



NATIONAL ELECTRICAL CODE®

NFPA 70® - NEC® - 2014 Edition

Presented to:



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get it right



■ Purpose

- The practical safeguarding of persons and property from hazards arising from the use of electricity

■ Code Arrangement

- Introduction and nine chapters
 - Article 90, *Introduction*
 - Purpose, Scope and Code Arrangement
 - Section 90.2(B)(4), 'Exemption'
 - Section 90.3, 'Independence' of Chapter 8
 - Chapters 1 through 4 apply generally
 - Electrical installations, wiring and protection (fusing), grounding
 - Article 100, *Definitions* and Article 250, *Grounding and Bonding*
 - Chapters 5 through 7 apply to special occupancies, equipment
 - Elevators, IT equipment, fire alarm systems, data centers, optical fiber cables and raceways



National Electrical Code[®]

■ Code Arrangement (cont'd.)

- Chapter 8, *Communications Systems*
 - Article 800, *Communications Circuits* (wire-line telephone)
 - Article 810, *Radio and Television Equipment*
 - Article 820, *CATV and Radio Distribution Systems*
 - Article 830, *Network-Powered Broadband Communications Systems*
 - Article 840, *Premises-Powered Broadband Communications Systems*
 - Independent of Chapters 1 -7, except where requirements are specifically referenced within Chapter 8
- Chapter 9 consists of tables that are applicable as referenced
 - Conduit fill, conductor properties, power source limitations



National Electrical Code[®]

- NEC[®] Relevance
 - Adopted by municipalities and other Authorities Having Jurisdiction (AHJ)
 - Unlike voluntary standards, the NEC[®] carries the force of law
 - Used by electrical inspectors to approve electrical and communications installations
 - Impacts daily activities of communications utilities in providing communications services as well as manufacturers providing communications products



NEC[®] Revision Process

- The NEC[®] is revised on a three-year schedule by the National Fire Protection Association[®], Publisher
 - Revision accomplished in response to public input, formerly change proposals and comments, and
 - Code-Making Panel (CMP) and Correlating Committee (CC) action on those proposals and comments
 - Revision of the NEC[®] is a multi-step process
 - Process began with the introduction of the 2011 NEC[®]
 - Change proposals were due to NFPA[®] by November 4, 2011
 - CMP action on public proposals, January 2012 (ROP meeting)
 - CMPs acted upon 3500 proposals to revise the 2011 NEC[®]



NEC[®] Revision Process

- Revision of the NEC[®] is a multi-step process, Cont'd.
 - Correlating Committee (CC) review, April 2012
 - Report on Proposals published, July 2012
 - Public comments due to NFPA[®] by October 17, 2012
 - CMP action on public comments, Nov. 28 – Dec. 8, 2012 (ROC meeting)
 - CMPs acted upon 1625 public comments to proposed revisions to the 2011 NEC[®]
 - Correlating Committee (CC) review, February 2013
 - Report on Comments published, March 2013
 - Notice of Intent To Make A Motion (NITMAM) to NFPA[®], May 2013
 - NFPA[®] Membership approval of the 2014 NEC[®], August 2013
 - Appeals to the NFPA[®] Standards Council, July 2013
 - NEC[®] 2014 Edition issued September 2013



NEC[®] Revision Process - Schedule

- NEC[®] 2014 Edition – Major Steps
 - November 4, 2011 – Closing date for proposals
 - January 9-21, 2012 - Report on Proposals CMP meetings
 - April 23-27, 2012 – Correlating Committee review
 - July 13, 2012 – Report on Proposals (ROP) available to public
 - October 17, 2012 – Closing date for comments
 - November 28-December 8, 2012 – Report on Comments CMP meetings
 - February 18-22, 2013 – Correlating Committee review
 - March 22, 2013 – Report on Comments (ROC) available to public
 - May 3, 2013 – Closing date for Notice of Intent to Make A Motion
 - May 17, 2013 – Posting of Notices of Intent to Make A Motion
 - June 2-6, 2013 – NFPA[®] Annual meeting to approve 2014 NEC
 - July 2013 – NFPA[®] Standards Council hearing of appeals
 - **September 2013 – Release of the NEC[®], 2014 Edition**



NEC[®] Revision Process - ATIS Representation

- ATIS is represented on the three NEC[®] CMPs of greatest interest and potential impact to ATIS, and on the NEC[®] Correlating Committee (CC)
 - CMP 1 – Purpose and Scope (Arts. 90, 100 and 110),
 - CMP 5 – Grounding (Arts. 200, 250, 280 and 285),
 - CMP 16 – Communications Systems (Arts. 770, 800, 810, 820, 830 and 840),
 - NEC[®] CC - oversight responsibility for the entire Code-making process, i.e., ensuring due process and correlating the actions of all 19 CMPs.



NEC[®] Revision Process – CMP Ballot

get it right

- CMP member ballot on proposals/comments occurs in two stages
 - Informal ballot conducted at the ROP/ROC meeting
 - Panel Action acceptance requires a simple majority
 - Formal ballot conducted following the ROP/ROC meeting
 - Ballot begins via email approximately one to two weeks following the ROP/ROC meeting
 - Panel Action acceptance requires a 2/3rds majority
 - Ballots are circulated to provide opportunity for change
 - The formal ballot is the controlling ballot



2014 NEC[®] Revisions

■ Article 90 *Introduction*

- There continue to be no changes to the following important provisions for communications systems
 - Section 90.2(B)(4) - facilities under exclusive communications utility control are not covered.
 - The 'exemption' precludes electrical inspection of central office, telephone closets, and similar facilities.
 - Section 90.3 - Chapter 8, *Communications Systems*, is not subject to the requirements of Chapters 1–7.
 - The 'independence' of Chapter 8 precludes application of electrical requirements to communications facilities.
- Both provisions remain unaffected and intact in the 2014 NEC[®].



2014 NEC[®] Revisions Overview

- 2014 NEC[®] revisions of interest to ATIS:
 - Added
 - Listing requirements for grounding devices (bonding, grounding hardware)
 - Listing requirements for nonmetallic cable ties, other nonmetallic cable accessories in plenums and air handling spaces
 - Definition – *Electrical Circuit Protective System*
 - New Article 728, Fire-Resistive Cable Systems
 - Applications - cable routing assemblies
 - Article 770 correlating revisions



2014 NEC[®] Revisions

Overview, Cont'd.

- Revised
 - Definition, *Cable Routing Assemblies*, revised, moved to Article 100
 - Definition, *Communications Raceway*, revised, moved to Article 100
 - Definition, *communications equipment*, to include conductors
 - Definition, *optical fiber cable*
 - Definition, *point of entrance*
 - Definition, *fiber to the premises*
 - Article 810 - *Scope*
 - Voltage limits for associated optical fibers and electrical conductors
 - Reference to Section 250.94 where there is no Intersystem Bonding Termination (IBT)



2014 NEC[®] Revisions Overview, Cont'd.

- Editorial/Other
 - Clarified mobile home grounding requirements in Articles 830 and 840
 - Clarified grounding and bonding terminology throughout Article 770 and Chapter 8



2014 NEC[®] Revisions

Grounding Devices

- New requirement to list grounding devices
 - Covers devices used to connect a shield, sheath or non-current-carrying metallic member of a cable to a bonding conductor or grounding electrode conductor
 - Helps ensure that connection meets construction and performance criteria
 - Promotes reliable bonding and grounding
 - Requirement appears in 770.180, 800.180, 810.7, 820.180, 830.180 and 840.180



2014 NEC[®] Revisions

Listing of Cable Ties

- New requirement to list nonmetallic cable ties
 - Applies to nonmetallic cable ties and other nonmetallic cable accessories used in plenums and other spaces for environmental air
 - Provides for low smoke and heat release properties
 - Correlates with NFPA[®] 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*
 - NFPA[®] Standards Council has ruled that NFPA[®] 90A has jurisdiction over air handling spaces
 - Requirement appears in 770.24, 800.24, 820.24, 830.24; listing information in 800.170(C)



2014 NEC[®] Revisions

Electrical Circuit Protective System

- New definition added to 770.2 and 800.2
 - “**Electrical Circuit Protective System.** A system consisting of components and materials intended for installation as protection for specific electrical wiring systems with respect to the disruption of electrical circuit integrity upon exterior fire exposure.”
- New Article 728, *Fire-Resistive Cable Systems*
 - Covers circuit integrity, electrical circuit protective systems
 - Requirements added to 770.179(E) and 800.179(G)
 - Adds electrical circuit protective system
 - Provides listing and classification information for circuit integrity and fire-resistive cables



2014 NEC[®] Revisions

Applications - Cable Routing Assembly

- Added Applications for Cable Routing Assemblies
 - Requirements added as 770.110(C), 800.110(C), 820.110(C) and 830.110(C)
 - Identifies permitted uses
 - Permissible cable types, etc.
 - Provides horizontal and vertical support requirements



2014 NEC[®] Revisions

Article 770 Correlating Revisions

- **Underground OF Cables Entering Buildings**
 - Requirements added as 770.47
 - Identical to those of 800, 820 and 830
 - Provides correlation and consistency with 800, 820 and 830
- **Bonding Conductor, Grounding Electrode Conductor Length**
 - Requirements added as 770.100(A)(4)
 - Identical to those of 800, 820 and 830
 - Provides correlation and consistency with 800, 820 and 830



Definition - *Cable Routing Assembly*

- Definition – *Cable Routing Assembly* – revised and relocated to Article 100
 - Appeared only in Article 770 in 2011 NEC
 - Panel 16 duplicated the definition in Article 800 as listing requirements are contained in 800.182
 - CC overrode Panel 16 and relocated definition to Article 100
 - Word “protect” removed, specific applications added
 - **“Cable Routing Assembly.** A single channel or connected multiple channels, as well as associated fittings, forming a structural system that is used to support and route communications wires and cables, optical fiber cables, data cables associated with information technology and communications equipment, Class 2 and Class 3 cables, and power-limited fire alarm cables.”



Definition – *Communications Raceway*

- Definition – *Communications Raceway* – revised and relocated to Article 100
 - Appeared only in Article 800 in 2011 NEC
 - CC moved definition to 100 for NEC Style Manual compliance
 - The word “expressly” and the phrase “typically communications wire and cables and optical fiber and data (Class 2 and Class 3)” added to emphasize application only for communications (i.e., no power)
 - **“Communications Raceway.** An enclosed channel of nonmetallic materials designed expressly for holding communications wires and cables, typically communications wires and cables and optical fiber and data (Class 2 and Class 3) in plenum, riser, and general-purpose applications.”



2014 NEC[®] Revisions

Definition – *Communications Equipment*

- Revised definition (Art. 100):
 - 2014 NEC definition clarifies that wiring is part of communications equipment and not subject to electrical inspection
 - Added phrase: “and conductors dedicated solely for the operation of the equipment”.
 - **“Communications Equipment.** The electronic equipment that performs the telecommunications operations for the transmission of audio, video, and data, and includes power equipment (e.g., dc converters, inverters, and batteries), technical support equipment (e.g., computers) and conductors dedicated solely for the operation of the equipment.”



2014 NEC[®] Revisions

Definition – *Optical Fiber Cable*

- Revised definition (770.2):
 - “**Optical Fiber Cable** - A factory assembly or field assembly of one or more optical fibers having an overall covering.”
 - “Field assembly” added
 - Superfluous text “that transmits light for control, signaling, and communications” is deleted
 - Informational Note added describing field assembled optical fiber cable
 - Listing requirements for field assembled optical fiber cables appear in 770.179(F)



2014 NEC[®] Revisions

Definition – *Point of Entrance*

- Revised definition (800.2):
 - “**Point of Entrance** - The point within a building at which the communications wire or cable emerges from an external wall, from a concrete floor slab, from rigid metal conduit (RMC) or intermediate metal conduit (IMC).”
 - “Communications” added for clarification and to keep the definition associated with Article 800
 - Text “connected by a bonding conductor or grounding electrode in accordance with 800.100(B)” (*sic*) moved to new section 800.49
 - Possible NEC Style Manual violation – requirements not permitted within a definition
 - Revised to correctly state “grounding electrode conductor”
 - Similar changes made to Articles 770, 820 and 830.



2014 NEC[®] Revisions

Definition – *Fiber to the Premises*

- Revised definition (840.2):
 - “**Fiber-to-the-Premises (FTTP)**. Conductive or nonconductive optical fiber cable that is brought to the premises, is terminated at an Optical Network Terminal (ONT) and establishes a connection to a communications network.”
 - Deletes text “either aerial, buried or through a raceway” as not pertinent to the definition
 - Clarifies that the fiber-to-the-premises does not establish a communications network, but establishes a connection to a communications network.



2014 NEC[®] Revisions

Revised Article 810, *Scope*

- Section 810.1, *Scope* revised:
 - “**Scope.** This article covers antenna systems for radio and television receiving equipment, amateur and citizen band radio transmitting and receiving equipment, and certain features of transmitter safety. This article covers antennas such as wire-strung type, multi-element, vertical rod, flat, or parabolic and also covers the wiring and cabling that connect them to equipment. This article does not cover equipment and antennas used for coupling carrier current to power line conductors.”
 - Replaces term ‘dish’ with ‘parabolic’
 - Adds ‘flat’ antennas
 - Proposals/comments to move parabolic antennas to Article 840 were rejected, hence coverage remains in Article 810



2014 NEC[®] Revisions

Increased Voltage Limits

- Associated electrical conductors and optical fibers
 - Voltage limits increased from 600 to 1000 volts
 - Applies to electrical conductors, electrical systems and associated optical fibers
 - Revision initiated by *High Voltage Task Group*
 - Necessitated by photovoltaic, wind generation systems operating at levels approaching 1000 V
 - Applied generally across the NEC[®]
 - Specific applications
 - Section 770.133 for optical fiber cable
 - Section 250.142(B), Exception No. 4 (electrode-type boilers)



2014 NEC[®] Revisions

Intersystem Bonding Termination (IBT)

- Reference to 250.94, *Exception*, deleted
 - Applies to 800.100(B)(2)(3), 820.100(B)(2)(3) and 830.100(B)(2)(3)
 - Now refers to full 250.94
 - Revision intended to encourage installation of IBT, e.g., electric meter base ring
 - Results in circular logic
 - The 800, 820 and 830 sections apply where there is no IBT
 - 250.94 essentially requires an IBT
 - 250.94, *Exception*, continues to exist
 - Provides relief for communications installers where no IBT present
 - Potential area for ATIS input for 2017 revision cycle



2014 NEC[®] Revisions

Editorial/Other

- Mobile home grounding requirements clarified
 - Articles 830 and 840 revised for consistency with Articles 770, 800 and 820
 - No change in requirements
- Bonding and grounding terminology clarified
 - Revisions throughout Article 770 and Chapter 8
 - No change in requirements
 - Provides consistency in use of terms
 - Bonding conductor
 - Grounding electrode conductor
 - “Tidy-up” following global change in 2011 NEC replacing term “grounding conductor” with “grounding electrode conductor”



2014 NEC[®] Revisions Summary

- Exclusion of facilities under the exclusive control of the communications utility from NEC coverage remains unchanged [90.2(B)(4)]
- Independence of Chapter 8 remains intact [90.3]
- New/revised requirements:
 - Listing of grounding devices (bonding, grounding hardware)
 - Impacts 770.180, 800.180, 810.7, 820.180, 830.180, 840.180
 - Listing of nonmetallic cable ties for air handling space applications
 - Impacts 770.24, 800.24, 820.24, 830.24; listing information in 800.170(C)



2014 NEC[®] Revisions

Summary, Cont'd.

- Added definition, *Electrical Circuit Protective System* [770.2, 800.2]
- New Article 728, *Fire-Resistive Cable Systems*
- Applications for cable routing assemblies
 - Impacts 770.110(C), 800.110(C), 820.110(C) and 830.110(C)
- Underground OF cables entering buildings [770.47]
 - No new requirements, identical to those of 800, 820, 830
- Bonding Conductor, Grounding Electrode Conductor Length [770.100(A)(4)]
 - No new requirements, identical to those of 800, 820, 830
- Revised definition, *Cable Routing Assembly* [Art. 100]
 - Clarifies application of cable routing assemblies



2014 NEC[®] Revisions Summary, Cont'd.

- Revised definition, *Communications Raceway* [Art. 100]
 - Clarifies application of communications raceways
- Revised definition, *Communications Equipment* [Art. 100]
 - Now includes associated conductors
- Revised definition, *Optical Fiber Cable* [770.2]
 - Adds field-assembled OF cable, deletes superfluous text
- Revised definition, *Point of Entrance* [800.2]
 - “Communications” added for clarification
- Revised definition, *Fiber to the Premises* [840.2]
 - Editorial – no technical change



2014 NEC[®] Revisions Summary, Cont'd.

- Revised Article 810, Scope [810.1]
 - Replaces “dish” with “parabolic”, adds “flat antennas”, parabolic and flat antennas remain in Article 810
- Increased voltage limits (1000v) for associated electrical conductors and optical fibers
 - Impacts 770.133, 250.142(B), Ex. No. 4
- Deleted reference to 250.94, *Exception*
 - Impacts 800.100(B)(2)(3), 820.100(B)(2)(3), 830.100(B)(2)(3)
- Mobile home grounding requirements clarified
 - Impacts 830 and 840, consistent with 770, 800 and 820
- Bonding and grounding terminology clarified
 - Impacts 770, Chapter 8, no technical change, Cleans up terms “bonding conductor”, grounding electrode conductor



NEC[®] Task Group Activities

Reorganization of Chapter 8

- Request from Panel 16 Chair
 - Correlating Committee consider reorganizing Chapter 8
 - Combine all Chapter 8 articles into new Article 800, *Communications*
 - Part I, General
 - One set of requirements that apply to 800, 810, 820, 830 and 840
 - Could include general grounding and bonding requirements, definitions
 - Part II, existing 800 communications circuits requirements
 - Part III, existing 810 radio and TV equipment requirements
 - Part IV, existing 820 CATV requirements
 - Part V, existing 830 network-powered broadband requirements
 - Part VI, existing 840 premises-powered broadband requirements
 - Applicable to the 2017 NEC[®] revision cycle



NEC[®] Task Group Activities

Reorganization of Chapter 8

- Request, Cont'd.
 - Rationale
 - Reduce number of proposals and comments
 - Reduce duplication, improve usability
- ATIS Representatives' Concern
 - Chapter 8 is currently structured so each article is self-contained, promoting Code usability
 - Reorganization would involve rewriting much of Chapter 8
 - Presents possibility of unnecessary/unwanted changes
- Correlating Committee Action
 - Formed CC task group to weigh merits of reorganization
 - ATIS CC/CMP 16 representative on task group
 - ATIS representative successful in convincing task group that reorganization was unwarranted
 - Task group recommended to CC that no action be taken regarding Chapter 8 reorganization



NEC[®] Task Group Activities

Cable Routing Assembly Task Group

- Correlating Committee ROC review
 - Determined CMP 3 and 16 action on a number of comments adversely impacted existing requirements
 - CC directed that the affected comments be reported as “Hold”
 - Impacts Articles 725, 760 and 770
 - Revisions necessary for consideration during the 2017 NEC revision cycle
 - Involves cable routing assemblies, communications raceways
 - CC further observed that alignment between the definitions for cable routing assemblies and communications raceways and the installation requirements throughout the NEC needed to be addressed



NEC[®] Task Group Activities

Cable Routing Assembly Task Group

- Correlating Committee Action
 - Initiated two CC task Groups
 - Cable Routing Assemblies Task Group
 - Communications Raceways Task Group
 - ATIS representatives to CC, E. Gallo and J. Brunssen, appointed as Co-Chairmen
 - Responsible to staff the task groups and resolve issues
 - Selected balanced representation from CMP 3 and CMP 16
 - Formed single task group, *Cable Routing Assembly and Communications Raceway Installations Issues Task Group*
 - Issues similar and better served by a single task group



NEC[®] Task Group Activities

Cable Routing Assembly Task Group

- Task Group Directive
 - **Cable Routing Assemblies.** Review installation requirements of cable routing assemblies throughout the Code and develop Public Inputs (PIs) to align the requirements with the definition in Article 100.
 - Specific reference to Comment 3-88
 - **Communications Raceways.** Review the use of the term “communications raceways” in the requirements of the Code to ensure consistency with the definition in Article 100.
 - Specific reference to Comments 3-41, 3-71, 16-13



NEC[®] Task Group Activities

Cable Routing Assembly Task Group

■ Task Group Results

- All activity conducted via conference call, emails
- Co-Chairs developed preliminary draft Public Inputs (PIs)
 - Served as discussion points, expedited Task Group work
 - Task Group identified need for revision to draft PIs, additional areas of the NEC to be addressed per the CC directive
- Task Group developed 18 PIs for 2017 NEC cycle
 - PIs address Articles 100, 725, 760, 770, 800, 820, 830, 840
 - Revised definitions in 100 to identify cable types and applications
 - Articles 725, 760, 770 revised to specify application
 - Articles 800, 820, 830, 840 revised to provide listing and installation requirements, editorial changes



NEC[®] 2014 Edition

What's Next?

- NEC 2014 Edition complete and issued
- We now begin the 2017 NEC revision cycle
 - Public Input (PI) [formerly proposals] due
 - Paper – October 3, 2014
 - Electronic – November 7, 2014
 - Time to consider proposed NEC revisions
 - Clarification in Chapter 8 article references to 250.94 and IBT application
 - Reference to listing requirements for cable ties in 770.24, 800.24, 820.24 and 830.24
 - ATIS NEC representatives happy to coordinate and assist ATIS/PEG members to develop PIs for the 2017 revision cycle

Questions ??????