

Tables from the National Electrical Safety Code

Correction Sheet
September 29, 1989

Pages 24 and 25. Replace Tables 232-2 FT and 232-2 M with the following corrected tables.

Table 232-2 Vertical Clearance of Equipment Cases and Unguarded Rigid Live Parts Above Ground or Roadway Surfaces			
(Voltages are phase-to-ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definition section for voltages of other systems.)			
	Effectively grounded equipment cases ⑥	Unguarded rigid live parts of 0 to 750 V and ungrounded cases that contain equipment connected to circuits of not more than 750 V	Unguarded rigid live parts of over 750 V to 22 kV and ungrounded cases that contain equipment connected to circuits of over 750 V to 22 kV
Nature of surface below:	(ft)	(ft)	(ft)
1. Where rigid parts overhang:			
a. Roads, streets, alleys; nonresidential driveways; parking lots and other areas subject to truck traffic ④	15.0	16.0	18.0
b. Residential driveways	15.0	16.0 ①	18.0
c. Other land traversed by vehicles such as cultivated land, grazing land, forest, orchard, etc.	15.0	16.0	18.0
d. Spaces and ways subject to pedestrians or restricted traffic only ⑤	11.0 ⑦	12.0 ⑧	14.0
2. Where rigid parts are along and within the limits of highways or other road rights- of-way but do not overhang the roadway:			
a. Roads, streets, and alleys	15.0	16.0	18.0
b. Roads in rural districts where it is unlikely that vehicles will be crossing under the line	13.0 ⑦	14.0 ②	16.0

① This clearance may be reduced to the following values:
(feet)

- a. Insulated live parts limited to 300 V to ground 12
- b. Insulated live parts limited to 150 V to ground and drip loops of service drop conductors limited to 150 V to ground and meeting Rules 230C2 or 230C3. 10

② Where a supply line along a road is limited to 300 V to ground and is located relative to fences, ditches, embankments, etc, so that the ground under the line would not be expected to be traveled except by pedestrians, this clearance may be reduced to 12 ft.

③ This footnote not used in this edition.

④ For the purpose of this rule, trucks are defined as any vehicle exceeding 8 ft in height. Areas not subject to truck traffic are areas where truck traffic is not normally

encountered or not reasonably anticipated.

⑤ Spaces and ways subject to pedestrians or restricted traffic only are those areas where equestrians, vehicles, or other mobile units, exceeding 8 ft in height, are prohibited by regulation or permanent terrain configurations or are otherwise not normally encountered or not reasonably anticipated.

⑥ The bottom of the housing of traffic control signals suspended over the traveled portion of the roadway shall be not less than 15 ft nor more than 19 ft above the grade at the center of the roadway.

⑦ Effectively grounded equipment cases such as fire alarm boxes, traffic control boxes, or meters may be mounted over a walkway at a lower level for accessibility provided such equipment does not unduly obstruct the walkway.

(Continued on next page)

Table 232-2 Vertical Clearance of Equipment Cases and Unguarded Rigid Live Parts Above Ground or Roadway Surfaces

(Voltages are phase-to-ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definition section for voltages of other systems.)

M

Nature of surface below:	Effectively grounded equipment cases ⑥ (m)	Unguarded rigid live parts of 0 to 750 V and ungrounded cases that contain equipment connected to circuits of not more than 750 V (m)	Unguarded rigid live parts of over 750 V to 22 kV and ungrounded cases that contain equipment connected to circuits of over 750 V to 22 kV (m)
1. Where rigid parts overhang:			
a. Roads, streets, alleys; nonresidential driveways; parking lots and other areas subject to truck traffic ④	4.6	4.9	5.5
b. Residential driveways	4.6	4.9 ①	15.5
c. Other land traversed by vehicles such as cultivated land, grazing land, forest, orchard, etc.	4.6	4.9	5.5
d. Spaces and ways subject to pedestrians or restricted traffic only ⑤	3.4 ⑦	3.6 ⑧	4.3
2. Where rigid parts are along and within the limits of highways or other road rights-of-way but do not overhang the roadway:			
a. Roads, streets, and alleys	4.6	4.9	5.5
b. Roads in rural districts where it is unlikely that vehicles will be crossing under the line	4.0 ⑦	4.3 ②	4.9

① This clearance may be reduced to the following values:
(meters)

- a. Insulated live parts limited to 300 V to ground 3.6
- b. Insulated live parts limited to 150 V to ground and drip loops of service drop conductors limited to 150 V to ground and meeting Rules 230C2 or 230C3. 3.0

② Where a supply line along a road is limited to 300 V to ground and is located relative to fences, ditches, embankments, etc, so that the ground under the line would not be expected to be traveled except by pedestrians, this clearance may be reduced to 3.6 m.

③ This footnote not used in this edition.

④ For the purpose of this rule, trucks are defined as any vehicle exceeding 2.45 m in height. Areas not subject to truck traffic are areas where truck traffic is not normally

encountered or not reasonably anticipated.

⑤ Spaces and ways subject to pedestrians or restricted traffic only are those areas where equestrians, vehicles, or other mobile units, exceeding 2.45 m in height, are prohibited by regulation or permanent terrain configurations or are otherwise not normally encountered or not reasonably anticipated.

⑥ The bottom of the housing of traffic control signals suspended over the traveled portion of the roadway shall be not less than 4.6 m nor more than 5.8 m above the grade at the center of the roadway.

⑦ Effectively grounded equipment cases such as fire alarm boxes, traffic control boxes, or meters may be mounted over a walkway at a lower level for accessibility provided such equipment does not unduly obstruct the walkway.

National Electrical Safety Code

1990 Edition

***Tentative Interim Amendment 90-1
and
Second Correction Sheet***

July 15, 1990

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ANSI C2-1990

**Tentative Interim Amendment 90-1
to the
National Electrical Safety Code
ANSI C2-1990**

In accordance with Section 13 of its Procedures, the National Electrical Safety Code Committee has issued the following Tentative Interim Amendment (TIA) to ANSI C2, National Electrical Safety Code, 1990 Edition. The TIA was issued by the Secretariat on June 7, 1990, as a result of a proposal submitted by a member of Technical Subcommittee 4 on Overhead Line Clearances.

A Tentative Interim Amendment is tentative because it has not been processed through the entire standards-making procedure. It is interim because it is effective only between editions of the code. A TIA automatically becomes a Proposal of the proponent for the next edition of the code; as such, it is then subject to all the procedures of the standards-making process.

1. In the third line of the definition of "V" in Rule 234I, change "22 ft (6.7 m)" to "20 ft (6.1 m)."
2. In footnotes (2) and (16) to Table 232-1 FT, change "22 ft" to "20 ft" (3 locations). In the metric table (Table 232-1 M), footnotes (2) and (16), change "6.7 m" to "6.1 m."

ANSI C2-1990

Errata

- page 47: In Rule 014A1c, the word "shall" is misspelled.
In Rule 015B, the word "conductions" should read "conditions."
- pages 108, 109: In Rules 127A1, 127A2, and 127A5, "105 ohm-cm" should be "10⁵ ohm-cm."
- page 134: In Rules 180B5 and 180B6, "181B4" should be "180B4."
- page 189: In Table 233-1, row 3, fifth column, "2.0" should read "0.60."
In row 4, the second and fourth columns, "2.40" should read "1.80."
- page 196: In Rule 234C3 the word "to" should be deleted as shown below:

Where the permanent attachment of supply conductors of any class ~~to~~ is necessary for an entrance, such conductors shall meet the following requirements over or along the installation to which the conductors are attached:

- page 277: The equations should read as follows:

$$\begin{aligned} \text{pressure in lbf/ft}^2 &= 0.00256 (v_{\text{mi/h}})^2 \\ \text{pressure in pascals} &= 0.613 (v_{\text{m/s}})^2 \end{aligned}$$

Fig 250-1 is missing only from the Second Printing. See Fig 250-1 on page 3 of this correction sheet.

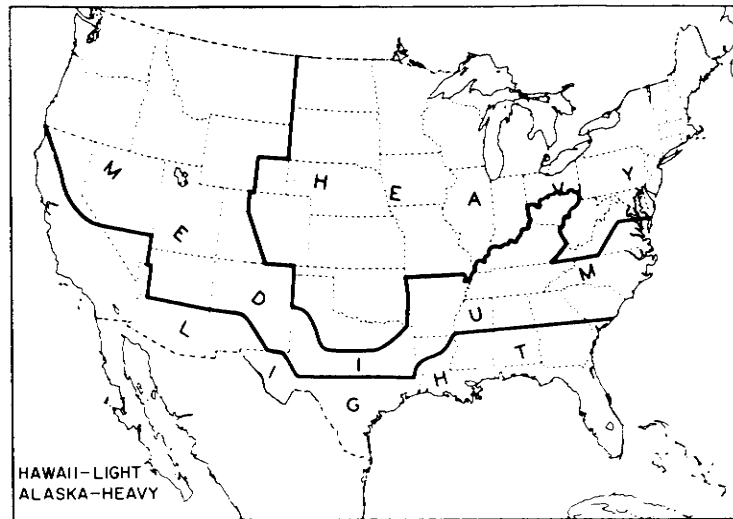
- page 289: In Rule 261A2b(2) *EXEPTION 2*, the word "length" should be "strength," as shown below:

EXCEPTION 2: At a grade B crossing in a straight section of line, wood structures complying with the transverse strength requirements of Rule 261A2b(2) without the use of transverse guys shall be considered as having the required longitudinal ~~length,~~ **strength**, providing the longitudinal strength is comparable to the transverse strength of the structure. This exception does not modify the requirements of this rule for dead ends.

ANSI C2-1990

page 373: In Rule 441A2, "100 feet (300 meters)" should be "1000 feet (300 meters)."

**Fig 250-1
General Loading Map of United States with Respect
to Loading of Overhead Lines**



Tentative Interim Amendment 90-2 and Erratum

to the

National Electrical Safety Code

ANSI C2-1990

July 26, 1991

In accordance with Section 13 of its Procedures, the National Electrical Safety Code Committee has issued the following Tentative Interim Amendment (TIA) to ANSI C2, National Electrical Safety Code, 1990 Edition. The TIA was issued by the Secretariat on May 19, 1991, as a result of a proposal submitted by a member of Technical Subcommittee 4 on Overhead Line Clearances.

A Tentative Interim Amendment is tentative because it has not been processed through the entire standards-making procedure. It is interim because it is effective only between editions of the code. A TIA automatically becomes a Proposal of the proponent for the next edition of the code; as such, it is then subject to all the procedures of the standards-making process.

**Table 234-1 Clearance of Wires, Conductors, Cables, and Unguarded Rigid Live Parts FT
Adjacent but Not Attached to Buildings and Other Installations Except Bridges.**

(Voltages are phase-to-ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definitions section for voltages of other systems.)

Clearance of	Insulated communication conductors and cables; messengers; surge protection wires; grounded guys; neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (ft.)	Supply cables of 0 to 750 V meeting Rules 230C2 or 230C3 (ft.)	Unguarded rigid live parts, 0 to 750V; non-insulated communication conductors (ft.)	Supply cables over 750 V meeting Rules 230C2 or 230C3; open supply conductors, 0 to 750 V (ft.)	Open supply conductors, over 750 V to 22 kV (ft.)	Unguarded rigid live parts, over 750 V to 22 kV (ft.)
1. Buildings						
a. Horizontal						
(1) To walls, projections and guarded windows	4.5 (7)	5.0	5.0	5.5 (1)(2)(9)	7.5 (1)(2)(10)(11)	7.0
(2) To unguarded windows (8)	4.5	5.0	5.0	5.5 (1)(2)(9)	7.5 (10)(11)	7.0
(3) To balconies and areas accessible to pedestrians (3)	4.5	5.0	5.0	5.5 (9)	7.5 (10)(11)	7.0
b. Vertical						
(1) Over or under roofs or projections not accessible to pedestrians (3)	3.0	3.5	10.0	10.5	12.5	12.0
(2) Over or under balconies and roofs accessible to pedestrians (3)	10.5	11.0	11.0	11.5	13.5	13.0
(3) Over roofs accessible to vehicles but not subject to truck traffic (6)	10.5	11.0	11.0	11.5	13.5	13.0
(4) Over roofs accessible to truck traffic (6)	15.5	16.0	16.0	16.5	18.5	18.0
2. Signs, chimneys, billboards, radio and television antennas, tanks, and other installations not classified as buildings or bridges						
a. Horizontal (4)	3.0	3.5	5.0	5.5 (1)(2)(9)	7.5 (1)(2)(10)(11)	7.0
b. Vertical over or under (4)	3.0	3.5	5.5	6.0 (1)	8.0	7.5

(1) Where building, sign, chimney, antenna, tank, or other installation does not require maintenance such as painting, washing, changing of sign letters, or other operations that would require persons to work or pass between supply conductors and structure, the clearance may be reduced by 2 ft.

(2) Where available space will not permit this value, the clearance may be reduced by 2 ft, provided the conductors, including splices and taps, have a covering that provides sufficient dielectric to prevent a short circuit in case of momentary contact between the conductors and a grounded surface.

(3) A roof, balcony, or area is considered accessible to pedestrians if the means of access is through a doorway, ramp, window, stairway, or permanently mounted ladder. A permanently mounted ladder is not considered a means of access if its bottom rung is 8 ft or more from the ground or other permanently installed accessible surface.

(4) The required clearances shall be to the closest approach of motorized signs or moving portions of installations covered by Rule 234C.

(5) This footnote not used in this edition.

(6) For the purpose of this rule, trucks are defined as any vehicle exceeding 8 ft in height.

(7) This clearance may be reduced to 3 in for the grounded portions of guys.

(8) Windows not designed to open may have the clearances permitted for walls and projections.

(9) This clearance shall be not less than 3.5 ft with the conductor or cable displaced by wind; see Rule 234C1b.

(10) This clearance shall be not less than 4.5 ft with the conductor displaced by wind; see Rule 234C1b.

(11) Where available space will not permit this value, the clearance may be reduced to 7.0 ft for conductors limited to 8.7 kV to ground.

Table 234-1 Clearance of Wires, Conductors, Cables, and Unguarded Rigid Live Parts Adjacent but Not Attached to Buildings and Other Installations Except Bridges. M

(Voltages are phase-to-ground for effectively grounded circuits and those other circuits where all ground faults are cleared by promptly de-energizing the faulted section, both initially and following subsequent breaker operations. See the definitions section for voltages of other systems.)

Clearance of	Insulated communication conductors and cables; messengers; surge protection wires; grounded guys; neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (m)	Supply cables of 0 to 750 V meeting Rules 230C2 or 230C3 (m)	Unguarded rigid live parts, 0 to 750V; non-insulated communication conductors (m)	Supply cables over 750 V meeting Rules 230C2 or 230C3; open supply conductors, 0 to 750 V (m)	Open supply conductors, over 750 V to 22 kV (m)	Unguarded rigid live parts, over 750 V to 22 kV (m)
1. Buildings						
a. Horizontal						
(1) To walls, projections and guarded windows	1.40 (7)	1.50	1.50	1.70 (1)(2)(9)	2.30 (1)(2)(10)(11)	2.00
(2) To unguarded windows (8)	1.40	1.50	1.50	1.70 (1)(2)(9)	2.30 (10)(11)	2.00
(3) To balconies and areas accessible to pedestrians (3)	1.40	1.50	1.50	1.70 (9)	2.30 (10)(11)	2.00
b. Vertical						
(1) Over or under roofs or projections not accessible to pedestrians (3)	0.90	1.07	3.0	3.2	3.8	3.6
(2) Over or under balconies and roofs accessible to pedestrians (3)	3.2	3.4	3.4	3.5	4.1	4.0
(3) Over roofs accessible to vehicles but not subject to truck traffic (6)	3.2	3.4	3.4	3.5	4.1	4.0
(4) Over roofs accessible to truck traffic (6)	4.7	4.9	4.9	5.0	5.6	5.5
2. Signs, chimneys, billboards, radio and television antennas, tanks, and other installations not classified as buildings or bridges						
a. Horizontal (4)	0.90	1.07	1.50	1.70 (1)(2)(9)	2.30 (1)(2)(10)(11)	2.00
b. Vertical over or under (4)	0.90	1.07	1.70	1.80(1)	2.45	2.30

(1) Where building, sign, chimney, antenna, tank, or other installation does not require maintenance such as painting, washing, changing of sign letters, or other operations that would require persons to work or pass between supply conductors and structure, the clearance may be reduced by 0.60 m.
 (2) Where available space will not permit this value, the clearance may be reduced by 0.60 m, provided the conductors, including splices and taps, have a covering that provides sufficient dielectric to prevent a short circuit in case of momentary contact between the conductors and a grounded surface.
 (3) A roof, balcony, or area is considered accessible to pedestrians if the means of access is through a doorway, ramp, window, stairway, or permanently mounted ladder. A permanently mounted ladder is not considered a means of access if its bottom rung is 2.45 m or more from the ground or other permanently installed accessible surface.

(4) The required clearances shall be to the closest approach of motorized signs or moving portions of installations covered by Rule 234C.
 (5) This footnote not used in this edition.
 (6) For the purpose of this rule, trucks are defined as any vehicle exceeding 2.45 m in height.
 (7) This clearance may be reduced to 75 mm for the grounded portions of guys.
 (8) Windows not designed to open may have the clearances permitted for walls and projections.
 (9) This clearance shall be not less than 1.07 m with the conductor or cable displaced by wind; see Rule 234C1b.
 (10) This clearance shall be not less than 1.40 m with the conductor displaced by wind; see Rule 234C1b.
 (11) Where available space will not permit this value, the clearance may be reduced to 2.00 m for conductors limited to 8.7 kV to ground.

Erratum to the National Electrical Safety Code, 1990 Edition

In Table 232-1, Metric, Column 1, Row 7(a) through 7(d) should read as follows:

- (a) Less than 8 ha
- (b) 8 to 80 ha
- (c) 80 to 800 ha
- (d) Over 800 ha

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