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 Meeting Minutes

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NESC SUBCOMMITTEE 8  
 WORK RULES  
 02 Oct, 2003 - 03 Oct, 2003  
 IEEE, Piscataway, NJ

Name	Voting	Organization	10/02	10/3
Robert W Baird (Alternate)	N	IEC	A	A
Frederick Brooks (principal)	Y	NSPE	X	A
Kenneth Brubaker (principal)	Y	NRECA	X	X
John F Doering (principal)	Y	self	X	X
Maury Dunn (Alternate)	N	EEI	A	A
Brian Erga (principal)	Y	NWPPA	A	A
Robert A Fass (Principal)	Y	EEI	X	X
Charles W Grose (principal)	Y	Self	X	X
Dennis Henry (principal)	Y	ATIS	X	X
Ed Hunt (principal)	Y	WAPA	X	X
Henry J Kientz (principal)	Y	Self	X	X
Brent McKinney (Principal)	Y	APPA	X	X
J. David Mitchell (Principal)	Y	IEEE/PES/T&D	X	X
David J Nagy (Alternate)	N	SEEX	X	X
Stephen Poholski (Principal)	Y	NECA	X	X
Thomas Ryder (Principal)	N	EIA	A	A
Lawrence Schweitzer (Principal)	Y	IEEE	X	X
James Spadafore (Principal)	Y	EEI	X	X
Samuel Stonerock (Alternate)	N	EEI	X	X
Steven Theis (Principal)	Y	NUCA	X	X
James R Tomaseski (Principal)	Y	IBEW	X	X
Gene Tootle (Principal)	Y	SEEX	X	X
James C Tuggle (Alternate)	Y	IEC	A	A
Thomas Verdecchio (Alternate)	N	IEEE	X	X
David M Wallis (principal)	N	OSHA	X	X
William C Weintritt (Alternate)	N	AEIC	X	X
Jeffery A White (Principal)	Y	AEIC	X	X
Chuck Woodings (principal)	Y	IEC	A	A
<b>Guest</b>				
O.C. Amrhym			A	X
William Ash		IEEE	X	X
Chuck Kelly		EEI	X	X
Lawrence M Slavin		ATIS	A	A

Sue Vogel

IEEE

X X

**X - Present A - Absent****Chair:** James Tomaseski **Secretary:** David Mitchell**Notes:** CP 2825 Rule 444 D was a new CP submitted at the meeting by the Subcommittee.

SC8 discussed the outcome of IR522 and concluded that no action was necessary by the subcommittee.

January 2004 Meeting

A Subcommittee 8 meeting was held on January 13 and 14 2004 to address the work submitted by each working group, which include CP 2640, CP 2814, CP2815, CP 2525, CP 2524, CP 2818, and CP 2820.

For CP2564 refer to CP2640

For CP2562, CP2563, CP2627, CP2628, CP2816 and CP2817 refer to CP2818 and CP2820.

**Revised Text**

Table of Contents

**CP2641****Subcommittee Recommendation:** Accept in principle**Subcommittee Comment:**

Accept the modifications in CP 2641 and add a definition

**Vote on Subcommittee Recommendation:****Affirmative:** (18) Brooks, Brubaker, Doering, Erga, Fass, Grose, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White**Negative:** (1) Henry**Abstention:** (0)**Explanation of Vote:**

Dennis Henry: Present wording is adequate and conveys the intent of the rule.

**Revised Text**

Part: 4 Section: 41

Rule: 410 A2

**CP2640****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:****Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings**Negative:** (1) Doering**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons' Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

**C. Vehicular and Mechanical Equipment in Transit**

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c. If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the

grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

\_\_\_\_\_ Limited Approach Distance To Exposed Energized Parts \_\_\_\_\_  
 \_\_\_\_\_ (See Rule 448 in its entirety.) \_\_\_\_\_

Nominal System \_\_\_\_\_ Limited Approach Boundaries \_\_\_\_\_  
 Voltage Range, \_\_\_\_\_ Distance From Person To \_\_\_\_\_ Distance From Long  
 Phase to Phase \_\_\_\_\_ Exposed Energized Circuit \_\_\_\_\_ Conductive Object  
 \_\_\_\_\_ Part1 \_\_\_\_\_ (In Contact With Person)  
 \_\_\_\_\_ To Exposed Energized Part

Column 1	Column 2	Column 3
0 to 50 Volts	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m
301 to 750 Volts	3 ft 6 in	1.07 m
751 Volts to 15 kV	5 ft 0 in	1.53 m
15.1 kV to 36 kV	6 ft 0 in	1.83 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m
138 kV to 145 kV	10 ft 0 in	3.05 m
161 kV to 169 kV	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m
765 kV to 800 kV	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

- (1) For voltages to ground 50 kV or below B 10 ft.
- (2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA`s 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

**New Text**

Part: 4 Section: 41

Rule: 410 C3

**CP2502**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

More processes other than directional boring are subject to Rule 410C1 and 2.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)  
**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 41  
Rule: 411 B

**CP2813**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

Add reference to ASTM F1796, Standard Specification for High Voltage Detectors--Part 1 Capacitive Type to be Used for Voltages Exceeding 600V AC into Section 3, References.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)  
**Abstention:** (0)

**Explanation of Vote:**

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**New Text**

Part: 4 Section: 41  
Rule: 411 B

**CP2814**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Refer to WG 8.10

January 14, 2004

Subcommittee deemed the addition was unnecessary. The original motion of rejection will stand.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (20) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White, Woodings

**Negative:** (0)  
**Abstention:** (0)

**Explanation of Vote:**

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**New Text**

Part: 4 Section: 42  
Rule: 420 B

**CP2503**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

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

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#### **Revised Text**

Part: 4 Section: 42

Rule: 420 B1

**CP2640**

**Subcommittee Recommendation:** Reject

#### **Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

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

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

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

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

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c.If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

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751 Volts to 15 kV	5 ft 0 in / 1.53 m	10 ft 0 in / 3.05 m
15.1 kV to 36 kV	6 ft 0 in / 1.83 m	10 ft 0 in / 3.05 m
36.1 kV to 46 kV	8 ft 0 in / 2.44 m	10 ft 0 in / 3.05 m
46.1 kV to 72.5 kV	8 ft 0 in / 2.44 m	10 ft 0 in / 3.05 m
72.6 kV to 121 kV	8 ft 0 in / 2.44 m	10 ft 8 in / 3.26 m
138 kV to 145 kV	10 ft 0 in / 3.05 m	11 ft 0 in / 3.36 m
161 kV to 169 kV	11 ft 8 in / 3.56 m	11 ft 8 in / 3.56 m
230 kV to 242 kV	13 ft 0 in / 3.97 m	13 ft 0 in / 3.97 m
345 kV to 362 kV	15 ft 4 in / 4.68 m	15 ft 4 in / 4.68 m
500 kV to 550 kV	19 ft 0 in / 5.80 m	19 ft 0 in / 5.80 m
765 kV to 800 kV	23 ft 9 in / 7.24 m	23 ft 9 in / 7.24 in

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

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### **Revised Text**

Part: 4 Section: 42

Rule: 420 B3

### **CP2640**

**Subcommittee Recommendation:** Reject

### **Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

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

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

### **Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

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Table 448-1

Limited Approach Distance To Exposed Energized Parts					
(See Rule 448 in its entirety.)					
Nominal System		Limited Approach Boundaries			
Voltage Range,	Distance From Person To	Distance From Long		Distance From Long	
Phase to Phase	Exposed Energized Circuit	Exposed Energized Circuit		Conductive Object	
	Part1	(In Contact With Person)			
		To Exposed Energized Part			
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified
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#### **Revised Text**

Part: 4 Section: 42

Rule: 420 C1

#### **CP2640**

**Subcommittee Recommendation:** Reject

#### **Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

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

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

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

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed

by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons’ Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter’s satisfaction (see rule 421C).

C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a.If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b.If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c.If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

_____ Limited Approach Distance To Exposed Energized Parts _____			
_____ (See Rule 448 in its entirety.) _____			
Nominal System _____	_____ Limited Approach Boundaries _____		
Voltage Range, _____	Distance From Person To _____	Distance From Long _____	
Phase to Phase _____	Exposed Energized Circuit _____	Conductive Object _____	
_____	Part1 _____	(In Contact With Person) _____	
_____	_____ To Exposed Energized Part _____		

Column 1	Column 2	Column 3
0 to 50 Volts	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m
301 to 750 Volts	3 ft 6 in	1.07 m
751 Volts to 15 kV	5 ft 0 in	1.53 m
15.1 kV to 36 kV	6 ft 0 in	1.83 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m
121 kV to 145 kV	10 ft 0 in	3.05 m
145 kV to 161 kV	11 ft 8 in	3.56 m
161 kV to 169 kV	11 ft 8 in	3.56 m
169 kV to 230 kV	13 ft 0 in	3.97 m
230 kV to 242 kV	13 ft 0 in	3.97 m
242 kV to 345 kV	15 ft 4 in	4.68 m
345 kV to 362 kV	15 ft 4 in	4.68 m
362 kV to 500 kV	19 ft 0 in	5.80 m
500 kV to 550 kV	19 ft 0 in	5.80 m
550 kV to 765 kV	23 ft 9 in	7.24 m
765 kV to 800 kV	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

- (1) For voltages to ground 50 kV or below B 10 ft.
- (2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA`s 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

**Revised Text**

Part: 4 Section: 42

Rule: 420 C4

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for

unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

**New Definition: limited approach boundary.** An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons.  
**New Rule: 448. Limited Approach Boundary.** The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

**A. Unqualified Persons' Limited Approach Boundary.** All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

**B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons.** Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

**Exception:** Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

### C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c. If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts				
(See Rule 448 in its entirety.)				
Nominal System		Limited Approach Boundaries		
Voltage Range,	Distance From Person To	Distance From Long		
Phase to Phase	Exposed Energized Circuit	Conductive Object		
Part1		(In Contact With Person)		
To Exposed Energized Part				
Column 1	Column 2	Column 3		
0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m
15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in	3.05 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
138 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36.m
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 in

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

- (1) For voltages to ground 50 kV or below B 10 ft.
- (2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA`s 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

**Revised Text**

Part: 4 Section: 42

Rule: 420 C6

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

### **Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons' Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

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1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c. If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that

provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts				
(See Rule 448 in its entirety.)				
Nominal System	Limited Approach Boundaries			
Voltage Range,	Distance From Person To	Distance From Long		
Phase to Phase	Exposed Energized Circuit	Conductive Object		
	Part1	(In Contact With Person)		
	To Exposed Energized Part			
Column 1	Column 2	Column 3		
0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m
15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in	3.05 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
138 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

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**Revised Text**

Part: 4 Section: 42

Rule: 420 D

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

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Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

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3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts \_\_\_\_\_  
 \_\_\_\_\_ (See Rule 448 in its entirety.)

Nominal System Voltage Range, Phase to Phase _____	Limited Approach Boundaries		
	Distance From Person To Exposed Energized Circuit Part1 _____	Distance From Long Conductive Object (In Contact With Person) To Exposed Energized Part _____	Distance From Long Conductive Object (In Contact With Person) To Exposed Energized Part _____
Column 1 _____	Column 2 _____	Column 3 _____	Column 3 _____
0 to 50 Volts _____	Not Specified _____	Not Specified _____	Not Specified _____
51 to 300 Volts _____	3 ft 6 in _____	1.07 m _____	10 ft 0 in _____ 3.05 m
301 to 750 Volts _____	3 ft 6 in _____	1.07 m _____	10 ft 0 in _____ 3.05 m
751 Volts to 15 kV _____	5 ft 0 in _____	1.53 m _____	10 ft 0 in _____ 3.05 m
15.1 kV to 36 kV _____	6 ft 0 in _____	1.83 m _____	10 ft 0 in _____ 3.05 m
36.1 kV to 46 kV _____	8 ft 0 in _____	2.44 m _____	10 ft 0 in _____ 3.05 m
46.1 kV to 72.5 kV _____	8 ft 0 in _____	2.44 m _____	10 ft 0 in _____ 3.05 m
72.6 kV to 121 kV _____	8 ft 0 in _____	2.44 m _____	10 ft 8 in _____ 3.26 m
138 kV to 145 kV _____	10 ft 0 in _____	3.05 m _____	11 ft 0 in _____ 3.36 m
161 kV to 169 kV _____	11 ft 8 in _____	3.56 m _____	11 ft 8 in _____ 3.56 m
230 kV to 242 kV _____	13 ft 0 in _____	3.97 m _____	13 ft 0 in _____ 3.97 m
345 kV to 362 kV _____	15 ft 4 in _____	4.68 m _____	15 ft 4 in _____ 4.68 m
500 kV to 550 kV _____	19 ft 0 in _____	5.80 m _____	19 ft 0 in _____ 5.80 m
765 kV to 800 kV _____	23 ft 9 in _____	7.24 m _____	23 ft 9 in _____ 7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

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**Revised Text**

Part: 4 Section: 42

Rule: 420 G2

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons' Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision or a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be

reduced by 6 feet (1.83 m).

b.If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c.If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

\_\_\_\_\_ Limited Approach Distance To Exposed Energized Parts \_\_\_\_\_  
 \_\_\_\_\_ (See Rule 448 in its entirety.) \_\_\_\_\_

Nominal System \_\_\_\_\_ Limited Approach Boundaries \_\_\_\_\_  
 Voltage Range, \_\_\_\_\_ Distance From Person To \_\_\_\_\_ Distance From Long  
 Phase to Phase \_\_\_\_\_ Exposed Energized Circuit \_\_\_\_\_ Conductive Object  
 \_\_\_\_\_ Part1 \_\_\_\_\_ (In Contact With Person)  
 \_\_\_\_\_ To Exposed Energized Part

Column 1	Column 2	Column 3
0 to 50 Volts	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m
301 to 750 Volts	3 ft 6 in	1.07 m
751 Volts to 15 kV	5 ft 0 in	1.53 m
15.1 kV to 36 kV	6 ft 0 in	1.83 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m
121 kV to 145 kV	10 ft 0 in	3.05 m
145 kV to 161 kV	11 ft 8 in	3.56 m
161 kV to 169 kV	11 ft 8 in	3.56 m
169 kV to 230 kV	13 ft 0 in	3.97 m
230 kV to 242 kV	13 ft 0 in	3.97 m
242 kV to 345 kV	15 ft 4 in	4.68 m
345 kV to 362 kV	15 ft 4 in	4.68 m
362 kV to 500 kV	19 ft 0 in	5.80 m
500 kV to 550 kV	19 ft 0 in	5.80 m
550 kV to 765 kV	23 ft 9 in	7.24 m
765 kV to 800 kV	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516.

The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

(1) For voltages to ground 50 kV or below B 10 ft.

(2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA`s 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

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**Revised Text**

Part: 4 Section: 42

Rule: 420 I.1

**CP2815**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

Refer to WG 8.10

January 14, 2004

Subcommittee accepted the revised CP presented by the WG 8.10.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (15) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White

**Negative:** (3) McKinney, Doering, Woodings

**Abstention:** (1) Kientz

**Explanation of Vote:**

**DOERING:** As Tables 410-1 and 410-2 contain a number of assumptions, at best they belong in an appendix. Beside the assumptions listed with the tables, an unidentified MAD value must have been assumed to calculate the clearing time. As there is little or no experimental data at the higher voltages, what is Arc Pro based on? Lee`s work was based on the maximum arc occurring when the arc voltage drop is equal to the voltage drop in the system. In distribution and transmission lines, except for low voltage secondary systems, the voltage drop in the arc is only a few percent of the drop in the system. I believe IEEE Std 1584 references Lee for the higher voltages, but I`m not sure what Arc Pro uses. I have submitted a method of calculation the incident energy from various inputs to the working group, but it lacked peer review, so it apparently was not seriously considered.

**MCKINNEY:** The major reason for this CP was OSHA`s desire to have an industrial consensus on this issue to help them with future rulemaking. Currently, the FR clothing rules for the industry are only found in NFPA 70E which specifically excludes utilities. We believe there is insufficient data from OSHA to justify requiring FR clothing for the industry at this time. There are a small amount of documented accidents in which burns are received. However, in almost all of these cases the person burned has violated an existing NESC rule. If we are going to spend extra time and money to reduce these injuries we should consider increasing enforcement of existing rules rather than just creating another rule. Sometimes it is better to just make sure some wears their belt other than requiring suspenders in case they forget to wear their belt.

**WOODINGS:** Effectiveness, Acceptance, and Ability to perform required work are my reasons for rejecting CP 2815. As for the effectiveness of wearing FR rated material in a thermal situation, yes it is beneficial, but if employees would all wear long sleeve cotton shirts and a plain white cotton "T" shirt underneath, the acceptance level on both employee and employers would be far greater than it currently is. A contributing factor in reviewing many incidents is the need for more and better training, as many individuals do not realize the danger of wearing synthetic fabrics nor the potential danger of a thermal situation. Another factor in the acceptance of this requirement is the problem of working in a hot environment with an FR rated shirt or jacket as they can be too hot for safe working conditions.

Where many large utilities are in compliance with wearing FR rated shirts, there are many small utilities and contractors serving these utilities that have been and will be impacted by this CP. Cotton garments are readily available and reasonably priced, making them a more acceptable method of achieving a reasonable degree of burn

prevention given adequate training per the following requirement:

(6) Apparel.

(i) When work is performed within reaching distance of exposed energized parts of equipment, the employer shall ensure that each employee removes or renders nonconductive all exposed conductive articles, such as key or watch chains, rings, or wrist watches or bands, unless such articles do not increase the hazards associated with contact with the energized parts.

(ii) The employer shall train each employee who is exposed to the hazards of flames or electric arcs in the hazards involved.

(iii) The employer shall ensure that each employee who is exposed to the hazards of flames or electric arcs does not wear clothing that, when exposed to flames or electric arcs, could increase the extent of injury that would be sustained by the employee.

Note: Clothing made from the following types of fabrics, either alone or in blends, is prohibited by this paragraph, unless the employer can demonstrate that the fabric has been treated to withstand the conditions that may be encountered or that the clothing is worn in such a manner as to eliminate the hazard involved: acetate, nylon, polyester, rayon.

#### **Revised Text**

Part: 4 Section: 42

Rule: 420 J3

**CP2640**

**Subcommittee Recommendation:** Reject

#### **Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

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

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

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

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

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B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

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1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a.If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b.If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c.If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts				
(See Rule 448 in its entirety.)				
Nominal System		Limited Approach Boundaries		
Voltage Range,	Distance From Person To	Distance From Long	Distance From Long	Distance From Long
Phase to Phase	Exposed Energized Circuit	Conductive Object	Conductive Object	Conductive Object
	Part I	(In Contact With Person)	(In Contact With Person)	(In Contact With Person)
		To Exposed Energized Part	To Exposed Energized Part	To Exposed Energized Part
Column 1	Column 2	Column 3	Column 3	Column 3
0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m

15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in	3.05 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
138 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

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This is the OSHA 10 ft rule provisions. OSHA's 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

### Revised Text

Part: 4 Section: 42

Rule: 420 L

**CP2640**

**Subcommittee Recommendation:** Reject

### Subcommittee Comment:

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

### Vote on Subcommittee Recommendation:

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

### Explanation of Vote:

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

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b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

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3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts	
(See Rule 448 in its entirety.)	
Nominal System	Limited Approach Boundaries

Voltage Range,	Distance From Person To	Distance From Long
Phase to Phase	Exposed Energized Circuit	Conductive Object
	Part1	(In Contact With Person)
		To Exposed Energized Part
Column 1	Column 2	Column 3
0 to 50 Volts	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	10 ft 0 in
301 to 750 Volts	3 ft 6 in	10 ft 0 in
751 Volts to 15 kV	5 ft 0 in	10 ft 0 in
15.1 kV to 36 kV	6 ft 0 in	10 ft 0 in
36.1 kV to 46 kV	8 ft 0 in	10 ft 0 in
46.1 kV to 72.5 kV	8 ft 0 in	10 ft 0 in
72.6 kV to 121 kV	8 ft 0 in	10 ft 8 in
138 kV to 145 kV	10 ft 0 in	11 ft 0 in
161 kV to 169 kV	11 ft 8 in	11 ft 8 in
230 kV to 242 kV	13 ft 0 in	13 ft 0 in
345 kV to 362 kV	15 ft 4 in	15 ft 4 in
500 kV to 550 kV	19 ft 0 in	19 ft 0 in
765 kV to 800 kV	23 ft 9 in	23 ft 9 in

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

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**Revised Text**

Part: 4 Section: 42

Rule: 420 M

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

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Table 448-1

Limited Approach Distance To Exposed Energized Parts				
(See Rule 448 in its entirety.)				
Nominal System		Limited Approach Boundaries		
Voltage Range,	Distance From Person To	Distance From Long	Distance From Long	Distance From Long
Phase to Phase	Exposed Energized Circuit	Exposed Energized Circuit	Exposed Energized Circuit	Exposed Energized Circuit
		Part 1 (In Contact With Person)		
To Exposed Energized Part				
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301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m
15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in	3.05 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
138 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

- (1) For voltages to ground 50 kV or below B 10 ft.
- (2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA`s 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

**Revised Text**

Part: 4 Section: 42

Rule: 421 C

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of

complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons' Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c. If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

- a. The employee is using protective equipment rated for the phase-to-ground voltage; or
  - b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.
3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts				
(See Rule 448 in its entirety.)				
Nominal System	Limited Approach Boundaries			
Voltage Range,	Distance From Person To	Distance From Long		
Phase to Phase	Exposed Energized Circuit	Conductive Object		
	Part1	(In Contact With Person)		
	To Exposed Energized Part			
Column 1	Column 2	Column 3		
0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m
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36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
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72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
121 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m
145 kV to 161 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
169 kV to 230 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
242 kV to 345 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
362 kV to 500 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
550 kV to 765 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

- (1) For voltages to ground 50 kV or below B 10 ft.
- (2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA`s 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

**Revised Text**

Part: 4 Section: 42

Rule: 422 A

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

**DOERING:** The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

**New Definition:** limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. **New Rule:** 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

**A. Unqualified Persons' Limited Approach Boundary.** All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

**B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons.** Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

**Exception:** Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

**C. Vehicular and Mechanical Equipment in Transit**

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c.If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts				
(See Rule 448 in its entirety.)				
Nominal System		Limited Approach Boundaries		
Voltage Range,	Distance From Person To	Distance From Long	Distance From Long	Distance From Long
Phase to Phase	Exposed Energized Circuit	Exposed Energized Circuit	Conductive Object	Conductive Object
	Part1		(In Contact With Person)	
			To Exposed Energized Part	
Column 1	Column 2	Column 3	Column 4	Column 5
0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m
15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in	3.05 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
121 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m
145 kV to 161 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
169 kV to 230 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
242 kV to 345 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
362 kV to 500 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
550 kV to 765 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516.

The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

(1) For voltages to ground 50 kV or below B 10 ft.

(2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA`s 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

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**Revised Text**

Part: 4 Section: 42

Rule: 422 A1

**CP2640****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

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B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

**C. Vehicular and Mechanical Equipment in Transit**

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however,

under any of the following conditions, the distance may be reduced:

a.If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b.If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c.If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts \_\_\_\_\_  
(See Rule 448 in its entirety.)

Nominal System Voltage Range, Phase to Phase	Limited Approach Boundaries		Distance From Long Exposed Energized Circuit Part1	Distance From Long Conductive Object (In Contact With Person) To Exposed Energized Part
	Column 1	Column 2		
0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m
15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in	3.05 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
138 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
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Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516.

The source for the Column 2 distances are as follows:

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**Revised Text**

Part: 4 Section: 42

Rule: 422 A2

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

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Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross

the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c. If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts  
(See Rule 448 in its entirety.)

Nominal System	Limited Approach Boundaries			
Voltage Range, Phase to Phase	Distance From Person To Exposed Energized Circuit Part 1	Distance From Person To Exposed Energized Circuit Part 2	Distance From Long Conductive Object To Exposed Energized Part	Distance From Long Conductive Object To Exposed Energized Part
	Column 1	Column 2	Column 3	Column 3
0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m
15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in	3.05 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
121 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m
145 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
169 kV to 230 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
242 kV to 345 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
362 kV to 500 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
550 kV to 765 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

(1) For voltages to ground 50 kV or below B 10 ft.

(2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA's 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

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**New Text**

Part: 4 Section: 42

Rule: 422 C1

**CP2642**

**Subcommittee Recommendation:** Withdrawn by the submitter

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (0)

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 42

Rule: 422 C1

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons' Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

#### C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c. If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages

within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts				
(See Rule 448 in its entirety.)				
Nominal System		Limited Approach Boundaries		
Voltage Range,	Distance From Person To	Distance From Long	Phase to Phase	Exposed Energized Circuit
		Conductive Object		
		Part1 (In Contact With Person)		
		To Exposed Energized Part		
Column 1	Column 2	Column 3	Column 3	Column 3
0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m
15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in	3.05 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
138 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 in

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

- (1) For voltages to ground 50 kV or below B 10 ft.
- (2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA`s 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

**Revised Text**

Part: 4 Section: 42

Rule: 422 C5

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons' Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

**C. Vehicular and Mechanical Equipment in Transit**

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c. If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts					
(See Rule 448 in its entirety.)					
Nominal System		Limited Approach Boundaries			
Voltage Range,	Distance From Person To	Distance From Long		Distance From Long	
Phase to Phase	Exposed Energized Circuit	Conductive Object		Conductive Object	
Part1		(In Contact With Person)			
		To Exposed Energized Part			
Column 1	Column 2	Column 3		Column 3	
0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m	
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m	
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m	
15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in	3.05 m	
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m	
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m	
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m	
138 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m	
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m	
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m	
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m	
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m	
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m	

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

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The source for the Column 3 distances are based on the following distances:

(1) For voltages to ground 50 kV or below B 10 ft.

(2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA`s 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

**Revised Text**

Part: 4 Section: 42

Rule: 423 C3

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons' Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c. If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to

the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

- a. The employee is using protective equipment rated for the phase-to-ground voltage; or
- b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts \_\_\_\_\_  
(See Rule 448 in its entirety.)

Nominal System Voltage Range, Phase to Phase	Limited Approach Boundaries		
	Distance From Person To Exposed Energized Circuit Part1	Distance From Long Conductive Object (In Contact With Person) To Exposed Energized Part	Distance From Long Conductive Object (In Contact With Person) To Exposed Energized Part
	Column 1	Column 2	Column 3

0 to 50 Volts	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in
15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in
128 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

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**Revised Text**

Part: 4 Section: 42

Rule: 423 D

**CP2504**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (1) McKinney

**Abstention:** (0)

**Explanation of Vote:**

MCKINNEY: Given 2-ft location variance, parallel cabling in small right-of-way (row) could result in a large amount of exposures. Also, the rule may promote excessive exposure of electric services owned by the utility or customer when telecommunication lines are installed.

**Revised Text**

Part: 4 Section: 42

Rule: 423 D2

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

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could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a.If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b.If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c.If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts					
(See Rule 448 in its entirety.)					
Nominal System		Limited Approach Boundaries			
Voltage Range,	Distance From Person To	Distance From Long		Distance From Long	
Phase to Phase	Exposed Energized Circuit	Conductive Object		Conductive Object	
Part I		(In Contact With Person)			
		To Exposed Energized Part			
Column 1	Column 2	Column 3		Column 3	
0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m	
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m	
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m	

15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in	3.05 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
138 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

(1) For voltages to ground 50 kV or below B 10 ft.

(2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA's 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

### Revised Text

Part: 4 Section: 42

Rule: 423 D3

### CP2640

**Subcommittee Recommendation:** Reject

### Subcommittee Comment:

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

### Vote on Subcommittee Recommendation:

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

### Explanation of Vote:

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons' Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c. If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts	
(See Rule 448 in its entirety.)	
Nominal System	Limited Approach Boundaries

Voltage Range,	Distance From Person To	Distance From Long
Phase to Phase	Exposed Energized Circuit	Conductive Object
	Part1	(In Contact With Person)
		To Exposed Energized Part
Column 1	Column 2	Column 3
0 to 50 Volts	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m
301 to 750 Volts	3 ft 6 in	1.07 m
751 Volts to 15 kV	5 ft 0 in	1.53 m
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36.1 kV to 46 kV	8 ft 0 in	2.44 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m
138 kV to 145 kV	10 ft 0 in	3.05 m
161 kV to 169 kV	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m
765 kV to 800 kV	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

- (1) For voltages to ground 50 kV or below B 10 ft.
- (2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA`s 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

**New Text**

Part: 4 Section: 43

Rule: 431 C

**CP2530**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

Add new Rule 420Q

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

**Revised Text**

Part: 4 Section: 43  
Rule: 431 Table 431-1  
**CP2525**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

Combine 431-1a and 431-1b and use the existing lower voltage values in Table 431-1. Also to include footnote 8 only as footnote 3.

January 13, 2004

The WG reviewed and submitted modification.

The existing table needs to be updated for the following reasons:

- The references data for this table was taken from IEEE Standard 516-1995. IEEE Standard 516 has been revised, updated and approved by the IEEE Standards Board. In IEEE Standard 516-2003, the minimum approach distances have been recalculated and the tables expanded to cover the present day equipment.
- For phase-to-phase voltages above 72.5 kV, the existing Table 431-1 is only valid for altitudes up to 3000 feet or 900 meters above sea level. To make the tables more "user friendly", separate tables have been developed for the various work site altitudes. Over one third of the land area in the United States is above 3000 feet. To obtain the correct Minimum Approach Distance for altitudes above 3000 feet, the data is the existing Table 431-1, must have the inadvertent movement factor subtracted from it, before it is multiplied by the Altitude Correction Factors from Table 441-5 and then the inadvertent movement factor must be reapplied. It has been noted that generally this correction is not being made.
- The range of voltages covered by the existing table stops at 140 kV. With antennas and similar equipment being installed and serviced on the power line supporting structure, above the energized conductors, by workers, who are not supply trained, the tables needs to be expanded to cover the full range of supply voltages.

Subcommittee modified Rule 432 to insure the exception continues to apply only to 140 kV and below. A suitable barrier has not been defined for voltage above 140 kV.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (0)

**Abstention:** (2) Doering, Kientz

**Explanation of Vote:**

DOERING: Part of my concern with the distances required will be discussed in connection with CP2524. I would suggest those persons that must follow the distances in CP2525 evaluate the effect on the towers they are required to climb. I believe there may not be climbing space by the supply conductors.

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**Revised Text**

Part: 4 Section: 43  
Rule: 431 Table 431-1  
**CP2559**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

See action on CP2525

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 43

Rule: 431 Table 431-1

**CP2659****Subcommittee Recommendation:** Withdrawn by the submitter**Subcommittee Comment:****Vote on Subcommittee Recommendation:****Affirmative:** (0)**Negative:** (0)**Abstention:** (0)**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 43

Rule: 432

**CP2564****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

Refer to WG 8.11 on CP2640

**Vote on Subcommittee Recommendation:****Affirmative:** (19) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White**Negative:** (0)**Abstention:** (0)**Explanation of Vote:**

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**New Text**

Part: 4 Section: 43

Rule: 432 B

**CP2713****Subcommittee Recommendation:** Reject**Subcommittee Comment:**

Metal basket aerial devices are used in the communications industry for aerial line work. This type of aerial lift provides the strength, durability, and agility to perform aerial line function.

An aerial lift used for communications work is prohibited from entering the supply space regardless of the material design of the aerial lift.

A nonconductive material used for communications lifts should not be considered in factoring employee safety from supply lines.

**Vote on Subcommittee Recommendation:****Affirmative:** (19) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell,

Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

### Explanation of Vote:

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#### Revised Text

Part: 4 Section: 44

Rule: 441 441 & Tables

#### CP2524

**Subcommittee Recommendation:** Accept as modified

#### Subcommittee Comment:

Send to WG 8.12

January 14, 2004

The Subcommittee request that specific comments be made on NEW Rule 441A5 and 441A6. It is anticipated that some changes will be made based on comments received after public review. Based on the comments received some of the proposed rule changes may be moved to other sections of the code or a non-mandatory appendix. An IEEE paper is being proposed to address the calculation of T for live-line work.

#### Vote on Subcommittee Recommendation:

**Affirmative:** (15) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, White, Woodings

**Negative:** (3) McKinney, Doering, Tootle

**Abstention:** (1) Kientz

#### Explanation of Vote:

DOERING: If the utility replaces adequate breakers with inadequate breakers that restrike on opening, they will need to add insulators to limit insulator flashover. Based on 516 Table D.6 we see the following:  
345 kV: 3.0 pu req 8.09 ft while 3.5 pu req 10.17 ft thus the I string needs to be 2.1 ft longer. The towers will need to be raised 2.1 ft and widen 8.4 ft.

500 kV: 2.4 pu req 10.83 ft while 3.0 pu req 15.63 ft thus the I string needs to be 4.8 ft longer. The towers will need to be raised 4.8 ft and widen 19.2 ft.

765 kV: 2.0 pu req 14.88 ft while 2.5 pu req 21.6 ft thus the I string needs to be 6.7 ft longer. The towers will need to be raised 6.7 ft and widen 26.9 ft.

The point, do not revise Table 441-1. Add a note that the approach distances are based on transient overvoltages of 3.0 pu for 362 kV and below, 2.4 pu for 550 kV, and 2 pu for 800 kV. If the facility being worked on experiences higher transient overvoltages, consult Table 441-2 and 441-3 for the appropriate approach distances.

I would agree that the details proposed by 441A5 and 441A6 should not be part of the NESC. The proposed studies are appropriate when major capacitor banks or other special equipment are being added to the system, or new lines to connect new generation to the system, but such studies are not needed every time there is an addition or change in the system. Collecting data on system overvoltages has become easier with the newer "quality" equipment.

I believe the changes to 441A4 are unnecessary as they refer to 441A5 and 441A6 which have requirements beyond the scope of the NESC.

TOOTLE: I agree with updating the 441 Tables to reflect the latest changes in IEEE 516. However, the inclusion of design criteria relation to "T" factors is beyond the intent of the NESC as a safety standard.

MCKINNEY: The NESC is not the proper vehicle to establish design or technical calculations. Technical formulas and criteria should first be approved through an IEEE committee, complete with peer review, before the NESC should act on the new formulas or criteria. Approving this standard creates a dangerous precedent of NESC committees establishing design criteria without peer review from IEEE technical committees. This CP should first

become an IEEE standard and then be reviewed by the NESC. After the IEEE paper is complete it may fit well as a reference in the appendix section of the NESC.

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**Revised Text**

Part: 4 Section: 44

Rule: 441 A.3.b

**CP2816**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Send to WG 8.13

January 14, 2004

Refer to CP 2818 and CP 2820.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**New Text**

Part: 4 Section: 44

Rule: 441 A.3.c

**CP2817**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Send to WG 8.13

January 14, 2004

Refer to CP 2818 and CP 2820.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 44

Rule: 441 A.3.d

**CP2818**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

Send to WG 8.13

January 14, 2004

Subcommittee accepted the revised CP presented by the WG.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (12) Brubaker, Doering, Erga, Grose, Henry, Hunt, Mitchell, Poholski, Schweitzer, Theis, Tomaseski, Woodings

**Negative:** (6) Brooks, McKinney, Fass, Spadafore, Tootle, White

**Abstention:** (1) Kientz

**Explanation of Vote:**

**BROOKS:** Existing rules are sufficient. There has been no demonstrated safety deficiency when covering for phase to ground exposure.

**DOERING:** Following are a series of requirements that apply to 441.A.3. Most of them are covered by the NESC with the changes proposed by CP 2818 and 2820.+The principle concern when selecting insulating cover-up including rubber gloves, is that their minimum breakdown voltage rating equals or exceeds the line to ground voltage times the anticipated transient overvoltage factor.

Class of Rubber Insulating Equipment	Minimum Breakdown Voltage	Class Of cover Up ABS High Dielectric Polyethylene	Minimum Breakdown Voltage
1	20,000 Volts	2	14,000 Volts
2	30,000 Volts	3	21,000 Volts
3	40,000 Volts	4	32,000 Volts
4	50,000 Volts	5	43,300 Volts
		6	64,000 Volts

As the task normally requires prolonged contact with a phase conductor, there is a possibility of an overvoltage occurring while in contact.

Work procedures do not normally anticipate phase to phase contact, therefore the probability of a phase to phase contact occurring during a transient overvoltage is extremely low.

Working from an insulated aerial is required at the higher voltages to limit the charging current the worker would experience if working from ground. In addition the aerial device is the backup should there be a glove failure or an inadvertent contact.+ The maximum use phase to phase values relate to guarded phase to guarded phase. Generally units are not rated for guarded phase to bare phase potentials.

Plastic cover-up in-service testing values are greater than the maximum use phase to ground values.+ Rubber protective equipment in-service testing is 10 kV less than the minimum breakdown voltage.

Class 4 rubber goods will provide line to ground protection when gloving 46 kV if the transient overvoltage is limited to 2.3 p.u.

The maximum use voltage may be considered the phase to phase voltage if:

- A. For systems over 15 kV phase to phase, and
- B. If the maximum phase to ground voltage is 2.3 p.u. or less, and
- C. The system must have an effectively grounded neutral, and
- D. Where phase to phase exposure exists, that is when a worker could contact two phases simultaneously, both phases shall be covered.

**FASS:** The present code as it exists is sufficient. The additional comment does not specifically say the employer has the right to determine if a phase-to-phase exposure exists. The existing code was revised during the last code cycle. This would limit the gloving of 46kV.

**MCKINNEY:** Existing NESC Rules are sufficient.

**SPADAFORE:** Existing code statements provide the same requirements as the proposal to properly qualify company employees and employers.

TOOTLE: The application of phase-to-phase cover-up will restrict and/or eliminate the ability to glove 46kV. Hard cover-up (class 5) for jumpers, arms, risers, etc. is very difficult to apply.

WHITE: The proposed language, in effect, does not change the interpretation of the existing language. The rating of the cover-up equipment utilized should be determined based on the voltage involved. Employees have been performing energized line work for several years complying with the language or an interpretation of the existing code language.

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**Revised Text**

Part: 4 Section: 44

Rule: 441 A1

**CP2561**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 44

Rule: 441 A1

**CP2626**

**Subcommittee Recommendation:** Withdrawn by the submitter

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (0)

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 44

Rule: 441 A3b

**CP2560**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (1) Doering

**Abstention:** (0)

**Explanation of Vote:**

Doering: Hold until results of WG 8.11 are resolved. See CP 2640

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**Revised Text**

Part: 4 Section: 44

Rule: 441 A3b

**CP2625**

**Subcommittee Recommendation:** Withdrawn by the submitter

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (0)

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 44

Rule: 441 A3b

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

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B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a.If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b.If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c.If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts _____				
(See Rule 448 in its entirety.)				
Nominal System _____		Limited Approach Boundaries		
Voltage Range, _____	Distance From Person To _____	Distance From Long _____	Phase to Phase _____	Exposed Energized Circuit _____
		Part1 _____	(In Contact With Person)	
		To Exposed Energized Part		
Column 1 _____	Column 2 _____	Column 3 _____		
0 to 50 Volts _____	Not Specified _____	Not Specified _____	Not Specified _____	Not Specified _____
51 to 300 Volts _____	3 ft 6 in _____	1.07 m _____	10 ft 0 in _____	3.05 m _____
301 to 750 Volts _____	3 ft 6 in _____	1.07 m _____	10 ft 0 in _____	3.05 m _____
751 Volts to 15 kV _____	5 ft 0 in _____	1.53 m _____	10 ft 0 in _____	3.05 m _____
15.1 kV to 36 kV _____	6 ft 0 in _____	1.83 m _____	10 ft 0 in _____	3.05 m _____

36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
138 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

- (1) For voltages to ground 50 kV or below B 10 ft.
- (2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA's 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

#### **Revised Text**

Part: 4 Section: 44

Rule: 441 A4

#### **CP2641**

**Subcommittee Recommendation:** Accept in principle

#### **Subcommittee Comment:**

Accept the modifications in CP 2641 and add a definition

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

**Affirmative:** (18) Brooks, Brubaker, Doering, Erga, Fass, Grose, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (1) Henry

**Abstention:** (0)

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

Dennis Henry: Present wording is adequate and conveys the intent of the rule.

#### **Revised Text**

Part: 4 Section: 44

Rule: 441 A4a

#### **CP2641**

**Subcommittee Recommendation:** Accept in principle

#### **Subcommittee Comment:**

Accept the modifications in CP 2641 and add a definition

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brooks, Brubaker, Doering, Erga, Fass, Grose, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (1) Henry

**Abstention:** (0)

**Explanation of Vote:**

Dennis Henry: Present wording is adequate and conveys the intent of the rule.

---

**Revised Text**

Part: 4 Section: 44

Rule: 441 A4b

**CP2641**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

Accept the modifications in CP 2641 and add a definition

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brooks, Brubaker, Doering, Erga, Fass, Grose, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (1) Henry

**Abstention:** (0)

**Explanation of Vote:**

Dennis Henry: Present wording is adequate and conveys the intent of the rule.

---

**Revised Text**

Part: 4 Section: 44

Rule: 441 A4b2

**CP2641**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

Accept the modifications in CP 2641 and add a definition

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brooks, Brubaker, Doering, Erga, Fass, Grose, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (1) Henry

**Abstention:** (0)

**Explanation of Vote:**

Dennis Henry: Present wording is adequate and conveys the intent of the rule.

---

**Revised Text**

Part: 4 Section: 44

Rule: 441 A5b

**CP2641**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

Accept the modifications in CP 2641 and add a definition

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brooks, Brubaker, Doering, Erga, Fass, Grose, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (1) Henry

**Abstention:** (0)

**Explanation of Vote:**

Dennis Henry: Present wording is adequate and conveys the intent of the rule.

---

**Revised Text**

Part: 4 Section: 44

Rule: 441 A6a

**CP2828**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (13) Brubaker, Doering, Erga, Fass, Grose, Kientz, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 44

Rule: 441 B3a

**CP2641**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

Accept the modifications in CP 2641 and add a definition

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brooks, Brubaker, Doering, Erga, Fass, Grose, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (1) Henry

**Abstention:** (0)

**Explanation of Vote:**

Dennis Henry: Present wording is adequate and conveys the intent of the rule.

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**New Text**

Part: 4 Section: 44

Rule: 441 C

**CP2531**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

See action taken on CP 2530.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

---

**Revised Text**

Part: 4 Section: 44

Rule: 441 Table 441-2

**CP2641**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

Accept the modifications in CP 2641 and add a definition

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brooks, Brubaker, Doering, Erga, Fass, Grose, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (1) Henry

**Abstention:** (0)

**Explanation of Vote:**

Dennis Henry: Present wording is adequate and conveys the intent of the rule.

---

**Revised Text**

Part: 4 Section: 44

Rule: 441 Table 441-3

**CP2641**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

Accept the modifications in CP 2641 and add a definition

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brooks, Brubaker, Doering, Erga, Fass, Grose, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (1) Henry

**Abstention:** (0)

**Explanation of Vote:**

Dennis Henry: Present wording is adequate and conveys the intent of the rule.

---

**Revised Text**

Part: 4 Section: 44

Rule: 441 Table 441-4 ft

**CP2639**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 44

Rule: 441 Table 441-5

**CP2523**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (19) Brooks, Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 44

Rule: 441 Table 441-6

**CP2562**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Send to WG 8.13

January 14, 2004

Refer to CP 2818 and CP 2820.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (1) Brooks

**Explanation of Vote:**

**Revised Text**

Part: 4 Section: 44  
 Rule: 441 Table 441-6  
CP2627

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Send to WG 8.13

January 14, 2004  
 Refer to CP 2818 and CP 2820.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White  
**Negative:** (0)  
**Abstention:** (0)

**Explanation of Vote:**

**Revised Text**

Part: 4 Section: 44  
 Rule: 441 Table 441-6  
CP2820

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

Send to WG 8.13

January 14, 2004  
 Subcommittee accepted the revised CP presented by the WG.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (12) Brubaker, Doering, Erga, Grose, Henry, Hunt, Mitchell, Poholski, Schweitzer, Theis, Tomaseski, Woodings  
**Negative:** (6) Brooks, McKinney, Fass, Spadafore, Tootle, White  
**Abstention:** (1) Kientz

**Explanation of Vote:**

BROOKS: Existing rules are sufficient. There has been no demonstrated safety deficiency when covering for phase to ground exposure.

DOERING: Following are a series of requirements that apply to 441.A.3. Most of them are covered by the NESC with the changes proposed by CP 2818 and 2820.+The principle concern when selecting insulating cover-up including rubber gloves, is that their minimum breakdown voltage rating equals or exceeds the line to ground voltage times the anticipated transient overvoltage factor.

Class of Rubber	Minimum	Class Of cover Up ABS	Minimum
Insulating Equipment	Breakdown	High Dielectric Polyethylene	Breakdown
	Voltage		Voltage
1	20,000 Volts	2	14,000 Volts
2	30,000 Volts	3	21,000 Volts
3	40,000 Volts	4	32,000 Volts
4	50,000 Volts	5	43,300 Volts

As the task normally requires prolonged contact with a phase conductor, there is a possibility of an overvoltage occurring while in contact.

Work procedures do not normally anticipate phase to phase contact, therefore the probability of a phase to phase contact occurring during a transient overvoltage is extremely low.

Working from an insulated aerial is required at the higher voltages to limit the charging current the worker would experience if working from ground. In addition the aerial device is the backup should there be a glove failure or an inadvertent contact.+ The maximum use phase to phase values relate to guarded phase to guarded phase. Generally units are not rated for guarded phase to bare phase potentials.

Plastic cover-up in-service testing values are greater than the maximum use phase to ground values.+ Rubber protective equipment in-service testing is 10 kV less than the minimum breakdown voltage.

Class 4 rubber goods will provide line to ground protection when gloving 46 kV if the transient overvoltage is limited to 2.3 p.u.

The maximum use voltage may be considered the phase to phase voltage if:

- A. For systems over 15 kV phase to phase, and
- B. If the maximum phase to ground voltage is 2.3 p.u. or less, and
- C. The system must have an effectively grounded neutral, and
- D. Where phase to phase exposure exists, that is when a worker could contact two phases simultaneously, both phases shall be covered.

FASS; The existing code is sufficient. The present practice of using rubber gloves and sleeves has not caused any problems. The rating of the rubber protective equipment is less than the 2.4 p.u. On the 25kV system the maximum overvoltage are within the 1.6 to 1.65p.u. which is under the breakdown voltage for our protective equipment and we have had no accidents using the present gloving practices

MCKINNEY: Existing NESC Rules are sufficient.

SPADAFORO: Existing code provide the same level of safety to distribution circuits which are already having maximum overvoltage < 2.4p.u.

TOOTLE: The requirement for a 2.4 p.u. or less value for the use of phase-to-ground gloves is unnecessary since distribution circuits have multiple clipping in the form of lighting arrestor. Most overvoltage values are so low the blocking of reclosing is not required.

WHITE: The maximum use voltage ratings found in Table 441-6 provides a safety factor that allows for overvoltages on a system. The existing language presently in 441.A.3.b is sufficient to protect employees performing energized line work.

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#### **Revised Text**

Part: 4 Section: 44

Rule: 441 Table 441-6, EXCEP 2

#### **CP2563**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Send to WG 8.13

January 14, 2004

Refer to CP 2818 and CP 2820.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski,

Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 44

Rule: 441 Table 441-6, Excp 2

**CP2628**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Send to WG 8.13

January 14, 2004

Refer to CP 2818 and CP 2820.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

---

**Revised Text**

Part: 4 Section: 44

Rule: 441 Table441-4

**CP2641**

**Subcommittee Recommendation:** Accept in principle

**Subcommittee Comment:**

Accept the modifications in CP 2641 and add a definition

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brooks, Brubaker, Doering, Erga, Fass, Grose, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (1) Henry

**Abstention:** (0)

**Explanation of Vote:**

Dennis Henry: Present wording is adequate and conveys the intent of the rule.

---

**Revised Text**

Part: 4 Section: 44

Rule: 442 B

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons' Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c. If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to

the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

- a. The employee is using protective equipment rated for the phase-to-ground voltage; or
- b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts \_\_\_\_\_  
(See Rule 448 in its entirety.)

Nominal System	Limited Approach Boundaries		
Voltage Range, Phase to Phase	Distance From Person To Exposed Energized Circuit Part1	Distance From Long Exposed Energized Circuit	Distance From Long Conductive Object (In Contact With Person) To Exposed Energized Part
Column 1	Column 2	Column 3	Column 3

0 to 50 Volts	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in
15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in
128 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

- (1) For voltages to ground 50 kV or below B 10 ft.
- (2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA's 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

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**New Text**

Part: 4 Section: 44

Rule: 443 A 6

**CP2643**

**Subcommittee Recommendation:** Withdrawn by the submitter

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (0)

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**Revised Text**

Part: 4 Section: 44

Rule: 443 A3

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons" Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach

boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a.If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b.If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c.If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts _____					
(See Rule 448 in its entirety.)					
Nominal System _____		Limited Approach Boundaries			
Voltage Range, _____	Distance From Person To _____	Distance From Long _____		Distance From _____	
Phase to Phase _____	Exposed Energized Circuit _____	Conductive Object _____		_____	
Part1 _____		(In Contact With Person) _____			
_____		To Exposed Energized Part _____			
Column 1 _____	Column 2 _____	Column 3 _____		_____	
0 to 50 Volts _____	Not Specified _____	Not Specified _____	Not Specified _____	Not Specified _____	Not Specified _____
51 to 300 Volts _____	3 ft 6 in _____	1.07 m _____	10 ft 0 in _____	3.05 m _____	_____
301 to 750 Volts _____	3 ft 6 in _____	1.07 m _____	10 ft 0 in _____	3.05 m _____	_____
751 Volts to 15 kV _____	5 ft 0 in _____	1.53 m _____	10 ft 0 in _____	3.05 m _____	_____
15.1 kV to 36 kV _____	6 ft 0 in _____	1.83 m _____	10 ft 0 in _____	3.05 m _____	_____
36.1 kV to 46 kV _____	8 ft 0 in _____	2.44 m _____	10 ft 0 in _____	3.05 m _____	_____
46.1 kV to 72.5 kV _____	8 ft 0 in _____	2.44 m _____	10 ft 0 in _____	3.05 m _____	_____
72.6 kV to 121 kV _____	8 ft 0 in _____	2.44 m _____	10 ft 8 in _____	3.26 m _____	_____
138 kV to 145 kV _____	10 ft 0 in _____	3.05 m _____	11 ft 0 in _____	3.36 m _____	_____

161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

(1) For voltages to ground 50 kV or below B 10 ft.

(2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA's 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

#### **Revised Text**

Part: 4 Section: 44

Rule: 443 A5

#### **CP2640**

**Subcommittee Recommendation:** Reject

#### **Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

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

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

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

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons” Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter’s satisfaction (see rule 421C).

C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a.If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b.If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c.If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

_____ Limited Approach Distance To Exposed Energized Parts _____		
_____ (See Rule 448 in its entirety.) _____		
Nominal System _____	_____ Limited Approach Boundaries _____	
Voltage Range, _____	Distance From Person To _____	Distance From Long _____
Phase to Phase _____	Exposed Energized Circuit _____	Conductive Object _____
_____	Part1 _____	(In Contact With Person) _____
_____	_____ To Exposed Energized Part _____	
Column 1 _____	Column 2 _____	Column 3 _____

0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m
15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in	3.05 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
138 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
765 kV to 800 kV	23 ft 9 in	7.24 m	23 ft 9 in	7.24 m

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

(1) For voltages to ground 50 kV or below B 10 ft.

(2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA's 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

#### **Revised Text**

Part: 4 Section: 44

Rule: 443 B

#### **CP2640**

**Subcommittee Recommendation:** Reject

#### **Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

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

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

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

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their

adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

**New Definition: limited approach boundary.** An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons.  
**New Rule: 448. Limited Approach Boundary.** The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

**A. Unqualified Persons' Limited Approach Boundary.** All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

**B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons.** Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

**Exception:** Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

#### C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

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a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts				
(See Rule 448 in its entirety.)				
Nominal System		Limited Approach Boundaries		
Voltage Range,	Distance From Person To	Distance From Long	Distance From Long	
Phase to Phase	Exposed Energized Circuit	Conductive Object	Conductive Object	
		Part1	(In Contact With Person)	
		To Exposed Energized Part		
Column 1	Column 2	Column 3	Column 3	Column 3
0 to 50 Volts	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
301 to 750 Volts	3 ft 6 in	1.07 m	10 ft 0 in	3.05 m
751 Volts to 15 kV	5 ft 0 in	1.53 m	10 ft 0 in	3.05 m
15.1 kV to 36 kV	6 ft 0 in	1.83 m	10 ft 0 in	3.05 m
36.1 kV to 46 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
46.1 kV to 72.5 kV	8 ft 0 in	2.44 m	10 ft 0 in	3.05 m
72.6 kV to 121 kV	8 ft 0 in	2.44 m	10 ft 8 in	3.26 m
138 kV to 145 kV	10 ft 0 in	3.05 m	11 ft 0 in	3.36 m
161 kV to 169 kV	11 ft 8 in	3.56 m	11 ft 8 in	3.56 m
230 kV to 242 kV	13 ft 0 in	3.97 m	13 ft 0 in	3.97 m
345 kV to 362 kV	15 ft 4 in	4.68 m	15 ft 4 in	4.68 m
500 kV to 550 kV	19 ft 0 in	5.80 m	19 ft 0 in	5.80 m
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**Revised Text**

Part: 4 Section: 44

Rule: 443 K

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer,

Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

### **Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

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Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

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a. The employee is using protective equipment rated for the phase-to-ground voltage; or

b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1,

Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

\_\_\_\_\_ Limited Approach Distance To Exposed Energized Parts \_\_\_\_\_  
 \_\_\_\_\_ (See Rule 448 in its entirety.) \_\_\_\_\_

Nominal System _____	Limited Approach Boundaries			
Voltage Range, _____	Distance From Person To _____	Distance From Long _____	Distance From Long _____	Distance From Long _____
Phase to Phase _____	Exposed Energized Circuit _____	Conductive Object _____	Conductive Object _____	Conductive Object _____
_____	Part1 _____	(In Contact With Person) _____	(In Contact With Person) _____	(In Contact With Person) _____
_____	_____	To Exposed Energized Part _____	To Exposed Energized Part _____	To Exposed Energized Part _____
Column 1 _____	Column 2 _____	Column 3 _____	Column 3 _____	Column 3 _____
0 to 50 Volts _____	Not Specified _____	Not Specified _____	Not Specified _____	Not Specified _____
51 to 300 Volts _____	3 ft 6 in _____	1.07 m _____	10 ft 0 in _____	3.05 m _____
301 to 750 Volts _____	3 ft 6 in _____	1.07 m _____	10 ft 0 in _____	3.05 m _____
751 Volts to 15 kV _____	5 ft 0 in _____	1.53 m _____	10 ft 0 in _____	3.05 m _____
15.1 kV to 36 kV _____	6 ft 0 in _____	1.83 m _____	10 ft 0 in _____	3.05 m _____
36.1 kV to 46 kV _____	8 ft 0 in _____	2.44 m _____	10 ft 0 in _____	3.05 m _____
46.1 kV to 72.5 kV _____	8 ft 0 in _____	2.44 m _____	10 ft 0 in _____	3.05 m _____
72.6 kV to 121 kV _____	8 ft 0 in _____	2.44 m _____	10 ft 8 in _____	3.26 m _____
138 kV to 145 kV _____	10 ft 0 in _____	3.05 m _____	11 ft 0 in _____	3.36 m _____
161 kV to 169 kV _____	11 ft 8 in _____	3.56 m _____	11 ft 8 in _____	3.56 m _____
230 kV to 242 kV _____	13 ft 0 in _____	3.97 m _____	13 ft 0 in _____	3.97 m _____
345 kV to 362 kV _____	15 ft 4 in _____	4.68 m _____	15 ft 4 in _____	4.68 m _____
500 kV to 550 kV _____	19 ft 0 in _____	5.80 m _____	19 ft 0 in _____	5.80 m _____
765 kV to 800 kV _____	23 ft 9 in _____	7.24 m _____	23 ft 9 in _____	7.24 m _____

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516. The source for the Column 2 distances are as follows:

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751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

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---

**Revised Text**

Part: 4 Section: 44

Rule: 444 D

**CP2825**

**Subcommittee Recommendation:** Accept

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brubaker, Doering, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (1) Erga

**Abstention:** (0)

**Explanation of Vote:**

ERGA: The second paragraph of Rule 444D should be replaced with the following paragraph: "Before installing personal protective grounding equipment the line and equipment shall be tested to ensure it is de-energized using a properly rated voltage detector. After the line and equipment has been proven to be de-energized, properly sized personal protective grounding equipment, specified in ASTM F855, shall be placed at such locations and arranged in such a manner to prevent each employee from being exposed to hazardous differences in electrical potential (equipotential grounding methods) that might arise from the effects of electromagnetic and electrostatic induction and accidental re-energization of the lines and equipment." The existing paragraph and proposed revision is inconsistent with current OSHA 1910.269 regulations and current industry accepted practices. A number of industry published papers and research projects have shown that installing grounds on each side of the work location (bracket grounding) may not provide adequate worker protection. In fact, grounds on both sides of the worksite have shown to increase the voltage and hazard across the worksite. I agree also the word "single point" should be removed from the current rule and the proposed paragraph should replace the existing wording. The paragraph should also include verbiage to require testing of the line and equipment with a properly rated voltage detector. "Fussing or Bussing" with a wrench or screwdriver is not an industry accepted practice. But, current rule wording does not discuss proper testing methods.

Rule 445.A.2 should have the second sentence removed "Grounding switches may be employed to connect the equipment or lines being grounded to the actual ground connections." The use of ground switches may not provide adequate worker protection and in fact when used on transmission lines can create lethal electromagnetic induction hazards.

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**Revised Text**

Part: 4 Section: 44

Rule: 445 B

**CP2819**

**Subcommittee Recommendation:** Accept as modified

**Subcommittee Comment:**

**Vote on Subcommittee Recommendation:**

**Affirmative:** (18) Brubaker, Doering, Erga, Fass, Grose, Henry, Hunt, Kientz, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, Tuggle, White

**Negative:** (0)

**Abstention:** (0)

**Explanation of Vote:**

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**New Text**

Part: 4 Section: 44

Rule: 448

**CP2640**

**Subcommittee Recommendation:** Reject

**Subcommittee Comment:**

Recommend the formation of a WG 8.11 to work on this issue.

January 13, 2004

WG reviewed the original CP and proposed modifications. The Subcommittee decided that the existing code

language was appropriate. Also the SC believed that the CP and the modifications added an unnecessary layer of complexity.

**Vote on Subcommittee Recommendation:**

**Affirmative:** (17) Brooks, Brubaker, Erga, Fass, Grose, Henry, Hunt, McKinney, Mitchell, Poholski, Schweitzer, Spadafore, Theis, Tomaseski, Tootle, White, Woodings

**Negative:** (1) Doering

**Abstention:** (1) Kientz

**Explanation of Vote:**

DOERING: The NESC is overdue to have an approach distance to exposed energized facilities requirement for unqualified persons. The following was essentially my recommendation to WG 8.11, and I recommend their adoption. The proposed tables provide support to OSHA's 1910 Subpart S and NFPA 70E approach distance tables. Two limited approach distances are proposed, one for a worker with no conductive objects involved, and a second for when conductive objects are involved, such as tools, cranes, TV towers, etc. For the most part the proposal to replace "in the vicinity" with "within the limited approach distance" improves the document.

New Definition: limited approach boundary. An approach distance from exposed energized parts within which a shock hazard exists for unqualified persons. New Rule: 448. Limited Approach Boundary. The limited approach boundary is the minimum distance to exposed energized parts for unqualified persons. The boundary may be crossed by qualified communication persons (rule 430) or supply persons (rule 440).

A. Unqualified Persons' Limited Approach Boundary. All persons that do not meet the requirements for qualified shall not approach, or knowingly permit others to approach, energized parts closer than the distances specified in column 2 of Table 448-1. Work procedures, barricades, or barriers, shall be provided where an unqualified person could make unintentional contact with energized parts.

B. Limited Approach Boundary To Exposed Energized Parts For Conductive Objects In Contact With Unqualified Persons. Equipment such as dump bed trucks, cranes, augers, etc., operated by unqualified persons shall take appropriate precautions to assure that the operation of such equipment does not violate the limited approach boundary specified in column 3 of Table 448-1. Extension ladders, poles, antenna towers, long conductive tools, etc., shall be restrained or otherwise controlled so as not to violate the provisions of this paragraph. Work procedures, barricades, or barriers, shall be provided where an unqualified person in contact with a conductive tool or piece of equipment could make unintentional contact with energized parts.

Exception: Unqualified persons accompanied by and under the direct supervision of a qualified person, may cross the limited approach boundary in extreme situations where communications or supply persons do not possess the knowledge or skills to perform the specific task. The unqualified person shall be given instructions on approach distances and associated electrical hazards. The unqualified person shall repeat the instructions to the qualified person to the latter's satisfaction (see rule 421C).

C. Vehicular and Mechanical Equipment in Transit

1. Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that the limited approach boundary in Table 448-1, Column 3 is maintained; however, under any of the following conditions, the distance may be reduced:

a. If the vehicle is in transit with its structure lowered, the distance specified in Table 448-1, Column 3 may be reduced by 6 feet (1.83 m).

b. If insulating barriers are installed to prevent contact with the energized parts, and if the barriers are rated for the voltage of the energized part being guarded and are not a part of or an attachment to the vehicle or its raised structure, the distance may be reduced to a distance within the designed working dimensions of the insulating barrier.

c. If the equipment is an aerial device insulated for the voltage involved, and if the work is performed by a qualified person, the distance (between the uninsulated portion of the aerial device and the energized part) may be reduced to the distance of rule 431 for communications employees or rule 441 for supply employees.

2. Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

- a. The employee is using protective equipment rated for the phase-to-ground voltage; or
- b. The vehicle or equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path for persons on the ground) can come closer to the line than permitted in Table 448-1, Column 3.

3. If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of energized part contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous step, touch, and transfer voltages within 3 m (10 ft) of any extremity of the grounding point or grounded object.

Table 448-1

Limited Approach Distance To Exposed Energized Parts _____				
(See Rule 448 in its entirety.)				
Nominal System _____		Limited Approach Boundaries		
Voltage Range, _____	Distance From Person To _____	Distance From Long _____	Phase to Phase _____	Exposed Energized Circuit _____
		Part1 _____	(In Contact With Person)	
		To Exposed Energized Part		
Column 1 _____	Column 2 _____	Column 3 _____		
0 to 50 Volts _____	Not Specified _____	Not Specified _____	Not Specified _____	Not Specified _____
51 to 300 Volts _____	3 ft 6 in _____	1.07 m _____	10 ft 0 in _____	3.05 m _____
301 to 750 Volts _____	3 ft 6 in _____	1.07 m _____	10 ft 0 in _____	3.05 m _____
751 Volts to 15 kV _____	5 ft 0 in _____	1.53 m _____	10 ft 0 in _____	3.05 m _____
15.1 kV to 36 kV _____	6 ft 0 in _____	1.83 m _____	10 ft 0 in _____	3.05 m _____
36.1 kV to 46 kV _____	8 ft 0 in _____	2.44 m _____	10 ft 0 in _____	3.05 m _____
46.1 kV to 72.5 kV _____	8 ft 0 in _____	2.44 m _____	10 ft 0 in _____	3.05 m _____
72.6 kV to 121 kV _____	8 ft 0 in _____	2.44 m _____	10 ft 8 in _____	3.26 m _____
138 kV to 145 kV _____	10 ft 0 in _____	3.05 m _____	11 ft 0 in _____	3.36 m _____
161 kV to 169 kV _____	11 ft 8 in _____	3.56 m _____	11 ft 8 in _____	3.56 m _____
230 kV to 242 kV _____	13 ft 0 in _____	3.97 m _____	13 ft 0 in _____	3.97 m _____
345 kV to 362 kV _____	15 ft 4 in _____	4.68 m _____	15 ft 4 in _____	4.68 m _____
500 kV to 550 kV _____	19 ft 0 in _____	5.80 m _____	19 ft 0 in _____	5.80 m _____
765 kV to 800 kV _____	23 ft 9 in _____	7.24 m _____	23 ft 9 in _____	7.24 in _____

Note 1 If energized part is a movable conductor, increase the distance to allow for swing in direction of person or held object.

Source/Justification for table clearances:

The voltage ranges shown in Column 1 are the same as used by OSHA in 1910.269, as well as in IEEE Std 516.

The source for the Column 2 distances are as follows:

0 - 750 volts, based on NEC Table 110-26(a) Working Clearances Condition 2 for 151-600V.

751 Volts to 145 kV, based on values in NEC Table 110-34(a) Working Clearances Condition 2.

The source for the Column 3 distances are based on the following distances:

- (1) For voltages to ground 50 kV or below B 10 ft.
- (2) For voltages to ground over 50 kV B 10 ft. plus 4 in. For every 10 kV over 50 kV.

This is the OSHA 10 ft rule provisions. OSHA`s 10 ft rule appeared in their standards as early as October 1972. It is believed that OSHA took their 10 ft rule from the Crawler, Locomotive, and Truck Cranes USA Standard B30.5-1968, as it essentially reads the same as in their original crane standard 1910.181(j)(5). These values have worked for 35 years, so they are okay.

**Meeting Conclusion:**

Following working groups were formed to address unresolved CPs:  
 WG 8.10 to address Protective Clothing: Tomaseski(chair)

CP 2814 and CP 2815

WG 8.11 to address "in the vicinity of": Kientz (chair)  
CP 2640 and CP 2564

WG 8.12 to address altitude adjustment for Min Approach Distance: Grose (chair)  
CP 2524 and CP 2525

WG 8.13 to address Maximum Use Voltage: Theis (chair)  
CP 2562, CP 2563, CP 2627, CP 2628, CP 2816, CP 2817, CP 2818, and CP2820

Working groups will submit a revised CP to be acted on by Subcommittee 8 for inclusion in the preprint of the 2007 edition. Working group reports are to be submitted to SC 8 Chair by no later than December 19.

OSHA 1910.269/Subpart V – David Wallis reviewed the status of the revision to these standards and where the process will go from this point.

Hank Kientz resigned as chairman of SC8. Hank will remain active with the subcommittee.

A tribute to John Dahmer:

John unexpectedly passed away earlier this year. John spent many years on Subcommittee 8 and contributed his expertise, dedication, and commitment to worker safety. John will be greatly missed by all.