Clearances from Structures and Ground

Notes:

1 This standard covers only clearances from structures/objects. For working clearances for qualified workers, see WAC 296-5. For working clearances for unqualified workers, see WAC 296-155-428 and WAC 296-24-960.

2 For transmission lines, in addition to the additional clearance required by NESC-2002 Rule 232C1, Seattle City Light requires designs to add an extra 2 feet for construction tolerances.

3 Seattle City Light overhead triplex and quadraplex conductors are governed by NESC rule 230C3.

Vertical Clearance of Wires, Conductors, and Cables Above Ground, Roadway, Rail, or Water Surfaces[25] (with final unloaded sag).

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.

References: *NESC-2002, Table 232-1, Rule 232*	**cables**	**triplex & quadruplex**	**supply**	**SCL nominal Ø-Ø system voltage: 26 kV & 34 kV**	**trolley and electrified railroad contact conductors and associated span or messenger wires**	
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.	non-insulated 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.	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)[2,16,22]	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

Vertical Clearance of Wires, Conductors, and Cables Above Ground, Roadway, Rail, or Water Surfaces[25] (with final unloaded sag).

References: *NESC-2002, Table 232-1, Rule 232* **nature of surface underneath wires, conductors, or cables**	**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.	**triplex & quadruplex** noninsulated communication conductors; supply cables of 0 to 750 V meeting Rules 230C2 or 230C3 ft.	**supply** 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.	**SCL nominal Ø-Ø system voltage: 26 kV & 34 kV** 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						
6. Water areas not suitable for sailboating or where sailboating is prohibited[21]	14.0	14.5	15.0	17.0	–	–
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 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. 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]

Notes for tables on pages 1 and 2

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.

2 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 230C1or 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: (see top of next column)

		(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.

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-mile-long 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 overwater 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.

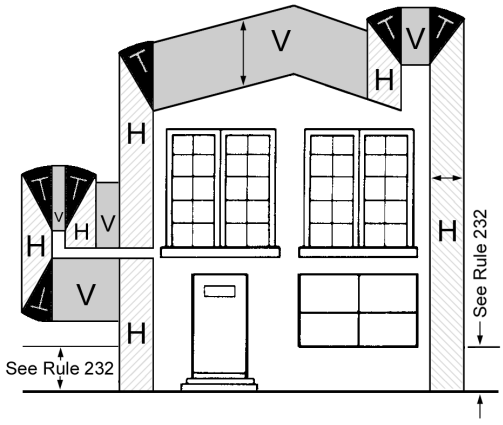
22 See Rule 234I for the required horizontal and diagonal clearances to rail cars.

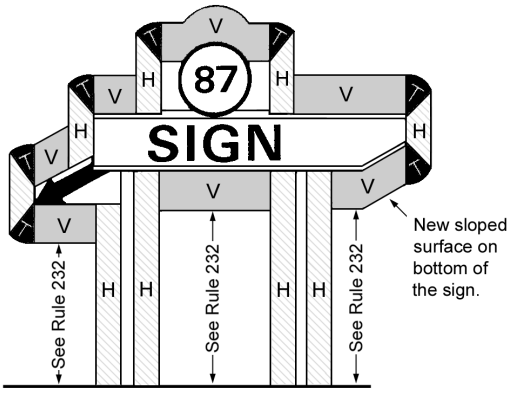
23 For the purpose of this Rule, trucks are defined as any vehicle exceeding 8 ft in height. Areas not subject to truck traffic are areas where truck traffic is not normally encountered nor reasonably anticipated.

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.





Legend

regions where conductors are prohibited		controlling clearance	control criteria
H		Horizontal	With wire, conductor, or cable displaced from the rest by a six-pound-per-square-foot wind force at final sag at 60° F.
V		Vertical	With final unloaded sag in the wire, conductor, or cable.
T	T	Transitional = Vertical (Arc)	

Reference: NESC-2002 Fig. 234-1

Clearance of Wires, Conductors, Cables, and Unguarded Rigid Live Parts Adjacent but Not Attached to Buildings and Other Installations Except Bridges [12]

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. Clearances are with no wind displacement except where stated in the footnotes below. See Rules 234C1a, 234C2, and 234H4.

References: NESC-2002, Table 234-1, Rule 234		**Triplex & Quadru-plex**				**SCL nominal Ø-Ø system voltage**
	insulated communication conductors and cables; messengers; surge-protection wires; grounded guys; ungrounded guys exposed to 0 to 300 V[12]; neutral conductors meeting Rule 230E1; supply cables meeting Rule 230C1[5] ft.	**under 750 V plus**		**over 750 V plus**		Open supply conductors, over 750 V to 22 kV ft.
clearance of		supply cables of 0 to 750 V meeting Rules 230C2 or 230C3 ft.	unguarded rigid live parts 0 to 750 V; non-insulated communication conductors; ungrounded equipment cases, 0 to 750 V; ungrounded guys exposed to open supply conductors of over 300 V to 750 V[5] ft.	supply cables over 750 V meeting Rules 230C2 or 230C3; open supply conductors, 0 to 750 V ft.	unguarded rigid live parts, over 750 V to 22 kV; ungrounded equipment cases, 750 V to 22 kV; ungrounded guys exposed to over 750 V to 22 kV[5] ft.	26 kV & 34 kV
1. Buildings						
a. Horizontal						
(1) To walls, projections, and guarded windows	4.5[1, 2, 7]	5.0[1, 2]	5.0[1, 2]	5.5[1, 2, 9]	7.0[1, 2]	See Note 14.
(2) To unguarded windows[8]	4.5	5.0	5.0	5.5[9]	7.0	See Note 14.
(3) To balconies and areas readily accessible to pedestrians[3]	4.5	5.0	5.0	5.5[9]	7.0	See Note 14.
b. Vertical [14]						
(1) Over or under roofs or projections not readily accessible to pedestrians[3]	3.0	3.5	10.0	10.5	12.0	See Note 14.
(2) Over or under balconies and roofs readily accessible to pedestrians[3]	10.5	11.0	11.0	11.5	13.0	See Note 14.
(3) Over roofs accessible to vehicles but not subject to truck traffic[6]	10.5	11.0	11.0	11.5	13.0	See Note 14.
(4) Over roofs accessible to truck traffic[6]	15.5	16.0	16.0	16.5	18.0	18.5
2. Other Installations not classified as buildings or bridges						
a. Horizontal [4]						
(1) To portions that are readily accessible to pedestrians[3]	4.5	5.0	5.0[1, 2]	5.5[9]	7.0[1, 2]	See Note 14.
(2) To portions that are not readily accessible to pedestrians[3]	3.0	3.5	5.0[1, 2]	5.5[1, 2, 9]	7.0[1, 2]	See Note 14.
b. Vertical						
(1) Over or under catwalks and other surfaces upon which personnel walk	10.5	11.0	11.0	11.5	13.0	See Note 14.
(2) Over or under other portions of such installations[4]	3.0	3.5	5.5	6.0[1]	7.5	See Note 14.

Notes for table on page 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 wires, conductors, cables or unguarded rigid live parts 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 wires, conductors, or cables, including splices and taps, and unguarded rigid live parts have a covering that provides sufficient dielectric strength to limit the likelihood of a short circuit in case of momentary contact with a structure or building.

3 A roof, balcony, or area is considered readily accessible to pedestrians if it can be casually accessed through a doorway, ramp, window, stairway, or permanently mounted ladder by a person on foot who neither exerts extraordinary physical effort nor employs special tools or devices to gain entry. A permanently mounted ladder is not considered a means of access if its bottom 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 Ungrounded guys and ungrounded portion of guys between guy insulators shall have clearances based on the highest voltage to which they may be exposed to a slack conductor or guy.

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 The clearance at rest shall be not less than the value shown in this table. Also, when the conductor or cable is displaced by wind, the clearance shall be not less than 3.5 ft; see Rule 234C1b.

10 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.

11 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-2b of Appendix A.

12 The anchor end of guys insulated in accordance with Rule 279 may have the same clearance as grounded guys.

13 For clearances above railings, walls, or parapets around balconies or roofs, use the clearances required for row 1b (1). For such clearances where an outside stairway exists, use the clearances required for row 2b (2).

14. See SCL 0100.04; Clearance Between 26 kV Overhead Distribution Conductors and Buildings."

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Clearance of Wires, Conductors, Cables, and Unguarded Rigid Live Parts from 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. Clearances are with no wind displacement except where stated in the footnotes below. See Rules 234D1a and 234H4.

References: NESC-2002, Table 234-2, Rule 234	**triplex & quadruplex**		**unguarded or ungrounded plus**	**SCL nominal Ø-Ø system voltage**
	unguarded rigid live parts 0 to 750 V; non-insulated communication conductors; supply cables of 0 to 750 V meeting Rules 230C2 or 230C3[7]	**supply**	unguarded rigid live parts, over 750 V to 22 kV; ungrounded equipment cases, 750 V to 22 kV; ungrounded guys exposed to open supply conductors of over 750 V to 22 kV [4] ft.	open supply conductors, over 750 V to 22 kV
clearance	ungrounded equipment cases, 0 to 750V; ungrounded guys exposed to open supply conductors over 300 V to 750 V [4] ft.	supply cables over 750 V meeting Rules 230C2 or 230C3[7], open supply conductors, 0 to 750 V ft.		26 kV & 34 kV ft.
1. Over bridges [1]				
a. Attached [3]	3.0	3.5	5.0	14.0[10]
b. Not attached	10.0	10.5	12.0	14.0[10]
2. Beside, under, or within bridge structure [6]				
a. Readily accessible portions of any bridge including wing, walls, and bridge attachments [1]				
(1) Attached [3]	3.0	3.5[8]	5.0	14.0[10]
(2) Not attached	5.0	5.5[8]	7.0	14.0[10]
b. Ordinarily inaccessible portions of bridges (other than brick, concrete, or masonry) and from abutments [2]				
(1) Attached [3, 5]	3.0	3.5[8]	5.0	14.0[10]
(2) Not attached [4, 5]	4.0	4.5[8]	6.0	14.0[10]

1 Where over traveled ways on or near bridges, the clearances of Rule 232 apply also.

2 Bridge seats of steel bridges carried on masonry, brick, or concrete abutments that require frequent access for inspection shall be considered as readily accessible portions.

3 Clearance from supply conductors to supporting arms and brackets attached to bridges shall be the same as specified in Table 235-6 (Rule 235E1) if the supporting arms and brackets are owned, operated, or maintained by the same utility

4 Ungrounded guys and ungrounded portions of 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.

5 Where conductors passing under bridges are adequately guarded against contact by unauthorized persons and can be de-energized and grounded per Rule 444D for maintenance of the bridge, clearances of the conductors from the bridge, at any point, may have the clearances specified in Table 235-6 for clearance from surfaces of support arms plus one-half the final unloaded sag of the conductor at that point.

6 Where the bridge has moving parts, such as a lift bridge, the required clearances shall be maintained throughout the full range of movement of the bridge or any attachment thereto.

7 Where permitted by the bridge owner, supply cables may be run in rigid conduit attached directly to the bridge. Refer to Part 3 for installation rules.

8 The clearance at rest shall be not less than the value shown in this table. Also, when the conductor or cable is displaced by wind, the clearance shall be not less than 3.5 ft; see Rule 234D1b.

9 The clearance at rest shall be not less than the value shown in this table. Also, when the conductor or cable is displaced by wind, the clearance shall be not less than 4.5 ft; see Rule 234D1b.

10 Seattle City Light policy is that the clearance shall be 10 feet (WAC 296-155-428) plus 4 feet for maintenance and construction of building surfaces.

Clearances - State Highways

The vertical clearance for overhead power and communication lines above the highway and the lateral and vertical clearance from bridges shall conform with the National Electrical Safety Code and/or with the clearances as shown below, whichever is greater.

Reference: WAC 468-34-290 (Wash. DOT - Utility Lines - Franchises and Permits)

type of utility line	vertical clearance	
	lines crossing roadways, ft.	longitudinal, ft.
Communications and Cable Television	24	20
Communications and/or Cable Television Joint Usage with Electrical	20	20

Reference: WAC 468-34-290 (Wash. DOT - Utility Lines - Franchises and Permits)

electrical phase-to-ground voltage	SCL nominal Ø-Ø system voltage	vertical clearance	
		lines crossing roadways, ft.	longitudinal, ft.
0 - 750 volts	–	24	24
751 - 15,000 volts	–	30	27
15,001 - 50,000 volts	26 kV & 34 kV	32	32
50,001 volts and over	–	34	32

Notes for State highway clearances

1 The minimum height of highway crossings shall be measured from the point of the roadway directly under the crossing.

2 The minimum height of longitudinal lines shall be measured from ground line.

3 All clearances shall be at State Electrical Construction Code temperature and loading standards, and comply with all other requirements of this code.

Definition of terms

Reference: WAC 468-34-110

Unless otherwise stated, words and phrases used herein shall have the following meaning:

1 Highway – A general term denoting a street, road or public way for purposes of vehicular travel, including the entire area within the right of way.

2 Roadway – The portion of a highway including shoulders, for vehicular use. A divided highway has two or more roadways.

3 SCL – Seattle City Light