



National Fire Protection Association

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WORKING DRAFT OF NEC[®] CODE MAKING PANEL 10 MEETING OUTPUT

**CONTENT NOT FINAL –SUBJECT TO REVISION
PRIOR TO LETTER BALLOT AND PUBLICATION OF
SECOND DRAFT REPORT**

Document: National Electrical Code[®]

Revision Cycle: A2019

Meeting Dates: October 29 – November 3, 2018

Committee Activity: Comment Stage

This is a working draft, prepared by NFPA staff, to record the output generated at the Code-Making Panels Second Draft Meetings. It includes draft copies of the Second Revisions and any Global Revisions.

It is being made available to Committee members for the purpose of facilitating early review, particularly for those Committee members who may be seeking input from their respective organizations in preparation for the Letter Ballot of the Committee.

**Second Revision No. 8083-NFPA 70-2018 [Global Comment]**

Renumbering of Article 242. See attachment. Items should be ordered chronologically according to the newly assigned numbers.

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP10_SR8083_242.docx	Renumbering for Article 242	

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Tue Oct 30 17:13:17 EDT 2018

Committee Statement

Committee Statement: This material was moved from Article 280 and 285 to create a new Article 242 in the first draft. Reorganizing the subsections to similar locations for Part II and Part III provides a more user-friendly format.

Response Message: SR-8083-NFPA 70-2018

Public Comment No. 1340-NFPA 70-2018 [Article 242]

Article 242 Overvoltage Protection

Part I. General

242.1 Scope.

This article provides the general requirements, installation requirements, and connection requirements for overvoltage protection and overvoltage protective devices. Part II covers surge-protective devices (SPDs) permanently installed on premises wiring systems of not more than 1000 volts, nominal, while Part III covers surge arresters permanently installed on premises wiring systems over 1000 volts, nominal.

242.3 Other Articles.

Equipment shall be protected against overvoltage in accordance with the article in this *Code* that covers the type of equipment or location specified in Table 242.3.

Table 242.3 Other Articles

Equipment	Article
Class I locations	501
Class II locations	502
Community antenna television and radio distribution systems	820
Critical operations power systems	708
Elevators, dumbwaiters, escalators, moving walks, platform lifts, and stairway chairlifts	620
Emergency systems	700
Equipment over 1000 volts, nominal	490
Fire pumps	695
Industrial machinery	670
Information technology equipment	645
Modular data centers	646
Outdoor overhead conductors over 1000 volts	399
Radio and television equipment	810
Receptacles, cord connectors, and attachment plugs (caps)	406
Wind electric systems	694

Part II. Surge-Protective Devices (SPDs), 1000 Volts or Less

Informational Note: Surge arresters 1000 volts or less are also known as Type 1 SPDs.

242.6 Uses Not Permitted.

An SPD device shall not be installed in the following:

- (1) Circuits over 1000 volts
- (2) On ungrounded systems, impedance grounded systems, or corner grounded delta systems unless listed specifically for use on these systems
- (3) Where the rating of the SPD is less than the maximum continuous phase-to-ground voltage at the power frequency available at the point of application

~~242.20~~242.7 Number Required.

Where used at a point on a circuit, the SPD shall be connected to each ungrounded conductor.

~~242.8~~242.9 Listing.

An SPD shall be a listed device.

~~242.10~~242.11 Short-Circuit Current Rating.

The SPD shall be marked with a short-circuit current rating and shall not be installed at a point on the system where the available fault current is in excess of that rating. This marking requirement shall not apply to receptacles.

242.22~~242.13~~ Location.

SPDs shall be permitted to be located indoors or outdoors and shall be made inaccessible to unqualified persons unless listed for installation in accessible locations.

242.24~~242.15~~ Routing of Connections.

The conductors used to connect the SPD to the line or bus and to ground shall not be any longer than necessary and shall avoid unnecessary bends.

242.26~~242.19~~ Connection.

Where an SPD device is installed, it shall comply with ~~242.21 through 242.29~~ 242.12, 242.14, 242.16, 242.28, and 242.30.

242.12~~242.21~~ Type 1 SPDs.

Type 1 SPDs shall be installed in accordance with ~~242.12(A) and (B)~~ 242.21(A) and (B).

(A) Installation.

Type 1 SPDs shall be permitted to be connected in accordance with one of the following:

- (1) To the supply side of the service disconnect as permitted in 230.82(4)
- (2) As specified in 242.14~~242.23~~

(B) At the Service.

When installed at services, Type 1 SPDs shall be connected to one of the following:

- (1) Grounded service conductor
- (2) Grounding electrode conductor
- (3) Grounding electrode for the service
- (4) Equipment grounding terminal in the service equipment

242.14~~242.23~~ Type 2 SPDs.

Type 2 SPDs shall be installed in accordance with ~~242.14(A) through (C)~~ 242.23(A) through (C).

(A) Service-Supplied Building or Structure.

Type 2 SPDs shall be connected anywhere on the load side of a service disconnect overcurrent device required in 230.91 unless installed in accordance with 230.82(8).

(B) Feeder-Supplied Building or Structure.

Type 2 SPDs shall be connected at the building or structure anywhere on the load side of the first overcurrent device at the building or structure.

(C) Separately Derived System.

The SPD shall be connected on the load side of the first overcurrent device in a separately derived system.

242.16~~242.25~~ Type 3 SPDs.

Type 3 SPDs shall be permitted to be installed on the load side of branch-circuit overcurrent protection up to the equipment served. If included in the manufacturer's instructions, the Type 3 SPD connection shall be a minimum 10 m (30 ft) of conductor distance from the service or separately derived system disconnect.

242.18~~242.26~~ Type 4 and Other Component Type SPDs.

Type 4 component assemblies and other component type SPDs shall only be installed by the equipment manufacturer.

242.28~~242.27~~ Conductor Size.

Line and grounding conductors shall not be smaller than 14 AWG copper or 12 AWG aluminum.

242.30~~242.29~~ Connection Between Conductors.

An SPD shall be permitted to be connected between any two conductors — ungrounded conductor(s), grounded conductor, equipment grounding conductor, or grounding electrode conductor. The grounded conductor and the equipment grounding conductor shall be interconnected only by the normal operation of the SPD during a surge.

242.32~~242.31~~ Grounding Electrode Conductor Connections and Enclosures.

Except as indicated in this article, SPD grounding connections shall be made as specified in Article 250, Part III. Grounding electrode conductors installed in metal enclosures shall comply with 250.64(E).

Part III. Surge Arresters, Over 1000 Volts

242.44~~242.43~~ Number Required.

Where used at a point on a circuit, a surge arrester shall be connected to each ungrounded conductor. A single installation of such surge arresters shall be permitted to protect a number of interconnected circuits if no circuit is exposed to surges while disconnected from the surge arresters.

242.42~~242.43~~ Surge Arrester Selection.

The surge arresters shall comply with 242.42(A) and (B)~~242.43(A) and (B)~~.

(A) Rating.

The rating of a surge arrester shall be equal to or greater than the maximum continuous operating voltage available at the point of application.

(1) Solidly Grounded Systems.

The maximum continuous operating voltage shall be the phase-to-ground voltage of the system.

(2) Impedance or Ungrounded System.

The maximum continuous operating voltage shall be the phase-to-phase voltage of the system.

(B) Silicon Carbide Types.

The rating of a silicon carbide-type surge arrester shall be not less than 125 percent of the rating specified in 242.42(A)~~242.43(A)~~.

Informational Note No. 1: For further information on surge arresters, see IEEE C62.11-2012, *Standard for Metal-Oxide Surge Arresters for Alternating-Current Power Circuits (>1 kV)*, and IEEE C62.22-2009, *Guide for the Application of Metal-Oxide Surge Arresters for Alternating-Current Systems*.

Informational Note No. 2: The selection of a properly rated metal oxide arrester is based on considerations of maximum continuous operating voltage and the magnitude and duration of overvoltages at the arrester location as affected by phase-to-ground faults, system grounding techniques, switching surges, and other causes. See the manufacturer's application rules for selection of the specific arrester to be used at a particular location.

242.46~~242.45~~ Location.

Surge arresters shall be permitted to be located indoors or outdoors. Surge arresters shall be made inaccessible to unqualified persons unless listed for installation in accessible locations.

242.40~~242.47~~ Uses Not Permitted.

A surge arrester shall not be installed where the rating of the surge arrester is less than the maximum continuous phase-to-ground voltage at the power frequency available at the point of application.

242.48~~242.49~~ Routing of Surge Arrester Equipment Grounding Conductors.

The conductor used to connect the surge arrester to line, bus, or equipment and to an equipment grounding conductor or grounding electrode connection point as provided in 242.50~~242.51~~ shall not be any longer than necessary and shall avoid unnecessary bends.

242.50~~242.51~~ Connection.

The arrester shall be connected to one of the following:

- (1) Grounded service conductor
- (2) Grounding electrode conductor
- (3) Grounding electrode for the service
- (4) Equipment grounding terminal in the service equipment

~~242.52~~242.53 Surge-Arrester Conductors.

The conductor between the surge arrester and the line, and the surge arrester and the grounding connection, shall not be smaller than 6 AWG copper or aluminum.

~~242.54~~242.55 Interconnections.

The surge arrester protecting a transformer that supplies a secondary distribution system shall be interconnected as specified in ~~242.54(A), (B), or (C)~~242.55(A), (B), or (C).

(A) Metal Interconnections.

A metal interconnection shall be made to the secondary grounded circuit conductor or the secondary circuit grounding electrode conductor, if, in addition to the direct grounding connection at the surge arrester, the connection complies with ~~242.54(A)(1) or (A)(2)~~242.55(A)(1) or (A)(2).

(1) Additional Grounding Connection.

The grounded conductor of the secondary has a grounding connection elsewhere to a continuous metal underground water piping system. In urban water-pipe areas where there are at least four water-pipe connections on the neutral conductor and not fewer than four such connections in each mile of neutral conductor, the metal interconnection shall be permitted to be made to the secondary neutral conductor with omission of the direct grounding connection at the surge arrester.

(2) Multigrounded Neutral System Connection.

The grounded conductor of the secondary system is part of a multigrounded neutral system or static wire of which the primary neutral conductor or static wire has at least four grounding connections in each 1.6 km (1 mile) of line in addition to a grounding connection at each service.

(B) Through Spark Gap or Device.

Where the surge arrester grounding electrode conductor is not connected as in ~~242.54(A)~~242.55(A), or where the secondary is not grounded as in ~~242.54(A)~~242.55(A) but is otherwise grounded as in 250.52, an interconnection shall be made through a spark gap or listed device as required by ~~242.54(B)(1) or (B)(2)~~242.55(B)(1) or (B)(2).

(1) Ungrounded or Unigrounded Primary System.

For ungrounded or unigrounded primary systems, the spark gap for a listed device shall have a 60-Hz breakdown voltage of at least twice the primary circuit voltage but not necessarily more than 10 kV, and there shall be at least one other ground on the grounded conductor of the secondary that is not less than 6.0 m (20 ft) distant from the surge-arrester grounding electrode.

(2) Multigrounded Neutral Primary System.

For multigrounded neutral primary systems, the spark gap or listed device shall have a 60-Hz breakdown of not more than 3 kV, and there shall be at least one other ground on the grounded conductor of the secondary that is not less than 6.0 m (20 ft) distant from the surge-arrester grounding electrode.

(C) By Special Permission.

An interconnection of the surge-arrester ground and the secondary neutral conductor, other than as provided in ~~242.54(A) or (B)~~242.55(A) or (B), shall be permitted to be made only by special permission.

~~242.56~~242.57 Grounding Electrode Conductor Connections and Enclosures.

Except as indicated in this article, surge-arrester grounding electrode conductor connections shall be made as specified in Article 250, Parts III and X. Grounding electrode conductors installed in metal enclosures shall comply with 250.64(E).

**Second Revision No. 8011-NFPA 70-2018 [Detail]**

240.88 Reconditioned Equipment. Reconditioned equipment shall be listed as “reconditioned” and the original listing mark removed.

(A) Circuit Breakers. The use of reconditioned circuit breakers shall comply with (1) through (3):

(1) Molded case circuit breakers shall not be permitted to be reconditioned.

(2) Low, and medium voltage power circuit breakers shall be permitted to be reconditioned.

(3) High voltage circuit breakers shall be permitted to be reconditioned.

(B) Components. The use of reconditioned trip units, protective relays and current transformers shall comply with (1) and (2):

(1) Low voltage power circuit breaker electronic trip units shall not be permitted to be reconditioned.

(2) Electromechanical protective relays and current transformers shall be permitted to be reconditioned.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 19:41:54 EDT 2018

Committee Statement

Committee Statement: Public Comment 980 was submitted by an NEC Correlating Committee appointed task group to address the global impacts of PI 2935. PI 2935 would have required that “Reconditioned Equipment” be “listed as reconditioned” and the “original listing marks removed”. PI 2935 has ramifications that are global in nature and impacts all products referenced in the NEC under the purview of every CMP. Proposed new section 240.88 is safety-driven and is necessary to prevent the reconditioning of products that cannot be safely reconditioned. Public Comment 980 was based on the global impact of PI 2935 and does not represent new material.

Response Message: SR-8011-NFPA 70-2018

[Public Comment No. 980-NFPA 70-2018 \[New Section after 240.87\(B\)\]](#)

**Second Revision No. 8020-NFPA 70-2018 [Detail]**

240.67(C) Performance Testing. Where a method to reduce clearing time is required in 240.67(B), the arc energy reduction system shall be performance tested when first installed on site. This testing shall be conducted by a qualified person(s) in accordance with manufacturer's instructions.

Performance testing of an instantaneous element of the protective device shall be conducted by a qualified person(s) using a test process of primary current injection and manufacturer's recommended test procedures.

A written record of this testing shall be made and shall be available to the authority having jurisdiction.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Tue Oct 30 11:20:00 EDT 2018

Committee Statement

Committee Statement: It is both practical and feasible to require performance testing of arc energy reduction systems at the time of installation. The inclusion of performance testing criteria is not new in the NEC. Sections 210.13, 215.10 and 230.95 mandate performance testing of required GFPE when first installed. The second sentence mandates that only qualified persons are permitted to perform this testing. Additionally, that sentence mandates that the manufacturer's instructions be followed. That is extremely important as new technologies may not lend themselves well to traditional testing methods. The remainder of the proposed text mirrors that seen in 230.95.

Response Message: SR-8020-NFPA 70-2018

Public Comment No. 2161-NFPA 70-2018 [Section No. 240.67]

Public Comment No. 1269-NFPA 70-2018 [New Section after 240.67(B)]

**Second Revision No. 8030-NFPA 70-2018 [Detail]**

240.87 (C) Performance Testing. The arc energy reduction protection system shall be performance tested when first installed on site. This test shall be conducted by a qualified person(s) in accordance with manufacturer's instructions.

Performance testing of an instantaneous element of the protective device shall be conducted by a qualified person(s) using a test process of primary current injection and manufacturer's recommended test procedures.

A written record of this testing shall be made and shall be available to the authority having jurisdiction.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Tue Oct 30 12:07:09 EDT 2018

Committee Statement

Committee Statement: It is both practical and feasible to require performance testing of arc energy reduction systems at the time of installation. The inclusion of performance testing criteria is not new in the NEC. Sections 210.13, 215.10 and 230.95 mandate performance testing of required GFPE when first installed. The second sentence mandates that only qualified persons are permitted to perform this testing. Additionally, that sentence mandates that the manufacturer's instructions be followed. That is extremely important as new technologies may not lend themselves well to traditional testing methods. The remainder of the proposed text mirrors that seen in 230.95.

Response Message: SR-8030-NFPA 70-2018

Public Comment No. 1270-NFPA 70-2018 [New Section after 240.87(B)]

**Second Revision No. 8072-NFPA 70-2018 [Detail]**

New definition for Article 100

Reconditioned. Electromechanical systems, equipment, apparatus or components that are restored to operating conditions. This process differs from normal servicing of equipment that remains within a facility, or replacement of listed equipment on a one-to-one basis. (CMP-10)

Informational Note: The term "reconditioned" is frequently referred to as "rebuilt," "refurbished," or "remanufactured."

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Tue Oct 30 15:40:43 EDT 2018

Committee Statement

Committee Statement: CMP-10 has created multiple second revisions that impact "reconditioned" equipment. In order to ensure clarity and consistent enforcement, the term "reconditioned" must be defined. While the definition in this SR and the substantiation below are the work of CMP-9, this CMP finds it necessary to move this concept forward as well. The NEC Correlating Committee should review and correlate all actions that attempt to define "Reconditioned."

CMP-10 is adding this definition in Article 100 and in 240.2 as it is critical with respect to the application of requirements within Article 240 for reconditioned overcurrent protective devices. The action taken by CMP-1 in SR 7992 to create a definition for "Reconditioned" undermines the actions of CMP-10 in Article 240 and the actions of CMP-13 in Articles 700, 701, 702, 695 and 708. The CMP-1 definition (below) mandates that any action taken in any equipment to maintain the equipment in place or to replace listed components renders the equipment as "reconditioned."

Second Revision No. 7992-NFPA 70-2018 [New Definition after Definition: Receptacle Outlet.]

Reconditioned.

Devices and equipment that are restored to conditions as recommended by the manufacturer's instructions for installation and use in conformity with this Code. (CMP-1)

Informational Note: Reconditioning differs from normal and routine servicing of equipment. The term "reconditioned" is commonly referred to as "rebuilt," "refurbished," or "remanufactured".

CMP-10 requests that the purview of this definition reside in a technical committee that has requirements that permit and prohibit equipment from being reconditioned.

CMP-9 substantiation:

This term will appear in numerous locations and must be defined. This definition is taken from the NEMA document that undergirds Comment 987, but which, as written, is unacceptable because it contains requirements. This wording retains the essential elements from the NEMA definition without including requirements that may need to be developed in future Code editions. The wording also clearly distinguishes both routine maintenance and also one-for-one part replacements from reconditioning. For additional clarity the recommendation also incorporates an adaptation of the informational note that CMP 1 is adding to 110.21(B)(2) relative to other terminology that is often used interchangeably.

Response Message: SR-8072-NFPA 70-2018 Also see SR-8074 Also see PC-979

**Second Revision No. 7950-NFPA 70-2018 [Definition: Fault Current.]****100. Fault Current.**

~~An objectionable current that flows due to an abnormal~~ The current delivered at a point on the system during a short-circuit condition. (CMP-10)

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 17:34:21 EDT 2018

Committee Statement

Committee Statement: The definition, based upon NFPA 70E-2018, adds clarity. The word "amount" was not included because a "fault current" is not an amount.

Response Message: SR-7950-NFPA 70-2018

[Public Comment No. 1993-NFPA 70-2018 \[Definition: Fault Current.\]](#)

[Public Comment No. 1303-NFPA 70-2018 \[Definition: Fault Current.\]](#)

[Public Comment No. 2140-NFPA 70-2018 \[Definition: Fault Current.\]](#)

**Second Revision No. 8070-NFPA 70-2018 [Definition: Service Drop.]****100. Service Drop.**

The overhead conductors between the serving utility ~~electric system~~ and the service point. (CMP-10)

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Tue Oct 30 14:46:14 EDT 2018

Committee Statement

Committee Statement: In response to PC 1212, this revision from First Revision 8197 coordinates the term "serving utility" with the definitions of service, service drop, and service equipment.

Response Message: SR-8070-NFPA 70-2018

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**Second Revision No. 8068-NFPA 70-2018 [Definition: Service Equipment.]****100. Service Equipment.**

The necessary equipment, consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the serving utility ~~electric system~~ and intended to constitute the main control and disconnect of the serving utility- ~~electric system~~ . (CMP-10)

Submitter Information Verification**Committee:** NEC-P10**Submittal Date:** Tue Oct 30 14:43:04 EDT 2018**Committee Statement**

Committee Statement: In response to PC 1212, this revision from First Revision 8199 coordinates the term "serving utility" with the definitions of service, service drop, and service equipment.

Response Message: SR-8068-NFPA 70-2018 Also see SR-8070

Public Comment No. 1212-NFPA 70-2018 [Definition: Service Equipment.]

**Second Revision No. 7858-NFPA 70-2018 [Section No. 215.10]****215.10** Ground-Fault Protection of Equipment.

Each feeder disconnect rated 1000 amperes or more and installed on solidly grounded wye electrical systems of more than 150 volts to ground, but not exceeding 600 volts phase-to-phase, shall be provided with ground-fault protection of equipment in accordance with 230.95.

Informational Note: For buildings that contain health care occupancies, see the requirements of 517.17.

Exception No. 1: This section shall not apply to a disconnecting means for a continuous industrial process where a nonorderly shutdown will introduce additional or increased hazards.

Exception No. 2: This section shall not apply if ground-fault protection of equipment is provided on the supply side of the feeder and on the load side of any transformer supplying the feeder.

Exception No. 3: If temporary feeder conductors are used to connect a generator to a facility for repair, maintenance, or emergencies, ground-fault protection of equipment shall not be required. Temporary feeders without ground-fault protection shall be permitted for the time period necessary but shall not exceed 90 days.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 11:36:18 EDT 2018

Committee Statement

Committee Statement: The informational note is editorially revised to conform with the NEC style manual.

Response Message: SR-7858-NFPA 70-2018

Public Comment No. 853-NFPA 70-2018 [Section No. 215.10]

**Second Revision No. 7860-NFPA 70-2018 [Section No. 225.3]****225.3 Other Articles. [SEE ATTACHED FOR TABLE CHANGES]**

Application of other articles, including additional requirements to specific cases of equipment and conductors, is shown in Table 225.3.

Table 225.3 Other Articles

<u>Equipment/Conductors</u>	<u>Article</u>
Branch circuits	210
Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits	725
Communications circuits	800
Community antenna television and radio distribution systems	820
Conductors for general wiring	310
Electrically driven or controlled irrigation machines	675
Electric signs and outline lighting	600
Feeders	215
Fire alarm systems	760
Fixed outdoor electric deicing and snow-melting equipment	426
Floating buildings	553
Grounding and bonding	250
Hazardous (classified) locations	500
Hazardous (classified) locations — specific	510
Marinas and boatyards	555
Messenger-supported wiring	396
Mobile homes, manufactured homes, and mobile home parks	550
Open wiring on insulators	398
Over 1000 volts, general	490
Overcurrent protection	240
Radio and television equipment	810
Services	230
Solar photovoltaic systems	690
Swimming pools, fountains, and similar installations	680
Use and identification of grounded conductors	200

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP10_SR7860_225.3.docx	Edits to Table 225.3-For staff use	

Submitter Information Verification**Committee:** NEC-P10**Submittal Date:** Mon Oct 29 11:40:25 EDT 2018**Committee Statement**

Committee Statement: In response to public comment 124, the reference to communication circuits in 225.3 is editorially revised to reference article 805. This action is based upon continued support of the referenced

WORKING DRAFT OF CMP 10 MEETING OUTPUT - NATIONAL ELECTRICAL CODE - NFPA 70
OCTOBER 29 - NOVEMBER 3, 2018 - SUBJECT TO REVISION - NOT FOR PUBLICATION

revision by CMP 16 in the second revision stage.

In response to global PC 2215, this revision is based on the actions on FR 8030 that moves the medium voltage conductors and cable provisions to a new article 311. This was added to the table to included medium voltage conductors and cable to the list of other articles.

**Response
Message:**

SR-7860-NFPA 70-2018 Also see global comment 2215

[Public Comment No. 124-NFPA 70-2018 \[Section No. 225.3\]](#)

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**Second Revision No. 7863-NFPA 70-2018 [Section No. 225.10]****225.10** Wiring on Buildings (or Other Structures).

The installation of outside wiring on surfaces of buildings (or other structures) shall be permitted for circuits not exceeding 1000 volts, nominal, as the following:

- (1) Auxiliary gutters
- (2) Busways
- (3) Cable trays
- (4) Cablebus
- (5) Electrical metallic tubing (EMT)
- (6) Flexible metal conduit (FMC)
- (7) Intermediate metal conduit (IMC)
- (8) Liquidtight flexible metal conduit (LFMC)
- (9) Liquidtight flexible nonmetallic conduit (LFNC)
- (10) Messenger-supported wiring
- (11) Open wiring on insulators
- (12) Reinforced thermosetting resin conduit (RTRC)
- (13) Rigid metal conduit (RMC)
- (14) Rigid polyvinyl chloride conduit (PVC)
- (15) Type MC cable
- (16) Type MI cable
- (17) Type TC-ER cable
- (18) Type UF cable
- (19) Type SE cable
- (20) Wireways

Circuits of over 1000 volts, nominal, shall be installed as provided in 300.37.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 11:43:06 EDT 2018

Committee Statement

Committee Statement: This second revision modifies 225.10(17) to correlate with the actions taken on FR8457 in section 230.43. This revision clarifies that type TC-ER cable is permitted. Additionally, type SE cable is added as a permitted wiring method. The deletion of "multiconductor cable" in the first draft stage inadvertently removed type SE cable from the list of permitted wiring methods.

Response Message: SR-7863-NFPA 70-2018

[Public Comment No. 1715-NFPA 70-2018 \[Section No. 225.10\]](#)

[Public Comment No. 856-NFPA 70-2018 \[Section No. 225.10\]](#)

**Second Revision No. 7864-NFPA 70-2018 [New Section after 225.21]**

225.22 Raceways on Exterior Surfaces of Buildings or Other Structures . Raceways on exteriors of buildings or other structures shall be arranged to drain and shall be listed or approved for use in wet locations.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 11:46:25 EDT 2018

Committee Statement

Committee Statement: This section was deleted during the first draft stage in an effort to relocate this requirement into article 300. However, CMP 3 rejected that public input. This action reinserts section 225.22 to previous text.

Response Message: SR-7864-NFPA 70-2018

[Public Comment No. 863-NFPA 70-2018 \[Section No. 225.21\]](#)

FOR CODE-MAKING PANEL USE ONLY
SUBJECT TO REVISION - NOT FOR PUBLICATION

**Second Revision No. 7866-NFPA 70-2018 [Section No. 225.30]****225.30** Number of Supplies.

A building or other structure that is served by a branch circuit or feeder on the load side of a service disconnecting means shall be supplied by only one feeder or branch circuit unless permitted in 225.30(A) through (E). For the purpose of this section, a multiwire branch circuit shall be considered a single circuit.

Where a branch circuit or feeder originates in these additional buildings or other structures, only one feeder or branch circuit shall be permitted to supply power back to the original building or structure, unless permitted in 225.30(A) through (E).

(A) Special Conditions.

Additional feeders or branch circuits shall be permitted to supply the following:

- (1) Fire pumps
- (2) Emergency systems
- (3) Legally required standby systems
- (4) Optional standby systems
- (5) Parallel power production systems
- (6) Systems designed for connection to multiple sources of supply for the purpose of enhanced reliability
- (7) Electric vehicle charging systems listed, labeled, and identified for more than a single branch circuit or feeder
- (8) Docking facilities and piers

(B) Common Supply Equipment.

Where feeder conductors originate in the same panelboard, switchboard, or other distribution equipment, and each feeder terminates in a single disconnecting means, not more than six feeders shall be permitted. Where more than one feeder is installed in accordance with this section, all feeder disconnects in supplying the building or structure supplied shall be grouped in the same location, and the requirements of 225.33 shall not apply. Each disconnect shall be marked to indicate the load served.

(C) Special Occupancies.

By special permission, additional feeders or branch circuits shall be permitted for either of the following:

- (1) Multiple-occupancy buildings where there is no space available for supply equipment accessible to all occupants
- (2) A single building or other structure sufficiently large to make two or more supplies necessary

(D) Capacity Requirements.

Additional feeders or branch circuits shall be permitted where the capacity requirements are in excess of 2000 amperes at a supply voltage of 1000 volts or less.

(E) Different Characteristics.

Additional feeders or branch circuits shall be permitted for different voltages, frequencies, or phases, or for different uses such as control of outside lighting from multiple locations.

(F) Documented Switching Procedures.

Additional feeders or branch circuits shall be permitted to supply installations under single management where documented safe switching procedures are established and maintained for disconnection.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 11:51:00 EDT 2018

Committee Statement

Committee Statement: This revision is editorial in nature and provides clarity with respect to feeder disconnects being located inside of, or outside of a building or structure supplied.

Response Message: SR-7866-NFPA 70-2018

[Public Comment No. 638-NFPA 70-2018 \[Section No. 225.30\(B\)\]](#)

FOR CODE-MAKING PANEL USE ONLY
SUBJECT TO REVISION - NOT FOR PUBLICATION

**Second Revision No. 8015-NFPA 70-2018 [Section No. 230.11]****230.11** Splices and Taps.

~~Splices and taps shall be permitted. Power distribution blocks, pressure connectors, and devices for splices and taps shall be listed. Power distribution blocks, pressure connectors, and devices for splices and taps, installed on service conductors, shall be marked "suitable for use on the line side of the service equipment" or equivalent.~~

Submitter Information Verification**Committee:** NEC-P10**Submittal Date:** Mon Oct 29 19:59:57 EDT 2018**Committee Statement****Committee Statement:** Section 230.11 is deleted in this second revision. These requirements have been relocated to 230.46, which addresses service entrance conductors being spliced or tapped.**Response Message:** SR-8015-NFPA 70-2018[Public Comment No. 191-NFPA 70-2018 \[Section No. 230.11\]](#)

**Second Revision No. 7871-NFPA 70-2018 [Section No. 230.46]****230.46** Spliced and Tapped Conductors.

Service-entrance conductors shall be permitted to be spliced or tapped in accordance with 110.14, 300.5(E), 300.13, and 300.15. Power distribution blocks, pressure connectors, and devices for splices and taps shall be listed. Power distribution blocks installed on service conductors shall be marked "suitable for use on the line side of the service equipment" or equivalent.

Effective January 1, 2023 pressure connectors and devices for splices and taps installed on service conductors shall be marked "suitable for use on the line side of the service equipment" or equivalent.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 12:08:56 EDT 2018

Committee Statement

Committee Statement: This second revision revises and relocates requirements from section 230.11 and relocates them into existing 230.46. The existing requirement permits service entrance conductors to be spliced or tapped. Power distribution blocks, pressure connectors, and devices for these splices and taps are now required to be listed. As required in previous text in section 314.28(E)(1) and 230.11 in the first draft stage, power distribution blocks installed on service conductors are required to be marked "suitable for use on the line side of service equipment."

The requirement for pressure connectors and devices for splices and taps installed on service conductors to be marked "suitable for use on the line side of the service equipment" or equivalent is modified with a delayed implementation date. This will require additional review, modification to product standards, and testing. This requirement is necessary because magnetic and thermal forces (damage) are not eliminated as a result of pressure connectors and devices for splices and taps being "free floated" during installation.

Response Message: SR-7871-NFPA 70-2018

Public Comment No. 192-NFPA 70-2018 [Section No. 230.46]

**Second Revision No. 7896-NFPA 70-2018 [Section No. 230.62(C)]****(C) Barriers.**

Barriers shall be placed in service equipment such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations.

Exception: This requirement shall not apply to service panelboards with provisions for more than one service disconnect within a single enclosure as permitted in 408.36, Exceptions 1, 2, and 3.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 13:30:58 EDT 2018

Committee Statement

Committee Statement: The action to revise section 230.71 which modifies the previous permission for up to six service disconnects in a panelboard requires that the existing exception referencing 408.36 be deleted.

Response Message: SR-7896-NFPA 70-2018

[Public Comment No. 1113-NFPA 70-2018 \[Section No. 230.62\(C\)\]](#)

**Second Revision No. 7897-NFPA 70-2018 [Section No. 230.66(B)]****(B) Meter Sockets.**

Meter sockets shall not be considered service equipment but shall be listed and rated for the voltage and ampacity-current rating of the service.

Exception: Meter sockets supplied by and under the exclusive control of an electric utility shall not be required to be listed.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 13:32:31 EDT 2018

Committee Statement

Committee Statement: This revision editorially deletes "ampacity" and inserts "current rating." Services are not rated in ampacity, they are rated in "current ratings" such as but not limited to: 100, 200, 400, 600 and 1200 amps.

Response Message: SR-7897-NFPA 70-2018

[Public Comment No. 2175-NFPA 70-2018 \[Section No. 230.66\(B\)\]](#)

**Second Revision No. 7898-NFPA 70-2018 [Section No. 230.67]****230.67** Surge Protection.**(A)** Surge Protective Device.

All services in- supplying dwelling units shall be provided with a surge protective device (SPD).

(B) Location.

The surge protective device shall be an integral part of the service equipment or shall be located immediately adjacent thereto.

Exception: The surge protective device shall not be required to be located in the service equipment as required in (B) if located at each next level distribution equipment downstream toward the load.

(C) Type.

The surge protective device shall be a Type 1 or Type 2 SPD.

(D) Replacement.

Where service equipment is replaced, all of the requirements of this section shall apply.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 13:34:29 EDT 2018

Committee Statement

Committee Statement: This revision removes text that infers that 230.67 applied only to service equipment inside of a dwelling unit. The revised text provides clarity.

Response Message: SR-7898-NFPA 70-2018



Second Revision No. 7901-NFPA 70-2018 [Section No. 230.71]

230.71 Maximum Number of Disconnects.

~~In general, each~~ Each service shall have ~~not more than~~ only one disconnecting means unless the requirements of 230.71(B) are met.

(A) General.

For the purpose of this section, disconnecting means installed as part of listed equipment and used solely for the following shall not be considered a service disconnecting means:

- (1) Power monitoring equipment
- (2) Surge-protective device(s)
- (3) Control circuit of the ground-fault protection system
- (4) Power-operable service disconnecting means

(B) Two to Six Service Disconnecting Means.

Two to six service disconnects shall be permitted for each service permitted by 230.2 or for each set of service-entrance conductors permitted by 230.40, Exception No. 1, 3, 4, or 5. The two to six service disconnecting means shall be permitted to consist of a combination of any of the following:

- (1) Separate enclosures with a main service disconnecting means in each enclosure
- (2) Panelboards with a main service disconnecting means in each panelboard
~~A service disconnect in a switchboard~~
- (3) enclosure
- (4) Switchboard(s) where there is only one service disconnect in ~~an enclosure~~
~~A service disconnect in switchgear that is located in its own~~
- (5) each separate vertical section where there are barriers separating each vertical section
- (6) Service disconnects in switchgear or metering centers where each disconnect is located in a separate compartment

Informational Note

~~: See 408.36, Exception No. 3, for service equipment in certain panelboards, and see 430.95 for service equipment in motor control centers~~

No. 1: Metering centers are addressed in UL 67, the standard for panelboards.

Informational Note No. 2: Examples of separate enclosures with a main service disconnecting means in each enclosure include but are not limited to motor control centers, fused disconnects, circuit breaker enclosures and transfer switches that are suitable for use as service equipment .

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP10_SR7901_230.71.docx	Clean text for 230.71--for staff use	

Submitter Information Verification

Committee: NEC-P10
Submittal Date: Mon Oct 29 13:48:49 EDT 2018

Committee Statement

WORKING DRAFT OF CMP 10 MEETING OUTPUT - NATIONAL ELECTRICAL CODE - NFPA 70
OCTOBER 29 - NOVEMBER 3, 2018 - SUBJECT TO REVISION - NOT FOR PUBLICATION

**Committee
Statement:**

Editorial revisions are made in the parent text of 230.71 for grammar and clarity.

The existing informational note is deleted to correlate with the actions taken in section 230.71 in this second revision and in FR 8463.

The following revisions are made in 230.71(B):

- List item (2) is clarified by referencing “each enclosure”
- List item (3) is modified to clarify that in accordance with this requirement, service disconnects are permitted in separate vertical sections of switchboards provided there are barriers between each vertical section
- List item (4) is modified to include switchgear and metering centers, where each disconnect is located in a separate compartment.

Two new informational notes are added to provide clarity to the user.

- The first note explains that metering centers are addressed in the product standard for panelboards, UL 67.
- The second note provides examples of enclosures identified in 230.71(B)(1)

**Response
Message:**

SR-7901-NFPA 70-2018

[Public Comment No. 866-NFPA 70-2018 \[Section No. 230.71\]](#)

[Public Comment No. 867-NFPA 70-2018 \[Section No. 230.71\]](#)

[Public Comment No. 382-NFPA 70-2018 \[Section No. 230.71 \[Excluding any Sub-Sections\]\]](#)

[Public Comment No. 1485-NFPA 70-2018 \[Section No. 230.71 \[Excluding any Sub-Sections\]\]](#)

[Public Comment No. 53-NFPA 70-2018 \[Section No. 230.71\]](#)

**Second Revision No. 7912-NFPA 70-2018 [Section No. 230.82]****230.82 Equipment Connected to the Supply Side of Service Disconnect.**

Only the following equipment shall be permitted to be connected to the supply side of the service disconnecting means:

- (1) Cable limiters.
- (2) Meters and meter sockets nominally rated not in excess of 1000 volts, if all metal housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250.
- (3) Meter disconnect switches nominally rated not in excess of 1000 volts that have a short-circuit current rating equal to or greater than the available fault current, if all metal housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250. A meter disconnect switch shall be capable of interrupting the load served. A meter disconnect shall be legibly field marked on its exterior in a manner suitable for the environment as follows: METER DISCONNECT NOT SERVICE EQUIPMENT
- (4) Instrument transformers (current and voltage), impedance shunts, load management devices, surge arresters, and Type 1 surge-protective devices.
- (5) Conductors used to supply load management devices, circuits for standby power systems, fire pump equipment, and fire and sprinkler alarms, if provided with service equipment and installed in accordance with requirements for service-entrance conductors.
- (6) Solar photovoltaic systems, fuel cell systems, wind electric systems, energy storage systems, or interconnected electric power production sources, if provided with a disconnecting means listed as suitable for use as service equipment, and overcurrent protection as specified in Part VII of Article 230.
- (7) Control circuits for power-operable service disconnecting means, if suitable overcurrent protection and disconnecting means are provided.
- (8) Ground-fault protection systems or Type 2 surge-protective devices, where installed as part of listed equipment, if suitable overcurrent protection and disconnecting means are provided.
- (9) Connections used only to supply listed communications equipment under the exclusive control of the serving electric utility, if suitable overcurrent protection and disconnecting means are provided. For installations of equipment by the serving electric utility, a disconnecting means is not required if the supply is installed as part of a meter socket, such that access can only be gained with the meter removed.
- (10) ~~Emergency disconnect switches~~ disconnects in accordance with 230.85, if all metal housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250.
- (11) Meter-mounted transfer switches nominally rated not in excess of 1000 volts that have a short-circuit current rating equal to or greater than the available fault current. A meter-mounted transfer switch shall be listed and be capable of transferring the load served. A meter-mounted transfer switch shall be marked on its exterior:
 - (12) Meter-mounted transfer switch
 - (13) Not service equipment

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 14:23:50 EDT 2018

Committee Statement

Committee In response to public comments 869 and 1539, this revision clarifies and correlates the term

Statement: “emergency disconnect” with the requirements of 230.85.

In response to public comment 217, meter mounted transfer switches are not capable of being “suitable for use as service equipment.” It is difficult to make necessary terminations and provide future access in a meter mounted transfer switch since it is behind equipment that is typically under exclusive utility control. This second revision provides necessary marking requirements to clarify that a meter mounted transfer switch it is not service equipment.

Response Message: SR-7912-NFPA 70-2018

[Public Comment No. 869-NFPA 70-2018 \[Section No. 230.82\]](#)

[Public Comment No. 1539-NFPA 70-2018 \[Section No. 230.82\]](#)

[Public Comment No. 217-NFPA 70-2018 \[Section No. 230.82\]](#)

FOR CODE-MAKING PANEL USE ONLY
SUBJECT TO REVISION - NOT FOR PUBLICATION

**Second Revision No. 7924-NFPA 70-2018 [Section No. 230.85]****230.85** Emergency Disconnect(s) Disconnects .

For one- and two-family dwelling units, all service conductors shall terminate in disconnecting means having a short-circuit current rating equal to or greater than the available fault current, installed in a readily accessible outdoor location. If more than one disconnect is provided, they shall be grouped. Each disconnect shall be one of the following:

- (1) Service disconnect(s) disconnects marked as follows: EMERGENCY DISCONNECT, SERVICE DISCONNECT
- (2) Meter disconnect(s) disconnects installed per 230.82(3) and marked as follows: EMERGENCY DISCONNECT, METER DISCONNECT, NOT SERVICE EQUIPMENT
- (3) Other listed disconnect switch(es) switches or circuit breaker(s) breakers on the supply side of each service disconnect that are suitable for use as service equipment and marked as follows: EMERGENCY DISCONNECT, NOT SERVICE EQUIPMENT

Markings shall comply with 110.21(B).

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 16:19:31 EDT 2018

Committee Statement

Committee Statement: Section 230.85 is editorially revised for clarity.

Response Message: SR-7924-NFPA 70-2018

Public Comment No. 1542-NFPA 70-2018 [Section No. 230.85]

**Second Revision No. 8065-NFPA 70-2018 [Section No. 230.208]****230.208 Protection Requirements.**

A short-circuit protective device shall be provided on the load side of, or as an integral part of, the service disconnect, and shall protect all ungrounded conductors that it supplies. The protective device shall be capable of detecting and interrupting all values of current, in excess of its trip setting or melting point, that can occur at its location. A fuse rated in continuous amperes not to exceed three times the ampacity of the conductor, or a circuit breaker with a trip setting of not more than six times the ampacity of the conductors, shall be considered as providing the required short-circuit protection.

Informational Note: See Table 310.311 .60(C)(67) through Table 310.311 .60(C)(86) for ampacities of conductors rated 2001 volts and above to 35,000 volts .

Overcurrent devices shall conform to 230.208(A) and (B).

(A) Equipment Type.

Equipment used to protect service-entrance conductors shall meet the requirements of Article 490, Part II.

(B) Enclosed Overcurrent Devices.

The restriction to 80 percent of the rating for an enclosed overcurrent device for continuous loads shall not apply to overcurrent devices installed in systems operating at over 1000 volts.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Tue Oct 30 14:23:18 EDT 2018

Committee Statement

Committee Statement: In response to PC 2215, this second revision is based on the actions on FR 8030 that moves the medium voltage conductors and cable provisions to a new article 311. The informational note was revised to reflect the changes made by new article 311. The words "and above" were revised to state the voltage as listed in Article 311 for accuracy.

Response Message: SR-8065-NFPA 70-2018 Also see PC 2215 Also see SR-7860

[Public Comment No. 2215-NFPA 70-2018 \[Global Input\]](#)



Second Revision No. 8074-NFPA 70-2018 [New Definition after Definition: Current-Limiting Overcurrent...]

240.2 Reconditioned. Electromechanical systems, equipment, apparatus or components that are restored to operating conditions. This process differs from normal servicing of equipment that remains within a facility, or replacement of listed equipment on a one-to-one basis. (CMP-10)
Informational Note: The term "reconditioned" is frequently referred to as "rebuilt," "refurbished," or "remanufactured."

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Tue Oct 30 15:46:37 EDT 2018

Committee Statement

Committee Statement: CMP-10 has created multiple second revisions that impact "reconditioned" equipment. In order to ensure clarity and consistent enforcement, the term "reconditioned" must be defined. While the definition in this SR and the substantiation below are the work of CMP-9, this committee feels it necessary to move this concept forward as well. The NEC Correlating Committee should review and correlate all actions that attempt to define "Reconditioned." CMP-10 requests that the definition submitted in SR 8072 in Article 100 be included in the 2020 NEC. CMP-10 requests that the NEC Correlating Committee remove this definition from 240.2 provided that the definition in SR 8072 is retained in Article 100.

CMP-10 is adding this definition in Article 100 and in 240.2 as it is critical with respect to the application of requirements within Article 240 for reconditioned overcurrent protective devices. The action taken by CMP-1 in SR 7992 to create a definition for "Reconditioned" undermines the actions of CMP-10 in Article 240 and the actions of CMP-13 in Articles 700, 701, 702, 695 and 708. The CMP-1 definition (below) mandates that any action taken in any equipment to maintain the equipment in place or to replace listed components renders the equipment as "reconditioned."

Second Revision No. 7992-NFPA 70-2018 [New Definition after Definition: Receptacle Outlet.]

Reconditioned.

Devices and equipment that are restored to conditions as recommended by the manufacturer's instructions for installation and use in conformity with this Code. (CMP-1)

Informational Note: Reconditioning differs from normal and routine servicing of equipment. The term "reconditioned" is commonly referred to as "rebuilt," "refurbished," or "remanufactured".

CMP-10 requests that the purview of this definition reside in a technical committee that has requirements that permit and prohibit equipment from being reconditioned.

CMP-9 substantiation:

This term will appear in numerous locations and must be defined. This definition is taken from the NEMA document that undergirds Comment 987, but which, as written, is unacceptable because it contains requirements. This wording retains the essential elements from the NEMA definition without including requirements that may need to be developed in future Code editions. The wording also clearly distinguishes both routine maintenance and also one-for-one part replacements from reconditioning. For additional clarity the recommendation also incorporates an adaptation of the informational note that CMP 1 is adding to 110.21(B)(2) relative to other terminology that is often used interchangeably.

Response Message: SR-8074-NFPA 70-2018 Also see SR-8072 Also see PC-979

WORKING DRAFT OF CMP 10 MEETING OUTPUT - NATIONAL ELECTRICAL CODE - NFPA 70
OCTOBER 29 - NOVEMBER 3, 2018 - SUBJECT TO REVISION - NOT FOR PUBLICATION

FOR CODE-MAKING PANEL USE ONLY
SUBJECT TO REVISION - NOT FOR PUBLICATION

**Second Revision No. 7955-NFPA 70-2018 [Section No. 240.6(C)]****240.6 (C) Restricted Access Adjustable-Trip Circuit Breakers.**

A circuit breaker(s) that has restricted access to the adjusting means shall be permitted to have an ampere rating(s) that is equal to the adjusted current setting (long-time pickup setting). Restricted access shall be ~~defined as~~ achieved by one of the following methods :

- (1) Located behind removable and sealable covers over the adjusting means
- (2) Located behind bolted equipment enclosure doors
- (3) Located behind locked doors accessible only to qualified personnel
- (4) Password protected, with password accessible only to qualified personnel

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 17:43:39 EDT 2018

Committee Statement

Committee Statement: The list options in 240.6(C) are not definitions but rather provisions. Replacement of the words "defined as one of the following" with "achieved by one of the following methods" more accurately and clearly shows the intent of this requirement.

Response Message: SR-7955-NFPA 70-2018

Public Comment No. 422-NFPA 70-2018 [Section No. 240.6(C)]

**Second Revision No. 7956-NFPA 70-2018 [Section No. 240.21(B)]****240.21 (B) Feeder Taps.**

Conductors shall be permitted to be tapped, without overcurrent protection at the tap, to a feeder as specified in 240.21(B)(1) through (B)(5). The tap shall be permitted at any point on the load side of the feeder overcurrent protective device. Section 240.4(B) shall not be permitted for tap conductors.

(1) Taps Not over 3 m (10 ft) Long.

If the length of the tap conductors does not exceed 3 m (10 ft) and the tap conductors comply with all of the following:

- (1) The ampacity of the tap conductors is
- (2) Not less than the combined calculated loads on the circuits supplied by the tap conductors, and
- (3) Not less than the rating of the equipment containing an overcurrent device(s) supplied by the tap conductors or not less than the rating of the overcurrent protective device at the termination of the tap conductors.

Exception to b: Where listed equipment, such as a surge protective device(s) [SPD(s)], is provided with specific instructions on minimum conductor sizing, the ampacity of the tap conductors supplying that equipment shall be permitted to be determined based on the manufacturer's instructions.

- (4) The tap conductors do not extend beyond the switchboard, switchgear, panelboard, disconnecting means, or control devices they supply.
- (5) Except at the point of connection to the feeder, the tap conductors are enclosed in a raceway, which extends from the tap to the enclosure of an enclosed switchboard, switchgear, a panelboard, or control devices, or to the back of an open switchboard.
- (6) For field installations, if the tap conductors leave the enclosure or vault in which the tap is made, the ampacity of the tap conductors is not less than one-tenth of the rating of the overcurrent device protecting the feeder conductors.

Informational Note: For overcurrent protection requirements for panelboards, see 408.36.

(2) Taps Not over 7.5 m (25 ft) Long.

Where the length of the tap conductors does not exceed 7.5 m (25 ft) and the tap conductors comply with all the following:

- (1) The ampacity of the tap conductors is not less than one-third of the rating of the overcurrent device protecting the feeder conductors.
- (2) The tap conductors terminate in a single circuit breaker or a single set of fuses that limit the load to the ampacity of the tap conductors. This device shall be permitted to supply any number of additional overcurrent devices on its load side.
- (3) The tap conductors are protected from physical damage by being enclosed in an approved raceway or by other approved means.

(3) Taps Supplying a Transformer [Primary Plus Secondary Not over 7.5 m (25 ft) Long].

Where the tap conductors supply a transformer and comply with all the following conditions:

- (1) The conductors supplying the primary of a transformer have an ampacity at least one-third the rating of the overcurrent device protecting the feeder conductors.
- (2) The conductors supplied by the secondary of the transformer shall have an ampacity that is not less than the value of the primary-to-secondary voltage ratio multiplied by one-third of the rating of the overcurrent device protecting the feeder conductors.
- (3) The total length of one primary plus one secondary conductor, excluding any portion of the primary conductor that is protected at its ampacity, is not over 7.5 m (25 ft).
- (4) The primary and secondary conductors are protected from physical damage by being enclosed in an approved raceway or by other approved means.
- (5) The secondary conductors terminate in a single circuit breaker or set of fuses that limit the load current to not more than the conductor ampacity that is permitted by 310.14.

(4) Taps over 7.5 m (25 ft) Long.

Where the feeder is in a high bay manufacturing building over 11 m (35 ft) high at walls and the installation complies with all the following conditions:

- (1) Conditions of maintenance and supervision ensure that only qualified persons service the systems.
- (2) The tap conductors are not over 7.5 m (25 ft) long horizontally and not over 30 m (100 ft) total length.
- (3) The ampacity of the tap conductors is not less than one-third the rating of the overcurrent device protecting the feeder conductors.
- (4) The tap conductors terminate at a single circuit breaker or a single set of fuses that limit the load to the ampacity of the tap conductors. This single overcurrent device shall be permitted to supply any number of additional overcurrent devices on its load side.
- (5) The tap conductors are protected from physical damage by being enclosed in an approved raceway or by other approved means.
- (6) The tap conductors are continuous from end-to-end and contain no splices.
- (7) The tap conductors are sized 6 AWG copper or 4 AWG aluminum or larger.
- (8) The tap conductors do not penetrate walls, floors, or ceilings.
- (9) The tap is made no less than 9 m (30 ft) from the floor.

(5) Outside Taps of Unlimited Length.

Where the conductors are located outside of a building or structure, except at the point of load termination, and comply with all of the following conditions:

- (1) The tap conductors are protected from physical damage in an approved manner.
- (2) The tap conductors terminate at a single circuit breaker or a single set of fuses that limits the load to the ampacity of the tap conductors. This single overcurrent device shall be permitted to supply any number of additional overcurrent devices on its load side.
- (3) The overcurrent device for the tap conductors is an integral part of a disconnecting means or shall be located immediately adjacent thereto.
- (4) The disconnecting means for the tap conductors is installed at a readily accessible location complying with one of the following:
 - (5) Outside of a building or structure
 - (6) Inside, nearest the point of entrance of the tap conductors
 - (7) Where installed in accordance with 230.6, nearest the point of entrance of the tap conductors

Supplemental Information

File Name	Description	Approved
70_CMP10_SR7956_240.21.docx	Editorial: Track changes for 240.21(B)--for staff use	

Submitter Information Verification**Committee:** NEC-P10**Submittal Date:** Mon Oct 29 17:47:00 EDT 2018**Committee Statement**

Committee Statement: This second revision provides clarity and aligns with the requirements of 445.13(B). Tap conductors are permitted to be supplied by an overcurrent protective device in accordance with 240.21(B).

Response Message: SR-7956-NFPA 70-2018

Public Comment No. 257-NFPA 70-2018 [Section No. 240.21(B) [Excluding any Sub-Sections]]

FOR CODE-MAKING PANEL USE ONLY
SUBJECT TO REVISION - NOT FOR PUBLICATION

**Second Revision No. 7961-NFPA 70-2018 [Section No. 240.24(A)]****240.24 (A) Accessibility.**

~~Switches~~ ~~Circuit breakers, and switches~~ containing fuses, and ~~circuit breakers~~ shall be readily accessible and installed so that the center of the grip of the operating handle of the switch or circuit breaker, when in its highest position, is not more than 2.0 m (6 ft 7 in.) above the floor or working platform, unless one of the following applies:

- (1) For busways, as provided in 368.17(C).
- (2) For supplementary overcurrent protection, as described in 240.10.
- (3) For overcurrent devices, as described in 225.40 and 230.92.
- (4) For overcurrent devices adjacent to utilization equipment that they supply, access shall be permitted to be by portable means.

Exception: The use of a tool shall be permitted to access overcurrent devices located within listed industrial control panels or similar enclosures.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 18:01:45 EDT 2018

Committee Statement

Committee Statement: The rewording of the first sentence is editorial and improves clarity.

Response Message: SR-7961-NFPA 70-2018

Public Comment No. 868-NFPA 70-2018 [Section No. 240.24(A)]

**Second Revision No. 8022-NFPA 70-2018 [Section No. 240.33]****240.33** Vertical Position.

~~(A) Vertical Position.~~

Enclosures for overcurrent devices shall be mounted in a vertical position

~~unless that is shown to be impracticable~~

~~(B) Horizontal Position.~~

~~Circuit breaker enclosures shall be permitted to be installed horizontally where the circuit breaker is installed in accordance with 240.81. Listed busway plug-in units shall be permitted to be mounted in orientations corresponding to the busway mounting position.~~

~~(C) Face-Up Position.~~

~~Panelboards shall not be installed in the face-up position.~~

Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
70_CMP10_SR8022_240.33.docx	Clean text for 240.33--for staff use	

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Tue Oct 30 11:25:52 EDT 2018

Committee Statement

Committee Statement: This second revision reverts back to the previous text in the 2017 NEC. The separation of this requirement into subdivisions created confusion. The first sentence requires that enclosures for overcurrent devices are mounted in a vertical position. The text "unless that is shown to be impracticable" is deleted in the first sentence to prohibit enclosures from being installed in the face up position.

Response Message: SR-8022-NFPA 70-2018

Public Comment No. 875-NFPA 70-2018 [Section No. 240.33]

Public Comment No. 807-NFPA 70-2018 [Section No. 240.33(C)]

Public Comment No. 873-NFPA 70-2018 [Section No. 240.33]

Public Comment No. 1828-NFPA 70-2018 [Section No. 240.33(C)]

Public Comment No. 1386-NFPA 70-2018 [Section No. 240.33(C)]

Public Comment No. 524-NFPA 70-2018 [Section No. 240.33(C)]

Public Comment No. 876-NFPA 70-2018 [Section No. 240.33]

**Second Revision No. 7974-NFPA 70-2018 [New Section after 240.61]**

240.62 Reconditioned Equipment. Low voltage fuseholders and low voltage non-renewable fuses shall not be permitted to be reconditioned.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 18:30:38 EDT 2018

Committee Statement

Committee Statement: Public Comment 981 was submitted by an NEC Correlating Committee appointed task group to address the global impacts of PI 2935. PI 2935 would have required that "Reconditioned Equipment" be "listed as reconditioned" and the "original listing marks removed". PI 2935 has ramifications that are global in nature and impacts all products referenced in the NEC under the purview of every CMP. Proposed new section 240.62 is safety-driven and is necessary to prevent the reconditioning of products that cannot be safely reconditioned. Public Comment 981 was based on the global impact of PI 2935 and does not represent new material.

Response Message: SR-7974-NFPA 70-2018

Public Comment No. 981-NFPA 70-2018 [New Section after 240.61]

**Second Revision No. 7991-NFPA 70-2018 [Sections 240.67(A), 240.67(B)]****Sections 240.67(A), 240.67(B)****(A) Documentation.**

Documentation shall be available to those authorized to design, install, operate, or inspect the installation as to the location of the fuses.

Documentation shall also be provided to demonstrate that the method chosen to reduce clearing time is set to operate at a value below the available arcing current.

(B) Method to Reduce Clearing Time.

A fuse shall have a clearing time of 0.07 seconds or less at the available arcing current, or one of the following means shall be provided and shall be set to operate at less than the available arcing current:

- (1) Differential relaying
- (2) Energy-reducing maintenance switching with local status indicator
- (3) Energy-reducing active arc flash mitigation system
- (4) Current-limiting, electronically actuated fuses
- (5) An approved equivalent means

Informational Note No. 1: An energy-reducing maintenance switch allows a worker to set a disconnect switch to reduce the clearing time while the worker is working within an arc-flash boundary as defined in *NFPA 70E-2018, Standard for Electrical Safety in the Workplace*, and then to set the disconnect switch back to a normal setting after the potentially hazardous work is complete.

Informational Note No. 2: An energy-reducing active arc flash mitigation system helps in reducing arcing duration in the electrical distribution system. No change in the disconnect switch or the settings of other devices is required during maintenance when a worker is working within an arc flash boundary as defined in *NFPA 70E-2018, Standard for Electrical Safety in the Workplace*.

Informational Note No. 3: IEEE 1584-2002, *IEEE Guide for Performing Arc Flash Hazard Calculations*, is one of the available methods that provides guidance in determining arcing current.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 19:08:47 EDT 2018

Committee Statement

Committee Statement: For situations where the fuse opening time is greater than 0.07 seconds at the available arcing current, all four methods to reduce clearing time now include the requirement that they be set to operate at less than the available arcing current. The concept "and shall be set to operate at less than the available arcing current" is in the 2017 NEC® for circuit breaker instantaneous trip and circuit breaker instantaneous override and was introduced for the 2020 NEC® for fuses (240.67) by PI 2637. This requirement is critical for fast operation of all four methods to help protect the worker.

A requirement has been added in (A) to document that the chosen method is set to operate at less than the arcing current, helping to assure that the method chosen opens the circuit in time to help protect the worker. This concept was introduced by PI 2637.

Response Message: SR-7991-NFPA 70-2018

**Second Revision No. 7999-NFPA 70-2018 [Sections 240.87(A), 240.87(B)]****Sections 240.87(A), 240.87(B)****(A) Documentation.**

Documentation shall be available to those authorized to design, install, operate, or inspect the installation as to the location of the circuit breaker(s). Documentation shall also be provided to demonstrate that the method chosen to reduce clearing time is set to operate at a value below the available arcing current.

(B) Method to Reduce Clearing Time.

One of the following means shall be provided and shall be set to operate at less than the available arcing current :

- (1) Zone-selective interlocking
- (2) Differential relaying
- (3) Energy-reducing maintenance switching with local status indicator
- (4) Energy-reducing active arc flash mitigation system
- (5) An instantaneous trip setting ~~that is less than the available arcing current~~ . Temporary adjustment of the instantaneous trip setting to achieve arc energy reduction shall not be permitted.
- (6) An instantaneous override ~~that is less than the available arcing current~~
- (7) An approved equivalent means

Informational Note No. 1: An energy-reducing maintenance switch allows a worker to set a circuit breaker trip unit to "no intentional delay" to reduce the clearing time while the worker is working within an arc-flash boundary as defined in *NFPA 70E-2018, Standard for Electrical Safety in the Workplace*, and then to set the trip unit back to a normal setting after the potentially hazardous work is complete.

Informational Note No. 2: An energy-reducing active arc flash mitigation system helps in reducing arcing duration in the electrical distribution system. No change in the circuit breaker or the settings of other devices is required during maintenance when a worker is working within an arc flash boundary as defined in *NFPA 70E-2018, Standard for Electrical Safety in the Workplace*.

Informational Note No. 3: An instantaneous trip is a function that causes a circuit breaker to trip with no intentional delay when currents exceed the instantaneous trip setting or current level. If arcing currents are above the instantaneous trip level, the circuit breaker will trip in the minimum possible time.

Informational Note No. 4: IEEE 1584-2002, *IEEE Guide for Performing Arc Flash Hazard Calculations*, is one of the available methods that provide guidance in determining arcing current.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Mon Oct 29 19:17:32 EDT 2018

Committee Statement

Committee Statement: A requirement has been added in (A) to document that the chosen method is set to operate at less than the arcing current, helping to assure that the method chosen opens the circuit in time to help protect the worker.

The requirement that the setting is less than the available arcing current now applies to all seven techniques. The concept "and shall be set to operate at less than the available arcing current" is in the 2017 NEC® for instantaneous trip and instantaneous override and is critical for fast operation of all seven methods to help protect the worker.

Response Message: SR-7999-NFPA 70-2018

[Public Comment No. 1022-NFPA 70-2018 \[Section No. 240.87\(B\)\]](#)

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SUBJECT TO REVISION - NOT FOR PUBLICATION

**Second Revision No. 8046-NFPA 70-2018 [Section No. 240.91(B)]****(B) Devices Rated Over 800 Amperes.**

Where the overcurrent device is rated over 800 amperes, the ampacity of the conductors it protects shall be equal to or greater than 95 percent of the rating of the overcurrent device in accordance with the following:

- (1) The conductors are protected within recognized time vs. current limits for short-circuit currents

Informational Note: Table 240.92(B) provides time vs. short-circuit current ~~formulae~~ formulas to determine limits for copper and aluminum conductors.

- (2) All equipment in which the conductors terminate is listed and marked for the application.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Tue Oct 30 13:19:26 EDT 2018

Committee Statement

Committee Statement: Clarity is improved by replacing "formulae" with "formulas".

Response Message: SR-8046-NFPA 70-2018

Public Comment No. 877-NFPA 70-2018 [Section No. 240.91(B)]

**Second Revision No. 8048-NFPA 70-2018 [New Section after 240.101]**

240.102 . Reconditioned Equipment. . Medium voltage fuseholders and medium voltage non-renewable fuses shall not be permitted to be reconditioned.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Tue Oct 30 13:21:29 EDT 2018

Committee Statement

Committee Statement: Public Comment 982 was submitted by an NEC Correlating Committee appointed task group to address the global impacts of PI 2935. PI 2935 would have required that "Reconditioned Equipment" be "listed as "reconditioned" and the "original listing marks removed". PI 2935 has ramifications that are global in nature and impacts all products referenced in the NEC under the purview of every CMP. Proposed new section 240.102 is safety-driven and is necessary to prevent the reconditioning of products that cannot be safely reconditioned. Public Comment 982 was based on the global impact of PI 2935 and does not represent new material.

Response Message: SR-8048-NFPA 70-2018

Public Comment No. 982-NFPA 70-2018 [New Section after 240.101(B)]

**Second Revision No. 8066-NFPA 70-2018 [Section No. 242.1]****242.1 Scope.**

This article provides the general requirements, installation requirements, and connection requirements for overvoltage protection and overvoltage protective devices. Part II covers surge-protective devices (SPDs) permanently installed on premises wiring systems of not more than 1000 volts, nominal, while Part III covers surge arresters permanently installed on premises wiring systems over 1000 volts, nominal.

Informational Note: Article 242 combines and replaces Articles 280 and 285 in NFPA 70-2017.

Submitter Information Verification

Committee: NEC-P10

Submittal Date: Tue Oct 30 14:30:07 EDT 2018

Committee Statement

Committee Statement: This second revision adds a new Informational Note for the new article 242 that was added to provide a transition for the 2020 NEC.

Response Message: SR-8066-NFPA 70-2018

Public Comment No. 836-NFPA 70-2018 [Global Input]