“Proposed Changes for Commercial Wiring for the 2017 NEC and How it Will Impact Your Business”

Phil Simmons, Electrical Safety Consultant and Author
Cengage Learning
Presenter: Phil Simmons

- Member NEC CMP-5 (Acting Chair 1999 NEC), previously on CMP-1, CMP-19 (Chair), CMP-17
- Past IAEI International President (1987) and Executive Director
- Past Chief Electrical Inspector State of Washington
- Master Electrician and former electrical contractor
- Author of several authoritative books including:
  - Electrical Wiring Commercial and Electrical Wiring Residential (Delmar 2011 and 2014)
  - Significant Changes in 2005 NEC (Delmar 2004)
  - Soares Grounding and Bonding (IAEI, several editions)

Seminar Objectives

- Create awareness of significant proposed changes for commercial wiring for the 2017 NEC
- Be aware of opportunities to influence these proposed changes
- Stay on top of the proposed changes that can affect your bottom line
Revised NEC Process

- Focused on digital, not paper, process
- Code panels decide on changes to the text of the NEC in a more limited manner (no more Accept in Principle, Accept in Part, Accept in Principle in Part, etc)
- IEC has a representative(s) on each NEC Committee and Correlating Committee
- Contact them if you have concern

2017 NEC Cycle

Public Inputs (PIs)

- 4,012 Public Inputs were submitted recommending changes to the 2014 NEC or new material for the 2017 NEC
- 1,235 Public Inputs were accepted in some form or fashion by one of the 19 Code Making Panels
- Go to www.nfpa.org/70 “next edition” tab for additional information
Proposed New Articles

• Art 425 – Fixed Resistance and Electrode Industrial Process Heating Equipment
  – Applies to boilers, electrode boilers, duct heaters, strip heaters, immersion heaters, process heaters and other approved heaters

• Art 691 – Large-Scale Photovoltaic (PV) Electric Supply Stations
  – Covers PV stations for the supply of merchant power into the electricity grid

Proposed New Articles

• Art 706 – Energy Storage Systems
  – Permanently installed energy storage systems that may be stand-alone or interactive with power production sources
  – May be batteries, flow batteries, capacitors and kinetic energy devices

• Art 712 – Direct-Current Microgrids
  – Supplies may be interconnected to supply dc loads such as LED lighting, communications equipment, computers and servers, etc.

110.14(D) Tightening Torque

• According to a study, at least 75% of connections are made improperly.
• Improper connections may result in premature failure of electrical terminations
• A calibrated torque tool will be required to achieve the torque value indicated on equipment unless the manufacturer provides instructions for an alternative method
110.16(B) Arc-Flash Warning

- New sublevel (B) added specifically addressing service equipment
- Coordinates with NFPA 70E, *Electrical Safety in the Workplace.*
- Applies to other than dwelling units

110.21(A)(2) Reconditioned Equipment

- Must be marked with the:
  - Name, trademark or other descriptive marking of organization responsible for reconditioning
  - Date of reconditioning
110.24(A) Field Marking

- Relates to calculation of maximum short-circuit current at the service and the date the calculation was performed.
- New rule adds, “The calculation shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.”

110.26(A)(4) Limited Access Working Space

- Equipment “located in a space with limited access” such as above a suspended ceiling or in a crawl space (“Limited access” not defined)
- Specific rules apply to:
  1. Where located above a lay-in ceiling
  2. Width of limited access working space
  3. Doors or hinged panels openable to 90°
  4. Space in front of the enclosure

110.26(B) Clear Space Signs

- Adds a requirement for a sign complying with 110.21(B) that reads:

  **NOTICE**
  ELECTRICAL EQUIPMENT WORKING SPACE AND EGRESS AREA — NO OBSTRUCTION OR STORAGE ALLOWED
110.26(E)(2) Outdoor Working Space

- Revised to require that equipment be:
  1. Installed in suitable enclosures
  2. Protected from accidental contact by unauthorized personnel, or by vehicular traffic
  3. Protected from accidental spillage or leakage from piping systems

Continued

110.26(E)(2) Outdoor Working Space

- Revised to require:
  (B) Work Space. The working clearance space shall include the zone described in 110.26(A). No architectural appurtenance or other equipment shall be located in this zone.

  *Exception to (b): Structural overhangs or roof extensions shall be permitted in this zone.*

110.41 Inspections and Tests (Over 1000 Volts)

(A) Pre-energization and Operating Tests.

- Where required elsewhere in this Code, the complete electrical system design, including settings for protective, switching, and control circuits, shall be prepared in advance and made available on request to the authority having jurisdiction and shall be tested when first installed on-site.

(Continued)
110.41 Inspections and Tests

(B) Test Report.

- A test report covering the results of the tests required in 110.41(A) shall be available to the authority having jurisdiction prior to energization and made available to those authorized to install, operate, test, and maintain the system.


(a) All single-phase receptacles rated 150 volts to ground or less, 50 amperes or less, shall have GFCI protection for personnel,
(b) All three-phase receptacles rated 150 volts to ground or less, 100 amperes or less, shall have GFCI protection for personnel.

210.8(B)(2) Classes C, D, or E Special-Purpose Ground-Fault Circuit-Interrupter Protection

(a) All single-phase receptacles rated more than 150 volts to ground and up to 600 volts between ungrounded conductors, 100 amperes or less, shall have special-purpose ground-fault circuit-interrupter (SPGFCI) protection for personnel.
210.8(B)(2) Classes C, D, or E Special-Purpose Ground-Fault Circuit-Interrupter Protection

(b) All three-phase receptacles rated more than 150 volts to ground and up to 600 volts between ungrounded conductors, 100 amperes or less, shall have special-purpose ground-fault circuit-interrupter (SPGFCI) protection for personnel.

210.8(B)(3) Locations

a) Bathrooms
b) Kitchens
c) Rooftops
d) Outdoors (See exceptions)
e) Sinks — where receptacles are installed within 1.8 m (6 ft) of the outside edge of the sink (See exceptions)

f) Indoor wet locations
g) Locker rooms with associated showering facilities
h) Garages, service bays, and similar areas other than vehicle exhibition halls and showrooms
i) Crawl spaces — GFCI protection shall be provided for lighting outlets in crawl spaces at or below grade level.
210.8(B)(3) Locations

j) Unfinished basements — for the purposes of this section, unfinished basements are defined as portions or areas of the basement not intended as habitable rooms.

210.71 Meeting Room Receptacles

New section provides requirements for:
• Meeting rooms with fixed walls –
• Floor receptacle outlets
• Receptacle outlets for movable room partitions
• Receptacle outlet placement

230.29 Metal Supports

• New text is added to require bonding of metal support of overhead service conductors.
• It shall be bonded by means of a bonding jumper and listed connector to the grounded overhead service conductor. The bonding jumper shall be of the same conductor size and material as the grounded overhead service conductor.
230.53 Raceways to Drain

- Where exposed to the weather, raceways enclosing service-entrance conductors shall be suitable listed or approved for use in wet locations and arranged to drain. Where embedded in masonry, raceways shall be arranged to drain.

240.67 Arc Energy Reduction (Fuses)

- New provisions are proposed for arc energy reduction for installations of fusible systems where the rating of the fusible switch is 1200 amperes or more.
- This section has a delayed effective date of Jan. 1, 2020.
- Identical in concept to arc-reduction circuit breakers in 240.87.

250.30(A)(4) Grounding Electrodes for Separately Derived Systems

- Now, the same grounding electrodes used for the building service must be used for the separately derived system.
- Building or structure metal members and water pipes are recognized as grounding electrode conductors by 250.68(C).
250.52(A)(2) Grounding Electrodes

- “Metal, in-ground support structures” replace “Metal frame of the building or structure” as a grounding electrode.
- Intended to comply with the definition of “grounding electrode” in NEC Article 100 where a connection to earth is described.
- Consist of pilings, casings or other structural metal.

250.52(B)(3) Grounding Electrodes Not Permitted

1) Metal underground gas piping systems
2) Aluminum
3) The structures and structural reinforcing steel described at 680.26(B)(1) and (B)(2) shall not be considered as a grounding electrode described by this section.
250.122(F) Equipment Grounding Conductors in Parallel

• Section rewritten with several significant changes.
• 250.122(F)(1) applies to “Conductor Installations in Raceways, Auxiliary Gutters, or Cable Trays”.
• 250.122(F)(2) applies to installations of “Multiconductor Cables”.

310.15(B)(3)(c) Rooftop Temperature Adjustments

• Cables above ¾ in. do not require adjustment for temperature
• Cables installed below ¾ in. above the roof require a 60% derating
• Table 310.15(B)(3)(c) is proposed to be deleted.
• Conductors with XHHW-2 insulations are exempt from the temperature adjustment.

312.8 Switch and Overcurrent Device Enclosures

• Revised to include a new Subsection B that refers to equipment installed in a switch or overcurrent device enclosure
  1. The device or equipment is identified as a field installable accessory as part of the listed equipment, or is a listed kit evaluated for field installation in the specific equipment
  2. The total area of all conductors, splices, taps, devices, and equipment does not exceed 75 percent of the cross-sectional area of that space.
314.27(E) Separable Attachment Fittings

- New section that permits support device

![Diagram of separable attachment fittings]

320.6 Cable Wiring Methods Listed

- Type AC cable and associated fittings shall be listed and labeled.
- Identical change made to many other cable articles including:
  - Type FC Cable 324.6; Type MV Cable 328.6;
  - Type MC Cable 330.6; Type NM Cable 324.6;
  - Type SE Cable 338.6; and Type UF Cable 340.6

338.10(B) Uses Permitted Type SE Cable

- The change will require only Type SE Cable with ungrounded conductors sized 10 AWG or smaller to be restricted to 60°C allowable ampacity ratings.
- Type SE Cables are typically installed in sizes 8 AWG copper and 6 AWG aluminum and will not be required to be similarly restricted.
366.20 Auxiliary Gutters

- Where single conductor cables comprising each phase, neutral, or grounded conductor of an alternating-current circuit are connected in parallel as permitted in 310.10(H), the conductors shall be installed in groups consisting of not more than one conductor per phase, neutral, or grounded conductor to prevent current imbalance in the paralleled conductors due to inductive reactance.

404.22 Electronic Lighting Control Switches

- All these devices are required to be listed and labeled.
- The device is not permitted to introduce current on the equipment grounding conductor.

406.3(F) Receptacle with USB Charger

- Applies to combination wiring devices that include a 15- or 20-ampere, 125-volt receptacle and a USB type receptacle.
- Required to be listed and labeled.
- Required to be self-contained with no external source or connection for supply to the USB device.
406.12 Tamper-Resistant Receptacles

- Expanded to include:
  - Preschools and elementary education facilities
  - Business offices, corridors, waiting rooms and the like in clinics, medical and dental offices and outpatient facilities
  - Assembly occupancies such as places of awaiting transportation, gymnasiums, skating rinks and auditoriums
  - Dormitories

408.3(A)(2) Barriers at Service Panelboards, Switchboards...

- A barrier to isolate unprotected line-side conductors from inadvertent contact while servicing the panelboard has been added.
- An exception excludes a Main-Lug-Only panelboard from this requirement as being impracticable.

408.4(B) Source of Supply

- All switchboards, switchgear, and panelboards supplied by a feeder(s) in other than one- or two-family dwellings shall be permanently marked to indicate each device or equipment where the power originates.
- The label shall be permanently affixed, of sufficient durability to withstand the environment involved, and not handwritten.
409.23 Available Fault Current Industrial Control Panels

- 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 short circuit current calculation was performed shall be documented and made available to those authorized to inspect the installation.

445.11 Marking (Generators)

- In addition to present markings including the power factor, the subtransient and the insulation system class, the generator will be required to be marked with the:
  - Transient reactance
  - Maximum short-circuit current

501.10(B)(1) Wiring in Class I, Division 2

- In addition to the wiring methods permitted in Class I, Division 1 areas, the following are permitted:
  1) Rigid metal conduit (RMC) and intermediate metal conduit (IMC) with listed threadless fittings.
  2) Electrical metallic tubing (EMT) with listed fittings.
  9) Cablebus.
Tables 511.3(C) and (D) Major and Minor Repair Garages

- Table 511.3(C) Extent of Classified Locations for Major and Minor Repair Garages with Heavier-Than-Air Fuel
- Table 511.3(D) Extent of Classified Locations for Major Repair Garages with Lighter-than-Air Fuel

517.2 Health Care Facilities

- Buildings or portions of buildings, or mobile enclosures in which human medical, dental, psychiatric, nursing, obstetrical, or surgical care are provided. [99: 3.3.67]
- Informational Note: Health Examples of health care facilities include, but are not limited to, hospitals, nursing homes, limited care facilities, clinics, medical and dental offices, and ambulatory care centers, whether permanent or movable.

517.2 Patient Care Space

- Space Any space of within a health care facility wherein patients are intended to be examined or treated. [99: 3.3.127]
- Basic Care (Category 3) Space. Space in which failure of equipment or a system is not likely to cause injury to the patients, staff, or caregivers but may cause patient discomfort. [99: 3.3.127.3]
517.2 Patient Care Space

• General Care (Category 2) Space. Space in which failure of equipment or a system is likely to cause minor injury to patients, staff, or caregivers visitors. [99:3.3.127.2]

• Critical Care (Category 1) Space. Space in which failure of equipment or a system is likely to cause major injury or death to patients, staff, or caregivers visitors. [99: 3.3.127.1]

• Support (Category 4) Space. Space in which failure of equipment or a system is not likely to have a physical impact on patients or caregivers patient care. [99: 3.3.127.4]

517.2 Medical Office (Dental Office)

• A building or part thereof in which the following occur: (1) examinations and minor treatments or procedures are performed under the continuous supervision of a medical or dental professional; (2) only sedation or local anesthesia is involved and treatment or procedures do not render the patient incapable of self-preservation under emergency conditions; and (3) overnight stays for patients or 24-hour operation are not provided. [99: 3.3.98]
517.16 Isolated Ground Receptacles
A. An isolated ground grounding receptacle shall not be installed within a patient care vicinity. [99:6.3.2.2.7.1(B)]
B. Isolated grounding receptacle(s) used outside of a patient care vicinity shall not defeat the purposes of the safety features of the grounding systems detailed in 517.13.
• Lots more!

680.11 Underground Wiring Location
• Provides list of permitted wiring methods
• Deletes Table 680.11 and will rely on Table 300.5 for cover depths.

680.21 Wiring Methods (to pool pump motors)
• Revises format of permitted wiring methods
• Deletes special provision of wiring methods unique to the interior of one-family dwelling units.
680.23(F)(1) Wiring Methods (Underwater luminaires)

- Revised wiring methods
- Continues emphasis and separate requirements for wiring methods in corrosive and noncorrosive areas

Article 680 Part VIII. Electrically Powered Pool Lifts

- New Part 8 of Article 680 covers the electrical wiring of Electrically Powered Pool Lifts.
- This equipment is widely installed and no specific installation requirements were provided.

690.8(A)(1)

- Proposed revision will allow for engineering supervision to be used in calculating maximum source circuit current for PV systems with a generating capacity of 100 kW or greater.
700.3(F) Temporary Source of Power

- Requirements and an exception dictate under what conditions provision must be made for temporary power to be provided while the normal supply of emergency system power is not operational usually for maintenance.

Watching Your Bottom Line

- It is imperative that electrical contractors be informed about proposed changes to the NEC as “Callbacks usually have a negative action on your bank account!
- Get involved in the NEC process through your IEC Codes and Standards Committee

Any Questions?

- Phil Simmons
- Simmons Electrical Services
- simmelectserv@gmail.com
- 360-789-7163