

Comments of Allen Clapp on Major Original Proposals for the 2007 NESC

by Rule, Change Proposal, and Preprint Page No.

Note: Many of these changes are clearly appropriate; others are controversial and require significant input from commentators to ensure appropriate final action. The action taken by the subcommittees is preliminary and may be changed due to comments received by the deadline 1 May 2005. **Copies of the 2007 NESC Preprint may be obtained from www.utilitybookstore.com or from IEEE.**

These brief descriptions of selected change proposals with significant change or clarification were prepared by Allen Clapp and John Dagenhart of Clapp Research Associates, P.C., Raleigh, NC, for Clapp Research, Inc. ©2004 — All Rights Reserved. See actual Change Proposal in the official Preprint for the complete text and extent of proposed changes and subcommittee actions. Commentary included with some descriptions is by Allen Clapp.

Comments by interested parties are solicited on all proposals by the NESC Committee. All comments must be submitted electronically through the following web site: <http://standards.ieee.org/nesc/rp/welcome.html>.

Comments for each separate topic are to be uploaded separately using the template at the following URL: <http://standards.ieee.org/nesc/rp/Comment.html>.

Scope, Application, Definitions and References

New Rule 013C, CP 2838, p. 14. Requires the inspection rules and work rules of the current edition to be used for inspection of, or work on, all installations, both existing and new.

New Rule 018, CP 2654, p. 165. The clearances tables will be revised to show the appropriate numbers of significant digits to allow new Rule 018 requiring results of calculations to be rounded off to the nearest significant digit, unless otherwise instructed in a rule. This will eliminate questions about whether “shall be not less than” language requires rounding up, instead of rounding off.

Revised Definition of Readily Climbable, CP 2528, p. 36. Would now require an 8-ft gap from the ground to the first handhold or foothold OR between the lowest two handholds/footholds. *This change may make some towers readily climbable that are not now so: i.e., where the 8-ft gap starts at less than 6 ft from ground and is between the 2nd and 3rd handhold/foothold level. Comments about whether to include the present allowance for the gap to start up to 6 ft above ground are appropriate.*

Proposed New Section 4 Inspections, Tests, and Maintenance, CP 2712, p. 42. Would create a new section from existing Rules 121, 214, and 313 and deletes those rules. Would eliminate confusions due to different wordings

in separate rules. Would also define timely transfer of facilities during maintenance. —

Rejected. Rejection appears to be primarily over concern about specifying time transfer of facilities. Comments are appropriate about both parts of the proposal: consolidating the rules so that minor word differences cannot be confused with intended differences in application and limiting the transfer times.

Grounding

Revised Rule 92D, CP 2538, p. 52-53. Will add another level of action for addressing objectionable current; i.e., determining the source and taking corrective action. Additional text will further define “objectionable current.” A Note will also be added to state that some current will always be present in the grounding conductors of an AC electrical system

Proposed Revision Rule 093B, CP 2793, p. 56. Would have prohibited the interconnection of different metallic materials except by using connectors that are made for bi-metallic connection. Also would prohibit direct contact between a copper-coated ground rod and a galvanized steel pole below ground. —*Rejected.* Comments on corrosion issues are welcome.

New Rules 094A and 094B, CP 2708, p. 58 and CP 2715, p. 65. Will allow a directly embedded steel pole to be used as a grounding electrode, under specified conditions.

Deletion of Text, Rule 094A1, CP 2671, p. 61. Preference for metallic underground cold water piping as grounding electrodes, where readily accessible, will be deleted.

Proposed Revision of Rule 094B2, CP 2790 and CP 2731, pp. 62-63. Would add metric designator and trade size designations for driven ground rods. Also, would require ANSI/GR-1 as the required specifications for copper and zinc coated iron and steel ground rods and stainless steel ground rods. —*Rejected*. A recent Interpretation indicates cited the fact that the NEMA GR-1 committee changed the dimension ranges so that the ranges do not include the nominal dimensions required by the NESC. Present Rule 017 that allows nominal dimensions from other standards was instituted after the NESC considered the ground rod dimensions then in effect. The reduced NEMA GR-1 dimensions cannot be determined to meet the NESC requirements.

Proposed New Rule 094C, CP 2794, p. 67. Would require grounding electrodes to be as near as practical to the equipment being protected and would prohibit installing electrodes in backfill around poles and foundations. —*Rejected*.

Proposed Deletion of Rule 096C, CP 2774, p. 70-71. Would eliminate the multi-grounded neutral system. —*Rejected*.

Revised Rule 096C, CP 2831, pp. 72-73. A Note will be added to state the intent of the 4-grounds-in-each mile requirement is to ensure that grounds are distributed at ¼ mile or smaller intervals.

Proposed Deletion of Rule 097B2, CP 2772, pp. 73-74. Would eliminate allowing the primary and secondary grounding conductors to be interconnected. —*Rejected*.

Proposed Revision of Rule 097C, CP 2773, pp. 75-76. Would eliminate utilizing a common neutral. —*Rejected*.

Revised Rule 097D2, CP 2629, p. 78. Will require the guarding of the secondary grounding conductor according to Rule 093D2 when primary and secondary grounding conductors are separated.

Proposed Revision of Rule 097D2, CP 2770, p. 79. Would eliminate the “should” rule for interconnecting primary and secondary neutrals on “existing” multi-grounded systems. —*Rejected*.

Proposed Revision of Rule 097D2, CP 2771, p. 81. Would require a separation of greater than 6 feet between the primary and secondary electrodes where the two are not interconnected. —*Rejected*.

Revised Rule 097G, CP 2539, p. 82. Will “require” the bonding of electric supply and communication system grounding systems on joint-use structures. Previously, this was a “should” rule.

Proposed Revision to Rule 097G, CP 2672, p. 83. Would move Rule 097G to Rule 99. Also, would require bonding at intervals not less than 4 times in each mile and revise Rule 099 to reflect the current version of the NEC—*Rejected*. The subcommittee stated it thought the submitter was trying to do too much in one submission.

New Rule 099D, CP 2634, p. 89. Would require bonding of all above ground metallic power and communication apparatus less than 6 ft. apart, whether underground or overhead systems. —*Rejected*. The subcommittee stated that this was an attempt to change grounding requirements, not the methods for grounding. The subcommittee suggested this proposal should be submitted to another subcommittee for consideration.

Electric Supply Stations

Revised Rule 123C; Deletion of Rule 173C, CP 2840, p. 95. A provision in Rule 123C that indicated that grounding could be omitted on conductors <25 kV with visible openings that are tagged will be removed, as will related provisions in Rule 173C. This is language that was placed in the code in the 1970 revision apparently in anticipation of such allowance by the work rules that never happened and is not contemplated. This action matches the Tentative Interim Amendment shown in the back of the 2002 Edition of the NESC.

Clarified Rule 124A1 and Table 124-1, CP2674, p. 96. These changes correct the apparent mismatch between the voltage limit starting Table 124-1 of 151 V phase-to-phase and Rule 124A1 of above 150 V phase-to-ground. The intention was to exempt 120-240 V. The rule will now refer to above 300 V phase-to-phase and the table will now refer to between .301-.6 kV phase-to-phase.

Overhead Clearances

Revised Rules 215C2 and 279; new Rules 215C3-C6, CP 2652, p. 109. The application and use requirements for guy insulators were moved from Rule 279 to Rule 215C, so that all requirements for using guy insulators as an alternate to grounding guys will be in one place. Rule 279 retains the strength requirements for guy insulators.

Revised Rule 217A1a, CP 2600, p. 120. Moves the following from Note status to Rule status: “This rules does not require protection or marking of structural components located outside of the traveled ways of roadways or established parking areas.”

New 217C and Revised 264E, CP 2616, p. 555. This revision moves the existing requirements for protection and marking of guys from Rule 264E to a new Rule 217C. This may well be best placed in Rule 217A.

Revised Rule 218A1, CP 2789 p. 122. Updates the tree trimming rule to refer to appropriate vegetation management practices and illustrates factors to consider in determining extent of vegetation management program.

Revised Rule 230B, CP 2508, p. 21. Copies the existing Figure 250-1 and Table 250-1 into Section 23 and re-labels the loading *districts* as ice *zones*. The radial ice is used to calculate sag at 32 °F. The radial ice, wind pressure and temperature combination is used in calculating inelastic deformation included in sag. Note: a new ice and wind map will be added to Section 25; this retains the existing information for use in calculating sags and clearances.

Clarified Rule 230I, CP 2542, p.133. The clearances of Section 23 are not intended to be maintained during the course of, or as a result of, abnormal events such as, but not limited to, actions of others, weather events in excess of those described under Section 23, etc.

Revised Rule 233B1, CP 2716, p. 153. The voltage adder for adjacent line horizontal clearances will now start at 22 kV as with other rules, instead of 129 kV. The basic vertical

clearance in Table 233-1 is 2 ft and the basic horizontal clearance in Rule 233B1 is 5 ft. The extra 3 ft horizontal clearance limits the opportunity for contact between swinging lines during storms. The 1981 revision of Rule 233 effectively removed the extra 3 ft as the voltage approached 129 kV. The 2007 revision restores the extra 3 ft horizontal storm clearance at all voltages.

Proposed Revision of Rule 234B1, CP 2803, p. 167. Would increase the clearance of a conductor to another line structure from 5 ft to 7.5 ft to recognize need for increased clearance for access to structure by workers in buckets and to eliminate the need to cover the conductors for work by personnel climbing the structure. —*Rejected*.

Revised Rule 234C2 and Exception 1 to Rule 234G1, CP 2799, p. 174. Restores the limitation on reduced clearances to metal-clad supply cables meeting Rule 230C1a, as was originally the case. Rule 230C1 includes two kinds of supply cables. Rule 230C1a requires a continuous metallic sheath or shield over the insulation. Rule 230C1b allows a semiconducting sheath or shield with suitable mechanical drainage, such as URD supply cable with concentric neutral. The latter cables are not considered as guarded under Rule 234C2 and require a conduit or covering when traversing the communication space down the pole under Rule 239G.

Revised Exception 1 and Deleted Exception 2 in Rule 234C3d, CP 2544, p. 176. Will directly specify clearances required for service drop conductors over roofs or balconies using criteria formerly in Exception 2 and eliminate the need for the present undefined “shall not be readily accessible” language and the undefined “special” tools. This change increases the readability of the rule and decreases the opportunity for misunderstanding, but is not a fundamental change in requirements. Additional changes are made to clearance values in CP 2635 below.

Revised Exception 1 and Deleted Exception 2 in Rule 234C3d, CP 2635, p. 178. This proposal includes a fundamental change in the basic clearance above a roof or balcony from 8 ft to 10 ft and extends coverage of the rule to porches or

attached decks over which they pass, in order to appropriately reflect expected activities in these areas. It will also directly specify and will increase clearances required for service drop conductors over roofs or balconies using criteria formerly in Exception 2 and eliminate the need for the present undefined “shall not be readily accessible” language, as in CP 2544 above. The reductions allowed in existing Exceptions 1 and 2 are retained in the revised Exception 1. This change also increases the readability of the rule and decreases the opportunity for misunderstanding, similar to CP 2544.

Clarification of Rule 235B1b, CP 2809, p. 208. This rule limits the opportunity for midspan contact due to swinging conductors. Horizontal clearances between conductors at the attachments on the supporting structures are measured to the surfaces of the conductors themselves and do not include armor rods, tie wires or other fasteners.

Clarification and Revision of Rules 235C and 235C1 and Table 235-5, CP 2547, p. 210. To limit the opportunity for confusion, this change directly refers users to the correct sub-rules for clearances between supply and communication lines (Table 235-5), communication lines in the communication space (Rule 235H), and communication lines in the supply space (Table 235-5).

In addition, the rule plainly specifies no clearance requirement between a neutral meeting Rule 230E1 and a supply cable meeting Rule 230C3. This change is in response to a recent Interpretation based upon present language that would not allow the widespread present safe practice of attaching the neutral/messenger of a triplex cable to an existing neutral bracket for support. This proposed rule should probably be revised to limit this to the attachment and require a midspan clearance not less than that required by Rule 235G, which is present practice. See the related changes to Rule 235G in CP 2835, p. 244.

Further, the change would specify no clearance requirement between two ungrounded, open

supply conductors of the same phase, same circuit, and same utility. This may be appropriate only so long as both wires are always energized or de-energized and cannot have different voltage levels; otherwise Rule 235A3 and normal clearances need to apply to recognize the level of voltage that can be between the conductors if one is grounded for work while the other is still energized. Further limitation may be appropriate.

Clarification of Rule 235C2b(1)(a), CP 2835, p. 213. The required midspan vertical clearance between conductors/cables supported on the same supporting structures is intended to be 75% of the basic value required at the structure by Table 235-5 plus the full amount of any voltage adder. The 75% reduction only applies to the basic value, not any voltage adder.

In addition, where a calculation is required by Table 235-5 and additional clearance is required above the basic table value for voltages above 8.7 kV, the 8.7 kV value will be increased to 16 kV. This completes the conversion from previous editions under which individual voltage adders were required if either voltage exceeded a table value, instead of the present requirement to use the greater of the phasor difference voltage or phase-to-ground voltage between the conductors, in accordance with Rule 235A3. The old 8.7 kV value was chosen to be between actual values. This change uses 8 kV rounded from 7960 V to produce the combined 16 kV allowed between the conductors before a voltage adder is required.

Clarification of Rule 235C2b(1)(c), CP 2833, p. 218. This proposal intended to clarify the conditions of loading mismatch required for vertical clearances between the upper conductor or cable and the lower conductor or cable for the design winter condition and design summer condition. The part of the change that indicates that neutrals, etc., need not be at 120 °F and can be at whatever temperature would be produced by ambient air plus insolation was *accepted*.

The part of the proposal that would limit the Exception allowing both conductors or cables to be considered without icing differentials under certain conditions to the winter design condition in Rule 235C2b(1)(c)iii was *rejected*. As a result,

utilities do not have to consider the temperature differential between conductors of the same utility when one conductor is fully loaded electrically and the other has tripped off or been taken off for work. The Exception should never apply to differences in electrical heating under any condition summer or winter. The Exception should only apply, if ever, to the ice loading differentials of Rule 235C2b(1)(c)ii. The Exception should not apply to the temperature differentials of Rule 235C2b(1)(c)i.

Clarification of Rule 235F, CP2549, p.237.

With respect to circuits of different voltage classifications located in the supply space on the same support arm, a neutral conductor is considered to have the same voltage classification as the circuit with which it is associated.

Revised Rule 235G, CP 2805, p. 244. Rule 235G will now explicitly allow the long-existing safe practice of attaching a multiplex neutral to an existing neutral bracket, so long as (a) the clearances at midspan meet Rule 235G and the newly numbered Table 235-8 containing the existing values in a previously unnumbered table and (b) the energized, insulated conductors of the multiplex cable are held away from chafing on the existing supply neutral at the attachment. See the related changes to Rules 235C and 235C1 in CP 2547, p. 210.

Clarification of Rule 235I2, CP2527, p. 249.

The former references to a radio frequency of 0-750 V are appropriately changed to a radio frequency of 3 kHz to 300 GHz.

Revised Table 235-5, Row 2d, Column 5, CP 2548, p. 259. The clearance between conductors of different utilities where an upper line of >8.7 kV is above a lower line of >22 kV is changed from 16 inches plus the voltage adder to 40 inches plus the voltage adder, to match Rows 2a, 2b, and 2c(1).

Revised Table 235-5 Heading, CP 2538, p. 261. The heading will include notification that the calculations required inside the table use voltages between conductors, as well as the requirement to use the phase-to-ground voltage

to enter the table column and row headings. See Rule 235A3.

Revised Table 235-5 Footnote 5, CP2758, p. 282.

Fiber optic cables and insulated communication cables located in the supply space and carried on a grounded messenger will now be allowed to have clearances from communication cables in the communication space of 30 inches at the structure and 12 inches at midspan—if the messengers are bonded together, similar to the present allowance for 230E1 neutrals. Entirely dielectric fiber optic cables have no conductive messenger to bond to communication messengers.

Clarification of Table 235-6, CP 2595, p. 286.

Neutrals meeting Rule 230E1 are recognized differently from phase conductors of 0-8.7 kV. Comment is appropriate. The original proposal to have neutrals and communication lines have the same clearances—and to have those clearances differ if on joint-use structures—was modified to only show a neutral clearance on a joint-use structure, but neither may be the best presentation. The neutral clearance also needs to be stated when on structures that are not joint-use.

Proposed Revision of Rule 238C, CP 2801, p. 300.

This proposal would have prohibited ungrounded span wires or brackets of luminaires, traffic signals, or trolley conductors in the communication worker safety zone. —*Rejected*. Comment is appropriate. Many power utilities prefer to have street light brackets ungrounded in the supply space. There are valid arguments both ways on that issue. However, it is difficult to find any excuse to have an ungrounded street light bracket located below the grounded neutral in the communication worker safety zone. It is not a potential ground source for the supply workers, since it is below their own grounded neutral, but it is a potential source of voltage difference for communication workers and should be prohibited.

Revised Rule 239A2, CP 2698, p. 307.

Limitations on placing cables of different voltages or different utilities in the same conduit duct or under the same U-guard are directly specified. Secondary and primary voltage supply cables can be in the same duct or U-guard if the primary cable meets Rule 350B. Supply and communication owned by the same utility may be in the same duct or U-guard. Communication cables owned by different utilities may be in the

same duct or U-guard if all agree. See also **CP 2624** on page 587 of the Preprint.

Revised Rule 239A6, CP 2586, p. 309. A backing plate would not be required on U-guards above the level of 8 ft above ground.

Overhead Strengths and Loadings

Revised Tables 242-1 and 242-2, CP2826, p. 318. Grade B construction will now be required over navigable waterways requiring waterway crossing permits, in addition to railroad tracks and limited access highways. Recent storm rescue efforts were hampered by lines down over waterways used for rescue. This will limit line failure due to storm winds alone coming across unsheltered water.

Complete Revision of Sections 25, 26 and 27, CP 2737, p. 322. The intent of this revision is to make NESC requirements be consistent with the latest trends in ANSI recognized documents, including ASCE 7 and other documents with standardized methodologies, new combined ice/wind loading maps (for freezing rain), etc. To allow a reasonable transition over 5 years, the proposal is to include these revisions in the 2007 Edition with an N prefix to rules and tables, with the previous system having a P prefix to rules and tables. Either system would be allowed. The systems are independent and cannot be combined.

Other change proposals approved to existing requirements that would also affect existing requirements carried over into this new system would also be incorporated into the new system.

Three types of loading must be considered: ice combined with wind, wind on bare facilities, and construction/maintenance loads. The existing exemption from considering extreme winds on structures or facilities less than 60 ft above ground is eliminated. The exemption was installed for distribution facilities in the 1977 Edition. The wind data is taken at 10 m (33 ft) above ground. At the time this decision was made, the predominant distribution pole length was 35 ft. Thus all facilities were significantly below 33 ft above ground and experienced lesser wind pressures. The history of line failures in extreme winds was limited to transmission lines with larger conductors

on tall structures or over ravines. No significant distribution line failure was known to exist at that time. Further, few distribution poles were loaded near the maximum loading allowed by the NESC. Today, the predominant pole length is 40 to 50 ft and many structures are loaded near allowed limits with larger power wires and larger and more communication cables. Structure failures have started to drop distribution lines that pass the old combined ice/wind test but cannot pass the extreme wind test. Such failures have occurred all across the nation and are not confined to heavy ice loading areas. It is long past time to require all structures to be checked against expected extreme wind loadings.

A significant change is the inclusion of the new freezing rain ice and wind maps from ANSI/ASCE 7 that is now used throughout the nation in building code requirements. This map does not include rime ice or hoar frost. As a result, the present ice loading districts may also be retained and be required to be checked as well as the new freezing rain map. Some areas of the country that experience rime ice or hoar frost on overhead wires, cables, and structures have loadings that exceed the freezing rain map of ASCE 7.

The extreme wind map of ASCE 7 and the system of height adjustment and gust response factors introduced in the 2002 Edition of the NESC will be retained.

The old calculation method currently in Table 253-2 and Table 261-1B will be discontinued.

Significant comments are presented by various subcommittee members after the vote. Many of these can be expected to produce comments and may cause change in the final form.

Revised Rule 250 and Combine Ice/Wind Maps, CP 2802, p. 361. This proposal adds the combined freezing rain ice and wind map from ASCE 7 into the existing methodology by adding a new Rule 250D. The existing loading district map will also be retained to take care of areas where rime ice or hoar frost may cause a greater loading. See discussion under CP 2737 above.

Proposed Revision to Include an Alternate Method for Single Pole Structures Without Bracing or Guying Based Upon Reliability-Based Design Methodologies, CP 2736, p. 377. This proposal is the result of extensive effort by a

special working group and is related to CP 2733 and CP 2734 on pages 417 and 421 of the Preprint. It would add an alternate method based upon the ASCE Manual of Practice on Reliability-Based Design of Utility Pole Structures. This methodology uses probability-based storm loadings and strengths for design of poles only, not crossarms, braces, and other items. The system is designed to work without regard to which material is used, since it uses probability-based lower exclusion values of strength of different materials—*Rejected*. The revisions were rejected because the ASCE manual upon which they are based is not complete. Comment is appropriate. See the various comments by subcommittee members on page 389 of the Preprint.

Revised Rule 250A1, CP 2766, p. 390. The 60-ft exemption will be removed from the present methodology (see the discussion under CP 2737 above) but extreme wind pressures on bare facilities will be limited to 22.5 psf and 15 psf for Grade B and Grade C, respectively, for attachments and structures below 60 ft above grade. Significant and extensive comments by subcommittee members can be expected to produce comments and may cause change in the final form. See page 398 of the Preprint. The report of the Task Force 5.1.2 that developed this proposal is included in CP 2798 on p. 402. That report is also followed by extensive comments by subcommittee members. Also see related CP 2739 on page 506 of the Preprint.

Proposed Revision of Rule 250C, CP 2718, p. 432. This proposal would have replaced existing Rule 250C and Tables 250-2 and 250-3 with a new system for applying wind to structures and supporting facilities. —*Rejected*. This system is extensive and has extensive support tables. It was rejected because it was felt not to appreciably improve usability of the code and some of the values were reductions without supporting justification.

Revised Rule 250C, CP 2787, p. 451. The extreme wind height adjustment system and gust response factor system was simplified for

application to structures by using the wind pressure at 2/3rds of the height of the structure. This revision allows for more specific determinations of wind loading for large tower arms and similar facilities located at or near the top of the structure.

New Rule 250D; Revised Rules 250A2, 263A and 263C and Table 253-1, CP 2658, p. 413. A new Rule 250D (which may be renumbered as necessary) will be added to specify construction and maintenance loads to be considered. The vertical overload factor of 1.90 in Table 253-1 will be changed to 1.35 and Footnote 6 will be removed from the table. Rules 263A and 263C will be revised to require consideration of worker loads in Rule 250A2.

In the 1980s, there were some failures of small, lightly loaded rural poles with workers on them. Investigation determined that the greatest loads on the structures were not wind and ice loads but worker loads during construction or maintenance. As a result, the vertical overload capacity factor for Grade C was increased in the 1990 Edition to match that of Grade B as a way to recognize loads placed on structures during construction or maintenance. This method was not directly related to actual worker loads, but worked for smaller structures. It caused over-design of larger structures and towers built to Grade C.

When the strength factors were split out of the overload capacity factors, the vertical overload factor for Grade C had to be greater than that for Grade B, with appropriate footnotes, to produce the same end result when the overload factor of Table 253-1 and the strength factor of Table 261-1A were combined in use. This awkward situation led to formation of a task force to study worker loads and apply those directly, so that the previous relationships between Grade B and Grade C could be restored.

Vertical loads at sagging tensions will use an overload factor of 2.00; if the sagging operation is carefully controlled, the overload factor can be reduced to 1.50. Structural members that will support a line worker must support 340 lb at their

midpoint. If the wire-pulling process is not carefully controlled to limit the opportunity for hang-ups, the pulling tension must be applied at the block location with an overload factor of 1.50. If workers are expected to be on a structure during pulling, both sets of loads apply. The proposal was accepted with modifications. Comments are appropriate. Extensive subcommittee comments were given that may result in further comment and change to the proposal.

Revised Rule 251 and Table 251-1, CP 2707, p. 462. The proposal would have restated the requirements for tension on conductors and cables for the conductor loading check in Rule 251 and would have eliminated the need for the “k” factor constant of Table 251-1. This constant has caused confusion about what loads were to be applied to the structures since its inception. The original code requirement was to use an 8 psf wind on structures and suspended facilities. That was felt to be too high and was reduced to 4 psf for structures and suspended facilities. However for the strength check on the wires and cables, the resultant of the weight load and 4 psf wind load was required to be increased by a constant that essentially produced the effect of the original 8 psf wind. The problem was uncertainty as to which tension should be applied to the structures, that produced by the 4 psf wind or that produced by the 4 psf wind plus the constant. The original proposal would have restated the 8 psf inside Table 251-1. The subcommittee voted to eliminate the k factor altogether and delete it from the table. Comment is appropriate. See the comments on page 466 of the Preprint.

Proposed New Rule 252A, CP 2506, p. 468. This proposal would have added a new rule for eccentric loads. This was in response to line failures resulting from ice loading on crossarms with significant differences in loading on each side of the pole.—*Rejected*. The subcommittee felt that Rule 252D already takes care of this issue. Several members were concerned that the proposal was incomplete and did not adequately specify stress assessment at the point of maximum stress.

Revised Exception to Rule 252B2c, CP 2786, p. 472. A reduction of shape factors based upon a qualified engineering study will be allowed.

Revision of Rules 253 and 261 to Delete the Alternate Method for Wood Poles and Tables 253-2 and 261-1B, CP 2717, p. 473. This deletion was originally scheduled to occur in the 2002 Edition but, due to inadvertent oversight was included only within another proposal that was not accepted.

Proposed Clarification of Rules 253 and 277 and Table 253-1; New Table 253-3, CP 2829, p. 475. This proposal would have clarified the overload factors to be applied to support hardware and insulators. Insulator standards are referenced in Rule 277 and separate specifications are shown for station post insulators, line post insulators and suspension insulators.—*Rejected*. This proposal resulted from correspondence between NESC SC5 on Strengths and Loadings and the ANSI C29 committee on insulators concerning degradation of insulators over their life. Extensive controversy surrounds this proposal and the best course of action for the NESC Committee, refusal of the ANSI C29 committee to give appropriate direction. The problems addressed by this proposal have potentially dramatic consequences. Comment is appropriate.

Revised Table 253-1, CP 2552, p. 480. The distinction between Grade B at crossing and Grade B elsewhere is eliminated to simplify the requirements and eliminate confusion.

Proposed Revision of Table 253-1 and Footnote 6, CP 2568, p 482. This proposal would have eliminated differences in the strength factors for Grade B and Grade C wood.—*Rejected*. It was rejected because no justification was given for changing the relative effect for the two grades by the manner of the revision. Comment is appropriate. It makes sense to put all of the Importance Factors for the difference between Grade B and Grade C into Section 25 and leave strength variability factors alone in Section 26. Comments may be able to revive the useful part of this proposal by placing the appropriate relative Importance Factors in Section 25.

Revised Rules 253 and 260B, New Rules 261A3, 261C3 and 261D3 and Tables 253-1 and 261-

1A, CP 2569, p. 486. This change recognizes appropriate overload factors for fiber-reinforced polymer portions of structures, crossarms, guys, etc., in Grade C construction, but the manner of its adoption does not obviously recognize the materials for use in Grade B. Comment is appropriate.

Proposed Revision of Table 253-1 and Table 261-1A, CP 2807, p. 494. This proposal is the result of a longstanding need to coordinate the loading factors, importance factors and strength factors in a uniform manner. The basic results of an EXCEL spreadsheet are shown. The EXCEL spreadsheet may be found at either www.clappresearch.com or www.utilitybookstore.com. The present values were developed over time and are not coordinated. As a result, relative under-design or over-design or both may occur. Since the original values were not coordinated, some values need to move up or down to achieve appropriate coordination. —*Rejected*. This proposal was not in final form, but is presented so that all can run their own trials and produce effective comment on appropriate values for load factors, importance factors and strength factors upon which to base code requirements. This consideration has been going on for several code editions. With all of the changes being made in this edition, now is the time to coordinate these values once and for all. The term load factor is supposed to only include factors to account for (a) deviation in actual load from nominal load, (b) uncertainties in the analysis that transforms the load into a load effect, and (c) the probability that more than one extreme load can simultaneously occur. Our present overload factors have additional importance considerations for angles, deadends, crossings, etc., in addition to the considerations shown above, which is one of the reasons that the term overload factor has been used instead of load factor.

Now is the time for us to pull out importance factors for deadends and angles vs. tangent structures, Grade B vs. Grade C, crossings versus non-crossings (or eliminate this particular distinction), etc., and to make the strength factor be only related to variability in material. We should have the Grade B vs. Grade C importance factors in one place, not two. We know that the present numbers are not coordinated and some would have to change to have equal

weighting given to the same importance factor when included in other numbers. The present system does not match well with modern computer calculation routines. We attempted to start the process by separating factors for loading from factors for strength, but we have not been complete. We even have the Grade B vs. Grade C importance factor split between two sections, which does not make sense. It is time to get this area of the code in shape to make it easy to deal with for the future.

It does not matter whether we present the ultimate result in a load factor and set of importance factors in Section 25 with a strength factor in Section 26 or lump the importance factors with load factors to create a coordinated set of overload factors in Section 25. Mathematically it does not matter if the importance factors are on the load side or resistance side of the equation, but it seems most people prefer them to be on the load side.

Clarification of Tables 253-2 and 261-1A, CP 2827, p. 502. The footnotes will be revised to clarify that the limits on deterioration of strength, replacement, and rehabilitation for structures apply also to components of structures.

Revised Tables 261A and 261B, CP 2824, p 520. Crossarms and braces are added to the strength factor tables to reflect the requirements of Rules 261D1, 261D2a(1), and 261D2a(2). See also **CP 2614** on page 548 of the Preprint.

Revised Rule 261A2b(1), CP 2780, p. 525. A new sentence is added to recognize the need to consider the height effect on allowable fiber stress in accordance with ANSI O5.1-2002.

New Rule 261N, CP 2709, p. 529. A new Rule 261N Climbing and Working Steps and Attachments was added with a NOTE to refer users to IEEE Std 1307-1996 *IEEE Standard for Fall Protection for Utility Work*. See also **CP 2776** on page 546 of the Preprint.

Deleted Rule 261A2e, CP 2553, p. 534. The former *average strength of three poles* wood pole rule was deleted. It is not appropriate to install poles with less strength than normally required. Such action is not permitted for other materials. The rule was only appropriate in very short span construction, where significant guying could be achieved from conductors attached to neighboring poles. This is rarely the case with the large conductors and cables with large sags in use today.

New Exception 1 to Rule 261D4b, CP 2830, p. 538. This allows crossarm braces used only to sustain unbalanced vertical loads to be designed only for those unbalanced loads: i.e., without an overload factor being applied. Comment is appropriate. This proposal may be changed based upon comments; it was passed before the vote to put the former vertical overload factors back to appropriate levels by separately accounting for worker loads.

Proposed Revision of Rule 261H1, CP 2768, p. 541. This proposal would have updated the aeolian vibration limits in the NESC based upon modern theory and practice. —*Rejected*. This results from presentations by experts and consideration by the subcommittee at various prior meetings. The majority felt that the trigger point in this proposal was too restrictive, but others felt that it could be made workable. Comments are appropriate. This is a difficult issue to add appropriate restrictions without being overly restrictive or burdensome.

Revised Table 263-1, CP 2619, p. 554. The distinction between urban and rural locations for minimum sizes of Grade N supply line conductors was removed and the table values were consolidated.

Revised Rules 279 and 215C2; new Rules 215C3-C6, CP 2652, p. 109. The application and use requirements for guy insulators were moved from Rule 279 to Rule 215C, so that all requirements for using guy insulators as an alternate to grounding guys will be in one place. Rule 279 retains the strength requirements for guy insulators.

Revised Rule 279A2b(2), CP 2555, p. 567. The rule about placement of guy insulators in ungrounded guys was modified to add “due to a slack conductor or guy” as the method of a guy and energized conductor contacting each other, apparently due to a belief that the rule was not intended to cover broken guys. This may be a controversial change, since many believe that broken guys are the worst problem in bringing voltage down to the ground or lower facilities. Most fatalities or injuries with which Allen Clapp is familiar are related to guys that have been cut, broken or corroded loose from the anchor.

New Rule 279A3b, CP 2620, p. 568.

Specifications for insulators added in guys for purposes of increasing the BIL insulation level at the top of the pole are added. Grounding of the anchor guy below such insulation may be required.

Underground

New Rule 311C, CP 2623, p. 571. This change mirrors existing Rule 230A2d in the underground rules to allow emergency placement of some cables directly upon the ground. This is useful in achieving time restoration of service until a permanent fix can be accomplished, if an existing cable faults out of service.

Proposed Revision of Note 2 under the title of Section 32 and Rule 350H, CP 2705, 573. This proposal was intended to correct a change made in the 2002 Edition to allow single duct conduits not a part of a conduit system to meet Section 35 on direct-buried lines instead of Section 32 on conduit lines and conduit systems. The effect of the 2002 change was to increase a clearance between gas and electric lines in joint trenches belonging to the same utility with which no bad history has been shown. —*Rejected*. This is a controversial change and can be expected to receive comments. Unfortunately, due to fact that the construction of the code does not allow mandatory actions to be contained in NOTES, the original intent of the subcommittee has not been met, either. Comments are appropriate to assure that the best code language results.

Proposed Revision of Rule 322A, CP 2811, p. 576. This would have required color coding of underground conduits. —*Rejected*. The code allows color coding but does not require it, since colors are not permanent in many soils.

Move of Rule 350F to 384C, CP 2765, 578. This move will apply the bonding requirements for above-ground padmounted equipment within 6 ft of each other to both direct-buried cable and conduit cable fed equipment.

Proposed Revision of Rule 350G, CP 2812, p. 580. This would have required color coding of direct-buried underground cables. —*Rejected*. The

code allows color coding but does not require it, since colors are not permanent in many soils.

Revision of Rules 351C1 and 351C2, CP 2622, p. 582. The 5 ft horizontal clearance of Rule 351C1 will apply only to below ground pools. Above-ground pools were added to 351C2 by a change to refer to “other structures” in that rule and a new Note under Rule 351C1 referring the user to 351C2 for above-ground pools.

Proposed Revision of Rules 352C and 352D, CP 2501, p. 584. This revision would have limited the use of guided boring technologies to bury cables. —*Rejected*.

Revision of Rules 352E and 352F, CP 2624, p. 587. This prohibits supply and communication cables in the same conduit duct, unless owned by the same utility, and prohibits multiple communication cables in the same duct, unless all utilities involved are in agreement. See also **CP 2698** on page 307 of the Preprint.

Work Rules

Proposed Revision of Rules 410A2; 420B-D, G, J, L, and M; 421C; 422A, C1 and C5; 423C and D; 441A3b; 442B; and 443A3 and 5, B and K; New Rule 448, CP 2640, p. 590. This revision would have added minimum approach distances for persons other than qualified communications or electrical employees who were not escorted. —*Rejected*. The changes were complex and were felt to add an unnecessary layer of complexity. Extensive comments of subcommittee members were provided starting at page 599 of the Preprint.

New Rule 420B2, CP 2503, p. 604. A new rule requiring operators of mechanized equipment to be qualified was added in response to concerns about operators of guided boring and directional drilling operators.

New Rule 410A3, New Tables 410-1 and 410-2, and Revised Rule 420I, CP2815, p.606. As of January 2009, employers must (a) have completed arc-exposure analysis based upon available fault current, arc duration, and employee distance from the arc and (b) require

employees to wear clothing or a clothing system with an appropriate arc rating. Tables of voltage, fault current, and maximum clearing time are matched with appropriate clothing system calorie designations.

New Rule 423D2, CP 2504, p. 613. Existing utilities must be exposed before using guided boring or directional drilling for placing new cables on a crossing path.

New Rule 420Q, CP 2530, p. 615. Exposure of workers near communication antennas of 3 kHz to 300 GHz shall not be exposed to excessive radiation levels. OSHA 29 CFR 1910.97 and 1910.268, FCC Bulletin 65, and IEEE Std C95.1-1999 are referenced.

Revised Table 431-1 and Rule 432, CP 2525, p. 617. The minimum approach distances for communication workers to exposed energized parts has been revised based upon changes in IEEE Std 516. In addition, distances at higher altitudes are now shown in the table.

Proposed Revision of Rule 432B, CP 2713, p. 627. Communication utilities would have been given until January 1, 2009 to provide employees with insulated aerial buckets and prohibit the use of metal basket aerial devices on joint-use power lines. —*Rejected*. This is obviously a controversial proposal. When a communication worker contacts an energized power line and is injured, every joint user on the pole is sued. Any electric utility that allows the use of conductive buckets on joint-use poles has an increased liability, because of the all-too-frequent contact by communication workers with power lines above the communication space during movement of the bucket, particularly when maneuvering around shrubbery that the communication workers fail to remove before working on their facilities.

The industry is correct that Rule 432 now prohibits communication workers from being higher than the lowest supply conductor, but the accidental contacts still occur. Part of the problem may be that communication workers for major telephone utilities can be in charge of a crew inside of 6 months of starting work. Power

workers are not working alone or in charge of a crew until around 5 yrs or more. Whatever the problem is, it is not going away. This proposal could save lives and limit the liability of all other joint users of a pole. Comment is appropriate.

Revised Rule 441 and all its Tables, CP 2524, p. 629. This includes extensive modifications of the minimum approach distances to exposed energized parts based upon changes in IEEE Std 516, including stated distances at various altitudes, and extensive requirements for engineering analysis and temporary transient control. Many of these changes are complicated and **the subcommittee is soliciting extensive comments on this proposal**, particularly on new Rules 441A5 on engineering analysis of transient overvoltages and 441A6 on transient overvoltage control.

Revised Rule 441A3b, CP 2560, p. 662. Rubber gloves will be required when working “within the reach or extended reach of the minimum approach distances listed in Table 441-1”... The term “extended reach” is not defined. Comment is appropriate.

Proposed Revision of Rule 441A3c, CP 2817, p. 664. This revision would have required rubber gloves to be rated for transient overvoltages. —*Rejected* in favor of action on **CP 2818** below.

New Rule 441A3d, CP 2818, p. 665. A new Rule 441A3d is added to specify that (a) cover-up used to insulate phase-to-phase exposure be rated for phase-to-phase voltage and (b) all other cover-up be rated for not less than phase-to-ground voltage. A new NOTE explains that voltage exposure of the worker is based upon conductor spacing, worker position, the task being performed, work rules, etc. There were extensive comments by subcommittee members that are instructive on this subject.

Revised Footnote 1 of Table 441-6, CP 2820, p. 675. If the maximum anticipated transient overvoltage is 2.4 per unit or less, the phase-to-ground potential may be considered as the nominal design voltage when selecting rubber

gloves where there is no multi-phase exposure or such exposure is removed. This works with new Rule 441A3d above to produce a safe system to allow workers to be protected without wearing unduly burdensome thicknesses of gloves. As with CP 2818 above, there were extensive comments by subcommittee members that are instructive on this subject.

Revised Rule 445B, CP 2819, p. 682. Where multiple phase ground connections are connected to the same point, all of the phase connections must be removed before the ground connections, unless a hazard of accidental contact of the ground with ungrounded parts could occur. In that case, the grounds can be removed individually.

Appendix

Revised Appendix A, CP 2551, p. 685. The portions of the present Appendix that explains the derivation of clearance requirements prior to 1990 will be removed; only the present system will be shown.

Revised Table A-1, CP 2575, p. 690. The table of mechanical and electrical clearance components will be rearranged for ease of reading and metric numbers will be added.

Revised Table A-2a, CP 2599, p. 694. The table of reference components will be revised to have the same row headings as now used in the tables in Rule 232.

New Appendix B?, CP 2784, p. 698. A new appendix will give examples demonstrating the application of the extreme wind loading rules.

New Appendix B?, CP 2508, p. 21. A new appendix will discuss the uniform clearance calculations for conductors under ice and wind loading adopted in the 2007 Edition.

Preliminary Report of Task Force 5.2.1

At the rear of the Preprint is a preliminary report of the task force evaluating the loading implications of CP 2737, the new strengths and loading system. It compares load cases for various pole types for 2002 loading and proposed 2007 new system loading.