Meeting Room: Conference Center

Time: December 9th and 10th, 2015
   8:00 am – 5:00 pm Wednesday
   9:00 am – 10:50 am Thursday

Logistics:

Attendance:
All SCC18 members are expected to attend and participate. IEEE members who are not SCC18 members are welcome to attend with advance notice* to the SCC18 Chair. They may not participate without advance permission* from the SCC18 Chair. The meeting is closed to non-IEEE members.
(*Deadline is November 30th)

Upon arrival:
You will be directed to the conference room

Meals:
Lunch will be served both days; breakfast and dinner will be on your own

To join meeting from offsite location:

Join by WebEx
https://ieemmeetings.webex.com/ieemmeetings/j.php?MTID=m881f6db6b168fd5a90b59fc5e4d6023c
Meeting number: 595 779 433
Meeting password: no password required

Join by Phone:
Call-in toll-free number: 1-866-2030920 (US)
Call-in number: 1-206-4450056 (US)
Conference Code: 321 918 3442

Facilitator: Ed Larsen
Acting Secretary: Arthur Smith

1. Welcome (Ed Larsen)
   Logistics (emergency exits, restrooms, lunch, etc.)

2. Introduction of participants (Ed Larsen - All)
   Introductions:
   a) Chair – Ed Larsen, - Schneider Electric USA
   b) SCC-18 Membership Chair - Bill McCoy, Telco Sales, Inc.
   c) Acting Secretary/Treasurer, Elections Officer - Arthur J. Smith, III, Waldemar S. Nelson & Co., Inc.
   d) IEEE Staff Liaison – Pat Roder, IEEE Standards Association (IEEE-SA), Senior Program Manager
   e) Self-introduction of those present (all)

3. Record of attendance (Arthur Smith)
   Sign in sheet documents attendance and any contact information changes – review carefully
4. **Determination of quorum for record** *(Mario Spina)*

   Notes:
   
   1. 30 SCC18 members as of December 9, 2015) **Mario Spina established a quorum with 18 voting members present** *(Note: 16 SCC18 members required to establish a quorum)*
   2. All IEEE meetings, including SCC 18, are open to all wishing to attend; however, Business Meeting voting is limited to IEEE-SA SCC-18 members

    **Members Present (see sign sheet)**
    
    1. Wednesday December 9th - 24 Voting Members Present or participating via conference call
    2. Thursday December 10th - 23 Voting Members Present or participating via conference call

5. **Determination of voting count and record** *(Mario Spina)*

   Note: A Majority of all **SCC-18 Members** eligible to vote (i.e. not required to recuse themselves on a particular vote and participating in meeting (i.e. no write-in votes)

6. **Approval or Revision of Agenda** *(Ed Larsen - All)*

   **Agenda Revisions**

   Slight modification in agenda for **ERs to make motion for SCC-18 direction LAST**. This will help streamline the meeting and minimize the number of motions.

   Motion and second made with unanimous **approval** given to accept the Meeting Agenda “as-modified”

7. **Conduct of Meeting** *(Ed Larsen)*

   a) The meeting will be conducted in a fashion similar to that of an NFPA technical committee meeting (request permission to speak, motions to oppose a panel first revision must be accompanied by a statement, etc.)

   b) Roberts Rules will be followed

   c) A motion to oppose a Second Revision may be for one or more reasons:

      1. Technical
      2. Best engineering practice
      3. Field experience

   d) If the chair must recuse himself, Bill McCoy will temporarily chair the meeting

   e) **Approval of March 5th and 6th, 2015 meeting minutes** – The March, 2015 meeting minutes were approved

   f) SCC-18 Recusals

    **7.1.2 of the IEEE Standards Association Operations Manual states:**

    The ER should not represent another group in the same external organization, committee, or entity to which that person is serving as an IEEE ER. However, recognizing that an ER might need to represent another group (such as his/her employer that underwrites travel costs), the ER may be permitted to represent that group as well as the IEEE-SA in the same external organization, committee, or entity. In such situations, the individual serving as an ER shall recuse himself/herself from voting on issues that would result in a conflict between his/her duty to the IEEE-SA and his/her duty to the other group. The ER shall report such situations to the OBC at the earliest practical time. Once the OBC is made aware of the situation by the ER, the OBC shall decide the best course of action to provide the IEEE-SA position on the issue to the external organization.
The following SCC18 members must recuse themselves from voting on issues related to the stated NFPA Technical Committee or Code Making Panel because they represent another organization on that TC or CMP.

<table>
<thead>
<tr>
<th>Name</th>
<th>TC / CMP</th>
<th>Organization</th>
</tr>
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<tbody>
<tr>
<td>David Brender</td>
<td>CMP5</td>
<td>Copper Development Association</td>
</tr>
<tr>
<td>Paul Dobrowsky</td>
<td>CMP5</td>
<td>American Chemistry Council</td>
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<tr>
<td>Ed Larsen</td>
<td>CMP2</td>
<td>Schneider Electric USA</td>
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<td>Ed Larsen</td>
<td>CMP11</td>
<td>NEMA</td>
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<td>Dan Neeser</td>
<td>CMP13</td>
<td>Eaton Bussmann</td>
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<tr>
<td>Marcelo Valdes</td>
<td>CMP17</td>
<td>NEMA</td>
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<tr>
<td>Others?</td>
<td></td>
<td>No Others Noted</td>
</tr>
</tbody>
</table>

8. Second Draft Reports and Actions for 2017 NEC - Presented in Numerical Order Subject to Availability of ERs

Notes:
1. Each NEC Principal will have a maximum of 45 minutes for his report to be considered and ballot instructions agreed to using the Word template
2. Alternate will present report in absence of Principal, Chair will read submittal if neither is present
3. All ballot statements are to be prepared in advance to present at this meeting.
4. IEEE-SA ER SCC 18 votes to oppose ER planned action(s) will have those comments developed by those so opposing

a) CMP-1, 2017 NEC Second Draft Report

Articles 90, 100, 110, Chapter 9, Table 10, Annex A, H, I, and J
(Kent Sayler, Principal - Frank Tyler, Alternate)
77 Public Comments resulting in 22 Second Revisions

1) Noteworthy Panel Actions that will **Not be** the Subject of an Opposing Action
   a) Second Revision No. 2-NFPA 70-2015 [Section No. 110.3]

Revising 110.3 to clarify the requirements product listing for AHJs and reads as shown below.

I agree with the addition of (C) but think that the Informational Note is unnecessary and could create confusion because it could be interpreted that OSHA is the **only** organization that recognizes NTRLs:

“(C) Listing. Product testing, evaluation, listing (product certification) shall be performed by recognized qualified electrical testing laboratories and shall be in accordance with applicable product standards recognized as achieving equivalent and effective safety for equipment installed to comply with this Code.

Informational Note: The Occupational Safety and Health Administration recognizes qualified electrical testing laboratories that perform evaluations, testing, and certification of certain products to ensure that they meet the requirements of both the construction and general industry OSHA electrical standards. If the listing (product certification) is done under a qualified electrical testing laboratory program, this listing mark signifies that the tested and certified the product complies with the requirements of one or more appropriate product safety test standards.”

b) Second Revision No. 6-NFPA 70-2015 [Section No. 100.1]

Revising definition of Readily Accessible to now read as shown below:

“Capable of being reached quickly for operation, renewal, or inspections without requiring those to whom ready access is requisite to actions such as to use tools (other than keys), to climb over or under, remove obstacles, or to resort to portable ladders, and so forth.”
Informational Note: Use of keys is a common practice under controlled or supervised conditions and a common alternative to the ready access requirements under such supervised conditions as provided elsewhere in the NEC.

c) Second Revision No. 9-NFPA 70-2015 [Section No. 110.21]

Revising 110.21 to provide additional guidance for marking reconditioned equipment as shown below:

“Reconditioned equipment shall be identified as “reconditioned” and approval of the reconditioned equipment shall not be based solely on the equipment’s original listing.

Exception: In industrial occupancies, where conditions of maintenance and supervision ensure that only qualified persons service the equipment, the markings indicated in 110.21(A)(2) are not required.

Informational Note: Industry standards are available for application of reconditioned and refurbished equipment. Normal servicing of equipment that remains within a facility should not be considered reconditioning or refurbishing.”

2) Noteworthy Panel Actions that will be the Subject of an Opposing Action

a) Second Revision No. 11-NFPA 70-2015 [Section No. 110.16(B)]

(B) Service Equipment.

In addition to the requirements in (A), a permanent label shall be field or factory applied to service equipment rated 1200 amps or more. The label shall meet the requirements of 110.21(B) and contain the following information:

(1) Nominal system voltage
(2) Available fault current at the service overcurrent protective devices
(3) The clearing time of service overcurrent protective devices based on the available fault current at the service equipment
(4) The date the label was applied

Exception to (B)(1)(2)(3)(4): Service equipment labeling shall not be required if an arc flash label is applied in accordance with acceptable industry practice.

Informational Note No. 1: NFPA 70E 2015, Standard for Electrical Safety in the Workplace, provides guidance, such as determining severity of potential exposure, planning safe work practices, arc flash labeling, and selecting personal protective equipment.

Informational Note No. 2: ANSI Z535.4 2011, Product Safety Signs and Labels, provides guidelines for the design of safety signs and labels for application to products.

Informational Note No. 3: Acceptable industry practices for equipment labeling are described in NFPA 70E2015 Standard for Electrical Safety in the Workplace. This standard provides specific criteria for developing arc flash labels for equipment that provides nominal system voltage, incident energy levels, arc flash boundaries, and minimum required levels of personal protective equipment and so forth.

3) Statements Opposing Second Revisions

a) IEEE statement opposing the Second Revision: No. 11-NFPA 70-2015 [Section No. 110.16(B)]

Labeling on manufactured equipment is specified in applicable product standards. Introducing the factory to the labeling process is impractical because they may not have information on the end use devices and settings.

Providing clearing time on a label is not currently required by other applicable industrial practices because overcurrent devices may have variable settings that can be modified rendering the label incorrect.
4) Motion

Motion to vote AFFIRMATIVE on all Second Revisions and to SUPPORT
Second Revision No. 2-NFPA 70-2015 [Section No. 110.3] with following
affirmative comment of support and to OPPOSE Second Revision No. 11-NFPA
70-2015 [Section No. 110.16(B)] with the above panel statements of opposition
Second Revision No. 2-NFPA 70-2015 [Section No. 110.3] Statement of Support:
The informational note should be removed as it can be interpreted as stating that
OSHA is the only organization capable of recognizing testing laboratories.
The NEC is an international Code and may be used where OSHA regulations do not
apply.

5) SCC-18 Panel Direction to IEEE-ER

SCC-18 Directs the IEEE-ER to SUPPORT all Second Revisions EXCEPT No. 2-
NFPA 70-2015 [Section No. 110.3] with above affirmative comment of support
and to OPPOSE Second Revision No. 11-NFPA 70-2015 [Section No. 110.16(B)]
with the above panel statements to oppose.

b) CMP-2, 2017 NEC Second Draft Report

Articles 210, 215, 220, Annex D, Examples D1 through D6

(Jim Mitchem, Principal – Alternate, Vacant) Ed Larsen provided the Report in Jim Mitchem’s absence

1) Noteworthy Panel Actions that will Not be the Subject of an Opposing Action

a) Article 210.8 has been revised to incorporate both GFCI protection for personnel,
and for appliances. The requirement for 250 volt ground fault protection was deleted
due to insufficient substantiation. GFCI protection for circuits in other than dwelling
units has been defined in 210.8(B)(1) to (10).

b) The requirements for Class, C, D, or E Special purpose Ground Fault Circuit
Protection has been removed due to concern for of improper application and
insufficient substantiation of need.

2) Motion

Motion to support all Second Revisions

3) SCC-18 Direction to IEEE-ER

SCC-18 Directs the IEEE-ER to SUPPORT all Second Revisions

c) CMP-3, 2017 NEC Second Draft Report

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

(Dave Mills, Principal – Alternate, Vacant)

1) Noteworthy Panel Actions that will Not be the Subject of an Opposing Action

a) Public Comment # 1657, which proposed a new section to 300.11 to require metallic
cable supports in spaces above areas of egress to prevent first responder and
occupant entanglement in cables falling due to failure of non-metallic supports. The
Panel determined it to be “Reject but Hold” since the issue of “dangling cables” has
not been well documented and the impact of this proposal to several other parts of
the Code. What will happen with this issue is it will be reconsidered as Public Input
for the 2020 NEC Cycle.
b) Public Comments # 692 and 1689 were accepted but modified as SR 611 which adds a new section and table as 725.144 allowing for type “LP” cables to be used for ampacities above normal cable types for Class 2 and 3 circuits previously included in 725.143. The addition was based upon the Fact Finding Report on Power over Local Area Network type cables with additionally an introduction to new cable type “LP” that provides the current limitation due to cable bundling and some other installation considerations for power over Ethernet. There was much discussion and I was initially against the new section, but will defer to the affirmative.

c) Public Comment # 1677, which proposes a similar requirement as in Public Comment # 1657, but for 725.24. The Panel also determined it to be “Reject but Hold” for the same reasoning.

d) Public Comment # 1685, which proposes a similar requirement as in Public Comment # 1657, but for 760.24(A). The Panel also determined it to be “Reject but Hold” for the same reasoning.

2) Motion

*Motion to support all Second Revisions*

3) SCC-18 Panel Direction to IEEE-ER

*SCC-18 Directs the IEEE-ER to SUPPORT all Second Revisions*
d) CMP-4, 2017 NEC Second Draft Report

*Articles 225, 230, 690, 692, 694, 705*

*(Mark Gibbs, Principal – Alternate, Vacant)*

1) Noteworthy Panel Actions that will Not be the Subject of an Opposing Action

a) Rapid shutdown - Article 690.12

Second Revision

690.12 Rapid Shutdown of PV Systems on Buildings.

PV system circuits installed on or in buildings shall include a rapid shutdown function to reduce shock hazard for emergency responders in accordance with 690.12(A) through (D).

*Exception: Ground mounted PV system circuits that enter buildings, of which the sole purpose is to house PV system equipment, are not required to comply with 690.12.*

(A) Controlled Conductors.

Requirements for controlled conductors shall apply only to PV circuits supplied by the PV system.

(B) Controlled Limits.

The use of the term, array boundary, in this section is defined as 305 mm (1 ft) from the array in all directions. Controlled conductors outside the array boundary shall comply with 690.12(B)(1) and inside the array boundary shall comply with 690.12(B)(2).

1) Outside the array boundary. Controlled conductors located outside the boundary or more than 1 m (3 ft) from the point of entry inside a building shall be limited to not more than 30 volts within 30 seconds of rapid shutdown initiation. Voltage shall be measured between any two conductors and between any conductor and ground.

2) Inside the array boundary. The PV system shall comply with (a), (b), or (c):

*Mark Gibbs Note: The fire service expressed concern that a rapid shutdown standard may result in lesser safety that the 80 volt requirement. This clearly signals standards committees what the code intent is for this new standard.*

(a) The PV array is listed and labeled or field labeled as a rapid shutdown PV array. Such a PV array is installed and used in accordance with the instructions included with the rapid shutdown PV array listing and labeling or field labeling.

Informational Note: A listed and labeled or field labeled rapid shutdown PV array is evaluated as an assembly or system as defined in the installation instructions to reduce but not eliminate risk of electric shock hazard within a damaged PV array during fire-fighting procedures. These rapid shutdown PV arrays are designed to reduce shock hazards by methods such as limiting access to energized components, reducing the voltage difference between energized components, limiting the electric current that might flow in an electrical circuit involving personal with increased resistance of the conductive circuit, or by a combination of such methods.

(b) Controlled conductors located inside the boundary or not more than 1 m (3 ft) from the point of penetration of the surface of the building or structure shall be limited to not more than 80 volts within 30 seconds of rapid shutdown initiation. Voltage shall be measured between any two conductors and between any conductor and ground.

(c) PV arrays with no exposed wiring methods, no exposed conductive parts, and installed more than 2.5m (8 ft) from exposed grounded conductive parts or ground.

The requirement of 690.12(B)(2) shall become effective January 1, 2019.
(C) Initiation Device.

The initiation device(s) shall initiate the rapid shutdown function of the PV system. The device “off” position shall indicate that the rapid shutdown function has been initiated for all PV systems connected to that device. For one-family and two-family dwellings, an initiation device(s) shall be located at a readily accessible location outside the building.

The rapid shutdown initiation device(s) shall consist of at least one of the following:

1. Service disconnecting means.
2. PV system disconnecting means.
3. Readily-accessible switch that plainly indicates whether it is in the “off” or “on” position.

Informational Note: One example of why an initiation device that complies with 690.12(C)(3) would be used is where a PV system is connected to an optional standby system that remains energized upon loss of utility voltage.

Where multiple PV systems are installed with rapid shutdown functions on a single service, the initiation device(s) 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. These initiation device(s) shall initiate the rapid shutdown of all PV systems with rapid shutdown functions on that service. Where auxiliary initiation devices are installed, these auxiliary devices shall control all PV systems with rapid shutdown functions on that service.

(D) Equipment.

Equipment that performs the rapid shutdown functions, other than initiation devices such as listed disconnect switches, circuit breakers, or control switches, shall be listed and labeled for providing rapid shutdown protection.

Informational Note: Inverter input circuit conductors often remain energized for up to 5 minutes with inverters not listed for rapid shutdown.

b) Service Disconnects - Article 230.70 (New Section after 230.70(A)(3)

Second Revision

230.70(A)(4) Service Disconnects on One- and Two-Family Dwellings.

Where installed on one-family and two-family dwellings, the service disconnecting means or remote controlled device in accordance with 230.70(A)(3) shall be installed outside the structure at the meter location, or at nearest point of entrance of the service conductors.

This requirement shall take effect on July 1, 2020.

Mark Gibbs Note: The effective date will allow time for implementation into new products.

c) Microgrid Systems - Article 705.150

Mark Gibbs Note: New Part IV – Interconnected electric power production sources and intentionally islanded or stand-alone systems was replaced/renamed Microgrid Systems for consistency. All references to stand-alone systems were eliminated, as they are now addressed in Article 710. An informational note was added to explicitly indicate MID functionality can be included in other devices.

Second Revision

a) 705.150 System Operation.

Microgrid systems shall be permitted to disconnect from the primary source of power or other interconnected electric power production sources and operate as a separate microgrid system.
b) **705.160 Primary Power Source Connection.**

Connections to primary power sources that are external to the microgrid system shall comply with the requirements of 705.12.

c) **705.165 Reconnection to Primary Power Source.**

Microgrid systems that reconnect to primary power sources shall be provided with the necessary equipment to establish a synchronous transition.

d) **705.170 Microgrid Interconnection Devices.**

Microgrid interconnect devices shall comply with the following:

1. Be required for any connection between a microgrid system and a primary power source.
2. Be listed and labeled or field labeled, for the application.
3. Have sufficient number of overcurrent devices located to provide overcurrent protection from all sources.

Informational Note: MID functionality may be incorporated in an interactive or multimode inverter, energy storage system, or similar device identified for interactive operation.

d) **Stand-Alone Systems - Article 710**

*Mark Gibbs Note: New Article - The requirements for stand-alone systems do not fit well into Article 705 Interconnected Systems. For stand-alone to remain in Article 705 the scope would need to be changed to include both inter-connected and non-interconnected. A new Article makes sense and is supported by the NFPA correlating committee.*

Second Revision

This Article covers electric power production sources operating in stand-alone mode.

a) **710.6 Equipment Approval**

All equipment shall be listed and labeled, or field labeled for the intended use.

b) **705.15 General**

Premises wiring systems shall be adequate to meet the requirements of this Code for similar installations supplied by a feeder or service. The wiring on the supply side of the building or structure disconnecting means shall comply with the requirements of this Code, except as modified by (A) through (F).

(A) Supply Output.

Power supply to premises wiring systems shall be permitted to have less capacity than the calculated load. The capacity of the stand-alone supply shall be equal to or greater than the load posed by the largest single utilization equipment connected to the system. Calculated general lighting loads shall not be considered as a single load.

(B) Sizing and Protection.

The circuit conductors between a stand-alone source and a building or structure disconnecting means shall be sized based on the sum of the output ratings of the stand-alone sources.
(C) Single 120-Volt Supply.
Stand-alone systems shall be permitted to supply 120 volts to single-phase, 3-wire, 120/240-volt service equipment or distribution panels where there are no 240-volt outlets and where there are no multiwire branch circuits. In all installations, the sum of the ratings of the power sources shall be less than the rating of the neutral bus in the service equipment. This equipment shall be marked with the following words or equivalent:

WARNING:
SINGLE 120-VOLT SUPPLY. DO NOT CONNECT MULTIWIRE BRANCH CIRCUITS!
The warning sign(s) or label(s) shall comply with 110.21(B).

(D) Energy Storage or Backup Power System Requirements.
Energy storage or backup power supplies are not required.

(E) Back-Fed Circuit Breakers.
Plug-in type back-fed circuit breakers connected to an interconnected supply shall be secured in accordance with 408.36(D). Circuit breakers marked "line" and "load" shall not be back-fed.

(F) Voltage and Frequency Control.
The stand-alone supply shall be controlled so that voltage and frequency remain within suitable limits for the connected loads.

e) Definitions - Article 705.2
Create Second Revision

a) Microgrid System.
A premises wiring system that has generation, energy storage, and load(s), or any combination thereof, that includes the ability to disconnect from and parallel with the primary source.

Informational Note: The application of Article 705 to microgrid systems is limited by the exclusions in 90.2(B)(5) related to electric utilities.

b) Microgrid Interconnect Device (MID).

Mark Gibbs Note: Replaces term intentionally islanded with the current industry term microgrid.
A device that allows a microgrid system to separate from and reconnect to a primary power source.

c) Multimode Inverter.
Equipment having the capabilities of both the interactive inverter and the stand-alone inverter.

Removed utility to maintain consistency with actions taken in Article 705.

MOVE TO ARTICLE 100:
Stand-Alone System.
A system that supplies power independently of an electrical production and distribution network.

2) Motion

Motion to support all Second Revisions

3) SCC-18 Panel Direction to IEEE-ER

SCC-18 Directs the IEEE-ER to SUPPORT all Second Revisions
e) **CMP-5, 2017 NEC Second Draft Report**

*Articles 200, 250, 280, 285*

(Daleep C Mohla, Principal – Alternate, Vacant) Note: Daleep C Mohla presented report (see attached)

1) **Noteworthy Panel Actions that will Not be the Subject of an Opposing Action**

   a) Over 100 comments, 38 SR’s. Meeting was over in less than three days

   b) Most Second Revisions were to correct transcription errors in the First Draft

   c) CMP 5 decided to go back to 1000 Volts at all places reversing action taken during the First Revision (In the first case vote was 9-6, other two cases it was 12-4). UL wanted to retain 2000V limit

   d) A comment to change 50V to 50 V AC/60V DC in 200.7 and in the proposed Informational Note in Article 100 was rejected 12-4

   e) Added an Informational Note in 250.187 indicating maximum neutral to ground voltage in a three phase impedance grounded system is 57.7 percent of phase to phase voltage.

2) **Motion**

   *Motion to support all Second Revisions*

3) **SCC-18 Direction to IEEE-ER**

   *SCC-18 Directs the IEEE-ER to Support all Second Revisions*

f) **NFPA 70E Standard for Electrical Safety in the Workplace®**

(Daleep Mohla, Principal - Paul Dobrowsky, Alternate)

Daleep Mohla reviewed IEEE-SA ER SCC 18 TC Report for NFPA 70E

(PowerPoint Presentation)

g) **NFPA 79 Electrical Standard for Industrial Machinery®**

(Daleep Mohla, Principal – Alternate, Vacant)

Daleep Mohla reviewed IEEE-SA ER SCC 18 TC Report for NFPA 79

(PowerPoint Presentation)

h) **Special Presentation**

(Ned Brush)

Ned Brush reviewed the attached PowerPoint Presentation

(PowerPoint Presentation)
i) **CMP-6, 2017 NEC Second Draft Report**

*Articles 310, 400, 402, Chapter 9, Tables 5 through 9, and Annex B*

*(Ned Brush, Principal, Alternate, Vacant)*

1) **Noteworthy Panel Actions that will Not be the Subject of an Opposing Action**

   a) All proposed changes and public comments were reviewed and discussed. All issues (wording changes, consolidations, additional language for clarifications, etc.) with 1 exception (“Motion” - cited below), were agreed without objections and passed unanimously, including the 208/120 proposed change cited in the next item.

   b) Retaining the NEC 2014 wording that 208/120v is separate from the 240/120v sections, as the “3d wire carries current in 208/120 with those extra i2R heating effects”; Scott Cline attended and presented, as did Bob Huddleston – both presenting extensive technical detail as to why these should continue to be dealt with separately. This proposed change had been passed initially (Hilton Head), and SCC18 Houston agreed with the proposed change. This issue, raised in Public Comment by Scott Cline due to the initial proposed inclusion of these together, was discussed thoroughly and the vote to reject the proposed change and retain the existing Code separate sections was passed unanimously.

   c) Word insertion in 400. especially included “flexible cords and cordsets” with insertion of “flexible cords and flexible cordsets” for clarification that flexible applies to both.

2) **Motion**

   Motion to support all Second Revisions:

3) **SCC-18 Panel Direction to IEEE-ER**

   SCC-18 Directs the IEEE-ER to SUPPORT all Second Revisions

j) **CMP-7, 2017 NEC Second Draft Report**

*(Articles covered: 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 382, 394, 396, 398 and 399)*

*(Dennis Nielsen, Principal – Alternate, Vacant)*

1) **Noteworthy Panel Actions that will Not be the Subject of an Opposing Action**

   38 Public Inputs, 15 Second Revisions

   a) **SR 1809**, FR 3940, Ballotable Detail; Article 336.10 Uses Permitted

   (11) In hazardous (classified) locations where specifically permitted by other articles in this Code. For Class I, Division 1 and Zone 1 locations only, Type TC cable used for other than flexible connections shall also comply with the following:

   a. The cable jacket and construction shall be evaluated and listed for the specific hazardous materials present in the location,

   b. The hazardous material group(s) evaluated shall be marked on the cable,

   c. The cable diameter shall be limited to 1” or smaller,

   d. The cable shall be permitted only for voltages of 150 volts to ground or less and currents of 30 amps or less, and

   e. The cable shall be marked both “-ER” and “-HL”
b) **SR 1808/FR1840 Article 336.10 Uses Permitted**

(15) In one- and two-family dwelling units, Type TC-ER cable containing both power and control conductors that is identified for pulling through structural members shall be permitted to be installed between a power inlet box or permanently installed generator and the transfer equipment. Type TC-ER cable used as exterior wiring shall be installed per the requirements of Part II of Article 340. Type TC-ER cable used as interior wiring shall be installed per the requirements of Part II of Article 334.

*Exception: Where used to connect a generator and associated equipment having terminals rated 75 °C (140 °F) or higher, the cable shall not be limited in ampacity by 334.80 or 340.80.*

Informational Note 1: TC-ER cable that is suitable for pulling through structural members is marked “JP.”

*Informational Note 2: See 725.136 for limitations on Class 2 or 3 circuits contained within the same cable with conductors of electric light, power or Class 1 circuits.*

c) **SR 1814 Article 396.2 Definitions. Insulated Conductor.** For the purposes of this article, an insulated conductor includes those listed in Article 310 and

1. Conductor types described in 310.104, and
2. Overhead service conductors encased in a polymeric material that has been evaluated for the applied nominal voltage.

*Informational Note: Evidence of evaluation for the applied nominal voltage can be given by certification that the conductors have met the requirements of ICEA 76 474-2004 2011, Standard for Neutral Supported Power Cable Assemblies with Weather Resistant Extruded Insulation Rated 600 Volts*

d) **IEEE Pls:** N/A

e) **IEEE Stationary Battery Committee Pls:** N/A

2) **Motion**

*Motion to support all Second Revisions with the affirmative comment for SR 1809 as provided below.*

3) **SCC-18 Panel Direction to IEEE-ER**

*SCC-18 Directs the IEEE-ER to Support all Second Revisions with the following affirmative comment for SR 1809*

4) **Affirmative Comment for SR 1809**

*With the following Comment:*

**SR 1809, FR 3940, Ballotable Detail; Article 336.10 Uses Permitted**

The development of this new ballot-able detail has created inconsistencies with Second Revision 3902 for 501.10A (i) and Second Revision 3906 for 505.15 (f). Specifically, the limitation per item c “The cable diameter shall be limited to 1” or smaller,” per CMP14 Second Revisions. The IEEE supports the removal of this 1” cable diameter limitation per the Second Revisions in CMP14. The purpose of the CMP7 panel action was to correlate the changes within CMP7’s jurisdiction. This inconsistency needs to be resolved by the Correlating Committee in accordance with the ballot-able detail process.
k) **CMP-8, 2017 NEC Second Draft Report**


   (Paul Myers, Principal – Alternate, Vacant)

   1) **Noteworthy Panel Actions that will Not be the Subject of an Opposing Action**
      a) A high percentage of the PC’s were concerning the addition of the “and labeled” after the requirement for components to be “listed”. It was decided that CMP-8 would not accept this since there is a Task Group figuring out the necessary definitions, etc., to allow this inclusion.

   2) **Motion**

      *Motion to support all Second Revisions by CMP-8*

   3) **SCC-18 Panel Direction to IEEE-ER**

      *SCC-18 Directs the IEEE-ER to Support all Second Revisions*

l) **CMP-9, 2017 NEC Second Draft Report**

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

   (No Representation)

m) **CMP-10, 2017 NEC Second Draft Report**

   **Article 240 - Overcurrent Protection**

   (Dennis Darling, Principal – Stephen Townsend, Alternate) Note: Stephen Townsend presented report

   1) **Noteworthy Panel Actions that will Not be the Subject of an Opposing Action**
      a) New Section 240.67- Second Revision No. 2702

         Arc Energy Reduction for Fused Switches – Parallel the section on circuit breakers. Will not become effective until January 2020.

         Discussion – The delay to 2020 was to give manufactures time to design products to meet these requirements

   2) **Motion**

      *Motion to support all Second Revisions on CMP-10*

   3) **SCC-18 Panel Direction to IEEE-ER**

      *SCC-18 Directs the IEEE-ER to Support all Second Revisions*
n) **CMP-11, 2017 NEC Second Draft Report**

*Articles 409, 430, 440, 460, 470 & Annex D Example D8*

(Arthur J. Smith, Ill, Principal – Alternate, Vacant)

1) **Noteworthy Panel Actions that will Not be the Subject of an Opposing Action**

a) Sections 409.22, 409.23 - Second Revision No. 3003

*(Public Comment 1800 [Section 409.22] and 409 [Section 409.23])*

**409.22 Short-Circuit Current Rating**

(A) **Installation**

An industrial control panel shall not be installed where the available fault short-circuit current exceeds its short-circuit current rating as marked in accordance with 409.110(4).

(B) **Documentation**

When an industrial control panel is required to be marked with a short circuit current rating in accordance with 409.110(4), the available short circuit current at the industrial control panel and the date the circuit short circuit current calculation was performed shall be documented and made available to those authorized to inspect the installation.

**Committee Statement:**

“Fault” current is replaced by “short-circuit” current for improved clarity. Throughout the NEC®, “fault” current can be replaced by “short-circuit” current without changing the intent. However, “short-circuit” current cannot be universally changed to “fault” current without causing confusion. For example, equipment short-circuit current rating could not be changed to equipment fault current rating without causing much confusion. CMP 11 asks the Correlating Committee to direct all Code Making Panels to replace “fault” current with “short-circuit” current throughout the NEC®.

In order to further improve clarity surrounding “short-circuit” current verses “fault” current, 409.22 is combine with 409.23 as has been done in the new 440.10. The previous text in 409.22 now becomes the first level subdivision (A), titled “Installation”, and the text in 409.23 becomes the first level subdivision (B). The title of 409.23, “Available Fault Current”, is changed to “Documentation” as the new title of first level subdivision (B).

b) 409.110 - Second Revision No. 3004

*(Public Comments 833 and 1801 [Section 409.110])*

**409.110 Marking**

An industrial control panel shall be marked with the following information that is plainly visible after installation:

1. Manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified.
2. Supply voltage, number of phases, frequency, and full-load current for each incoming supply circuit.
3. Industrial control panels supplied by more than one electrical source such that where more than one disconnecting means is required to disconnect all circuits 50 volts or more within the control panel shall be marked to indicate that more than one disconnecting means is required to de-energize the equipment. The location of the means necessary to disconnect all circuits 50V and over or more shall be documented and available.
4. Short-circuit current rating of the industrial control panel based on one of the following:
   (5) Short-circuit current rating of a listed and labeled assembly
   (6) Short-circuit current rating established utilizing an approved method

Informational Note: ANSI/UL 508A, Standard for Industrial Control Panels, Supplement SB, is an example of an approved method.
Exception to (4): Short-circuit current rating markings are not required for industrial control panels containing only control circuit components.

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

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

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

Committee Statement:

The revised text clarifies that the marking requirement only applies to circuits of 50 volts or more. “50-volts and over” has been changed to “50-volts or more”, to better correlate with other parts of this Code.

c) 430.22(G) - Second Revision No. 3006

(Section 430.22(G))

430.22 Single Motor

(G) Conductors for Small Motors.

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

(1) 18 AWG Copper.

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

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

a. The circuit is protected in accordance with 430.52.

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

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

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

a. The circuit is protected in accordance with 430.52.

b. The circuit is provided with maximum Class 20 overload protection in accordance with 430.32.

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

(2) 16 AWG Copper.

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

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

a. The circuit is protected in accordance with 430.52.

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

c. Overcurrent protection is provided in accordance with 240.4(D)(2)(2).
(2) The circuit supplies a motor with a full-load current rating, as determined by 430.6(A)(1), of 5.5 amperes or less, and all the following conditions are met:

a. The circuit is protected in accordance with 430.52.

b. The circuit is provided with maximum Class 20 overload protection in accordance with 430.32.

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

**Committee Statement:**
Installation concerns regarding potential damage to multiconductor cables and cords leaving the enclosure are adequately addressed in the construction specifications, wiring methods, and restrictions in Chapters 3 and 4.

2) **Motion**

*Motion to support all Second Revisions*

3) **SCC-18 Direction to IEEE-ER**

*SCC-18 Directs the IEEE-ER to Support all Second Revisions*

o) **CMP-12, 2017 NEC Second Draft Report**

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

*(No Representation)*
p) **CMP-13, 2017 NEC Second Draft Report**  
*Articles 445, 455, 480, 695, 700, 701, 702, 708, Annex F, and Annex G*  
*(Mario Spina, Principal – William Cantor, Alternate)*  
Note: Mario Spina presented report

**Summary of Panel Actions**

- **Total PC’s submitted**: 192
- **Second Revisions**: 58

1) **Noteworthy Panel Actions that will Not be the Subject of an Opposing Action**

a) Second Draft #3621 of Section 445.20 result of PC #956

```
445.20  Ground-Fault Circuit-Interrupter Protection for Receptacles on 15-kW or Smaller Portable Generators.

All 125-volt single phase, 15- and 20-ampere receptacle outlets that are a part of a 15-kW or smaller portable generator shall have listed ground-fault circuit-interrupter protection (GFCI) for personnel integral to the generator or receptacle outlet or shall not be as indicated in either (A) or (B).

(A) Unbonded (Floating Neutral) Generators. Unbonded generators with both 125-volt and 125/250-volt receptacle outlets shall have listed GFCI protection for personnel integral to the generator or receptacle, on all 125-volt, 15 and 20-ampere receptacle outlets.

Exception: GFCI protection shall not be required where the 125-volt receptacle outlets(s) are interlocked such that they are not available for use when the any 125/250-volt receptacle is (s) are in use. If the generator does not have 125/250 volt receptacles, the requirement to disable the 125 volt, single phase, 15-

(B) Bonded Neutral Generators. Bonded generator shall be provided with GFCI protection on all 125-volt, 15, and 20-ampere receptacle outlets shall not apply.

Exception

* Informational Note: Refer to 590.6(A)(3) for GFCI requirements for 15-kW or smaller portable generators used for temporary electric power and lighting.

Exception to (A) and (B): If the generator was manufactured or remanufactured prior to January 1, 2015, listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted.
```

- Wording modified in an attempt to clarify the requirements and address the differences between unbonded and bonded generators. The result is:
  - **Unbonded Generators**: If a generator is equipped with both 125V and 125V/250V receptacles, then all 125V 15A and 20A receptacles shall be equipped with GFCI protection unless the 125V receptacles are not available for use when the 125V/250V is in use.
  - **Bonded Generators**: All 125V 15A and 20A receptacles shall be equipped with GFCI protection.
b) Second Draft #362 of Section 695.6(A) (2) result of PC #838

<table>
<thead>
<tr>
<th>B</th>
<th>Feeders.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2)</td>
<td>Fire pump supply conductors on the load side of the final disconnecting means and overcurrent device(s) permitted by 695.4(B), or conductors that connect directly to an on-site standby generator, shall comply with all of the following:</td>
</tr>
<tr>
<td>a)</td>
<td>Independent Routing. The conductors shall be kept entirely independent of all other wiring.</td>
</tr>
<tr>
<td>b)</td>
<td>Associated Fire Pump Loads. The conductors shall supply only loads that are directly associated with the fire pump system.</td>
</tr>
<tr>
<td>c)</td>
<td>Protection from Potential Damage. The conductors shall be protected from potential damage by fire, structural failure, or operational accident.</td>
</tr>
<tr>
<td>d)</td>
<td>Inside of a Building. Where routed through a building, the conductors shall be protected from fire for 2 hours using one of the following methods:</td>
</tr>
<tr>
<td>(5)</td>
<td>The cable or raceway is encased in a minimum 50 mm (2 in) of concrete.</td>
</tr>
<tr>
<td>(6)</td>
<td>Is a listed fire resistive cable system.</td>
</tr>
</tbody>
</table>

- Comes full circle and puts back the 2 in. requirement. The panel felt that this was important for AHJ's to have a depth requirement.

c) Second Draft #3005 modifies Section 480.6(A) result of PC #1063

<table>
<thead>
<tr>
<th>A</th>
<th>Disconnecting Means.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A)</td>
<td>A disconnecting means shall be provided for all ungrounded conductors derived from a stationary battery system with a nominal voltage over 50-60 volts DC. A disconnecting means shall be readily accessible and located within sight of the battery system.</td>
</tr>
</tbody>
</table>

- Removes the word nominal and increases the voltage to 60 volts DC in order to correlate with other sections where the limits 50 volts AC and 60 volts DC are used.

d) Second Draft #3629 of Section No. 480.3 result of PC #1490

| 480.3 Equipment. |
|---|---|
| Storage batteries and battery management equipment shall be listed. This requirement shall not apply to lead-acid batteries. |

- Adds the requirement for all batteries and battery management equipment to be listed. The revision does exempt lead-acid batteries from this requirement as the panel felt that the intent of the listing requirement was to assist the installer, maintainer and AHJ to determine if the new chemistries are being applied correctly.
e) Second Draft #3626 of Section 695.14(F) result of PI #1201

(F) Generator Control Wiring Methods.

Control conductors installed between the fire pump power transfer switch and the standby generator supplying the fire pump during normal power loss shall be kept entirely independent of all other wiring. Breakage, disconnecting, shorting of the wires, or loss of power to the remote start circuit control conductors shall cause immediate starting and continuous running of the generator and shall not prevent the starting of the generator(s) due to causes other than failure of these external control circuits. The integrity of the generator control wiring shall be continuously monitored. Loss of integrity of the remote start circuit(s) shall initiate visual and audible annunciation of generator malfunction at the generator local and remote annunciator(s) and start the generator(s).

- Further refines the requirement that the generator start signals be “self-supervising”.

f) Second Draft #3662 edited the newly created Energy Storage System Article, 706 which was created by First Draft Result of (71) PC’s.

- Many edits to the new Article 706 ESS which is intended to eventually capture all requirements for energy storage systems installations (i.e. Batteries, Flywheels, etc.). Many of these were to align 706 with 480, but during the discussions it became clear that capturing all applications of these types of systems might be unwieldy.

g) Second Draft #3627 edited the newly created of Article 712 which was created by First Draft Result of PC’s #1374,1016,1086,839,1628,1017,1019,1662, 841,1021, 841, 1022, 1684, 1375, 1645

- Many edits to the new Article 712 Microgrids which is intended to list all requirements for Microgrids. At first revision, the panel recognized in their statement that the Article needed a significant amount of work and even developed a list of items that should be addressed in the Second Draft. This revision addresses many of those items and others.

2) Motion

Motion to support all Second Revisions without Comment

Discussion – Recent $30MM fire with storage batteries

3) SCC-18 Panel Direction to IEEE-ER

SCC-18 Directs the IEEE-ER to Support all Second Revisions
q) **CMP-14, 2017 NEC Second Draft Report**

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

(Will McBride, Principal – Andrew Hernandez, Alternate)

Note: Will McBride presented CMP-14 report

1) **Noteworthy Panel Actions that will Not be the Subject of an Opposing Action**

   a) SR 3913; PC 701; FR 3997: Section 100 Definition: Cord Connectors [as applied to Hazardous (Classified) Locations] Paul Dobrowsky’s recommendation was rejected by CMP-14 by a vote of 14 - 1

   b) SR 3901; PC 1061, 564, 912; FR 3941; PI 2591: Section 501.10(B)(1)

      CMP-14 initially voted to allow EMP in Class I, Division 2 locations. When a Task Group attempted to write a panel statement, they instead called for a motion to re-consider and the Panel voted to Reject but See. Mostly due to the allowance for supports up to 10 feet apart.

   c) SR 3902; PC 1059; PI # 1250, 1906, 4598; FR 3940: Section 501.10(A)(1)

      TC-ER-HL Cable was introduced in the 2014 NEC. There has been limited use so far, so there is limited feedback from installers, users, inspectors. One Problem is that the requirement for a dedicated ground conductor has been misinterpreted by the Nationally Recognized Testing Laboratory for instrument shielded pairs. They allow an oversized bare drain conductor to be considered the ground conductor. Unfortunately the drain conductor is required to be isolated on one end for low level analog signals and does not provide a grounding conductor for the field device.

2) **Noteworthy Panel Actions that will be the Subject of an Opposing Action**


      (1) General.

      In Class I, Division 1 locations, the wiring methods in (a) through (f) shall be permitted.

      (a) **Threaded rigid metal conduit or threaded steel intermediate metal conduit.**

      Exception: Type PVC conduit, Type RTRC conduit, and Type HDPE conduit shall be permitted where encased in a concrete envelope a minimum of 50 mm (2 in.) thick and provided with not less than 600 mm (24 in.) of cover measured from the top of the conduit to grade. The concrete encasement shall be permitted to be omitted where subject to the provisions of 514.8, Exception No. 2, or 515.8(A). Threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for the last 600 mm (24 in.) of the underground run to emergence or to the point of connection to the aboveground raceway. An equipment grounding conductor shall be included to provide for electrical continuity of the raceway system and for grounding of non–current-carrying metal parts.

      (b) **Type MI cable terminated with fittings listed for the location.** Type MI cable shall be installed and supported in a manner to avoid tensile stress at the termination fittings.

      (c) **In industrial establishments with restricted public access,** where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type MC-HL cable listed for use in Class I, Zone 1 or Division 1 locations, with a gas/vapor tight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material, and a separate equipment grounding conductor(s) in accordance with 250.122, and terminated with fittings listed for the application.
Type MC-HL cable shall be installed in accordance with the provisions of Article 330, Part II.

(d) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type ITC-HL cable listed for use in Class I, Zone 1 or Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath and an overall jacket of suitable polymeric material, and terminated with fittings listed for the application, and installed in accordance with the provisions of Article 727.

(e) Optical fiber cable Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC shall be permitted to be installed in raceways in accordance with 501.10(A). These optical fiber cables shall be sealed in accordance with 501.15.

(f) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, for applications limited to 600 volts, nominal, or less, and where protected from damage by location or a suitable guard, listed Type TC-ER-HL cable with an overall jacket and a separate equipment grounding conductor(s) in accordance with 250.122 that is terminated with fittings listed for the location. Type TC-ER-HL cables shall be installed in accordance with the provisions of Article 336.10, including the restrictions of 336.10(7). For circuits over 150 volts to ground, nominal or 30 amps or more, the TC-ER-HL cables shall have a metallic shield encompassing the current carrying conductors to provide a reliable ground fault path that will ensure the operation of a ground fault protection device.

3) Statements Opposing Second Revisions

The increased use of TC-ER-HL cables in Class I, Division 1 locations should only be allowed if cables have a dedicated equipment grounding conductor (not including the bare drain wire included in shielded instrument cables).

TC-ER-HL cables should not be used above 150 volts, nominal or above 30 amps because this cable is available in some cases without an effective grounding conductor.

NEC 501.10(A)(1)(f) should read as follows:

In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation for applications limited to 600 volts, nominal, or less, with overcurrent protection of currents of 30 amps or less and where protected from damage by location or suitable guard, listed type TC-ER-HL cable with an overall jacket and a separate equipment grounding conductor(s) in accordance with 250.122 that is terminated with fittings listed for the application.

Type TC-ER-HL cables shall be installed in accordance with the provisions of 336.10, including the restrictions of 336.10(7).

4) Motion

Motion to support all Second Revisions Except Public Comment No. 1059-NFPA 70-2015 [Section No. 501.10(A)(1)] Second Revision: 3902

Motion to support Second Revisions Public Comment No. 1059-NFPA 70-2015 [Section No. 501.10(A)(1)] Second Revision: 3902

5) SCC-18 Panel Direction to IEEE-ER

SCC-18 Directs the IEEE-ER to SUPPORT all Second Revisions except Second Revision: 3902.

SCC-18 Directs the IEEE-ER to Support Second Revision: 3902
r) **CMP-15, 2017 NEC Second Draft Report**

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

(Matthew Dozier, Principal – Alternate, Vacant)

1) **Noteworthy Panel Actions that will Not be the Subject of an Opposing Action**

   a) CMP had a total of 53 Public Comments to address.

   b) All comments were split into groups based on code sections and assigned to task force subcommittees prior to the meeting. Task force subcommittees participated in conference reviews and working sessions and developed recommended action for the Committee.

   c) Task force subcommittee reviews and recommendations were circulated to all committee members for review prior to meeting.

   d) Of the 53 Public Comments:

      - 17 – Rejected
      - 9 – Accepted
      - 27 – Rejected but See Panel Action

   e) The bulk of the comments acted on via Accept or Reject but See were correlating committee recommendations for correlation with either other sections or with NFPA 99 for Art. 517.

   f) For all but 2 Public Comments the Committee actions were unanimous. For the 2 comments there was only a single dissent.

   g) No IEEE Comments were noted.

2) **Motion**

   *Motion to support all Second Revisions:*

3) **SCC-18 Direction to IEEE-ER**

   *SCC-18 Directs the IEEE-ER to Support all Second Revisions*

s) **CMP-16, 2017 NEC Second Draft Report**

*Articles 770, 800, 810, 820, 830, 840*

(William J. McCoy, Principal – Alternate, Vacant)

Code Making Panel – 16 (CMP-16) met November 1-6, 2015 for the Second Draft Meeting associated with the 2017 revision cycle of the National Electrical Code® (NEC®) to review the public comments (PCs) submitted on the First Draft of the NEC®. The following is a breakdown of the disposition of the PCs.

<table>
<thead>
<tr>
<th>Total Number of PCs:</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepted:</td>
<td>21</td>
</tr>
<tr>
<td>Rejected:</td>
<td>30</td>
</tr>
<tr>
<td>Rejected but see:</td>
<td>87</td>
</tr>
<tr>
<td>Rejected but hold:</td>
<td>0</td>
</tr>
<tr>
<td>Panel Second Revisions:</td>
<td>2</td>
</tr>
</tbody>
</table>

A number of the PCs for which the Second Revisions were issued are:

- Editorial changes
- Inserting Informational Notes
- Updating references to technical documents in informational notes
- Addressing the insertion of Section 840.160 for power delivery circuits on communications cables.
The total number of Second Revisions issued as a result of the action taken by CMP-16 were 54.

1) Noteworthy Panel Actions that will Not be the Subject of an Opposing Action

a) Section 770.24 (SR #4509)

Section 770.24 had an issue with what CMP-16 had done during the First Draft Meeting, what was being shown in TerraView, and what was shown on the ballot. A Second Revision (SR #4509) was created to correct the discrepancies and Section 770.24 now reads as follows.

Mechanical Execution of Work.

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

Informational Note No. 1: Information of industry practices for installing and testing are described in ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling; ANSI/NECA/FOA 301-2015, Standard for Installing and Testing Fiber Optic Cables; and other ANSI-approved installation standards.

Informational Note No. 2: See 4.3.11.2.6.5 and 4.3.11.5.5.6 of NFPA 90A-2012 2015, Standard for the Installation of Air-Conditioning and Ventilating Systems, for discrete combustible components installed in accordance with 300.22(C).

Informational Note 3: Paint, plaster, cleaners, abrasives, corrosive residues, or other contaminants can result in an undetermined alteration of optical fiber cable properties.

The major change to this Section is specifying all of 300.4 instead of just certain parts. The Panel felt that since optical fiber cables carried life safety circuits that the installation of these cables should comply with all of Section 304.

b) Section 770.44 [SR #4509], [SR #4510], 800.44(B) [SR #4523], 800.90(A) [SR #4525], and 830.44(B) [SR #4548] A Second Revision was created in the information note to correct the reference to the National Electrical Safety Code as shown.

Informational Note: For additional information regarding overhead wires and cables, see ANSI/IEEE C2-2012, National Electrical Safety Code, Part 2, Safety Rules for Overhead Lines

c) Section 770.48(A) [SR #4511] has been modified to read as follows.

The point of entrance shall be permitted to be extended from the penetration of the external wall or floor slab by continuously enclosing the entrance optical fiber cables in rigid metal conduit (RMC) or intermediate metal conduit (IMC) to the point of emergence.
d) In Sections 770.100(B)(2) [SR #4531], 800.100(B)(2) [SR #4532], 820.100(B)(2) [SR #4543], and 830.100(B)(2) [SR #4550] the following underlined wording were added to comply with the NFPA Style Manual and addressed the changes to Section 250.94 by CMP-5.

If an intersystem bonding termination is established, all the rules of 250.94(A) shall apply.

If the building or structure served has no intersystem bonding termination, the bonding conductor or grounding electrode conductor shall be connected to the nearest accessible location on the following:

(1) The building or structure grounding electrode system as covered in 250.50
(2) The grounded interior metal water piping system, within 1.5 m (5 ft) from its point of entrance to the building, as covered in 250.52
(3) The power service accessible means external to enclosures as covered in using the options identified in the 250.94(A) Exception.
(4) The nonflexible metallic power service raceway
(5) The service equipment enclosure
(6) The grounding electrode conductor or the grounding electrode conductor metal enclosure of the power service, or
(7) The grounding electrode conductor or the grounding electrode of a building or structure disconnecting means that is grounded to an electrode as covered in 250.32

e) In Section 770.179 [SR #4515] the subject of “Installed and Labeled” which was being proposed by a Task Group formed by the Correlating Committee was addressed. This wording was installed as reflected below.

Optical fiber cables shall be listed, labeled, and identified in accordance with 770.179(A) through (F) and shall be marked in accordance with Table 770.179. Optical fiber cables shall have a temperature rating of not less than 60°C (140°F).

The first revision was updated for Section 810.15 [SR #4539] where in the information note referenced was made to the rolling sphere theory in the first draft. The changes are reflected below.

Informational Note: See NFPA 780-2014, Standard for the Installation of Lightning Protection Systems, 4.8.3.1 for the application of the term “rolling sphere.”

The informational note in Sections 800.48 [SR #4524] and 820.48 [SR #4542] were modified to read as follows.

The first revision was updated for Section 810.15 [SR #4539] where in the information note referenced was made to the rolling sphere theory in the first draft. The changes are reflected below.

Informational Note: See NFPA 780-2014, Standard for the Installation of Lightning Protection Systems, 4.8.3.1 for the application of the term “rolling sphere.”

820.48 Unlisted Cables Entering Buildings.

Informational Note: The point of entrance may be extended further into the building by continuing to enclose the entrance cable in rigid metal conduit (RMC) or intermediate metal conduit (IMC).

As a reminder steps were taken during the First Draft Meeting in January to replace the words Optical Network Terminal (ONT) with just Network Terminal in Article 840 for the purpose of including all premises-powered broadband communications systems. This effort continued during the Second Draft Meeting. The title for Section 840.100 [SR #4560] now reads as follows.
840.100 Network Terminal and Cable Grounding

During the first draft meeting a first revision (FR 4643) was created to establish a new part (Part VI) and Section 840.160 powering circuits over communications cable. A table was inserted into this Section which provided limitations on the amount of current that could flow on each conductor. The concern was overheating of the cables. Underwriters Laboratory was commissioned by the Society of Plastic Institute (SPI) to conduct an informational study on various bundles of communications type cables at different power levels. What was clearly revealed by this study was that once the power being delivered goes above 60 watts heating begins of the outer sheath and greater than 100 watts the increased risk of a fire became evident with the center cable being the most at risk. A lot of research is still required to ensure that the modeling is correct. Public Comment 1441 was submitted with updated information which included an updated table. CMP-16 chose to reject this information because the feeling was that any guidelines on power delivery circuits over a communications cable should be placed in Article 725. Therefore, all the information that was placed in Section 840.160 by the first draft was removed and replaced with the following wording. SR #4564

Part VI. Premises Powering of Communications Equipment over Communications Cables

840.160 Powering Circuits

Communications cables, in addition to carrying the communications circuit, shall also be permitted to carry circuits for powering communications equipment. Where the power supplied over a communications cable to communications equipment is greater than 60 watts, communication cables and the power circuit shall comply with 725.144 where communications cables are used in place of Class 2 and Class 3 cables.

The reason for the rejection of Public Comment 1441 is the Scope of Chapter 8 is communications systems and the title of Article 840 is Premises-Powered Broadband Communications Systems. What was being proposed is not a communications system, but rather a power delivery system on a communications cable. CMP-16 felt that 60 watts was sufficient power to deliver the communications circuit(s) and any other power being placed on the cable should follow the installation rules outlined in Article 725. CMP-3 during the second draft meeting agreed to establish Section 725.144 based on public comments submitted to them.

2) Motion

Motion to support all Second Revisions Generated by CMP-16

NOTE: Motion is supported by Power Systems Communications and Cyber Security Committee

Discussion – Was this a change in the First Revision? No – Revision clarifies point of entrance can be extended by approved conduit

3) SCC-18 Panel Direction to IEEE-ER

SCC-18 Directs the IEEE-ER to Support all Second Revisions
t) **CMP-17, 2017 NEC Second Draft Report**

**Articles 422, 424, 425 (new), 426, 427, 680, 682**

(Chester Sandberg, Principal – Alternate, Vacant)

Summary of Panel Actions for Second Revision

Total proposals addressed - 53

1) Noteworthy Panel Actions that will Not be the Subject of an Opposing Action

a) **Approximate 50% of changes were and labeled**

   e.g. Listed and labeled central vacuum outlet assemblies shall be permitted to be connected to a branch circuit in accordance with 210.23(A).

b) **422.18 Support of Ceiling-Suspended (Paddle) Fans.**

   Ceiling-suspended (paddle) fans shall be supported independently of an outlet box or by one of the following:
   1. listed outlet box or listed outlet box systems system identified for the use and installed in accordance with 314.27(C)
   2. listed outlet box system, a listed locking support and mounting receptacle and a compatible factory installed attachment fitting designed for support, identified for the use and installed in accordance with 314.27(E).

c) **Addition of Article 425**

   1. **425.1 Scope**

   This article covers fixed industrial process heating employing electric resistance or electrode heating technology. For the purpose of this article, heating equipment shall include boilers, electrode boilers, duct heaters, strip heaters, immersion heaters, process air heaters, or other approved fixed electric equipment used for industrial process heating. This article shall not apply to heating and room air conditioning for personnel spaces covered by Article 424, fixed heating equipment for pipelines and vessels covered by Article 427, and induction and dielectric heating equipment covered by Article 665, and industrial furnaces incorporating silicon carbide, molybdenum, or graphite process heating elements.
2. Section 680.14  New article on Corrosive Environment

680.14 Corrosive Environment

(A) General

Areas where pool sanitation chemicals are stored as well as areas with circulation pumps, automatic chlorinators, filters, open areas under decks adjacent to or abutting the pool structure, and the like shall be considered to be a corrosive environment. The air in such areas shall be considered to be laden with acid, chlorine and/or bromine vapors, and any liquids or condensation in those areas shall be considered to be laden with acids, chlorine and/or bromine.

(B) Wiring Methods

Wiring methods in the areas described in 680.14(A) shall be listed, labeled and identified for use in such areas. Rigid metal conduit, intermediate metal conduit, rigid polyvinyl chloride conduit, and reinforced thermosetting resin conduit are considered to be resistant to the corrosive environment specified in 680.14(A).

3. Notable NFPA Research Foundation.
d) There were no changes in the Second Draft to the following IEEE submitted PI’s.
   • FR 4846 / PI 2240 Section No. 426.32
   • FR 4847 / PI 2241 Section No. 427.1
   • FR 4848 PI 2242 Section No. 427.20
   • FR 4849 PI 2239 Section No. 427.27

   But just to review what they are:

   **PI 2240 / FR 4846**

   What we asked for

   **426.32 Voltage Limitations.** Unless protected by ground-fault circuit-interrupter protection for personnel-protection of equipment, the secondary winding of the isolation transformer connected to the impedance heating elements shall not have an output voltage greater than 30 volts ac.

   Where ground-fault circuit-interrupter protection for personnel protection of equipment is provided, the voltage shall be permitted to be greater than 30 but not more than 80 volts.

   What we got

   **426.32 Voltage Limitations.** Unless protected by ground-fault circuit-interrupter protection for personnel, the secondary winding of the isolation transformer connected to the impedance heating elements shall not have an output voltage greater than 30 volts ac.

   Where ground-fault circuit-interrupter protection for personnel is provided, the voltage shall be permitted to be greater than 30 but not more than 80 volts.
PI 2241 / FR4847

427.1 Scope. The requirements of this article shall apply to electrically energized heating systems and the installation of these systems used with pipelines or vessels or both.


Didn’t ask for this but got it at no extra charge

PI 2242 / FR 4848

- What we asked for
  427.20 Marking. Each factory-assembled heating unit shall be legibly marked within a complete assembly, including both the heating portion and the non-heating end leads or termination, and shall have permanent markings as required, to be identified as being suitable for use, located on one or both of the non-heating leads not more than 75 mm (3 in.) of each end of the non-heating leads with the permanent identification symbol, catalog number, and ratings in volts and watts or in volts and amperes from the supply end of a non-heating lead.

- What we got
  427.20 Marking. Each factory-assembled heating unit shall be legibly marked within 75 mm (3 in.) of each end of the nonheating leads with the permanent identification symbol, catalog number, and ratings in volts and watts or in volts and amperes.
2) Motion

*Motion to support all Second Revisions*

3) SCC-18 Panel Direction to IEEE-ER

*SCC-18 Directs the IEEE-ER to Support all Second Revisions*
u) **CMP-18, 2017 NEC Second Draft Report**

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

(Kurt Clemente, Principal – Alternate, Vacant) Note: Kurt Clemente presented CMP-18 report (see attached)

1) **Noteworthy Panel Actions that will Not be the Subject of an Opposing Action**

a) SR 5103 – increase Section 393.6 suspended ceiling requirement from "listed" to "listed and labeled" as part of a panel-wide effort to clarify and memorialize these two functions.

b) SR 5104 – modify Section 406.4(D)(2) for non-grounding-type receptacle marking to ensure the present marking "no equipment ground" remains visible after installation. This addressed inspector concerns this might be shown on the receptacle but concealed by the faceplate.

c) SR 5111 – modify Section 406.3(E) controlled receptacle markings, which currently must have a "power symbol." The new language requires both the power symbol and the word "controlled." The panel argued at length, finding agreement that the public did not understand the intent of controlled receptacles but was divided on the benefit of the single extra word, which would only be in English. Several panel votes were required to arrive at this Second Revision.

d) SR 5112 – modify Section 410.6 luminaires to increase requirement from "listed" to "listed and labeled." Similarly, SR 5113 modified 411.4(A) and 411.4(B).

e) SR 5114 – modify Section 600.3 electric outline signs to increase requirement from "listed" to "listed and labeled." Similarly, SR 5115 modified 600.22(A), SR 5116 modified 600.23(A), SR 5117 modified 600.24(A), and SR 5118 modified 600.42(H).

f) SR 5120 – modify Section 600.4(B) to clarify and expand the wording on luminaire retrofit kits. Concerns were raised that since some LED retrofit kits modify the voltage but not the form-factor of the lamp “tombstones,” an electrician could be injured attempting to replace a malfunctioning retrofit kit with the original fluorescent lamp.

g) SR 5125 – modify Section 600.12(C) to add Table 600.33(A) with wiring types and acceptable substitutions.

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**TABLE 600.33(A)**

<table>
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<tr>
<th>Location</th>
<th>CL2</th>
<th>CL3</th>
<th>CL2R</th>
<th>CL3R</th>
<th>CL2P</th>
<th>CL3P</th>
<th>PLTC</th>
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<td>Y</td>
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<td>N</td>
<td>Y</td>
<td>Y</td>
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<td>Y</td>
</tr>
<tr>
<td>Environmental air spaces plenums -or- risers</td>
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<td>N</td>
<td>Y</td>
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<td>N</td>
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<td>N</td>
</tr>
</tbody>
</table>

Y = Permitted, N = Not Permitted.
h) SR 5172 – modify Section 600.6(A)(1) to modify “metal-jacketed cable” adding the text “identified for the location” recognizing this may imply the use of non-outdoor-listed cable. Some proposal portions were not accepted, including the change of “metal-jacketed” to read “armored” when it was discussed that Article 320 Type AC cable is not listed for wet or damp locations and so would be unsuitable for nearly all electric signs.

i) SR 5128 – modifies definition of receptacle in Article 100 to recognize and memorialize the use of direct plug-in transformers and other electrical devices that lack an actual cord and attachment plug (think: cell-phone power supply).

2) Motion

   *Motion to support all Second Revisions*

3) SCC-18 Direction to IEEE-ER

   *SCC-18 Directs the IEEE-ER to Support all Second Revisions*
v) **CMP-19, 2017 NEC Second Draft Report**

*Articles 545, 547, 550, 551, 552, 553, 555, 604, 675, and Annex D, Examples D11 and D12*

(Don Zipse, Principal – Alternate, Vacant) Ed Larsen presented the following Report

1) **Noteworthy Panel Actions that will Not be the Subject of an Opposing Action**
   a) As usual the Mobile Homes Recreational Vehicles and Parks and Trailer Parks limited vote members came prepared as usual.
   b) D. W. Zipse’s and the agricultural representative comments on Equipotential Planes ended up lost in the Internet ether.

2) **Comment**

   D. W. Zipse made a presentation to the panel on the latest information concerning Equipotential Planes which included the fact that the Canadian Electrical Code no longer requires equipotential planes to be installed in dairies.

3) **Motion**

   *Motion to support all Second Revisions*

4) **SCC-18 Direction to IEEE-ER**

   *SCC-18 Directs the IEEE-ER to Support all Second Revisions*

9. **Other NFPA Reports**

   Each ER will have a **maximum of 5 minutes** for his status and timeline report - may use PowerPoint if desired

   a) **NFPA 70B Recommended Practice for Electrical Equipment Maintenance**

   (Brian Brecheisen, Principal - William Cantor, Alternate)

   Currently not in revision cycle – no information to report

   b) **NFPA 70E Standard for Electrical Safety in the Workplace®**

   (Daleep Mohla, Principal - Paul Dobrowsky, Alternate)

   See attached PowerPoint Presentation

   c) **NFPA 73 Electrical Inspection Code for Existing Dwellings**

   (Principal, Vacant – Alternate, Vacant)

   No Report

   d) **NFPA 79 Electrical Standard for Industrial Machinery®**

   (Daleep Mohla, Principal – Alternate, Vacant)

   See Attached PowerPoint Presentation
10. Other Business (Ed Larsen - All)

a) Reports to Sponsors

Each member is responsible for reporting to their sponsoring committee on the activities of SCC18 and their NFPA technical committee. Please mention that SCC18 has vacancies to fill.

b) Election of Officers

Paul Myers, Dennis Nielsen and Bill McCoy are running for the SCC18 offices as indicated below.

- Vice Chair - no candidates
- Secretary/Treasurer - Paul Myers & Dennis Nielsen
- Membership Officer - Bill McCoy unopposed

High level career summary for Dennis Nielsen attached.

Paul Myers works for PotashCorp and has been in the industry for 34 years.

Bill McCoy has served as Membership officer for the last several years and has agreed to continue in this role.

Each candidate was given the opportunity to state why they would like to serve as an SCC18 officer during our December SCC18 meeting before SCC18 members were required to cast a paper ballot at the meeting. Members, attending the meeting via WebEx were be required to cast a ballot via e-mail to Arthur.Smith@WSNelson.com by COB December 10, 2015.

The winners will be announced to the SCC18 Membership as soon as all votes are counted and documented as part of these meeting minutes.

- **Paul Myers was elected as SCC18 Secretary Treasurer. Let’s all congratulate Paul and offer him our support.**
- **Bill McCoy will continue to serve as SCC18 Membership Officer**

c) Need to fill Vacant Positions

Ed Larsen and Bill McCoy emphasized the need to recruit ERs

d) NEC Processing Schedule

1) **Posting of second draft and panel ballot - January 4, 2016**
2) **Final date for receipt of second draft ballots - January 15, 2016**
3) **Final date for receipt of recirculation - January 22, 2016**
4) Posting of second draft for Correlating Committee - **February 5, 2016**
5) Correlating Committee meeting - **February 22-26, 2016**
6) Posting of second draft for Correlating Committee Ballot - **March 18, 2016**
7) Final date for receipt of Correlating Committee second draft ballot - **March 25, 2016**
8) Final date for receipt of Correlating Committee recirculation - **April 1, 2016**
9) Post final draft for NITMAM review - **April 8, 2016**
10) Notice of intent to make a motion closing date - **April 29, 2016**
11) Posting of certified amending motions **May 13, 2016**
12) Association meeting for documents with certified amending motions (CAMs) - **June 13-16, 2016**
13) Appeal closing date for NEC CAMs - **July 6, 2016**
14) Standards Council issuance for documents with CAMS - **August 11, 2016**
e) Other –

SCC-18 Members planning on attending:

- Ed Larsen
- Mario Spina
- Paul Dobrowsky
- 

11. Review Action Items

12. Meeting Critique

a) What worked well? – Keep Doing
   
i. Meeting facility and meeting location
ii. Meeting agenda/minutes worked well
iii. WebEx worked well
iv. 

b) What didn’t work well? - Stop doing
   
i. Some Draft reports from NEC received too close to SCC18 meeting date – Need to try and schedule SCC18 meetings with sufficient time to develop IEEE ER report and submit to SCC18


c) What to change?
   
i. Nothing Noted

13. Adjourn (Ed Larsen)

   Meeting adjourned 10:50 am Thursday December 10th, 2015
### 14. Action Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Person Responsible for Completion</th>
<th>Target Completion Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Review meeting minutes and provide responses no later than close of business Wednesday December 16, 2015</td>
<td>ALL</td>
<td>12/16/15</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>SCC18 Members to submit comments to Arthur Smith on New NFPA Process that may have created a problem and how to modify – Executive Committee to develop letter to NFPA</td>
<td>All SCC18 Members</td>
<td>12/31/15</td>
<td>Not successful</td>
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<tr>
<td>3</td>
<td>Develop IEEE Response to NFPA on change in process that created problems</td>
<td>Ed Larsen</td>
<td>1/31/16</td>
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### 15. Attachments

- a) March 5th, and 6th, 2013 meeting minutes
- b) Committee Reports
- c) NFPA 70E First Draft Report to SCC 18 PowerPoint
- d) NFPA 79 SCC 18 Update PowerPoint
- e) CMP-6 Special Presentation PowerPoint
- f) Dennis A. Nielsen Career Summary Resume’