



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, 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



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 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 due to NFPA[®] by November 4, 2011
 - CMP action on public proposals, January 2012 (ROP meeting)
 - NFPA received and the 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
 - This is the current step in the revision process
 - Remaining Steps
 - Publication of the Report on Comments (ROC)
 - NFPA Membership approval of the 2014 NEC
 - Appeals to the NFPA Standards Council



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

- 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
 - Results presented herein reflect the ROC formal ballot and CC review
 - Results could change during the NFPA annual meeting or upon appeal to the NFPA Standards Council



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.



NEC[®] Revisions Overview

- 2014 NEC revisions of interest to ATIS:
 - Added
 - Listing requirements for grounding devices
 - Listing requirements for cable ties in plenums and air handling spaces
 - Revised
 - Definition of *Cable Routing Assemblies* revised and moved to Article 100
 - Definition of *communications equipment* to include conductors
 - Definition of *optical fiber cable*
 - Definition of *point of entrance*
 - Definition of *fiber to the premises*



NEC[®] Revisions Overview, Cont'd.

- Revised, Cont'd.
 - Voltage limits for associated optical fibers and electrical conductors
 - Reference to Section 250.94 where there is no Intersystem Bonding Termination
- Editorial/Other
 - Clarified mobile home grounding requirements in Articles 830 and 840
 - Clarified grounding and bonding terminology throughout Article 770 and Chapter 8



NEC[®] Revisions Overview, Cont'd.

- Rejected
 - Added mechanical protection requirements for optical fiber cable and communications cable/wire installations
 - Inclusion of parabolic antenna systems in Article 840
 - Exclusion of parabolic antennas of 1 meter or less from Article 810
 - Elimination of communications 5-foot ground rod
 - Expanded use and relocation of Intersystem Bonding Termination (IBT)
 - Expanded NEC scope
 - Limiting NEC application at less than 50 volts
 - Improved manhole accessibility



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
 - Separate proposals for Articles 770, 800, 820, 830 and 840
 - All proposals accepted unanimously
 - No comments received
 - Final Action - Listing requirements to be incorporated in the 2014 NEC



NEC[®] Revisions

Listing of Cable Ties

- New requirement in Article 800 to list cable ties
 - Applies to cable ties used in plenums and other spaces for environmental air
 - Provides for low smoke and heat release properties for cable ties in these environments
 - 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
 - Panel continues to accept proposal
 - Final Action - Listing requirements to be included in the 2014 NEC



NEC[®] Revisions

Cable Routing Assembly

- Definition – *Cable Routing Assembly* – added to Article 800 by ROP Panel Action
 - Contained in both Article 770 and Article 800
 - ROP review - CC directs Panel to place definition in 800
 - ROC - panel places definition in 800.2, removes from 770
 - ROC review - CC reverses previous action and directs placement in Article 100
- Final Action – Cable Routing Assembly definition to appear in Article 100
 - **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



NEC[®] Revisions

Parabolic Antenna Systems

- Addition of parabolic antenna systems to Article 840 *Premises-Powered Broadband Comm. Systems*
 - Proposed to revise Section 840.1, *Scope*, to include parabolic antenna systems, remove from coverage in Article 810
 - Proposals marginally accepted by panel during ROP
 - Ten affirmative, five negative ballots
 - Reported as “Reject” during CC ROP review
 - CC is responsible for NEC scope statements
 - CC acknowledged the many negative ballot comments
 - Final Action - Parabolic antenna systems will not be added to Article 840 in the 2011 NEC
 - Coverage of parabolic antennas will remain in Article 810



NEC[®] Revisions

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Definition – *Communications Equipment*

- Revised definition (Art. 100):
 - “**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: clarifies that wiring is part of communications equipment and not subject to electrical inspection
 - Final Action – revised definition will be included in the 2014 NEC



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” deleted
 - Informational Note added describing field assembled optical fiber cable
 - Final Action – revised definition and added informational note to appear in the 2014 NEC



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
 - Requirement to ground (bond) metal conduit moved to new section 800.49
 - Possible NEC Style Manual violation –requirements not permitted within a definition
 - Similar changes made to Articles 770, 820 and 830.
 - Final Action – revised definition to appear in the 2014 NEC



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.”
 - Removes “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.
 - Final Action – revised definition to appear in the 2014 NEC



NEC[®] Revisions

Revised Article 810, *Scope*

- Section 810.1, *Scope* revised:
 - Adds 'flat' antennas
 - Replaces term 'dish' with 'parabolic'
 - Other changes rejected
 - Section 810.3, *Other Articles*
 - Treatment of coaxial cable
 - Apply Article 820 to antennas greater than 1 meter -rejected
 - Apply Article 840 to antennas not exceeding 1 meter - rejected
 - Final Action – coverage of all flat and parabolic antennas remains in Article 810 in the 2014 NEC



NEC[®] Revisions

Increased Voltage Limits

- Permit optical fibers to be associated with electrical conductors of up to 1000 volts
 - CC High Voltage Task Group proposal
 - Accepted by CMP 16
 - Applicable to Section 770.133
 - Photovoltaic systems operating at levels approaching 1000 V
 - Previous limit was 600 volts
 - Applies to optical fibers associated with these systems
 - Similar proposal for Section 250.142(B)
 - Accepted in principle by CMP 5
 - Similar proposals for Art. 100. Part II
 - Rejected by CMP 1
 - Final Action – increased voltage limits will be incorporated as appropriate throughout the 2014 NEC



NEC[®] Revisions

Intersystem Bonding Termination (IBT)

- Articles 800, 820 and 830 revised to refer to full 250.94
 - Previously referred to 250.94 *Exception*
 - Exception deals with situations where IBT is not present
 - Reference to full Section 250.94 encourages establishing IBT, e.g., electric meter base ring
 - Final Action – reference to full 250.94 will appear in the 2014 NEC
- Expanded use and location of IBT rejected
 - Proposed: Revise Article 100 definition to include ‘other systems’; 250.94 to permit IBT location in other spaces
 - Final Action – Panel Action to “Reject” continues and proposed revisions will not appear in the 2014 NEC



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 eliminating term “grounding conductor”
 - Final Action – these editorial revisions will appear in the 2014 NEC



5-Foot Communications Ground Rod

- Proposal to eliminate 5-foot communications ground rod rejected
 - No technical substantiation provided
 - No safety issues cited
 - CMP 16 conclusions
 - 5-foot ground rods used by telecommunications utilities for decades
 - Use has resulted in safe and reliable telecommunications installations
 - Final Action – 5-foot communications ground rod remains in the 2014 NEC
 - No public comments to Panel Action to reject the proposal were received



NEC[®] Revisions

Expanded NEC Scope

- Proposal to expand NEC coverage rejected
 - Proposed - add to wiring covered
 - Energy management systems
 - Load control systems
 - Possibly lead to including smart grid elements not presently covered by the NEC
 - Effectively expands scope of the NEC
 - Final Action – the text of the 2014 NEC remains unchanged



Limit NEC Application At Less Than 50 V

- Proposals to exempt equipment operating at less than 50 volts from NEC coverage rejected
 - Equipment operating at less than 50 volts and conforming to specific conditions exempt from:
 - Listing, electrical inspection by AHJ
 - Proposal flawed
 - Inspection or review required to determine if specific preconditions are met
 - CMP 1 concerned that equipment operating at less than 50 volts can still be a safety hazard
 - Final Action – proposal continues to be rejected



Mechanical Execution of Work

- Proposal to expand mechanical protection requirements to include all of Section 300.4
 - Would apply to 770.24, 800.24, 820.24 & 830.24
 - Unnecessary requirements, increased installation costs
 - Rejected by Panel 16 during formal ROP ballot
 - Failed to achieve 2/3rds majority
 - Rejected proposals returned to Panel 16 by NFPA as comments during ROC
 - Panel reversed position on 770.24 during ROC meeting
 - Cited use of optical fiber cable in life safety situations
 - Panel Action to accept rejected in formal ROC ballot
 - Final Action – no new mechanical protection requirements added to XXX.24 sections in 2014 NEC



Improved Manhole Accessibility

- Proposal to increase manhole diameter rejected
 - Proposed:
 - Increase diameter of opening from 26 inches to 36 inches
 - Facilitate access by personnel using newer and bulkier personal protective equipment (PPE)
 - Conform to OSHA requirements
 - CMP 1 rejected the proposal
 - Lack of technical substantiation
 - Failure to cite specific OSHA requirement
 - No public comments received
 - Final Action – no change to manhole diameter requirements in 2014 NEC



NEC[®] Revisions

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



Reorganization of Chapter 8

- Request, Cont'd.
 - Rationale
 - Reduce number of proposals and comments
 - Reduce duplication, improve usability
- Present Chapter 8 organization
 - Intentionally structured so each article is self-contained
 - Eliminates flipping between parts to obtain information
 - Promotes Code usability
- Correlating Committee Action
 - Will form a task group to weigh merits of reorganization
 - Task group to report recommendation to CC at July 29, 2013 meeting
 - ATIS representatives appointed to task group
- Seeking PEG feedback
 - Reorganize or retain present arrangement?
 - PEG position presented to the task group and CC



NEC[®] Revisions Summary

- Exclusion of facilities under the exclusive control of the communications utility from NEC coverage remains unchanged
- Independence of Chapter 8 remains intact
- New requirements:
 - Listing of grounding devices
 - Listing of cable ties for air handling space applications



NEC[®] Revisions Summary, Cont'd.

- Revised requirements
 - *Cable Routing Assembly* definition revised and moved to Article 100
 - *Communications Equipment* definition to include associated wiring
 - *Optical Fiber Cable* definition to include field-assembled optical fiber cable
 - *Point of Entrance* definition revised to be specific to each article where it is used
 - Optical fibers permitted to be associated with power conductors of up to 1000 volts



NEC[®] Revisions

Caveat

Remember – we are quite far along in the NEC revision process and results are pretty firm. However, there is still the possibility of change. Issues can be brought before the NFPA voting assembly at the Annual Meeting or the NFPA Standards Council on appeal.



NEC[®] 2014 Edition

What's Next?

- NFPA to issue the Report on Comments March 22, 2013
- Notice of Intent To Make A Motion (NITMAM) due May 3, 2013
 - Individuals intending to bring an issue to the floor of the Annual Meeting must file their intent beforehand
- Approval of the 2014 NEC at NFPA Annual Meeting
 - June 2-6, 2013
- Appeals to NFPA Standards Council
 - July 30, 2013
- Correlating Committee NEC Chapter 8 Reorganization Task Group report to CC at July 29, 2013 meeting
 - If decision to proceed, task group will develop of reorganized Chapter 8 as public input for 2017 NEC revision cycle.