur on almost a daily basis.

For an example of just how common cyber attacks on life safety related infrastructure have become, let's look at just the water supply and waste water treatment industry. The DNI (Director of National Intelligence), through the CTIIC (Cyber Threat Intelligence Integration Center) recently released a report of 12 cyber attacks on the industrial control systems of water utilities, water systems, and waste water treatment systems, for the six-month period from November 2023 through April 2024. This report can be found at

https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.dni.gov/files/CTIIC/documents/products/Recent_Cyber_Attacks_on_US_Infrastructure_Underscore_Vulnerability_of_Crit June2024.pdf&ved=2ahUKEwi5gP7-m4eIAxUakYkEHasyIRQQFnoECB8QAQ&usg=AOvVaw3hJL2DMIRs-CECfmewcXVP

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

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

Let's look at an example of a financial center. 110.3(A)(8) currently requires that a fire alarm system in the financial center, because it is life safety equipment, be evaluated in light of cybersecurity. However, there is no requirement for the other non-life safety equipment/systems within or directly supplying the financial center, such as internet-connected wind electric systems, which could easily be compromised by a cyber attack. The proposed text in this Public Comment addresses this vulnerability.

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

THIS PUBLIC COMMENT SIMPLY REQUIRES THAT WIND ELECTRIC SYSTEMS, DIRECTLY SUPPLYING LIFE SAFETY-RELATED INFRASTRUCTURES, EITHER NOT BE CONNECTED TO THE INTERNET, OR IF THEY ARE CONNECTED TO THE INTERNET, THAT THEY BE "IDENTIFIED" FOR CYBERSECURITY AND THAT AN ASSESSMENT IS PROVIDED.

Related Item

• PI 1250

Submitter Information Verification

Submitter Full Name: Vincent Saporita
Organization: Saporita Consulting
Street Address:
City:
State:
Zip:

Submittal Date: Sat Aug 24 07:49:05 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: CMP4 does agree that cybersecurity for certain critical systems and life safety systems are important. However, the cybersecurity scope of the NEC in general has already been established in 110.3(A)(8) and by other Articles such as 708 for Critical Operations Power Systems. CMP4 will rely on the work of CMP1 with input from the NFPA Cybersecurity Advisory Committee for the wording of 110.3(A)(8) and any related terms and definitions. As stated in 90.3, Chapters 1 through 4 generally apply to all electrical installations and subsequent Chapters may supplement or modify. Therefore, if a power production system covered by this Article was considered as part of life safety equipment or system, then 110.3(A)(8) would already apply. If it was part of a critical operation power system, then in addition to this Article, other Articles such as 708 would apply. Per the NEC style manual, general requirements from Chapters 1 through 4 shall not be repeated in other Articles.

Public Comment No. 1476-NFPA 70-2024 [Section No. 694.30(B)]

(B) Flexible Cords and Cables.

Flexible cords and cables, where used to connect the moving parts of turbines or where used for ready removal for maintenance and repair, shall either be part of the listed equipment or shall comply with all of the following:

(1) Be identified as hard service cord type or portable power cable type

(2) Be suitable for extra-hard usage

(3) Be listed for outdoor use

(4) Be water resistant

(5) Comply with Table 400.4

(6) Be sunlight resistant where exposed to sunlight

Statement of Problem and Substantiation for Public Comment

The proposed requirements are appropriate for a general application outside of a listing certification. The proposed modification allows for use of the UL6141 and UL6142 wind turbine safety standard certifications that have similar requirements for the application where the certification evaluation addresses the specific application aspects without including the visual individual supporting ratings needed to confirm compliance with points (1) - (6) below.

Related Item

• First Revision No. 8999-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Timothy Zgonena
Organization: UL LLC
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 23 13:34:03 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7602-NFPA 70-2024
Statement: The revision allows for use of the wind turbine safety standard certifications for verifying flexible cords and cables where listed as part of the system.

Public Comment No. 100-NFPA 70-2024 [Section No. 705.1]

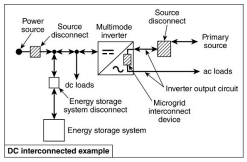
705.1 Scope.

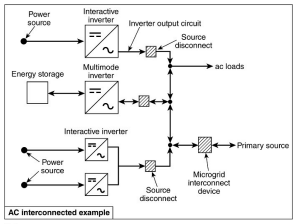
This article covers installation of one or more electric power production sources operating in parallel with a primary source(s) of ~~electricity.~~ electricity and interconnected microgrid systems. .

Informational Note No. 1: Examples of the types of primary sources include a utility supply or an on-site electric power source(s).

Informational Note No. 2: See Figure Informational Note 705.1.

Figure Informational Note 705.1 Identification of Power Source Components in Common Configurations.





Notes:
(1) These diagrams are intended to be a means of identification for power source components, circuits, and connections.
(2) The power source disconnect in these diagrams separates the power source from other systems.
(3) Equipment disconnecting means not shown.
(4) System grounding and equipment grounding are not shown.
(5) Custom designs occur in each configuration, and some components are optional.

Statement of Problem and Substantiation for Public Comment

The additional text is to clarify that the scope that Article 705 includes the provisions of interconnected microgrid systems that are capable of operating in interactive mode with a primary source of power, or electric utility, or other electric power production and distribution network [705.50].

Related Item

• 3264

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 16 18:45:41 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7603-NFPA 70-2024
Statement: The parenthesis (s) is removed from primary source in the scope since the new definition of primary source can be made up of multiple power sources. A microgrid can function as a primary source per the definition in Article 100 and it does not need to be called out in the requirement. The Informational Note No.1 was not consistent with the new definition of primary source so the IN was changed to a simple reference to the Article 100 definition as this change of definition is causing confusion to the users of this Code and needs to be highlighted for at least a few code cycles.

Public Comment No. 1474-NFPA 70-2024 [Section No. 705.11]

705.11 Source Connections to a Service.

~~**(A)** Service Connections.~~

An electric power production source

~~shall be permitted to be~~

connected to a service

~~by one of the following methods:~~

(1) ~~To a new service in accordance with~~ 230.4(A)

(2) ~~To the supply side of the service disconnecting means in accordance with~~ 230.82(6)

(3) ~~To an additional set of service entrance conductors in accordance with~~ 230.40 ~~, Exception No. 5~~

~~These connections~~

shall comply with 705.11(

~~B~~

A)

~~through~~

and 705.11(

~~C~~

B) .

(~~B~~ A) Service Conductors Connected to Power Sources.

Service conductors connected to power sources shall comply with the following:

(1) The ampacity of service conductors connected to the power source service disconnecting means shall not be less than that of the power production source maximum circuit current in accordance with 705.28(A).

(2) Service conductors connected to the power source service disconnecting means shall be sized in accordance with 705.28 and not smaller than 6 AWG copper or 4 AWG aluminum or copper-clad aluminum.

(3) The ampacity of service conductors to which power source service conductors are connected shall not be less than that required in 705.11(B)(1) or 705.11(B)(2).

(~~C~~ B) Overcurrent Protection.

Power source service conductors shall be protected from overcurrent in accordance with 705.30.

(1) Power Source Connections in Buildings.

Power

~~source~~

sources are permitted to be connected to existing service conductors located within buildings

~~and connected to existing service conductors or equipment shall be protected in accordance with one of the following methods:~~

- ~~In dwelling units, with an overcurrent protective device located within 3 m (10 ft) of conductor length from the point of connection.~~
- ~~In other than dwelling units, with an overcurrent protective device located within 5 m (16.5 ft) of conductor length from the point of connection.~~

~~In other than dwelling units with cable limiters located within 5 m (16.5 ft) of conductor length from the point of connection, with an overcurrent protective device located within 20 m (66 ft) of conductor length from the point of connection.~~

when all of the following requirements are met:

(1) Services are 1000 Vac and less

(2) Service conductors are protected from physical damage in accordance with 230.50(B)(1)

(3) Connection to service conductors are in accordance with 230.46

(4) Service conductors must terminate on a service disconnecting means connecting the power source

(5) Service conductors are limited to a length of 3 m (10 ft.) within the structure

Informational Note: The limits in 705.11(C)(1) are intended to provide guidance on practical distances for unprotected power source service conductors inside buildings.

~~**(2)** Ground Fault Protection of Equipment.~~

~~The rating of overcurrent protective devices of power source service disconnecting means shall be used to determine if ground fault protection of equipment is required in accordance with~~ 230.95 ~~.~~

Statement of Problem and Substantiation for Public Comment

the proposed language changes do the following:

Parent text change: The parent text of 705.11 has been modified to remove references to other sections. Permissions to place PV systems on a structure as an additional service are already permitted as part of Article 230.

Old (C)(1) and new (B)(1)
Proposed changes to this section provide the restrictions around placing service conductors within a structure. The suggested language restricts the length of unprotected conductor to 10ft [(C)(5)] in any structure and only permits service conductors less than 1000V to be run in these applications [(C)(1)]. The suggested language offers a cut-off to keep the installation out of the range of medium voltage. Because of that limitation we don't have to address dwelling versus non-dwelling applications. In my opinion this limits the exposure and provides a length of conductor that is in protected raceway offering a means to connect to existing

service equipment yet leave the building within 10ft.

the language of (B)(2) is necessary because of the confusion that exists as to whether or not these are service conductors. NEC 2023 is the first cycle that identifies the conductors that connect to the service are not power source output conductors but indeed are service entrance conductors. The addition of this language is necessary to ensure clarity around the requirements for physical protection of these conductors. The reference section made here is how we would treat all service entrance conductors and requires physical protection for these conductors when subject to physical damage. Specifically pointing to 230.51(B)(1) elevates the awareness for this application of service conductors within a structure and helps to ensure physical protection is afforded for these service conductors.

The suggested language of (B)(3) identifies the exact reference for permissible methods to connect to service conductors.

The suggest language of (B)(4) ensures the service conductors land on a service disconnecting means.

The language related to current limiters is being removed until this subject can be reviewed further by CMP 10. The requirements around the application of these products in applications under the purview of the NEC are limited leaving only permissions that they may be used. The following are the concerns about the existing language / permissions found in 705.11.

Possible overload condition: If, for example, the application includes multiple conductors per phase, some concerns present themselves for safe installation and protection of the conductors especially from overload. Let's assume 3 conductors per phase in this example. If we leverage cable limiters on each conductor and if one conductor has damage and takes out a limiter, the other two conductors now carry the entire load yet they are all protected at the load connection by the service disconnecting means at the same current rating. So if 3 conductors carry 80A continuous and are sized for 100A ampacity protected by a 100A OCPD which provides overload protection, if one of the three conductors is taken out of the picture by the cable limiter we would have two conductors carrying the 80A of continuous load and not be rated for that amount of current and the protecting OCPD is still rated 100A. The OCPD would not provide overload protection for the application. If only one conductor per cable limiter was applied, this concern would not exist. The issue is that we do not have specific requirements for the application of current limiters to follow in the NEC. I would not feel comfortable at this point in the cycle to begin the journey of creating language without the benefit of public review. These are service conductors installed inside of a structure and care should be taken when crafting language for the safety of this application.

Installation hardware: Cable limiters come in many different forms. We don't have language in the NEC to address the application when the cable limiter is not placed at the origin of the circuit. These devices are heavily used on the secondary of transformers and connected at the source of the secondary transformer conductors. Quite often the cable limiter is placed at each end of the conductor. If we have a lead length as permitted in the first draft language of 16.5 ft. and then the cable limiter is installed, guidance/requirements for the proper installation of that limiter at this location is not provided in the NEC. Language should provide needed requirements to address whether an enclosure is required for these limiters, listing requirements, and possibly more. 600 Volt and below limiters are available with cable-in/cable-out crimping capabilities but we don't have information as to if those can be in the raceway, if they must be in a pull box, if they have to be exposed or can be exposed, and other details. If you are not using the type that crimp on both ends, we don't address the enclosure for the termination. We don't have listing requirements. I don't believe the manufacturer installation instructions would be sufficient.

Related Item

• FR 8564 • FR 8568

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
Organization: Eaton Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 23 12:24:21 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: 705.11(A) is necessary as pointers to the three sections of Article 230 that are directly related to this section. Two of these three sections are nearly universally overlooked by installers and enforcement. This change would be considered new information and falls outside the allowable actions for the second draft. 705.11(B) Existing heading is clear and less confusing than that proposed in the public comment. Ampacity is not the only issue covered by this section. Minimum size is based on fault clearing capabilities and not ampacity. See Second Revision 7620 for related actions to 705.11(C).

Public Comment No. 1921-NFPA 70-2024 [Section No. 705.11]

705.11 Source Connections to a Service.

(A) Service Connections.

An electric power production source shall be permitted to be connected to a service by one of the following methods:

(1) To a new service in accordance with 230.4(A)

(2) To the supply side of the service disconnecting means in accordance with 230.82(6)

(3) To an additional set of service entrance conductors in accordance with 230.40, Exception No. 5

These connections shall comply with 705.11(B) through 705.11(C).

(B) Service Conductors Connected to Power Sources.

Service conductors connected to power sources shall comply with the following:

(1) The ampacity of service conductors connected to the power source service disconnecting means shall not be less than that of the power production source maximum circuit current in accordance with 705.28(A).

(2) Service conductors connected to the power source service disconnecting means shall be sized in accordance with 705.28 and not smaller than 6 AWG copper or 4 AWG aluminum or copper-clad aluminum.

(3) The ampacity of service conductors to which power source service conductors are connected shall not be less than that required in 705.11(B)(1) or 705.11(B)(2).

(C) Overcurrent Protection.

Power source service conductors shall be protected from overcurrent in accordance with 705.30.

(1) Power Source Connections in Buildings.

Power source service conductors located within buildings and connected to existing service conductors or equipment shall be protected in accordance with one of the following methods:

(1) In dwelling units, with an overcurrent protective device located within 3 m (10 ft) of conductor length from the point of connection.

(2) In other than dwelling units, with an overcurrent protective device located within 5 m (16.5 ft) of conductor length from the point of connection.

(3) In other than dwelling units with cable limiters located within 5 m (16.5 ft) of conductor length from the point of connection, with an overcurrent protective device located within 20 m (66 ft) of conductor length from the point of connection.

Informational Note: The limits in 705.11(C)(1) are intended to provide guidance on practical distances for unprotected power source service conductors inside buildings.

(2) Ground Fault Protection of Equipment.

The rating of overcurrent protective devices of power source service disconnecting means shall be used to determine if ground fault protection of equipment is required in accordance with 230.95.

(D) Service Disconnecting Means.

A disconnecting means in accordance with Parts VI through VII of Article 230 shall be provided to disconnect all ungrounded conductors of a power production source from the conductors of other systems.

Statement of Problem and Substantiation for Public Comment

Here's this scenario: a PV system engineer working on a supply-side connected system design reads through 2026 NEC section 705.11 to see what changed. 705.11(D) requirements for service disconnecting means - that a disconnect in accordance with Parts VI through VII of article 230 must be used for source connections – has been deleted.

Per the substantiation: “705.11(D) – The language has been removed as the requirements of Chapter 2 are applicable unless modified in accordance with 90.3. The requirements of and for a service disconnecting means are already referenced through 230.2(A)(5) and 230.82(6).”

However, there is a modification per 90.3 for disconnects for Interconnected Electric Power Production Sources: 705.20 Source Disconnecting Means, which would seemingly apply, and which would mean no requirement to put the disconnect outside per 230.70(A)(2).

Providing clarity is essential, therefore this comment proposes reinserting the previously deleted text. An alternate approach would be using the same language in 705.20 specifically for source connections to a service.

Related Item

• FR-8568

Submitter Information Verification

Submitter Full Name: Brian Mehalic
Organization: Solar Energy International
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 28 09:52:23 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7681-NFPA 70-2024

Statement: PC 1921 requested the return of the language from the 2023 NEC related to disconnecting means. Rather than using that approach, this second revision places the requirement for a power source service disconnecting means in 705.11(A) ahead of the first draft first uses of the term in 705.11(B). Clarifying language is added to 705.20 to show that the power source service disconnecting means required in 705.11(A) is permitted to meet the requirements of 705.20 so additional disconnects are not required. See SR 7685.

This SR is being balloted separately from SR 7614 which is also on 705.11(A).

Public Comment No. 1941-NFPA 70-2024 [Section No. 705.11]

705.11 Source Connections to a Service.

(A) Service Connections.

An electric power production source shall be permitted to be connected to a service by one of the following methods:

(1) To a new service in accordance with 230.4(A)

(2) To the supply side of the service disconnecting means in accordance with 230.82(6)

(3) To an additional set of service entrance conductors in accordance with 230.40, Exception No. 5

These connections shall comply with 705.11(B) through 705.11(C).

(B) Service Conductors Connected to Power Sources.

Service conductors connected to power sources shall comply with the following:

(1) The ampacity of service conductors connected to the power source service disconnecting means shall not be less than that of the power production source maximum circuit current in accordance with 705.28(A).

(2) Service conductors connected to the power source service disconnecting means shall be sized in accordance with 705.28 and not smaller than 6 AWG copper or 4 AWG aluminum or copper-clad aluminum.

(3) The ampacity of service conductors to which power source service conductors are connected shall not be less than that required in 705.11(B)(1) or 705.11(B)(2).

(C) Overcurrent Protection.

Power source service conductors shall be protected from overcurrent in accordance with 705.30.

~~**(2)**~~

~~**(1)** Power Source Connections in Buildings.~~

~~Power source service conductors located within buildings and connected to existing service conductors or equipment shall be protected in accordance with one of the following methods:~~

(1) ~~In dwelling units, with an overcurrent protective device located within 3 m (10 ft) of conductor length from the point of connection.~~

(2) ~~In other than dwelling units, with an overcurrent protective device located within 5 m (16.5 ft) of conductor length from the point of connection.~~

(3) ~~In other than dwelling units with cable limiters located within 5 m (16.5 ft) of conductor length from the point of connection, with an overcurrent protective device located within 20 m (66 ft) of conductor length from the point of connection.~~

~~Informational Note:~~ ~~The limits in~~ ~~705.11(C)(1)~~ ~~are intended to provide guidance on practical distances for unprotected power source service conductors inside buildings.~~

D) Ground Fault Protection of Equipment.

The rating of overcurrent protective devices of power source service disconnecting means shall be used to determine if ground fault protection of equipment is required in accordance with 230.95.

Statement of Problem and Substantiation for Public Comment

Minimizing the distance of service conductors within a building reduces the likelihood of an electrical hazard. The distances suggested in the initial revised text do not have sufficient technical support.

Cable limiters are not fuses. Cable limiters are normally installed for reliability purposes, isolating a faulted cable and allowing other cables in a parallel set to support the load. There is no warning if a cable limiter installed in a parallel set of power source service conductors opens, creating a condition that could potentially overload the other power source service cables in the parallel set.

Related Item

• FR-8812

Submitter Information Verification

Submitter Full Name: Duke Schamel
Organization: Electrical Service Solutions, Inc.
Street Address:
City:
State:
Zip:
Submittal Date: Wed Aug 28 11:54:04 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7620-NFPA 70-2024
Statement: The requirements for cable limiters, including their use in parallel conductors, was revised to require engineering supervision, limit the use to services of 1000Vac or less, and the installation in switchgear or similar enclosures. Small changes were made to address other items beyond the

scope of the task group actions. One action was to change text for “overcurrent device” to OCPD in several places to align with PC 1644. The requirement for one cable limiter per ungrounded conductor located within switchgear or enclosures is used to clarify that each of any parallel conductors requires a cable limiter, but does not exclude the allowance of a second cable limiter on the opposite end of the conductors as recommended by manufacturers.

Public Comment No. 512-NFPA 70-2024 [Section No. 705.11]

705.11 Source Connections to a Service.

(A) Service Connections.

An electric power production source shall be permitted to be connected to a service by one of the following methods:

(1) To a new service in accordance with 230.4(A)

(2) To the supply side of the service disconnecting means in accordance with 230.82(6)

(3) To an additional set of service entrance conductors in accordance with 230.40, Exception No. 5

These connections shall comply with 705.11(B) through 705.11(C).

(B) Service Conductors Connected to Power Sources.

Service conductors connected to power sources shall comply with the following:

(1) The ampacity of service conductors connected to the power source service disconnecting means shall not be less than that of the power production source maximum circuit current in accordance with 705.28(A).

(2) Service conductors connected to the power source service disconnecting means shall be sized in accordance with 705.28 and not smaller than 6 AWG copper or 4 AWG aluminum or copper-clad aluminum.

(3) The ampacity of service conductors to which power source service conductors are connected shall not be less than that required in 705.11(B)(1) or 705.11(B)(2).

(C) Overcurrent Protection.

Power source service conductors shall be protected from overcurrent in accordance with 705.30.

(1) Power Source Connections in Buildings.

Power source service conductors located within buildings and connected to existing service conductors or equipment shall be protected in accordance with one of the following methods:

(1) In dwelling units, with an overcurrent protective device located within 3 m (10 ft) of conductor length from the point of connection.

(2) In other than dwelling units, with an overcurrent protective device located within 5 m (16.5 ft) of conductor length from the point of connection.

(3) In other than dwelling units with cable limiters located within 5 m (16.5 ft) of conductor length from the point of connection, with an overcurrent protective device located within 20 m (66 ft) of conductor length from the point of connection.

Informational Note: The limits in 705.11(C)(1) are intended to provide guidance on practical distances for unprotected power source service conductors inside buildings.

(2) Ground Fault Protection of Equipment.

The rating of overcurrent protective devices of power source service disconnecting means shall be used to determine if ground fault protection of equipment is required in accordance with 230.95.

Additional Proposed Changes

File Name	Description	Approved
CN_190.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 190 appeared in the First Draft Report.

The Correlating Committee directs that a task group consisting of members from CMPs 4 and 10 be formed to review and correlate the requirements for service conductors and equipment in Article 230 and Article 705.

Related Item

• Correlating Committee Note No. 190

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 22:43:20 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7620-NFPA 70-2024
Statement: The requirements for cable limiters, including their use in parallel conductors, was revised to require engineering supervision, limit the use to services of 1000Vac or less, and the installation in switchgear or similar enclosures. Small changes were made to address other items beyond the scope of the task group actions. One action was to change text for “overcurrent device” to OCPD in several places to align with PC 1644. The requirement for one cable limiter per ungrounded conductor located within switchgear or enclosures is used to clarify that each of any parallel

conductors requires a cable limiter, but does not exclude the allowance of a second cable limiter on the opposite end of the conductors as recommended by manufacturers.

Correlating Committee Note No. 190-NFPA 70-2024 [Section No. 705.11]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 10:46:19 EDT 2024

Committee Statement

Committee Statement: The Correlating Committee directs that a task group consisting of members from CMPs 4 and 10 be formed to review and correlate the requirements for service conductors and equipment in Article 230 and Article 705.

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. 1802-NFPA 70-2024 [Section No. 705.11(A)]

(A) Service Connections.

An electric power production source shall be permitted to be connected to a service by one of the following methods:

(1) To a new service in accordance with 230.4(A) or 268.4(A)

(2) To the supply side of the service disconnecting means in accordance with 230.82(6) or 268.82(4)

(3) To an additional set of service entrance conductors in accordance with 230.40, Exception No. 5 or 268.40, Exception No. 3

These connections shall comply with 705.11(B) through 705.11(C).

Statement of Problem and Substantiation for Public Comment

705.11(A) language could be perceived as no longer permitting the connection of interactive power systems to services >1000Vac. This is because there are only references to Article 230 in 705.11(A), which is now limited to 1000Vac/1500Vdc. With the inclusion of the proper references to Article 268 this potential inadvertent omission can be fixed.

Related Item

• FR 8812

Submitter Information Verification

Submitter Full Name: Rebekah Hren
Organization: IPPNC LLC
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 27 12:59:49 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7614-NFPA 70-2024

Statement: References are added for the corresponding sections of Article 268 that parallel Article 230. The cross reference to Article 268 is needed for medium voltage services. The TC requests that the CC look into the reference in 268.40 Exception No. 3 as it has an error as it refers to 268.82(5) and 268.82(6) which do not match what was intended. The correct references that should be in 268.40 Exception No. 3 should 268.82(3) and 268.82(4) which aligns with the language in 230.40 Exception No. 5.

Public Comment No. 278-NFPA 70-2024 [Section No. 705.11(A)]

(A) Service Connections.

An electric power production source shall be permitted to be connected to a service by one of the following methods:

(1) To a new service in accordance with 230.4(A)

(2) To the supply side of the service disconnecting means in accordance with 230.82(6)

(3) To an additional set of service entrance conductors in accordance with 230.40, Exception No. 5

These connections shall comply with 705.11(B) through 705.11(C). The source disconnect is not required to be grouped with the service disconnect.

Statement of Problem and Substantiation for Public Comment

Some jurisdictions require the source disconnect for a PV system to be grouped with the service disconnect where a supply side connection is made. My proposal helps eliminate confusion and clarifies that the source disconnect is not required to be grouped with the service disconnect where a supply side connection is made.

Related Item

• 705.11 Source Connection

Submitter Information Verification

Submitter Full Name: MARK RHOTON
Organization: Frederick County Government Permits and Inspections
Affiliation: Chief Electrical Inspector Frederick County Maryland
Street Address:
City:
State:
Zip:
Submittal Date: Sat Jul 27 10:16:15 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected
Resolution: While the NEC may not require or restrict grouping, some utilities may require grouping of the power source disconnecting means with other service disconnecting means in specific applications.

Public Comment No. 1444-NFPA 70-2024 [Section No. 705.11(C)]

(C) Overcurrent Protection.

Power source service conductors shall be protected from overcurrent in accordance with 705.30.

~~(1)~~

~~Power Source Connections in Buildings.~~

~~Power source service conductors located within buildings and connected to existing service conductors or equipment shall be protected in accordance with one of the following methods:~~

(1) ~~In dwelling units, with an overcurrent protective device located within 3 m (10 ft) of conductor length from the point of connection.~~

(2) ~~In other than dwelling units, with an overcurrent protective device located within 5 m (16.5 ft) of conductor length from the point of connection.~~

(3) ~~In other than dwelling units with cable limiters located within 5 m (16.5 ft) of conductor length from the point of connection, with an overcurrent protective device located within 20 m (66 ft) of conductor length from the point of connection.~~

~~Informational Note:~~ ~~The limits in 705.11(C)(1)~~ ~~are intended to provide guidance on practical distances for unprotected power source service conductors inside buildings.~~

~~(2)~~ ~~Ground Fault Protection of Equipment.~~

~~The rating of overcurrent protective devices of power source service disconnecting means shall be used to determine if ground fault protection of equipment is required in accordance with 230.95~~ .

Statement of Problem and Substantiation for Public Comment

Why does CMP-4 think it is OK to have unprotected utility service conductors in building at any length? Delete the revived language that was removed in 2020 for good reason. This rule is unnecessary as the installation of service conductors in is article 230.

Delete (C)(1) entirely. Relocate section (C)(2) as (C)(1)

Related Item

• FR 8812-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Peter Diamond
Organization: Diamond Seminars
Street Address:
City:
State:
Zip:
Submittal Date: Thu Aug 22 19:11:50 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: This language is not adding permissive language to the NEC, it is adding specifics in an area that is currently open ended in articles 230 and 268. The specific language is for these specific power source connections that are common for those using Article 705.

Public Comment No. 1614-NFPA 70-2024 [Section No. 705.11(C)]

(C) Overcurrent Protection.

Power source service conductors shall be protected from overcurrent in accordance with 705.30.

~~**(1)** Power Source Connections in Buildings.~~

~~Power~~

Power source service conductors located within buildings and connected to existing service conductors or equipment shall be protected in accordance with one of the following methods:

(1) In dwelling units, with an overcurrent protective device located within 3 m (10 ft) of conductor length from the point of connection.

(2) In other than dwelling units, with an overcurrent protective device located within 5 m (16.5 ft) of conductor length from the point of connection.

(3) In other than dwelling units with cable limiters located within 5 m (16.5 ft) of conductor length from the point of connection, with an overcurrent protective device located within 20 m (66 ft) of conductor length from the point of connection.

Informational Note: The limits in 705.11(C)(1) are intended to provide guidance on practical distances for unprotected power source service conductors inside buildings.

~~**(2)** Ground Fault Protection of Equipment.~~

~~The rating of overcurrent protective devices of power source service disconnecting means shall be used to determine if ground fault protection of equipment is required in accordance with 230.95 .~~

Statement of Problem and Substantiation for Public Comment

This PC deletes the ground-fault protection of equipment requirements as 230.95 already has these requirements and this language could conflict with the requirements in Article 230. This language is not necessary and should be deleted to ensure the proper application of GFPE in these applications.

Related Item

• FR 8812

Submitter Information Verification

Submitter Full Name: Thomas Domitrovich
Organization: Eaton Corporation
Street Address:
City:
State:
Zip:
Submittal Date: Sat Aug 24 16:30:04 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: The ground-fault protection of equipment section is necessary to differentiate which rating should be used for determining when 230.95 requires ground-fault protection of equipment.

Public Comment No. 1769-NFPA 70-2024 [Section No. 705.11(C)]

(C) Overcurrent Protection.

Power source service conductors shall be protected from overcurrent in accordance with 705.30.

(1) Power Source Connections in Buildings.

Power source service conductors located within buildings and connected to existing service conductors or equipment shall be protected in accordance with one of the following methods:
(a) In dwelling units, with an overcurrent protective device located within 3 m (10 ft) of conductor length from the point of connection.

(b) In other than dwelling units, with an overcurrent protective device located within 5 m (16.5 ft) of conductor length from the point of connection.

(c) In other than dwelling units

~~with cable limiters located within 5 m (16.5~~
for services not over 1000 volts ac nominal, with an overcurrent protective device located within 20 m (66 ft) of

~~conductor~~
conductors length from the point of connection

~~, with an overcurrent protective device located within 20 m (66~~
and where cable limiters are also installed in accordance with the following:

(1) Under engineering supervision

(2) One per ungrounded conductor

(3) Within a switchgear enclosure

(4) Located within 5 m (16.5 ft) of conductor length from the point of connection

.

Informational Note: The limits in 705.11(C)(1) are intended to provide guidance on practical distances for unprotected power source service conductors inside buildings.

(2) Ground Fault Protection of Equipment.

The rating of overcurrent protective devices of power source service disconnecting means shall be used to determine if ground fault protection of equipment is required in accordance with 230.95.

Additional Proposed Changes

File Name	Description	Approved
705-11-C_CC_TG_PC_redline.jpg	Redline showing actual changes as proposed.	

Statement of Problem and Substantiation for Public Comment

Note that not all items marked as changed in Terra are actually changed. See attachment for specifics.

Changes are proposed to new section 705.11(C)(1) to add clarity further addressing where it is permitted to use cable limiters for these connections, and what installation requirements apply. These changes do not change the high level requirements from the first draft however they add important details to ensure that all future applications utilizing cable limiters are held to practical limits in keeping with common practices in use today. The following changes are proposed:
- Third level subdivision items are changed from numbered to alphabetical identifiers to align with the NEC Style Manual section 2.1.6.3.4.
- Requirements to apply section 705.11(C)(1)(c) have been rearranged to align with the previous subsections and are moved into a list format to align with the NEC Style Manual section 3.5.1.1.
- A practical limit of 1000Vac has been added to address the fact that there are no listed cable limiters above this rating that are known to exist.
- A requirement for engineering supervision has been added to recognize that the proper application of cable limiters is site and equipment dependent and should only be specified by a qualified professional engineer.
- A requirement to add one cable limiter per ungrounded conductor has been added to address installations utilizing parallel conductors.
- A requirement to ensure that all cable limiters are installed within the enclosure of switchgear is included to ensure the cable limiters are only installed within equipment that is completely enclosed on all sides and top with sheet metal.

This public comment is submitted on behalf of the NEC 2026 Correlating Committee Task Group formed to respond to Correlating Committee Note 190 on Section 705.11(C). This task group is made up of members of CMP 4 and CMP 10 to review correlation issues between Article 230 and 705. The task group consisted of the following members: Nathan Philips (Taskgroup Chair), Jim Rogers , Tom Domitrovich, Bill Brooks, Randy Dollar, Pete Jackson, Diane Lynch, Jason Fisher.

Related Item

• CCN-190 • FR-8812

Submitter Information Verification

Submitter Full Name: Jason Fisher
Organization: Solar Technical Consulting LLC
Affiliation: NEC 2026 Correlating Committee Task Group for CCN 190
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 09:52:27 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7620-NFPA 70-2024

Statement: The requirements for cable limiters, including their use in parallel conductors, was revised to require engineering supervision, limit the use to services of 1000Vac or less, and the installation in switchgear or similar enclosures. Small changes were made to address other items beyond the scope of the task group actions. One action was to change text for “overcurrent device” to OCPD in several places to align with PC 1644. The requirement for one cable limiter per ungrounded conductor located within switchgear or enclosures is used to clarify that each of any parallel conductors requires a cable limiter, but does not exclude the allowance of a second cable limiter on the opposite end of the conductors as recommended by manufacturers.

705.11 Source Connections to a Service. (Proposed NEC 2026 changes)

(C) Overcurrent Protection.
Power source service conductors shall be protected from overcurrent in accordance with 705.30.

(1) Power Source Connections in Buildings.
Power source service conductors located within buildings and connected to existing service conductors or equipment shall be protected in accordance with one of the following methods:

~~1.~~(a) In dwelling units, with an overcurrent protective device located within 3 m (10 ft) of conductor length from the point of connection.

~~2.~~(b) In other than dwelling units, with an overcurrent protective device located within 5 m (16.5 ft) of conductor length from the point of connection.

~~3.~~(c) In other than dwelling units for services not over 1000 volts ac nominal, with an overcurrent protective device located within 20 m (66 ft) of conductor length from the point of connection and~~with~~ where cable limiters are also installed in accordance with the following:

(1) Under engineering supervision

(2) One per ungrounded conductor

(3) Within a switchgear enclosure

(4) ~~I~~Located within 5 m (16.5 ft) of conductor length from the point of connection~~, with an overcurrent protective device located within 20 m (66 ft) of conductor length from the point of connection.~~

Informational Note: The limits in 705.11(C)(1C) are intended to provide guidance on practical distances for unprotected power source service conductors inside buildings.

Public Comment No. 1295-NFPA 70-2024 [Section No. 705.11(C)(1)]

(1) Power Source Connections in Buildings.

Power source service conductors located within buildings and connected to existing service conductors or equipment shall be protected in accordance with one of the following methods:

(1) In dwelling units, with an overcurrent protective device located within 3 m (10 ft) of conductor length from the point of connection.

(2) In other than dwelling units, with an overcurrent protective device located within 5 m (16.5 ft) of conductor length from the point of connection.

(3) In other than dwelling units with an overcurrent protective device located within 20 m (66 ft) of conductor length from the point of connection when the conductor is protected in accordance with one of the following methods:

(4) W ith cable limiters located within 5 m (16.5 ft) of conductor length from the point of connection

~~, with an overcurrent protective device located within 20 m (66~~

(1) for single conductor circuits or two parallel conductor circuits.

(2) W ith cable limiters located within 5 m (16.5 ft) of conductor length from the point of

~~connection~~

(1) connection and cable limiters located at the power source for parallel conductor circuits with three or more parallel circuits .

Informational Note: The limits in 705.11(C)(1) are intended to provide guidance on practical distances for unprotected power source service conductors inside buildings.

Statement of Problem and Substantiation for Public Comment

TerraView has mangled the markup of my comment.
In circuits with 3 or more parallel conductors and cable limiters on one end only, a faulted conductor is not protected. When a fault occurs the cable limiter opens isolating that end of the conductor but the fault is still supplied with current from the other parallel conductors connected together on the opposite end. The other parallel cable limiters see a reduced fault current depending on the number of parallel conductors. With 3 parallel conductors each remaining limiter sees 1/2 of the fault current, with 10 parallel conductors each remaining limiter sees 1/9th of the fault current. Since cable limiters only open on short circuit current and not overload it is increasingly unlikely that the cable limiters on one end of the unfaulted conductors will open with an increasing number of parallel conductors. Therefore the faulted conductor in a 3 or more parallel conductor circuit is unprotected under the proposed language and this makes the increased conductor length allowance unsupported.
The solution for this is to put cable limiters on both ends of the conductors for circuits with 3 or more parallel conductors when the circuit length is greater than 5m, up to 20m. With cable limiters on both ends of the conductor and a fault on the conductor the limiters on both ends would see the full fault current and open, isolating the faulted conductor and removing that conductor from the circuit.
Other options would be:
1) Only allow the use of single ended cable limiters and the corresponding increase in cable length to apply to single conductor or two parallel conductor circuits.
2) To remove the cable limiters and make the conductor length allowance 20m instead of 5m
3) To remove the cable limiters and make the conductor length allowance 5m
4) Go back to the 2023 language of referring to Art. 230 which has no length limit for service entrance conductors
5) Incorporate the Art. 230 language for service entrance conductor protection into the section

Related Item

• FR-8812-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Marvin Hamon
Organization:
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 20 12:15:51 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7620-NFPA 70-2024

Statement: The requirements for cable limiters, including their use in parallel conductors, was revised to require engineering supervision, limit the use to services of 1000Vac or less, and the installation in switchgear or similar enclosures. Small changes were made to address other items beyond the scope of the task group actions. One action was to change text for “overcurrent device” to OCPD in several places to align with PC 1644. The requirement for one cable limiter per ungrounded conductor located within switchgear or enclosures is used to clarify that each of any parallel conductors requires a cable limiter, but does not exclude the allowance of a second cable limiter on the opposite end of the conductors as recommended by manufacturers.

Public Comment No. 1632-NFPA 70-2024 [Section No. 705.11(C)(1)]

~~(1) Power Source Connections in Buildings.~~

~~Power source service conductors located within buildings and connected to existing service conductors or equipment shall be protected in accordance with one of the following methods:~~

(1) ~~In dwelling units, with an overcurrent protective device located within 3 m (10 ft) of conductor length from the point of connection.~~

(2) ~~In other than dwelling units, with an overcurrent protective device located within 5 m (16.5 ft) of conductor length from the point of connection.~~

(3) ~~In other than dwelling units with cable limiters located within 5 m (16.5 ft) of conductor length from the point of connection, with an overcurrent protective device located within 20 m (66 ft) of conductor length from the point of connection.~~

~~Informational Note: The limits in 705.11(C)(1) are intended to provide guidance on practical distances for unprotected power source service conductors inside buildings.~~

Statement of Problem and Substantiation for Public Comment

The prohibition of unprotected conductors entering buildings predates even the NEC itself. The earliest such rule that I have found is from 1881 in the requirements of the New York Board of Fire Undwerriters. Service conductors inside of a building are not only a danger to the occupant, they are a danger to first responders that cannot shut them of manually. The presence of cable limiters does not remove this danger. If a building is supplied by multiple sets of parallel conductors, one (or, worse still, two) cable limiter(s) can open and result in the other phase conductors carrying much more load than they are designed to carry. The overload protection afforded in 230.90 will not open to protect these conductors. Once they are overloading and melting, how do I shut them off, now that we are allowing 60+ feet of them in the building without a manual shutoff?

Related Item

• FR 8812

Submitter Information Verification

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

Submittal Date: Sun Aug 25 16:37:33 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: This language is not adding permissive language to the NEC, it is adding specifics in an area that is currently open ended in articles 230 and 268. The specific language is for these specific power source connections that are common for those using Article 705.

Public Comment No. 1325-NFPA 70-2024 [Section No. 705.12(B)]

(B) Busbars.

For power source connections to distribution equipment with no specific listing and instructions for combining multiple sources, one or more of the following methods shall be used to determine the required ampere ratings of busbars:

(1) The sum of 125 percent of the power source(s) output circuit current and the rating of the overcurrent device protecting the busbar shall not exceed the busbar ampere rating.

(2) Where two sources, one being a primary power source and the other another power source, are located at opposite ends of a busbar that contains loads, the following shall apply:

(3) . The sum of 125 percent of the power-source output circuit currents and the rating of the overcurrent device protecting the busbar shall not exceed 120 percent of the busbar ampere rating.

(4) . A permanent warning label shall be applied to the distribution equipment adjacent to the power source overcurrent device that displays the following or equivalent wording:

WARNING:

POWER SOURCE OUTPUT. DO NOT RELOCATE THIS OVERCURRENT DEVICE.

(5) The sum of the ampere ratings of all overcurrent devices protecting circuits connected to panelboards, both load and supply devices, excluding the rating of the overcurrent device protecting the busbar, shall not exceed the ampacity of the busbar. The rating of the overcurrent device protecting the busbar, excluding incidental loads that have no impact on the system, , shall not exceed the rating of the busbar. Permanent warning labels shall be applied to distribution equipment displaying the following or equivalent wording:

WARNING:

EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR.

(6) A connection at either end of a center-fed panelboard in dwellings shall be permitted where the sum of 125 percent of the power-source output circuit currents and the rating of the overcurrent device protecting the busbar does not exceed 120 percent of the busbar ampere rating. The warning label in 705.12(B)(2) shall be applied to the power source overcurrent devices complying with 705.12(B)(4).

(7) Connections shall be permitted on busbars of panelboards that supply lugs connected to feed-through conductors or are supplied by feed-through conductors in accordance with the following:

(8) . The feed-through conductors shall be sized in accordance with 705.12(A) .

(9) . Where an overcurrent device is installed at either end of the feed-through conductors, panelboard busbars on either side of the feed-through conductors shall be permitted to be sized in accordance with 705.12(B)(1) through 705.12(B)(3) .

(10) Connections shall be permitted on switchgear, switchboards, and panelboards in configurations other than those permitted in 705.12(B)(1) through 705.12(B)(5) where designed under engineering supervision that includes available fault-current and busbar load calculations.

Informational Note: See UL 1741-2023, *Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources*. Specifically designed equipment exists for the combination and distribution of sources to supply loads. The options provided in 705.12(B) are for equipment with no specific listing for combining sources.

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 reconsider Public Input No. 2061 that would negate the incidental loads associated with the solar system. For enforcement reasons, the panel statement "The authority having jurisdiction can approve panelboards with incidental loads that have little or no impact on this method of compliance" is concerning. If the CMP believes this is a "non issue to add additional loads with no impact" on the system, please consider adding that language from your panel statement. Currently, the language is clear that additional loads are not allowed.

Related Item

• Public Input No. 2061-NFPA 70-2023 Section No. 705.12(B)

Submitter Information Verification

Submitter Full Name: Dean Hunter
Organization: Minnesota Department of Labor
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 20 15:51:24 EDT 2024

Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: The suggested language is too open-ended and may cause conflict between installers and AHJs as to what the term “incidental loads that have no impact” actually means, which could present a safety concern where the bus could be overloaded. In addition the allowance in 705.12 (B) (6) gives enforcement leeway to allow incidental loads if designed under engineering supervision.

Public Comment No. 1483-NFPA 70-2024 [Section No. 705.13]

705.13 Power Control Systems (PCSs).

Power control systems (PCSs) in accordance with Article 130, Part II, shall be permitted to limit current and loading on busbars and conductors ~~supplied by the output of one~~ connected to one or more interconnected electric power production or energy storage sources. Where a PCS is used to control one or more interconnected electric power production or energy storage sources, it shall be marked as a multisource PCS.

Informational Note: See UL 3141-2024, *Outline of Investigation for Power Control Systems* , and UL 1741-2023, *Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources,* for information on PCSs. A listed PCS is a type of EMS that is capable of monitoring multiple power sources and controlling the current on busbars and conductors to prevent overloading.

Informational Note 2: Bidirectional power production sources may act as a load and a source depending on their operational state.

Statement of Problem and Substantiation for Public Comment

705.13 addresses when a PCS is used with an interconnected electric power production or energy storage source. The revised text addresses the multisource marking a PCS shall have to include source control and as such be suitable for the application addressed within 705.13.

The wording of “supplied by the output of one” was revised to “connected to one” to account for the fact that bidirectional sources such as energy storage systems can act as a source and a load and when charging do not act as a supply. Further the informational note was added to clarify that bidirectional sources can function as both a source and a load depending on if they are in a charge or discharge operational state.

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]	Primary edit for PCS requirements. 705.13 edits are being made to align with this PC

Related Item

- FR 8689

Submitter Information Verification

Submitter Full Name: Scott Picco
Organization: UL Solutions
Street Address:
City:
State:
Zip:
Submittal Date: Fri Aug 23 14:22:36 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7638-NFPA 70-2024

Statement: The revised terms are aligned with article 130, 750 terminology as well as the published UL3141, October, 9 2024. Multisource PCS are common and are defined and addressed in UL 3141. The marking requirements for PCS to be marked and listed are in 130.2 and are not necessary to repeat here. Informational note 2 was added to clarify that bidirectional sources can function as both a source and a load depending on if they are in a charge or discharge operational state.

Public Comment No. 513-NFPA 70-2024 [Section No. 705.13]

705.13 Power Control Systems (PCSs).

Power control systems (PCSs) in accordance with Article 130, Part II, shall be permitted to limit current and loading on busbars and conductors supplied by the output of one or more interconnected electric power production or energy storage sources.

Informational Note: See UL 3141-2024, *Outline of Investigation for Power Control Systems* , and UL 1741-2023, *Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources,* for information on PCSs. A listed PCS is a type of EMS that is capable of monitoring multiple power sources and controlling the current on busbars and conductors to prevent overloading.

Additional Proposed Changes

File Name	Description	Approved
CN_191.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 191 appeared in the First Draft Report on First Revision No. 8689.

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. 8689

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 22:44:41 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7638-NFPA 70-2024
Statement: The revised terms are aligned with article 130, 750 terminology as well as the published UL3141, October, 9 2024. Multisource PCS are common and are defined and addressed in UL 3141. The marking requirements for PCS to be marked and listed are in 130.2 and are not necessary to repeat here. Informational note 2 was added to clarify that bidirectional sources can function as both a source and a load depending on if they are in a charge or discharge operational state.

Correlating Committee Note No. 191-NFPA 70-2024 [Section No. 705.13]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 10:48:09 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. 8689-NFPA 70-2024 [Section No. 705.13]

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. 1919-NFPA 70-2024 [Section No. 705.20]

705.20 Source Disconnecting Means.

Means shall be provided to disconnect power source output conductors of electric power production equipment from conductors of other systems. A single disconnecting means shall be permitted to disconnect multiple power sources from conductors of other systems.

Informational Note: See 480.7; Article 445, Part II; Article 690, Part III; Article 692, Part III; Article 694, Part III; and Article 706, Part II, for specific source disconnecting means requirements.

(A) Location.

Disconnecting means shall be readily accessible.

(B) Ratings.

Disconnecting means shall have ratings sufficient for the maximum circuit current, available fault current, and available voltage at the terminals of the disconnecting means.

(C) Type.

Disconnecting means shall simultaneously disconnect all ungrounded conductors of the circuit and be one of the following types:

(1) A manually operable switch or circuit breaker

(2) A load-break-rated pull-out switch

(3) A power-operated or remote-controlled switch or circuit breaker that is manually operable locally and opens automatically when control power is interrupted

(4) A device listed or approved for the intended application

(D) Live Parts.

~~Disconnection.~~ Disconnecting means shall be externally operable without exposed live parts.

(E) Indication.

~~Disconnection.~~ Disconnecting means shall plainly indicate whether it is in the open (off) or closed (on) position.

(F) Marking.

Where line and load terminals of disconnecting means are capable of being energized in the open position, disconnecting means shall be marked with the following words or equivalent:

WARNING

ELECTRIC SHOCK HAZARD TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION.

Informational Note: With interconnected power sources, some equipment, including switches and fuses, is capable of being energized from both directions.

(G) ~~dc~~ Power Source Connections.

Termination of ~~dc~~ power source output conductors to disconnecting means shall comply with one of the following:

(1) Terminate to either side of disconnecting means not marked “line” and “load”

(2) Terminate only to the line side of disconnecting means marked “line” and “load”

Informational Note: The disconnect markings referred to in this section relate to markings on the disconnect means itself and not to the equipment in which it is mounted. A dc disconnecting means marked “line” and “load” may have not been evaluated for source connection to the load terminals, backfeed, or reverse current.

(H) Backfed Power Sources.

Disconnecting means marked “line” and “load” shall not be permitted as a source disconnecting means for back-fed power sources.

Informational Note: The markings referred to in this section relate to markings on the disconnecting means or circuit breaker itself and not the equipment on which it is mounted.

Statement of Problem and Substantiation for Public Comment

A new 705.2(H) is proposed to restrict the use of disconnecting means marked “line” and “load” for backfed power sources. Disconnecting means with these markings may have been designed with internal current interrupting components (such contacts and arc-chutes) which are capable of interrupting current/power in one direction only, and may not be suitable to interrupt current/power in the opposite direction. The device may not be able to interrupt the current with a reverse power flow, potentially leading to an unsafe condition. Such devices should not be permitted for backfed power sources.

Additionally, “dc” is removed from 705.20(G) as the product markings and limitations also apply disconnects used for ac interconnected power sources.

Furthermore, in 705.20(D) and (E), “disconnection” is replaced with “disconnecting” to align the text with the defined term.

Related Item

• First Revision No. 8734-NFPA 70-2024

Submitter Information Verification

Submitter Full Name: Danish Zia
Organization: UL Solutions
Street Address:
City:

State:
Zip:
Submittal Date: Wed Aug 28 09:36:15 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7642-NFPA 70-2024
Statement: Informational Note #2 is added to alert users to the requirements of 705.30(D) for back fed OCPD. Some of the public commenter's concerns related to misapplication of disconnects and overcurrent devices were addressed by the addition of the informational Note No. 2 with the reference to 705.30 (D) as the requirements for backfed OCPD are located in that section.

Public Comment No. 1787-NFPA 70-2024 [Section No. 705.20(G)]

(G) ~~dc~~ D c Power Source Connections.

Termination of dc power source output conductors to disconnecting means shall comply with one of the following:

(1) Terminate to either side of disconnecting means not marked “line” and “load”

(2) Terminate only to the line side of disconnecting means marked “line” and “load”

Informational Note: The disconnect markings referred to in this section relate to markings on the disconnect means itself and not to the equipment in which it is mounted. A dc disconnecting means marked “line” and “load” may have not been evaluated for source connection to the load terminals, backfeed, or reverse current.

Statement of Problem and Substantiation for Public Comment

The first word is "dc" and therefore needs to be printed as "Dc" in title format. It was originally submitted this way and it looks like it was incorrectly edited.

Related Item

• FR-8734

Submitter Information Verification

Submitter Full Name: William Brooks
Organization: Brooks Engineering
Affiliation: Brooks Engineering
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 27 11:27:33 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7647-NFPA 70-2024
Statement: The correct spelling of Dc is with a capital D and it is being corrected here. This is a detail SR to be balloted separately from SR 7642 which is also on 705.20(G).

Public Comment No. 1789-NFPA 70-2024 [Section No. 705.25]

705.25 Wiring Methods.

Power source output conductors shall comply with 705.25(A) through 705.25(C).

(A) Flexible Cords and Cables.

Flexible cords and cables shall comply with the following:

(1) They shall be listed and identified as DG cables, or other cords and cables suitable for extra hard use.

(2) They shall be water resistant.

(3) If exposed to sunlight, they shall be sunlight resistant.

Informational Note: See UL 3003-2018, *Distributed Generation Cables*, and UL 9703-2018, *Outline of Investigation for Distributed Generation Wiring Harnesses*, for additional information on DG cable and harnesses. An ac module harness is one example of a multiconductor cable assembly.

(B) Identification of ~~dc~~ Dc Power Source Output Conductors.

Color coding, marking tape, tagging, or other approved means in accordance with 705.25(B)(1) through 705.25(B)(3) shall be used to identify dc power source output conductors at all termination, connection, and splice points.

(1) Positive Polarity.

Identification of dc positive conductors shall occur by one of the following means:

(1) Imprinted plus signs (+) or the word POSITIVE or POS durably marked on conductor insulation.

(2) An approved permanent marking means (e.g., sleeving or shrink-tubing) that is suitable for the conductor size at all termination, connection, and splice points, with imprinted plus signs (+) or the word POSITIVE or POS

(2) Negative Polarity.

Identification of dc negative conductors shall occur by one of the following means:

(1) Imprinted minus signs (–) or the word NEGATIVE or NEG durably marked on conductor insulation

(2) An approved permanent marking means (e.g., sleeving or shrink-tubing) that is suitable for the conductor size at all termination, connection, and splice points, with imprinted minus signs (–) or the word NEGATIVE or NEG

(3) Color Identification.

Where color is used, identification shall occur by one of the following means:

(1) For nonsolidly grounded dc positive conductors, marked with an insulation color other than green, white, or gray

(2) For nonsolidly grounded dc negative conductors, marked with an insulation color other than green, white, gray, or red

(3) For solidly grounded dc conductors, marked in accordance with 200.7

Informational Note: See Article 100 for the definitions of *functionally grounded* and *solidly grounded*.

(C) Grounded Conductors of Different Nominal Voltage Systems.

If functionally or solidly grounded conductors of different nominal voltage systems are installed in the same raceway, cable, box, auxiliary gutter, or other type of enclosures, the following shall apply:

(1) Each grounded conductor shall be identified by nominal voltage system.

(2) Identification by color coding, marking tape, tagging, or other approved means shall be permitted.

(3) The means of identification shall be documented in a manner that is readily available or permanently posted where the conductors of different nominal voltage systems originate and terminate.

Statement of Problem and Substantiation for Public Comment

Same problem as in the title for 705.20 due to the fact that "dc" is a word and must capitalize the first letter when in a title--"Dc".

Related Item

• FR-8814

Submitter Information Verification

Submitter Full Name: William Brooks
Organization: Brooks Engineering
Affiliation: Brooks Engineering
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 27 11:38:09 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7652-NFPA 70-2024
Statement: The correct spelling of Dc is with a capital D and it is being corrected here.

Public Comment No. 842-NFPA 70-2024 [Sections 705.25(B), 705.25(C)]

~~**Sections 705.25(B), 705.25(C)**~~

~~**(B)** Identification of dc Power Source Output Conductors.~~

~~Color coding, marking tape, tagging, or other approved means in accordance with 705.25(B)(1) through 705.25(B)(3) shall be used to identify dc power source output conductors at all termination, connection, and splice points.~~

~~**(1)** Positive Polarity.~~

~~Identification of dc positive conductors shall occur by one of the following means:~~

(1) ~~Imprinted plus signs (+) or the word POSITIVE or POS durably marked on conductor insulation.~~

(2) ~~An approved permanent marking means (e.g., sleeving or shrink-tubing) that is suitable for the conductor size at all termination, connection, and splice points, with imprinted plus signs (+) or the word POSITIVE or POS~~

~~**(2)** Negative Polarity.~~

~~Identification of dc negative conductors shall occur by one of the following means:~~

(1) ~~Imprinted minus signs (–) or the word NEGATIVE or NEG durably marked on conductor insulation~~

(2) ~~An approved permanent marking means (e.g., sleeving or shrink-tubing) that is suitable for the conductor size at all termination, connection, and splice points, with imprinted minus signs (–) or the word NEGATIVE or NEG~~

~~**(3)** Color Identification.~~

~~Where color is used, identification shall occur by one of the following means:~~

(1) ~~For nonsolidly grounded dc positive conductors, marked with an insulation color other than green, white, or gray~~

(2) ~~For nonsolidly grounded dc negative conductors, marked with an insulation color other than green, white, gray, or red~~

(3) ~~For solidly grounded dc conductors, marked in accordance with 200.7~~

~~Informational Note: See Article 100 for the definitions of *functionally grounded* and *solidly grounded*.~~

~~**(C)** Grounded Conductors of Different Nominal Voltage Systems.~~

~~If functionally or solidly grounded conductors of different nominal voltage systems are installed in the same raceway, cable, box, auxiliary gutter, or other type of enclosures, the following shall apply:~~

(1) ~~Each grounded conductor shall be identified by nominal voltage system.~~

(2) ~~Identification by color coding, marking tape, tagging, or other approved means shall be permitted.~~

(3) ~~The means of identification shall be documented in a manner that is readily available or permanently posted where the conductors of different nominal voltage systems originate and terminate.~~

Statement of Problem and Substantiation for Public Comment

The CMP added this language because, according to the committee statement, "...the requirements of Article 210 do not specifically apply to power sources." This is true, Article 210 does not cover this, Article 215 does. The material is already addressed in 215.12. See the Article 100 definition of "Feeder," particlaurly as it relates to conductors between a power supply source and the final branch circuit overcurrent portective device.
Section 90.3 handles this issue and repeating it here is a violation of 4.1.1 of the NEC Style Manual.

Related Item

• FR 8814

Submitter Information Verification

Submitter Full Name: Ryan Jackson
Organization: Self-employed
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City:
State:
Zip:
Submittal Date: Tue Aug 06 13:53:17 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected
Resolution: This section has been intentionally differentiated from Article 215 feeder requirements due to specific power source technology differences including but not limited to functionally grounded conductors and differences in color coding.

Public Comment No. 514-NFPA 70-2024 [Section No. 705.28(A)]

(A) Power Source Output Maximum Current.

The maximum current for power sources shall be calculated in accordance the following:

(1) The sum of the continuous output current ratings of power production sources at the circuit nominal system voltage unless different requirements elsewhere in this code apply to the power sources

(2) For power production sources controlled by PCSs, the current setpoint of the PCSs

(3) Where sources controlled by a PCS are combined with other sources on the same power source output circuit, the sum of 705.28(A)(1) and 705.28(A)(2)

Calculations shall be permitted to be rounded to the nearest whole ampere, with decimal fractions smaller than 0.5 dropped.

Additional Proposed Changes

File Name	Description	Approved
CN_192.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 192 appeared in the First Draft Report on First Revision No. 8700.

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. 8700

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 22:45:54 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR
Resolution: SR-7660-NFPA 70-2024
Statement: The revised terms are aligned with article 130, 750 terminology as well as the published UL3141, October, 9 2024. Changes were made to align references related to overcurrent protective devices with their defined terms and acronyms. This is related to the resolutions of PC 1644.

Correlating Committee Note No. 192-NFPA 70-2024 [Section No. 705.28(A)]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 10:50:35 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. 8700-NFPA 70-2024 [Section No. 705.28(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. 114-NFPA 70-2024 [Section No. 705.30(D)]

(D) Suitable for Backfeed.

Suitability for backfeeding shall be determined as follows:

(1) Fused disconnects, unless otherwise marked, shall be considered suitable for backfeed. Fuses shall not remain energized after the disconnect is opened in accordance with 240.40.

(2) Circuit breakers not marked "line" and "load" shall be considered suitable for backfeed.

(3) Circuit breakers marked "line" and "load" shall not be used to satisfy the requirements in 705.30(A).

Informational Note No 1 : The markings referred to in this section relate to markings on the disconnecting means or circuit breaker itself and not the equipment on which it is mounted.

Informational Note No 2: Utility interactive power sources cease output when isolated from the primary source.

Additional Proposed Changes

File Name	Description	Approved
.1721338737124		
fused_disconnect.jpg	Terminating the utility supply to the bottom (load side) of this fused disconnecting means will result in energized fuse bodies...even after opening the disconnecting means.	

Statement of Problem and Substantiation for Public Comment

It is very common for installers to terminate the output of an interconnected power source to the line side of knife blade fused disconnecting means. This practice results in energized fuses even after the disconnect switch element is opened. An individual opening the disconnect to replace a fuse will be in contact with an energized cartridge upon contact. Though common and dangerous, this practice is also very easy to prevent with utility-interactive power sources...simply terminate the power source to the load side of the fused disconnecting means. The modifications of 705.30 that address backfeed must include this prohibition. The Informational Note No. 2 is added to alert NEC users to the dynamics utility-interactive interconnected power sources.

Please see the comments by Mr. Smith to 8757:

I believe that fuses that are listed as suitable for back feed should be specifically labeled as such as such. The line and and load configuration in disconnects is critical to safety for electricians based on the ability to work de-energized or energized. The electrician needs to be able to clearly understand if the conductor they are working on is energized or de-energized based on the disconnects open or closed status. Terminating to the load side of a disconnect, could cause energization on conductors even when the disconnect is in the open position. I believe we need further modification to the this language limiting this practice to clear labeling or double break disconnects

Related Item

• FR 8757

Submitter Information Verification

Submitter Full Name: Peter Jackson
Organization: City of Bakersfield, Californi
Street Address:
City:
State:
Zip:
Submittal Date: Thu Jul 18 16:23:36 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7720-NFPA 70-2024

Statement: The revisions were made to reduce the potential shock hazards associated with energized fuses. There are multimode inverters that have loss of phase detection to automatically shutdown if a plug-in breaker were to unlatch from the busbar. This comment allows for two methods to meet the requirements. Many inverters are not multimode so those inverters that only work in interactive mode comply without additional information. Multimode inverters may respond differently to loss of phase so additional information on the certification of the multimode inverter will need to comply with this section to remove the required fastener. Most plug-in type panelboards have one location where a fastener may be installed. The informational note clarifies the certification standard for these functions. The response of these multimode inverters are intended to be similar to interactive only mode inverters.

Changes were made to align references related to overcurrent protective devices with their defined terms and acronyms. This is related to the resolutions of PC 1644.


FUSETRON
FRS 600

Public Comment No. 123-NFPA 70-2024 [Section No. 705.30(D)]

(D) Suitable for Backfeed.

Suitability for backfeeding shall be determined as follows:

(1) Fused disconnects, unless otherwise marked, shall be considered suitable for backfeed.

(2) Circuit breakers not marked "line" and "load" shall be considered suitable for backfeed.

(3) Circuit breakers marked "line" and "load" shall not be used to satisfy the requirements in 705.30(A).

Informational Note No.1 : The markings referred to in this section relate to markings on the disconnecting means or circuit breaker itself and not the equipment on which it is mounted.

Informational Note No. 2: See 240.40 for requirements related to disconnection of fuses from power sources.

Statement of Problem and Substantiation for Public Comment

It is very common for installers to terminate the output of an interconnected power source to the line side of knife blade fused disconnecting means. This practice results in energized fuses even after the disconnect switch element is opened. An individual opening the disconnect to replace a fuse will be in contact with an energized cartridge upon contact. Though common and dangerous, this practice is also very easy to prevent with utility-interactive power sources...simply terminate the power source to the load side of the fused disconnecting means. The modifications of 705.30 that address backfeed must not be interpreted as deleting the correct termination of power sources to fused disconnecting means.. The Informational Note No. 2 is added to alert NEC users to the requirements of 240.40 that address disconnection of fuses.

Please see the comments by Mr. Smith to FR 8757:

I believe that fuses that are listed as suitable for back feed should be specifically labeled as such as such. The line and and load configuration in disconnects is critical to safety for electricians based on the ability to work de-energized or energized. The electrician needs to be able to clearly understand if the conductor they are working on is energized or de-energized based on the disconnects open or closed status. Terminating to the load side of a disconnect, could cause energization on conductors even when the disconnect is in the open position. I believe we need further modification to the this language limiting this practice to clear labeling or double break disconnects

Related Item

• FR 8757

Submitter Information Verification

Submitter Full Name: Peter Jackson
Organization: City of Bakersfield, Californi
Street Address:
City:
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Zip:
Submittal Date: Fri Jul 19 13:28:33 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7720-NFPA 70-2024

Statement: The revisions were made to reduce the potential shock hazards associated with energized fuses. There are multimode inverters that have loss of phase detection to automatically shutdown if a plug-in breaker were to unlatch from the busbar. This comment allows for two methods to meet the requirements. Many inverters are not multimode so those inverters that only work in interactive mode comply without additional information. Multimode inverters may respond differently to loss of phase so additional information on the certification of the multimode inverter will need to comply with this section to remove the required fastener. Most plug-in type panelboards have one location where a fastener may be installed. The informational note clarifies the certification standard for these functions. The response of these multimode inverters are intended to be similar to interactive only mode inverters.

Changes were made to align references related to overcurrent protective devices with their defined terms and acronyms. This is related to the resolutions of PC 1644.

Public Comment No. 1925-NFPA 70-2024 [Section No. 705.30(D)]

(D) Suitable for Backfeed.

Suitability for backfeeding shall be determined as follows:

(1) Fused disconnects, unless otherwise marked, shall be considered suitable for backfeed.

(2) ~~- Circuit~~ Only circuit breakers not marked "line" and "load" shall be considered suitable for backfeed.

(3) ~~Circuit breakers marked "line" and "load" shall not be used to satisfy the requirements in 705.30(A) .~~

Informational Note: The markings referred to in this section relate to markings on the disconnecting means or circuit breaker itself and not the equipment on which it is mounted.

Statement of Problem and Substantiation for Public Comment

Although the changes in the first draft text do address concerns with improper use of circuit breakers marked "line" and "load", the new 705.30(D)(3) may still create confusion as it does not restrict the improper application of such circuit breakers. Adding "only" to 705.3(D)(2) and deleting 705.3(D)(3) would address this confusion.

Related Item

• First Revision No. 8757-NFPA 70-2024 [Section No. 705.30(D)]

Submitter Information Verification

Submitter Full Name: Danish Zia
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City:
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Submittal Date: Wed Aug 28 10:06:13 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7720-NFPA 70-2024

Statement: The revisions were made to reduce the potential shock hazards associated with energized fuses. There are multimode inverters that have loss of phase detection to automatically shutdown if a plug-in breaker were to unlatch from the busbar. This comment allows for two methods to meet the requirements. Many inverters are not multimode so those inverters that only work in interactive mode comply without additional information. Multimode inverters may respond differently to loss of phase so additional information on the certification of the multimode inverter will need to comply with this section to remove the required fastener. Most plug-in type panelboards have one location where a fastener may be installed. The informational note clarifies the certification standard for these functions. The response of these multimode inverters are intended to be similar to interactive only mode inverters.

Changes were made to align references related to overcurrent protective devices with their defined terms and acronyms. This is related to the resolutions of PC 1644.

Public Comment No. 1791-NFPA 70-2024 [Section No. 705.30(E)]

(E) Fastening.

Where power output circuits ~~can only operate in interactive mode,~~ are connected to the load side of plug-in-type circuit breakers, the circuit breaker shall be permitted to omit the additional fastener normally required by 408.36(D) where the power source has either of the following settings:

(1) the power source only operates in interactive mode

(2) the power source has open-phase detection when operating in island or stand-alone mode .

Statement of Problem and Substantiation for Public Comment

This change in the first draft may be too limiting. There are many multimode inverters that have loss of phase detection that automatically shutdown if a plug-in breaker were to unlatch from the busbar. This comment allows for two methods to meet the requirements. Many inverters are not multimode so those inverters that only work in interactive mode comply without additional information. Multimode inverters may respond differently to loss of phase so there may be a need for additional information on the certification of the multimode inverter to comply with this section. Several ESS and PV inverters have the capability to respond to a loss of phase while in island mode.

Related Item

• FR-8710

Submitter Information Verification

Submitter Full Name: William Brooks
Organization: Brooks Engineering
Affiliation: Brooks Engineering
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 11:46:39 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7720-NFPA 70-2024

Statement: The revisions were made to reduce the potential shock hazards associated with energized fuses. There are multimode inverters that have loss of phase detection to automatically shutdown if a plug-in breaker were to unlatch from the busbar. This comment allows for two methods to meet the requirements. Many inverters are not multimode so those inverters that only work in interactive mode comply without additional information. Multimode inverters may respond differently to loss of phase so additional information on the certification of the multimode inverter will need to comply with this section to remove the required fastener. Most plug-in type panelboards have one location where a fastener may be installed. The informational note clarifies the certification standard for these functions. The response of these multimode inverters are intended to be similar to interactive only mode inverters.

Changes were made to align references related to overcurrent protective devices with their defined terms and acronyms. This is related to the resolutions of PC 1644.

Public Comment No. 1855-NFPA 70-2024 [Section No. 705.30(E)]

(E) Fastening.

Where power output circuits can only operate in interactive mode, with built-in anti-islanding protection, plug-in-type circuit breakers shall be permitted to omit the additional fastener normally required by 408.36(D).

Additional Proposed Changes

File Name	Description	Approved
Pub._Comment_No._1855-NFPA_70-2024_Section_No._705.30_E_.pdf	Legislative Text View	

Statement of Problem and Substantiation for Public Comment

The additional text requiring anti-islanding protection for interactive inverter output circuits utilizing plug-in type circuit breakers, not secured by an additional fastener, will help improve the safety of the installation, ensuring shutdown of the output circuit should a circuit breaker become dislodged, or otherwise removed, from its proper mounting position.

Related Item

• FR No. 8710 • PI 4535

Submitter Information Verification

Submitter Full Name: Peter Noval Jr
Organization: Noval Jr
Street Address:
City:
State:
Zip:
Submittal Date: Tue Aug 27 17:55:35 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7720-NFPA 70-2024

Statement: The revisions were made to reduce the potential shock hazards associated with energized fuses. There are multimode inverters that have loss of phase detection to automatically shutdown if a plug-in breaker were to unlatch from the busbar. This comment allows for two methods to meet the requirements. Many inverters are not multimode so those inverters that only work in interactive mode comply without additional information. Multimode inverters may respond differently to loss of phase so additional information on the certification of the multimode inverter will need to comply with this section to remove the required fastener. Most plug-in type panelboards have one location where a fastener may be installed. The informational note clarifies the certification standard for these functions. The response of these multimode inverters are intended to be similar to interactive only mode inverters.

Changes were made to align references related to overcurrent protective devices with their defined terms and acronyms. This is related to the resolutions of PC 1644.

Public Comment No. 1855-NFPA 70-2024 [Section No. 705.30(E)]

(E) Fastening.

Where power output circuits can only operate in interactive mode, plug-in-type circuit breakers shall be permitted to omit the additional fastener normally required by 408.36(D).

Statement of Problem and Substantiation for Public Comment PLEASE SEE ATTACHED

Submitter Information Verification

This PC has not been submitted yet

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I, Peter Noval Jr, hereby irrevocably grant and assign to the National Fire Protection Association (NFPA) all and full rights in copyright in this Public Comment (including both the Proposed Change and the Statement of Problem and Substantiation). I understand and intend that I acquire no rights, including rights as a joint author, in any publication of the NFPA in which this Public Comment in this or another similar or derivative form is used. I hereby warrant that I am the author of this Public Comment and that I have full power and authority to enter into this copyright assignment.

✓ By checking this box I affirm that I am Peter Noval Jr, and I agree to be legally bound by the above Copyright Assignment and the terms and conditions contained therein. I understand and intend that, by checking this box, I am creating an electronic signature that will, upon my submission of this form, have the same legal force and effect as a handwritten signature

8/20/2024

Public Comment No. 1855-NFPA 70-2024(Section No. 705.30(E))

Revise text to read:

(E) Fastening

Where power output circuits can only operate in interactive mode, with built-in anti-islanding protection, plug-in type circuit breakers shall be permitted to omit the additional fastener normally required by 408.36(D).

Statement of Problem and Substantiation for Public Comment:

The additional text requiring anti-islanding protection for interactive inverter output circuits utilizing plug-in type circuit breakers, not secured by an additional fastener, will help improve the safety of the installation, ensuring shutdown of the output circuit should a circuit breaker become dislodged, or otherwise removed, from its proper mounting position.

Public Comment No. 1570-NFPA 70-2024 [New Section after 705.45(B)]

TITLE OF NEW CONTENT

Type your content here ...

705.46. Cybersecurity

Interconnected Electric Power Production Sources , directly supplying life safety-related infrastructures, that are connected to a communication network and have the capability to be controlled or permit control of any portion of the premises shall comply with either of the following:

(1) The ability to control interconnected electric power production sources is limited to a direct connection through a local nonnetworked interface.

(2) The interconnected electric power production sources are connected through a networked interface complying with both of the following methods:

a. The interconnected electric power production sources are identified as being evaluated for cybersecurity.

b. A cybersecurity assessment of interconnected electric power production sources is completed and documentation of the assessment and certification is available to those authorized to inspect, operate, and maintain the system.

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

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

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

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

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

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

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

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

Statement of Problem and Substantiation for Public Comment

Let's examine the Panel Statement to resolve Public Input 1255 one sentence at a time.

The first sentence is "The submitter has not made a sufficient case for these requirements to be included in this Code." For an example of just how common cyber attacks on life safety related infrastructure have become, let's look at just the water supply and waste water treatment industry. The DNI (Director of National Intelligence), through the CTIIC (Cyber Threat Intelligence Integration Center) recently released a report of 12 cyber attacks on the industrial control systems of water utilities, water systems, and waste water treatment systems, for the six-month period from November 2023 through April 2024. This report can be found at

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

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

The second sentence of the Panel Statement is "A detailed proposal providing requirements and test methods should be submitted to the UL 1741 Technical Committee." The fact that cybersecurity is addressed in UL 1741 does not put requirements into the NEC. In order to assure that interconnected electric power production sources, directly supplying life safety-related infrastructure, are cyber secure when installed, the requirements must be in the NEC, not in a UL Product Standard.

This Public Comment limits the suggested cybersecurity requirement to interconnected electric power production sources directly supplying life safety-related infrastructures. Informational Note No. 5 provides examples of life safety-related infrastructure.

Most of the cybersecurity focus has been on IT systems. There has been very little public discussion about cybersecurity for Operational Technology (OT), but cyber attacks on OT occur on almost a daily basis. Hackers can easily destroy unprotected equipment and shut down entire unprotected facilities. Our adversaries are continuously mounting cyber attacks on our life safety-related infrastructure. We have the ability, and obligation, to prevent this type of damage to our infrastructure from malicious cyber attacks.

Let's look at an example of a financial center. 110.3(A)(8) currently requires that a fire alarm system in the financial center, because it is life safety equipment, be evaluated in light of cybersecurity. However, there is no requirement for the other non-life safety equipment/systems within or directly supplying the financial center, such as interconnected electric power production sources, which could easily be compromised by a cyber attack. The proposed text in this Public Comment addresses this vulnerability.

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

THIS PUBLIC COMMENT SIMPLY REQUIRES THAT INTERCONNECTED ELECTRIC POWER PRODUCTION SOURCES, DIRECTLY SUPPLYING LIFE SAFETY-RELATED INFRASTRUCTURES, EITHER NOT BE CONNECTED TO THE INTERNET, OR IF THEY ARE CONNECTED TO THE INTERNET, THAT THEY BE “IDENTIFIED” FOR CYBERSECURITY AND THAT AN ASSESSMENT IS PROVIDED.

Related Item

• PI 1255

Submitter Information Verification

Submitter Full Name: Vincent Saporita
Organization: Saporita Consulting
Street Address:
City:
State:
Zip:

Submittal Date: Sat Aug 24 07:55:54 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: CMP4 does agree that cybersecurity for certain critical systems and life safety systems are important. However, the cybersecurity scope of the NEC in general has already been established in 110.3(A)(8) and by other Articles such as 708 for Critical Operations Power Systems. CMP4 will rely on the work of CMP1 with input from the NFPA Cybersecurity Advisory Committee for the wording of 110.3(A)(8) and any related terms and definitions. As stated in 90.3, Chapters 1 through 4 generally apply to all electrical installations and subsequent Chapters may supplement or modify. Therefore, if a power production system covered by this Article was considered as part of life safety equipment or system, then 110.3(A)(8) would already apply. If it was part of a critical operation power system, then in addition to this Article, other Articles such as 708 would apply. Per the NEC style manual, general requirements from Chapters 1 through 4 shall not be repeated in other Articles.

Public Comment No. 515-NFPA 70-2024 [Article 710]

Article 710 Stand-Alone Systems

710.1 Scope.

This article covers stand-alone systems.

Informational Note: These systems operate independently from an electric utility and include isolated microgrid systems. Stand-alone systems often include a single source or a compatible interconnection of sources such as engine generators, solar PV, wind, ESS, or batteries.

710.2 Listing Requirements.

All power production equipment or systems shall approved by one of the following:

(1) Listing

(2) Evaluation for the application and have a field label applied

Informational Note: See UL 1741-2021, *Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources*, and UL 62109-1-2014, *Power Converters for Use in Photovoltaic Power Systems — Part 1: General Requirements.* See UL 2200-2020, *Stationary Engine Generator Assemblies*, for engine generators used in stand-alone applications. This equipment is commonly used in power production sources.

710.10 Identification of Power Sources.

A permanent plaque, label, or directory shall be installed at each building power source disconnecting means location, or at an approved readily visible location, and denote the location of each power source disconnecting means for the building. Where multiple sources supply the building, markings shall comply with 705.10.

710.15 Power Production Source Circuits.

Circuit conductors between stand-alone sources and building or structure disconnecting means shall be sized based on the sum of the output ratings of the stand-alone sources.

Additional Proposed Changes

File Name	Description	Approved
CN_193.pdf		

Statement of Problem and Substantiation for Public Comment

NOTE: The following CC Note No. 193 appeared in the First Draft Report on First Revision No. 8983, First Revision No. 8986, First Revision No. 8989, First Revision No. 8992 and First Revision No. 8993.

The remaining requirements in this article should be reviewed to determine if necessary. Elimination of the article should be considered.

Related Item

• First Revision No. 8983 • First Revision No. 8986 • First Revision No. 8989 • First Revision No. 8992 • First Revision No. 8993

Submitter Information Verification

Submitter Full Name: CC Notes
Organization: NEC Correlating Committee
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 30 22:47:06 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: The proposed remaining items in 710 are not addressed in other articles and need to remain until such time they are addressed elsewhere in the Code. Not all stand-alone systems are interconnected and they can be single source stand-alone systems. As more businesses and residences look to become grid independent and as technologies like off-grid EV charging systems with solar and battery become prevalent (potentially with an all-DC system) there is the potential for future expansion of stand-alone system requirements and it is necessary to retain the requirements here. While the contents of this article could be merged with the material in 705, the scope of 705 precludes single-source power systems. The standards listed in 710.2 are different than those in 705.2 as they are more directly applicable to stand-alone systems. 710.10 is necessary in that it differs from 705.10 which references services whereas stand-alone systems do not have services and therefore the location of the plaque is specifically covered in 710.10.

Correlating Committee Note No. 193-NFPA 70-2024 [Article 710]

Submitter Information Verification

Committee: NEC-AAC
Submittal Date: Thu May 09 10:53:37 EDT 2024

Committee Statement

Committee Statement: The remaining requirements in this article should be reviewed to determine if necessary. Elimination of the article should be considered.

First Revision No. 8983-NFPA 70-2024 [Section No. 710.1]

First Revision No. 8986-NFPA 70-2024 [Section No. 710.6]

First Revision No. 8989-NFPA 70-2024 [Section No. 710.10]

First Revision No. 8992-NFPA 70-2024 [Section No. 710.12]

First Revision No. 8993-NFPA 70-2024 [Section No. 710.15]

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. 101-NFPA 70-2024 [New Article after 710]

710.1 6 Grounding.

(A) Alternating Current System. Stand-alone AC systems that are required to be grounded in accordance with 250.20, shall have the non-current carrying metal parts connected to a grounding electrode system with a grounding electrode conductor sized to 250.66 installed in accordance with Part III of Article 250.

(B) Direct Current System. Stand -alone DC systems that are required to be grounded in accordance with 250.162 , shall have the non-current carrying metal parts connected to a grounding electrode system with a grounding electrode conductor sized to 250.166 installed in accordance with Part III of Article 250.

Type your content here ...

Statement of Problem and Substantiation for Public Comment

The panel rejected my PI with the statement “This information is already covered in Article 250. There were no modifications proposed to the requirements which are also found in Chapters 1-4. The NEC Style Manual prevent repeating requirements in Chapters 1-4, see 4.1.1.”
I’m sorry but the panel statement is not correct. There are NO requirements on the grounding of stand-alone systems, if the panel feels there are, then please be sure to include those references if they reject my comment. It’s important that there be Grounding rules in Article 710. If the panel feels that they are not qualified to make this decision (I understand), then the panel needs to get a working group with CMP 5. Please don't just blow this off...

Related Item

• 3268

Submitter Information Verification

Submitter Full Name: Mike Holt
Organization: Mike Holt Enterprises Inc
Street Address:
City:
State:
Zip:
Submittal Date: Tue Jul 16 18:48:08 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: System bonding and grounding is the purview of CMP 5. 250.30 for separately derived systems covers the requirements for grounding separately derived systems. 250.162 addresses Dc systems. If the commenter believes that these sections do not adequately cover this subject, they should address it in Article 250.

Public Comment No. 1571-NFPA 70-2024 [New Section after 710.15]

TITLE OF NEW CONTENT

Type your content here ...

710.16. Cybersecurity

Stand alone systems , directly supplying life safety-related infrastructures, that are connected to a communication network and have the capability to be controlled or permit control of any portion of the premises shall comply with either of the following:

(1) The ability to control stand alone systems is limited to a direct connection through a local nonnetworked interface.

(2) The stand alone systems are connected through a networked interface complying with both of the following methods:

a. The stand alone systems are identified as being evaluated for cybersecurity.

b. A cybersecurity assessment of stand alone systems is completed and documentation of the assessment and certification is available to those authorized to inspect, operate, and maintain the system.

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

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

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

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

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

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

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

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

Statement of Problem and Substantiation for Public Comment

Let's examine the Panel Statement to resolve Public Input 1257 one sentence at a time.

The first sentence is "NEC 90.2(A) defines the purpose of the code to protect from hazards related to the use of electricity, not control systems." The text in this Public Comment is exactly related to the use of electricity and focused solely on stand alone systems. This Comment is not focused on industrial control systems. Attacks on industrial control systems are given as examples of the frequency of cyber incidents. Most types of electrical equipment/systems, if connected to the internet, and unprotected against cyber attack, are vulnerable, not just industrial control systems.

The first half of the second sentence of the Panel Statement reads "The proposal is outside the scope of the NEC". If the intent of the Panel Statement were that the proposal was outside the scope of Article 710, that would be unclear because it reads "This article covers electric power production systems that operate in island mode not connected to an electric utility or other electric power production and distribution network." There is nothing in Public Input 1257 or in this Public Comment that is outside of that scope.

The second half of the second sentence reads "and is also addressed by communication standards such as IEEE 2030.5 which are required for UL1741 / IEEE 1547 listing". The fact that cybersecurity is addressed in IEEE and UL Product Standards does not put requirements into the NEC. In order to assure that stand alone systems, directly serving life safety-related infrastructure, are cyber secure when installed, the requirements must be in the NEC, not in an IEEE or UL Product Standard.

This Public Comment limits the suggested cybersecurity requirement to stand alone systems directly supplying life safety-related infrastructures.

Informational Note No. 5 provides examples of life safety-related infrastructure.

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

https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.dni.gov/files/CTIIC/documents/products/Recent_Cyber_Attacks_on_US_Infrastructure_Underscore_Vulnerability_of_Crit June2024.pdf&ved=2ahUKEwi5gP7-m4eIAxUakYkEHasyIRQQFnoECB8QAQ&usg=AOvVaw3hJL2DMIRs-CECfmewcXVP

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

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

Let's look at an example of a financial center. 110.3(A)(8) currently requires that a fire alarm system in the financial center, because it is life safety equipment, be evaluated in light of cybersecurity. However, there is no requirement for the other non-life safety equipment/systems within or directly supplying the financial center, such as internet-connected stand alone systems, which could easily be compromised by a cyber attack. The proposed text in this Public Comment addresses this vulnerability.

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

THIS PUBLIC COMMENT SIMPLY REQUIRES THAT STAND ALONE SYSTEMS, DIRECTLY SUPPLYING LIFE SAFETY-RELATED INFRASTRUCTURES, EITHER NOT BE CONNECTED TO THE INTERNET, OR IF THEY ARE CONNECTED TO THE INTERNET, THAT THEY BE "IDENTIFIED" FOR CYBERSECURITY AND THAT AN ASSESSMENT IS PROVIDED.

Related Item

• PI 1257

Submitter Information Verification

Submitter Full Name: Vincent Saporita
Organization: Saporita Consulting
Street Address:
City:
State:
Zip:

Submittal Date: Sat Aug 24 08:09:25 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected

Resolution: CMP4 does agree that cybersecurity for certain critical systems and life safety systems are important. However, the cybersecurity scope of the NEC in general has already been established in 110.3(A)(8) and by other Articles such as 708 for Critical Operations Power Systems. CMP4 will rely on the work of CMP1 with input from the NFPA Cybersecurity Advisory Committee for the wording of 110.3(A)(8) and any related terms and definitions. As stated in 90.3, Chapters 1 through 4 generally apply to all electrical installations and subsequent Chapters may supplement or modify. Therefore, if a power production system covered by this Article was considered as part of life safety equipment or system, then 110.3(A)(8) would already apply. If it was part of a critical operation power system, then in addition to this Article, other Articles such as 708 would apply. Per the NEC style manual, general requirements from Chapters 1 through 4 shall not be repeated in other Articles.

Public Comment No. 1807-NFPA 70-2024 [Section No. 710.15]

~~710.15 Power Production Source Circuits.~~

~~Circuit conductors between~~

15 General .

(A) Capacity and Rating

The stand-alone ~~sources and building or structure disconnecting means shall be sized based on the sum of the output ratings of the stand-alone sources.~~ system shall have adequate capacity and rating for the supply of all equipment intended to be operated at one time. The user of the system shall be permitted to select the load connected to the system.

(B) Power Production Source Circuits

Circuits shall comply with 705.28.

Statement of Problem and Substantiation for Public Comment

There has been confusion for installers and AHJs regarding the differences between capacity requirements in 710 versus 702. The first draft revisions deleted all requirements for supply capacity in this Article. This public comment revises the text to include the same language used in Article 702 for capacity and ratings. This should provide more clarity for users of the Code, and harmonize the Code requirements for standby and stand-alone systems.

In addition, the reference to 705.28 is made to simplify and clarify circuit sizing and current requirements for power sources without rewriting the requirements in Article 705.

Related Item

• FR 8993

Submitter Information Verification

Submitter Full Name: Rebekah Hren
Organization: IPPNC LLC
Street Address:
City:
State:
Zip:

Submittal Date: Tue Aug 27 13:37:13 EDT 2024
Committee: NEC-P04

Committee Statement

Committee Action: Rejected but see related SR

Resolution: SR-7700-NFPA 70-2024

Statement: This revision provides more clarity for users of the Code, and harmonize the Code requirements for standby and stand-alone systems. The reference to 705.28 is made to simplify and clarify circuit sizing and current requirements for power sources without rewriting the requirements in Article 705.