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NESC SUBCOMMITTEE 5  
 OVERHEAD LINES - STRENGTH AND LOADING  
 29 Sep, 2003 - 02 Oct, 2003  
 IEEE, Piscataway, NJ

Name	Voting	Organization	09/29	9/30	10/1	10/2
Richard Aichinger (Alternate)	Y	AISI	X	X	X	X
Julian Ajello (Principal)	N	NARUC	A	A	A	A
Alan J Amato (principal)	Y	SCTE	A	A	A	A
Chris Austin (Alternate)	N	NCTA	A	A	A	A
Nelson G Bingel (Principal)	Y	AWPA	X	X	X	A
Chuck Bishop (Principal)	N	NRECA	A	A	A	A
Rex Bullinger (Principal)	Y	NCTA	X	X	X	X
Terry Burley (Alternate)	Y	WAPA	A	X	X	X
Allen L Clapp (Principal)	Y	Self	X	X	X	X
Clayton L Clem (Principal)	Y	TVA	X	X	X	X
Ron Corzine (Alternate)	N	SEEX	X	X	X	X
Frank A Denbrock (Principal)	Y	IEEE/PES/T&D	X	X	X	X
Nicholas J DeSantis (Principal)	Y	EEI	X	X	X	X
Bruce Freimark (Principal)	Y	EEI	X	X	X	X
Robert S Fuller (Principal)	N	NSPE	A	A	A	A
Douglas Hanson (Principal)	N	WAPA	A	A	A	A
Jerome G Hanson (Principal)	N	Self	A	A	A	A
Edward Harrel (Principal)	Y	EEI	X	X	X	X
Donald G Heald (Principal)	Y	RUS	X	X	X	X
Richard W Hensel (Principal)	Y	IEEE	X	X	X	X
Walter D Jones (Principal)	Y	IEEE/IAS	A	X	X	X
Leon Kempner (Principal)	Y	BPA	X	X	X	X
Jim Kinghorn (principal)	Y	NCEMC	A	A	A	A
Robert O Kluge (Principal)	Y	EEI	X	X	X	X
Brian Lacoursiere (Alternate)	N	AISI	A	A	A	A
Robert Lash (Alternate)	N	RUS	A	A	A	A

Joseph Muccilo (Principal)	N	EIA	A	A	A	A
Robert C Peters (Principal)	Y	IEEE	X	X	X	A
Joseph Rempe (principal)	Y	APPA	A	A	A	A
Camille G Rubeiz (Principal)	N	AISI	A	A	A	A
Andrew Schwalm (Principal)	Y	IEEE	A	A	X	X
Wade Shultz (Principal)	Y	SEEX	X	X	X	X
Lawrence M Slavin (Principal)	Y	ATIS	X	X	X	X
Richard J Standford (Principal)	Y	EEI	X	X	X	X
Jose Vivas (Alternate)	Y	EEI	X	X	X	X
C. Jerry Wong (Principal)	Y	EEI	X	X	X	X
Ted S Woo (Alternate)	N	SCTE	A	X	A	A
Alan T Young (Alternate)	N	EIA	A	A	A	A

**Guest**

O C Amrhyn		Self	A	X	X	X
William Ash		IEEE	X	X	X	X
Steve Cantrell		TVA	X	X	X	X
Wes Oliphant		Newmark	X	X	X	X
H M Rollins			X	X	X	X
Sue Vogel		IEEE	X	X	X	X

**X - Present    A - Absent**

**Chair:** Frank Denbrock    **Secretary:** Allen Clapp

**Notes:** New CPs submitted by Subcommittee 5:

- CP 2826 Rule 242
- CP 2827 Rule 253 and 261
- CP 2828 Rule 250
- CP 2829 Rule 253 and 277
- CP 2830 Rule 261

**Revised Text**

Part: 2 Section: 24  
 Rule: 242 Table 242-1  
**CP2617**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Amato, Bingel, Bullinger, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Kempner, Kluge,

Peters, Rempe, Shultz, Slavin, Standford, Vivas, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 24

Rule: 242 Table 242-1& 2

**CP2826**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Peters, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (1) Kinghorn

**Abstention:** (0)

**Explanation of Vote:**

KINGHORN: USACOE will not allow variances from Code even under emergency (permit) conditions. The CP will eliminate emergency restoration under circumstances as we recently experienced. It would have been impractical to span the breach of Hatteras Island we recently experienced if this change had been in place.

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**Deleted Text**

Part: 2 Section: 24

Rule: 242 Table 242-2

**CP2618**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Amato, Bingel, Bullinger, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Standford, Vivas, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**New Text**

Part: 2 Section: 25

**CP2737**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

Send to have Task force 5.2.1 to calibrate values and get feedback from utilities on loading cases. Also to have a report prepared by March 1, 2004.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (13) Aichinger, Bingel, Burley, Clapp, Clem, Denbrock, Heald, Hensel, Jones, Peters, Rempe, Slavin, Standford

**Negative:** (8) DeSantis, Bullinger, Amato, Freimark, Harrel, Kempner, Kluge, Shultz

**Abstention:** (2) Kinghorn, Wong

**Explanation of Vote:**

AMATO: There exists insufficient supporting comments and data.

BINGEL: Compared to the 2002 NESC, This CP incorporates more accurate weather data and improved methodologies that provide known levels of reliability. I voted affirmative so we would receive public comments and gain a clearer understanding of how this CP will impact pole loading. I also agreed to chair the Task Force 5.2.1 which is charged with comparisons between this CP and the 2002 NESC for locations across the country. In addition to individual efforts of subcommittee members, we would like to receive comparisons from as many utilities as possible. I can be contacted at nbingel@osmose.com . This compilation of load cases will help to determine the final practice implementation of this CP.

BULLINGER: There are no supporting comments on this CP. It is not clear how this CP will enhance safety. The concerns expressed are map inconsistencies need to be reconciled. The introduction of an alternate proposal will add confusion and implies that the committee has not done a complete job. The CP should include full supporting examples and justifications to allay the natural concerns of the NESC user. This sweeping change is likely to have many unintended consequences. These possibilities need to be evaluated before presentation to the public. Much verbal justification for this and many other CPs rely too heavily on anecdotes, hearsay, memory, and opinion. Real data and engineering analysis is required to justify such a major change. Inconsistent voting on this CP as compared to others related CPs imply there is inadequate understanding and justification for major changes that do not clearly enhance safety.

CLAPP: Rule N250B should use 0 degrees F for old heavy loading district areas, 15 degrees F for old medium loading district, and 30 degrees F for old light loading district. The map should show temperature line.

CLEM: CP 2737 would ultimately lead to a total revision of the code methods. While I voted affirmative for the proposal at this time, I have reservations which must be addressed. The affirmative vote of the committee allows the task force to continue development of the proposal and will allow the task force, set up with Nelson Bingel as chair, to continue comparing loads and soliciting input from utilities. One power company submitted comments to the committee urging rejection of the CP, however, in their comment they referred to the ¾ inch radial ice with a concurrent 4psf wind. The CP does not have this load case. The ice map included with the CP specifies ¾ inch radial ice with a concurrent 2.3psf (30mph) wind. I would encourage utilities to get involved with the task force and provide further substantive comments why the CP should be rejected or suggestion of how the CP should be modified.

DESANTIS: These are the same reasons I voted against it the first time: I feel some of the concepts included in this CP are too radical a change for line designers to see for the first time in an Alternate Method. i.e.: elimination of the

historical NESC Loading Districts, the elimination of the 60ft exclusion for extreme wind, the inclusion of a new Extreme Wind and Ice Map and the change in insulator loadings just to name a few. I would prefer some of these concepts be introduced into the existing Code to allow designers to familiarize themselves with the concepts, as some of the other change proposals recommend. I then would suggest this Alternative be included on the 2012 Code as an Alternate. I am specifically opposed to the following concepts regardless of when they are implemented:

N250C – There is no cap on the calculated wind pressure for facilities under 60ft. Collateral damage will occur in Category 3 hurricanes and above and the large expense incurred by utilities to design to these limits will not provide any additional safety or reliability to the customer. Many lines and homes that were damaged during Hurricane Isabel (2003), which was a Type 2 when it made landfall, occurred not as a result of structural failure due to high winds, but as a result of healthy trees being uprooted due to saturated soils. N250C – The line designer must use the values in the Tables. There is no allowance to use the formulas for  $k_z$  and GRF for all calculations as currently exists. N250C – If Exposure B is allowed to be used, then the appropriate Tables need to be included for this use. N253B – This is too severe for insulators. The Load Factor should be 1.0 for insulators. See Comments in N277 below for supporting comments. N261H – The change in temperature from 60deg to 32 deg does not help prevent fatigue due to Aeolian vibration. If individuals didn't calculate correct damper requirements before, they are not going to now. N277 – These limits are too severe for Maintenance Loadings, more specifically, N250D3 and N253B. This requirement would eliminate the use of post insulators for many applications where they have been currently used for decades. The "specified cantilever load" and "specified mechanical load" limits are designed for sustained events and not short term or instantaneous loads. I would support an EXCEPTION for N250D3 loads to read "Should a composite insulator be subject to a load exceeding these percentages during the stringing operation, it shall be immediately removed from service before the stringing operation can continue".

FREIMARK: Prior to the January, 2003 meeting of SC5 in Las Vegas, for Rule 277, Mechanical Strength of Insulators, this CP would have allowed insulators to be loaded to 70% of their rated strength (an increase from the present 40-50% due to the proposed greater "ultimate" weather loads). It was felt that the 70% value with the greater weather loads in this proposal would give insulator strengths at specific locations comparable to the weather and insulator strength criteria in the present NESC.

In Las Vegas, ANSI-C29, the committee responsible for all insulator standards, made a presentation to NESC SC5. After this presentation, a vote was taken by SC5 to issue a TIA making "corrections" to Rule 277 to effect the 1997 and 2002 NESC Editions and also to submit a Change Proposal (eventually called CP2829) to revised Rule 277 as well as other affected sections of the NESC. In accordance with this vote, Rule 277 in this CP was revised to its present form.

For various reasons, the TIA was never submitted. Additionally, at the Ballot meeting in October, 2003, CP 2829 to revise Rule 277 was rejected. Based on the non-submittal of the TIA and the rejection of CP 2829, I feel that there is no basis for the more restrictive insulator loads contained in the present CP 2737 and therefore vote not to Accept.

HARREL: I do not believe we should include an alternate method that produces loading requirements with significantly different results. Although I agree the ice wind maps have a much more accurate basis for part of their development, even the map developers caution on the use of these maps for their sole application in calculation of loading requirement.

HEALD: I voted in the affirmative to bring this change proposal to the forefront for comment by the public. This CP is the output of a working group established by SC5. This alternate method has been submitted as a change proposal to previous editions of the code by the same working group of SC 5. Some of the people who have voted "no" to this change proposal have supported the formation and continuation of this working group of SC5. I agree with many of the explanations of committee members who cast a negative vote. However, if this CP was voted down by the subcommittee, the public would probably not comment on it; the working group would continue; and the same change proposal would be submitted for the 2012 edition of the code.

Based on public comment and member`s explanation of their vote, final acceptance or rejection of this change proposal will be made in October, 2005. If this change proposal is rejected, then it will be a indication that SC 5 should disband this working group and put this CP proposal to rest. Although I feel the public would like a complete rewrite of sections 25, 26, and 27 of the NESC (as well as section 24), I don`t believe the current setup for code revisions is compatible to complete rewrites.

KEMPNER: In principal, I am against having two different methods for determining safety loads that can result in significantly different loads. If the subcommittee feels that the proposed alternate is an adequate safety criterion than the alternate should be the selected method for the revised NESC code. Having the alternates as proposed may subject utilities to legal consequences if a line failure were to occur using an alternate method that gives a significantly lower safety load. Implementation of new information (such as the ice and wind maps) and methodologies (such as gust factors vs. gust response factors) is being accomplished through the current code change process.

KLUGE: Although I have voted against this motion because the modifications are not identified, I support the concepts embedded in the proposal. However, I prefer a softer transition that would impliment many of these concepts into the present code by individual rules. A sudden change would be burdensome on the utilities and could result in unforeseen consequences. For example, the ASCE combined wind and ice map is fundamental to this proposal and it is not currently a load case recognized by NESC. There is another proposal to make the ASCE ice/wind load an additional load case. This is an example of an acceptable “soft transition”.

SHULTZ: This proposal has been revised to yield structure strengths that are reasonably comparable to current practice for most transmission structures although governing load cases may change from combined ice and wind to extreme wind, or vice versa. However, elimination of the extreme wind loading exemption for structures and facilities less than 60’ above ground or water can result in strength requirements that are significantly greater than current practice for such structures in coastal areas, particularly in Light loading areas, and the increase can be several pole classes. The safety need for strength increases of these magnitudes is not shown. Consequently, I believe this proposal needs further work to calibrate distribution pole class requirements for extreme wind loading more closely to established practice.

Similarly, it is unclear how the extreme wind requirements of this proposal will compare with the requirements of CP2766 (which was accepted as modified), yet the methods are to be considered acceptable alternative methods. Some calibration to current practice might be appropriate.

The requirement that stringing block lock-up loads “shall be considered” is ambiguous and will cause confusion for code users. It also may limit use of some structure configurations or construction practices if longitudinal capacity for such loads must be provided. This concern might be eliminated if alternative methods of assuring safety could be allowed by the proposal.

Finally, the stated intent of the working group to modify this proposal based on dispositions of other change proposals leaves some uncertainty as to what will be included in the final draft of this proposal.

SLAVIN: This is an important proposal, providing the overall format for upgrading the Strength & Loading section consistent with the latest technical information, in a logical, intergrated manner. Although somewhat controversial when originally proposed many code cycles ago, much of CP2737 has already been incorporated into the NESC (e.g., the 3-second gust map of ASCE 7), agrees with the latest accepted standards and information (e.g., 50-year Combined Ice and Wind map of ASCE 7-02), or is generally consistent with various other change proposals accepted by SC5 (e.g, Extreme Wind below 60 ft.). It is recognized that CP2737 does not treat Extreme Wind

below 60 ft. in exactly the same manner as the accepted CP, but it does provide significant load reduction for Grade C and/or sheltered environments. In any case, it is anticipated that CP2737 would be modified, as appropriate, based upon public comments on the various CPs. Since CP2737 is proposed as an "Alternate Method", it will allow the industry at least one code cycle to adjust to the new overall methodology. While an alternate method that produces dissimilar results may raise some short-term issues, this nonetheless represents the most practical procedure for introducing potentially significant changes into the NESC.

WONG: Many issues in the CP have already been taking care of by others. Also many other issues, such as structures below 60 ft, may have better foundation than CP 2766. However, ice map is only for freezing rain. Tension limit (1.15 factor) has not been justified and could produce totally different answer than code (2002 NESC) requires currently. It should not be considered as "alternate method". Alternate methods should have equivalent results as the main method. AISC and ACI have done that.

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**Revised Text**

Part: 2 Section: 25

**CP2767**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Amato, Bingel, Bullinger, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Standford, Vivas, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 25

Rule: 250

**CP2673**

**Subcommittee Recommendation:** Accept in principle see action on cp2766

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Aichinger, Bingel, Clapp, Clem, Denbrock, DeSantis, Freimark, Heald, Kempner, Peters, Rempe, Slavin, Standford, Wong

**Negative:** (6) Bullinger, Amato, Harrel, Hensel, Kluge, Shultz

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 6 ft exclusion.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

HENSEL & HARREL: I am not in favor of removing the 60 ft exclusion.

KLUGE: I prefer CP 2766 as modified.

SHULTZ: Removing the 60' exemption unilaterally will likely result in considerable increase in strength requirements in many loading situations, particularly in coastal areas. The public comments on a similar proposal for the 2002 revision cycle overwhelmingly cited collateral loading as the predominant cause of extreme wind failures. This proposal offers nothing to refute those statements of experience. In addition, in the 2002 cycle, several utilities in the South reviewed their records to see what claims for injury could be attributed to extreme wind failures. Those utilities could not identify any such claims for the previous several years. If this experience is anywhere near typical, the safety record is very good, and no support is provided in this proposal to demonstrate that removal of the exemption will improve on this safety performance.

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**New Text**

Part: 2 Section: 25

Rule: 250

**CP2802**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

This proposal include ice plus concurrent wind map of ASCE 7-2002. The map is being revised and is expected to be completed by the time of the final vote on the NESC 2007 edition.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Standford, Wong

**Negative:** (1) Kinghorn

**Abstention:** (0)

**Explanation of Vote:**

FREIMARK: In general I support the intent of this change proposal and am voting in favor of it at this time. However, if the final outcome for the 2007 NESC is approval of CP 2737, the major re-write of the section 25, 26, and 27 of the NESC, then I feel that the passage of this particular CP would cause possible confusion and/or redundancy for the period that both the "new" and "previous" portions of the NESC are in effect and will vote against this proposal at that time.

KINGHORN: There is not sufficient evidence in my opinion that any additional public safety will be gained by this CP. The likelihood of the concurrent occurrence of these conditions is very remote. The approval of this CP could result in significant waste of resources without adequate justification.

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**New Text**

Part: 2 Section: 25

Rule: 250 250C

**CP2718****Subcommittee Recommendation:** Rejected**Subcommittee Comment:**

This change proposal was rejected because it does not add value to the current method for determining wind loads on wire and structures. The current method is complete and consistent with industry standard practice. The proposed change does not improve on the current approach and in some areas has values less than the loads now specified with no correlation data to justify this reduction

**Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Amato, Bingel, Bullinger, Clem, Denbrock, Freimark, Harrel, Kempner, Peters, Shultz, Slavin, Standford, Vivas, Wong

**Negative:** (4) Heald, Hensel, Kluge, Rempe

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE, HENSEL, HEALD, & REMPE: I support the change for the reasons stated in the proposal.

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**Revised Text**

Part: 2 Section: 25

Rule: 250 A-C, Fig 250-1,...

**CP2736****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Schwalm, Shultz, Standford, Wong

**Negative:** (5) DeSantis, Aichinger, Peters, Rempe, Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

AICHINGER: Although this CP addresses only single, unguayed poles, this is a complete and effective method to provide, finally, a method to design around various materials. This CP represents the design process of the future.

DESANTIS & REMPE: Although I agree this CP isn't complete, I feel it's important for the public to review it and get a feel for what will be presented and potentially implemented in future codes. By rejecting it, it is highly unlikely

the public will take the time to crunch the numbers and make comparisons.

PETERS: RBD committee did a correct job in proposing this CP and therefore it should not be rejected.

SLAVIN: See Supporting Comments for CP2736, as well as the additional comments. The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

(1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003). (2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration. (3) Lack of industry experience in application of the recommended procedures and methodology.

(4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules. (5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 -- May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005. In order to demonstrate that the determination of the values of Item (2) within the necessary time frame is not unreasonable, procedures by which such results may be obtained were briefly discussed at the SC5 meeting, including initial estimates of the required parameters. (It is understood that the latter estimates do not necessarily represent the final values to be agreed-upon by the ASCE RBD Committee.)

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology.

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#### **Revised Text**

Part: 2 Section: 25

Rule: 250 A1

**CP2766**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Aichinger, Bingel, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Kempner, Kinghorn,

Peters, Rempe, Slavin, Standford

**Negative:** (7) Clapp, Bullinger, Amato, Hensel, Kluge, Shultz, Wong

**Abstention:** (0)

### **Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

CLAPP: I understand the desire to show a relative 2/3 relationship between Grade C and Grade B, but I think it should be achieved by raising the 15 psf limit to 20 psf (i.e., use 20 psf/30 psf) rather than reducing the 30 psf to 22.5 psf (i.e., 15/22.5).

HENSEL: The new RBD Manual will apparently recommend removing the 60 ft exemption from extreme wind and reducing the load factor for Grade C  $\leq$  60 ft to 0.5. I don't think we adequately considered the new RBD Manual recommendation. I think we are being more restrictive in non-hurricane areas than is being called for on the RBD Manual.

SHULTZ: Removing the 60' exemption unilaterally will likely result in considerable increase in strength requirements in many loading situations, particularly in coastal areas. The public comments on a similar proposal for the 2002 revision cycle overwhelmingly cited collateral loading as the predominant cause of extreme wind failures. This proposal offers nothing to refute those statements of experience. In addition, in the 2002 cycle, several utilities in the South reviewed their records to see what claims for injury could be attributed to extreme wind failures. Those utilities could not identify any such claims for the previous several years. If this experience is anywhere near typical, the safety record is very good, and no support is provided in this proposal to demonstrate that removal of the exemption will improve on this safety performance.

WONG: There is a difference in the wind behaviors between continental wind and hurricane wind this I support CP2798 over CP2766.

KLUGE: This CP should be rejected for the following reasons:

1. The "not to exceed" limits are set too high as illustrated in the following example for a typical distribution pole. By having the limits set so high, the proposal inadequately responds to the comments from the users that distribution structures are not damaged by wind directly but by wind blown debris. To require structures to be designed to wind speeds that surrounding buildings and trees cannot withstand is not justified.
2. If the "not to exceed" limits are set too high, the designer is frequently directed to use the formulas. This is especially true for communication companies that occupy the lowest attachment height on a pole. However, most distribution and communication designers will find the NESC formulas burdensome.

The following table further illustrates why I find CP2766 as modified unacceptable. The following table compares the wind pressures calculated using NESC Rule 250C wind formulas to the "not to exceed" limits of CP2766 as modified. Note that the "need not exceed" limits seldom apply—controlling values are shown in bold text. Note also the numerous pressure values for the phase, neutral and communication wires and the structure. These calculations were done for a typical 40 ft. distribution pole, buried 6 feet, with phase conductors at the top, neutral conductors 8 ft. below the phases, and communication cables located 3-1/2 ft. below the neutral.

Wind Pressure (psf) on Conductors as proposed in CP2766

Grade B

OLF = 1.0

Wind Speed (mph) \_\_ Phase Cond. \_\_ Neutral Wire \_\_ Comm. Cable \_\_ CP2766 Need not exceed

85	15.2	14.6	14.3	22.5
90	17.0	16.3	16.0	22.5
100	21.0	20.2	19.7	22.5
110	24.5	24.4	23.8	22.5

Grade C

OLF = 0.87

Wind Speed (mph) \_\_ Phase Cond. \_\_ Neutral Wire \_\_ Comm. Cable \_\_ CP2766 Need not exceed

85	13.2	12.7	12.4	15.0
90	14.8	14.2	13.9	15.0
100	18.3	17.6	17.1	15.0

OLF = .075

110	18.4	18.3	17.9	15.0
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Alaska OLF = 0.87

110	21.3	21.2	20.7	15.0
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Wind Pressure (psf) on Structures as proposed in CP2766

Grade B

Grade C

Wind Speed (mph) \_\_ OLF = 1.0 \_\_ Need Not exceed \_\_ OLF = 0.87 OLF = 0.75 \_\_ Need Not exceed

85	16.4	22.5	14.3	15.0
90	18.4	22.5	16.0	15.0
100	22.7	22.5	19.7	15.0
110	27.5	22.5	US except Alaska	15.0
110	27.5	22.5	In Alaska	15.0

If the subcommittee is determined to eliminate the 60 ft exception, here are two modifications that would make this CP more acceptable—either reduce the “not to exceed” limit or offering a single constant to use in the formula to convert wind speed to pressure. Both would accomplish the objective of making the design easier and could be calibrated to recognize the experience of the utilities.

The concept of a single constant to use in the wind speed-pressure formulas has the advantage of providing a custom wind-pressure for each wind speed location as explained below. (See also CP2718.) For structures 60 feet tall or shorter, the following values for  $k_z \cdot GRF \cdot I$  would be appropriate. (These values were determined from the NESC formulas for a typical distribution pole as defined above.)

	$k_z \cdot GRF \cdot I$
Wires	0.80
Structure	0.90

(The above factors are intended for Grade B. To obtain Grade C factors, CP2766 recommends using 87% of the Grade B factors.)

Using the above factors for  $k_z \cdot GRF \cdot I$  defines two wind pressure values (one for the wires and a second one for the pole) for structures 60 feet or less in height, within a particular wind speed region.

Wind Pressure (psf)

Wind Speed	On Wires	On Structures
85 mph	15	17
90 mph	17	19
100 mph	21	23
110 mph	25	28

(The values listed are only for Grade B. To obtain Grade C factors, CP2766 recommends using 87% of the Grade B factors. Not to exceed limits could still be applied.)

For short structures, it may be reasonable to use a single  $k_z \cdot GRF \cdot I$  value for wires and structures of 0.80. This produces only one pressure value to consider for each wind speed region or grade of construction, as follows:

Wind Pressure (psf)	On wires	and structures
Wind Speed	Grade B	Grade C
85 mph	15	17
90 mph	17	14
100 mph	21*	18*
110 mph	25*	22*

\* Outside Alaska “not to exceed” values should be 20 psf and 17 psf for Grades B and C, respectfully.

These are the calibrated design wind pressures CP2766 should target for structures 60 feet or less in height. CP2766 does not achieve these target wind pressures. Furthermore, because CP2766 sets the “not to exceed” limits so high, it would burden the utilities to use complex formulas to calculate specific pressures for each wire at attachment height. Therefore, I have voted to reject CP2766 as modified.

If you would like to perform calibrations for your typical structures and geographic location, I would gladly email you a copy of an Excel spreadsheet with the wind speed-pressure formulas embedded. Just send me an email at [rkluge@atcllc.com](mailto:rkluge@atcllc.com) and ask for the NESC wind computation sheet. Your opinions of these proposals are extremely valuable to the NESC Subcommittee.

For your reference, there are several change proposals addressing wind load—CP2673, 2739, 2766, 2798, 2718, 2787.

#### **Deleted Text**

Part: 2 Section: 25

Rule: 250 A1

#### **CP2798**

**Subcommittee Recommendation:** Accept in principle see action on cp2766

**Subcommittee Comment:**

#### **Vote on Subcommittee Recommendation:**

**Affirmative:** (13) Aichinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Heald, Hensel, Kempner, Peters, Rempe, Slavin, Wong

**Negative:** (7) Bullinger, Bingel, Amato, Harrel, Kluge, Shultz, Stanford

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BINGEL: This CP follows CP 2766 which already passed in eliminating the 60 ft exclusion for extreme wind. However, CP2798 adds an additional cap for Grade C wind pressure. This only applies to regions in the country where the extreme wind speed is 90 mph or less. By not accepting this CP, the load requirement for Grade C construction in the medium load district will increase. No proof was presented to justify this load increase. A few subcommittee members expressed feeling that the load should be higher. That's not reason enough to reject this CP.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

HARREL: I am not in favor of the removal of the 60 ft exclusion.

SHULTZ: I prefer to keep the 60' exemption, but if it is removed, I prefer CP2798 rather than CP2766, which was accepted. I do support the same revisions to the footnotes in CP2798 as were made in CP2766. The 10 psf cap for Grade C continental extreme winds is reasonably comparable to present loading requirements for structures 60' and less in height which have served well.

STANDFORD: I feel that the cap of 10 psf (62.5 mph) is too low for extreme wind and believe that it should be 15 psf as it is in CP 2677.

WONG: CP 2766 has higher requirements to Grade C construction located at medium load district. CP 2798 Note 8 is written to address this issue. 10 psf wind pressure is more closely related to current 2002 NESC requirements. Yet, is 10 psf (60 mph plus) adequate? We need code user input.

KLUGE: I prefer CP 2739 as long as the district loads remain. The present district loads provide adequate strength for structures  $\leq$  60 ft tall.

I encourage you to evaluate the impact of this proposal on your current designs. To assist you, I have calculated the wind pressure for a typical 40 ft. distribution pole, buried 6 feet, with phase conductors at the top, neutral conductors 8 ft. below the phases, and communication cables located 3-1/2 ft. below the neutral and displayed the results in the following table. Look at the pressure associated with the wind speed that represents your service territory.

Note that the "need not exceed" limits in Grade B are relatively high and not likely to apply. The controlling values are shown in bold text. Note also that when the "need not exceed" limits don't control, unique pressure values must be calculated for the phase, neutral and communication wires and the pole.

Wind Pressure (psf) on Conductors as proposed in CP2798

Grade B

OLF = 1.0

Wind Speed (mph)	Phase Cond.	Neutral Wire	Comm. Cable	Need not exceed
85	15.2	14.6	14.3	30.0
90	17.0	16.3	16.0	30.0
100	21.0	20.2	19.7	30.0

110	24.5	24.4	23.8	30.0
Grade C				
OLF = 0.87				
Wind Speed (mph)	Phase Cond.	Neutral Wire	Comm. Cable	Need not exceed
85	13.2	12.7	12.4	10.0
90	14.8	14.2	13.9	15.0
100	18.3	17.6	17.1	15.0
OLF = .075				
110	18.4	18.3	17.9	15.0
Alaska OLF = 0.87				
110	21.3	21.2	20.7	15.0

Wind Pressure (psf) on Structures as proposed in CP2798

Wind Speed (mph)	Grade B		Grade C	
	OLF = 1.0	Need Not exceed	OLF = 0.87	OLF = 0.75
85	16.4	30.0	14.3	10.0
90	18.4	30.0	16.0	15.0
100	22.7	30.0	19.7	15.0
110	27.5	30.0	US except Alaska	20.6
110	27.5	30.0	In Alaska	23.9

I find CP2698 unacceptable for the following two reasons:

1. The “not to exceed” limit of 10 psf for Grade C is set too low for the 85 mph wind speed region and would permit unsafe designs. A safe value would be 13 to 15 psf.
2. The “not to exceed” limits are set too high for Grade B. Reasonable values would be 16 to 20 psf. By setting the limits too high, the proposal inadequately responds to the comments from users that distribution structures are not damaged by wind directly but by wind blown debris. To require structures to be designed to wind speeds that building cladding and trees cannot withstand is not justified.
3. If the “not to exceed” limits are set too high, the designer is economically directed to use the formulas. This is especially true for communication companies occupying the lowest attachment height on the pole. However, most distribution and communication designers will find the formulas for kZ and GRF in NESC Rule 250C burdensome.

Since the wind speed-pressure formulas in NESC Rule 250C are too cumbersome for common distribution structure designs, as a possible modification, I would suggest calibrating the “not to exceed” limit to value that is safe yet low enough to render the need to use the formulas unnecessary. To accomplish both objectives, several “not to exceed” limits may be required to fit the various wind speed regions.

Or, as an alternate modification, one could use the NESC formulas for kZ and GRF to calibrate a single constant for use in the wind speed-pressure formula. (See my comment for CP2766.) This would more readily insure a safe design in various wind speed regions and accomplish most the simplicity of the “not to exceed” limit. (See also CP2718 for an example of a single constant for kZ and GRF. However, values for structures under 60 feet tall would need to be developed as CP2718 does not currently address short structures.)

If you would like to perform calibrations for your typical structures and geographic location, I would gladly email you a copy of an Excel spreadsheet with the wind speed-pressure formulas embedded. Just send me an email at rkluge@atllc.com and ask for the NESC wind computation sheet. Your opinions of these proposals are extremely valuable to the NESC Subcommittee.

Note there are several wind related change proposals. They include CP2673, 2739, 2766, 2798, 2718, 2787.

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**Revised Text**

Part: 2 Section: 25

Rule: 250 A2

**CP2658**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (12) Aichinger, Amato, Bingel, Burley, Clapp, Denbrock, Freimark, Harrel, Jones, Kempner, Rempe, Schwalm

**Negative:** (8) DeSantis, Clem, Heald, Kluge, Peters, Shultz, Standford, Wong

**Abstention:** (4) Bullinger, Hensel, Kinghorn, Slavin

**Explanation of Vote:**

CLEM: The industry has used controlled pulling practices for years that allowed the successful use of Davit Arms, post insulators etc. In addition, the installation of new OPGW to replace the existing OHGW could be a problem with this rule. Since the intent of the rule is worker safety, I believe that the committee should see case studies substantiating the need for restricting our typical construction practices and base any adopted rule as corrective action to specific typical problems.

DESANTIS: These requirements would eliminate the use of past insulators for many applications where they have been currently used for decades. The insulator % limits in Rule 277 are designed for sustained events and not short term or instantaneous loads. I would support an EXCEPTION for 250D3 to read "Should a composite insulator be subject to a load exceeding these percentages during the stringing operation, it should be immediately removed from service before the stringing operation can continue." The EXCEPTION probably needs to reside in Rule 277.

CLAPP: The purpose of this CP was to appropriately address the worker safety without using the present method of requiring the result of overload factor x strength factor = total factor for Grade C to equal the result for Grade B. In effect, the present method over designs Grade C structures for vertical loads because it increases the total factor for all vertical loads, not just those caused by work. This rejection is the equivalent of throwing the baby out with the bath water. We should find an acceptable way to keep the baby.

SLAVIN: I believe the NESC requires more extensive safety rules regarding construction and maintenance loads.

STANDFORD: I do not agree with lowering the vertical overload factors for Grade C to 1.35 for both wood and steel. This is to large of a reduction for wood. A reduction to 1.5 for wood and 1.35 for steel would have been a better move.

SHULTZ & HEALD: The proposed addition of this rule is well-intentioned, but it presents some practical problems to the code user in complying. For instance, proposed Rules 250D1, 250D2, 250D3, and 250D4 specify loading scenarios that are conditional. That is, whether or not they would apply will depend upon situations that could be expected to vary from project to project, even from structure to structure. Yet the designer is expected to foresee all these situations beforehand and include those that apply in the structure design. Because these can be design-governing loads, it will be extremely difficult to comply with these provisions without assuming worst case

loadings. From a safety perspective, this is unnecessarily restrictive. The responsibility for construction and maintenance loading safety is already assigned by the NESC. This proposal only codifies design loads that would be better included in a design manual. Given that this proposal addresses construction and maintenance loads, and load factors are specified in the text of the proposed rules, the revision of vertical load factors is inappropriate in this proposal.

PETERS: I am for the original change propose submitted by TF 5.1.1

WONG: The original CP 2658 was rejected by SC 5. This substitute CP could change string or pulling operation on post insulator configuration. Existing conductor pulling operation with post insulator has not cause any known safety problems. Thus I cannot support this CP without more studies with input from construction people.

KLUGE: See comments by Shultz and Wong

BULLINGER: Lack of expertise

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### **New Text**

Part: 2 Section: 25

Rule: 250 A5

### **CP2733**

**Subcommittee Recommendation:** Reject

### **Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

### **Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Standford, Wong

**Negative:** (1) Slavin

**Abstention:** (1) Kinghorn

### **Explanation of Vote:**

SLAVIN: See Supporting Comments for CP2733, as well as the additional comments below.

The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

(1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003).

(2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration.

(3) Lack of industry experience in application of the recommended procedures and methodology.

(4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules.

(5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However,

the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 – May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005.

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology.

CLAPP: I cannot condone applying to a 65 ft pole one-half the load applied to a 70 ft pole. This is an inappropriate exemption for pole less than 70 ft in length (60 ft above ground).

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**New Text**

Part: 2 Section: 25

Rule: 250 A5

**CP2734**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Shultz, Stanford, Wong

**Negative:** (2) Peters, Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

SLAVIN: See Supporting Comments for CP2734, as well as the additional comments below.

The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

(1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003).

(2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration.

- (3) Lack of industry experience in application of the recommended procedures and methodology.
- (4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules.
- (5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 – May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005.

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology

PETERS: CP should be accepted to allow for industry consideration of RBD methods. RBD methods are the standard practice of structure design and should be seriously considered for incorporation for NESC

CLAPP: I cannot condone applying to a 65 ft pole one-half the load applied to a 70 ft pole. This is an inappropriate exemption for pole less than 70 ft in length (60 ft above ground).

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#### **Revised Text**

Part: 2 Section: 25

Rule: 250 C

**CP2532**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Amato, Bingel, Bullinger, Clapp, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Peters, Rempe, Shultz, Slavin, Stanford, Vivas, Wong

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

Robert Kluge: I feel the units  $n*s^2/m$ , metric, ( $lb*hr^2/m^2*ft^3$  customary) should appear in the definition.

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**Revised Text**

Part: 2 Section: 25

Rule: 250 C

**CP2766**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Aichinger, Bingel, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Kempner, Kinghorn, Peters, Rempe, Slavin, Standford

**Negative:** (7) Clapp, Bullinger, Amato, Hensel, Kluge, Shultz, Wong

**Abstention:** (0)

**Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

CLAPP: I understand the desire to show a relative 2/3 relationship between Grade C and Grade B, but I think it should be achieved by raising the 15 psf limit to 20 psf (i.e., use 20 psf/30 psf) rather than reducing the 30 psf to 22.5 psf (i.e., 15/22.5).

HENSEL: The new RBD Manual will apparently recommend removing the 60 ft exemption from extreme wind and reducing the load factor for Grade C  $\leq$  60 ft to 0.5. I don't think we adequately considered the new RBD Manual recommendation. I think we are being more restrictive in non-hurricane areas than is being called for on the RBD Manual.

SHULTZ: Removing the 60' exemption unilaterally will likely result in considerable increase in strength requirements in many loading situations, particularly in coastal areas. The public comments on a similar proposal for the 2002 revision cycle overwhelmingly cited collateral loading as the predominant cause of extreme wind failures. This proposal offers nothing to refute those statements of experience. In addition, in the 2002 cycle, several utilities in the South reviewed their records to see what claims for injury could be attributed to extreme wind failures. Those utilities could not identify any such claims for the previous several years. If this experience is anywhere near typical, the safety record is very good, and no support is provided in this proposal to demonstrate that removal of the exemption will improve on this safety performance.

WONG: There is a difference in the wind behaviors between continental wind and hurricane wind this I support CP2798 over CP2766.

KLUGE: This CP should be rejected for the following reasons:

1. The "not to exceed" limits are set too high as illustrated in the following example for a typical distribution pole.

By having the limits set so high, the proposal inadequately responds to the comments from the users that distribution structures are not damaged by wind directly but by wind blown debris. To require structures to be designed to wind speeds that surrounding buildings and trees cannot withstand is not justified.

2. If the “not to exceed” limits are set too high, the designer is frequently directed to use the formulas. This is especially true for communication companies that occupy the lowest attachment height on a pole. However, most distribution and communication designers will find the NESC formulas burdensome.

The following table further illustrates why I find CP2766 as modified unacceptable. The following table compares the wind pressures calculated using NESC Rule 250C wind formulas to the “not to exceed” limits of CP2766 as modified. Note that the “need not exceed” limits seldom apply—controlling values are shown in bold text. Note also the numerous pressure values for the phase, neutral and communication wires and the structure. These calculations were done for a typical 40 ft. distribution pole, buried 6 feet, with phase conductors at the top, neutral conductors 8 ft. below the phases, and communication cables located 3-1/2 ft. below the neutral.

Wind Pressure (psf) on Conductors as proposed in CP2766

Grade B

OLF = 1.0

Wind Speed (mph)	Phase Cond.	Neutral Wire	Comm. Cable	CP2766 Need not exceed
85	15.2	14.6	14.3	22.5
90	17.0	16.3	16.0	22.5
100	21.0	20.2	19.7	22.5
110	24.5	24.4	23.8	22.5

Grade C

OLF = 0.87

Wind Speed (mph)	Phase Cond.	Neutral Wire	Comm. Cable	CP2766 Need not exceed
85	13.2	12.7	12.4	15.0
90	14.8	14.2	13.9	15.0
100	18.3	17.6	17.1	15.0
OLF = .075				
110	18.4	18.3	17.9	15.0
Alaska OLF = 0.87				
110	21.3	21.2	20.7	15.0

Wind Pressure (psf) on Structures as proposed in CP2766

Wind Speed (mph)	Grade B		Grade C	
	OLF = 1.0	Need Not exceed	OLF = 0.87	OLF = 0.75 Need Not exceed
85	16.4	22.5	14.3	15.0
90	18.4	22.5	16.0	15.0
100	22.7	22.5	19.7	15.0
110	27.5	22.5	US except Alaska 20.6	15.0
110	27.5	22.5	In Alaska 23.9	15.0

If the subcommittee is determined to eliminate the 60 ft exception, here are two modifications that would make this CP more acceptable—either reduce the “not to exceed” limit or offering a single constant to use in the formula to convert wind speed to pressure. Both would accomplish the objective of making the design easier and could be calibrated to recognize the experience of the utilities.

The concept of a single constant to use in the wind speed-pressure formulas has the advantage of providing a custom wind-pressure for each wind speed location as explained below. (See also CP2718.) For structures 60 feet

tall or shorter, the following values for  $kz \cdot GRF \cdot I$  would be appropriate. (These values were determined from the NESC formulas for a typical distribution pole as defined above.)

	$kz \cdot GRF \cdot I$
Wires	0.80
Structure	0.90

(The above factors are intended for Grade B. To obtain Grade C factors, CP2766 recommends using 87% of the Grade B factors.)

Using the above factors for  $kz \cdot GRF \cdot I$  defines two wind pressure values (one for the wires and a second one for the pole) for structures 60 feet or less in height, within a particular wind speed region.

Wind Pressure (psf)	
Wind Speed	On Wires      On Structures
85 mph	15                      17
90 mph	17                      19
100 mph	21                      23
110 mph	25                      28

(The values listed are only for Grade B. To obtain Grade C factors, CP2766 recommends using 87% of the Grade B factors. Not to exceed limits could still be applied.)

For short structures, it may be reasonable to use a single  $kz \cdot GRF \cdot I$  value for wires and structures of 0.80. This produces only one pressure value to consider for each wind speed region or grade of construction, as follows:

Wind Pressure (psf) On wires and structures		
Wind Speed	Grade B	Grade C
85 mph	15	17
90 mph	17	14
100 mph	21*	18*
110 mph	25*	22*

\* Outside Alaska “not to exceed” values should be 20 psf and 17 psf for Grades B and C, respectfully.

These are the calibrated design wind pressures CP2766 should target for structures 60 feet or less in height. CP2766 does not achieve these target wind pressures. Furthermore, because CP2766 sets the “not to exceed” limits so high, it would burden the utilities to use complex formulas to calculate specific pressures for each wire at attachment height. Therefore, I have voted to reject CP2766 as modified.

If you would like to perform calibrations for your typical structures and geographic location, I would gladly email you a copy of an Excel spreadsheet with the wind speed-pressure formulas embedded. Just send me an email at [rkluge@atcllc.com](mailto:rkluge@atcllc.com) and ask for the NESC wind computation sheet. Your opinions of these proposals are extremely valuable to the NESC Subcommittee.

For your reference, there are several change proposals addressing wind load—CP2673, 2739, 2766, 2798, 2718, 2787.

**New Text**

Part: 2 Section: 25  
Rule: 250 C  
**CP2783**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 25  
Rule: 250 C  
**CP2785**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (1) Kluge

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE: The Term “shape factor” better describes the coefficient and is currently well understood and accepted.

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**Revised Text**

Part: 2 Section: 25  
Rule: 250 C  
**CP2785**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (1) Kluge  
**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE: The Term “shape factor” better describes the coefficient and is currently well understood and accepted.

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**Revised Text**

Part: 2 Section: 25

Rule: 250 C

**CP2787**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (1) Kluge

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE: The NESC is becoming a design guide. This complexity is not necessary – See CP 2718.

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**Deleted Text**

Part: 2 Section: 25

Rule: 250 C

**CP2798**

**Subcommittee Recommendation:** Accept in principle see action on CP2766

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (13) Aichinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Heald, Hensel, Kempner, Peters, Rempe, Slavin, Wong

**Negative:** (7) Bullinger, Bingel, Amato, Harrel, Kluge, Shultz, Stanford

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BINGEL: This CP follows CP 2766 which already passed in eliminating the 60 ft exclusion for extreme wind. However, CP2798 adds an additional cap for Grade C wind pressure. This only applies to regions in the country

where the extreme wind speed is 90 mph or less. By not accepting this CP, the load requirement for Grade C construction in the medium load district will increase. No proof was presented to justify this load increase. A few subcommittee members expressed feeling that the load should be higher. That's not reason enough to reject this CP.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

HARREL: I am not in favor of the removal of the 60 ft exclusion.

SHULTZ: I prefer to keep the 60' exemption, but if it is removed, I prefer CP2798 rather than CP2766, which was accepted. I do support the same revisions to the footnotes in CP2798 as were made in CP2766. The 10 psf cap for Grade C continental extreme winds is reasonably comparable to present loading requirements for structures 60' and less in height which have served well.

STANDFORD: I feel that the cap of 10 psf (62.5 mph) is too low for extreme wind and believe that it should be 15 psf as it is in CP 2677.

WONG: CP 2766 has higher requirements to Grade C construction located at medium load district. CP 2798 Note 8 is written to address this issue. 10 psf wind pressure is more closely related to current 2002 NESC requirements. Yet, is 10 psf (60 mph plus) adequate? We need code user input.

KLUGE: I prefer CP 2739 as long as the district loads remain. The present district loads provide adequate strength for structures <= 60 ft tall.

I encourage you to evaluate the impact of this proposal on your current designs. To assist you, I have calculated the wind pressure for a typical 40 ft. distribution pole, buried 6 feet, with phase conductors at the top, neutral conductors 8 ft. below the phases, and communication cables located 3-1/2 ft. below the neutral and displayed the results in the following table. Look at the pressure associated with the wind speed that represents your service territory.

Note that the "need not exceed" limits in Grade B are relatively high and not likely to apply. The controlling values are shown in bold text. Note also that when the "need not exceed" limits don't control, unique pressure values must be calculated for the phase, neutral and communication wires and the pole.

Wind Pressure (psf) on Conductors as proposed in CP2798

Grade B

OLF = 1.0

Wind Speed (mph)	Phase Cond.	Neutral Wire	Comm. Cable	Need not exceed
85	15.2	14.6	14.3	30.0
90	17.0	16.3	16.0	30.0
100	21.0	20.2	19.7	30.0
110	24.5	24.4	23.8	30.0

Grade C

OLF = 0.87

Wind Speed (mph)	Phase Cond.	Neutral Wire	Comm. Cable	Need not exceed
85	13.2	12.7	12.4	10.0
90	14.8	14.2	13.9	15.0

100	18.3	17.6	17.1	15.0
OLF = .075				
110	18.4	18.3	17.9	15.0
Alaska OLF = 0.87				
110	21.3	21.2	20.7	15.0

Wind Pressure (psf) on Structures as proposed in CP2798

Wind Speed (mph)	Grade B		Grade C	
	OLF = 1.0	Need Not exceed	OLF = 0.87	OLF = 0.75
85	16.4	30.0	14.3	10.0
90	18.4	30.0	16.0	15.0
100	22.7	30.0	19.7	15.0
110	27.5	30.0	US except Alaska	20.6
110	27.5	30.0	In Alaska	23.9

I find CP2698 unacceptable for the following two reasons:

1. The “not to exceed” limit of 10 psf for Grade C is set too low for the 85 mph wind speed region and would permit unsafe designs. A safe value would be 13 to 15 psf.
2. The “not to exceed” limits are set too high for Grade B. Reasonable values would be 16 to 20 psf. By setting the limits too high, the proposal inadequately responds to the comments from users that distribution structures are not damaged by wind directly but by wind blown debris. To require structures to be designed to wind speeds that building cladding and trees cannot withstand is not justified.
3. If the “not to exceed” limits are set too high, the designer is economically directed to use the formulas. This is especially true for communication companies occupying the lowest attachment height on the pole. However, most distribution and communication designers will find the formulas for kZ and GRF in NESC Rule 250C burdensome.

Since the wind speed-pressure formulas in NESC Rule 250C are too cumbersome for common distribution structure designs, as a possible modification, I would suggest calibrating the “not to exceed” limit to value that is safe yet low enough to render the need to use the formulas unnecessary. To accomplish both objectives, several “not to exceed” limits may be required to fit the various wind speed regions.

Or, as an alternate modification, one could use the NESC formulas for kZ and GRF to calibrate a single constant for use in the wind speed-pressure formula. (See my comment for CP2766.) This would more readily insure a safe design in various wind speed regions and accomplish most the simplicity of the “not to exceed” limit. (See also CP2718 for an example of a single constant for kZ and GRF. However, values for structures under 60 feet tall would need to be developed as CP2718 does not currently address short structures.)

If you would like to perform calibrations for your typical structures and geographic location, I would gladly email you a copy of an Excel spreadsheet with the wind speed-pressure formulas embedded. Just send me an email at rkluge@atcllc.com and ask for the NESC wind computation sheet. Your opinions of these proposals are extremely valuable to the NESC Subcommittee.

Note there are several wind related change proposals. They include CP2673, 2739, 2766, 2798, 2718, 2787.

**Revised Text**

Part: 2 Section: 25  
Rule: 250 C

**CP2828**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (1) Kinghorn

**Abstention:** (0)

**Explanation of Vote:**

KINGHORN: "customary" is not included in the definitions. Change makes intent less clear. "Customary" could be interpreted as whatever one is using.

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**Revised Text**

Part: 2 Section: 25

Rule: 250 C1

**CP2787**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (1) Kluge

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE: The NESC is becoming a design guide. This complexity is not necessary – See CP 2718.

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**Deleted Text**

Part: 2 Section: 25

Rule: 250 C2

**CP2766**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Aichinger, Bingel, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Kempner, Kinghorn,

Peters, Rempe, Slavin, Standford

**Negative:** (7) Clapp, Bullinger, Amato, Hensel, Kluge, Shultz, Wong

**Abstention:** (0)

### **Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

CLAPP: I understand the desire to show a relative 2/3 relationship between Grade C and Grade B, but I think it should be achieved by raising the 15 psf limit to 20 psf (i.e., use 20 psf/30 psf) rather than reducing the 30 psf to 22.5 psf (i.e., 15/22.5).

HENSEL: The new RBD Manual will apparently recommend removing the 60 ft exemption from extreme wind and reducing the load factor for Grade C  $\leq$  60 ft to 0.5. I don't think we adequately considered the new RBD Manual recommendation. I think we are being more restrictive in non-hurricane areas than is being called for on the RBD Manual.

SHULTZ: Removing the 60' exemption unilaterally will likely result in considerable increase in strength requirements in many loading situations, particularly in coastal areas. The public comments on a similar proposal for the 2002 revision cycle overwhelmingly cited collateral loading as the predominant cause of extreme wind failures. This proposal offers nothing to refute those statements of experience. In addition, in the 2002 cycle, several utilities in the South reviewed their records to see what claims for injury could be attributed to extreme wind failures. Those utilities could not identify any such claims for the previous several years. If this experience is anywhere near typical, the safety record is very good, and no support is provided in this proposal to demonstrate that removal of the exemption will improve on this safety performance.

WONG: There is a difference in the wind behaviors between continental wind and hurricane wind this I support CP2798 over CP2766.

KLUGE: This CP should be rejected for the following reasons:

1. The "not to exceed" limits are set too high as illustrated in the following example for a typical distribution pole. By having the limits set so high, the proposal inadequately responds to the comments from the users that distribution structures are not damaged by wind directly but by wind blown debris. To require structures to be designed to wind speeds that surrounding buildings and trees cannot withstand is not justified.
2. If the "not to exceed" limits are set too high, the designer is frequently directed to use the formulas. This is especially true for communication companies that occupy the lowest attachment height on a pole. However, most distribution and communication designers will find the NESC formulas burdensome.

The following table further illustrates why I find CP2766 as modified unacceptable. The following table compares the wind pressures calculated using NESC Rule 250C wind formulas to the "not to exceed" limits of CP2766 as modified. Note that the "need not exceed" limits seldom apply—controlling values are shown in bold text. Note also the numerous pressure values for the phase, neutral and communication wires and the structure. These calculations were done for a typical 40 ft. distribution pole, buried 6 feet, with phase conductors at the top, neutral conductors 8 ft. below the phases, and communication cables located 3-1/2 ft. below the neutral.

Wind Pressure (psf) on Conductors as proposed in CP2766

Grade B

OLF = 1.0

Wind Speed (mph) \_\_ Phase Cond. \_\_ Neutral Wire \_\_ Comm. Cable \_\_ CP2766 Need not exceed

85	15.2	14.6	14.3	22.5
90	17.0	16.3	16.0	22.5
100	21.0	20.2	19.7	22.5
110	24.5	24.4	23.8	22.5

Grade C

OLF = 0.87

Wind Speed (mph) \_\_ Phase Cond. \_\_ Neutral Wire \_\_ Comm. Cable \_\_ CP2766 Need not exceed

85	13.2	12.7	12.4	15.0
90	14.8	14.2	13.9	15.0
100	18.3	17.6	17.1	15.0

OLF = .075

110	18.4	18.3	17.9	15.0
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Alaska OLF = 0.87

110	21.3	21.2	20.7	15.0
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Wind Pressure (psf) on Structures as proposed in CP2766

Grade B

Grade C

Wind Speed (mph) \_\_ OLF = 1.0 \_\_ Need Not exceed \_\_ OLF = 0.87 OLF = 0.75 \_\_ Need Not exceed

85	16.4	22.5	14.3	15.0
90	18.4	22.5	16.0	15.0
100	22.7	22.5	19.7	15.0
110	27.5	22.5	US except Alaska	15.0
110	27.5	22.5	In Alaska	15.0

If the subcommittee is determined to eliminate the 60 ft exception, here are two modifications that would make this CP more acceptable—either reduce the “not to exceed” limit or offering a single constant to use in the formula to convert wind speed to pressure. Both would accomplish the objective of making the design easier and could be calibrated to recognize the experience of the utilities.

The concept of a single constant to use in the wind speed-pressure formulas has the advantage of providing a custom wind-pressure for each wind speed location as explained below. (See also CP2718.) For structures 60 feet tall or shorter, the following values for  $k_z \cdot GRF \cdot I$  would be appropriate. (These values were determined from the NESC formulas for a typical distribution pole as defined above.)

$k_z \cdot GRF \cdot I$
Wires 0.80
Structure 0.90

(The above factors are intended for Grade B. To obtain Grade C factors, CP2766 recommends using 87% of the Grade B factors.)

Using the above factors for  $k_z \cdot GRF \cdot I$  defines two wind pressure values (one for the wires and a second one for the pole) for structures 60 feet or less in height, within a particular wind speed region.

Wind Pressure (psf)

Wind Speed	On Wires	On Structures
85 mph	15	17
90 mph	17	19
100 mph	21	23
110 mph	25	28

(The values listed are only for Grade B. To obtain Grade C factors, CP2766 recommends using 87% of the Grade B factors. Not to exceed limits could still be applied.)

For short structures, it may be reasonable to use a single  $kz \cdot GRF \cdot I$  value for wires and structures of 0.80. This produces only one pressure value to consider for each wind speed region or grade of construction, as follows:

Wind Pressure (psf)	On wires	and structures
Wind Speed	Grade B	Grade C
85 mph	15	17
90 mph	17	14
100 mph	21*	18*
110 mph	25*	22*

\* Outside Alaska “not to exceed” values should be 20 psf and 17 psf for Grades B and C, respectfully.

These are the calibrated design wind pressures CP2766 should target for structures 60 feet or less in height. CP2766 does not achieve these target wind pressures. Furthermore, because CP2766 sets the “not to exceed” limits so high, it would burden the utilities to use complex formulas to calculate specific pressures for each wire at attachment height. Therefore, I have voted to reject CP2766 as modified.

If you would like to perform calibrations for your typical structures and geographic location, I would gladly email you a copy of an Excel spreadsheet with the wind speed-pressure formulas embedded. Just send me an email at [rkluge@atcllc.com](mailto:rkluge@atcllc.com) and ask for the NESC wind computation sheet. Your opinions of these proposals are extremely valuable to the NESC Subcommittee.

For your reference, there are several change proposals addressing wind load—CP2673, 2739, 2766, 2798, 2718, 2787.

#### **Revised Text**

Part: 2 Section: 25

Rule: 250 C2

#### **CP2787**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

#### **Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Shultz, Slavin, Standford, Wong

**Negative:** (1) Kluge

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE: The NESC is becoming a design guide. This complexity is not necessary – See CP 2718.

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**Deleted Text**

Part: 2 Section: 25

Rule: 250 C2

**CP2798**

**Subcommittee Recommendation:** Accept in principle see action on CP2766

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (13) Aichinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Heald, Hensel, Kempner, Peters, Rempe, Slavin, Wong

**Negative:** (7) Bullinger, Bingel, Amato, Harrel, Kluge, Shultz, Stanford

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BINGEL: This CP follows CP 2766 which already passed in eliminating the 60 ft exclusion for extreme wind. However, CP2798 adds an additional cap for Grade C wind pressure. This only applies to regions in the country where the extreme wind speed is 90 mph or less. By not accepting this CP, the load requirement for Grade C construction in the medium load district will increase. No proof was presented to justify this load increase. A few subcommittee members expressed feeling that the load should be higher. That's not reason enough to reject this CP.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

HARREL: I am not in favor of the removal of the 60 ft exclusion.

SHULTZ: I prefer to keep the 60' exemption, but if it is removed, I prefer CP2798 rather than CP2766, which was accepted. I do support the same revisions to the footnotes in CP2798 as were made in CP2766. The 10 psf cap for Grade C continental extreme winds is reasonably comparable to present loading requirements for structures 60' and less in height which have served well.

STANDFORD: I feel that the cap of 10 psf (62.5 mph) is too low for extreme wind and believe that it should be 15 psf as it is in CP 2677.

WONG: CP 2766 has higher requirements to Grade C construction located at medium load district. CP 2798 Note 8 is written to address this issue. 10 psf wind pressure is more closely related to current 2002 NESC requirements. Yet, is 10 psf (60 mph plus) adequate? We need code user input.

KLUGE: I prefer CP 2739 as long as the district loads remain. The present district loads provide adequate strength

for structures <= 60 ft tall.

I encourage you to evaluate the impact of this proposal on your current designs. To assist you, I have calculated the wind pressure for a typical 40 ft. distribution pole, buried 6 feet, with phase conductors at the top, neutral conductors 8 ft. below the phases, and communication cables located 3-1/2 ft. below the neutral and displayed the results in the following table. Look at the pressure associated with the wind speed that represents your service territory.

Note that the “need not exceed” limits in Grade B are relatively high and not likely to apply. The controlling values are shown in bold text. Note also that when the “need not exceed” limits don’t control, unique pressure values must be calculated for the phase, neutral and communication wires and the pole.

Wind Pressure (psf) on Conductors as proposed in CP2798

Grade B

OLF = 1.0

Wind Speed (mph)	Phase Cond.	Neutral Wire	Comm. Cable	Need not exceed
85	15.2	14.6	14.3	30.0
90	17.0	16.3	16.0	30.0
100	21.0	20.2	19.7	30.0
110	24.5	24.4	23.8	30.0

Grade C

OLF = 0.87

Wind Speed (mph)	Phase Cond.	Neutral Wire	Comm. Cable	Need not exceed
85	13.2	12.7	12.4	10.0
90	14.8	14.2	13.9	15.0
100	18.3	17.6	17.1	15.0
OLF = .075				
110	18.4	18.3	17.9	15.0
Alaska OLF = 0.87				
110	21.3	21.2	20.7	15.0

Wind Pressure (psf) on Structures as proposed in CP2798

Wind Speed (mph)	Grade B		Grade C	
	OLF = 1.0	Need Not exceed	OLF = 0.87	OLF = 0.75
85	16.4	30.0	14.3	10.0
90	18.4	30.0	16.0	15.0
100	22.7	30.0	19.7	15.0
110	27.5	30.0	US except Alaska	20.6
110	27.5	30.0	In Alaska	23.9

I find CP2698 unacceptable for the following two reasons:

1. The “not to exceed” limit of 10 psf for Grade C is set too low for the 85 mph wind speed region and would permit unsafe designs. A safe value would be 13 to 15 psf.
2. The “not to exceed” limits are set too high for Grade B. Reasonable values would be 16 to 20 psf. By setting the limits too high, the proposal inadequately responds to the comments from users that distribution structures are not damaged by wind directly but by wind blown debris. To require structures to be designed to wind speeds that building cladding and trees cannot withstand is not justified.
3. If the “not to exceed” limits are set too high, the designer is economically directed to use the formulas. This is

especially true for communication companies occupying the lowest attachment height on the pole. However, most distribution and communication designers will find the formulas for kZ and GRF in NESC Rule 250C burdensome.

Since the wind speed-pressure formulas in NESC Rule 250C are too cumbersome for common distribution structure designs, as a possible modification, I would suggest calibrating the “not to exceed” limit to value that is safe yet low enough to render the need to use the formulas unnecessary. To accomplish both objectives, several “not to exceed” limits may be required to fit the various wind speed regions.

Or, as an alternate modification, one could use the NESC formulas for kZ and GRF to calibrate a single constant for use in the wind speed-pressure formula. (See my comment for CP2766.) This would more readily insure a safe design in various wind speed regions and accomplish most the simplicity of the “not to exceed” limit. (See also CP2718 for an example of a single constant for kZ and GRF. However, values for structures under 60 feet tall would need to be developed as CP2718 does not currently address short structures.)

If you would like to perform calibrations for your typical structures and geographic location, I would gladly email you a copy of an Excel spreadsheet with the wind speed-pressure formulas embedded. Just send me an email at rkluge@atcllc.com and ask for the NESC wind computation sheet. Your opinions of these proposals are extremely valuable to the NESC Subcommittee.

Note there are several wind related change proposals. They include CP2673, 2739, 2766, 2798, 2718, 2787.

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**Revised Text**

Part: 2 Section: 25

Rule: 250 Figure 250-2a

**CP2783**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 25

Rule: 250 Figure 250-2b

**CP2783**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 25

Rule: 250 Figure 250-2c

**CP2783**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 25

Rule: 250 Figurev 250-2e

**CP2783**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Deleted Text**

Part: 2 Section: 25

Rule: 250 Table 250-2

**CP2718**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

This change proposal was rejected because it does not add value to the current method for determining wind loads on wire and structures. The current method is complete and consistent with industry standard practice. The proposed change does not improve on the current approach and in some areas has values less than the loads now specified with no correlation data to justify this reduction

**Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Amato, Bingel, Bullinger, Clem, Denbrock, Freimark, Harrel, Kempner, Peters, Shultz, Slavin, Stanford, Vivas, Wong

**Negative:** (4) Heald, Hensel, Kluge, Rempe

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE, HENSEL, HEALD, & REMPE: I support the change for the reasons stated in the proposal.

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**New Text**

Part: 2 Section: 25

Rule: 250 Table 250-2

**CP2718**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

This change proposal was rejected because it does not add value to the current method for determining wind loads on wire and structures. The current method is complete and consistent with industry standard practice. The proposed change does not improve on the current approach and in some areas has values less than the loads now specified with no correlation data to justify this reduction

**Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Amato, Bingel, Bullinger, Clem, Denbrock, Freimark, Harrel, Kempner, Peters, Shultz, Slavin, Stanford, Vivas, Wong

**Negative:** (4) Heald, Hensel, Kluge, Rempe

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE, HENSEL, HEALD, & REMPE: I support the change for the reasons stated in the proposal.

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**Revised Text**

Part: 2 Section: 25

Rule: 250 TABLE 250-2

**CP2766**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Aichinger, Bingel, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Kempner, Kinghorn, Peters, Rempe, Slavin, Standford

**Negative:** (7) Clapp, Bullinger, Amato, Hensel, Kluge, Shultz, Wong

**Abstention:** (0)

**Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

CLAPP: I understand the desire to show a relative 2/3 relationship between Grade C and Grade B, but I think it should be achieved by raising the 15 psf limit to 20 psf (i.e., use 20 psf/30 psf) rather than reducing the 30 psf to 22.5 psf (i.e., 15/22.5).

HENSEL: The new RBD Manual will apparently recommend removing the 60 ft exemption from extreme wind and reducing the load factor for Grade C  $\leq$  60 ft to O.5. I don't think we adequately considered the new RBD Manual recommendation. I think we are being more restrictive in non-hurricane areas than is being called for on the RBD Manual.

SHULTZ: Removing the 60' exemption unilaterally will likely result in considerable increase in strength requirements in many loading situations, particularly in coastal areas. The public comments on a similar proposal for the 2002 revision cycle overwhelmingly cited collateral loading as the predominant cause of extreme wind failures. This proposal offers nothing to refute those statements of experience. In addition, in the 2002 cycle, several utilities in the South reviewed their records to see what claims for injury could be attributed to extreme wind failures. Those utilities could not identify any such claims for the previous several years. If this experience is anywhere near typical, the safety record is very good, and no support is provided in this proposal to demonstrate that removal of the exemption will improve on this safety performance.

WONG: There is a difference in the wind behaviors between continental wind and hurricane wind this I support CP2798 over CP2766.

KLUGE: This CP should be rejected for the following reasons:

1. The "not to exceed" limits are set too high as illustrated in the following example for a typical distribution pole. By having the limits set so high, the proposal inadequately responds to the comments from the users that distribution structures are not damaged by wind directly but by wind blown debris. To require structures to be designed to wind speeds that surrounding buildings and trees cannot withstand is not justified.
2. If the "not to exceed" limits are set too high, the designer is frequently directed to use the formulas. This is especially true for communication companies that occupy the lowest attachment height on a pole. However, most distribution and communication designers will find the NESC formulas burdensome.

The following table further illustrates why I find CP2766 as modified unacceptable. The following table compares the wind pressures calculated using NESC Rule 250C wind formulas to the "not to exceed" limits of CP2766 as modified. Note that the "need not exceed" limits seldom apply—controlling values are shown in bold text. Note

also the numerous pressure values for the phase, neutral and communication wires and the structure. These calculations were done for a typical 40 ft. distribution pole, buried 6 feet, with phase conductors at the top, neutral conductors 8 ft. below the phases, and communication cables located 3-1/2 ft. below the neutral.

Wind Pressure (psf) on Conductors as proposed in CP2766

Grade B

OLF = 1.0

Wind Speed (mph) Phase Cond. Neutral Wire Comm. Cable CP2766 Need not exceed

85	15.2	14.6	14.3	22.5
90	17.0	16.3	16.0	22.5
100	21.0	20.2	19.7	22.5
110	24.5	24.4	23.8	22.5

Grade C

OLF = 0.87

Wind Speed (mph) Phase Cond. Neutral Wire Comm. Cable CP2766 Need not exceed

85	13.2	12.7	12.4	15.0
90	14.8	14.2	13.9	15.0
100	18.3	17.6	17.1	15.0

OLF = .075

110	18.4	18.3	17.9	15.0
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Alaska OLF = 0.87

110	21.3	21.2	20.7	15.0
-----	------	------	------	------

Wind Pressure (psf) on Structures as proposed in CP2766

Wind Speed (mph)	Grade B		Grade C	
	OLF = 1.0	Need Not exceed	OLF = 0.87	OLF = 0.75 Need Not exceed
85	16.4	22.5	14.3	15.0
90	18.4	22.5	16.0	15.0
100	22.7	22.5	19.7	15.0
110	27.5	22.5	US except Alaska 20.6	15.0
110	27.5	22.5	In Alaska 23.9	15.0

If the subcommittee is determined to eliminate the 60 ft exception, here are two modifications that would make this CP more acceptable—either reduce the “not to exceed” limit or offering a single constant to use in the formula to convert wind speed to pressure. Both would accomplish the objective of making the design easier and could be calibrated to recognize the experience of the utilities.

The concept of a single constant to use in the wind speed-pressure formulas has the advantage of providing a custom wind-pressure for each wind speed location as explained below. (See also CP2718.) For structures 60 feet tall or shorter, the following values for  $kz \cdot GRF \cdot I$  would be appropriate. (These values were determined from the NESC formulas for a typical distribution pole as defined above.)

	$kz \cdot GRF \cdot I$
Wires	0.80
Structure	0.90

(The above factors are intended for Grade B. To obtain Grade C factors, CP2766 recommends using 87% of the Grade B factors.)

Using the above factors for  $k_z \cdot GRF \cdot I$  defines two wind pressure values (one for the wires and a second one for the pole) for structures 60 feet or less in height, within a particular wind speed region.

Wind Pressure (psf)	Wind Speed	On Wires	On Structures
	85 mph	15	17
	90 mph	17	19
	100 mph	21	23
	110 mph	25	28

(The values listed are only for Grade B. To obtain Grade C factors, CP2766 recommends using 87% of the Grade B factors. Not to exceed limits could still be applied.)

For short structures, it may be reasonable to use a single  $k_z \cdot GRF \cdot I$  value for wires and structures of 0.80. This produces only one pressure value to consider for each wind speed region or grade of construction, as follows:

Wind Pressure (psf) On wires and structures	Wind Speed	Grade B	Grade C
	85 mph	15	17
	90 mph	17	14
	100 mph	21*	18*
	110 mph	25*	22*

\* Outside Alaska “not to exceed” values should be 20 psf and 17 psf for Grades B and C, respectfully.

These are the calibrated design wind pressures CP2766 should target for structures 60 feet or less in height. CP2766 does not achieve these target wind pressures. Furthermore, because CP2766 sets the “not to exceed” limits so high, it would burden the utilities to use complex formulas to calculate specific pressures for each wire at attachment height. Therefore, I have voted to reject CP2766 as modified.

If you would like to perform calibrations for your typical structures and geographic location, I would gladly email you a copy of an Excel spreadsheet with the wind speed-pressure formulas embedded. Just send me an email at [rkluge@atcllc.com](mailto:rkluge@atcllc.com) and ask for the NESC wind computation sheet. Your opinions of these proposals are extremely valuable to the NESC Subcommittee.

For your reference, there are several change proposals addressing wind load—CP2673, 2739, 2766, 2798, 2718, 2787.

### Revised Text

Part: 2 Section: 25

Rule: 250 Table 250-2

### CP2783

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark,

Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

---

**Revised Text**

Part: 2 Section: 25

Rule: 250 Table 250-3 ft

**CP2783**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 25

Rule: 250 Table 250-3 m

**CP2783**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

---

**Deleted Text**

Part: 2 Section: 25

Rule: 250 Table 253-3

**CP2718**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

This change proposal was rejected because it does not add value to the current method for determining wind loads on wire and structures. The current method is complete and consistent with industry standard practice. The proposed change does not improve on the current approach and in some areas has values less than the loads now specified with no correlation data to justify this reduction

**Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Amato, Bingel, Bullinger, Clem, Denbrock, Freimark, Harrel, Kempner, Peters, Shultz, Slavin, Standford, Vivas, Wong

**Negative:** (4) Heald, Hensel, Kluge, Rempe

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE, HENSEL, HEALD, & REMPE: I support the change for the reasons stated in the proposal.

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**New Text**

Part: 2 Section: 25

Rule: 251

**CP2802**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

This proposal include ice plus concurrent wind map of ASCE 7-2002. That map is being revised and is expected to be completed by the time of the final vote on the NESC 2007 edition.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Standford, Wong

**Negative:** (1) Kinghorn

**Abstention:** (0)

**Explanation of Vote:**

FREIMARK: In general I support the intent of this change proposal and am voting in favor of it at this time. However, if the final outcome for the 2007 NESC is approval of CP 2737, the major re-write of the section 25, 26, and 27 of the NESC, then I feel that the passage of this particular CP would cause possible confusion and/or redundancy for the period that both the "new" and "previous" portions of the NESC are in effect and will vote against this proposal at that time.

KINGHORN: There is not sufficient evidence in my opinion that any additional public safety will be gained by this CP. The likelihood of the concurrent occurrence of these conditions is very remote. The approval of this CP could result in significant waste of resources without adequate justification.

---

**Revised Text**

Part: 2 Section: 25

Rule: 251

**CP2707**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (1) Freimark

**Abstention:** (0)

**Explanation of Vote:**

FREIMARK: During the discussion on this CP, I pointed out that the resulting lighter unit loads could result in higher tensions for the line design base on the 60% RBS criteria presently in Rule 261H. However, I did vote for this CP because I presumed that CP 2768, which I had submitted on behalf of TF 5.1.9 would be accepted and strengthen the criteria for avoiding fatigue damage (i.e., from aeolian vibration) to the conductors. Since CP2768 presently stands as rejected I feel that I must change my vote on CP2707 to Negative (i.e., REJECT), for the following reason: "This CP2707 allows a possible increase to conductor tensions above that previously permitted without at least a "Note" that the possibility of damage to the conductor from fatigue failures may also increase".

---

**Revised Text**

Part: 2 Section: 25

Rule: 251 A2

**CP2785**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Shultz, Slavin, Standford, Wong

**Negative:** (1) Kluge

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE: The Term "shape factor" better describes the coefficient and is currently well understood and accepted.

---

**Revised Text**

Part: 2 Section: 25

Rule: 251 B3, Table 251-1

**CP2736**

**Subcommittee Recommendation:** Reject**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Schwalm, Shultz, Standford, Wong

**Negative:** (5) DeSantis, Aichinger, Peters, Rempe, Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

**AICHINGER:** Although this CP addresses only single, unguyed poles, this is a complete and effective method to provide, finally, a method to design around various materials. This CP represents the design process of the future.

**DESANTIS & REMPE:** Although I agree this CP isn't complete, I feel it's important for the public to review it and get a feel for what will be presented and potentially implemented in future codes. By rejecting it, it is highly unlikely the public will take the time to crunch the numbers and make comparisons.

**PETERS:** RBD committee did a correct job in proposing this CP and therefore it should not be rejected.

**SLAVIN:** See Supporting Comments for CP2736, as well as the additional comments. The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

(1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003). (2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration. (3) Lack of industry experience in application of the recommended procedures and methodology.

(4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules. (5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 – May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005. In order to demonstrate that the determination of the values of Item (2) within the necessary time frame is not unreasonable, procedures by which such results may be obtained were briefly discussed at the SC5 meeting, including initial estimates of the required parameters. (It is understood that the latter estimates do not necessarily represent the final values to be agreed-upon by the ASCE RBD Committee.)

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may

become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology.

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**Revised Text**

Part: 2 Section: 25

Rule: 251 Table 251-1

**CP2613****Subcommittee Recommendation:** Accept**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Standford, Wong**Negative:** (0)**Abstention:** (1) Kinghorn**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 25

Rule: 251 Table 251-1

**CP2707****Subcommittee Recommendation:** Accept as modified**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong**Negative:** (1) Freimark**Abstention:** (0)**Explanation of Vote:**

FREIMARK: During the discussion on this CP, I pointed out that the resulting lighter unit loads could result in higher tensions for the line design base on the 60% RBS criteria presently in Rule 261H. However, I did vote for this CP because I presumed that CP 2768, which I had submitted on behalf of TF 5.1.9 would be accepted and strengthen the criteria for avoiding fatigue damage (i.e., from aeolian vibration) to the conductors. Since CP2768 presently stands as rejected I feel that I must change my vote on CP2707 to Negative (i.e., REJECT), for the following reason: "This CP2707 allows a possible increase to conductor tensions above that previously permitted without at least a "Note" that the possibility of damage to the conductor from fatigue failures may also increase".

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**New Text**

Part: 2 Section: 25

Rule: 252 A

**CP2506****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

There already exist instructions in Rule 252D "Simultaneous Application of Loads" to consider vertical loads that would include eccentric loads. Secondly, NESC references ANSI O5.1 for the permitted stress level. Although the present code specifies that the analysis be performed at the ground line for unbraced single-based structures ANSI O5.1-2002 provides instruction to analyze all poles at the point of maximum stress. Furthermore, ANSI O5.1-2002 provides a "fiber stress height effect: the reduces the permitted stress at mid-height to 75% of that at ground-line. These revisions in ANSI O5.1 are addresses by CP 2780 and CP 2781. The combination of the above NESC Rule and referenced standard adequately address this issue.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Aichinger, Amato, Bingel, Bullinger, Burley, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Shultz, Standford, Wong

**Negative:** (4) Clem, Clapp, Rempe, Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

CLAPP: I disagree with the reason for rejection. I think the proposal is deficient because it does not require stress assessment at the point of maximum stress and, as a result, would not be effective. It would add a minor bending moment at the ground line.

HEALD & REMPE: I do not agree with the reasons for rejection provided by the committee. I voted to reject because there is not sufficient supporting information for the change proposal. The report by Telcordia is available to everyone and should have been provided as part of the supporting comments.

SLAVIN: See Supporting Comments

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**Revised Text**

Part: 2 Section: 25

Rule: 252 B, C7

**CP2736****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, Freimark, Harrel, Heald, Hensel,

Jones, Kempner, Kluge, Schwalm, Shultz, Standford, Wong

**Negative:** (5) DeSantis, Aichinger, Peters, Rempe, Slavin

**Abstention:** (1) Kinghorn

### **Explanation of Vote:**

**AICHINGER:** Although this CP addresses only single, unguyed poles, this is a complete and effective method to provide, finally, a method to design around various materials. This CP represents the design process of the future.

**DESANTIS & REMPE:** Although I agree this CP isn't complete, I feel it's important for the public to review it and get a feel for what will be presented and potentially implemented in future codes. By rejecting it, it is highly unlikely the public will take the time to crunch the numbers and make comparisons.

**PETERS:** RBD committee did a correct job in proposing this CP and therefore it should not be rejected.

**SLAVIN:** See Supporting Comments for CP2736, as well as the additional comments. The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

(1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003). (2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration. (3) Lack of industry experience in application of the recommended procedures and methodology.

(4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules. (5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 -- May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005. In order to demonstrate that the determination of the values of Item (2) within the necessary time frame is not unreasonable, procedures by which such results may be obtained were briefly discussed at the SC5 meeting, including initial estimates of the required parameters. (It is understood that the latter estimates do not necessarily represent the final values to be agreed-upon by the ASCE RBD Committee.)

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology.

**New Text**

Part: 2 Section: 25

Rule: 252 B2b

**CP2782****Subcommittee Recommendation:** Accept as modified**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (24) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kinghorn, Kluge, Peters, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong**Negative:** (0)**Abstention:** (0)**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 25

Rule: 252 B2b

**CP2785****Subcommittee Recommendation:** Accept**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Shultz, Slavin, Stanford, Wong**Negative:** (1) Kluge**Abstention:** (1) Kinghorn**Explanation of Vote:**KLUGE: The Term "shape factor" better describes the coefficient and is currently well understood and accepted.

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**Revised Text**

Part: 2 Section: 25

Rule: 252 B2c

**CP2785****Subcommittee Recommendation:** Accept**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (1) Kluge

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE: The Term "shape factor" better describes the coefficient and is currently well understood and accepted.

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**Revised Text**

Part: 2 Section: 25

Rule: 252 B2c

**CP2786**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (2) Amato, Kinghorn

**Explanation of Vote:**

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**New Text**

Part: 2 Section: 25

Rule: 252 B3

**CP2507**

**Subcommittee Recommendation:** Withdrawn

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (0)

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 25

Rule: 253

**CP2717**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Jones, Kempner, Kluge, Peters, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (1) Hensel

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

HENSEL: Eliminating the alternate method for wood pole will require recalculating all standards book allowable spans based on the current 2.00, 2.67, and 4.00 wood pole safety factors. This change proposal will require us to change to a method in 2007 that is scheduled to be removed from the NESC in 2012, when we will be required to change to a reliability base design method. It is wasteful to require NESC user to switch to a new method that will be obsolete in five years. No one claims the method we will be required to use in the 2007 NESC is safer than the alternate method being eliminated by this change proposal.

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**New Text**

Part: 2 Section: 25

Rule: 253

**CP2802**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

This proposal include ice plus concurrent wind map of ASCE 7-2002. That map is being revised and is expected to be completed by the time of the final vote on the NESC 2007 edition.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Standford, Wong

**Negative:** (1) Kinghorn

**Abstention:** (0)

**Explanation of Vote:**

FREIMARK: In general I support the intent of this change proposal and am voting in favor of it at this time. However, if the final outcome for the 2007 NESC is approval of CP 2737, the major re-write of the section 25, 26, and 27 of the NESC, then I feel that the passage of this particular CP would cause possible confusion and/or redundancy for the period that both the "new" and "previous" portions of the NESC are in effect and will vote against this proposal at that time.

KINGHORN: There is not sufficient evidence in my opinion that any additional public safety will be gained by this CP. The likelihood of the concurrent occurrence of these conditions is very remote. The approval of this CP could result in significant waste of resources without adequate justification.

---

**Revised Text**

Part: 2 Section: 25

Rule: 253

**CP2829****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

Major changes to the insulators strength should be championed by ANSI C29

**Vote on Subcommittee Recommendation:****Affirmative:** (14) Aichinger, Amato, Burley, Clem, Denbrock, Harrel, Heald, Hensel, Kempner, Kinghorn, Rempe, Shultz, Standford, Wong**Negative:** (5) Slavin, Kluge, Freimark, DeSantis, Clapp**Abstention:** (1) Bullinger**Explanation of Vote:**

CLAPP: If ANSI C29 is not willing to get off its collective duff and provide appropriate guidance, then they must be willing to accept what comes out of this committee. They can't tell us we have incorrect requirements without giving us the correct requirements. Kluge's proposal has merit to assure that insulator strength is appropriate. We have just gone through a major blackout that apparently turns out to be partly the result of inappropriate thermal ratings for conductors resulting in too much sag and lines contacting trees below. We don't need to have insulators breaking because of similar loading case mismatches. I think that the recent information on insulator life changes due to stress loadings may go a long way to explain some previously unexplained insulator failures and should be properly addressed. Even if it were not a safety problem to have insulator failures, which it most certainly is a safety problem, we don't have the line redundancy to allow line failure due to insulator failures. The reliability and safety of electric utility transmission line and distribution line service is of paramount concern now, and will only increase in concern in future years. Now is the time to properly state insulator strength requirements so that they will (a) be appropriate for actual expected long-term and short-term loadings and (b) they cannot be misunderstood due to lack of specificity.

KLUGE: The reason the subcommittee gave for rejection is not true. The change proposal was indeed championed by ANSI C29.

1) During the NESC 2002 revision cycle, ANSI C29 committee submitted a written comment to CP2372 stating that insulators should not be loaded beyond the 40-50% rated strength limit. "Loads above these limits, no matter how short in duration, introduce a risk to the integrity of the insulators, and the possibility of either an immediate or delayed line failure."

2) The Chair and Vice-Chair of ANSI C29 Committee came to a NESC Subcommittee meeting and gave a presentation on insulator strength. This personal visit was to "champion" this change to NESC. Slides from their presentation are included with the supporting comments to the change proposal.

3) Two Subcommittee 5 members are also members of ANSI C29. Both Schwalm and DeSantis voted to support the change proposal.

As long as ANSI C29 continues to support this change proposed, NESC is obligated to approve this change proposal. ANSI C29 is the recognized authority on insulators. Your comments are invited. I'll personally see that any comments received are also reviewed by ANSI C29 committee. I'm committed to do what is deemed right by ANSI C29.

SLAVIN: See supporting comments.

DESANTIS: I support these changes in principle and would support it if it only included the District Loading changes. Although we currently follow these proposed guidelines for Extreme Loadings on insulators at my Company, there are other utilities that do not. By establishing the limits for Extreme Winds, you would be hindering their options to load their insulators to higher loadings, a practice that has been apparently working for them for many years. If those utilities wish to continue their practice and accept the Liability of their actions, then so be it.

BULLINGER: Lack of expertise

FREIMARK: While I am generally opposed to the provisions contained in this CP for the reason provided for its Rejection, I would prefer that this CP receive public comments appropriate to the CPs importance as I believe that "accepted" proposal receive greater public scrutiny than do "rejected" proposals. I therefore change my vote to be against rejection; SC5 can still reject this CP in October, 2005, after the comment period.

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**Revised Text**

Part: 2 Section: 25

Rule: 253 Table 253-1

**CP2505**

**Subcommittee Recommendation:** Withdrawn

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (0)

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 25

Rule: 253 Table 253-1

**CP2552**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (23) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 25

Rule: 253 Table 253-1

**CP2568****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

No justification to reduce Grade C and increase Grade B factors.

**Vote on Subcommittee Recommendation:****Affirmative:** (20) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Schwalm, Shultz, Stanford, Wong**Negative:** (3) DeSantis, Kluge, Slavin**Abstention:** (1) Kinghorn**Explanation of Vote:**

DESANTIS: I support having one strength factor for any respective material and handle the load variability for different grades of construction or reliability in the load factor for the respective conditions

SLAVIN: See Supporting Comments

HARREL: The vertical overload factor for grade C should not be reduced below 1.5. Historically, the vertical loads were the same for Grade B and C. See also support Comment in CP 2821. Secondly I do not agree with the supporting comments and am not convinced this detailed change is needed. Possibly this could be covered in a simpler manner under the NESC Part 4 because if proper care is taken these loads may not exist.

KLUGE: I support the proposal for the reason given in the proposal. The revised design method in ANSI O5.1 2002 for large poles and the test results for small poles would justify increasing the Grade B allowable strength factor from 65% to 75%.

Furthermore, it makes sense to address the different grades of construction with load factors not a combination of load and strength factors. However, the vertical overload factors for wood should be greater than 1.70. The current values in NESC do not adequately recognize the loss of strength that occurs in wood when exposed to long duration loads such as gravity loads. The vertical overload factor for wood should be between 1.75 and 2.0 for both grade B and C. (See also CP 2821 that addresses this subject.)

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**Revised Text**

Part: 2 Section: 25

Rule: 253 Table 253-1

**CP2569****Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bingel, Bullinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Schwalm, Shultz, Slavin, Stanford

**Negative:** (2) Kluge, Wong

**Abstention:** (2) Burley, Kinghorn

**Explanation of Vote:**

KLUGE: With this proposal, designers of fiberglass poles would use design factors for steel and design methods for wood. The fiberglass industry needs to tell us if their product behaves more like a wood or a steel pole. Specifically, in Rule 261C3, the proposal considers the fiberglass pole as a "strut" only. Yet, typically fiberglass poles are tubular and, therefore, presumably stiffer than solid wood poles. This assumption is not proper if steel overloads are recommended for Table 253-1.

Secondly, the fiberglass industry needs to provide long duration load test data. This is needed to evaluate the appropriateness of proposed Rule 261D3 regarding the effect of long term loads such as gravity loads on fiberglass crossarms.

If the above data is provided, I could accept this proposal with appropriate modifications.

WONG: I agree in principle with the CP. Fiberglass material is widely used in the industry and should be in the code. However, fiberglass material behaves differently under long-term loads. A note or statement should be included to make user aware this potential concern. Also are the proposed load factors "correct"?

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**Revised Text**

Part: 2 Section: 25

Rule: 253 Table 253-1

**CP2658**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (12) Aichinger, Amato, Bingel, Burley, Clapp, Denbrock, Freimark, Harrel, Jones, Kempner, Rempe, Schwalm

**Negative:** (8) DeSantis, Clem, Heald, Kluge, Peters, Shultz, Stanford, Wong

**Abstention:** (4) Bullinger, Hensel, Kinghorn, Slavin

**Explanation of Vote:**

CLEM: The industry has used controlled pulling practices for years that allowed the successful use of Davit Arms, post insulators etc. In addition, the installation of new OPGW to replace the existing OHGW could be a problem with this rule. Since the intent of the rule is worker safety, I believe that the committee should see case studies substantiating the need for restricting our typical construction practices and base any adopted rule as corrective action to specific typical problems.

DESANTIS: These requirements would eliminate the use of past insulators for many applications where they have been currently used for decades. The insulator % limits in Rule 277 are designed for sustained events and not short term or instantaneous loads. I would support an EXCEPTION for 250D3 to read "Should a composite insulator be subject to a load exceeding these percentages during the stringing operation, it should be immediately removed from service before the stringing operation can continue." The EXCEPTION probably needs to reside in Rule 277.

CLAPP: The purpose of this CP was to appropriately address the worker safety without using the present method of requiring the result of overload factor x strength factor = total factor for Grade C to equal the result for Grade B. In effect, the present method over designs Grade C structures for vertical loads because it increases the total factor for all vertical loads, not just those caused by work. This rejection is the equivalent of throwing the baby out with the bath water. We should find an acceptable way to keep the baby.

SLAVIN: I believe the NESC requires more extensive safety rules regarding construction and maintenance loads.

STANDFORD: I do not agree with lowering the vertical overload factors for Grade C to 1.35 for both wood and steel. This is to large of a reduction for wood. A reduction to 1.5 for wood and 1.35 for steel would have been a better move.

SHULTZ & HEALD: The proposed addition of this rule is well-intentioned, but it presents some practical problems to the code user in complying. For instance, proposed Rules 250D1, 250D2, 250D3, and 250D4 specify loading scenarios that are conditional. That is, whether or not they would apply will depend upon situations that could be expected to vary from project to project, even from structure to structure. Yet the designer is expected to foresee all these situations beforehand and include those that apply in the structure design. Because these can be design-governing loads, it will be extremely difficult to comply with these provisions without assuming worst case loadings. From a safety perspective, this is unnecessarily restrictive. The responsibility for construction and maintenance loading safety is already assigned by the NESC. This proposal only codifies design loads that would be better included in a design manual. Given that this proposal addresses construction and maintenance loads, and load factors are specified in the text of the proposed rules, the revision of vertical load factors is inappropriate in this proposal.

PETERS: I am for the original change propose submitted by TF 5.1.1

WONG: The original CP 2658 was rejected by SC 5. This substitute CP could change string or pulling operation on post insulator configuration. Existing conductor pulling operation with post insulator has not cause any known safety problems. Thus I cannot support this CP without more studies with input from construction people.

KLUGE: See comments by Shultz and Wong

BULLINGER: Lack of expertise

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### Revised Text

Part: 2 Section: 25

Rule: 253 Table 253-1

### CP2807

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Not fully formed.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 25

Rule: 253 Table 253-1

**CP2821**

**Subcommittee Recommendation:** Accept in principle see action on CP2658

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Hensel, Jones, Kempner, Kluge, Rempe, Schwalm, Slavin, Stanford, Wong

**Negative:** (2) Heald, Shultz

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

SHULTZ: This proposal was accepted in principle based on approval of CP2658. I do not support the CP2658 (see my comment); therefore, I do not support this proposal.

HEALD: I agree with Shultz and I also do not agree with many of the supporting comments made in CP2821.

KLUGE: I accept this proposal in principle. However, CP2658 is not relevant. CP2658 addresses stringing loads that are short duration and therefore not relevant to the issues raised by this proposal.

CP2568, if modified, would be a better proposal than CP2821. CP2568 could address the issues raised by this proposal, that is, the reduction in strength of wood when exposed to long duration loads. See also my comments on CP2568.

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**Revised Text**

Part: 2 Section: 25

Rule: 253 Table 253-1, 2

**CP2736**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Schwalm, Shultz, Standford, Wong

**Negative:** (5) DeSantis, Aichinger, Peters, Rempe, Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

**AICHINGER:** Although this CP addresses only single, unguyed poles, this is a complete and effective method to provide, finally, a method to design around various materials. This CP represents the design process of the future.

**DESANTIS & REMPE:** Although I agree this CP isn't complete, I feel it's important for the public to review it and get a feel for what will be presented and potentially implemented in future codes. By rejecting it, it is highly unlikely the public will take the time to crunch the numbers and make comparisons.

**PETERS:** RBD committee did a correct job in proposing this CP and therefore it should not be rejected.

**SLAVIN:** See Supporting Comments for CP2736, as well as the additional comments. The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

(1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003). (2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration. (3) Lack of industry experience in application of the recommended procedures and methodology.

(4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules. (5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 -- May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005. In order to demonstrate that the determination of the values of Item (2) within the necessary time frame is not unreasonable, procedures by which such results may be obtained were briefly discussed at the SC5 meeting, including initial estimates of the required parameters. (It is understood that the latter estimates do not necessarily represent the final values to be agreed-upon by the ASCE RBD Committee.)

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate

calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology.

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**New Text**

Part: 2 Section: 25

Rule: 253 Table 253-2

**CP2827****Subcommittee Recommendation:** Accept**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong**Negative:** (0)**Abstention:** (1) Kinghorn**Explanation of Vote:**

KLUGE: The wording in this CP could be confusing because the last sentence appears to contradict the change proposed. When brought to the attention of the committee, Allen Clapp offered to explain this dilemma in his handbook. I believe the NESC should be written clearly and not rely on an explanation in a handbook to convey its intent. The revised wording for footnote 2 of Table 261-1A and footnote 3 of Table 253-2 proposed in CP 2822 is clearer

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**Revised Text**

Part: 2 Section: 25

Rule: 253 Table 253-2 fn3

**CP2822****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

Allows too much deterioration to guy wires, guy anchors, steel structures and foundations.

**Vote on Subcommittee Recommendation:****Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong**Negative:** (0)**Abstention:** (0)**Explanation of Vote:****Revised Text**

Part: 2 Section: 25

Rule: 253 Tables 253-1 & 253-2

**CP2739**

**Subcommittee Recommendation:** Accept in principle see action on cp2766

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bingel, Bullinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE: I have changed my vote to support CP2739 over CP2766. The district loads provide adequate strength for structures  $\leq 60$  ft tall. See also my comments on CP2766. Without additional modifications to 2766, the only reasonable alternative is to keep the 60 ft exemption.

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**New Text**

Part: 2 Section: 25

Rule: 253 Tables 253-1 & 253-2

**CP2766**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Aichinger, Bingel, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Kempner, Kinghorn, Peters, Rempe, Slavin, Stanford

**Negative:** (7) Clapp, Bullinger, Amato, Hensel, Kluge, Shultz, Wong

**Abstention:** (0)

**Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

CLAPP: I understand the desire to show a relative 2/3 relationship between Grade C and Grade B, but I think it should be achieved by raising the 15 psf limit to 20 psf (i.e., use 20 psf/30 psf) rather than reducing the 30 psf to 22.5 psf (i.e., 15/22.5).

HENSEL: The new RBD Manual will apparently recommend removing the 60 ft exemption from extreme wind and reducing the load factor for Grade C  $\leq 60$  ft to 0.5. I don't think we adequately considered the new RBD Manual

recommendation. I think we are being more restrictive in non-hurricane areas than is being called for on the RBD Manual.

SHULTZ: Removing the 60' exemption unilaterally will likely result in considerable increase in strength requirements in many loading situations, particularly in coastal areas. The public comments on a similar proposal for the 2002 revision cycle overwhelmingly cited collateral loading as the predominant cause of extreme wind failures. This proposal offers nothing to refute those statements of experience. In addition, in the 2002 cycle, several utilities in the South reviewed their records to see what claims for injury could be attributed to extreme wind failures. Those utilities could not identify any such claims for the previous several years. If this experience is anywhere near typical, the safety record is very good, and no support is provided in this proposal to demonstrate that removal of the exemption will improve on this safety performance.

WONG: There is a difference in the wind behaviors between continental wind and hurricane wind this I support CP2798 over CP2766.

KLUGE: This CP should be rejected for the following reasons:

1. The "not to exceed" limits are set too high as illustrated in the following example for a typical distribution pole. By having the limits set so high, the proposal inadequately responds to the comments from the users that distribution structures are not damaged by wind directly but by wind blown debris. To require structures to be designed to wind speeds that surrounding buildings and trees cannot withstand is not justified.
2. If the "not to exceed" limits are set too high, the designer is frequently directed to use the formulas. This is especially true for communication companies that occupy the lowest attachment height on a pole. However, most distribution and communication designers will find the NESC formulas burdensome.

The following table further illustrates why I find CP2766 as modified unacceptable. The following table compares the wind pressures calculated using NESC Rule 250C wind formulas to the "not to exceed" limits of CP2766 as modified. Note that the "need not exceed" limits seldom apply—controlling values are shown in bold text. Note also the numerous pressure values for the phase, neutral and communication wires and the structure. These calculations were done for a typical 40 ft. distribution pole, buried 6 feet, with phase conductors at the top, neutral conductors 8 ft. below the phases, and communication cables located 3-1/2 ft. below the neutral.

Wind Pressure (psf) on Conductors as proposed in CP2766

Grade B

OLF = 1.0

Wind Speed (mph)	Phase Cond.	Neutral Wire	Comm. Cable	CP2766 Need not exceed
85	15.2	14.6	14.3	22.5
90	17.0	16.3	16.0	22.5
100	21.0	20.2	19.7	22.5
110	24.5	24.4	23.8	22.5

Grade C

OLF = 0.87

Wind Speed (mph)	Phase Cond.	Neutral Wire	Comm. Cable	CP2766 Need not exceed
85	13.2	12.7	12.4	15.0
90	14.8	14.2	13.9	15.0
100	18.3	17.6	17.1	15.0

OLF = .075

110	18.4	18.3	17.9	15.0
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Alaska OLF = 0.87

110	21.3	21.2	20.7	15.0
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Wind Pressure (psf) on Structures as proposed in CP2766

Wind Speed (mph)	Grade B		Grade C	
	OLF = 1.0	Need Not exceed	OLF = 0.87	OLF = 0.75
85	16.4	22.5	14.3	15.0
90	18.4	22.5	16.0	15.0
100	22.7	22.5	19.7	15.0
110	27.5	22.5	US except Alaska	20.6
110	27.5	22.5	In Alaska	23.9

If the subcommittee is determined to eliminate the 60 ft exception, here are two modifications that would make this CP more acceptable—either reduce the “not to exceed” limit or offering a single constant to use in the formula to convert wind speed to pressure. Both would accomplish the objective of making the design easier and could be calibrated to recognize the experience of the utilities.

The concept of a single constant to use in the wind speed-pressure formulas has the advantage of providing a custom wind-pressure for each wind speed location as explained below. (See also CP2718.) For structures 60 feet tall or shorter, the following values for  $k_z \cdot GRF \cdot I$  would be appropriate. (These values were determined from the NESC formulas for a typical distribution pole as defined above.)

	$k_z \cdot GRF \cdot I$
Wires	0.80
Structure	0.90

(The above factors are intended for Grade B. To obtain Grade C factors, CP2766 recommends using 87% of the Grade B factors.)

Using the above factors for  $k_z \cdot GRF \cdot I$  defines two wind pressure values (one for the wires and a second one for the pole) for structures 60 feet or less in height, within a particular wind speed region.

Wind Pressure (psf)	On Wires	On Structures
85 mph	15	17
90 mph	17	19
100 mph	21	23
110 mph	25	28

(The values listed are only for Grade B. To obtain Grade C factors, CP2766 recommends using 87% of the Grade B factors. Not to exceed limits could still be applied.)

For short structures, it may be reasonable to use a single  $k_z \cdot GRF \cdot I$  value for wires and structures of 0.80. This produces only one pressure value to consider for each wind speed region or grade of construction, as follows:

Wind Pressure (psf) On wires and structures	Grade B	Grade C
85 mph	15	17
90 mph	17	14
100 mph	21*	18*
110 mph	25*	22*

\* Outside Alaska “not to exceed” values should be 20 psf and 17 psf for Grades B and C, respectfully.

These are the calibrated design wind pressures CP2766 should target for structures 60 feet or less in height. CP2766 does not achieve these target wind pressures. Furthermore, because CP2766 sets the “not to exceed” limits so high, it would burden the utilities to use complex formulas to calculate specific pressures for each wire at attachment height. Therefore, I have voted to reject CP2766 as modified.

If you would like to perform calibrations for your typical structures and geographic location, I would gladly email you a copy of an Excel spreadsheet with the wind speed-pressure formulas embedded. Just send me an email at rkluge@atcllc.com and ask for the NESC wind computation sheet. Your opinions of these proposals are extremely valuable to the NESC Subcommittee.

For your reference, there are several change proposals addressing wind load—CP2673, 2739, 2766, 2798, 2718, 2787.

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### **Revised Text**

Part: 2 Section: 25

Rule: 253 Tables 253-1 & 253-2

### **CP2798**

**Subcommittee Recommendation:** Accept in principle see action on CP2766

### **Subcommittee Comment:**

### **Vote on Subcommittee Recommendation:**

**Affirmative:** (13) Aichinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Heald, Hensel, Kempner, Peters, Rempe, Slavin, Wong

**Negative:** (7) Bullinger, Bingel, Amato, Harrel, Kluge, Shultz, Stanford

**Abstention:** (1) Kinghorn

### **Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BINGEL: This CP follows CP 2766 which already passed in eliminating the 60 ft exclusion for extreme wind. However, CP2798 adds an additional cap for Grade C wind pressure. This only applies to regions in the country where the extreme wind speed is 90 mph or less. By not accepting this CP, the load requirement for Grade C construction in the medium load district will increase. No proof was presented to justify this load increase. A few subcommittee members expressed feeling that the load should be higher. That’s not reason enough to reject this CP.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

HARREL: I am not in favor of the removal of the 60 ft exclusion.

SHULTZ: I prefer to keep the 60’ exemption, but if it is removed, I prefer CP2798 rather than CP2766, which was accepted. I do support the same revisions to the footnotes in CP2798 as were made in CP2766. The 10 psf cap for

Grade C continental extreme winds is reasonably comparable to present loading requirements for structures 60' and less in height which have served well.

STANDFORD: I feel that the cap of 10 psf (62.5 mph) is too low for extreme wind and believe that it should be 15 psf as it is in CP 2677.

WONG: CP 2766 has higher requirements to Grade C construction located at medium load district. CP 2798 Note 8 is written to address this issue. 10 psf wind pressure is more closely related to current 2002 NESC requirements. Yet, is 10 psf (60 mph plus) adequate? We need code user input.

KLUGE: I prefer CP 2739 as long as the district loads remain. The present district loads provide adequate strength for structures <= 60 ft tall.

I encourage you to evaluate the impact of this proposal on your current designs. To assist you, I have calculated the wind pressure for a typical 40 ft. distribution pole, buried 6 feet, with phase conductors at the top, neutral conductors 8 ft. below the phases, and communication cables located 3-1/2 ft. below the neutral and displayed the results in the following table. Look at the pressure associated with the wind speed that represents your service territory.

Note that the "need not exceed" limits in Grade B are relatively high and not likely to apply. The controlling values are shown in bold text. Note also that when the "need not exceed" limits don't control, unique pressure values must be calculated for the phase, neutral and communication wires and the pole.

Wind Pressure (psf) on Conductors as proposed in CP2798

Grade B

OLF = 1.0

Wind Speed (mph) Phase Cond. Neutral Wire Comm. Cable Need not exceed

85	15.2	14.6	14.3	30.0
90	17.0	16.3	16.0	30.0
100	21.0	20.2	19.7	30.0
110	24.5	24.4	23.8	30.0

Grade C

OLF = 0.87

Wind Speed (mph) Phase Cond. Neutral Wire Comm. Cable Need not exceed

85	13.2	12.7	12.4	10.0
90	14.8	14.2	13.9	15.0
100	18.3	17.6	17.1	15.0

OLF = .075

110	18.4	18.3	17.9	15.0
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Alaska OLF = 0.87

110	21.3	21.2	20.7	15.0
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Wind Pressure (psf) on Structures as proposed in CP2798

Wind Speed (mph)	Grade B		Grade C	
	OLF = 1.0	Need Not exceed	OLF = 0.87	OLF = 0.75 Need Not exceed
85	16.4	30.0	14.3	10.0
90	18.4	30.0	16.0	15.0
100	22.7	30.0	19.7	15.0
110	27.5	30.0	US except Alaska 20.6	15.0

110 \_\_\_\_\_ 27.5 \_\_\_\_\_ 30.0 \_\_\_\_\_ In Alaska \_\_\_\_\_ 23.9 \_\_\_\_\_ 15.0

I find CP2698 unacceptable for the following two reasons:

1. The “not to exceed” limit of 10 psf for Grade C is set too low for the 85 mph wind speed region and would permit unsafe designs. A safe value would be 13 to 15 psf.
2. The “not to exceed” limits are set too high for Grade B. Reasonable values would be 16 to 20 psf. By setting the limits too high, the proposal inadequately responds to the comments from users that distribution structures are not damaged by wind directly but by wind blown debris. To require structures to be designed to wind speeds that building cladding and trees cannot withstand is not justified.
3. If the “not to exceed” limits are set too high, the designer is economically directed to use the formulas. This is especially true for communication companies occupying the lowest attachment height on the pole. However, most distribution and communication designers will find the formulas for kZ and GRF in NESC Rule 250C burdensome.

Since the wind speed-pressure formulas in NESC Rule 250C are too cumbersome for common distribution structure designs, as a possible modification, I would suggest calibrating the “not to exceed” limit to value that is safe yet low enough to render the need to use the formulas unnecessary. To accomplish both objectives, several “not to exceed” limits may be required to fit the various wind speed regions.

Or, as an alternate modification, one could use the NESC formulas for kZ and GRF to calibrate a single constant for use in the wind speed-pressure formula. (See my comment for CP2766.) This would more readily insure a safe design in various wind speed regions and accomplish most the simplicity of the “not to exceed” limit. (See also CP2718 for an example of a single constant for kZ and GRF. However, values for structures under 60 feet tall would need to be developed as CP2718 does not currently address short structures.)

If you would like to perform calibrations for your typical structures and geographic location, I would gladly email you a copy of an Excel spreadsheet with the wind speed-pressure formulas embedded. Just send me an email at rkluge@atcllc.com and ask for the NESC wind computation sheet. Your opinions of these proposals are extremely valuable to the NESC Subcommittee.

Note there are several wind related change proposals. They include CP2673, 2739, 2766, 2798, 2718, 2787.

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#### **New Text**

Part: 2 Section: 25

Rule: 254 A-F, Tables 254-1,2

#### **CP2734**

**Subcommittee Recommendation:** Reject

#### **Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

#### **Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Rempe, Schwalm, Shultz, Stanford, Wong

**Negative:** (2) Peters, Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

SLAVIN: See Supporting Comments for CP2734, as well as the additional comments below.

The reasons for the subcommittee (SC5) voting to recommend “rejection” of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

- (1) The final version of the “RBD Manual” (Ed. 1) is not available at the time of voting (week of September 29, 2003).
- (2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration.
- (3) Lack of industry experience in application of the recommended procedures and methodology.
- (4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules.
- (5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various “RBD” proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 – May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005.

Items (3) and (4) offset each other in that the use of an “alternate method” for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology

PETERS: CP should be accepted to allow for industry consideration of RBD methods. RBD methods are the standard practice of structure design and should be seriously considered for incorporation for NESC

CLAPP: I cannot condone applying to a 65 ft pole one-half the load applied to a 70 ft pole. This is an inappropriate exemption for pole less than 70 ft in length (60 ft above ground).

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**Deleted Text**

Part: 2 Section: 25

Rule: 261 A2f

**CP2766**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Aichinger, Bingel, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Kempner, Kinghorn, Peters, Rempe, Slavin, Standford

**Negative:** (7) Clapp, Bullinger, Amato, Hensel, Kluge, Shultz, Wong

**Abstention:** (0)

**Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

CLAPP: I understand the desire to show a relative 2/3 relationship between Grade C and Grade B, but I think it should be achieved by raising the 15 psf limit to 20 psf (i.e., use 20 psf/30 psf) rather than reducing the 30 psf to 22.5 psf (i.e., 15/22.5).

HENSEL: The new RBD Manual will apparently recommend removing the 60 ft exemption from extreme wind and reducing the load factor for Grade C  $\leq$  60 ft to 0.5. I don't think we adequately considered the new RBD Manual recommendation. I think we are being more restrictive in non-hurricane areas than is being called for on the RBD Manual.

SHULTZ: Removing the 60' exemption unilaterally will likely result in considerable increase in strength requirements in many loading situations, particularly in coastal areas. The public comments on a similar proposal for the 2002 revision cycle overwhelmingly cited collateral loading as the predominant cause of extreme wind failures. This proposal offers nothing to refute those statements of experience. In addition, in the 2002 cycle, several utilities in the South reviewed their records to see what claims for injury could be attributed to extreme wind failures. Those utilities could not identify any such claims for the previous several years. If this experience is anywhere near typical, the safety record is very good, and no support is provided in this proposal to demonstrate that removal of the exemption will improve on this safety performance.

WONG: There is a difference in the wind behaviors between continental wind and hurricane wind this I support CP2798 over CP2766.

KLUGE: I prefer CP 2739 as long as the district loads are maintained. The present district loads provide adequate strength for structure  $\leq$  60 ft tall.

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**New Text**

Part: 2 Section: 26

**CP2737**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

Send to have Task force 5.2.1 to calibrate values and get feedback from utilities on loading cases. Also to have a report prepared by March 1, 2004

**Vote on Subcommittee Recommendation:**

**Affirmative:** (13) Aichinger, Bingel, Burley, Clapp, Clem, Denbrock, Heald, Hensel, Kempner, Peters, Rempe, Slavin, Standford

**Negative:** (7) DeSantis, Bullinger, Amato, Freimark, Harrel, Kluge, Shultz

**Abstention:** (2) Kinghorn, Wong

**Explanation of Vote:**

AMATO: There exists insufficient supporting comments and data.

BINGEL: Compared to the 2002 NESC, This CP incorporates more accurate weather data and improved methodologies that provide known levels of reliability. I voted affirmative so we would receive public comments and gain a clearer understanding of how this CP will impact pole loading. I also agreed to chair the Task Force 5.2.1 which is charged with comparisons between this CP and the 2002 NESC for locations across the country. In addition to individual efforts of subcommittee members, we would like to receive comparisons from as many utilities as possible. I can be contacted at nbingel@osmose.com . This compilation of load cases will help to determine the final practice implementation of this CP.

BULLINGER: There are no supporting comments on this CP. It is not clear how this CP will enhance safety. The concerns expressed are map inconsistencies need to be reconciled. The introduction of an alternate proposal will add confusion and implies that the committee has not done a complete job. The CP should include full supporting examples and justifications to allay the natural concerns of the NESC user. This sweeping change is likely to have many unintended consequences. These possibilities need to be evaluated before presentation to the public. Much verbal justification for this and many other CPs rely too heavily on anecdotes, hearsay, memory, and opinion. Real data and engineering analysis is required to justify such a major change. Inconsistent voting on this CP as compared to others related CPs imply there is inadequate understanding and justification for major changes that do not clearly enhance safety.

CLAPP: Rule N250B should use 0 degrees F for old heavy loading district areas, 15 degrees F for old medium loading district, and 30 degrees F for old light loading district. The map should show temperature line.

CLEM: CP 2737 would ultimately lead to a total revision of the code methods. While I voted affirmative for the proposal at this time, I have reservations which must be addressed. The affirmative vote of the committee allows the task force to continue development of the proposal and will allow the task force, set up with Nelson Bingel as chair, to continue comparing loads and soliciting input from utilities. One power company submitted comments to the committee urging rejection of the CP, however, in their comment they referred to the ¾ inch radial ice with a concurrent 4psf wind. The CP does not have this load case. The ice map included with the CP specifies ¾ inch radial ice with a concurrent 2.3psf (30mph) wind. I would encourage utilities to get involved with the task force and provide further substantive comments why the CP should be rejected or suggestion of how the CP should be modified.

DESANTIS: These are the same reasons I voted against it the first time: I feel some of the concepts included in this CP are too radical a change for line designers to see for the first time in an Alternate Method. i.e.: elimination of the historical NESC Loading Districts, the elimination of the 60ft exclusion for extreme wind, the inclusion of a new Extreme Wind and Ice Map and the change in insulator loadings just to name a few. I would prefer some of these concepts be introduced into the existing Code to allow designers to familiarize themselves with the concepts, as some of the other change proposals recommend. I then would suggest this Alternative be included on the 2012 Code as an Alternate. I am specifically opposed to the following concepts regardless of when they are implemented:

N250C – There is no cap on the calculated wind pressure for facilities under 60ft. Collateral damage will occur in

Category 3 hurricanes and above and the large expense incurred by utilities to design to these limits will not provide any additional safety or reliability to the customer. Many lines and homes that were damaged during Hurricane Isabel (2003), which was a Type 2 when it made landfall, occurred not as a result of structural failure due to high winds, but as a result of healthy trees being uprooted due to saturated soils. N250C – The line designer must use the values in the Tables. There is no allowance to use the formulas for  $k_z$  and GRF for all calculations as currently exists. N250C – If Exposure B is allowed to be used, then the appropriate Tables need to be included for this use. N253B – This is too severe for insulators. The Load Factor should be 1.0 for insulators. See Comments in N277 below for supporting comments. N261H – The change in temperature from 60deg to 32 deg does not help prevent fatigue due to Aeolian vibration. If individuals didn't calculate correct damper requirements before, they are not going to now. N277 – These limits are too severe for Maintenance Loadings, more specifically, N250D3 and N253B. This requirement would eliminate the use of post insulators for many applications where they have been currently used for decades. The "specified cantilever load" and "specified mechanical load" limits are designed for sustained events and not short term or instantaneous loads. I would support an EXCEPTION for N250D3 loads to read "Should a composite insulator be subject to a load exceeding these percentages during the stringing operation, it shall be immediately removed from service before the stringing operation can continue".

FREIMARK: Prior to the January, 2003 meeting of SC5 in Las Vegas, for Rule 277, Mechanical Strength of Insulators, this CP would have allowed insulators to be loaded to 70% of their rated strength (an increase from the present 40-50% due to the proposed greater "ultimate" weather loads). It was felt that the 70% value with the greater weather loads in this proposal would give insulator strengths at specific locations comparable to the weather and insulator strength criteria in the present NESC.

In Las Vegas, ANSI-C29, the committee responsible for all insulator standards, made a presentation to NESC SC5. After this presentation, a vote was taken by SC5 to issue a TIA making "corrections" to Rule 277 to effect the 1997 and 2002 NESC Editions and also to submit a Change Proposal (eventually called CP2829) to revised Rule 277 as well as other affected sections of the NESC. In accordance with this vote, Rule 277 in this CP was revised to its present form.

For various reasons, the TIA was never submitted. Additionally, at the Ballot meeting in October, 2003, CP 2829 to revise Rule 277 was rejected. Based on the non-submittal of the TIA and the rejection of CP 2829, I feel that there is no basis for the more restrictive insulator loads contained in the present CP 2737 and therefore vote not to Accept.

HARREL: I do not believe we should include an alternate method that produces loading requirements with significantly different results. Although I agree the ice wind maps have a much more accurate basis for part of their development, even the map developers caution on the use of these maps for their sole application in calculation of loading requirement.

HEALD: I voted in the affirmative to bring this change proposal to the forefront for comment by the public. This CP is the output of a working group established by SC5. This alternate method has been submitted as a change proposal to previous editions of the code by the same working group of SC 5. Some of the people who have voted "no" to this change proposal have supported the formation and continuation of this working group of SC5. I agree with many of the explanations of committee members who cast a negative vote. However, if this CP was voted down by the subcommittee, the public would probably not comment on it; the working group would continue; and the same change proposal would be submitted for the 2012 edition of the code.

Based on public comment and member's explanation of their vote, final acceptance or rejection of this change proposal will be made in October, 2005. If this change proposal is rejected, then it will be an indication that SC 5 should disband this working group and put this CP proposal to rest. Although I feel the public would like a complete rewrite of sections 25, 26, and 27 of the NESC (as well as section 24), I don't believe the current setup for code revisions is compatible to complete rewrites.

KEMPNER: In principal, I am against having two different methods for determining safety loads that can result in significantly different loads. If the subcommittee feels that the proposed alternate is an adequate safety criterion than the alternate should be the selected method for the revised NESC code. Having the alternates as proposed may subject utilities to legal consequences if a line failure were to occur using an alternate method that gives a significantly lower safety load. Implementation of new information (such as the ice and wind maps) and methodologies (such as gust factors vs. gust response factors) is being accomplished through the current code change process.

KLUGE: Although I have voted against this motion because the modifications are not identified, I support the concepts embedded in the proposal. However, I prefer a softer transition that would impliment many of these concepts into the present code by individual rules. A sudden change would be burdensome on the utilities and could result in unforeseen consequences. For example, the ASCE combined wind and ice map is fundamental to this proposal and it is not currently a load case recognized by NESC. There is another proposal to make the ASCE ice/wind load an additional load case. This is an example of an acceptable "soft transition".

SHULTZ: This proposal has been revised to yield structure strengths that are reasonably comparable to current practice for most transmission structures although governing load cases may change from combined ice and wind to extreme wind, or vice versa. However, elimination of the extreme wind loading exemption for structures and facilities less than 60' above ground or water can result in strength requirements that are significantly greater than current practice for such structures in coastal areas, particularly in Light loading areas, and the increase can be several pole classes. The safety need for strength increases of these magnitudes is not shown. Consequently, I believe this proposal needs further work to calibrate distribution pole class requirements for extreme wind loading more closely to established practice.

Similarly, it is unclear how the extreme wind requirements of this proposal will compare with the requirements of CP2766 (which was accepted as modified), yet the methods are to be considered acceptable alternative methods. Some calibration to current practice might be appropriate.

The requirement that stringing block lock-up loads "shall be considered" is ambiguous and will cause confusion for code users. It also may limit use of some structure configurations or construction practices if longitudinal capacity for such loads must be provided. This concern might be eliminated if alternative methods of assuring safety could be allowed by the proposal.

Finally, the stated intent of the working group to modify this proposal based on dispositions of other change proposals leaves some uncertainty as to what will be included in the final draft of this proposal.

SLAVIN: This is an important proposal, providing the overall format for upgrading the Strength & Loading section consistent with the latest technical information, in a logical, intergrated manner. Although somewhat controversial when originally proposed many code cycles ago, much of CP2737 has already been incorporated into the NESC (e.g., the 3-second gust map of ASCE 7), agrees with the latest accepted standards and information (e.g., 50-year Combined Ice and Wind map of ASCE 7-02), or is generally consistent with various other change proposals accepted by SC5 (e.g, Extreme Wind below 60 ft.). It is recognized that CP2737 does not treat Extreme Wind below 60 ft. in exactly the same manner as the accepted CP, but it does provide significant load reduction for Grade C and/or sheltered environments. In any case, it is anticipated that CP2737 would be modified, as appropriate, based upon public comments on the various CPs. Since CP2737 is proposed as an "Alternate Method", it will allow the industry at least one code cycle to adjust to the new overall methodology. While an alternate method that produces dissimilar results may raise some short-term issues, this nonetheless represents the most practical procedure for introducing potentially significant changes into the NESC.

WONG: Many issues in the CP have already been taking care of by others. Also many other issues, such as

structures below 60 ft, may have better foundation than CP 2766. However, ice map is only for freezing rain. Tension limit (1.15 factor) has not been justified and could produce totally different answer than code (2002 NESC) requires currently. It should not be considered as “alternate method”. Alternate methods should have equivalent results as the main method. AISC and ACI have done that.

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**Revised Text**

Part: 2 Section: 26

**CP2767****Subcommittee Recommendation:** Accept**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (18) Amato, Bingel, Bullinger, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Standford, Vivas, Wong**Negative:** (0)**Abstention:** (1) Kinghorn**Explanation of Vote:**

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**New Text**

Part: 2 Section: 26

Rule: 260

**CP2802****Subcommittee Recommendation:** Accept as modified**Subcommittee Comment:**

This proposal include ice plus concurrent wind map of ASCE 7-2002. That map is being revised and is expected to be completed by the time of the final vote on the NESC 2007 edition.

**Vote on Subcommittee Recommendation:****Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Standford, Wong**Negative:** (1) Kinghorn**Abstention:** (0)**Explanation of Vote:**

FREIMARK: In general I support the intent of this change proposal and am voting in favor of it at this time. However, if the final outcome for the 2007 NESC is approval of CP 2737, the major re-write of the section 25, 26, and 27 of the NESC, then I feel that the passage of this particular CP would cause possible confusion and/or redundancy for the period that both the “new” and “previous” portions of the NESC are in effect and will vote against this proposal at that time.

KINGHORN: There is not sufficient evidence in my opinion that any additional public safety will be gained by this CP. The likelihood of the concurrent occurrence of these conditions is very remote. The approval of this CP could result in significant waste of resources without adequate justification.

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**Revised Text**

Part: 2 Section: 26

Rule: 260 260B2

**CP2710****Subcommittee Recommendation:** Accept**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong**Negative:** (0)**Abstention:** (1) Kinghorn**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 26

Rule: 260 A, B

**CP2736****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:****Affirmative:** (18) Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Schwalm, Shultz, Standford, Wong**Negative:** (5) Aichinger, DeSantis, Peters, Rempe, Slavin**Abstention:** (1) Kinghorn**Explanation of Vote:**

AICHINGER: Although this CP addresses only single, unguyed poles, this is a complete and effective method to provide, finally, a method to design around various materials. This CP represents the design process of the future.

DESANTIS & REMPE: Although I agree this CP isn't complete, I feel it's important for the public to review it and get a feel for what will be presented and potentially implemented in future codes. By rejecting it, it is highly unlikely the public will take the time to crunch the numbers and make comparisons.

PETERS: RBD committee did a correct job in proposing this CP and therefore it should not be rejected.

SLAVIN: See Supporting Comments for CP2736, as well as the additional comments. The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

(1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003). (2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration. (3) Lack of industry experience in application of the recommended procedures and methodology.

(4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules. (5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 -- May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005. In order to demonstrate that the determination of the values of Item (2) within the necessary time frame is not unreasonable, procedures by which such results may be obtained were briefly discussed at the SC5 meeting, including initial estimates of the required parameters. (It is understood that the latter estimates do not necessarily represent the final values to be agreed-upon by the ASCE RBD Committee.)

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology.

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### Revised Text

Part: 2 Section: 26

Rule: 260 A1

**CP2565**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

The present wording is proper and conveys the intent of Subcommittee 5

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Stanford, Wong

**Negative:** (1) Slavin

**Abstention:** (2) Freimark, Kinghorn

**Explanation of Vote:**

FREIMARK: Based on NESC criteria, it is presumed that the effects of deflection is included the calculations. Good engineering practice says to include the effects of deflection. This issue is too controversial for me to take a position

SLAVIN: See supporting comments.

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**Revised Text**

Part: 2 Section: 26

Rule: 260 A1

**CP2566**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

The present wording is proper and conveys the intent of Subcommittee 5

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Standford, Wong

**Negative:** (1) Slavin

**Abstention:** (2) Freimark, Kinghorn

**Explanation of Vote:**

FREIMARK: Based on NESC criteria, it is presumed that the effects of deflection is included the calculations. Good engineering practice says to include the effects of deflection. This issue is too controversial for me to take a position

SLAVIN: See supporting comments.

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**Revised Text**

Part: 2 Section: 26

Rule: 260 A2

**CP2612**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**New Text**

Part: 2 Section: 26

Rule: 260 A3, B2

**CP2734****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Rempe, Shultz, Standford, Wong

**Negative:** (2) Peters, Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

SLAVIN: See Supporting Comments for CP2734, as well as the additional comments below.

The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

- (1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003).
- (2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration.
- (3) Lack of industry experience in application of the recommended procedures and methodology.
- (4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules.
- (5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 -- May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005.

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is

recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology

PETERS: CP should be accepted to allow for industry consideration of RBD methods. RBD methods are the standard practice of structure design and should be seriously considered for incorporation for NESC

CLAPP: I cannot condone applying to a 65 ft pole one-half the load applied to a 70 ft pole. This is an inappropriate exemption for pole less than 70 ft in length (60 ft above ground).

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**Revised Text**

Part: 2 Section: 26

Rule: 260 B

**CP2505**

**Subcommittee Recommendation:** Withdrawn

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (0)

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**New Text**

Part: 2 Section: 26

Rule: 260 B

**CP2567**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**New Text**

Part: 2 Section: 26

Rule: 260 B

**CP2569**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bingel, Bullinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Schwalm, Shultz, Slavin, Stanford

**Negative:** (2) Kluge, Wong

**Abstention:** (2) Burley, Kinghorn

**Explanation of Vote:**

KLUGE: With this proposal, designers of fiberglass poles would use design factors for steel and design methods for wood. The fiberglass industry needs to tell us if their product behaves more like a wood or a steel pole. Specifically, in Rule 261C3, the proposal considers the fiberglass pole as a "strut" only. Yet, typically fiberglass poles are tubular and, therefore, presumably stiffer than solid wood poles. This assumption is not proper if steel overloads are recommended for Table 253-1.

Secondly, the fiberglass industry needs to provide long duration load test data. This is needed to evaluate the appropriateness of proposed Rule 261D3 regarding the effect of long term loads such as gravity loads on fiberglass crossarms.

If the above data is provided, I could accept this proposal with appropriate modifications.

WONG: I agree in principle with the CP. Fiberglass material is widely used in the industry and should be in the code. However, fiberglass material behaves differently under long-term loads. A note or statement should be included to make user aware this potential concern. Also are the proposed load factors "correct"?

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**Revised Text**

Part: 2 Section: 26

Rule: 260 B1

**CP2733**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (23) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Schwalm, Shultz, Stanford, Vivas, Wong

**Negative:** (1) Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

SLAVIN: See Supporting Comments for CP2733, as well as the additional comments below.

The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

(1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003).

(2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration.

(3) Lack of industry experience in application of the recommended procedures and methodology.

(4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules.

(5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 -- May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005.

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology.

CLAPP: I cannot condone applying to a 65 ft pole one-half the load applied to a 70 ft pole. This is an inappropriate exemption for pole less than 70 ft in length (60 ft above ground).

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#### **New Text**

Part: 2 Section: 26

Rule: 261

**CP2802**

**Subcommittee Recommendation:** Accept as modified

#### **Subcommittee Comment:**

This proposal include ice plus concurrent wind map of ASCE 7-2002. That map is being revised and is expected to be completed by the time of the final vote on the NESC 2007 edition.

#### **Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Standford, Wong

**Negative:** (1) Kinghorn

**Abstention:** (0)

#### **Explanation of Vote:**

**FREIMARK:** In general I support the intent of this change proposal and am voting in favor of it at this time. However, if the final outcome for the 2007 NESC is approval of CP 2737, the major re-write of the section 25, 26, and 27 of the NESC, then I feel that the passage of this particular CP would cause possible confusion and/or redundancy for the period that both the “new” and “previous” portions of the NESC are in effect and will vote against this proposal at that time.

**KINGHORN:** There is not sufficient evidence in my opinion that any additional public safety will be gained by this CP. The likelihood of the concurrent occurrence of these conditions is very remote. The approval of this CP could result in significant waste of resources without adequate justification.

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#### **Revised Text**

Part: 2 Section: 26

Rule: 261 261-A1b,261-1A,Table

#### **CP2824**

**Subcommittee Recommendation:** Accept

#### **Subcommittee Comment:**

#### **Vote on Subcommittee Recommendation:**

**Affirmative:** (15) Aichinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Hensel, Kempner, Kluge, Rempe, Shultz, Standford, Wong

**Negative:** (3) Bullinger, Heald, Schwalm

**Abstention:** (3) Amato, Kinghorn, Slavin

#### **Explanation of Vote:**

**BULLINGER, HEALD & SCHWALM:** This CP goes far beyond the original request and issue in IR 530. Braces should not be included as they were not in the IR 530. Also the IR was very specific to Table 261-1A and the CP expanded too much on this interpretation. The global nature of these CP's has a too high risk of unintended consequences.

**SLAVIN:** Rule 261D1 requires that braces be designed to withstand loads, without exceeding the permitted load. Similar for Rule 261D2. Thus, it is necessary to add “braces” to Table 261-1A and 261-1B to be consistent with the above rules. However Rule 261D1 is problematic since braces typically are not used to provide significant support for the cross-arm under vertical loads (e.g, they will tend to buckle and bend at relatively low loads), but to prevent the cross-arm from rotating. Thus, the braces functions primarily in tension, but not compression for which the brace will buckle. I therefore recommend that Rule 261D1 be modified in the future to recognize this issue.

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#### **Revised Text**

Part: 2 Section: 26

Rule: 261 261-A1b,261-1B,Table

**CP2824**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (15) Aichinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Hensel, Kempner, Kluge, Rempe, Shultz, Standford, Wong

**Negative:** (3) Bullinger, Heald, Schwalm

**Abstention:** (3) Amato, Kinghorn, Slavin

**Explanation of Vote:**

BULLINGER, HEALD & SCHWALM: This CP goes far beyond the original request and issue in IR 530. Braces should not be included as they were not in the IR 530. Also the IR was very specific to Table 261-1A and the CP expanded too much on this interpretation. The global nature of these CP's has a too high risk of unintended consequences.

SLAVIN: Rule 261D1 requires that braces be designed to withstand loads, without exceeding the permitted load. Similar for Rule 261D2. Thus, it is necessary to add "braces" to Table 261-1A and 261-1B to be consistent with the above rules. However Rule 261D1 is problematic since braces typically are not used to provide significant support for the cross-arm under vertical loads (e.g, they will tend to buckle and bend at relatively low loads), but to prevent the cross-arm from rotating. Thus, the braces functions primarily in tension, but not compression for which the brace will buckle. I therefore recommend that Rule 261D1 be modified in the future to recognize this issue.

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**Revised Text**

Part: 2 Section: 26

Rule: 261 261A2

**CP2717**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (23) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Jones, Kempner, Kluge, Peters, Rempe, Schwalm, Shultz, Slavin, Standford, Vivas, Wong

**Negative:** (1) Hensel

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

HENSEL: Eliminating the alternate method for wood pole will require recalculating all standards book allowable spans based on the current 2.00, 2.67, and 4.00 wood pole safety factors. This change proposal will require us to change to a method in 2007 that is scheduled to be removed from the NESC in 2012, when we will be required to change to a reliability base design method. It is wasteful to require NESC user to switch to a new method that will be obsolete in five years. No one claims the method we will be required to use in the 2007 NESC is safer than the

alternate method being eliminated by this change proposal.

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**Revised Text**

Part: 2 Section: 26

Rule: 261 261A2a Exception1

**CP2781**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (16) Aichinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Kempner, Kinghorn, Kluge, Rempe, Shultz, Slavin, Standford, Wong

**Negative:** (3) Heald, Hensel, Schwalm

**Abstention:** (2) Bullinger, Amato

**Explanation of Vote:**

HEALD, HENSEL, & SCHWALM: The strength of pole is based on ground-line circumferences. This is because of the fact that the ground line, if not originally so, may become, through decay, the weakest section of the pole or the point where failure is most likely to occur. In species of poles having slight tapers the weakest section is always near the ground line, while for poles having excessive tapers or flaring butts the weakest section is initially at some distance above the ground line. However, even in poles of this latter class the ground line will generally become the section of least resistance (in proportion to bending moment of load) before they deteriorate to the point of removal.

BULLINGER: Lack of expertise

KLUGE: There are several comments regarding evaluating poles strengths at groundline. It is true that the strength of wood poles has historically been referenced at the groundline and, for that reason, published fiber strengths have also been translated to the groundline; and, that still could be done. However, recent test data show that the strength of large poles is less than that of smaller poles. If we were to continue to reference the strength at the groundline and also recognize the strength variation with size, we'd need a "soft" or variable design fiber stress. Initially, ANSI O5 committee considered such an approach—where the allowable fiber stress would decrease with pole size. This approach would use a formula to reduce the design fiber stress as the pole size increased. The benefit being the evaluation point could remain at the groundline. But most users and producers opined that a variable allowable fiber stress would make designing more difficult and might hurt the wood pole industry.

Rather than vary the fiber stress with pole size, which would require the introduction of a new formula, ANSI O5 committee chose to analyze the poles at a theoretical point of maximum stress and reduce the allowable fiber stress with height. This was favored because design programs were available that could determine the theoretical point of maximum stress and the relationship of stress reduction with height had been defined and published in the appendix of ANSI O5.1. However, the formula to reduce allowable stress with height was originally intended for use with braced structures or where the actual pole circumferences were known. It was not originally intended for design of simple cantilever poles based on ANSI O5.1 minimum circumferences because the allowable fiber stress had been adjusted for minimum circumferences and translated to the groundline, as mentioned previously. Nevertheless, ANSI O5 committee discovered by using the historical designated fiber stresses while analyzing the poles at the point of maximum stress and allowing for a stress reduction with height that the calculated pole strengths accurately matched those of pole tests. Therefore, this approach indirectly recognized the lower fiber strengths of larger poles.

The advantages of this approach are it maintains the historic designated fiber stresses and it uses existing fiber stress formulas and methods.

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**Revised Text**

Part: 2 Section: 26

Rule: 261 261A2b(1)

**CP2780****Subcommittee Recommendation:** Accept as modified**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (18) Aichinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong**Negative:** (1) Heald**Abstention:** (2) Bullinger, Amato**Explanation of Vote:**

HEALD: The equation for decreasing fiber stress with height has been in ANSI O5.1 for over thirty years, but it has always been in the Appendix of the standard. As part of the Appendix, the reduction in stress with height is a suggestion. I suspect that there was a reason for this equation being in the Appendix for such a long time. One reason may be that the exact height-strength relationship is not clear. Also, the equation that is shown in the standard is based on a limited number of species of wood. Although the equation may be sufficiently adequate for estimating pole modulus of rupture above ground for multiple-pole braced structures in which the maximum stress is somewhere near the midheight, it might not be appropriate for unbraced H-frames or single pole structures.

Before accepting what ANSI O5.1 did as correct (ie. moving the equation from a "suggested form" to a "mandatory equation"), I think this change proposal should include the backup information which was used to support this change in ANSI O5.1. If there is no backup information, I contend that our vote in the affirmative for this change proposal is simply perpetuating a mistake by ANSI O5.1. I don't believe moving the equation for height-strength relationship from the appendix of ANSI O5.1 to the body of the standard met the criteria of a standard and should have remained in the appendix of the standard.

CP 2781 and CP 2780 are related. No information has been supplied that current design practices based on ground line moments for single poles and unbraced multiple poles is unsafe. (CP 2780 is an extension to CP 2781 removing exception 1 from Rule 261A2a.).

BULLINGER: Lack of expertise.

KLUGE: ANSI O5.1 2002 revision is founded on additional pole test data. Therefore, this proposal should be accepted.

Since ANSI O5 adjusted the design fiber strength with height to accurately reflect pole test data, should the NESC design method also be adjusted to reflect utility practice and experience? Considering, the changes in ANSI O5.1 and the calibrations performed by the ASCE reliability team, apparently, the NESC strength factor should also be adjusted when ANSI O5.1 2002 is implemented.

See also CP2568 and CP2736. Based on reliability assessments using the new ANSI O5.1 2002 criteria, these proposals suggest the allowable strength factor of Table 261-1A be adjusted to 0.75 and 0.79, respectively.

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**Revised Text**

Part: 2 Section: 26

Rule: 261 261A2b(2)

**CP2779**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 26

Rule: 261 261D2

**CP2717**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Jones, Kempner, Kluge, Peters, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (1) Hensel

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

HENSEL: Eliminating the alternate method for wood pole will require recalculating all standards book allowable spans based on the current 2.00, 2.67, and 4.00 wood pole safety factors. This change proposal will require us to change to a method in 2007 that is scheduled to be removed from the NESC in 2012, when we will be required to change to a reliability base design method. It is wasteful to require NESC user to switch to a new method that will be obsolete in five years. No one claims the method we will be required to use in the 2007 NESC is safer than the alternate method being eliminated by this change proposal.

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**New Text**

Part: 2 Section: 26

Rule: 261 261N

**CP2709**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**New Text**

Part: 2 Section: 26

Rule: 261 A

**CP2505**

**Subcommittee Recommendation:** Withdrawn

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (0)

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 26

Rule: 261 A-M,Tbls 261-1A,1B

**CP2736**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Schwalm, Shultz, Standford, Wong

**Negative:** (5) Aichinger, DeSantis, Peters, Rempe, Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

AICHINGER: Although this CP addresses only single, unguyed poles, this is a complete and effective method to provide, finally, a method to design around various materials. This CP represents the design process of the future.

DESANTIS & REMPE: Although I agree this CP isn't complete, I feel it's important for the public to review it and get a feel for what will be presented and potentially implemented in future codes. By rejecting it, it is highly unlikely the public will take the time to crunch the numbers and make comparisons.

PETERS: RBD committee did a correct job in proposing this CP and therefore it should not be rejected.

SLAVIN: See Supporting Comments for CP2736, as well as the additional comments. The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

- (1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003).
- (2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration.
- (3) Lack of industry experience in application of the recommended procedures and methodology.
- (4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules.
- (5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 -- May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005. In order to demonstrate that the determination of the values of Item (2) within the necessary time frame is not unreasonable, procedures by which such results may be obtained were briefly discussed at the SC5 meeting, including initial estimates of the required parameters. (It is understood that the latter estimates do not necessarily represent the final values to be agreed-upon by the ASCE RBD Committee.)

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology.

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**Revised Text**

Part: 2 Section: 26

Rule: 261 A1c

**CP2766**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Aichinger, Bingel, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Kempner, Kinghorn, Peters, Rempe, Slavin, Standford

**Negative:** (7) Clapp, Bullinger, Amato, Hensel, Kluge, Shultz, Wong

**Abstention:** (0)

**Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

CLAPP: I understand the desire to show a relative 2/3 relationship between Grade C and Grade B, but I think it should be achieved by raising the 15 psf limit to 20 psf (i.e., use 20 psf/30 psf) rather than reducing the 30 psf to 22.5 psf (i.e., 15/22.5).

HENSEL: The new RBD Manual will apparently recommend removing the 60 ft exemption from extreme wind and reducing the load factor for Grade C  $\leq$  60 ft to 0.5. I don't think we adequately considered the new RBD Manual recommendation. I think we are being more restrictive in non-hurricane areas than is being called for on the RBD Manual.

SHULTZ: Removing the 60' exemption unilaterally will likely result in considerable increase in strength requirements in many loading situations, particularly in coastal areas. The public comments on a similar proposal for the 2002 revision cycle overwhelmingly cited collateral loading as the predominant cause of extreme wind failures. This proposal offers nothing to refute those statements of experience. In addition, in the 2002 cycle, several utilities in the South reviewed their records to see what claims for injury could be attributed to extreme wind failures. Those utilities could not identify any such claims for the previous several years. If this experience is anywhere near typical, the safety record is very good, and no support is provided in this proposal to demonstrate that removal of the exemption will improve on this safety performance.

WONG: There is a difference in the wind behaviors between continental wind and hurricane wind this I support CP2798 over CP2766.

KLUGE: I prefer CP 2739 as long as the district loads are maintained. The present district loads provide adequate strength for structure  $\leq$  60 ft tall.

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**Deleted Text**

Part: 2 Section: 26

Rule: 261 A1c

**CP2798**

**Subcommittee Recommendation:** Accept in principle see action on CP2766

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (13) Aichinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Heald, Hensel, Kempner, Peters, Rempe, Slavin, Wong

**Negative:** (7) Bullinger, Bingel, Amato, Harrel, Kluge, Shultz, Stanford

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BINGEL: This CP follows CP 2766 which already passed in eliminating the 60 ft exclusion for extreme wind. However, CP2798 adds an additional cap for Grade C wind pressure. This only applies to regions in the country where the extreme wind speed is 90 mph or less. By not accepting this CP, the load requirement for Grade C construction in the medium load district will increase. No proof was presented to justify this load increase. A few subcommittee members expressed feeling that the load should be higher. That's not reason enough to reject this CP.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

HARREL: I am not in favor of the removal of the 60 ft exclusion.

SHULTZ: I prefer to keep the 60' exemption, but if it is removed, I prefer CP2798 rather than CP2766, which was accepted. I do support the same revisions to the footnotes in CP2798 as were made in CP2766. The 10 psf cap for Grade C continental extreme winds is reasonably comparable to present loading requirements for structures 60' and less in height which have served well.

STANDFORD: I feel that the cap of 10 psf (62.5 mph) is too low for extreme wind and believe that it should be 15 psf as it is in CP 2677.

WONG: CP 2766 has higher requirements to Grade C construction located at medium load district. CP 2798 Note 8 is written to address this issue. 10 psf wind pressure is more closely related to current 2002 NESC requirements. Yet, is 10 psf (60 mph plus) adequate? We need code user input.

KLUGE: I prefer CP 2739 as long as the district loads remain. The present district loads provide adequate strength for structures  $\leq 60$  ft tall.

I encourage you to evaluate the impact of this proposal on your current designs. To assist you, I have calculated the wind pressure for a typical 40 ft. distribution pole, buried 6 feet, with phase conductors at the top, neutral conductors 8 ft. below the phases, and communication cables located 3-1/2 ft. below the neutral and displayed the results in the following table. Look at the pressure associated with the wind speed that represents your service territory.

Note that the "need not exceed" limits in Grade B are relatively high and not likely to apply. The controlling values are shown in bold text. Note also that when the "need not exceed" limits don't control, unique pressure values must be calculated for the phase, neutral and communication wires and the pole.

Wind Pressure (psf) on Conductors as proposed in CP2798

Grade B

OLF = 1.0

Wind Speed (mph) \_\_ Phase Cond. \_\_ Neutral Wire \_\_ Comm. Cable \_\_ Need not exceed

85	15.2	14.6	14.3	30.0
90	17.0	16.3	16.0	30.0
100	21.0	20.2	19.7	30.0
110	24.5	24.4	23.8	30.0

Grade C

OLF = 0.87

Wind Speed (mph) \_\_ Phase Cond. \_\_ Neutral Wire \_\_ Comm. Cable \_\_ Need not exceed

85	13.2	12.7	12.4	10.0
90	14.8	14.2	13.9	15.0
100	18.3	17.6	17.1	15.0

OLF = .075

110	18.4	18.3	17.9	15.0
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Alaska OLF = 0.87

110	21.3	21.2	20.7	15.0
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Wind Pressure (psf) on Structures as proposed in CP2798

Grade B

Grade C

Wind Speed (mph) \_\_ OLF = 1.0 \_\_ Need Not exceed \_\_ OLF = 0.87 OLF = 0.75 \_\_ Need Not exceed

85	16.4	30.0	14.3	10.0
90	18.4	30.0	16.0	15.0
100	22.7	30.0	19.7	15.0
110	27.5	30.0	US except Alaska	20.6
110	27.5	30.0	In Alaska	23.9

I find CP2698 unacceptable for the following two reasons:

1. The “not to exceed” limit of 10 psf for Grade C is set too low for the 85 mph wind speed region and would permit unsafe designs. A safe value would be 13 to 15 psf.
2. The “not to exceed” limits are set too high for Grade B. Reasonable values would be 16 to 20 psf. By setting the limits too high, the proposal inadequately responds to the comments from users that distribution structures are not damaged by wind directly but by wind blown debris. To require structures to be designed to wind speeds that building cladding and trees cannot withstand is not justified.
3. If the “not to exceed” limits are set too high, the designer is economically directed to use the formulas. This is especially true for communication companies occupying the lowest attachment height on the pole. However, most distribution and communication designers will find the formulas for kZ and GRF in NESC Rule 250C burdensome.

Since the wind speed-pressure formulas in NESC Rule 250C are too cumbersome for common distribution structure designs, as a possible modification, I would suggest calibrating the “not to exceed” limit to value that is safe yet low enough to render the need to use the formulas unnecessary. To accomplish both objectives, several “not to exceed” limits may be required to fit the various wind speed regions.

Or, as an alternate modification, one could use the NESC formulas for kZ and GRF to calibrate a single constant for use in the wind speed-pressure formula. (See my comment for CP2766.) This would more readily insure a safe design in various wind speed regions and accomplish most the simplicity of the “not to exceed” limit. (See also

CP2718 for an example of a single constant for kZ and GRF. However, values for structures under 60 feet tall would need to be developed as CP2718 does not currently address short structures.)

If you would like to perform calibrations for your typical structures and geographic location, I would gladly email you a copy of an Excel spreadsheet with the wind speed-pressure formulas embedded. Just send me an email at rkluge@atcllc.com and ask for the NESC wind computation sheet. Your opinions of these proposals are extremely valuable to the NESC Subcommittee.

Note there are several wind related change proposals. They include CP2673, 2739, 2766, 2798, 2718, 2787.

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**Revised Text**

Part: 2 Section: 26

Rule: 261 A2a, EXCEPTION 1

**CP2509**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

See action on CP2781 and CP2780

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Aichinger, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Stanford, Wong

**Negative:** (2) Heald, Slavin

**Abstention:** (2) Amato, Kinghorn

**Explanation of Vote:**

HEALD: See comments to CP2780 and CP2781. Also see comments from Slavin.

SLAVIN: See Supporting Comments for CP2509. In addition, the suggestion to “accept, as modified”, replacing the phrase “poles with height above ground line greater than 60 feet” by the preferred phrase “poles of length greater than 50 feet”, would retain the advantage of the simpler design calculations for most wood distribution pole applications, and be technically consistent with typical loading configurations. Furthermore, Annex C of the ANSIO5.1 - 2002 Standard for wood poles indicates that poles of less than 50 ft. in length display effective ground-line strengths essentially equal to the designated “fiber stress” (i.e., strength) of Table 1 of the Standard, verifying the validity of the procedure for this category of poles.

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**Revised Text**

Part: 2 Section: 26

Rule: 261 A2a, EXCEPTION 1

**CP2510**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

See action on CP2781 and CP2780

**Vote on Subcommittee Recommendation:**

**Affirmative:** (12) Aichinger, Burley, Clem, Denbrock, DeSantis, Harrel, Kempner, Kluge, Schwalm, Shultz, Stanford, Wong

**Negative:** (7) Clapp, Bullinger, Freimark, Heald, Hensel, Rempe, Slavin

**Abstention:** (2) Amato, Kinghorn

**Explanation of Vote:**

HEALD: See comments to CP2780 and CP2781. Also see comments from Slavin and Bullinger.

CLAPP, FREIMARK, HENSEL, & REMPE: Normal tangent pole of 50 ft or less in length should be exempted from the check, since the present at installation overload factor applied at the ground line forces to upper portion of the pole to be strong enough to take maximum stress. The only pole of this length expected to need such a check above ground level would be pole with significant eccentric loads or bending moments applied at points above, such as sidewalks guy poles, unbalanced pole with all conductors and cable on one side, etc.

BULLINGER & SLAVIN: See Supporting Comments for CP2510. In addition, the suggestion to “accept, as modified”, replacing the phrase “wood poles less than 60 ft. in height above ground” by the preferred phrase “wood poles of 50 ft or less in length”, would retain the advantage of the simpler design calculations for most wood distribution pole applications, and be technically consistent with typical loading configurations. Furthermore, Annex C of the ANSIO5.1 - 2002 Standard for wood poles indicates that poles of less than 50 ft. in length display effective ground-line strengths essentially equal to the designated “fiber stress” (i.e., strength) of Table 1 of the Standard, verifying the validity of the procedure for this category of poles.

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**Deleted Text**

Part: 2 Section: 26

Rule: 261 A2e

**CP2553**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Slavin, Stanford, Wong

**Negative:** (1) Shultz

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

SHULTZ: The rationale for removing this rule is that it is very seldom used to justify having a pole structure of less than required strength in a line. With the conditions specified in the rule, the weak structure is safely supported by the adjacent structures. Deleting this rule will have little negative consequence to the industry. Still, having the option of applying the rule could be an economical means of resolving some line maintenance problems. I prefer to

leave the rule in the code but limit its application to in-service pole structures. I agree that it is not appropriate for new construction.

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**Deleted Text**

Part: 2 Section: 26

Rule: 261 A2f

**CP2798**

**Subcommittee Recommendation:** Accept in principle see action on CP2766

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (13) Aichinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Heald, Hensel, Kempner, Peters, Rempe, Slavin, Wong

**Negative:** (7) Bullinger, Bingel, Amato, Harrel, Kluge, Shultz, Stanford

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

AMATO: I do not believe there is sufficient technical justification to remove the 60 ft exclusion.

BINGEL: This CP follows CP 2766 which already passed in eliminating the 60 ft exclusion for extreme wind. However, CP2798 adds an additional cap for Grade C wind pressure. This only applies to regions in the country where the extreme wind speed is 90 mph or less. By not accepting this CP, the load requirement for Grade C construction in the medium load district will increase. No proof was presented to justify this load increase. A few subcommittee members expressed feeling that the load should be higher. That's not reason enough to reject this CP.

BULLINGER: 60 ft exclusion removal is not justified by data. Anecdotes are insufficient to justify the possible unintended consequences that could result. It is not clear that the 60 ft exclusion removal will improve safety. The calibration back to past practice is fraught with possible unintended consequences as illustrated by the discussions of the committee.

HARREL: I am not in favor of the removal of the 60 ft exclusion.

SHULTZ: I prefer to keep the 60' exemption, but if it is removed, I prefer CP2798 rather than CP2766, which was accepted. I do support the same revisions to the footnotes in CP2798 as were made in CP2766. The 10 psf cap for Grade C continental extreme winds is reasonably comparable to present loading requirements for structures 60' and less in height which have served well.

STANDFORD: I feel that the cap of 10 psf (62.5 mph) is too low for extreme wind and believe that it should be 15 psf as it is in CP 2677.

WONG: CP 2766 has higher requirements to Grade C construction located at medium load district. CP 2798 Note 8 is written to address this issue. 10 psf wind pressure is more closely related to current 2002 NESC requirements. Yet, is 10 psf (60 mph plus) adequate? We need code user input.

KLUGE: I prefer CP 2739 as long as the district loads remain. The present district loads provide adequate strength for structures <= 60 ft tall.

I encourage you to evaluate the impact of this proposal on your current designs. To assist you, I have calculated the wind pressure for a typical 40 ft. distribution pole, buried 6 feet, with phase conductors at the top, neutral conductors 8 ft. below the phases, and communication cables located 3-1/2 ft. below the neutral and displayed the results in the following table. Look at the pressure associated with the wind speed that represents your service territory.

Note that the “need not exceed” limits in Grade B are relatively high and not likely to apply. The controlling values are shown in bold text. Note also that when the “need not exceed” limits don’t control, unique pressure values must be calculated for the phase, neutral and communication wires and the pole.

Wind Pressure (psf) on Conductors as proposed in CP2798

Grade B

OLF = 1.0

Wind Speed (mph)	Phase Cond.	Neutral Wire	Comm. Cable	Need not exceed
85	15.2	14.6	14.3	30.0
90	17.0	16.3	16.0	30.0
100	21.0	20.2	19.7	30.0
110	24.5	24.4	23.8	30.0

Grade C

OLF = 0.87

Wind Speed (mph)	Phase Cond.	Neutral Wire	Comm. Cable	Need not exceed
85	13.2	12.7	12.4	10.0
90	14.8	14.2	13.9	15.0
100	18.3	17.6	17.1	15.0
OLF = .075				
110	18.4	18.3	17.9	15.0
Alaska OLF = 0.87				
110	21.3	21.2	20.7	15.0

Wind Pressure (psf) on Structures as proposed in CP2798

Wind Speed (mph)	Grade B		Grade C	
	OLF = 1.0	Need Not exceed	OLF = 0.87	OLF = 0.75
85	16.4	30.0	14.3	10.0
90	18.4	30.0	16.0	15.0
100	22.7	30.0	19.7	15.0
110	27.5	30.0	US except Alaska	20.6
110	27.5	30.0	In Alaska	23.9

I find CP2698 unacceptable for the following two reasons:

1. The “not to exceed” limit of 10 psf for Grade C is set too low for the 85 mph wind speed region and would permit unsafe designs. A safe value would be 13 to 15 psf.
2. The “not to exceed” limits are set too high for Grade B. Reasonable values would be 16 to 20 psf. By setting the limits too high, the proposal inadequately responds to the comments from users that distribution structures are not damaged by wind directly but by wind blown debris. To require structures to be designed to wind speeds that building cladding and trees cannot withstand is not justified.
3. If the “not to exceed” limits are set too high, the designer is economically directed to use the formulas. This is especially true for communication companies occupying the lowest attachment height on the pole. However, most

distribution and communication designers will find the formulas for kZ and GRF in NESC Rule 250C burdensome.

Since the wind speed-pressure formulas in NESC Rule 250C are too cumbersome for common distribution structure designs, as a possible modification, I would suggest calibrating the "not to exceed" limit to value that is safe yet low enough to render the need to use the formulas unnecessary. To accomplish both objectives, several "not to exceed" limits may be required to fit the various wind speed regions.

Or, as an alternate modification, one could use the NESC formulas for kZ and GRF to calibrate a single constant for use in the wind speed-pressure formula. (See my comment for CP2766.) This would more readily insure a safe design in various wind speed regions and accomplish most the simplicity of the "not to exceed" limit. (See also CP2718 for an example of a single constant for kZ and GRF. However, values for structures under 60 feet tall would need to be developed as CP2718 does not currently address short structures.)

If you would like to perform calibrations for your typical structures and geographic location, I would gladly email you a copy of an Excel spreadsheet with the wind speed-pressure formulas embedded. Just send me an email at rkluge@atcllc.com and ask for the NESC wind computation sheet. Your opinions of these proposals are extremely valuable to the NESC Subcommittee.

Note there are several wind related change proposals. They include CP2673, 2739, 2766, 2798, 2718, 2787.

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**New Text**

Part: 2 Section: 26

Rule: 261 A3

**CP2569**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bingel, Bullinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Schwalm, Shultz, Slavin, Standford

**Negative:** (2) Kluge, Wong

**Abstention:** (2) Burley, Kinghorn

**Explanation of Vote:**

KLUGE: With this proposal, designers of fiberglass poles would use design factors for steel and design methods for wood. The fiberglass industry needs to tell us if their product behaves more like a wood or a steel pole. Specifically, in Rule 261C3, the proposal considers the fiberglass pole as a "strut" only. Yet, typically fiberglass poles are tubular and, therefore, presumably stiffer than solid wood poles. This assumption is not proper if steel overloads are recommended for Table 253-1.

Secondly, the fiberglass industry needs to provide long duration load test data. This is needed to evaluate the appropriateness of proposed Rule 261D3 regarding the effect of long term loads such as gravity loads on fiberglass crossarms.

If the above data is provided, I could accept this proposal with appropriate modifications.

WONG: I agree in principle with the CP. Fiberglass material is widely used in the industry and should be in the code. However, fiberglass material behaves differently under long-term loads. A note or statement should be included to make user aware this potential concern. Also are the proposed load factors “correct”?

---

**Revised Text**

Part: 2 Section: 26

Rule: 261 B, Note

**CP2554****Subcommittee Recommendation:** Accept in part**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (21) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong**Negative:** (0)**Abstention:** (0)**Explanation of Vote:**

CLAPP: The original words were carefully chosen to recognize that movement may occur, but only excessive movement is that which might bring clearance or structure capacity below requirements. There was no intent to require calculations for all foundations, ect., since normal design allow for nominal movement. The word “may” is in a note and does not imply permission.

KLUGE: These notes state the obvious and are not necessary. The notes belong in a design guide or commentary and are inappropriate in a code document. I believe the best action would be to delete these notes entirely. As a “note” these words are not, in fact, part of the code.

---

**New Text**

Part: 2 Section: 26

Rule: 261 C

**CP2505****Subcommittee Recommendation:** Withdrawn**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (0)**Negative:** (0)**Abstention:** (0)**Explanation of Vote:**

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**New Text**

Part: 2 Section: 26

Rule: 261 C

**CP2569**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bingel, Bullinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Schwalm, Shultz, Slavin, Standford

**Negative:** (2) Kluge, Wong

**Abstention:** (2) Burley, Kinghorn

**Explanation of Vote:**

KLUGE: With this proposal, designers of fiberglass poles would use design factors for steel and design methods for wood. The fiberglass industry needs to tell us if their product behaves more like a wood or a steel pole. Specifically, in Rule 261C3, the proposal considers the fiberglass pole as a "strut" only. Yet, typically fiberglass poles are tubular and, therefore, presumably stiffer than solid wood poles. This assumption is not proper if steel overloads are recommended for Table 253-1.

Secondly, the fiberglass industry needs to provide long duration load test data. This is needed to evaluate the appropriateness of proposed Rule 261D3 regarding the effect of long term loads such as gravity loads on fiberglass crossarms.

If the above data is provided, I could accept this proposal with appropriate modifications.

WONG: I agree in principle with the CP. Fiberglass material is widely used in the industry and should be in the code. However, fiberglass material behaves differently under long-term loads. A note or statement should be included to make user aware this potential concern. Also are the proposed load factors "correct"?

---

**Revised Text**

Part: 2 Section: 26

Rule: 261 C, Note

**CP2554**

**Subcommittee Recommendation:** Accept in part

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

CLAPP: The original words were carefully chosen to recognize that movement may occur, but only excessive movement is that which might bring clearance or structure capacity below requirements. There was no intent to require calculations for all foundations, ect., since normal design allow for nominal movement. The word "may" is in a note and does not imply permission.

KLUGE: These notes state the obvious and are not necessary. The notes belong in a design guide or commentary and are inappropriate in a code document. I believe the best action would be to delete these notes entirely. As a "note" these words are not, in fact, part of the code.

---

**New Text**

Part: 2 Section: 26

Rule: 261 D

**CP2505****Subcommittee Recommendation:** Withdrawn**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (0)**Negative:** (0)**Abstention:** (0)**Explanation of Vote:**

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**New Text**

Part: 2 Section: 26

Rule: 261 D

**CP2569****Subcommittee Recommendation:** Accept as modified**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (20) Aichinger, Amato, Bingel, Bullinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Schwalm, Shultz, Slavin, Standford**Negative:** (2) Kluge, Wong**Abstention:** (2) Burley, Kinghorn**Explanation of Vote:**

KLUGE: With this proposal, designers of fiberglass poles would use design factors for steel and design methods for wood. The fiberglass industry needs to tell us if their product behaves more like a wood or a steel pole. Specifically, in Rule 261C3, the proposal considers the fiberglass pole as a "strut" only. Yet, typically fiberglass poles are tubular and, therefore, presumably stiffer than solid wood poles. This assumption is not proper if steel overloads are recommended for Table 253-1.

Secondly, the fiberglass industry needs to provide long duration load test data. This is needed to evaluate the appropriateness of proposed Rule 261D3 regarding the effect of long term loads such as gravity loads on fiberglass crossarms.

If the above data is provided, I could accept this proposal with appropriate modifications.

WONG: I agree in principle with the CP. Fiberglass material is widely used in the industry and should be in the code. However, fiberglass material behaves differently under long-term loads. A note or statement should be included to make user aware this potential concern. Also are the proposed load factors "correct"?

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**New Text**

Part: 2 Section: 26

Rule: 261 D4b Exception

**CP2830**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (1) Clapp

**Abstention:** (0)

**Explanation of Vote:**

CLAPP: I regret that I was not available for this discussion. I don't understand why the vertical overload factors should not be used, especially now that they are being put back into proper form by pulling the worker loads out. While this proposal may have had some merit when the vertical overload factors were grossly in excess of the appropriate value for storm loadings (to take care of the worker issue), this proposal should not be adopted as written because it has too much of a blanket waiver written into it. If the other worker load proposals are adopted, this proposal should be rejected in its entirety.

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**Revised Text**

Part: 2 Section: 26

Rule: 261 D4c

**CP2621**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 26

Rule: 261 F1.a

**CP2739****Subcommittee Recommendation:** Accept in principle see action on CP2766**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (20) Aichinger, Amato, Bingel, Bullinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Stanford, Wong**Negative:** (0)**Abstention:** (1) Kinghorn**Explanation of Vote:**

KLUGE: I have changed my vote to support CP2739 over CP2766. The district loads provide adequate strength for structures <=60 ft tall. See also my comments on CP2766. Without additional modifications to 2766, the only reasonable alternative is to keep the 60 ft exemption.

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**Revised Text**

Part: 2 Section: 26

Rule: 261 H

**CP2644****Subcommittee Recommendation:** Accept**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (19) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Slavin, Stanford, Wong**Negative:** (2) Freimark, Shultz**Abstention:** (0)**Explanation of Vote:**

FREIMARK: I agree in principle with this change, but feel it will cause some confusion. I would prefer multiple "definition" entries for "Shield wire", "Overhead groundwire", etc., Pointing these out as synonyms for one fully defined facility

SHULTZ: Changing the terms "shield" and "static" to "ground" in referring to overhead ground wires is unnecessary and will result in less clear language. The terms proposed to be replaced are commonly used and are readily understood in the industry. In fact, both terms are defined in IEEE 100-2000, The Authoritative Dictionary of IEEE Standards Terms - Seventh Edition, and are indicated to be synonymous with "over head groundwire," not

slang terms as the submitter indicates. Additionally, it can be argued that use of “ground” can be misleading in that such wires are not always grounded. The present terminology is appropriate.

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**Revised Text**

Part: 2 Section: 26

Rule: 261 H1

**CP2707****Subcommittee Recommendation:** Accept as modified**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong**Negative:** (1) Freimark**Abstention:** (0)**Explanation of Vote:**

FREIMARK: During the discussion on this CP, I pointed out that the resulting lighter unit loads could result in higher tensions for the line design base on the 60% RBS criteria presently in Rule 261H. However, I did vote for this CP because I presumed that CP 2768, which I had submitted on behalf of TF 5.1.9 would be accepted and strengthen the criteria for avoiding fatigue damage (i.e., from aeolian vibration) to the conductors. Since CP2768 presently stands as rejected I feel that I must change my vote on CP2707 to Negative (i.e., REJECT), for the following reason: "This CP2707 allows a possible increase to conductor tensions above that previously permitted without at least a “Note” that the possibility of damage to the conductor from fatigue failures may also increase".

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**Revised Text**

Part: 2 Section: 26

Rule: 261 H1

**CP2768****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

Trigger point is too restrictive

**Vote on Subcommittee Recommendation:****Affirmative:** (11) Aichinger, Denbrock, DeSantis, Harrel, Hensel, Kempner, Kluge, Schwalm, Shultz, Standford, Wong**Negative:** (6) Clapp, Burley, Freimark, Heald, Rempe, Slavin**Abstention:** (3) Bullinger, Amato, Kinghorn**Explanation of Vote:**

CLAPP: I think the modified proposal that added a note at appropriate places after the word “considered” is

appropriate. Note: vibrations mitigation devices may or may not be needed.

FREIMARK & SLAVIN: The NESC needs modern vibration criteria. The values in the proposal are triggers for a study, not a requirement to install dampers.

HEALD & REMPE: The subject information should be provided in the appendix. This information is useful, but is based on work in progress.

KLUGE: I'm a proponent of using tension to unit-weight ratio for vibration limits, but, as written, this CP is not ready for the NESC. More work is needed. This should be first published and reviewed as an IEEE trial use guide. There is a considerable discrepancy regarding what the limits should be.

BULLINGER: Lack of expertise

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**Revised Text**

Part: 2 Section: 26

Rule: 261 H1

**CP2791**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 26

Rule: 261 H1a

**CP2644**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Slavin, Standford, Wong

**Negative:** (2) Freimark, Shultz

**Abstention:** (0)

**Explanation of Vote:**

FREIMARK: I agree in principle with this change, but feel it will cause some confusion. I would prefer multiple "definition" entries for "Shield wire", "Overhead groundwire", etc., Pointing these out as synonyms for one fully defined facility

SHULTZ: Changing the terms "shield" and "static" to "ground" in referring to overhead ground wires is unnecessary and will result in less clear language. The terms proposed to be replaced are commonly used and are readily understood in the industry. In fact, both terms are defined in IEEE 100-2000, The Authoritative Dictionary of IEEE Standards Terms - Seventh Edition, and are indicated to be synonymous with "over head groundwire," not slang terms as the submitter indicates. Additionally, it can be argued that use of "ground" can be misleading in that such wires are not always grounded. The present terminology is appropriate.

---

**Revised Text**

Part: 2 Section: 26

Rule: 261 J

**CP2792**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 26

Rule: 261 L1b

**CP2797**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Deleted Text**

Part: 2 Section: 26

Rule: 261 L2

**CP2810**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (15) Aichinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Hensel, Kempner, Kluge, Rempe, Shultz, Stanford, Wong

**Negative:** (4) Bullinger, Heald, Schwalm, Slavin

**Abstention:** (2) Amato, Kinghorn

**Explanation of Vote:**

BULLINGER: Not a valid CP. See NESC procedures 10.1.3(1). Need “exact change, rewording, or new material proposed.”

HEALD: I am not sure if 261L2b reference to “sag not less than 8 hard-drawn copper” should refer to “sag” or “tension”.

SCHWALM & SLAVIN: Insufficient time to analyze if replacement of word “sag” by “tension” is correct in every instance.

---

**Revised Text**

Part: 2 Section: 26

Rule: 261 M

**CP2739**

**Subcommittee Recommendation:** Accept in principle see action on CP2766

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bingel, Bullinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE: I have changed my vote to support CP2739 over CP2766. The district loads provide adequate strength for structures <=60 ft tall. See also my comments on CP2766. Without additional modifications to 2766, the only reasonable alternative is to keep the 60 ft exemption.

---

**New Text**

Part: 2 Section: 26

Rule: 261 N

**CP2776**

**Subcommittee Recommendation:** Accept in principle see action on CP2709

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 26

Rule: 261 Table 261-1A

**CP2505**

**Subcommittee Recommendation:** Withdrawn

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (0)

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 26

Rule: 261 Table 261-1A

**CP2568**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

No justification to reduce Grade C and increase Grade B factors.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Schwalm, Shultz, Stanford, Vivas, Wong

**Negative:** (3) DeSantis, Kluge, Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

DESANTIS: I support having one strength factor for any respective material and handle the load variability for different grades of construction or reliability in the load factor for the respective conditions

SLAVIN: See Supporting Comments

HARREL: The vertical overload factor for grade C should not be reduced below 1.5. Historically, the vertical loads were the same for Grade B and C. See also support Comment in CP 2821. Secondly I do not agree with the supporting comments and am not convinced this detailed change is needed. Possibly this could be covered in a simpler manner under the NESC Part 4 because if proper care is taken these loads may not exist.

KLUGE: I support the proposal for the reason given in the proposal. The revised design method in ANSI O5.1 2002 for large poles and the test results for small poles would justify increasing the Grade B allowable strength factor from 65% to 75%.

Furthermore, it makes sense to address the different grades of construction with load factors not a combination of load and strength factors. However, the vertical overload factors for wood should be greater than 1.70. The current values in NESC do not adequately recognize the loss of strength that occurs in wood when exposed to long duration loads such as gravity loads. The vertical overload factor for wood should be between 1.75 and 2.0 for both grade B and C. (See also CP 2821 that addresses this subject.)

---

**New Text**

Part: 2 Section: 26

Rule: 261 Table 261-1A

**CP2569**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bingel, Bullinger, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Peters, Rempe, Schwalm, Shultz, Slavin, Stanford

**Negative:** (2) Kluge, Wong

**Abstention:** (2) Burley, Kinghorn

**Explanation of Vote:**

KLUGE: With this proposal, designers of fiberglass poles would use design factors for steel and design methods for wood. The fiberglass industry needs to tell us if their product behaves more like a wood or a steel pole. Specifically, in Rule 261C3, the proposal considers the fiberglass pole as a "strut" only. Yet, typically fiberglass poles are tubular and, therefore, presumably stiffer than solid wood poles. This assumption is not proper if steel overloads are recommended for Table 253-1.

Secondly, the fiberglass industry needs to provide long duration load test data. This is needed to evaluate the appropriateness of proposed Rule 261D3 regarding the effect of long term loads such as gravity loads on fiberglass crossarms.

If the above data is provided, I could accept this proposal with appropriate modifications.

WONG: I agree in principle with the CP. Fiberglass material is widely used in the industry and should be in the code. However, fiberglass material behaves differently under long-term loads. A note or statement should be included to make user aware this potential concern. Also are the proposed load factors "correct"?

---

**New Text**

Part: 2 Section: 26

Rule: 261 Table 261-1A

**CP2614**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (15) Aichinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Hensel, Kempner, Kluge, Rempe, Shultz, Standford, Wong

**Negative:** (4) Bullinger, Amato, Heald, Schwalm

**Abstention:** (2) Kinghorn, Slavin

**Explanation of Vote:**

AMATO: This CP is overly wide in its scope and may present the hazard of unintended consequences.

HEALD & SCHWALM: I disagree.

BULLINGER: This CP goes far beyond the original request and issue in IR 530. Braces should not be included as they were not in the IR 530. Also the IR was very specific to Table 261-1A and the CP expanded too much on this interpretation. The global nature of these CP's has a too high risk of unintended consequences.

SLAVIN: Rule 261D1 requires that braces be designed to withstand loads, without exceeding the permitted load. Similar for Rule 261D2. Thus, it is necessary to add "braces" to Table 261-1A and 261-1B to be consistent with the above rules. However Rule 261D1 is problematic since braces typically are not used to provide significant support for the cross-arm under vertical loads (e.g, they will tend to buckle and bend at relatively low loads), but to prevent the cross-arm from rotating. Thus, the braces functions primarily in tension, but not compression for which the brace will buckle. I therefore recommend that Rule 261D1 be modified in the future to recognize this issue.

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**Revised Text**

Part: 2 Section: 26

Rule: 261 Table 261-1A

**CP2720**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

The modifying words are important, deterioration is a function of maintance, and the footnote is not necessary.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kinghorn, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (1) Kluge

**Abstention:** (0)

**Explanation of Vote:**

KLUGE: See supporting comments

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**New Text**

Part: 2 Section: 26

Rule: 261 Table 261-1A fn 2&3

**CP2827**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE: The wording in this CP could be confusing because the last sentence appears to contradict the change proposed. When brought to the attention of the committee, Allen Clapp offered to explain this dilemma in his handbook. I believe the NESC should be written clearly and not rely on an explanation in a handbook to convey its intent. The revised wording for footnote 2 of Table 261-1A and footnote 3 of Table 253-2 proposed in CP 2822 is clearer

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**New Text**

Part: 2 Section: 26

Rule: 261 Table 261-1B

**CP2615**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (15) Aichinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Hensel, Kempner, Kluge, Rempe, Shultz, Standford, Wong

**Negative:** (4) Bullinger, Amato, Heald, Schwalm

**Abstention:** (2) Kinghorn, Slavin

**Explanation of Vote:**

AMATO: This CP is overly wide in its scope and may present the hazard of unintended consequences.

HEALD & SCHWALM: I disagree.

BULLINGER: This CP goes far beyond the original request and issue in IR 530. Braces should not be included as they were not in the IR 530. Also the IR was very specific to Table 261-1A and the CP expanded too much on this interpretation. The global nature of these CP's has a too high risk of unintended consequences.

SLAVIN: Rule 261D1 requires that braces be designed to withstand loads, without exceeding the permitted load. Similar for Rule 261D2. Thus, it is necessary to add "braces" to Table 261-1A and 261-1B to be consistent with the above rules. However Rule 261D1 is problematic since braces typically are not used to provide significant support for the cross-arm under vertical loads (e.g, they will tend to buckle and bend at relatively low loads), but to prevent the cross-arm from rotating. Thus, the braces functions primarily in tension, but not compression for which the brace will buckle. I therefore recommend that Rule 261D1 be modified in the future to recognize this issue.

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**Deleted Text**

Part: 2 Section: 26

Rule: 261 Table 261-1B

**CP2717**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Jones, Kempner, Kluge, Peters, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (1) Hensel

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

HENSEL: Eliminating the alternate method for wood pole will require recalculating all standards book allowable spans based on the current 2.00, 2.67, and 4.00 wood pole safety factors. This change proposal will require us to change to a method in 2007 that is scheduled to be removed from the NESC in 2012, when we will be required to change to a reliability base design method. It is wasteful to require NESC user to switch to a new method that will be obsolete in five years. No one claims the method we will be required to use in the 2007 NESC is safer than the alternate method being eliminated by this change proposal.

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**Revised Text**

Part: 2 Section: 26

Rule: 261 Table 261A

**CP2822**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Allows to much deterioration to guy wires, guy anchors, steel structures, and foundations.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kinghorn, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Deleted Text**

Part: 2 Section: 26

Rule: 262

**CP2736**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Schwalm, Shultz, Standford, Wong

**Negative:** (5) Aichinger, DeSantis, Peters, Rempe, Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

AICHINGER: Although this CP addresses only single, unguyed poles, this is a complete and effective method to provide, finally, a method to design around various materials. This CP represents the design process of the future.

DESANTIS & REMPE: Although I agree this CP isn't complete, I feel it's important for the public to review it and get a feel for what will be presented and potentially implemented in future codes. By rejecting it, it is highly unlikely the public will take the time to crunch the numbers and make comparisons.

PETERS: RBD committee did a correct job in proposing this CP and therefore it should not be rejected.

SLAVIN: See Supporting Comments for CP2736, as well as the additional comments. The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

(1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003). (2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration. (3) Lack of industry experience in application of the recommended procedures and methodology.

(4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules. (5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 – May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005. In order to demonstrate that the determination of the values of Item (2) within the necessary time frame is not unreasonable, procedures by which such results may be obtained were briefly discussed at the SC5 meeting, including initial estimates of the required parameters. (It is understood that the latter estimates do not necessarily represent the final values to be agreed-upon by the ASCE RBD Committee.)

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology.

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**New Text**

Part: 2 Section: 26

Rule: 262 A, B, Tables 262-1,2

**CP2734**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (21) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Rempe, Schwalm, Shultz, Stanford, Wong

**Negative:** (2) Peters, Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

SLAVIN: See Supporting Comments for CP2734, as well as the additional comments below.

The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

(1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29,

- 2003).
- (2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration.
  - (3) Lack of industry experience in application of the recommended procedures and methodology.
  - (4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules.
  - (5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 – May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005.

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology

PETERS: CP should be accepted to allow for industry consideration of RBD methods. RBD methods are the standard practice of structure design and should be seriously considered for incorporation for NESC

CLAPP: I cannot condone applying to a 65 ft pole one-half the load applied to a 70 ft pole. This is an inappropriate exemption for pole less than 70 ft in length (60 ft above ground).

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#### **Revised Text**

Part: 2 Section: 26

Rule: 263 A

#### **CP2658**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (12) Aichinger, Amato, Bingel, Burley, Clapp, Denbrock, Freimark, Harrel, Jones, Kempner, Rempe, Schwalm

**Negative:** (8) Clem, DeSantis, Heald, Kluge, Peters, Shultz, Standford, Wong

**Abstention:** (4) Bullinger, Hensel, Kinghorn, Slavin

**Explanation of Vote:**

CLEM: The industry has used controlled pulling practices for years that allowed the successful use of Davit Arms, post insulators etc. In addition, the installation of new OPGW to replace the existing OHGW could be a problem with this rule. Since the intent of the rule is worker safety, I believe that the committee should see case studies substantiating the need for restricting our typical construction practices and base any adopted rule as corrective action to specific typical problems.

DESANTIS: These requirements would eliminate the use of past insulators for many applications where they have been currently used for decades. The insulator % limits in Rule 277 are designed for sustained events and not short term or instantaneous loads. I would support an EXCEPTION for 250D3 to read "Should a composite insulator be subject to a load exceeding these percentages during the stringing operation, it should be immediately removed from service before the stringing operation can continue." The EXCEPTION probably needs to reside in Rule 277.

CLAPP: The purpose of this CP was to appropriately address the worker safety without using the present method of requiring the result of overload factor x strength factor = total factor for Grade C to equal the result for Grade B. In effect, the present method over designs Grade C structures for vertical loads because it increases the total factor for all vertical loads, not just those caused by work. This rejection is the equivalent of throwing the baby out with the bath water. We should find an acceptable way to keep the baby.

SLAVIN: I believe the NESC requires more extensive safety rules regarding construction and maintenance loads.

STANDFORD: I do not agree with lowering the vertical overload factors for Grade C to 1.35 for both wood and steel. This is to large of a reduction for wood. A reduction to 1.5 for wood and 1.35 for steel would have been a better move.

SHULTZ & HEALD: The proposed addition of this rule is well-intentioned, but it presents some practical problems to the code user in complying. For instance, proposed Rules 250D1, 250D2, 250D3, and 250D4 specify loading scenarios that are conditional. That is, whether or not they would apply will depend upon situations that could be expected to vary from project to project, even from structure to structure. Yet the designer is expected to foresee all these situations beforehand and include those that apply in the structure design. Because these can be design-governing loads, it will be extremely difficult to comply with these provisions without assuming worst case loadings. From a safety perspective, this is unnecessarily restrictive. The responsibility for construction and maintenance loading safety is already assigned by the NESC. This proposal only codifies design loads that would be better included in a design manual. Given that this proposal addresses construction and maintenance loads, and load factors are specified in the text of the proposed rules, the revision of vertical load factors is inappropriate in this proposal.

PETERS: I am for the original change propose submitted by TF 5.1.1

WONG: The original CP 2658 was rejected by SC 5. This substitute CP could change string or pulling operation on post insulator configuration. Existing conductor pulling operation with post insulator has not cause any known safety problems. Thus I cannot support this CP without more studies with input from construction people.

KLUGE: See comments by Shultz and Wong

BULLINGER: Lack of expertise

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**Deleted Text**

Part: 2 Section: 26  
Rule: 263 A-I, Tables 263-1,2  
**CP2736**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Schwalm, Shultz, Standford, Wong  
**Negative:** (5) Aichinger, DeSantis, Peters, Rempe, Slavin  
**Abstention:** (1) Kinghorn

**Explanation of Vote:**

AICHINGER: Although this CP addresses only single, unguyed poles, this is a complete and effective method to provide, finally, a method to design around various materials. This CP represents the design process of the future.

DESANTIS & REMPE: Although I agree this CP isn't complete, I feel it's important for the public to review it and get a feel for what will be presented and potentially implemented in future codes. By rejecting it, it is highly unlikely the public will take the time to crunch the numbers and make comparisons.

PETERS: RBD committee did a correct job in proposing this CP and therefore it should not be rejected.

SLAVIN: See Supporting Comments for CP2736, as well as the additional comments. The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

- (1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003).
- (2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration.
- (3) Lack of industry experience in application of the recommended procedures and methodology.
- (4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules.
- (5) Limitation to single-pole (unguayed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 -- May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005. In order to demonstrate that the determination of the values of Item (2) within the necessary time frame is not unreasonable, procedures by which such results may be obtained were briefly discussed at the SC5 meeting, including initial estimates of the required parameters. (It is understood that the latter estimates do not necessarily represent the final values to be agreed-upon by the ASCE

RBD Committee.)

Items (3) and (4) offset each other in that the use of an “alternate method” for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology.

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**Revised Text**

Part: 2 Section: 26

Rule: 263 C

**CP2658**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (12) Aichinger, Amato, Bingel, Burley, Clapp, Denbrock, Freimark, Harrel, Jones, Kempner, Rempe, Schwalm

**Negative:** (8) Clem, DeSantis, Heald, Kluge, Peters, Shultz, Standford, Wong

**Abstention:** (4) Bullinger, Hensel, Kinghorn, Slavin

**Explanation of Vote:**

CLEM: The industry has used controlled pulling practices for years that allowed the successful use of Davit Arms, post insulators etc. In addition, the installation of new OPGW to replace the existing OHGW could be a problem with this rule. Since the intent of the rule is worker safety, I believe that the committee should see case studies substantiating the need for restricting our typical construction practices and base any adopted rule as corrective action to specific typical problems.

DESANTIS: These requirements would eliminate the use of past insulators for many applications where they have been currently used for decades. The insulator % limits in Rule 277 are designed for sustained events and not short term or instantaneous loads. I would support an EXCEPTION for 250D3 to read “Should a composite insulator be subject to a load exceeding these percentages during the stringing operation, it should be immediately removed from service before the stringing operation can continue.” The EXCEPTION probably needs to reside in Rule 277.

CLAPP: The purpose of this CP was to appropriately address the worker safety without using the present method of requiring the result of overload factor x strength factor = total factor for Grade C to equal the result for Grade B. In effect, the present method over designs Grade C structures for vertical loads because it increases the total factor for all vertical loads, not just those caused by work. This rejection is the equivalent of throwing the baby out with the bath water. We should find an acceptable way to keep the baby.

SLAVIN: I believe the NESC requires more extensive safety rules regarding construction and maintenance loads.

STANDFORD: I do not agree with lowering the vertical overload factors for Grade C to 1.35 for both wood and

steel. This is to large of a reduction for wood. A reduction to 1.5 for wood and 1.35 for steel would have been a better move.

SHULTZ & HEALD: The proposed addition of this rule is well-intentioned, but it presents some practical problems to the code user in complying. For instance, proposed Rules 250D1, 250D2, 250D3, and 250D4 specify loading scenarios that are conditional. That is, whether or not they would apply will depend upon situations that could be expected to vary from project to project, even from structure to structure. Yet the designer is expected to foresee all these situations beforehand and include those that apply in the structure design. Because these can be design-governing loads, it will be extremely difficult to comply with these provisions without assuming worst case loadings. From a safety perspective, this is unnecessarily restrictive. The responsibility for construction and maintenance loading safety is already assigned by the NESC. This proposal only codifies design loads that would be better included in a design manual. Given that this proposal addresses construction and maintenance loads, and load factors are specified in the text of the proposed rules, the revision of vertical load factors is inappropriate in this proposal.

PETERS: I am for the original change propose submitted by TF 5.1.1

WONG: The original CP 2658 was rejected by SC 5. This substitute CP could change string or pulling operation on post insulator configuration. Existing conductor pulling operation with post insulator has not cause any known safety problems. Thus I cannot support this CP without more studies with input from construction people.

KLUGE: See comments by Shultz and Wong

BULLINGER: Lack of expertise

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**Revised Text**

Part: 2 Section: 26

Rule: 263 Table 263-1

**CP2619**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:****Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Aichinger, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Deleted Text**

Part: 2 Section: 26

Rule: 264 A-G

**CP2736**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

The ASCE RBD guide is not finished, is not a consensus document, and is a guide, not a standard.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Schwalm, Shultz, Standford, Wong

**Negative:** (5) Aichinger, DeSantis, Peters, Rempe, Slavin

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

**AICHINGER:** Although this CP addresses only single, unguyed poles, this is a complete and effective method to provide, finally, a method to design around various materials. This CP represents the design process of the future.

**DESANTIS & REMPE:** Although I agree this CP isn't complete, I feel it's important for the public to review it and get a feel for what will be presented and potentially implemented in future codes. By rejecting it, it is highly unlikely the public will take the time to crunch the numbers and make comparisons.

**PETERS:** RBD committee did a correct job in proposing this CP and therefore it should not be rejected.

**SLAVIN:** See Supporting Comments for CP2736, as well as the additional comments. The reasons for the subcommittee (SC5) voting to recommend "rejection" of this change proposal, which is intended to introduce the further use of structural Reliability-Based Design (RBD) into the NESC, may be summarized as follows:

(1) The final version of the "RBD Manual" (Ed. 1) is not available at the time of voting (week of September 29, 2003). (2) Edition 1 of the Manual, and the RBD work to-date, has not yet addressed specific items -- particularly load factors for wire tension and, of less importance, allowable deterioration. (3) Lack of industry experience in application of the recommended procedures and methodology.

(4) The RBD method has been presented as an "Alternate Method", possibly resulting in different results than the present rules. (5) Limitation to single-pole (unguyed) structures -- consistent with Ed. 1 of the Manual.

The first two Items are critical since they relate to incomplete items referenced in the Change Proposal. However, the SC5 vote was premature and inconsistent with the prior determination by the IEEE Secretariat staff that CPs assigned to task forces (such as TF 5.1.8 assigned to shepherd the various "RBD" proposals submitted by the ASCE) may continue efforts to refine or complete details until the deadline required by the editors/publishers of the Preprint -- i.e., by March 1, 2004. On an expedited basis, the RBD Manual would have been published in early 2004, prior to which a final version could have been circulated among the SC5 membership. Similarly, specific details in Item (2) would have been addressed by the ASCE RBD Committee in advance of the deadline, and have also been circulated among the SC5 membership. In any case, the document and the details of Items (1) and (2) will be available to the industry and public during the comment period (Sept. 2004 -- May 2005), thereby facilitating better informed comments to be resolved by SC5 in October 2005. In order to demonstrate that the determination of the values of Item (2) within the necessary time frame is not unreasonable, procedures by which such results may be obtained were briefly discussed at the SC5 meeting, including initial estimates of the required parameters. (It is understood that the latter estimates do not necessarily represent the final values to be agreed-upon by the ASCE RBD Committee.)

Items (3) and (4) offset each other in that the use of an "alternate method" for at least one code cycle (NESC-2007) would in fact allow the industry the luxury of obtaining the necessary experience, prior to the time when this may become the only allowable method in the NESC. This philosophy is also consistent with initially limiting the scope to one very important category (single-pole structures, ...) -- as per Item (5) -- during this interim period. While it is

recognized that the alternate method may provide results different than the present method, this is inherent in any process that revises an important standard and should be accepted as inevitable. Nonetheless, the deliberate calibration of the proposed RBD method to past NESC practice assures that any such differences are minimized, corresponding to an evolutionary process in which the NESC is revised to reflect the latest technology.

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**Revised Text**

Part: 2 Section: 26

Rule: 264 E

**CP2616****Subcommittee Recommendation:** Accept**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (14) Aichinger, Burley, Clem, Denbrock, DeSantis, Freimark, Harrel, Kempner, Kluge, Schwalm, Shultz, Slavin, Standford, Wong**Negative:** (4) Bullinger, Heald, Hensel, Rempe**Abstention:** (3) Clapp, Amato, Kinghorn**Explanation of Vote:**

BULLINGER, HEALD, HENSEL, & REMPE: Moving guy marker requirements away from the guying strength requirement may result in line designers forgetting to specify required guy markers.

CLAPP: There are good reasons for keeping as is and for moving.

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**Revised Text**

Part: 2 Section: 26

Rule: 264 E3

**CP2761****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

Should remain a rule and there should be a note to inform SC4

**Vote on Subcommittee Recommendation:****Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong**Negative:** (0)**Abstention:** (1) Kinghorn**Explanation of Vote:**

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**New Text**

Part: 2 Section: 27

**CP2737**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

Send to have Task force 5.2.1 to calibrate values and get feedback from utilities on loading cases. Also to have a report prepared by March 1, 2004

**Vote on Subcommittee Recommendation:**

**Affirmative:** (13) Aichinger, Bingel, Burley, Clapp, Clem, Denbrock, Heald, Hensel, Kempner, Peters, Rempe, Slavin, Standford

**Negative:** (7) DeSantis, Bullinger, Amato, Freimark, Harrel, Kluge, Shultz

**Abstention:** (2) Kinghorn, Wong

**Explanation of Vote:**

AMATO: There exists insufficient supporting comments and data.

BINGEL: Compared to the 2002 NESC, This CP incorporates more accurate weather data and improved methodologies that provide known levels of reliability. I voted affirmative so we would receive public comments and gain a clearer understanding of how this CP will impact pole loading. I also agreed to chair the Task Force 5.2.1 which is charged with comparisons between this CP and the 2002 NESC for locations across the country. In addition to individual efforts of subcommittee members, we would like to receive comparisons from as many utilities as possible. I can be contacted at nbingel@osmose.com . This compilation of load cases will help to determine the final practice implementation of this CP.

BULLINGER: There are no supporting comments on this CP. It is not clear how this CP will enhance safety. The concerns expressed are map inconsistencies need to be reconciled. The introduction of an alternate proposal will add confusion and implies that the committee has not done a complete job. The CP should include full supporting examples and justifications to allay the natural concerns of the NESC user. This sweeping change is likely to have many unintended consequences. These possibilities need to be evaluated before presentation to the public. Much verbal justification for this and many other CPs rely too heavily on anecdotes, hearsay, memory, and opinion. Real data and engineering analysis is required to justify such a major change. Inconsistent voting on this CP as compared to others related CPs imply there is inadequate understanding and justification for major changes that do not clearly enhance safety.

CLAPP: Rule N250B should use 0 degrees F for old heavy loading district areas, 15 degrees F for old medium loading district, and 30 degrees F for old light loading district. The map should show temperature line.

CLEM: CP 2737 would ultimately lead to a total revision of the code methods. While I voted affirmative for the proposal at this time, I have reservations which must be addressed. The affirmative vote of the committee allows the task force to continue development of the proposal and will allow the task force, set up with Nelson Bingel as chair, to continue comparing loads and soliciting input from utilities. One power company submitted comments to the committee urging rejection of the CP, however, in their comment they referred to the ¾ inch radial ice with a concurrent 4psf wind. The CP does not have this load case. The ice map included with the CP specifies ¾ inch radial ice with a concurrent 2.3psf (30mph) wind. I would encourage utilities to get involved with the task force and provide further substantive comments why the CP should be rejected or suggestion of how the CP should be modified.

DESANTIS: These are the same reasons I voted against it the first time: I feel some of the concepts included in this CP are too radical a change for line designers to see for the first time in an Alternate Method. i.e.: elimination of the historical NESC Loading Districts, the elimination of the 60ft exclusion for extreme wind, the inclusion of a new Extreme Wind and Ice Map and the change in insulator loadings just to name a few. I would prefer some of these concepts be introduced into the existing Code to allow designers to familiarize themselves with the concepts, as some of the other change proposals recommend. I then would suggest this Alternative be included on the 2012 Code as an Alternate. I am specifically opposed to the following concepts regardless of when they are implemented:

N250C – There is no cap on the calculated wind pressure for facilities under 60ft. Collateral damage will occur in Category 3 hurricanes and above and the large expense incurred by utilities to design to these limits will not provide any additional safety or reliability to the customer. Many lines and homes that were damaged during Hurricane Isabel (2003), which was a Type 2 when it made landfall, occurred not as a result of structural failure due to high winds, but as a result of healthy trees being uprooted due to saturated soils. N250C – The line designer must use the values in the Tables. There is no allowance to use the formulas for  $k_z$  and GRF for all calculations as currently exists. N250C – If Exposure B is allowed to be used, then the appropriate Tables need to be included for this use. N253B – This is too severe for insulators. The Load Factor should be 1.0 for insulators. See Comments in N277 below for supporting comments. N261H – The change in temperature from 60deg to 32 deg does not help prevent fatigue due to Aeolian vibration. If individuals didn't calculate correct damper requirements before, they are not going to now. N277 – These limits are too severe for Maintenance Loadings, more specifically, N250D3 and N253B. This requirement would eliminate the use of post insulators for many applications where they have been currently used for decades. The “specified cantilever load” and “specified mechanical load” limits are designed for sustained events and not short term or instantaneous loads. I would support an EXCEPTION for N250D3 loads to read “Should a composite insulator be subject to a load exceeding these percentages during the stringing operation, it shall be immediately removed from service before the stringing operation can continue”.

FREIMARK: Prior to the January, 2003 meeting of SC5 in Las Vegas, for Rule 277, Mechanical Strength of Insulators, this CP would have allowed insulators to be loaded to 70% of their rated strength (an increase from the present 40-50% due to the proposed greater “ultimate” weather loads). It was felt that the 70% value with the greater weather loads in this proposal would give insulator strengths at specific locations comparable to the weather and insulator strength criteria in the present NESC.

In Las Vegas, ANSI-C29, the committee responsible for all insulator standards, made a presentation to NESC SC5. After this presentation, a vote was taken by SC5 to issue a TIA making “corrections” to Rule 277 to effect the 1997 and 2002 NESC Editions and also to submit a Change Proposal (eventually called CP2829) to revised Rule 277 as well as other affected sections of the NESC. In accordance with this vote, Rule 277 in this CP was revised to its present form.

For various reasons, the TIA was never submitted. Additionally, at the Ballot meeting in October, 2003, CP 2829 to revise Rule 277 was rejected. Based on the non-submittal of the TIA and the rejection of CP 2829, I feel that there is no basis for the more restrictive insulator loads contained in the present CP 2737 and therefore vote not to Accept.

HARREL: I do not believe we should include an alternate method that produces loading requirements with significantly different results. Although I agree the ice wind maps have a much more accurate basis for part of their development, even the map developers caution on the use of these maps for their sole application in calculation of loading requirement.

HEALD: I voted in the affirmative to bring this change proposal to the forefront for comment by the public. This CP is the output of a working group established by SC5. This alternate method has been submitted as a change proposal to previous editions of the code by the same working group of SC 5. Some of the people who have voted “no” to this change proposal have supported the formation and continuation of this working group of SC5. I agree

with many of the explanations of committee members who cast a negative vote. However, if this CP was voted down by the subcommittee, the public would probably not comment on it; the working group would continue; and the same change proposal would be submitted for the 2012 edition of the code.

Based on public comment and member's explanation of their vote, final acceptance or rejection of this change proposal will be made in October, 2005. If this change proposal is rejected, then it will be a indication that SC 5 should disband this working group and put this CP proposal to rest. Although I feel the public would like a complete rewrite of sections 25, 26, and 27 of the NESC (as well as section 24), I don't believe the current setup for code revisions is compatible to complete rewrites.

KEMPNER: In principal, I am against having two different methods for determining safety loads that can result in significantly different loads. If the subcommittee feels that the proposed alternate is an adequate safety criterion than the alternate should be the selected method for the revised NESC code. Having the alternates as proposed may subject utilities to legal consequences if a line failure were to occur using an alternate method that gives a significantly lower safety load. Implementation of new information (such as the ice and wind maps) and methodologies (such as gust factors vs. gust response factors) is being accomplished through the current code change process.

KLUGE: Although I have voted against this motion because the modifications are not identified, I support the concepts embedded in the proposal. However, I prefer a softer transition that would impliment many of these concepts into the present code by individual rules. A sudden change would be burdensome on the utilities and could result in unforeseen consequences. For example, the ASCE combined wind and ice map is fundamental to this proposal and it is not currently a load case recognized by NESC. There is another proposal to make the ASCE ice/wind load an additional load case. This is an example of an acceptable "soft transition".

SHULTZ: This proposal has been revised to yield structure strengths that are reasonably comparable to current practice for most transmission structures although governing load cases may change from combined ice and wind to extreme wind, or vice versa. However, elimination of the extreme wind loading exemption for structures and facilities less than 60' above ground or water can result in strength requirements that are significantly greater than current practice for such structures in coastal areas, particularly in Light loading areas, and the increase can be several pole classes. The safety need for strength increases of these magnitudes is not shown. Consequently, I believe this proposal needs further work to calibrate distribution pole class requirements for extreme wind loading more closely to established practice.

Similarly, it is unclear how the extreme wind requirements of this proposal will compare with the requirements of CP2766 (which was accepted as modified), yet the methods are to be considered acceptable alternative methods. Some calibration to current practice might be appropriate.

The requirement that stringing block lock-up loads "shall be considered" is ambiguous and will cause confusion for code users. It also may limit use of some structure configurations or construction practices if longitudinal capacity for such loads must be provided. This concern might be eliminated if alternative methods of assuring safety could be allowed by the proposal.

Finally, the stated intent of the working group to modify this proposal based on dispositions of other change proposals leaves some uncertainty as to what will be included in the final draft of this proposal.

SLAVIN: This is an important proposal, providing the overall format for upgrading the Strength & Loading section consistent with the latest technical information, in a logical, intergrated manner. Although somewhat controversial when originally proposed many code cycles ago, much of CP2737 has already been incorporated into the NESC (e.g., the 3-second gust map of ASCE 7), agrees with the latest accepted standards and information (e.g., 50-year

Combined Ice and Wind map of ASCE 7-02), or is generally consistent with various other change proposals accepted by SC5 (e.g, Extreme Wind below 60 ft.). It is recognized that CP2737 does not treat Extreme Wind below 60 ft. in exactly the same manner as the accepted CP, but it does provide significant load reduction for Grade C and/or sheltered environments. In any case, it is anticipated that CP2737 would be modified, as appropriate, based upon public comments on the various CPs. Since CP2737 is proposed as an "Alternate Method", it will allow the industry at least one code cycle to adjust to the new overall methodology. While an alternate method that produces dissimilar results may raise some short-term issues, this nonetheless represents the most practical procedure for introducing potentially significant changes into the NESC.

WONG: Many issues in the CP have already been taking care of by others. Also many other issues, such as structures below 60 ft, may have better foundation than CP 2766. However, ice map is only for freezing rain. Tension limit (1.15 factor) has not been justified and could produce totally different answer than code (2002 NESC) requires currently. It should not be considered as "alternate method". Alternate methods should have equivalent results as the main method. AISC and ACI have done that.

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**Deleted Text**

Part: 2 Section: 27

Rule: 270

**CP2536**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

Errata should be issued to effect correction back to 1993

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Aichinger, Amato, Bullinger, Burley, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 27

Rule: 270

**CP2762**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

See CP2536

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel,

Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**New Text**

Part: 2 Section: 27

Rule: 277

**CP2802**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

This proposal include ice plus concurrent wind map of ASCE 7-2002. That map is being revised and is expected to be completed by the time of the final vote on the NESC 2007 edition.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Stanford, Wong

**Negative:** (1) Kinghorn

**Abstention:** (0)

**Explanation of Vote:**

FREIMARK: In general I support the intent of this change proposal and am voting in favor of it at this time. However, if the final outcome for the 2007 NESC is approval of CP 2737, the major re-write of the section 25, 26, and 27 of the NESC, then I feel that the passage of this particular CP would cause possible confusion and/or redundancy for the period that both the "new" and "previous" portions of the NESC are in effect and will vote against this proposal at that time.

KINGHORN: There is not sufficient evidence in my opinion that any additional public safety will be gained by this CP. The likelihood of the concurrent occurrence of these conditions is very remote. The approval of this CP could result in significant waste of resources without adequate justification.

---

**Revised Text**

Part: 2 Section: 27

Rule: 277

**CP2829**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Major changes to the insulators strength should be championed by ANSI C29

**Vote on Subcommittee Recommendation:**

**Affirmative:** (14) Aichinger, Amato, Burley, Clem, Denbrock, Harrel, Heald, Hensel, Kempner, Kinghorn, Rempe, Shultz, Standford, Wong

**Negative:** (5) Slavin, Kluge, Freimark, DeSantis, Clapp

**Abstention:** (1) Bullinger

### **Explanation of Vote:**

CLAPP: If ANSI C29 is not willing to get off its collective duff and provide appropriate guidance, then they must be willing to accept what comes out of this committee. They can't tell us we have incorrect requirements without giving us the correct requirements. Kluge's proposal has merit to assure that insulator strength is appropriate. We have just gone through a major blackout that apparently turns out to be partly the result of inappropriate thermal ratings for conductors resulting in too much sag and lines contacting trees below. We don't need to have insulators breaking because of similar loading case mismatches. I think that the recent information on insulator life changes due to stress loadings may go a long way to explain some previously unexplained insulator failures and should be properly addressed. Even if it were not a safety problem to have insulator failures, which it most certainly is a safety problem, we don't have the line redundancy to allow line failure due to insulator failures. The reliability and safety of electric utility transmission line and distribution line service is of paramount concern now, and will only increase in concern in future years. Now is the time to properly state insulator strength requirements so that they will (a) be appropriate for actual expected long-term and short-term loadings and (b) they cannot be misunderstood due to lack of specificity.

KLUGE: The reason the subcommittee gave for rejection is not true. The change proposal was indeed championed by ANSI C29.

1) During the NESC 2002 revision cycle, ANSI C29 committee submitted a written comment to CP2372 stating that insulators should not be loaded beyond the 40-50% rated strength limit. "Loads above these limits, no matter how short in duration, introduce a risk to the integrity of the insulators, and the possibility of either an immediate or delayed line failure."

2) The Chair and Vice-Chair of ANSI C29 Committee came to a NESC Subcommittee meeting and gave a presentation on insulator strength. This personal visit was to "champion" this change to NESC. Slides from their presentation are included with the supporting comments to the change proposal.

3) Two Subcommittee 5 members are also members of ANSI C29. Both Schwalm and DeSantis voted to support the change proposal.

As long as ANSI C29 continues to support this change proposed, NESC is obligated to approve this change proposal. ANSI C29 is the recognized authority on insulators. Your comments are invited. I'll personally see that any comments received are also reviewed by ANSI C29 committee. I'm committed to do what is deemed right by ANSI C29.

SLAVIN: See supporting comments.

DESANTIS: I support these changes in principle and would support it if it only included the District Loading changes. Although we currently follow these proposed guidelines for Extreme Loadings on insulators at my Company, there are other utilities that do not. By establishing the limits for Extreme Winds, you would be hindering their options to load their insulators to higher loadings, a practice that has been apparently working for them for many years. If those utilities wish to continue their practice and accept the Liability of their actions, then so be it.

BULLINGER: Lack of expertise

FREIMARK: While I am generally opposed to the provisions contained in this CP for the reason provided for its

Rejection, I would prefer that this CP receive public comments appropriate to the CPs importance as I believe that “accepted” proposal receive greater public scrutiny than do “rejected” proposals. I therefore change my vote to be against rejection; SC5 can still reject this CP in October, 2005, after the comment period.

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**New Text**

Part: 2 Section: 27

Rule: 278

**CP2802****Subcommittee Recommendation:** Accept as modified**Subcommittee Comment:**

This proposal include ice plus concurrent wind map of ASCE 7-2002. That map is being revised and is expected to be completed by the time of the final vote on the NESC 2007 edition.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (22) Aichinger, Amato, Bingel, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Jones, Kempner, Kluge, Peters, Rempe, Shultz, Slavin, Standford, Wong

**Negative:** (1) Kinghorn

**Abstention:** (0)

**Explanation of Vote:**

**FREIMARK:** In general I support the intent of this change proposal and am voting in favor of it at this time. However, if the final outcome for the 2007 NESC is approval of CP 2737, the major re-write of the section 25, 26, and 27 of the NESC, then I feel that the passage of this particular CP would cause possible confusion and/or redundancy for the period that both the “new” and “previous” portions of the NESC are in effect and will vote against this proposal at that time.

**KINGHORN:** There is not sufficient evidence in my opinion that any additional public safety will be gained by this CP. The likelihood of the concurrent occurrence of these conditions is very remote. The approval of this CP could result in significant waste of resources without adequate justification.

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**Revised Text**

Part: 2 Section: 27

Rule: 279 279

**CP2650****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

CP would create more confusion

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 27

Rule: 279 279A2a

**CP2719**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Not clear that this is good practice

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (1) Kluge

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE: See supporting comments.

CLAPP: I regret that I was not in the room when this was discussed and voted. This is not an appropriate change. The very thing that the requirement to ground or insulate a guy was added to guard against is the ultimate in a slack guy: i.e., a broken one. The justification is not correct. This change should never be made. When guys get cut by vehicle damage, mower damage, or other calamity, or when they get covered up at the anchor and corrode in two pieces, and hang down upon the facilities below, the only thing that can save the public at the lower levels is either grounding at the structure sufficient to operate the ground fault protective devices or insulators placed at appropriate levels in the guy so that it will not bring hazardous voltages down to the public level. It doesn't matter where a guy is attached on the pole. If either (a) a guy can be cut loose at the ground and fall into an energized part or conductor or (b) an energized conductor can fall onto a guy due to a broken insulator, etc., the guy can become energized and should be grounded or insulated.

Please note that Subcommittee 4 on Clearances has voted to require all guys to be either grounded or insulated, regardless of the voltage to which they are exposed. Even 120 V can be deadly to the public below under the wrong circumstances and 277 and above are certainly hazardous.

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**New Text**

Part: 2 Section: 27

Rule: 279 279A2b(2)

**CP2728**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Current Rule 279A3 states that corrosion insulators shall not be classified as a guy insulator

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (1) Kluge

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

KLUGE:

279. Guy and Span Insulators

A. Insulators

(No change to 279A1 and 2)

3. Corrosion Protection

An insulator in the guy strand used exclusively for the elimination of corrosion of metal in ground rods, anchors, anchor rods, or pipe in an effectively grounded system shall not be classified as a guy insulator and shall not reduce the mechanical strength of the guy.

\*\*\*\*\* NEW TEXT\*\*\*\*\*

a. Insulators intended for corrosion protection shall be installed as follows:

(1) Corrosion prevention insulators shall be located so as not to render a ground installed according to Rule 215C ineffective.

(2) Where only the upper portion of a guy has been effectively grounded according to Rule 215C, corrosion prevention insulator(s) should be installed at an elevation below any conductors energized at more than 300 volts and at least eight (8) feet above the ground.

**Supporting Comments:**

Currently, there is no rule regarding the placement of corrosion insulators. Without such a rule, corrosion protection insulators may be placed in a manner that could render the grounding of a guy ineffective and could, thereby, compromise safety. This adds clarity regarding placement of corrosion insulators that may be inserted, according to Rule 279A3, in a grounded guy.

**New Text**

Part: 2 Section: 27

Rule: 279 279A2b(3)

**CP2729**

**Subcommittee Recommendation:** Reject**Subcommittee Comment:**

Insulation of guys should be coordinated as part of the joint use agreement

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Aichinger, Amato, Bullinger, Burley, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (2) Clapp, Kluge

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

CLAPP: I regret that I was not available when this was discussed. I think this action is akin to throwing out the baby with the bath water. This requirement should be stated as and EXCEPTION, not a NOTE.

KLUGE: This CP should be accepted. Members of Wisconsin Utility Association believe the present rule is vague and confusing.

Currently, NESC requires guys be either grounded (Rule 215C2) or insulated (Rule 279A2a). Clearly, NESC permits either type. There is no restriction that the two types cannot coexist on the same structure.

Rule 279A2b(3) specifically addresses the placement of guy insulators. This rule does not apply to grounded guys in general or, specifically, to a grounded guy rendering an insulator ineffective. Adding the proposed note would make that intent clear.

Furthermore, if a grounded guy contacts an insulated portion of an insulated guy, the fact that the insulator may be compromised is inconsequential because the grounded guy coincidentally grounds the insulated portion of the guy.

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**Revised Text**

Part: 2 Section: 27

Rule: 279 A2a

**CP2611**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Standford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: 2 Section: 27

Rule: 279 A2b(2)

**CP2555**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Aichinger, Amato, Bullinger, Burley, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald,

Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (1) Clapp

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

CLAPP: I regret that I was not in the room when this was discussed and voted. This is not an appropriate change. The very thing that the requirement to ground or insulate a guy was added to guard against is the ultimate in a slack guy: i.e., a broken one. The justification is not correct. This change should never be made. When guys get cut by vehicle damage, mower damage, or other calamity, or when they get covered up at the anchor and corrode in two pieces, and hang down upon the facilities below, the only thing that can save the public at the lower levels is either grounding at the structure sufficient to operate the ground fault protective devices or insulators placed at appropriate levels in the guy so that it will not bring hazardous voltages down to the public level. It doesn't matter where a guy is attached on the pole. If either (a) a guy can be cut loose at the ground and fall into an energized part or conductor or (b) an energized conductor can fall onto a guy due to a broken insulator, etc., the guy can become energized and should be grounded or insulated.

Please note that Subcommittee 4 on Clearances has voted to require all guys to be either grounded or insulated, regardless of the voltage to which they are exposed. Even 120 V can be deadly to the public below under the wrong circumstances and 277 and above are certainly hazardous.

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**New Text**

Part: 2 Section: 27

Rule: 279 A3

**CP2620**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Aichinger, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (2) Amato, Kinghorn

**Explanation of Vote:**

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**New Text**

Part: B

Rule: 250 Appendix B

**CP2784**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

Task Force is making sure that all modifications are included

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Revised Text**

Part: B

Rule: 264 E for Index

**CP2823**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

Rule was moved out of 264 to 217. See CP2617

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Aichinger, Amato, Bullinger, Burley, Clapp, Clem, Denbrock, DeSantis, Freimark, Harrel, Heald, Hensel, Kempner, Kluge, Rempe, Schwalm, Shultz, Slavin, Stanford, Wong

**Negative:** (0)

**Abstention:** (1) Kinghorn

**Explanation of Vote:**

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**Meeting Conclusion:**

T.F. 5.2.1: Scope: Compile load cases that compare the requirements of CP2737 to sections 25-27 of the 2002 NESC. Provide a preliminary report by March 1 for inclusions in the preprint. Solicit input from utilities and prepare a final report.

Members: Bingel (Chair), Freimark, Slavin, Rollins, Burley, Kluge, Cantrell, Rempe, Schultz, Kempner, Bullinger, Stanford, and Johnson.