RUS 2006
Electric Engineering Seminar
Orlando, Florida

National Electrical Safety Code Revisions

Bob Lash, Chief, Transmission Branch,
and RUS NESC Subcommittee Members

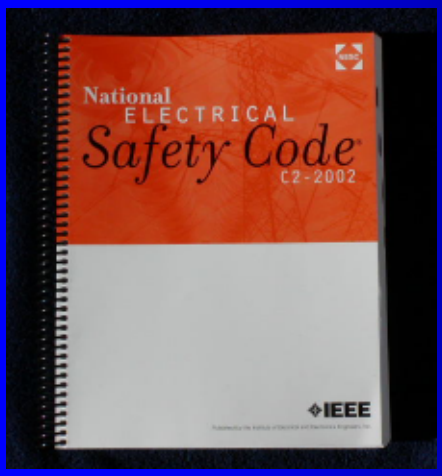
Development of NESC Change Proposals

- Change Proposals are submitted by individuals or organizations
- Task forces are established by NESC subcommittees to develop change proposals
- The subcommittee may develop a change proposal as a result of an interpretation request

REASONS FOR CHANGE PROPOSASLS

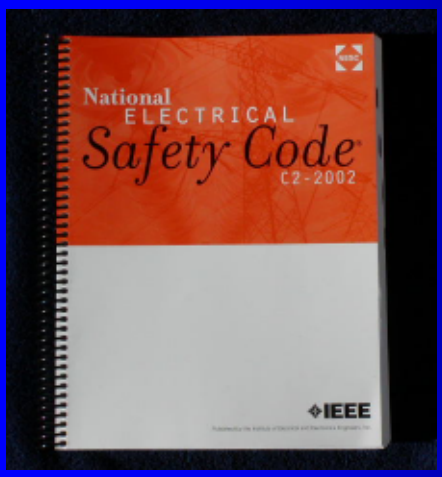
- *To address a safety issue*
- *To respond to an interpretation request*
- *To clarify a sentence or section*
- *To update the code to current national standards*
- *To update the code to new materials*

Proposed Changes to the 2002 NESC for the 2007 NESC



- *Comments from the public received by* ***May, 2005***
- *Final Vote by Subcommittees* ***Oct, 2005***

Proposed Changes to the 2002 NESC for the 2007 NESC



- Aug 1, 2006 publication of NESC 2007
- Jan, 2007 NESC 2007 becomes effective

Useful Links…..

- NESC Committee information

  http://grouper.ieee.org/groups/nesc/
- Interpretation Requests from 1991

  http://standards.ieee.org/nesc/interpretations.html
- NESC Revision Schedule

  http://standards.ieee.org/faqs/NESCFAQ.html#q4
- NESC Tentative Interim Amendments

  http://grouper.ieee.org/groups/nesc/index.html#tia
- NESC Errata's

  http://grouper.ieee.org/groups/nesc/index.html#errata

List of NESC Subcommittees

- SC 1 Purpose, Scope, Application, Definitions, and References
- SC2 Grounding Methods…..……Harvey Bowles
- SC3 Electric Supply Stations
- SC4 Overhead Lines – Clearances….Jim Bohlk
- SC5 Overhead Lines – Strengths and Loadings……..……..Donald Heald
- SC7 Underground Lines……Trung Hiu
- SC8 Work Rules
- Executive Subcommittee

Subcommittee 2 Grounding Methods

Harvey Bowles

Subcommittee 2 – Grounding Methods

- Rule 094B2 - Iron or steel rods shall have a cross-sectional dimension of **not less than** 15 mm (5/8 in).
- Rule 017B - The dimensions of physical items referenced in this code, such as wires and ground rods, are "**nominal values**" assigned for the purpose of convenient designation.

Subcommittee 2 – Grounding Methods

- SC2 requested that SC1 modify Rule 017B, by removing the words "ground rods" from the Rule, which would essentially make ground rod dimensions actual.
- SC1 accepted the request from SC2.

Subcommittee 2 – Grounding Methods

- At its September 2005 meeting, SC2 was informed by members of NEMA's 8CC technical committee that GR-1 (standard for ground rods) was being revised to require 5/8" galvanized rods to be a minimum of 0.625 inches in diameter.

Subcommittee 2 – Grounding Methods

- Rule 092D - Added paragraph and footnote
  - "Under normal system conditions a grounding conductor current will be considered objectionable if the electrical or communication system's owner/operator deems such current to be objectionable, or if the presence and/or electrical characteristics of the grounding conductor current is in violation of rules and regulations governing the electrical system, as set forth by the authority having jurisdiction to promulgate such rules."

Subcommittee 2 – Grounding Methods

- "NOTE: Some amount of current will always be present on the grounding conductors of an operating AC electrical system."

Subcommittee 2 – Grounding Methods

Justification:

"At present, misinterpretation and misapplication of the term "objectionable" in NESC 92D is creating unsafe system conditions at numerous locations. Electric utility customers with little or no understanding of the importance of grounding are being encouraged to cut grounds to eliminate current they consider "objectionable" (e.g., earth current). Unfounded earth current and "electrical pollution" concerns and the number of individuals misinterpreting and misapplying NESC 92D is on the increase. The number of system grounding conductors being cut by uninformed individuals because the term "objectionable" is not defined in NESC 92D is also on the increase."

Subcommittee 2 – Grounding Methods

094B7 – Revised to allow the use of steel poles as grounding electrodes under certain conditions:

- a. backfill around the pole is native earth, concrete, or conductive grout (not gravel),
- b. not less than (5.0 ft) of the embedded length is exposed directly to the earth, without nonconductive covering,
- c. the pole diameter is not less than (5 in),
- d. the metal thickness is not less than (1/4 in)

Subcommittee 2 – Grounding Methods

- Rule 096C – In response to an IR 532, Subcommittee 2 generated a proposal that adds a note to Rule 096C (otherwise known as the four grounds per mile rule).
  - "The intent is to ensure that grounds are distributed at approximately 400 meters (1/4 mile) or smaller intervals, although some intervals may exceed 400 meters (1/4 mile)."

Subcommittee 4
Overhead Lines –
Clearances

Jim Bohlk

Subcommittee 5
Overhead Lines –
Strengths and Loadings

Donald Heald

Members of Subcommittee 5
Overhead Lines - Strengths and Loadings
Sections 24, 25, 26, and 27

- EEI (7 members)
- IEEE (5 members)
- AWPA
- AISI
- ATIS
- EIA
- NARUC
- NSPE
- SEEX
- BPA
- RUS
- TVA
- WAPA
- NRECA (2)

Complete Rewrite of Sections 25, 26 & 27

- **PROPOSED** –
  Rewrite eliminates L,M,and H Loading Districts and replaces these with construction, extreme wind, and extreme wind and ice loads.
- Outcome for the preprint –
  - Accepted as an alternate method for the 2007 NESC
- **FINAL VOTE**–
  - Rejected

New Combined Ice/Wind Map CP 2802

- ***PROPOSED***
  - *New combined ice and wind map; retain current requirements of Light, Medium, and Heavy Loading Zones.*
- *Outcome for preprint*
  - *Accepted with modifications*
- ***FINAL VOTE***
  - *Accepted*

New Combined Ice/Wind Map

- *For Grade B, the radial thickness of ice from Figure 250-3 shall be multiplied by a factor of 1.00.*
- *For Grade C, the radial thickness of ice from Figure 250-3 shall be multiplied by a factor of 0.80.*
- *Structures and wires under 60 foot are excluded.*

Reference to ANSI O5.1-2002 CP 2780

- ***PROPOSED***
  - *Update reference of ANSI O5.1 in Rule 261A2b to ANSI O5.1-2002 .*
- *Outcome for preprint*
  - *Accepted*
- ***FINAL VOTE***
  - *Accepted but SC 5 updated the reference to ANSI O5.1-2005 and added wording to the rule (Rule 261A2b(1))*

Reference to ANSI O5.1-2002 CP 2780

- ***FINAL VOTE***
  - *Accepted but SC 5 updated the reference to ANSI O5.1-2005 and added to the rule the wording:*

    The "fiber stress height effect" of ANSI O5.1-2005 shall be considered for all naturally grown wood poles, greater than 55 feet in length, installed as single-based structures or unbraced multiple-pole structures.

Ground line moments
CP 2781

- ***PROPOSED –***

  To remove Exception 1 to Rule 261A2a

Ground line moments

What does Exception 1 to Rule 261A2a say?

"When installed, naturally grown wood poles acting as single based structures or unbraced multiple pole structures, shall meet the requirements of Rule 261A2a without exceeding the permitted stress level at the ground line for unguyed poles or at the points of attachment for guyed poles."

Ground line moments
CP 2781

- ***PROPOSED*** –
  To remove Exception 1 to Rule 261A2a
- *Outcome for preprint–*
  - *Accepted.*
- ***FINAL VOTE–***
  - *Accepted but revised the exception and added note 2. Also, acceptance is contingent on ANSI O5.1-2005 being approved.*

Ground line moments
CP 2781

- ***FINAL VOTE–***
  - *Revised Rule 261A2a by rewording the exception and adding note 2 as follows:*
  - ***NOTE 2: Maximum stress can occur above ground line.***
  - ***EXCEPTION 1: When installed, naturally grown wood poles, not greater than 55 feet in length, installed as single-based structures or unbraced multiple-pole structures, need only meet the requirements of Rule 261A2a without exceeding the permitted stress level at the ground line for unguyed poles or at the points of attachment for guyed poles.***

The 2007 edition of the NESC for wood poles over 55 ft in length:

- Design is to be based on decreasing fiber stress with height
- Design is to be based on the maximum stress point above ground

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60 foot exclusion (250C)
CP's 2766, 2673, and 2798

- ***PROPOSED*** –
  - *Remove 60 ft Exclusion Limit*
- *Outcome for the preprint* –
  - *Accepted 2766 with modifications. This CP removed the 60 ft exclusion but established a max. design wind load for structures under 60 ft.*
- ***FINAL VOTE*** –
  - *Rejected all CP's (60 ft. exclusion remains)*

60 foot exclusion remains
(Rule 261 A2a Exception 1)

- *CP's 2766, 2763, and 2798 are rejected based on information obtained from public comments. Utility experience has demonstrated that electrical distribution and communication line structures, under 60 ft in height, are damaged during extreme wind events by trees, tree limbs, and other flying debris. Designing structures with heights less than 60 ft for extreme winds will increase pole strengths for distribution systems resulting in large increases in cost and design complexity without commensurate increases in safety. Safety of employees and the public is provided using the current NESC loading requirements.*

Change Load Factor for Grade C Extreme Winds CP 2739

- ***PROPOSED -*** *The load factor for extreme winds and Grade C construction is changed to .87*
- *Outcome for the preprint - Accepted in principal, see CP 2766.*
- ***FINAL VOTE -*** *Accepted as originally submitted*

Remove Alternate Method CP 2717

- ***PROPOSED*** *–*
  Remove the alternate method (Table 253-2 & 261B) (the 'old method' ---ocf 4 and 2.67/2 for Grades B & C)
- *Outcome for preprint –*
  Accepted
- ***FINAL VOTE***
  Accepted but modified the CP. The alternate method shall not be used after July 31, 2010.

CP 2707 - Removal of 'k' factor from Table 251-1

- ***Proposal -*** *Removal of the 'K' factor from Table 251-1 used to determine sags and tensions*
- *Outcome for preprint*
  - Accepted as modified
- ***Final Vote -***
  - Rejected modified CP

Other Changes

- *Removal of the words urban and rural in section 24 (CP 2717)*
- *Changing the wording of overload factor to load factor throughout sections 25 and 26 (CP 2767)*

Other Changes (continued)

- '3-pole rule' is eliminated (CP2553)
- Table 253-1 (load factors) is reformatted to the heading (CP 2552):

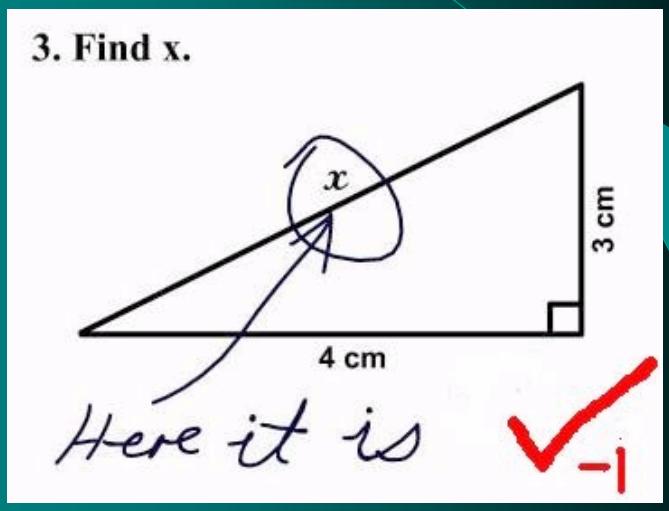
Grade B	Grade C	
All locations	At crossings	Elsewhere

- Load factors and strengths factors were added for fiber reinforced polymer structures (CP 2569)

Other Changes (continued)

- The strength of climbing and working steps is spelled out in a new rule 261N (Capable of supporting 2.0 times 300 pounds, unless otherwise quantified by the owner). (Modified CP 2709)
- An appendix is added with examples demonstrating calculations for extreme wind. (CP 2784)

Why Math teachers go bald…….



Subcommittee 7
Underground Lines

Trung Hiu

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