

Ground Clearance to Midspan

N.E.S.C. Rule 232B1

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Current edition of the N.E.S.C. 2002:

232B1 - B. Clearance of Wires, Conductors, Cables, Equipment, and Support Arms Mounted on Supporting Structures

1. Clearance to Wires, Conductors, and Cables

The vertical clearance of wires, conductors, and cables above ground in generally accessible places, roadway, rail, or water surfaces, shall be not less than that shown in Table 232-1.

ft

Table 232-1

Vertical Clearance of Wires, Conductors, and Cables Above Ground, Roadway, Rail, or Water Surfaces²⁵

(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. See Rules 232B1, 232C1a, and 232D4.)

Nature of surface underneath wires, conductors, or cables	Insulated communication conductors and cable; messengers; surge-protection wires; grounded guys; ungrounded guys exposed to 0 to 300 V ^{11, 15} ; neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1 (ft)	Noninsulated communication conductors; supply cables of 0 to 750 V meeting Rules 230C2 or 230C3 (ft)	Supply cables over 750 V meeting Rules 230C2 or 230C3; open supply conductors, 0 to 750 V; ungrounded guys exposed to over 300 V to 750 V ¹⁴ (ft)	Open supply conductors, over 750 V to 22 kV; ungrounded guys exposed to 750 V to 22 kV ¹⁴ (ft)	Trolley and electrified railroad contact conductors and associated span or messenger wires	
					0 to 750 V to ground (ft)	Over 750 V to 22 kV to ground (ft)
Where wires, conductors, or cables cross over or overhang						
1. Track rails of railroads (except electrified railroads using overhead trolley conductors) ^{2, 16} .	23.5	24.0	24.5	26.5	22.0 ⁴	22.0 ⁴
2. Roads, streets, and other areas subject to truck traffic ²³	15.5	16.0	16.5	18.5	18.0 ⁵	20.0 ⁵
3. Driveways, parking lots, and alleys ²³	15.5 ^{7, 13}	16.0 ^{7, 13}	16.5 ⁷	18.5	18.0 ⁵	20.0 ⁵
4. Other land traversed by vehicles, such as cultivated, grazing, forest, orchards, etc. ²⁶	15.5	16.0	16.5	18.5	—	—
5. Spaces and ways subject to pedestrians or restricted traffic only ⁹	9.5	12.0 ⁸	12.5 ⁸	14.5	16.0	18.0
6. Water areas not suitable for sailboating or where sailboating is prohibited ²¹	14.0	14.5	15.0	17.0	—	—

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7. Water areas suitable for sailboating including lakes, ponds, reservoirs, tidal waters, rivers, streams, and canals with an unobstructed surface area of ^{17, 18, 19, 20, 21}						
a. Less than 20 acres	17.5	18.0	18.5	20.5	—	—
b. Over 20 to 200 acres	25.5	26.0	26.5	28.5	—	—
c. Over 200 to 2000 acres	31.5	32.0	32.5	34.5	—	—
d. Over 2000 acres	37.5	38.0	38.5	40.5	—	—
8. Established boat ramps and associated rigging areas; areas posted with sign(s) for rigging or launching sail boats	Clearance above ground shall be 5 ft greater than in 7 above, for the type of water areas served by the launching site					
Where wires, conductors, or cables run along and within the limits of highways or other road rights-of-way but do not overhang the roadway						
9. Roads, streets, or alleys	15.5 ²⁴	16.0	16.5	18.5	18.0 ⁵	20.0 ⁵
10. Roads in rural districts where it is unlikely that vehicles will be crossing under the line	13.5 ^{10, 12}	14.0 ¹⁰	14.5 ¹⁰	16.5	18.0 ⁵	20.0 ⁵

1 Where subways, tunnels, or bridges require it, less clearance above ground or rails than required by Table 232-1 may be used locally. The trolley and electrified railroad contact conductor should be graded very gradually from the regular construction down to the reduced elevation.

2 For wires, conductors, or cables crossing over mine, logging, and similar railways that handle only cars lower than standard freight cars, the clearance may be reduced by an amount equal to the difference in height between the highest loaded car handled and 20 ft, but the clearance shall not be reduced below that required for street crossings.

3 This footnote not used in this edition.

4 In communities where 21 ft has been established, this clearance may be continued if carefully maintained. The elevation of the contact conductor should be the same in the crossing and next adjacent spans. (See Rule 225D2 for conditions that must be met where uniform height above rail is impractical.)

5 In communities where 16 ft has been established for trolley and electrified railroad contact conductors 0 to 750 V to ground, or 18 ft for trolley and electrified railroad contact conductors exceeding 750 V, or where local conditions make it impractical to obtain the clearance given in the table, these reduced clearances may be used if carefully maintained.

6 This footnote not used in this edition.

7 Where the height of a building or other installation does not permit service drops to meet these values, the clearances over residential driveways only may be reduced to the following: (feet)

- | | |
|--|------|
| (a) Insulated supply service drops limited to 300 V to ground | 12.5 |
| (b) Insulated drip loops of supply service drops limited to 300 V to ground | 10.5 |
| (c) Supply service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3 | 12.0 |
| (d) Drip loops only of service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3 | 10.0 |
| (e) Insulated communication service drops | 11.5 |

8 Where the height of a building or other installation does not permit service drops to meet these values, the clearances may be reduced to the following: (feet)

- | | |
|---|------|
| (a) Insulated supply service drops limited to 300 V to ground | 10.5 |
| (b) Insulated drip loops of supply service drops limited to 300 V to ground | 10.5 |
| (c) Supply service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3 | 10.0 |
| (d) Drip loops only of supply service drops limited to 150 V to ground and meeting Rules 230C1 or 230C3 | 10.0 |

9 Spaces and ways subject to pedestrians or restricted traffic only are those areas where riders on horses or other large animals, vehicles, or other mobile units exceeding a total height of 8 ft are prohibited by regulation or permanent terrain configurations, or are otherwise not normally encountered nor reasonably anticipated.

10 Where a supply or communication line along a road 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, the clearances may be reduced to the following values: (feet)

- | | |
|---|------|
| (a) Insulated communication conductor and communication cables. | 9.5 |
| (b) Conductors of other communication circuits | 9.5 |
| (c) Supply cables of any voltage meeting Rule 230C1, supply cables limited to 150 V to ground meeting Rules 230C2 or 230C3, and neutral conductors meeting Rule 230E1 | 9.5 |
| (d) Insulated supply conductors limited to 300 V to ground | 12.5 |
| (e) Guys | 9.5 |

11 No clearance from ground is required for anchor guys not crossing tracks, rails, streets, driveways, roads, or pathways.

12 This clearance may be reduced to 13 ft for communication conductors and guys.

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- 13 Where this construction crosses over or runs along alleys, driveways, or parking lots not subject to truck traffic this clearance may be reduced to 15 ft.
- 14 Ungrounded guys and ungrounded portions of span guys between guy insulators shall have clearances based on the highest voltage to which they may be exposed due to a slack conductor or guy.
- 15 Anchor guys insulated in accordance with Rule 279 may have the same clearance as grounded guys.
- 16 Adjacent to tunnels and overhead bridges that restrict the height of loaded rail cars to less than 20 ft, these clearances may be reduced by the difference between the highest loaded rail car handled and 20 ft, if mutually agreed to by the parties at interest.
- 17 For controlled impoundments, the surface area and corresponding clearances shall be based upon the design high-water level.
- 18 For uncontrolled water flow areas, the surface area shall be that enclosed by its annual high-water mark. Clearances shall be based on the normal flood level; if available, the 10-year flood level may be assumed as the normal flood level.
- 19 The clearance over rivers, streams, and canals shall be based upon the largest surface area of any 1-milong segment that includes the crossing. The clearance over a canal, river, or stream normally used to provide access for sailboats to a larger body of water shall be the same as that required for the larger body of water.
- 20 Where an overwater obstruction restricts vessel height to less than the applicable reference height given in Table 232-3, the required clearance may be reduced by the difference between the reference height and the over water obstruction height, except that the reduced clearance shall be not less than that required for the surface area on the line-crossing side of the obstruction.
- 21 Where the US Army Corps of Engineers, or the state, or surrogate thereof has issued a crossing permit, clearances of that permit shall govern.
- 22 See Rule 234I for the required horizontal and diagonal clearances to rail cars.
- 23 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 nor reasonably anticipated.
- 24 Communication cables and conductors may have a clearance of 15 ft where poles are back of curbs or other deterrents to vehicular traffic.
- 25 The clearance values shown in this table are computed by adding the applicable Mechanical and Electrical (M & E) value of Table A-1 to the applicable Reference Component of Table A-2a of Appendix A.
- 26 When designing a line to accommodate oversized vehicles, these clearance values shall be increased by the difference between the known height of the oversized vehicle and 14 ft.

History

(Important note: Always review the footnotes. The current ones are listed above but too many changes have been made over the years and were omitted to save room. Remember that the footnotes carry as much weight as the main rules.)

The rules origination is in Rule 220 Table 2 of the proposed rules in 1915:

Nature of crossing	Signal, guys, spans, overhead ground wires, service loops	0 to 7500 volts	7500 and higher volts	Trolley contact wires and trolley feeders
Crossing above railroads handling standard freight cars.....	25	25	25	21 (a)
Crossing or along streets or alleys in urban districts	18	20	25	18
Crossing or along streets or roads in rural districts (over the traveled way)	18	20	25	18
Crossings above spaces or ways accessible to pedestrians only....	10	15	20	18

(a) In many localities 22 feet is provided and considered good practice.

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In 1916, the rule moved to 240a and was changed as follows:

TABLE 1

Road Crossing Clearances

[The numbers represent the clearances in feet to be provided by the conductors or wires at the heads of columns, above places specified at the side of the table]

Nature of crossing	Signal, guys, spans, lightning-protection wires, supply lines less than 300 volts to ground, messengers	300 volts to ground up to 15 000 volts	15 000 to 50 000 volts ^a	Trolley contact wires (not feeder cables)
Crossing above track rails of railroads handling standard freight cars where brakemen are permitted on top.....	b 27	b 28	30	c 22
Crossing or along streets or alleys in urban districts or crossing streets or roads in rural districts (over the traveled way) or over track rails not included above.....	d 18	20	22	e 16
Along roads in rural districts.....	d 15	18	20	e 16
Crossings above spaces or ways accessible to pedestrians only.....	f 10	15	17	e 16

This Rule was moved to 220a in 1921 with this minor modification:

Crossings above spaces or ways accessible to pedestrians only.....	f 12	15	17	e, g 16
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This Rule was moved to 232 in 1927 for the 4th edition of the code. A column was added specifically to address guys and communications messengers as well as additional voltage differences

Table 1.—Minimum Vertical Clearance of Wires Above Ground or Rails

[All voltages are between wires unless otherwise stated. Supply wires include trolley feeders]

Nature of ground or rails under- neath wires	Guys; messen- gers; communi- cation, span, and lightning protection wires; per- manently grounded contin- uous-metal- sheath cables. All voltages	Open supply line wires, arc wires, and service drops			Trolley con- tact conduc- tors and associ- ated span or messenger wires *	
		0 to 750 volts	750 to 15,000 volts	15,000 to 50,000 volts	0 to 750 volts to ground	Ex- ceed- ing 750 volts to ground

WHERE WIRES CROSS OVER

Track rails of railroads handling freight cars on top of which men are permitted ^b	Feet ^a 27	Feet ^a 27	Feet ^a 28	Feet 30	Feet ^a 22	Feet ^a 22
Track rails of railroads not included above ^b	18	18	20	22	^a 18	^a 20
Streets, alleys, or roads in urban or rural districts.....	^f 18	18	20	22	^a 18	^a 20
Driveways to residence garages.....	10	10	20	22	^a 18	^a 20
Spaces or ways accessible to pedes- trians only.....	^a 15	^a 15	15	17	^a 16	^a 18

WHERE WIRES RUN ALONG

Streets or alleys in urban districts...	^f ^a 18	^f 18	20	22	^a 18	^a 20
Roads in rural districts.....	^f ^a 15	^f 15	18	20	^a 18	^a 20

In the 5th edition in 1948, only a minor modification to the basic clearances was made. It should be noted though that the footnotes were changed from letters to numbers. Please review the footnotes. There were too many changes over the years to list them all here.

Roads in rural districts.....	¹⁰ ¹¹ ¹² ¹⁴	¹⁰ ¹⁵	18	20	⁵ 18	⁵ 20
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Footnotes on following page.

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In 1977, the N.E.S.C. went through a major change to what you see below. Other changes have taken place since then, but only footnotes and heights. Please consult the more current versions where necessary.

Table 232-1. Minimum Vertical Clearance of Wires, Conductors, and Cables Above Ground, Rails, or Water
(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.)

Nature of surface underneath wires, conductors, or cables	Communication conductors and cables, guys, messengers, surge protection wires, neutral conductors meeting Rule 230E1, and supply cables meeting Rule 230 C1 (11) (ft)	Supply line conductors, street lighting conductors, and service drops				Trolley and electrified railroad contact conductors and associated span or messenger wires (1)	
		Open supply line conductors 0 to 750 V. Supply cables of all voltages meeting Rule 230C2 or 230C3 (ft)	Open supply line conductors		0 to 750 V to ground (ft)	750 V to 50 kV to ground (ft)	
			750 V to 15 kV (ft)	15 to 50 kV (ft)			
Where wires, conductors, or cables cross over							
1. Track rails of railroads (except electrified railroads using over-head trolley conductors) (2) (16) (21)	(3) (15) 27	(3) 27	(3) 28	30	(4) 22	(4) 22	
2. Roads, streets, alleys, parking lots subject to truck traffic (22) (23)	(6) (13) 18	18	20	22	(5) 18	(5) 20	
3. Residential driveways and commercial areas not subject to truck traffic (22) (23)	10	(8) 15	20	22	(5) 18	(5) 20	
4. Other land traversed by vehicles such as cultivated, grazing, forest, orchard, etc (17)	18	18	20	22	—	—	
5. Spaces or ways accessible to pedestraim only (9)	(7) 15	(8) (14) 15	15	17	16	18	
6. Water areas not suitable for sailboating or where sailboating is prohibited (20)	15	15	17	17	—	—	
7. Water areas suitable for sailboating including lakes, ponds, reservoirs, tidal waves, rivers, streams, and canals with an unobstructed surface area of: (18) (19) (20)							
(a) Less than 20 acres	18	18	20	22	—	—	
(b) 20 to 200 acres	26	26	28	30	—	—	
(c) 200 to 2000 acres	32	32	34	36	—	—	
(d) Over 2000 acres	38	38	40	42	—	—	
8. Public or posted private land and water areas for rigging or launching sailboats	Clearance above ground shall be 5 ft greater than in 7 above, for the type of water areas served by the launching site						
Where wires, conductors, or cables run along and within the limits of highways or other road rights-of-way but do not overhang the roadway							
9. Streets or alleys in urban districts	(10) (13) 18	(10) 18	20	22	(5) 18	(5) 20	
10. Roads in rural district	(10) (12) 14	(10) 15	18	20	(5) 18	(5) 20	

Footnotes for Table 232-1 on Pages 118-120