

NESC SUBCOMMITTEE 5
 OVERHEAD LINES - STRENGTH AND LOADING
 15 Sep, 2008-18 Sep, 2008
 IEEE, Piscataway, NJ

Name	Organization	09/15	09/16	09/17	09/18
Frank Agnew (Alternate)	SEEX	X	X	X	X
Richard Aichinger (Alternate)	AISI	A	A	A	A
Christopher Austin (Alternate)	NCTA	A	A	A	A
Marc Berlinger (Principal)	EIA	A	A	A	A
Nelson G Bingel (Principal)	AWPA	X	X	X	X
Rex Bullinger (Principal)	NCTA	X	X	X	X
Terry Burley (Alternate)	WAPA	A	X	X	X
John Busel (Principal)	ACMA	X	X	A	A
Jim Byrne (Principal)	NRECA	X	X	X	X
Helen Chen (Principal)	AISI	A	A	A	A
Allen L Clapp (Principal)	Consultant	X	X	X	X
Clayton L Clem (Principal)	TVA	A	A	A	A
Timothy Cooke (Principal)	SCTE	A	X	X	A
Ron Corzine (Principal)	SEEX	X	X	X	X
Ronald Cotant (Principal)	EEI	A	X	X	X
Frank A Denbrock (Principal)	IEEE/PES/T&D	X	X	X	X
Jeffery Erdle (Principal)	EEI	X	X	X	X
Bruce Freimark (Principal)	EEI	X	X	X	X
Robert S Fuller (Principal)	NSPE	A	A	A	A
Grant Glaus (Principal)	Marne and Associates	X	X	X	X
Russell Guerry (Alternate)	NCEMC	X	X	A	A
Thomas Haire (Principal)	REMC	X	X	X	X
Douglas Hanson (Principal)	WAPA	A	A	A	A
Edward Harrel (Principal)	EEI	X	X	X	X
Donald G Heald (Principal)	RUS	X	X	X	X
Richard W Hensel (Alternate)	IEEE	A	A	A	A
Walter D Jones (Principal)	IEEE/IAS	A	A	A	A

Christopher Jones (Principal)	APPA	X	X	X	X
Jacob Joplin (Principal)	NCEMC	A	A	X	X
Leon Kempner (Principal)	BPA	X	X	X	X
Robert O Kluge (Principal)	EEI	X	X	X	X
Brian Lacoursiere (Alternate)	ACMA	X	X	X	X
Robert Lash (Alternate)	RUS	A	A	A	A
Otto J Lynch (Principal)	Power Line Systems	X	X	X	X
Steve Mace (Alternate)	NCTA	A	A	A	A
John-Chung Ng (Alternate)	EEI	X	X	X	X
Michael C Pehosh (Alternate)	NRECA	A	X	X	X
Robert C Peters (Principal)	IEEE	X	X	X	A
Joseph Rempe (Principal)	APPA	A	A	A	A
Andrew Schwalm (Principal)	IEEE	A	A	A	A
Wade Shultz (Principal)	SEEX	X	X	X	X
Lawrence M Slavin (Principal)	ATIS	A	X	X	X
Donald Soderberg, Jr. (Principal)	IEEE	X	X	X	X
Richard J Stanford (Principal)	EEI	X	X	X	X
Dustin Troutman (Alternate)	ACMA	X	X	X	A
David West (Alternate)	SEEX	X	X	X	X
C. Jerry Wong (Principal)	EEI	X	X	X	X
Alan T Young (Alternate)	EIA	A	A	A	A

Guest

G. Paul Anundson	X	X	X	X
Stephen Cantrell	X	X	X	X
Mark Jurgemeye	X	X	X	X

Chair: Frank A. Denbrock

Secretary: Allen L. Clapp

X - Present

A - Absent

Meeting Note:

NESC 2007 TIA-2 Was addressed by CP3460

NESC 2007 TIA-3 Was addressed by CP3318

IR549 - IR was addressed by CP3035

IR556 - No action required

Revised Text

Part: 2 Appendix C **CP3320**

Subcommittee Recommendation: Accept in Principle

Subcommittee Comment:

To refer to a working group to appropriately update the appendix.

Kempner - Chair

Slavin

Shultz

Cantrell

Burley

Vote on Subcommittee Recommendation:

Affirmative: (27) Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Corzine, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Heald, Jones, Kempner, Kluge, Lynch, Pehosh, Peters, Schwalm, Shultz, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (1) Berlinger

Explanation of Vote:

Shultz (Affirmative) See attached comment

During discussion of this change proposal by Subcommittee 5, the subcommittee agreed with corrections of the typos and C_f values. The subcommittee accepted the proposal in principle. However, concern was expressed that the situation where a downwind tower section is spaced at a distance from a windward tower section such that shelter from the windward section could not be assumed for the downwind section is not covered in Appendix C.

A working group was assigned to address this concern and recommend a solution to the subcommittee. The working group did not make a recommendation prior to the December 31, 2008 deadline; however, a modification of the change proposal to address the concern was in circulation within the working group at that time.

Because of the significance Appendix C in providing direction to code users as to how wind loads may be determined per Rule 250C, it is important that it be as complete and technically valid as possible for the 2012 NESC. Therefore, this comment includes a work-in-progress suggested solution within the working group at the deadline in order to make it available for consideration during the public review process.

To address the wind loading situation described above, the following modification to Example 1 and addition of a new Example 5 for Appendix C are proposed. These modifications would be in addition to other corrections of the typos and C_f values noted in the original change proposal.

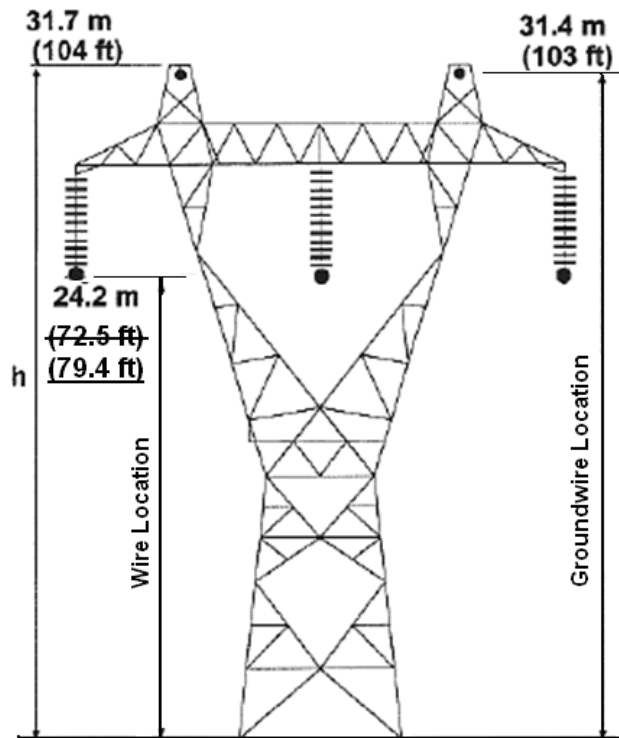
Modification of Example 1:

Example applications for Rule 250C Tables 250-2 and 250-3

The following ~~four~~ five examples demonstrate the use of Tables 250-2 and 250-3. The method of selecting the design parameters should not be considered the recommended method for the structures presented in these examples. The method used for determining the design values should be based on engineering judgment.

Example 1 demonstrates the basic application for determining the tower and wire wind loads. The tower

wind load is assumed to be uniformly distributed over the tower height (h). The structure is a lattice tower with flat-surfaced members. (Note: *Example 5 demonstrates determination of wind loads on a tower based upon more detailed analysis, including application of loads at centers-of- pressure of tower sections.*)



Example 1

Step 1: Determine the wind pressure for the phase conductors

Using Table 250-2, select a wire k_z value, velocity pressure exposure coefficient:

The k_z for the wire is based on the height, h , of the wire at the structure (Rule 250C1), $h = 24.2$ m (79.4 ft);

therefore from Table 250-2, $k_z = 1.20$. The Table k_z values represent, approximately, the upper limit for the

range of heights, h . The equations of Table 250-2 can be used to determine the exact value of k_z .

$$k_z = 2.01 \cdot (24.2 \text{ m}/275 \text{ m})^{(2/9.5)} = \mathbf{1.205}$$

$$k_z = 2.01 \cdot (79.4 \text{ ft}/900 \text{ ft})^{(2/9.5)} = \mathbf{1.205}$$

Using Table 250-3, select a wire G_{RF} value, gust response factor:

The wire gust response factor, G_{RF} , is determined using the height of the wire at the structure, $h = 24.2 \text{ m}$ (79.4 ft), and the design wind span, L . The design span for this example is assumed to be 400 m (1310 ft).

Using Table 250-3, the Wire G_{RF} equals **0.69**. The table values represent, approximately, the upper limit of the G_{RF} value based on the upper limit for the range of heights, h , and lower limit for the range of span

lengths, L . The equations of Table 250-3 can be used to determine the exact value of G_{RF} .

$$B_w = 1/(1 + 0.8 \cdot 400 \text{ m}/67) = 0.173$$

$$E_w = 0.346 \cdot (10/24.2 \text{ m})^{1/7} = 0.305$$

$$G_{RF} = [1 + (2.7 \cdot 0.305 \cdot (0.173)^{0.5})]/(1.43)^2 = \mathbf{0.657}$$

$$B_w = 1/(1 + 0.8 \cdot 1310 \text{ ft}/220) = 0.173$$

$$E_w = 0.346 \cdot (33/79.4 \text{ ft})^{1/7} = 0.305$$

$$G_{RF} = [1 + (2.7 \cdot 0.305 \cdot (0.173)^{0.5})]/(1.43)^2 = \mathbf{0.657}$$

The wire wind pressure, assuming 40 m/s (90 mph), I and $C_d C_e$ equal 1.0, and the table values for k_z and G_{RF} , is

$$\text{Wind pressure} = 0.613 \cdot (40 \text{ m/s})^2 \cdot 1.2 \cdot 0.69 \cdot 1.0 \cdot 1.0 = \mathbf{812 \text{ newtons/m}^2}$$

$$\text{Wind pressure} = 0.00256 \cdot (90 \text{ mph})^2 \cdot 1.2 \cdot 0.69 \cdot 1.0 \cdot 1.0 = \mathbf{17.17 \text{ psf}}$$

Step 2: Determine the wind pressure for the overhead groundwire

Using Table 250-2, select a wire k_z value, velocity pressure exposure coefficient:

The k_z for the wire is based on the height, h , of the wire at the structure (Rule 250C1), $h = 31.4 \text{ m}$ (103 ft);

therefore from Table 250-2, $k_z = \mathbf{1.30}$. The equations of Table 250-2 can be used to determine the exact value of k_z .

$$k_z = 2.01 \cdot (31.4 \text{ m}/275 \text{ m})^{(2/9.5)} = \mathbf{1.273}$$

$$k_z = 2.01 \cdot (103 \text{ ft}/900 \text{ ft})^{(2/9.5)} = \mathbf{1.273}$$

Using Table 250-3, select a wire G_{RF} value, gust response factor:

The wire gust response factor, G_{RF} , is determined using the height of the wire at the structure, $h = 31.4 \text{ m}$ (103 ft), and the design wind span, $L = 400 \text{ m}$ (1310 ft). Using Table 250-3, the overhead groundwire G_{RF} equals **0.68**. The equations of Table 250-3 can be used to determine the exact value of G_{RF} .

$$B_w = 1/(1 + 0.8 \cdot 400 \text{ m}/67) = 0.173$$

$$E_w = 0.346 \cdot (10/31.4 \text{ m})^{1/7} = 0.294$$

$$G_{RF} = [1 + (2.7 \cdot 0.294 \cdot (0.173)^{0.5})] / (1.43)^2 = \mathbf{0.650}$$

$$B_w = 1/(1 + 0.8 \cdot 1310 \text{ ft}/220) = 0.173$$

$$E_w = 0.346 \cdot (33/103 \text{ ft})^{1/7} = 0.294$$

$$G_{RF} = [1 + (2.7 \cdot 0.294 \cdot (0.173)^{0.5})] / (1.43)^2 = \mathbf{0.650}$$

The overhead groundwire wind pressure, assuming 40 m/s (90 mph), I and $C_d C_e$ equal 1.0, and the table values for k_z and G_{RF} , is

$$\text{Wind pressure} = 0.613 \cdot (40 \text{ m/s})^2 \cdot 1.3 \cdot 0.68 \cdot 1.0 \cdot 1.0 = \mathbf{867 \text{ newtons/m}^2}$$

$$\text{Wind pressure} = 0.00256 \cdot (90 \text{ mph})^2 \cdot 1.3 \cdot 0.68 \cdot 1.0 \cdot 1.0 = \mathbf{18.33 \text{ psf}}$$

Step 3: Determine the wind pressure for the structure

Using Table 250-2, select the structure k_z value, velocity pressure exposure coefficient:

The k_z for the structure is based on the total structure height, h , above the ground line (Rule 250C1), $h =$

31.7 m (104 ft); therefore from Table 250-2, $k_z = \mathbf{1.20}$. The equations of Table 250-2 can be used to determine the exact value of k_z .

$$k_z = 2.01 \cdot (0.67 \cdot 31.7 \text{ m}/275 \text{ m})^{(2/9.5)} = \mathbf{1.172}$$

$$k_z = 2.01 \cdot (0.67 \cdot 104 \text{ ft}/900 \text{ ft})^{(2/9.5)} = \mathbf{1.172}$$

It should be noted that the structure center of wind pressure is assumed at 2/3 the structure height for the values obtained from Table 250-2. This assumption is included in the table values and the table equation E_s with the adjustment factor 0.67. This assumption is appropriate when the wind speed is assumed uniformly distributed over the structure height and the structure height is equal to or less than 75 m. Example 3 will demonstrate when the 2/3 assumption should not be used.

Using Table 250-3, select a structure G_{RF} value, gust response factor:

The structure gust response factor, G_{RF} , is determined using the total structure height, $h = 31.7 \text{ m}$ (104 ft).

Using Table 250-3, the structure G_{RF} equals **0.89**. The equations of Table 250-3 can be used to determine the exact value of G_{RF} .

$$B_s = 1/(1 + 0.375 \cdot 31.7 \text{ m}/67) = 0.849$$

$$E_s = 0.346 \cdot (10/[0.67 \cdot 31.7 \text{ m}])^{1/7} = 0.311$$

$$G_{RF} = [1 + (2.7 \cdot 0.311 \cdot (0.849)^{0.5})] / (1.43)^2 = \mathbf{0.867}$$

$$B_s = 1/(1 + 0.375 \cdot 104 \text{ ft}/220) = 0.849$$

$$E_s = 0.346 \cdot (33/[0.67 \cdot 104 \text{ ft}])^{1/7} = 0.311$$

$$G_{RF} = [1 + (2.7 \cdot 0.311 \cdot (0.849)^{0.5})] / (1.43)^2 = \mathbf{0.867}$$

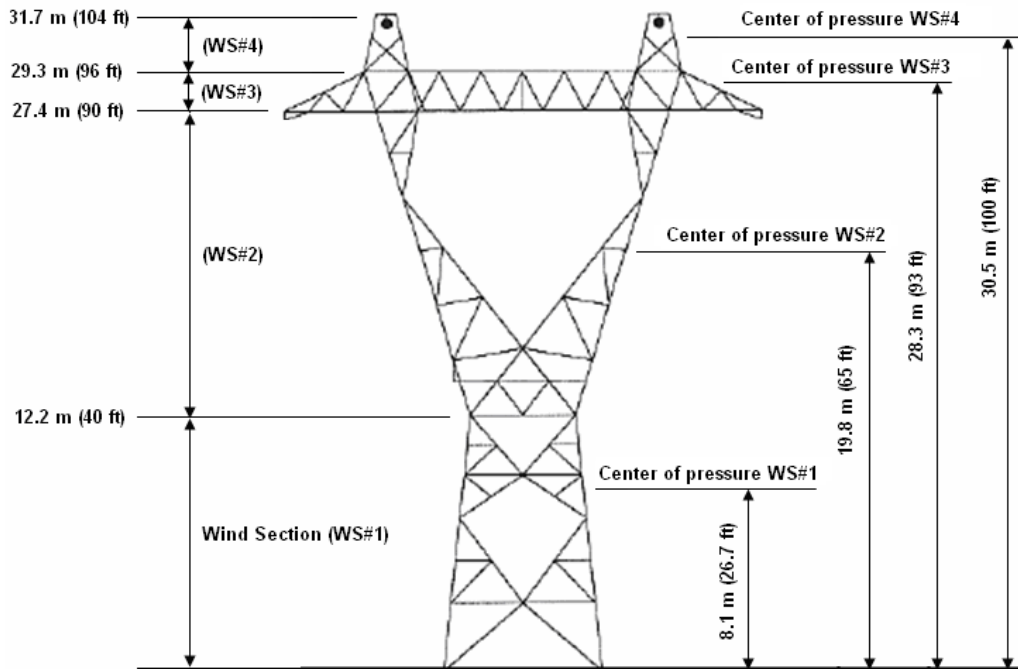
The structure wind pressure (uniformly distributed), assuming 40 m/s (90 mph), I equals 1.0, and $C_d C_f$ equals 1.0 3.2, and the table values for k_z and G_{RF} , is

$$\text{Wind pressure} = 0.613 \cdot (40 \text{ m/s})^2 \cdot 1.20 \cdot 0.89 \cdot 1.0 \cdot \mathbf{1.0 \cdot 3.2} = \mathbf{1047 \cdot 3352 \text{ newtons/m}^2}$$

$$\text{Wind pressure} = 0.00256 \cdot (90 \text{ mph})^2 \cdot 1.2 \cdot 0.89 \cdot 1.0 \cdot \mathbf{1.0 \cdot 3.2} = \mathbf{22.15 \cdot 70.87 \text{ psf}}$$

Add all new Example 5:

Example 5 demonstrates the application of a non-uniform wind load distribution for a lattice tower structure with a large window section and two separate groundwire support peaks. Wind loads on the window section and the groundwire peaks differ from the loading model discussed in Example 3. This example suggests methodology to account for loading of these specific tower features. This procedure may be used when, in the engineer's judgment, a detailed wind load distribution is desired.



Example 5

Step 1: Determine assumed wind load distribution

This structure is assumed to have 4 different wind sections (WS), each with its specific uniform wind load.

Wind Section #1 (WS #1) was determined by engineering judgment to be the height, h, from the ground line to the tower waist, h = 12.2 m (40 ft). The center of wind pressure for WS#1 is assumed to be 2/3 the height of 12.2 m (40 ft). The second section of the tower, WS#2, is assumed to be the distance from the tower waist to the bottom of the crossarm. The center of wind pressure for WS#2 is assumed to be at the mid-height of this wind section, h = 19.8 m (65 ft). The third tower section, WS#3, is the crossarm, and its center of pressure is assumed to be at its mid-height, h = 28.3 m (93 ft). The fourth tower section, WS#4, is the groundwire peak section (both peaks will be considered together as one tower section), and its center of pressure is assumed to be at its mid-height, h = 31.7 m (100 ft).

Step 2: Determine the wind load for each structure wind section, beginning with section WS#1.

Determine k_z , $h = 12.2$ m (40 ft), using Table 250-2, $k_z = 1.0$, using the equations:

$k_z = 2.01 \cdot (0.67 \cdot 12.2 \text{ m}/275 \text{ m})^{(2/9.5)} = \mathbf{0.959}$
$k_z = 2.01 \cdot (0.67 \cdot 40 \text{ ft}/900 \text{ ft})^{(2/9.5)} = \mathbf{0.959}$

:

Determine G_{RF} . The structure gust response factor is a function of the structures dynamic response. Therefore a single value of G_{RF} using the total structure height should be used on all structure wind sections. Given $h = 31.7$ m (104 ft), using the equations

$B_s = 1/(1 + 0.375 \cdot 31.7 \text{ m}/67) = 0.849$ $E_s = 0.346 \cdot (10/[0.67 \cdot 31.7 \text{ m}])^{1/7} = 0.311$ $G_{RF} = [1 + (2.7 \cdot 0.311 \cdot (0.849)^{0.5})] / (1.43)^2 = \mathbf{0.867}$
$B_s = 1/(1 + 0.375 \cdot 104 \text{ ft}/220) = 0.849$ $E_s = 0.346 \cdot (33/[0.67 \cdot 104 \text{ ft}])^{1/7} = 0.311$ $G_{RF} = [1 + (2.7 \cdot 0.311 \cdot (0.849)^{0.5})] / (1.43)^2 = \mathbf{0.867}$

The structure wind pressure (uniformly distributed over WS#1) assuming 40 m/s (90 mph), I equals 1.0 and C_f equals 3.2:

$\text{Wind pressure} = 0.613 \cdot (40 \text{ m/s})^2 \cdot 1.0 \cdot 0.867 \cdot 1.0 \cdot 3.2 = \mathbf{2721 \text{ newtons/m}^2}$
$\text{Wind pressure} = 0.00256 \cdot (90 \text{ mph})^2 \cdot 1.0 \cdot 0.867 \cdot 1.0 \cdot 3.2 = \mathbf{57.53 \text{ psf}}$

Step 3: Determine the wind load structure wind section WS#2.

In the engineer's judgment the large window of the tower presents twice the wind exposure of a normal boxed-type lattice structure. That is, the wind exposure on each side of the window would constitute two tower sections upon which wind pressure would be applied. Therefore, the judgment is made to apply a force coefficient, C_f , of 3.2 to the windward surface on each side of the window (or a single force coefficient of 6.4 to the most windward exposed surface).

Determine k_z , $h = 19.8$ m (65 ft), using the equations:

$$k_z = 2.01 \cdot (19.8 \text{ m}/275 \text{ m})^{(2/9.5)} = \mathbf{1.16}$$

$$k_z = 2.01 \cdot (65 \text{ ft}/900 \text{ ft})^{(2/9.5)} = \mathbf{1.16}$$

$G_{RF} = 0.867$ for the overall structure, thus the structure wind pressure (uniformly distributed over WS #2) assuming 40 m/s (90 mph), I equals 1.0, and a C_f value of 6.4 will be used (double the normal 3.2 value for open lattice structures to account for the two sides of the window effectively independently subjected to wind pressures):

$$\text{Wind pressure} = 0.613 \cdot (40 \text{ m/s})^2 \cdot 1.16 \cdot 0.867 \cdot 1.0 \cdot 6.4 = 6311 \text{ newtons/m}^2$$

$$\text{Wind pressure} = 0.00256 \cdot (90 \text{ mph})^2 \cdot 1.16 \cdot 0.867 \cdot 1.0 \cdot 6.4 = \mathbf{133.44 \text{ psf}}$$

Step 3: Determine the wind load structure wind section WS#3.

Determine k_z , $h = 28.3$ m (93 ft), using the equations:

$$k_z = 2.01 \cdot (28.3 \text{ m}/275 \text{ m})^{(2/9.5)} = \mathbf{1.25}$$

$$k_z = 2.01 \cdot (93 \text{ ft}/900 \text{ ft})^{(2/9.5)} = \mathbf{1.25}$$

$G_{RF} = 0.867$. The structure wind pressure (uniformly distributed over WS #3) assuming 40 m/s (90 mph), I equals 1.0 and C_f equals 3.2:

$$\text{Wind pressure} = 0.613 \cdot (40 \text{ m/s})^2 \cdot 1.25 \cdot 0.867 \cdot 1.0 \cdot 3.2 = 3402 \text{ newtons/m}^2$$

$$\text{Wind pressure} = 0.00256 \cdot (90 \text{ mph})^2 \cdot 1.25 \cdot 0.867 \cdot 1.0 \cdot 3.2 = 71.90 \text{ psf}$$

Step 4: Determine the wind load structure wind section WS#4.

Again, in the engineer's judgment the two groundwire peaks are separated such that they may be considered to be independently subjected to wind pressures, which would result in twice the wind exposure of a normal boxed-type lattice section. That is, the wind exposure on the two peak tower components would double the resulting wind load on the peak section of the tower. Therefore, the judgment is made to apply a force coefficient, C_f , of 3.2 to the windward surface of each peak (or a single force coefficient of 6.4 to the most windward exposed face of the peak section).

For WS#4, determine the uniformly distributed wind load. Determine, $h = 30.5$ m (100 ft), using the equations:

$$k_z = 2.01 \cdot (30.5 \text{ m}/275 \text{ m})^{(2/9.5)} = 1.27$$

$$k_z = 2.01 \cdot (100 \text{ ft}/900 \text{ ft})^{(2/9.5)} = 1.27$$

$G_{RF} = 0.867$. The structure wind pressure (uniformly distributed over WS#4) assuming 40 m/s (90 mph), I equals 1.0 and a C_f value of 6.4 will be used (double the normal 3.2 value for open lattice structures to account for independent wind loading of the two groundwire peaks):

$$\text{Wind pressure} = 0.613 \cdot (40 \text{ m/s})^2 \cdot 1.27 \cdot 0.867 \cdot 1.0 \cdot 6.4 = 6912 \text{ newtons/m}^2$$

$$\text{Wind pressure} = 0.00256 \cdot (90 \text{ mph})^2 \cdot 1.27 \cdot 0.867 \cdot 1.0 \cdot 6.4 = 146.13 \text{ psf}$$

Revised Text

Part: 2 Section: 23 Rule: 230 B CP3454

Also Part:2 Section:25 251 B SC5

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (28) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Fuller, Glaus, Haire, Heald, Jones, Joplin, Kempner, Lacoursiere, Lynch, Ng, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Wong

Negative: (2) Kluge, Freimark

Abstention: (0)

Explanation of Vote:

Freimark (Negative) I applaud Task Force 5.1.11 for their attempt but feel that the submitted change substitutes what has been one alleged point of confusion, the need and application of the k constant, which has been in the NESC since the 1940s, with a new source of confusion. Apparently not everyone understands the purpose (and logic) of the k constant and this causes confusion. Life is not always logical; remember, the Rule 250B criteria dates back to the days of “working loads” and “overload factors” which are no longer the norm.

Regarding the proposed modifications in Rule 230, clearances, the changes are relatively simple and straight forward. However in Section 25 we get a complexity with one loading case (Table 251-1) being used to determine wire tensions and a second loading case (Table 250-1) being used to calculate the non-tension related wind and ice loads on the structure.

If the “k” constant factor has been an issue for more than 60 years, will having two different loading cases for calculating the NESC District structure strength (Rule 250B) simplify anything? This is substituting one “problem” for another set of potential problem; i.e., using the lower Table 250-1 loads for calculating the tension or the higher Table 251-1 loads for calculating the structure loads (where the structure becomes stronger than intended – which is not really a problem regarding public safety).

I prefer to maintain the status quo regarding the NESC loading cases, at least as far as NESC Section 25 is concerned, and keep the “k” constant and other criteria in Rule 250B.

Kluge (Negative) Negative as proposed, but supportable with modification.

As long as the District Loads remain in NESC, this should not be changed. When or if the NESC makes a complete transition to the ASCE load maps, then the "k" factor will automatically disappear.

The supporting reasons are weak. The “k” factor is obsolete but so is the method this proposal intends to change. The district map with which the "k" factor is associated is flawed as was illustrated by the NESC sc5 task force comparison to ASCE 7 concurrent wind and ice maps in the 2007 NESC Preprint.

This change will confuse people who are familiar with the present district load method and contains no significant change to a more technically sound loading methodology.

Revised Text

Part: 2 Section: 24 Rule: 242 C CP3177

Subcommittee Recommendation: Reject

Subcommittee Comment:

Open wire communication is treated as secondary and it may be located above communication cables in the communication space and not above supply conductors.

Vote on Subcommittee Recommendation:

Affirmative: (27) Bingel, Bullinger, Busel, Byrne, Clapp, Clem, Corzine, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Ng, Peters, Schwalm, Shultz, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (1) Berlinger

Explanation of Vote:

Revised Text

Part: 2 Section: 24 Rule: 242 Table 242-1 **CP3299**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Deleted Text

Part: 2 Section: 24 Rule: 242 Table 242-2 **CP3176**

Also Part:2 Section:24 242 Table 242-1 SC5

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (29) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (2) Slavin, Fuller

Explanation of Vote:

Fuller (Abstain) I would also like to understand the change of the 8.7 kV limits, as noted by Mr Slavin in his abstention.

Slavin (Abstain) I fully support the attempt to simplify and consolidate Tables 242-1 and 242-2 for determining the grade of construction. However, I am confused by the change of the “8.7 kV” limits in the corresponding columns and rows to “22 kV” limits. As a result, in several cases, the grades of construction would change. For example, an 8.7 kV (or lower) Cable above a 15 kV Open wire was originally Grade B, but would now be downgraded to Grade C. As another example, a 15 kV Cable above Common or public rights-of-way was originally Grade C, but would now be downgraded to Grade N. It is not apparent that such downgrades are appropriate, and I suggest that either the original 8.7 kV limits be retained to avoid this issue, or that the

higher grade of construction be retained in such cases. In any case, it is not my intention to inhibit the simplification of these tables.

Revised Text

Part: 2 Section: 24 Rule: 242 Tables 242-1, 242-2 **CP3300**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (28) Berlinger, Bingel, Bullinger, Busel, Byrne, Clapp, Clem, Corzine, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Ng, Peters, Schwalm, Shultz, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 25 Rule: 250 B Figure 250-1 **CP3372**

Subcommittee Recommendation: Reject

Subcommittee Comment:

Proposal lack sufficient data to make a decision.

Vote on Subcommittee Recommendation:

Affirmative: (26) Bingel, Bullinger, Busel, Byrne, Clapp, Clem, Corzine, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Lynch, Ng, Peters, Schwalm, Shultz, Soderberg, Jr., Standford, Wong

Negative: (1) Kluge

Abstention: (1) Berlinger

Explanation of Vote:

Fuller (Affirmative) Such a substantial change needs substantial supporting data and discussion before adoption.

Kluge (Negative) Negative as proposed, but supportable with proper modification

I disagree with the subcommittee's basis for rejecting this proposal because of "lacking sufficient data".

The proposed map actually aligns better with current meteorological records of concurrent ice and wind than does the existing District Load map. Clearly, the NESC District Load map is flawed as was illustrated by the NESC subcommittee-5 task force comparison to ASCE 7 concurrent wind and ice maps in the 2007 NESC Preprint. (See NESC 2005 Preprint, Appendix).

My reason for voting to reject is that certain boundaries apparently do not match experience or local data. Discussions at both IEEE and NESC meetings highlighted several local areas where boundaries in this change proposal are not drawn properly.

For example, one correction suggested during NESC subcommittee discussions would be to keep a medium loading district in northern Alabama. This is supported by both local utility experience and the weather data supporting the ASCE ice and wind map. This modification should be made.

A second location of debate was the Washington DC area. Should the heavy loading extend further south? Yet, no one argued that the present medium load district was correct for DC. Therefore, further improvements or adjustments may be in order.

The proposal needs modification by those familiar with the ice and wind occurrences in the change affected areas. Adjustments to the proposed boundaries are welcome. It is through contributions from utilities, ASCE or IEEE and this preprint review process that such specific data could be obtained and considered.

New Text

Part: 2 Section: 25 Rule: 250 C **CP3302**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (25) Berlinger, Bingel, Bullinger, Busel, Byrne, Clapp, Clem, Cooke, Denbrock, Erdle, Freimark, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Peters, Slavin, Soderberg, Jr., Standford, Wong

Negative: (5) Shultz, Fuller, Cotant, Corzine, Burley

Abstention: (1) Schwalm

Explanation of Vote:

Burley (Negative): The special wind definition is vague and does not add any value.

Corzine (Negative) As was modified by SC5, the resulting proposal gave no guidance to the Code user for what action is needed in special wind regions. Also, the reference was removed from Fig. 250-2 as originally proposed.

Cotant (Negative) The proposed note as changed duplicates information that is already contained in Note 4 on each of the Figures 250-2(a) through 250-2 (e). Adding essentially the same information as a Note in the rule itself is unnecessary.

Fuller (Negative) The proposed change in RC3302 does not aid in understanding what is meant by the term Special Wind Region. Original wording in CP3302 seems better.

Kluge (Affirmative) The simpler proposal of the subcommittee is preferred but it does not provide any guidance on what to do. Although we are restricted on providing specific direction in an "note", the following general reference seems appropriate and should be added to this note. Sources of information regarding special wind region can be found in ASCE 7 from local meteorological studies.

The proposed note as change provides no guidance to the user as how to determine wind speeds in Special Wind Regions. Somewhere the user needs to receive guidance to appropriately account for the wind speed anomalies in the Special Wind Regions.

Shultz (Negative) The purpose of this change proposal was to provide guidance to the code user on how to determine wind speeds for loading requirements for those areas designated on the maps in Figures 250-2 (a) through(e) as "special wind regions." The modifications made by Subcommittee 5 to the original proposal strip any useful guidance from it, and the resulting note still leaves the code user wondering how to decide what are appropriate wind speeds for those regions. As a result, the revision serves no purpose

Revised Text

Part: 2 Section: 25 Rule: 250 C **CP3132**

Subcommittee Recommendation: Withdrawn

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (0)

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 25 Rule: 250 C **CP3131**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

New Text

Part: 2 Section: 25 Rule: 250 C Note **CP3303**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (27) Berlinger, Bingel, Bullinger, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Glaus, Guerry, Haire, Harrel, Jones, Kempner, Kluge, Lynch, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (4) Peters, Heald, Fuller, Burley

Abstention: (0)

Explanation of Vote:

Burley and Heald (Negative) The NESC can always be used conservatively. We do not need to repeat these statements for specific situations.

Fuller (Negative) I agree with Mr. Kluges point about being sure the conservative value is really conservative for all applicable ranges of height.

Kluge (Affirmative) I support in principal a proposal to simplify a rule that is an overly complex for many lower voltage applications. James T. Collins, author of CP3303 offers a third alternate means to convert wind speed to pressure. However, NESC does not need three (3) methods to calculate a these factors. NESC intended the tables to be the simpler method. The tables should be further simplified instead of offering a third method.

The short comings of Collin's proposal are:

1. This cannot be a note. It must be a rule if NESC is sanctioning the use of this single factor for kz and GRF for certain applications
2. Three alternate methods to obtain kz and GRF seem excessive (formulas, table values and the single factor proposed by Collins).
3. The single factor Collins proposes is highly conservative. For example, the Tables values are already conservative to the point of discouraging their use entirely.

Please consider the following modified proposal

I support in principal a proposal to simplify a rule that is an overly complex for many lower voltage applications. James T. Collins, author of CP3303 offers a third alternate means to convert wind speed to pressure. However, NESC does not need three (3) methods to calculate a these factors. NESC intended the tables to be the simpler method. The tables should be further simplified instead of offering a third method.

The short comings of Collin's proposal are:

1. This cannot be a note. It must be a rule if NESC is sanctioning the use of this single factor for k_z and GRF for certain applications
2. Three alternate methods to obtain k_z and GRF seem excessive (formulas, table values and the single factor proposed by Collins).
3. The single factor Collins proposes is highly conservative. For example, the Tables values are already conservative to the point of discouraging their use entirely.

Please consider the following modified proposal.

MODIFIED CHANGE PROPOSAL 3303

RULE: 250C

NESC-2007 Pages: 177-192

Replace Rule 250C with the following except Figures 250-2 do not change.

C. Extreme Wind Loading

If no portion of a structure or its support facilities exceed 18 m (60 ft) above ground or water level, the provisions of this rule are not required, except as specified by the addition in Rule 261A1c, 261A2e, or 261A3d. Where a structure or its supported facilities exceed 18 m (60 ft) above ground or water level, the structure and its supported facilities shall be designed to withstand the extreme wind load associated with the Basic Wind Speed, as specified by Figure 250-2. The wind pressures calculated shall be applied to the entire structure and supporting facilities without ice. The following formula shall be used to calculate wind load.

$$Load_{Newtons} = 0.613 \cdot (V_{m/s})^2 \cdot k_z \cdot G_{RF} \cdot I \cdot C_f \cdot A (m^2)$$

$$Load_{pounds} = 0.00256 \cdot (V_{mi/h})^2 \cdot k_z \cdot G_{RF} \cdot I \cdot C_f \cdot A (ft^2)$$

where:

0.613

0.00256 = Velocity-pressure numerical coefficient reflects the mass density of air for the standard atmosphere, i.e., temperature of 15 °C (59 °F) and sea level pressure of 760 mm (29.92 in) of mercury. The numerical coefficient 0.613 metric (0.00256 customary) shall be used except where sufficient climatic data are available to justify the selection of a different value of this factor for a design application.

V = Basic Wind Speed, 3-s gust wind speed in m/s at 10-m (mph at 33-ft) above ground, Figure 250-2

k_z = Velocity-Pressure Exposure Coefficient, as defined in Rule 250C1, ~~Table 250-2~~

G_{RF} = Gust Response Factor, as defined in Rule 250C2

I = Importance Factor, 1.0 for utility structures and their supported facilities

C_f = Force Coefficient (shape factor), as defined in Rule 252B

A = Projected wind area, m² (ft²)

The wind pressure parameters (k_z , V and G_{RF}) are based on open terrain with scattered obstructions (Exposure Category C as defined in ASCE 7-05). Exposure Category C is the basis of the NESC extreme wind criteria. Topographical features such as ridges, hills, and escarpments may increase the wind loads on site-specific structures. A Topographic Factor, K_{zt} , from ASCE 7-05, may be used to account for these special cases. Wire attachment points that are 18 m (60 ft) or less above ground or water level must be considered if the total structure height is greater than 18 m (60 ft) above ground or water.

Wind pressure parameters (k_z , and G_{RF}) shall be determined using the following formulas or from Tables 250-2 and 250-3, if applicable. Tables 250-3 and 250-3 may only be used for structure and wire parameters (k_z , and G_{RF}) within the designated height and span limits.

1. Velocity Pressure Exposure Coefficient, k_z , for $h \leq 275$ ft (Metric)

for structure

$$k_z = 2.01 \cdot (0.67 \cdot h / 275)^{(2/9.5)}$$

for wire, structure location and component:

$$k_z = 2.01 \cdot (0.67 \cdot h / 900)^{(2/9.5)}$$

Velocity Pressure Exposure Coefficient, k_z , for $h \leq 900$ ft (Customary)

for structure

$$k_z = 2.01 \cdot (h / 275)^{(2/9.5)}$$

for wire, structure location and component:

$$k_z = 2.01 \cdot (h / 900)^{(2/9.5)}$$

Velocity Pressure Exposure Coefficient, k_z , for $h > 275$ ft ($h > 900$ ft)

for structure

for wire, structure location and component:

$$k_z = 1.85$$

$$k_z = 2.01$$

Where:

h = Height, m (ft), as defined in Rule 250C4

Minimum, k_z :

$$k_z \geq 0.85$$

2. Gust Response Factor, G_{RF} , for structure, structure location and component:

$$G_{RF} = \frac{1 + 2.7 \cdot E_s \cdot \sqrt{B_s}}{k_v^2}$$

Metric

Customary

$$E_s = 0.346 \cdot (10/0.67 \cdot h)^{1/7}$$

$$E_s = 0.346 \cdot (33/0.67 \cdot h)^{1/7}$$

$$B_s = \frac{1}{1 + 0.375 \cdot h / 67}$$

$$B_s = \frac{1}{1 + 0.375 \cdot h / 220}$$

Gust Response Factor, G_{R} , for wire:

$$G_{RF} = \frac{1 + 2.7 \cdot E_w \cdot \sqrt{B_w}}{k_v^2}$$

Customary

Metric

$$E_w = 0.346 \cdot (10/h)^{1/7}$$

$$E_w = 0.346 \cdot (33/h)^{1/7}$$

$$B_w = \frac{1}{1 + (0.8 \cdot L / 67)}$$

$$B_w = \frac{1}{1 + 0.8 \cdot L / 220}$$

Where:

E_s = Structure Exposure Factor

E_w = Wire Exposure Factor

B_s = Dimensionless response term corresponding to the quasi-static background wind loads on the structure.

B_w = Dimensionless response term corresponding to the quasi-static background wind loads on the structure.

k_v = 1.430

h = Height, m (ft), as defined in Rule 250C4

L = Design wind span, (ft).

The gust response factor, G_{RF} , to be used on components, such as antennas, transformers, etc., shall be the structure gust response factor.

3. Alternatively, values for the product ($k_z \times G_{RF} \times I$) may be used from Tables 250-2 and 250-3 for Structures and Wires, respectively. Use of these tables ~~the general equations~~ is only applicable for structure heights up to 165 ft and wire spans up to 1500 ft. The tables are not applicable when calculating a wind load at a specific structure location or component such as antennas, transformers, etc. where h used to determine k_z is the height to the component and h used to determine G_{FR} is the height of the structure.

Where:

h = Height of structure or wire as defined in Rule 250C4

L = Design wind-span length

I = 1.0 as previously defined for utility applications

Table 250-2

Product of k_z , GRF and I

For Structure

Height		For Structure
(m)	(ft)	$k_z \cdot G_{RF} \cdot I$
≤10	≤33	0.88 ¹
>10 to 15	>33 to 50	0.93 ¹
>15 to 25	>50 to 80	0.99
>25 to 35	>80 to 115	1.03
>35 to 50	>115 to 165	1.07
>50	>165	Use formulas

¹ Structures with a total height of 18 m (60 ft) or less above ground or water level are exempt from Rule 250C.

Table 250-3

For Wires: Product of k_z , G_{RF} and I

Height ¹		Product of ($k_z \cdot G_{RF} \cdot I$) for respective span length (L) ³								
		m	L≤75	75<L≤150	150<L≤225	225<L≤300	300<L≤450	450<L≤600	L>600	
m	ft	ft	L≤100	100<L≤250	250<L≤500	500<L≤750	750<L≤1000	1000<L≤1500	L>1500	
≤10	≤33		0.96 ²	0.93 ²	0.86 ²	0.79 ²	0.75 ²	0.73 ²	Use	
>10 to 15	>33 to 50		1.00 ²	0.96 ²	0.90 ²	0.83 ²	0.80 ²	0.77 ²	Formulas	
>15 to 25	>50 to 80		1.06	1.03	0.96	0.90	0.85	0.83	--	
>25 to 35	>80 to 115		1.12	1.08	1.01	0.95	0.91	0.88	--	
>35 to 50	>115 to 165		1.18	1.14	1.07	1.00	0.96	0.93	--	
>50	>165		Use formulas - - -							

¹ When wires are attached at multiple heights on a single structure, the attachment height associated with each wire may be used for that respective wire, or, the average attachment height for all wires on that structure may be used to determine a single ($I \times k_z \times G_{RF}$) factor for use with all wires.

² Wire attachment points that are 18 m (60 ft) or less above ground or water level must be considered if the total structure height is greater than 18 m (60 ft) above ground or water level.

³ Wire attachment 3

4. Effective Height, h , of Structure, Wire or Significant Component or Attachment,

The height, h , to the center-of-pressure of the wind area as used to determine the velocity pressure exposure coefficient, k_z , and the structure and wire gust response factor, G_{RF} , or for use in Tables 250-2 and 250-3 is based on for the following load applications:

a. Structure: h = height of the structure above ground line

NOTE: In Table 250-2, for $h \leq 75$ m (250 ft), the structure k_z values are adjusted for the wind load to be determined at the center-of-pressure of the structure assumed to be at 0.67 h . The wind pressure is assumed uniformly distributed over the structure face normal to the wind.

b. Wire: h = height of the wire at the structure.

1) The height of the wire at mid-span should be considered, if greater than at the attachment point.

- 2) Wire attachment points that are 18 m (60 ft) or less above ground or water level must be considered if the total structure height is greater than 18 m (60 ft) above ground or water level

NOTE: In special terrain conditions (i.e., mountainous terrain and canyon) where the height of the wire above ground at mid-span may be substantially higher than at the structure, engineering judgment may be used in determining an appropriate value for the height of the wire.

c. Structure location and component:

When calculating a wind load at a specific structure location, the structure gust response factor, G_{RF} , determined using the total structure height, h , shall be used.

For k_z : h = height to the center-of-pressure of the wind area being considered

For G_{RF} : h = height of the structure above ground line

d. Units of measure for (h) is meters for metric and feet for customary.

Additional Comments:

- There appears to be an error in the NESC Table 250-3 (metric and customary) for the structure gust response factors. The values appear to be off by one row relative to the height.
- The information is arranged with formulas (being the primary means to calculate the wind pressure parameters) first followed by the Tables as an alternate method. The factors for “structures” are presented in one table and factors for “wires” in another table. We believe this arrangement is more convenient. Velocity Pressure Exposure Coefficient, Gust Response Factor and Importance Factor are combined into a single coefficient.
- See also CP 3459.

Besides simplifying the tables, this modification also moves the formulas for GRF and KZ into the rule rather than as footnotes in the tables. Tables follow as an alternate method. Collin’s proposed factor could follow that as an additional alternate but I don’t believe that will be necessary if these changes are made.

Peters (Negative) No need to simplify calculations.

Revised Text

Part: 2 Section: 25 Rule: 250 C, Figures 250-2 **CP3448**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Heald, Jones, Kempner, Kluge, Lynch, Pehosh, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 25 Rule: 250 C1, Table 250-2 **CP3459**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (27) Berlinger, Bingel, Bullinger, Burley, Clapp, Clem, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Heald, Jones, Joplin, Kempner, Kluge, Lynch, Ng, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 25 Rule: 250 C2 **CP3301**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (28) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Deleted Text

Part: 2 Section: 25 Rule: 250 D **CP3423**

Also Part:2 Section:25 250 C SC5

Subcommittee Recommendation: Reject

Subcommittee Comment:

The proposal does not increase safety.

Vote on Subcommittee Recommendation:

Affirmative: (24) Bingel, Bullinger, Byrne, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (3) Lynch, Clapp, Burley

Abstention: (3) Glaus, Fuller, Berlinger

Explanation of Vote:

Burley (Negative) It will increase safety.

Clapp (Negative) We have problems with distribution lines coming down due to wind loads only. Extreme wind loads should apply to all structures, regardless of pole height.

Now that distribution pole heights have increased to the 40' -50' range, rather than the 35 ft poles that were in use when the decision was made to exempt distribution poles from extreme wind loading. The wires and cables are at elevated levels and experience the full wind loading. In addition, my experience is that distribution lines are generally loaded to a higher percentage of allowed loading than in earlier years, and the greater diameters of conductors and cables located at higher levels are causing loads from storm winds on base conductors and cables to exceed the old Rule 250B loading.

Every distribution line sections failure I have investigated met Rule 250B loading but was either near to or failed to meet Rule 250C extreme wind requirements.

Fuller (Abstention) It seems that we are gathering compelling evidence that the 60 foot exclusion is not warranted. This at least merits further discussion at future meetings.

Glaus (Abstention) Further consideration is necessary regarding eliminating the 60 ft exclusion, Kz, and Grf.

Joplin (Affirmative) Within the last ten years, NCMEC has not experienced significant failures due to wind only. The majority of pole failures were contributed to debris blown on the lines. Based on our experience, this change proposal would not make a significant impact to improve reliability on distribution lines.

Lynch (Negative) It is time that we bring all overhead line facilities up to modern day standards. The exemption of facilities less than 60 ft from the scientifically based 50 year return period Extreme Wind and Combined Ice and Wind loadings that facilities above 60 ft are required to follow. The argument that all structures that are less than 60 ft that have failed due to wind or ice events were due to flying and falling debris hitting them has been disputed many times, including the report submitted to the Florida PSC regarding Hurricane Wilma and the fact that some 75% of those poles that failed under wind load alone that was under the Rule 250C winds for that region. Further, the concept that a structure will only fail with flying debris and therefore does not need to be designed for an extreme wind condition is flawed; what about structures that are not exposed to flying debris and where rights of ways have been properly maintained to guard against falling debris? Should they not be designed adequately and in the interest of public safety? Not designing all above ground facilities for these extreme wind and combined ice and wind events because they will fail due to external debris is like saying that we should not eat right or exercise because we will all die anyway.

It also does not make sense that we do not require loadings consistent with their expected lifetime; we expect these structures to last for 50 years (or more), yet we only require structures less than 60 ft to be designed for 20 year (more or less) wind and ice events.

It is time that we as professional engineers and leaders in our industry accept this responsibility and begin requiring that shorter structures and lines be designed for these same 50 year events that taller facilities are designed for before public service commissions or other outside organizations mandate that we do proper engineering.

New Text

Part: 2 Section: 25 Rule: 250 D, Figures 250-3 **CP3446**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Heald, Jones, Kempner, Kluge, Lynch, Pehosh, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 25 Rule: 250 Table 251-1 **CP3437**

Also Part:2 Section:23 230 B1 SC4

Part:2 Section:23 230 Figure 230-1 SC4
Part:2 Section:23 230 Table 230-1 SC4
Part:2 Section:23 230 Table 230-2 SC4
Part:2 Section:25 250 B SC5
Part:2 Section:25 250 D SC5
Part:2 Section:25 250 Figure 250-1 SC5
Part:2 Section:25 250 Table 250-1 SC5

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (27) Bingel, Bullinger, Busel, Byrne, Clapp, Clem, Corzine, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Ng, Peters, Schwalm, Shultz, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (1) Berlinger

Explanation of Vote:

New Text

Part: 2 Section: 25 Rule: 251 A2 **CP3133**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (29) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Peters, Shultz, Slavin, Soderberg, Jr., Standford

Negative: (1) Wong

Abstention: (1) Schwalm

Explanation of Vote:

Clapp (affirmative) I recommend adding the following to the existing Note: However, special low-drag construction can reduce the effective force coefficient.

Kluge (Affirmative) There are additional issues with this rule. The present Note is vague. I am not sure I understand what useful information it is providing. Secondly, the note contains a different term "roughness factor" not used in the rule. Is this the same as "force coefficient (shape factor)"?

Rule 013 allows for the regulatory authority to waive or modify a rule, therefore, possibly the proposed exception and the note could be combined with a clearer message.

Wong (Negative) This CP duplicated statement already exists in the Code. It also only addresses the reduction of force coefficient. There are many cases where the force coefficient can be higher than 1.0. Adding this exception gives the wrong impression that bare wire force coefficient will always be less than one, which would not be correct.

New Text

Part: 2 Section: 25 Rule: 251 B2 **CP3304**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (30) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Wong

Negative: (1) Stanford

Abstention: (0)

Explanation of Vote:

Erdle (Affirmative) I voted yes, because I believe this is technically correct. However, I do not believe this needs to be added to the code. Users of the code should know how to calculate projected area. We are moving into the direction of creating a design/instruction manual.

Kluge (Affirmative) Is this truly necessary? This belongs in a NESC commentary. As an alternative, maybe Clapp could add this to his handbook.

Stanford (Negative) The need to add a clarification of “projected area” is not needed. A person holding a technical position certainly should know a basic concept like projected area and how to determine it.

If a definition of “projected area” is needed then it should be in the definitions Section 2. There are four other places in Section 25 where this term is used in relation to wind loading. These sections are 250C (defines factor A used in calculations), 250D3, 251A2 and 252B2c. The term should be in the definitions to cover all instances, including conductors, spacers, cables, equipment and structures.

New Text

Part: 2 Section: 25 Rule: 251 Table 251-1 **CP3145**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (24) Bingel, Bullinger, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Guerry, Haire, Harrel, Jones, Kempner, Kluge, Lynch, Peters, Shultz, Slavin, Stanford, Wong

Negative: (5) Soderberg, Jr., Heald, Glaus, Fuller, Burley

Abstention: (2) Schwalm, Berlinger

Explanation of Vote:

Burley and Heald (Negative) The k constant is only applied to the wires carrying the tension. It is not applied to dead loads (equipment, other wires, aerial marker balls, etc.) that are supported by the wire.

Fuller (Negative) It appears that more discussion is needed about the proper application of the K factor.

Glaus (Negative) Adequate justification was not provided for applying the K factor as specified in the proposed new footnote.

Soderberg (Negative) This is not the proper application of the K factor.

Revised Text

Part: 2 Section: 25 Rule: 252 B2a **CP3305**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Stanford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

New Text

Part: 2 Section: 25 Rule: 252 C1 **CP3306**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 25 Rule: 253 CP3455

Also Part:2 Section:25 253 Table 253-2 SC5

Part:2 Section:26 261 A SC5

Part:2 Section:26 261 B SC5

Part:2 Section:26 261 D SC5

Part:2 Section:26 261 Table 261-1A,1B SC5

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (28) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Heald, Jones, Joplin, Kempner, Kluge, Lynch, Ng, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 25 Rule: 253 Table 253-1 CP3307

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)
Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 25 Rule: 253 Table 253-1 **CP3460**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (30) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Ng, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (1) Heald

Explanation of Vote:

Heald (Abstention) I agree with making any necessary clarifications to the Code. Rule 250C relates to wind loads only and the 0.87 is to be applied to the wind pressure calculated from Rule 250C.

New Text

Part: 2 Section: 25 Rule: 279 A1 **CP3457**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (29) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Ng, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 25 Rule: 279 B1 **CP3456**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (28) Berlinger, Bingel, Bullinger, Burley, Clapp, Clem, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Ng, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

New Text

Part: 2 Section: 26 Rule: 260 A1 **CP3413**

Subcommittee Recommendation: Withdrawn

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (0)

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 26 Rule: 260 B **CP3035**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 26 Rule: 260 B2 **CP3034**

Subcommittee Recommendation: Accept in Principle

Subcommittee Comment:

Recommend SC1 Accept CP3212

Vote on Subcommittee Recommendation:

Affirmative: (29) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Jones, Kempner, Kluge, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (1) Heald

Abstention: (0)

Explanation of Vote:

Heald (Negative) I voted no since 3312 includes conductor in the definition of supported facilities. The intention of the code is that the strength criteria for conductors and insulators be covered under their respective sections and supported facilities referred to components such as line hardware equipment, hangers, switches, and other facilities supported by the structure.

New Text

Part: 2 Section: 26 Rule: 261 A1a Note **CP3308**

Subcommittee Recommendation: Accept as Modified

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

Affirmative: (30) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Clapp and Kluge (Affirmative) The language of the Note can be read to require consideration of buckling. Such requirements must be a part of the code rule, not in a Note. I suggest the language of the note be changed to "buckling stresses may control."

Revised Text

Part: 2 Section: 26 Rule: 261 A1c **CP3309**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (29) Berlinger, Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Kempner, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (1) Kluge

Explanation of Vote:

Kluge (Abstention) The wording adds no additional information. Another example of the NESC becoming a design guide.

Revised Text

Part: 2 Section: 26 Rule: 261 A2a **CP3458**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (28) Berlinger, Bingel, Bullinger, Burley, Clapp, Clem, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Ng, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 26 Rule: 261 A2b(1) **CP3373**

Also Part:2 Section:26 261 A2aException 1 SC5

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (26) Berlinger, Bingel, Bullinger, Burley, Byrne, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Glaus, Harrel, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (4) Heald, Haire, Freimark, Clapp

Abstention: (1) Fuller

Explanation of Vote:

Clapp (Negative) It should include the 55ft adjustment and recognizing conflict over the testing methodology.

Freimark (Negative) For wood poles, the reduction of the allowable fiber stress with height is a real phenomena. Unfortunately the majority opinion of the members of the ANSI-O5.1 committee was to place this information in an Annex for the 2008 revision. It is noted that an annex is for information only and is technically not a part of the approved standard. On that basis, i.e., that the information on the "fiber stress height effect" is not an official part of the ANSI-O5.1, the majority of SC5 has voted to not mention this effect in the Rule, nor to include mention in a Note. I feel that the action of ANSI-O5.1 to relegate the information to an Annex was wrong and that the SC5's proposed action to ignore the effect is also wrong. At the very least, a reference to the "fiber stress height effect" information in the Annex to ANSI-O5.1 should be included in a Note in NESC Rule 261A2b(1).

Fuller (Abstention) The comments made pertaining to the "fiber stress height effect" are of interest. I would rather first hear the opposing view before voting for or against.

Haire (Negative) Based on the discussion of SC 5, ANSI O5.1 2008 Annex A contains data suggesting fiber stress height effect is negated due to manufacturers oversize of poles to meet minimum requirements. This negation is acceptable for poles up to and including 55 foot poles. However, annexes and appendixes are not normative parts of codes and standards, only informative. To remove ambiguity, the Rule 261 A.2.b.1 should included an exemption for poles 55 feet and shorter, or at least, a note identifying the existence of the findings in Annex A of ANSI O5.1.

Additional discussion of the methods used to determine the data supporting the findings of ANSI O5.1 provided significant questions. Rule 261 A.2.b.1 should not include data or cite requirements from a standard until the methods can be properly defended.

Heald (Negative) I am basically in agreement with the CP as modified. My negative vote is based on the fact that this is a change in philosophy was not provided. The philosophy since September 21, 1928 "Discussion of the NESC" to accompany the Fourth Edition of the Code follows: "The strength of a pole is based on ground-line circumferences. This is because of the fact that the ground line, if not originally so, soon becomes 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 or flaring butts the weakest section is initially at some distance above the ground line. However,

even in these poles 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."

Revised Text

Part: 2 Section: 26 Rule: 261 A2b(2) **CP3374**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 26 Rule: 261 A2c, e **CP3371**

Also Part:2 Section:25 250 A, C SC5

Subcommittee Recommendation: Reject

Subcommittee Comment:

The proposal does not increase safety.

Vote on Subcommittee Recommendation:

Affirmative: (23) Bingel, Bullinger, Burley, Byrne, Clem, Corzine, Cotant, Denbrock, Erdle, Freimark, Haire, Heald, Jones, Joplin, Kluge, Lynch, Ng, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (3) Kempner, Fuller, Clapp

Abstention: (1) Berlinger

Explanation of Vote:

Bingel (Affrimative) I voted to reject because more consideration should be given to understanding the impact of this and other proposals addressing loading and the extreme wind 60 foot exclusion. I would reconsider if The following proposals should also be included in further evaluation.

If 250C wind speed is 100mph or less, then 250C does not apply (250C will only apply to coastal areas)

PROPOSED CHANGE

Revise Rule 250C as indicated

C. Extreme wind loading

~~Except as provided below, if no portion of a structure or its supported facilities exceeds 18 m (60 ft) above ground or water level, the provisions of this rule are not required, except as specified in Rule 261A1c, 261A2e, or 261A3d. Where a structure or its supported facilities exceeds 18 m (60 ft) above ground or water level the s~~Structure and its ~~their~~ supported facilities shall be designed to withstand the extreme wind load associated with the Basic Wind Speed, as specified by Figure 250-2. The wind pressures calculated shall be applied to the entire structure and supported facilities without ice. The following formula shall be used to calculate wind load.

Exception: If no portion of a structure or its supported facilities exceeds 18 m (60 ft) above ground or water level, and the Basic Wind Speed, as specified by Figure 250-2 is 100 MPH or less, then the provisions of this rule are not required, except as specified in Rule 261A1c, 261A2e, or 261A3d.

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SUPPORTING COMMENT

This CP acknowledges that the wind does blow at heights that are less than 60 feet above ground level, but only in coastal (hurricane) regions.

Cap wind pressure at 15psf and 22psf, Grade B and C (equates to applying light loading criteria everywhere)

PROPOSED CHANGE

Note: Adapted from CP2766 (developed by WG 5.1.2, chaired by Don Heald) for the 2007 NESC Revision Cycle

Remove the 60 foot exclusion from Grade B and Grade C construction and provide a maximum wind load for Grade B and Grade C construction under 60 feet that is no greater than the current loads for the light loading district. This Change Proposal is based a previously submitted change proposal which provides appropriate load factors for Grade C construction from Grade B construction under 250C wind loads (extreme wind). The proposed changes are shown below:

Table 253-1—Load factors for structures,¹ crossarms, support hardware, guys, foundations, and anchors to be used with the strength factors of Table 261-1A

Load Factors

	Grade B	Grade C	
		At Crossings ⁶	Elsewhere
Rule 250B loads Vertical Loads ³	1.50	1.90 ⁵	1.90 ⁵
Transverse Loads Wind Wire Tensions	2.50 1.65 ²	2.20 1.30 ⁴	1.75 1.30 ⁴
Longitudinal Loads In general At deadends	1.10 1.65 ²	No requirement 1.30 ⁴	No requirement 1.30 ⁴
Rule 250C loads Transverse Load Wind All Other Loads	 1.00 ⁸ 1.00	 0.87 ^{7,9} 1.00	 0.87 ^{7,9} 1.00
Rule 250D loads	1.00	1.00	1.00

8 If no portion of the structure or its supported facilities exceeds 18 m (60 feet) above ground or water level, the wind pressure defined by $0.00256 V^2 k_z G_{RF}$ times the overload factor need not exceed 22.5 psf.

9 If no portion of the structure or its supported facilities exceeds 18 m (60 feet) above ground or water level, the wind pressure defined by $0.00256 V^2 k_z G_{RF}$ times the overload factor need not exceed 15psf.

Additional changes:

The following additional rules need to be changed to accommodate the above change:

- Rule 250C:
250C Extreme Wind Loading
~~If no portion of a structure or its supported facilities exceeds 18 m (60 ft) above ground or water level, the provisions of this rule are not required, except as specified in Rule 261A1c, 261A2e, or 261A3d. Where a structure or its supported facilities exceeds 18 m~~

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~~(60 ft) above ground or water level the s~~Structures and ~~itstheir~~ supported facilities shall be designed to withstand the extreme wind load associated with the Basic Wind Speed, as specified by Figure 250-2. The wind pressures calculated shall be applied to the entire structure and supported facilities without ice. The following formula shall be used to calculate wind load.

- Rule 250C2

2. Gust response factor, GRF

Selected values of the structure and wire gust response factors are tabulated in Table 250-3. The structure gust response factor, GRF, is determined using the total structure height, h . The wire gust response factor is determined using the height of the wire at the structure, h , and the design wind span, L . The structure and wire gust response factors may also be determined using the formulas in Table 250-3. For values of $h > 75$ m (250 ft) and $L > 600$ m (2000 ft) the GRF shall be determined using the formulas in Table 250-3. In special terrain conditions (i.e., mountainous terrain and canyon) where the height of the conductor aboveground at mid-span may be substantially higher than at the attachment point, engineering judgment may be used in determining an appropriate value for the wire GRF. ~~Wire attachment points that are 18 m (60 ft) or less above ground or water level must be considered if the total structure height is greater than 18 m (60 ft) above ground or water.~~

- Rule 261A1c

- c. All structures ~~including those below 18 m (60 ft)~~ shall be designed to withstand, without conductors, the extreme wind load in Rule 250C applied in any direction on the structure.

- Rule 261A1e

- e. All structures ~~including those below 18 m (60 ft)~~ shall be designed to withstand, without conductors, the extreme wind load in Rule 250C applied in any direction on the structure.

SUPPORTING COMMENT

Note: Adapted from CP2766 for the 2007 NESC Revision Cycle

Define the problem: For the 2007 NESC revision cycle, Subcommittee 5 established task force 5.1.2 of working group 5.1 to revisit the 60-foot height limit for extreme winds in the 2002 NESC. Rule 250C, Extreme Wind Loading, states:

“If no portion of a structure or its supported facilities exceeds 60 ft. above ground or water level, the provisions of this rule (Extreme Wind Loading) are not required, except as specified in Rule 261A1c or Rule 261A2e.”

Subcommittee 5 established the working group to make a recommendation concerning the disposition of the 60-foot exclusion limit.

History: The ‘60-foot exclusion’ was added in the 1977 edition of the NESC at the same time when the extreme winds (50 year) were added. Extreme winds were added primarily for instances of conductors over .9 inch in diameter used on transmission. Thus, whenever the conductor diameter exceeded .9 inch, the extreme wind case could possibly dictate the governing transverse load within the heavy loading district. This additional loading case enhanced the structure safety under transverse loads, particularly on EHV lines where large diameter conductors are being employed. The 60-ft exclusion limit was added primarily so distribution lines need only meet Light, Medium, and Heavy District loads requirements and to keep line design simple but safe.

Summary of comments to CP 2151 for the 1997 NESC: This change proposal was to remove the 60 ft exclusion from Rule 250C. Comments from the public and from members of Subcommittee 5 seemed to indicate that removal of the 60 ft. exemption would not necessarily increase safety and reliability. During extreme wind events, debris is blown into overhead line facilities (especially those under 60 ft), which has a more dramatic affect on the line than does the extreme wind event. Removal of this exemption ignores this problem while imposing a possible costly solution. Darr of Virginia Power, further explained ‘...how unnecessary it is to require extreme wind load calculations for structures of low height that are typically shielded by buildings and trees. Multi-pole structures and structures above 60 ft. in height are much more likely to be affected by high wind loads and should be covered by this Rule. The combined ice and wind loads for each conductor plus the required overload factors provide the protection required to the public and utility workers.’ The change proposal to remove the 60 exclusion was eventually voted down.

Task force 5.1.2: The task force discussed two options: 1) do not require high wind for structures below 60 feet and Grade C construction, or 2) to require high wind but at a reduced amount for structures below 60 feet and Grade C construction. The task force decided on option 2.

The task force debated as to what this designated maximum wind load should be for structures under 60 feet. The Saffir-Simpson Hurricane Scale and the Fujita Tornado Damage scale were reviewed to help determine a designated wind load at which point debris and objects are blown into the line. The task force realizes that this is only a rough estimate.

These two scales seem to indicate that the wind speed that debris and trees would blow into the line or fall on the line happens between 75 mph and 110 mph for hurricane loads and 73 to 112 for tornado loads. If one considers that the hurricane scale closely approximates the fastest mile wind, the wind load (fastest mile) would be between 13.7psf and 32 psf.

Because the range of the wind load is considerable, the task force decided to calibrate the maximum load using existing requirements associated with the Light Loading District. Existing Light Loading District Loads for Grade C is the product of the load factor of 1.75 load factor and 9 psf (2002 NESC, Table 253-1) and the load factor of 2 and 9 psf (2002 NESC, Table 253-2). The load in the Light Loading district is between 15.8 for Table 253-1 and 18 psf for Table 253-2.

The task force decided to designate 15 psf as the maximum load as defined by $0.00256 V^2 k_z G_{RF}$ for structures and facilities under 60 feet that need to be taken into account. This 15 psf wind becomes 16.1 psf and 17.4 psf when considering the $k_z G_{RF}$ factor for spans less than 250 ft and between 250 and 500 ft., typical spans one might find for lines under 60 feet in height. The wind velocity for these loads is approximately 80 mph, within the range of 73 mph and 110 mph.

The task force considered maximum load limits for Grade B construction under 60 feet. For Grade B construction, the task force decided to designate 22.5 psf as the maximum load as defined by $0.00256 V^2 k_z G_{RF}$ for structures and facilities under 60 feet that need to be taken into account. This maximum load approximately corresponds to a Category 2 hurricane. The task force recognizes that there exists an inconsistency in relative strengths between Grade B and Grade C for structures under 60 feet when considering extreme winds.

The Saffir-Simpson Hurricane Scale

<http://www.nhc.noaa.gov/aboutsshs.shtml>

The Saffir-Simpson Hurricane Scale is a 1-5 rating based on the hurricane's present intensity. This is used to give an estimate of the potential property damage and flooding expected along the coast from a hurricane landfall. Wind speed is the determining factor in the scale, as storm surge values are highly dependent on the slope of the continental shelf in the landfall region. Note that all winds are using the U.S. 1-minute average.

Category One Hurricane:

Winds 74-95 mph (64-82 kt or 119-153 km/hr). Storm surge generally 4-5 ft above normal. No real damage to building structures. Damage primarily to unanchored mobile homes, shrubbery, and trees. Some damage to poorly constructed signs. Also, some coastal road flooding and minor pier damage. Hurricanes [Allison](#) of 1995 and [Danny](#) of 1997 were Category One hurricanes at peak intensity.

Category Two Hurricane:

Winds 96-110 mph (83-95 kt or 154-177 km/hr). Storm surge generally 6-8 feet above normal. Some roofing material, door, and window damage of buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Coastal and low-lying escape routes flood 2-4 hours before arrival of the hurricane center. Small craft in unprotected anchorages break moorings. [Hurricane Bonnie](#) of 1998 was a Category Two hurricane when it hit the North Carolina coast, while [Hurricane Georges](#) of 1998 was a Category Two Hurricane when it hit the Florida Keys and the Mississippi Gulf Coast.

Category Three Hurricane:

Winds 111-130 mph (96-113 kt or 178-209 km/hr). Storm surge generally 9-12 ft above normal. Some structural damage to small residences and utility buildings with a minor amount of curtain wall failures. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane. Flooding near the coast destroys smaller structures with larger structures damaged by battering from floating debris. Terrain continuously lower than 5 ft above mean sea level may be flooded inland 8 miles (13 km) or more. Evacuation

of low-lying residences with several blocks of the shoreline may be required. Hurricanes [Roxanne](#) of 1995 and [Fran](#) of 1996 were Category Three hurricanes at landfall on the Yucatan Peninsula of Mexico and in North Carolina, respectively.

Category Four Hurricane:

Winds 131-155 mph (114-135 kt or 210-249 km/hr). Storm surge generally 13-18 ft above normal. More extensive curtain wall failures with some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. Complete destruction of mobile homes. Extensive damage to doors and windows. Low-lying escape routes may be cut by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of structures near the shore. Terrain lower than 10 ft above sea level may be flooded requiring massive evacuation of residential areas as far inland as 6 miles (10 km). [Hurricane Luis](#) of 1995 was a Category Four hurricane while moving over the Leeward Islands. Hurricanes [Felix](#) and [Opal](#) of 1995 also reached Category Four status at peak intensity.

Category Five Hurricane:

Winds greater than 155 mph (135 kt or 249 km/hr). Storm surge generally greater than 18 ft above normal. Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Low-lying escape routes are cut by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of all structures located less than 15 ft above sea level and within 500 yards of the shoreline. Massive evacuation of residential areas on low ground within 5-10 miles (8-16 km) of the shoreline may be required. [Hurricane Mitch](#) of 1998 was a Category Five hurricane at peak intensity over the western Caribbean. [Hurricane Gilbert](#) of 1988 was a Category Five hurricane at peak intensity and is one of the strongest Atlantic tropical cyclone of record.

Fujita Tornado Damage Scale

Developed in 1971 by T. Theodore Fujita of the University of Chicago

www.spc.noaa.gov/faq/tornado/f-scal.html

SCALE	WIND ESTIMATE *** (MPH)	TYPICAL DAMAGE
F0	< 73	Light damage . Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage . Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.

F2	113-157	<u>Considerable damage.</u> Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	<u>Severe damage.</u> Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	<u>Devastating damage.</u> Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.
F5	261-318	<u>Incredible damage.</u> Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yds); trees debarked; incredible phenomena will occur.

***** IMPORTANT NOTE ABOUT F-SCALE WINDS:** Do not use F-scale winds literally. These precise wind speed numbers are actually guesses and have never been scientifically verified. Different wind speeds may cause similar-looking damage from place to place -- even from building to building. *Without a thorough engineering analysis of tornado damage in any event, the actual wind speeds needed to cause that damage are unknown.*

Clapp (Negative) We have problems with distribution lines coming down due to wind loads only. Extreme wind loads should apply to all structures, regardless of pole height.

Now that distribution pole heights have increased to the 40' -50' range, rather than the 35 poles that were in use when the decision was made to exempt distribution poles from extreme wind loading. The wires and cables are at elevated levels and experience the full wind loading. In addition, my experience is that distribution lines are generally loaded to a higher percentage of allowed loading than in earlier years, and the greater diameters of conductors and cables located at higher levels are causing loads from storm winds on base conductors and cables to exceed the old Rule 250B loading.

Every distribution line sections failure I have investigated met Rule 250B loading but was either near to or failed to meet Rule 250C extreme wind requirements.

Cotant (Affirmative) The proposal as written will eliminate the "60 foot exemption" in areas of the country where experience does not support such elimination. The evidence presented in support of the proposal fails to provide any root cause analysis of structure failures purported to be caused by extreme wind loading, and no evidence of failures due to extreme ice with concurrent wind loading was offered. I am not convinced that the modes of failure that occur during wind storms point to a need to make Code changes that would lead to an increase in the likelihood of survival of structures and supported facilities during such events. My experience is that faults/failures affecting safety and causing outages are predominantly due to contact by foreign objects, primarily sustained faults due to conductor contact or broken conductors due to fall-through contacts by vegetation, sometimes also causing structure and/or supported facility failure or damage. This proposal would impose an unnecessary design burden on designers of distribution facilities that is unlikely to provide a corresponding improvement in structure survival and safety performance. There may be wisdom in eliminating the "60 foot exemption" on a limited basis, such as coastal areas subjected to Atlantic hurricanes, and possibly only for Grade B construction for structures supporting supply conductors over 750 volts.

Fuller (Negative) Clearly there is much left to discuss about this issue, and whether the wording achieves the desired results. I vote Negative in an effort to keep this issue on the table.

Joplin (Affirmative) Within the last ten years, NCMEC has not experienced significant failures due to wind only. The majority of pole failures were contributed to debris blown on the lines. Based on our experience, this change proposal would not make a significant impact to improve reliability on distribution lines.

Kempner (Negative) I voted "negative" to reject this CP3371 because I disagree with the stated reason for rejection "does not increase safety." There is evidence that structures with heights of 60 feet or less fail during extreme wind events. These failures are NOT caused by flying debris, but by wind only. For the NESC to require a higher strength design of these structures, 60 feet and below, directly improves the safety to the public that the NESC is charged to protect. Recent hurricane events have demonstrated the importance of the power system to our society. The report by KEMA (Technical Report, Post Hurricane Wilma Engineering Analysis, Final Report, KEMA Project 05-349, January 12th, 2006) documents the failure of electric power towers/poles to wind only. To state that there is no increase in safety with the removal of a 60 foot limit is not correct. Failure of electric power systems and the extended time to restore power systems after a major wind storm event directly effects the safety of the public.

Kluge (Affirmative) I do not agree with the reason the subcommittee gave for rejecting this proposal. When conductor sizes increase or telephone cables are over-lashed, the district load may not provide sufficient load requirements. This was recognized by transmission companies when their conductor diameter became larger (>1.0").

I voted to reject because the proposal is not the best way to address this issue.

I would like to see this change modified where the exemption in Rule 250C is maintained and instead a minimum wind load without ice would be added to Rule 250B (District Loads). The wind speed proposed in this CP should be converted to a pressure = 7.2 psf for use in Table 250

as a minimum wind load without ice.

People are suggesting that structure <60ft tall are not designed to any wind load. Such is not the case. Adding a reasonable wind without ice load in Rule 250 B (for medium and heavy load districts) would possibly resolve that accusation.

The load (7.2 psf) suggested above would only apply to wires with diameters larger than 0.625 inches for medium load districts and 1.25 inches for heavy load districts. Light load district already has a wind without ice loading case and would not be affected.

Revised Text

Part: 2 Section: 26 Rule: 261 A2e **CP3310**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

New Text

Part: 2 Section: 26 Rule: 261 A3a Note **CP3311**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (30) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 26 Rule: 261 A3d **CP3312**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

New Text

Part: 2 Section: 26 Rule: 261 B **CP3351**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

New Text

Part: 2 Section: 26 Rule: 261 H1 **CP3005**

Subcommittee Recommendation: Reject

Subcommittee Comment:

The proposed limits are to restrictive.

Vote on Subcommittee Recommendation:

Affirmative: (25) Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Corzine, Cotant, Denbrock, Erdle, Freimark, Glaus, Haire, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Schwalm,

Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (3) Heald, Fuller, Berlinger

Explanation of Vote:

Erdle (Affirmative) I voted to reject this proposal, but I believe it is the right approach to reduce problems with Aeolian Vibration. The H/W limits appear to be low based upon experience. Also, this proposal does not take into account the terrain categories in the CIGRE paper. The most conservative values for terrain were used which will penalize many users.

Fuller (Abstention) I am not familiar enough with the technical details to comment on this proposal

Heald (Abstention) I abstain because : (1) the trigger point appears to be to low and (2) I have not reviewed the CIGRE Task Force paper and the EPRI transmission line reference book Wind - Induced Conductor Motion Final Report, Nov. 2006

Revised Text

Part: 2 Section: 26 Rule: 261 H1 **CP3449**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (20) Bingel, Bullinger, Burley, Byrne, Clapp, Corzine, Cotant, Denbrock, Freimark, Glaus, Jones, Kempner, Kluge, Lynch, Ng, Pehosh, Shultz, Slavin, Standford, Wong

Negative: (8) Joplin, Heald, Haire, Fuller, Erdle, Clem, Soderberg, Jr., Schwalm

Abstention: (1) Berlinger

Explanation of Vote:

Clem (Negative) It is inappropriate to proceed with this without reviewing the impact on accepted practice that has yielded good results.

Erdle (Negative) This proposal was submitted in committee, after CP3005 which was intended to reduce Aeolian Vibration was rejected. CP3005 allowed higher tensions if vibration mitigation devices (dampers) were considered. CP3449 does not allow the user to use dampers to mitigate vibration.

There is still a note in this section that refers to Aeolian Vibration. This should be enough to allow the users to base tensions on experience in their geographic areas.

Fuller (Negative) I agree with other comments that we need to be certain we understand the

impact of changing the values.

Haire (Negative) The change proposed in SC5CP3 was proposed at the committee meeting and did not provide adequate time or resources to study the impact on the existing construction. Existing construction practices are not producing vibration in either transmission or distribution.

Heald (Negative) This rule should refer to Table 251-1 for the temperature of the conductor at initial unloaded tension and final unloaded tensions. It is confusing say “250B loads without external loads”. Section 250 (and Table 250-1) pertains to loading requirements Section 251 deals with conductor loading. As long as Table 251-1 exists Rule 261H1.b should refer to this Table.

Joplin (Negative) We are presently unsure the impact of the tensions at reduced temperatures on our construction policies and we have not experienced extensive damaged due to aeolian vibration.

Schwalm (Negative) I do not think there is sufficient, reliable data to support this change and maintain safety.

Soderberg (Negative) In the heavy loading district the temperature has changed from 60 degrees F to O degrees F. I did not want to vote accept without knowing how this change will affect tensions.

Revised Text

Part: 2 Section: 26 Rule: 261 H1a **CP3313**

Subcommittee Recommendation: Accept in Principle

Subcommittee Comment:

See CP3036

Vote on Subcommittee Recommendation:

Affirmative: (30) Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (1) Berlinger

Explanation of Vote:

New Text

Part: 2 Section: 26 Rule: 261 H1a **CP3036**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (30) Bingel, Bullinger, Burley, Busel, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Guerry, Haire, Harrel, Heald, Jones, Kempner, Kluge, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (1) Berlinger

Explanation of Vote:

Revised Text

Part: 2 Section: 26 Rule: 261 K1 **CP3179**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 26 Rule: 261 N **CP3318**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 26 Rule: 261 Table 261-1A **CP3317**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 26 Rule: 261 Table 261-1A **CP3316**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 26 Rule: 261 Table 261-1A **CP3315**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)
Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 26 Rule: 261 Table 261-1A **CP3439**

Subcommittee Recommendation: Reject

Subcommittee Comment:

The proposed strength factors are not justified in the proposal. Refer to working group to address foundation issues for future changes.

Working group - To prepare appropriate changes for foundation

Peters - Chair
Kempner and associate
Bingel and associate
Jurgenmeyer

Vote on Subcommittee Recommendation:

Affirmative: (29) Bingel, Bullinger, Burley, Byrne, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (1) Clapp

Abstention: (1) Berlinger

Explanation of Vote:

Clapp (Negative) We are experiencing line failures as a result of inadequate support of large class poles by the earth. While I agree that this proposal may require large factors for foundations for which tests are not performed, I think that large factors need to be applied where soil tests are not performed. The reaction capability of different soils vary too widely to use a factor of 1.00. See the rationale for the proposal. I support formation of a working group.

Deleted Text

Part: 2 Section: 26 Rule: 261 Table 261-1A **CP3118**

Also Part:2 Section:25 253 Table 253-1 SC5

Subcommittee Recommendation: Reject

Subcommittee Comment:

Unjustified penalty for Grade C wood poles.

Vote on Subcommittee Recommendation:

Affirmative: (25) Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Glaus, Guerry, Haire, Harrel, Jones, Kempner, Kluge, Peters, Schwalm, Shultz, Soderberg, Jr., Standford, Wong

Negative: (4) Slavin, Lynch, Heald, Busel

Abstention: (2) Fuller, Berlinger

Explanation of Vote:

Busel (Negative) ACMA believes that any variability between Grade B and Grade C Construction should be reflected in the Load Factors of Table 253-1, and not in the Strength Factors of Table 261-1A. In addition, having a single and separate Strength Factor for each pole material would allow for an easier transition to the use of Reliability-Based Design concepts in future editions of the NESC.

Fuller (Abstention) I need to hear both sides of this argument, rather than just the negative votes.

Heald (Negative) I basically agree with the CP in principal. Factors for Grade B need to be adjusted. I recognize there will be a slight hardening of Grade C construction. Grade B load factors need to be adjusted to prevent Grade B from basically being softened.

Lynch (Negative) The changes proposed in CP3118 only affect the politically based District Loadings (Rule 250B) and their subsequent analysis. The scientifically developed and engineering based Reliability Loadings (Rules 250C and 250D) and their subsequent analysis - assuming they were used to design the structures - are unaffected by this CP and thus the realistic performance and reliability of those structures under this CP would not be affected. In the case of wood structures less than 60 ft above ground when the loophole to ignore Rules 250C and 250D for satisfactory performance is used, smaller poles or longer spans could have been used for Grade B construction due to the decrease in the Vertical Load Factor and the increase in the corresponding Strength Factor. As it is often insisted by some that structures less than 60 ft above grade do not need to have any reliability since vegetation always takes them down, this could make the poles even smaller and save utilities even more money over the existing requirements.

This CP would have been a good compromise in attempting to bring the NESC into better correlation with commonly accepted structural engineering practices and I am disappointed that this effort to make this compromise was not more seriously considered.

Slavin (Negative) See original Supporting Comments.

Revised Text

Part: 2 Section: 26 Rule: 261 Table 261-1A

CP3178

Subcommittee Recommendation: Accept in Principle

Subcommittee Comment:

See CP3317

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 26 Rule: 261 Table 261-1A, 261-1B **CP3314**

Subcommittee Recommendation: Accept

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 27 Rule: 277 277 & Table 277 **CP3142**

Subcommittee Recommendation: Withdrawn

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (0)

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 27 Rule: 277 Table 277-1 **CP3411**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Revised Text

Part: 2 Section: 27 Rule: 277 Table 277-1 **CP3319**

Subcommittee Recommendation: Accept in Principle

Subcommittee Comment:

See CP3411

Vote on Subcommittee Recommendation:

Affirmative: (30) Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine, Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Standford, Wong

Negative: (0)

Abstention: (1) Berlinger

Explanation of Vote:

Revised Text

Part: 2 Section: 27 Rule: 279 A2b **CP3180**

Subcommittee Recommendation: Accept as Modified

Subcommittee Comment:

Vote on Subcommittee Recommendation:

Affirmative: (31) Berlinger, Bingel, Bullinger, Burley, Byrne, Clapp, Clem, Cooke, Corzine,

Cotant, Denbrock, Erdle, Freimark, Fuller, Glaus, Haire, Harrel, Heald, Jones, Joplin, Kempner, Kluge, Lacoursiere, Lynch, Peters, Schwalm, Shultz, Slavin, Soderberg, Jr., Stanford, Wong

Negative: (0)

Abstention: (0)

Explanation of Vote:

Meeting Conclusion:

Task Force 5.1.12

Limits for general guidance in Rule 260.

Peters (Chair)

Lacoursiere

Troutman

Lynch

Bingel

Task Force 5.1.13

Clarification Rules 251 and 252.

Bingel (chair)

Kempner

Stanford

Cantrell

Soderberg

Freimark

Wong

Slavin

Task Force 5.1.14

To prepare a CP for corrosion of metallic structure.

Bingel (Chair)

Erdle

Cantrell

Freimark

Task Force 5.1.15

Separation of importance factors from load factors and strength factors

Clapp (Chair)

Bingel

Lynch

Wong

Agnew

Erdle

Lacoursier

Aichinger
Rollins