Chapter E 123

CLEARANCES

The following sections of the Wisconsin Statutes apply to clearances, etc. Where the code requires greater clearance than the statutes the code requirements shall be used.

86.16 Electric lines on highways; place of poles; penalty.

(1) Any person, firm, or corporation including any foreign corporation authorized to transact business in this state may, with the written consent of the town board, but subject to the approval of the state highway commission, construct and operate telegraph, telephone or electric lines, or pipes or pipe lines for the purpose of transmitting messages, water, heat, light or power along, across or within the limits of any highway.

(2) All poles used in the construction of such lines shall be set in such manner as not to interfere with the use of such highway by the public, nor with the use of the adjoining land by the owner thereof; and all pole lines shall hereafter be constructed so as to meet the requirements of the Wisconsin state electrical code.

(3) No tree shall be cut, trimmed or the branches thereof cut or broken in the construction or maintenance of any such line without the consent of the owner of the tree.

(4) Any person erecting any telephone, telegraph, electric light or other pole or stringing any telephone, telegraph, electric light or other wire, or constructing any pipes or pipe lines in violation of the provisions of this section shall forfeit a sum not less than $10 nor more than $50.

(5) Any person, firm or corporation whose written application for permission to construct such lines within the limits of any highway of any town has been refused, or when such application shall have been on file with the town clerk for 20 days and no action shall have been taken thereon, such applicant may file with such town clerk a notice of appeal to the state highway commission. The town clerk shall thereupon make return of all the papers and action of the board to the

state highway commission, and such commission shall proceed to hear and try and determine such appeal on 10 days' notice to the town board, and the applicant. The order entered by the commission shall be final.

182.017 Transmission lines; privileges; damages.

(1) Right of way for. Any domestic corporation organized to furnish telegraph, telephone, service or transmit heat, power or electric current to the public or for public purposes, and any co-operative association organized under chapter 185 to furnish telegraph, telephone or transmit heat, power or electric current to its members, may, subject to reasonable regulations made by any city or village through which its transmission lines or systems may pass, construct and maintain such lines or system with all necessary appurtenances in, across or beneath any public highway or bridge or any stream or body of water, or upon any lands of any owner consenting thereto, and for such purpose may acquire lands or the necessary easements; and may connect and operate its lines or system with other lines or systems devoted to like business, within or without this state, and charge reasonable rates for the transmission and delivery of messages or the furnishing of heat, power or electric light.

(2) Not to obstruct public use. But no such line or system or any appurtenance thereto shall at any time obstruct or incommode the public use of any highway, bridge, stream or body of water.

(3) Abandoned lines removed. The public service commission after a public hearing as provided in section 196.26, and subject to the right of review as provided in chapter 227, may declare any line to have been abandoned or discontinued, if the facts warrant such finding. Whenever such a finding shall have been made the corporation shall remove such line, and on failure for three months after such finding of abandonment or discontinuance, any person owning land over, through or upon which such line shall pass, may remove the same, or the supervisors of any town within which said lines may be situated, may remove the said lines from the limits of its highways, and such person or supervisors shall be entitled to recover from the company owning the lines the expense for labor involved in removing the property.

(4) Location of poles. In case of dispute as to the location of poles, pipes or conduits, the commissioners appointed in condemnation proceedings under chapter 32 may determine the location. In no case, except where the owner consents, shall poles be set in front of or upon any residence property, or in front of a building occupied for business purposes, unless the commissioners find that the same is necessary and the court may review the finding.

(5) Limitation of action. The proceedings authorized in chapter 32 shall not be taken nor other action commenced against the corporation in respect to its rights to use or possess lands, unless begun within six years after the commencement of such use or possession.

(6) Trees protected, penalties. Any such corporation which shall in any manner destroy, trim or injure any shade or ornamental trees along any such lines or systems, or cause any damage to buildings, fences, crops, live stock or other property, except by the consent of the owner, or after the right so to do has been acquired, shall be liable to the person aggrieved in three times the actual damage sustained, besides costs.

(7) Municipal franchise required. No lighting or heating corporation shall have any right hereunder in any city or village until it has obtained a franchise or written consent for the erection or installation of its lines from such city or village.

182.018 Wires over railroads. (1) All wires strung over any steam railroad prior to August 1, 1949, shall be tied to insulators fastened to double cross-arms attached to a pole at each side of the crossing. The poles if of wood shall not be less than 6 inches in diameter at the top (if of other materials at least the equivalent strength thereof), set not less than 5 feet in the ground, securely guyed, and, unless the railroad right of way is over 100 feet in width, shall be set not more than 100 feet apart. The cross-arms shall be attached to the poles by machine bolts, and braced by at least one iron brace from each cross-arm to the pole. All wires shall be maintained not less than 25 feet above the rails, except street railway trolley wires, which shall be maintained not less than 22 feet above the rails.

(2) Any person ordered by the public service commission to change its wires so as to conform to this section failing to comply with such order within 10 days from the service thereof shall forfeit $25, and a like forfeiture for every additional 10 days of noncompliance with the order, unless a greater length of time to make such change shall be granted.

(3) All wires strung over any steam railroad on or after August 1, 1949 shall be strung in such a way as to meet requirements of the Wisconsin state electrical code. Any person stringing wires in violation of the code shall be subject to a forfeiture of not more than $100 nor less than $25. Each 10-day period, after the first day, that such violation occurs shall be a separate violation and shall subject the violator to an additional forfeiture of not less than $25 nor more than $100 for each such violation.

E 123.01 General. (1) APPLICATION. This section covers clearances, including separations and climbing spaces, involving poles and wires. Clearances of lamps from pole surfaces, from spaces accessible to the general public, and height above ground are covered in subsection E 128.07(4).

(2) CONSTANT-CURRENT CIRCUITS. The clearances for constant-current circuits shall be determined on the basis of their nominal full-load voltage.

(3) SUPPLY CABLES. As far as clearances are concerned, effectively grounded continuous metal-sheathed supply cables and any insulated supply conductors lashed to or twisted with an effectively grounded messenger or neutral, all voltages, are classified the same as open supply wires of 0 to 750 volts. See subsection E 103.02(2)(e)2. for effective grounding.

(4) NEUTRAL CONDUCTORS. Neutral conductors of supply circuits shall have the same clearances as the phase wires of the circuit with which they are associated, except that neutral conductors which are effectively grounded throughout their length in the manner prescribed in subsection E 103.02(2)(e)1. and associated with circuits operating from 0 to 22,000 volts to ground may have the same clearances as circuits 0 to 750 volts. See note (q) of table 1 section E 123.03 for special construction over railroads.

(5) MAINTENANCE OF CLEARANCES. The clearances required by this section shall be maintained at the specific values under the basic conditions stated for the various clearance situations.

History: Cr. Register, November, 1961, No. 71, eff. 12–1–61.

E 123.02 Horizontal clearances of supporting structures from other objects. No pole or attachment shall obstruct or incommode the public use of any highway, bridge, stream, or body of water. Poles, towers, and other supporting structures and their guys and braces shall have the following horizontal clearances from other objects. The clearance shall be measured between the nearest parts of the objects concerned.

(1) FROM FIRE HYDRANTS. Not less than 3 feet.

Note: Recommendation: Where conditions permit, a clearance of not less than 4 feet is recommended.

(2) FROM STREET CORNERS. Where hydrants are located at street corners, poles and towers should not be set so far from the corners as to make necessary the use of flying taps inaccessible from the poles.

(3) FROM CURBS. Not less than 6 inches measured to the street side of the curb if practicable.

(4) FROM RAILROAD TRACKS. Where railroad tracks are parallel or crossed by overhead lines, the poles and their guys and braces shall, be located not less than 12 feet from the nearest track rail.

(a) Exception 1: At sidings a clearance of not less than 7 feet may be allowed, provided sufficient space for a driveway be left where cars are loaded or unloaded.

(b) Exception 2: Supports for overhead trolley contact conductors may be located as near their own track rail as conditions require. If very close, however, permanent screens on cars will be necessary to protect passengers.

Note: The parties concerned shall cooperate with each other in locating poles, signs, signals, etc., along tracks so that the view of all signals and signs will be as clear as practicable.

(5) PROTECTION FROM FIRES. Poles and towers should be so placed, guarded, and maintained, as to be exposed as little as practicable to brush, grass, rubbish, or building fires.

History: Cr. Register, November, 1961, No. 71, eff. 12–1–61; (6) renum. to be 123.05 (7); (7) renum. to be 123.05 (8); (8) renum. to be 123.05 (9) and am.; (9) renum. to be 123.05 (10) and am., Register, April, 1964, No. 100, eff. 5–1–64.

E 123.03 Vertical clearance of wires above ground or rails. The vertical clearance of all wires above ground in generally accessible places or above rails shall be not less than the following:

(1) BASIC CLEARANCES. The clearances of table 1 apply under the following conditions:

(a) Conductor temperature of 60° F.

(b) No wind.

(c) Final unloaded sag.

(d) Fixed conductor supports.

(e) Span lengths 0–150 feet for 3-strand conductors, each wire of which is 0.09 inch or less in diameter.

(f) Span lengths 0–175 feet for other types of wire.

(g) Voltage 0 to 50,000 volts.

(h) For other conditions see subsection E 123.03(2).

(i) For definition of voltage see definition 170, section E 101.02.

(2) INCREASED CLEARANCES. Greater clearances than given in table 1, subsection E 123.03 (1), shall be provided where required by (a), (b) and (c) below. Increases are cumulative where more than one applies.

Exception: Increased clearances are not required for trolley contact conductors, for guys, or for cable supported by messenger.

(a) *Spans longer than specified in subsection E 123.03(1).* In applying the following rules the "point of crossing" in the case of roads, streets, alleys and driveways is considered to be the edge of the traveled way farthest from the nearer support of the crossing span. In the case of a railroad crossing, it is the track rail which is farthest from the nearer support of the crossing span. In other situations it is the location under the conductors of any topographical feature which is the determinant of the clearance.

1. Where point of crossing occurs at point of maximum total sag of the conductor.

a. General. For spans exceeding the limits specified in subsection E 123.03(1), the clearance specified in table 1 shall be increased by 0.1 foot for each 10 feet of the excess span length over such limits. (See c. below.)

b. Railroad crossings. For spans exceeding the limits specified in subsection E 123.03(1), the clearance specified in table 1 shall be increased by the following amounts for each 10 feet by which the crossing span lengths exceed such limits. (See c. below.)

Amount of Increase per 10 Feet

For conductors equal to or smaller than the following ------ 0.30 foot
Solid copper 0.160 inches in diameter
Stranded copper 0.250 inches in diameter
Other than all copper (solid) 0.250 inches in diameter
Other than all copper (stranded) 0.275 inches in diameter
For conductors larger than the above --------------------- 0.15 foot

c. Limits. The maximum additional clearance need not exceed 75% of the "maximum sag increase" for the conductor concerned. The "maximum sag increase" is the arithmetic difference between final unloaded sag with a conductor temperature of 60° F., no wind, and the maximum total sag under the entire conductor loading of section E 125.02, or with a conductor temperature of 120° F., no wind, whichever sag is the greater, computed for the span length for which such difference is greatest.

2. Where point of crossing is not at point of maximum total sag of the conductor. Under these conditions the required clearance may be obtained by multiplying the clearance determined by subsections

Distance from Nearer Support of Crossing Span to Point of Crossing in Percentage of Crossing Span Length	Factors
5	0.85
10	.88
15	.91
20	.94
25	.96
30	.98
35	.99
40 to 50	1.00

Interpolate for intermediate values.

TABLE 1

MINIMUM VERTICAL CLEARANCE OF WIRES (IN FEET) ABOVE GROUND OR RAILS (SUPPLY WIRES INCLUDE TROLLEY FEEDERS)

Location of Wires and Cables	Guys, Communication Cables; Messengers and Wires, Grounded Supply Cables; Messengers and Lightning Protection Wires (a) (b) (c)	Open Supply Line Wires, Arc Wires, and Service Drops (o) (c)			Trolley Contact Conductors and Associated Span or Messenger Wires (d)	
		0 to 750 Volts	750 to 15,000 Volts	15,000 to 50,000 Volts	0 to 750 Volts to Ground	Exceeding 750 Volts to Ground
Over track rails of railroads (e)	27 (f) (q)	27 (f) (q)	28	30	22	22
Over streets, alleys or roads (g)	18 (r)	18	20	22	18	20
Along streets or alleys in urban districts (g)	18 (h) (r)	18 (h)	20	22	18	20
Along roads in rural districts (g)	14 (h) (t)	15 (h)	18	20	18	20
Over areas used for agricultural purposes	15	15	18	20	18	20
Over fenced or otherwise guarded rights of way in which only authorized persons are permitted (i)	15 (j)	15 (x)	15	17	16 (n)	18 (n)
Over normal high water of lakes, streams or ponds See (y)	18	18	18	20	--------	--------
Over parking lots and drive-ins	12	15	18	20	--------	--------
Over driveways to:						
Residence garages	12	15 (s)	20	22	18	20
Commercial and Industrial Areas	18 (r)	18	20	22	18	20
Farm areas	15	15	20	22	18	20
Over footwalks and spaces accessible to pedestrians only	15 (w)	15 (x)	18	20	16 (n)	18 (n)
Over spaces or ways not covered above:						
In rural districts (p)	10 (j)	15 (x)	18 (m)	20 (m)	18	20
In urban districts (p)	10 (j)	18 (x)	20	22	18	20

(a) Including supply line guys where effectively grounded or insulated against the highest voltage to which they are exposed. Note: No clearance from ground is required for anchor guys not crossing streets, driveways, roads or pathways nor for anchor guys provided with traffic guards and paralleling sidewalk curbs.

(b) This relates to a supply cable of any voltage having effectively grounded continuous metal sheath supported by continuous grounded messenger and to insulated conductors lashed to or twisted with an effectively grounded continuous metallic messenger or neutral. This does not include a so-called cable where a messenger supports separate conductors with an insulating yoke.

(c) A conductor which is effectively grounded throughout its length and is associated with a supply circuit of 0 to 22,000 volts may have the clearance specified for conductors 0–750 volts.

(d) Where subways, tunnels or bridges require it, less clearances above ground or rails than required by Table 1 may be used locally. The trolley contact conductor should be graded very gradually from the regular construction down to the reduced elevation.

(e) In the case of electrified railroads served by overhead trolley conductors, these clearances do not apply if other orders require greater clearances.

(f) This clearance may be reduced to 25 feet where paralleled by trolley contact conductor on the same street or highway.

(g) These requirements apply only to wires within the limits of public highways or other public rights of way for traffic.

(h) Where a pole line along a road is located relative to fences, ditches, embankments, etc., so that the grounds under the line will never be traveled except by pedestrians, this clearance may be reduced to the following values:

(1) Communication conductors limited to 160 volts to ground and communication cables .... 8 Feet
(2) Conductors of other communication circuits .... 10 Feet
(3) Supply conductors .... 12 Feet
(4) Guys .... 8 Feet

(i) These clearance requirements do not apply in transformer or substation areas which are so fenced or guarded that they are never accessible to other than authorized persons. (See section E112.05)

(j) This clearance may be reduced to 8 feet for guys, cables, messengers and communication wires limited to 160 volts where the ground underneath the wires or cables is accessible to pedestrians only.

(m) This clearance may be reduced by 3 feet for distribution circuits in rural districts not along or across the yard or space near to the buildings of a farmstead, residence or school, if the wires are located relative to embankments, marshes, woods, etc., so that the ground underneath is not likely to be traveled by high loaded vehicles.

(n) Trolley contact conductors for industrial railways when not along or crossing roadways may be placed at a less height if suitably guarded.

(o) A diagonal clearance the same as the vertical clearance, shall be maintained to uneven or sloping terrain within a horizontal distance of ¾ of the vertical clearance. All distances to be measured from the conductors in their deflected position.

(p) See subsection E128.07(5) for street lamps and drops.

(q) This value may be reduced to 25 feet for guys, for cables having effectively grounded continuous metal sheaths, and for insulated conductors lashed to or twisted with an effectively grounded messenger or neutral, E 123.03(1) and E 123.03(2)(a)1. by the following factors, but in no case shall the clearance be less than required by table 1.

(b) *Voltages exceeding 50,000 volts.* For these voltages the clearances given in table 1, subsection E 123.03(1), shall be increased at the rate of 0.4 inch for each 1,000 volts of the excess.

(c) *Conductors supported by suspension-type insulators at crossings over track rails.* The clearance shall be increased by such an amount that the values specified in table 1, subsection E 123.03(1), will be maintained in case of a broken conductor in either adjoining span if the conductor is supported as follows.

1. At one support by suspension-type insulators in a suspended position, and at the other support by insulators which are not free to swing (including semistrain-type insulators).

2. At one support by strain insulators, and at the other support by semistrain-type insulators.

(d) *Methods of avoiding this increase of clearance.* Any of the following construction methods will avoid the necessity for the increase in clearance required by subsection E 123.03 (2) (c).

1. Suspension-type insulators in a suspended position at both supports.

2. Semistrain-type insulators at both supports.

3. Arrangement of insulators so that they are restrained from displacement toward the crossing.

(3) SUPPLY POLE WIRING AT UNDERGROUND RISERS. Unguarded supply wires connecting to underground systems shall not be run open closer to the ground than is indicated in table 2.

TABLE 2
CLEARANCE ABOVE GROUND FOR OPEN UNGUARDED SUPPLY WIRING

Voltage				
0 to 150 Volts	150 to 300 Volts	300 to 750 Volts	750 to 15,000 Volts	More Than 15,000 Volts
Feet	Feet	Feet	Feet	Feet
10	12	14	16	18

History: Cr. Register, November, 1961, No. 71, eff. 12–1–61; am. (1) (a); (2) (a) 1. c; (2) (d); Register, April, 1964, No. 100, eff. 5–1–64.

and for conductors effectively grounded throughout their length and associated with supply circuits of 0 to 22,000 volts only if such conductors are stranded, are of corrosion resistant material, and conform to the strength and tension requirements for messengers given in subsection E126.02(7).

(r) Where communication wires or communication cables cross over or run along alleys, this clearance may be reduced to 15 feet.

(s) Service drop operating at less than 600 volts may have the clearance reduced to 12 feet.

(t) This clearance may be reduced to 13 feet for communication conductors where no part of the line overhangs any part of the highway which is ordinarily traveled, and where it is unlikely that loaded vehicles will be crossing under the line into a field.

(w) This clearance may be reduced to the following values:
(1) For communication conductors of circuits limited to 160 volts to ground, and communication cables 8 Feet
(2) For conductors of other communication circuits 10 Feet
(3) For guys 8 Feet
(4) For supply cables having effectively grounded continuous metal sheath, and for insulated conductors lashed to or twisted with an effectively grounded messenger or neutral, all voltages 10 Feet

(x) This clearance may be reduced to the following values:
(1) Supply wires (except trolley contact wires) limited to 300 volts to ground 12 Feet
(2) Supply wires (except trolley contact wires) limited to 150 volts to ground and located at entrances to buildings 10 Feet
(3) Where supply circuits of 550 volts or less, with transmitted power of 3,200 watts or less, are run along fenced (or otherwise guarded) private rights of way in accordance with the provisions specified in subsection E122.01(2)(c) 10 Feet

(y) Lines shall not obstruct, or endanger navigation or activities associated therewith. Application of section 30.15, Wis. Statutes may require greater clearances than shown and clearances specified by the Army Engineers over waters considered navigable by the United States may be greater. The largest requirement shall be complied with.

E 123.04 Crossing clearances of wires carried on different supports. The clearance between any 2 wires crossing each other and carried on different supports shall not be less than the following:

Note: Recommendation: Crossings shall be made on a common crossing pole or structure where practicable.

(1) BASIC CLEARANCES. The clearances given in table 3 below apply under the following conditions:

(a) Conductor temperature of 60° F., no wind, with the upper conductor or wire at its final unloaded sag and the lower conductor or wire at its initial unloaded sag.

(b) Span lengths not greater than the following for the upper conductor or wire:

1. 0–150 feet for 3-strand conductors, each wire of which is 0.09 inch or less in diameter.

2. 0–175 feet for other types of wire.

(c) Fixed supports for the upper conductor or wire.

(d) For other conditions, see subsection E 123.04(2).

TABLE 3

MINIMUM CLEARANCES OF CROSSINGS OF WIRES CARRIED ON DIFFERENT SUPPORTS

(The insertion of a given clearance in parentheses indicates that in general the lines operating at the voltage named above this clearance should not cross over the lines at the voltage to the left of the clearance in parentheses)

Nature of Wires Crossed Over	Communication Wires Including Cables and Messengers	Open supply wires 0–750 volts; supply cable having effectively grounded continuous metal sheath, or insulated conductors lashed to or twisted with an effectively grounded messenger or neutral, all voltages; messengers associated with such cable		Open supply wires and service drops (a)		Guys, Span Lightning Protection Wires
		Line Wires	Service Drops	750 to 8,700 Volts	8,700 to 50,000 Volts	
	Feet	Feet	Feet	Feet	Feet	Feet
Communication, including cables and messengers	(b)2	(c)(j)(i)4	(i)2	(f)4	6	(b)2
Supply cable having effectively grounded continuous metal sheath or insulated conductors lashed to or twisted with an effectively grounded messenger or neutral, all voltages; messengers associated with such cable	(j)4	2	2	2	4	2
Open supply wires 0 to 750 volts	(4)	2	2	2	4	2
750 to 8,700 volts	(4)	(2)	(4)	2	4	4
8,700 to 50,000 volts	(6)	(4)	(6)	(4)	4	4
Trolley contact conductors	(d)4	(d)(e)4	(d)4	6	6	(d)4
Guys, span wires, lightning protection wires, service drops 0 to 750 volts	(b)(g)2	2	2	4	4	(b)(h)2

Footnotes for table 3

(a) A conductor which is effectively grounded throughout its length in accordance with subsection E 103.02(2)(e) and is associated with a circuit of 0 to 22,000 volts may have the clearances specified for open supply wires of 0 to 750 volts.

(b) The clearance of communication conductors and their guy spans, and messenger wires from each other in locations where no other classes of conductors are involved may be reduced by mutual consent of the parties concerned, subject to the approval of the administrative authority, except for fire-alarm wires and wires used in the operation of railroads, or where one set of conductors is for public use and the other used in the operation of supply systems.

(c) A clearance of 2 feet may be permitted where the supply conductor is above the communication conductor, provided the crossing is not within 6 feet of any pole concerned in the crossing and the voltage does not exceed 300 volts. (See note (i))

(d) Trolley contact conductors of more than 750 volts should have at least 6 feet clearance. This clearance should also be provided over lower-voltage trolley-contact conductors unless the crossover conductors are beyond reach of a trolley pole leaving the trolley-contact conductor or are suitably protected against damage from trolley poles leaving the trolley-contact conductor.

(e) Trolley feeders are exempt from this clearance requirement for trolley-contact conductors if they are of the same nominal voltage and of the same system.

(f) If the final unloaded sag at 60° F. will be lower than a straight line joining the points of support of the highest communication conductor, or the crossing is within 6 feet horizontally of a communication pole, the clearance shall be increased to 6 feet.

(g) This clearance shall be increased to 4 feet where communication cables cross over open supply service wires.

(h) Completely insulated sections of guys attached to supporting structures having no conductor of more than 8,700 volts may have less than this clearance from each other.

(i) Where a 2-foot clearance is required at 60° F. and where conditions are such that the sag in the upper conductor would increase more than 1.5 feet at the crossing point under the applicable loading of section E 125.02, the 2-foot clearances shall be increased by the amount of sag increase less 1.5 feet.

(j) Supply cables, all voltages, having effectively grounded metal sheaths and messengers associated with such cables, and insulated conductors lashed to or twisted with an effectively grounded messenger or neutral may have a clearance of 2 feet except where they cross under communication cables.

(2) INCREASED CLEARANCES. Greater clearances than given in table 3, subsection E 123.04(1), shall be provided under the following conditions: The increases required in subsections (a), (b), and (c) below are cumulative where more than one is applicable.

(a) *Crossing spans longer than specified in subsection E 123.04(1) (b).* Under these conditions the clearances specified in table 3 shall be increased as follows:

1. Where the crossing occurs at the point of maximum total sag in the upper conductor, the clearances of table 3 shall be increased by the following amounts for each 10 feet by which the crossing span length exceeds the limits specified in subsection E 123.04(1)(b).

Amount of Increase per 10 Feet

For conductors equal to or smaller than the following ______0.30 foot
Solid copper 0.160 inches in diameter
Stranded copper 0.250 inches in diameter
Other than all copper (solid) 0.250 inches in diameter
Other than all copper (stranded) 0.275 inches in diameter
For conductors larger than the above ____________________0.15 foot

The maximum additional clearance in 1. need not exceed 75 percent of the "maximum sag increase" for the conductor concerned. The "maximum sag increase" is the arithmetic difference between final unloaded sag with a conductor temperature of 60° F., no wind, and the maximum total sag under the entire conductor loading of section E 125.02, or with a conductor temperature of 120° F., no wind, whichever sag is the greater, computed for the span length for which such difference is greatest.

2. If the crossing point is located elsewhere than at the point of maximum total sag in the upper span, the required clearance may be obtained by multiplying the clearance determined in subsections E 123.04(1) and (2)(a)1. by the following factors, but in no case shall the clearance be less than required by table 3.

Distance from Nearer Support of Crossing Span to Point of Crossing, in Percentage of Crossing Span Length	Factors for Basic Clearance of	
	4 Feet	6 Feet
5	0.35	0.47
10	.47	.58
15	.60	.68
20	.71	.78
25	.82	.85
30	.90	.92
35	.96	.98
40 to 50	1.00	1.00

Interpolate for intermediate values, in vertical column.

(b) *Voltages exceeding 50,000 volts.* For these voltages the clearances given in table 3 subsection E 123.04(1) shall be increased at the rate of 0.4 inch for each 1,000 volts in excess.

(c) *Conductors supported by suspension-type insulators at crossings over communication wires.* For such conductors the clearance shall be increased by such an amount that the values specified in table 3, subsection (E123.04(1)) will be maintained in case of a broken conductor in either adjacent span, provided such conductor is supported as follows:

1. At one support by suspension-type insulators in a suspended position, and at the other support by insulators not free to swing (including semistrain-type insulators).

2. At one support by a strain insulator, and at the other support by a semistrain-type insulator.

(d) *Methods of avoiding this increase of clearance.* Any of the following construction methods will avoid the necessity for the increase in clearance required by subsection E 123.04(2)(c).

1. Suspension-type insulators in a suspended position at both supports.

2. Semistrain-type insulators at both supports.

3. Arrangement of insulators so that they are restrained from displacement toward the crossing.

History: Cr. Register, November, 1961, No. 71, eff. 12-1-61; am. (1)(a); (2)(a) 1., Register, April, 1964, No. 100, eff. 5-1-64.

E 123.05 Clearances of conductors of one line from other conductors and structures. (1) CLEARANCES FROM CONDUCTORS OF ANOTHER LINE. The clearance in any direction between any conductor of one line and any conductor of a second and conflicting line shall be not less than the largest value required by (a), (b), and (c) below at 60° F., and no wind.

(a) Four feet.

(b) The values required by subsections E 123.06(1)(b)1., a. or b. for separation between conductors on the same support.

(c) The apparent sag of the conductor having the greater sag, plus 0.2 inch per kilovolt of the highest voltage concerned.

1. Exception: In situations where supply-line conductors only are involved, the clearance required by (c) above need not be greater than the value required by subsections E 123.04(1) and (2) for a center-span crossing, assuming the conductor having the larger sag swinging through an arc of 45° from the vertical.

(2) CLEARANCES FROM SUPPORTING STRUCTURES OF ANOTHER LINE. Conductors of any line passing near a pole or similar supporting structure of a second line without being attached thereto, shall have clearances from any part of such structure not less than the larger value required by either (a) or (b) below at 60°F., and no wind.

(a) Three feet if practicable.

(b) The values required by subsections E 123.06(1)(b)1., a. and b. for separation between similar conductors on the same support, increased by 1 inch for each 2 feet of the distance from the supporting structure of the second line to the nearest supporting structure of the first line.

The climbing space on the structure of the second line shall in no case be reduced by a conductor of the first line.

(3) CLEARANCES FROM BUILDINGS. (a) *General.* Conductors shall be arranged and maintained so as to hamper and endanger firemen as little as possible in the performance of their duties.

(b) *Ladder space.* Where buildings exceed three stories (or 50 feet) in height, overhead lines should be arranged where practicable so that a clear space or zone at least 6 feet wide will be left, either adjacent to the building or beginning not over 8 feet from the building to facilitate the raising of ladders where necessary for fire fighting.

1. Exception: This requirement does not apply where it is the unvarying rule of the local fire departments to exclude the use of ladders in alleys or other restricted places which are generally occupied by supply lines.

(c) *Open supply conductors attached to buildings.* Where the permanent attachment of open supply conductors of any class to buildings is necessary for an entrance, such conductors shall meet the following requirements:

1. Conductors of more than 300 volts shall not be carried along or near the surface of the building unless they are guarded or made inaccessible.

2. Clearance of wires from building surface shall be not less than those required in table 9, subsection E 123.06(2)(c)1., for clearance of conductors from pole surfaces.

3. Service head and service-drop attachments shall be so located that no part of the drip loops or service-drop conductors within 3 feet of the service head and service drop attachments shall be less than 12 inches from communication cables or conductors attached to or carried along the surface of a building.

(d) *Conductor passing by or over buildings.* 1. Crossing roofs. Supply conductors exceeding 8,700 volts should not be carried over buildings not concerned in the operation of the utility owning them, if this can be avoided. When it is necessary to attach wires to the roofs of buildings, the supporting structure shall be of substantial construction. Wherever feasible, wires crossing over buildings shall be supported on structures which are independent of the buildings crossed over.

2. Minimum clearances. Unguarded or accessible supply conductors carrying voltages in excess of 300 volts may be run either beside or over buildings. The vertical or horizontal clearance to any building or its attachments (balconies, platforms, etc.) shall be as listed below. The horizontal clearance governs above the roof level to the point where the diagonal equals the vertical clearance requirement. From this point the diagonal clearance shall be equal to the vertical clearance requirement. This rule should not be interpreted as restricting the installation of a trolley contact conductor over the approximate center line of the track it serves.

a. Spans 0 to 150 feet. For spans 0 to 150 feet, the clearances shall be as given in table 4.

TABLE 4

CLEARANCES OF SUPPLY CONDUCTORS FROM BUILDINGS

Voltage of Supply Conductors	Horizontal Clearance	Vertical Clearance
	Feet	Feet
0 to 300	3	(a) 8
300 to 8,700	3	8
8,700 to 15,000	8	8
15,000 to 50,000	10	10
Exceeding 50,000	10 plus 0.4 inch per Kv. in excess	10 plus 0.4 inch per Kv. in excess

Note: (a) Conductors shall have a clearance of not less than 8 feet from the highest point of roofs over which they pass, except that where the voltage does not exceed 300 volts between conductors and the pitch of the roof is greater than 3 inches per foot the clearance may not be less than 3 feet. Where the service conduit extends through a roof, the service drop conductor, if operating at less than 300 volts between conductors, may have a clearance of not less than 18 inches vertically above the roof providing such conductors do not extend more than 45 inches across the roof.

b. Spans exceeding 150 feet. Where span lengths exceed 150 feet, the increased clearance required by rule E 123.03 (2) (a) shall be provided.

1. Exception: These increased clearances are not required where the voltage of the supply conductors is from 300 to 8,700 volts.

3. Guarding of supply conductors. Supply conductors of 300 volts or more shall be properly guarded by grounded conduit, barriers, or otherwise, under the following conditions:

a. Where the clearances set forth in table 4, subsection E 123.05 (3) (d) 2. a., cannot be obtained.

b. Where such supply conductors are placed near enough to windows, verandas, fire escapes, or other ordinarily accessible places, to be exposed to contact by persons.

Note: Supply conductors in grounded metal-sheathed cable are considered to be guarded within the meaning of this section.

(e) For clearance of conductors from scaffolding and buildings under construction see Wis. Ad. Code, ch. Ind 35.

(4) CLEARANCES FROM BRIDGES. (a) *Clearances of conductors from bridges.* Supply conductors which pass under, over or near a bridge shall have clearances therefrom not less than given in table 5.

1. Exception: Grounding conductors, effectively grounded neutrals, conductors installed in grounded conduit, metal sheathed cables and cables supported on effectively grounded messengers.

(b) *Guarding trolley contact conductors located under bridges.*

1. Where guarding is required. Guarding is required where the trolley contact conductor is located so that a trolley pole leaving the conductor can make simultaneous contact between it and the bridge structure.

2. Nature of guarding. Guarding shall consist of a substantial inverted trough of non-conducting material located above the contact conductor, or of other suitable means of preventing contact between the trolley pole and the bridge structure.

(5) CLEARANCE FROM SIGNS. The clearance of lines from buildings shall govern the clearance of lines from signs. Where signs are animated, contain lamps, or where the sign is periodically renewed, replaced or changed the minimum horizontal clearance shall not be less than 10 feet. This does not apply to the conductors supplying the sign.

(6) CLEARANCE FROM LIGHT STANDARDS. Conductors not used to supply light standards shall have clearances equal to the clearance from buildings between such conductors and independent lighting supports.

(a) *Exception 1:* Conductors properly attached to the lighting standards are permitted. Such conductors shall not interfere with the safe servicing of the lighting fixtures and shall have the clearance required for conductors on poles.

(b) *Exception 2:* A vertical clearance of 5 feet is permitted for lines 300 to 8,700 volts.

(7) LINES IN TREES. Supply wires shall not be run through fruit trees that must be climbed to gather the fruit.

(a) *Exception:* Insulated supply lines and associated neutral conductors operating at less than 300 volts to ground are exempt.

(8) NEAR STORED MATERIAL. Lines should not be run over areas where material is regularly stored and handled by cranes or other types of high machinery unless the clearance of such lines is adequate to permit full use of the equipment.

(9) NEAR STORAGE TANKS. Open conductors shall not pass over above ground flammable liquids storage tanks. Such conductors operating at more than 300 volts to ground shall be kept at least 15 feet horizontally from such tanks. When the voltage is 300 or below a horizontal clearance of not less than 8 feet shall be maintained.

(10) NEAR WELLS. Electric lines shall not pass over wells where the maintenance of the well requires the lifting of lengthy section of pump parts or pipe vertically above the ground. The horizontal clearance shall be ¾ the required vertical clearance of the conductor.

(11) E 123.05 Table 1, not o, requires a diagonal clearance the same as the vertical clearance be maintained to uneven or sloping terrain within a horizontal distance of ¾ of the vertical clearance. Distances are to be measured from the conductors in their deflected position.

TABLE 5

CLEARANCES FROM BRIDGES

Voltages	Readily Accessible Portions (Other Than Traveled Ways) (a) of Any Bridge, Including Wing Walls or Bridge Attachments		From Ordinarily Inaccessible Portions (b) of Bridges (Other Than Brick, Concrete or Masonry) and From Abutments	
	For Conductors Attached to Bridge	For Conductors Not Attached to Bridge	For Conductors Attached to Bridge(c)	For Conductors Not Attached to Bridge(c)
	Feet	Feet	Feet	Feet
0 to 2,500	3.0	3.0	0.5	3.0
Over 2,500 to 5,000	3.0	3.0	1.0	3.0
Over 5,000 to 8,700	3.0	3.0	3.0	3.0
Over 8,700 to 15,000	5.0	5.0	5.0	5.0
Over 15,000 to 25,000	7.5	7.5	7.5	7.5
Over 25,000 to 35,000	7.5	9.0	7.5	9.0
Over 35,000 to 50,000	7.5	12.0	7.5	12.0
Exceeding 50,000	7.5 plus 0.4 inch per Kv in excess	12.0 plus 0.4 inch per Kv in excess	7.5 plus 0.4 inch per Kv in excess	12.0 plus 0.4 inch per Kv in excess

(a) Where over traveled ways on or near bridges the clearances of section E 123.03 apply.
(b) Bridge seats of steel bridges carried on masonry, brick, or concrete abutments which require frequent access for inspection shall be considered as readily accessible portions.
(c) Where conductors passing under bridges are adequately guarded against contact by unauthorized persons and can be deenergized for maintenance of the bridge, clearances of the conductors from the bridge, at any point, may have the clearances specified in table 9 for clearance from surfaces of crossarms plus one-half the final unloaded sag of the conductor at that point.

History: Cr. Register, November, 1961, No. 71, eff. 12-1-61; am. (3) (d) 2. b; (3) (d) 3. a; cr. (3) (e); am. (5); cr. (6); renum. 123.02 (6) to be 123.05 (7); renum. 123.02 (7) to be 123.05 (8); renum. 123.02 (8) to be 123.05 (9) and am.; renum. 123.02 (9) to be 123.05 (10) and am.; cr. (11), Register, April, 1964, No. 100, eff. 5-1-64.

E 123.06 Minimum line-conductor clearances and separations at supports.

(1) SEPARATION BETWEEN CONDUCTORS ON POLE LINES.

(a) *Application of rule.* 1. Multiconductor wires or cables. Cables and duplex, triple or paired conductors supported on insulators or messengers, whether single or grouped, are for the purpose of this rule considered single conductors even though they may contain individual conductors not of the same phase or polarity.

2. Conductors supported by messengers or span wires. Clearances between individual wires or cables supported by the same messenger, or between any group and its supporting messenger, or between a trolley feeder, supply conductor, or communication conductor, and their respective supporting span wires, are not subject to the provisions of this rule. This paragraph also refers to spacer installations where the distance between conductors is maintained by spacers placed at intervals which are much less than the length of a span.

3. Measurement of clearances. The clearances and separations stated may be measured from the center of the supporting insulator instead of from the conductor itself.

(b) *Horizontal separations between line conductors.* 1. Fixed supports. Line conductors attached to fixed supports shall have horizontal separations from each other not less than the larger value required by either a. or b., below for the situation concerned.

Exception 1: The pin spacing at buckarm construction may be reduced as specified in subsection E 123.07(6), to provide climbing space.

Exception 2: The pin spacing at bridge fixtures may be reduced as specified in subsection E 123.06(3).

Exception 3: Grades D and N need meet only the requirements of a. below.

Exception 4: These clearances do not apply where conductors have insulating covering adequate for the voltage concerned.

a. Minimum horizontal separation between line conductors of the same or different circuits. Separations shall not be less than given in table 6.

TABLE 6

MINIMUM HORIZONTAL SEPARATION AT SUPPORTS BETWEEN LINE CONDUCTORS OF THE SAME OR DIFFERENT CIRCUITS

Class of Circuit	Separation	Notes
	Inches	
Communication conductors	6	Preferable minimum. Does not apply at conductor transposition points.
	3	Permitted where pin spacings less than 6 inches have been in regular use. Does not apply at conductor transposition points.
Railway feeders 0 to 750 volts, No. 4/0 or larger	6	
0 to 750 volts, smaller than No. 4/0	12	Where 10 to 12 inch separation has already been established by practice, it may be continued, subject to the provisions of rule E 123.06(1)(b)1.a., for conductors having apparent sags not over 3 feet and for voltages not exceeding 8,700.
750 volts to 8,700 volts	12	
Other supply conductors 0 to 8,700 volts	12	
For all conductors of more than 8,700 volts add for each 1,000 volts in excess of 8,700 volts	0.4	

b. Separations according to sags. The separation at the supports of conductors of the same or different circuits of grades B or C shall in no case be less than the values given by the following formulas, at 60°F., no wind. The requirements of subsection E 123.06(1)(b)1.a., apply if they give a greater separation than this rule.

For line conductors smaller than No. 2 A.W.G.:

$$\text{Separation} = 0.3 \text{ inch per kilovolt} + 7\sqrt{(S/3)-8}$$

For line conductors of No. 2 A.W.G. or larger:

$$\text{Separation} = 0.3 \text{ inch per kilovolt} + 8\sqrt{(S/12)}$$

S is the apparent sag in inches of the conductor having the greater sag, and the separation is in inches.

TABLE 7
SEPARATION IN INCHES REQUIRED FOR LINE CONDUCTORS SMALLER THAN NO. 2 A.W.G.

Voltages between Conductors	Sag (In Inches)						
	36	48	72	96	120	180	240
2,400	14.5	20.5	28.5	35.0	40.5	51.5	60.0
7,200	16.0	22.0	30.0	36.5	42.0	52.5	61.5
13,200	18.0	24.0	32.0	38.5	43.5	54.5	63.5
23,000	21.0	27.0	35.0	41.5	46.5	57.5	66.5
34,500	24.5	30.5	38.5	44.5	50.5	61.0	70.0
46,000	28.0	34.0	42.0	48.0	53.5	64.5	73.0
69,000	--------	40.5	48.5	55.0	60.5	71.0	80.0

TABLE 8
SEPARATION IN INCHES REQUIRED FOR LINE CONDUCTORS OF SIZE NO. 2 A.W.G. OR LARGER

Voltages between Conductors	Sag (In Inches)						
	36	48	72	96	120	180	240
2,400	14.5	16.5	20.5	23.5	26.0	31.5	36.5
7,200	16.0	18.0	22.0	25.0	27.5	33.0	38.0
13,200	18.0	20.0	23.5	26.5	29.5	35.0	39.5
23,000	21.0	23.0	26.5	29.5	32.0	38.0	42.5
34,500	24.0	26.5	30.0	33.0	35.5	41.5	46.0
46,000	27.5	30.0	22.5	36.5	39.0	45.0	49.5
69,000	--------	36.5	40.5	43.5	46.0	51.5	56.5

2. Suspension insulators not restrained from movement. Where suspension insulators are used and are not restrained from movement, the conductor separation shall be increased so that one string of line insulators may swing transversely through an angle of 30° from a vertical position without reducing the values given in 1. above.

(c) *Clearances in any direction from line conductors to supports and to vertical or lateral conductors, span or guy wires, attached to the same support.*

1. Fixed supports. Clearances shall be not less than given in table 9.

TABLE 9
MINIMUM CLEARANCE IN ANY DIRECTION FROM LINE CONDUCTORS TO SUPPORTS, AND TO VERTICAL OR LATERAL CONDUCTORS, SPAN OR GUY WIRES, ATTACHED TO THE SAME SUPPORT

Clearance of Line Conductors From—	Communication Lines		Supply Lines		
			0 to 8,700 Volts		Exceeding 8,700 Volts Add For Each 1,000 Volts of Excess
	In General	On Jointly Used Poles	In General	On Jointly Used Poles	
	Inches	Inches	Inches	Inches	Inches
Vertical and Lateral conductors					
Of same circuit	3	3	3	3	0.25
Of other circuits	3	3	(f)6	(f)6	0.4
Span and guy wires attached to same pole:					
General	(h)3	(a)(h)6	6	6	0.4
When parallel to line	(h)3	(a)(h)6	(a)12	(a)12	0.4
Lightning-protection wires parallel to line	(b)(e)	(b)(e)	(b)(e)	(b)(e)	0.4
Surfaces of crossarms	(c)3	(c)3	3	3	0.20
Surfaces of poles	(c)3	(c)5	(g)3	(d)(g)5	0.20

Footnotes to table 9

(a) For guy wires, if practicable. For clearances between span wires and communication conductors, see subsection E 123.09 (5) (c). On jointly used poles, guys which pass within 12 inches of supply conductors, and also pass within 12 inches of communication cables, shall be protected with a suitable insulating covering where the guy passes the supply conductors unless the guy is effectively grounded or insulated with a strain insulator at a point below the lowest supply conductor and above the highest communication cable.

(b) Clearance shall not be less than the separation required by table 6 or subsection E 123.06(1)(b)1., b. between two line conductors of the voltage concerned.

(c) Communication conductors may be attached to supports on the sides or bottoms of crossarms or surfaces of poles with less clearances, if at least 40 inches from any supply line conductor of less than 8,700 volts and at least 60 inches from any supply line conductor of more than 8,700 volts carried on the same pole.

(d) This clearance applies only to supply conductors carried on crossarms below communication conductors on joint poles. Where supply conductors are above communication conductors this clearance may be reduced to 3 inches except for supply conductors 0 to 750 volts whose clearance may be reduced to one inch.

(e) For the purpose of applying the above table, the voltage of lightning protection wires shall be considered as being the voltage to ground of the associated supply conductors.

(f) For supply circuits of 0 to 750 volts, this clearance may be reduced to 3 inches.

(g) A neutral conductor which is effectively grounded throughout its length and is associated with a circuit of 0 to 22,000 volts may be attached directly to the pole surface.

(h) Guys and messengers may be attached to the same strain plates or to the same through bolts.

(i) For supply circuits of 0 to 750 volts this clearance may be reduced to one inch.

2. Suspension insulators not restrained from movement. Where suspension insulators are used and are not restrained from movement, the conductor clearances from surfaces of supports, from span or guy wires, or from vertical or lateral conductors shall be such that the values of clearances required by 1. above will be maintained with an insulator swing of 30° from the vertical position.

(d) *Conductor separation—vertical racks.* Conductors or cables may be carried on vertical racks or separate brackets other than wood placed vertically at one side of the pole and securely attached thereto, if all the following conditions are met.

1. The voltage shall be not more than 750 volts, except that cables having effectively grounded continuous metal sheath or insulated conductors lashed together with an effectively grounded messenger may carry any voltage.

2. Conductors shall be of the same material or materials, except that different materials may be used if their sag-tension characteristics and arrangement are such that the separations specified in 3. below are maintained under all service conditions.

3. Vertical spacing between conductors shall be not less than the following:

Span Length	Vertical Clearance Between Conductors
Feet	(Inches)
0–150	4
150–200	6
200–250	8
250–300	12

(See table 9, subsection E 123.06(1)(c), for necessary clearances from pole surfaces and subsection E 123.07(7)(a) for method of providing climbing space)

(e) *Separation between supply circuits of different voltage classifications on the same crossarm.* Supply circuits of any one voltage classification as given in table 11, subsection E 123.09(1) (a), may be maintained on the same crossarm with supply circuits of the next consecutive voltage classification only under the following conditions:

1. If they occupy pin positions on opposite sides of the pole.
2. If in bridge-arm or side-arm construction they are separated by a distance of not less than the climbing space required for the higher voltage concerned and provided for in section E 123.07.
3. If the higher-voltage conductors occupy the outer pin positions and the lower-voltage conductors the inner pin positions.
4. If series lighting or similar circuits, are ordinarily dead during periods of work on or above the crossarm concerned.
5. If the 2 lines concerned are communication lines used in the operation of supply lines, and supply lines of less than 8,700 volts, and are owned by the same utility, provided they are installed as in 1. or 2. above.

(2) SEPARATION BETWEEN CONDUCTORS ATTACHED TO BUILDINGS. Separation of wires from each other shall be not less than those required in table 6, subsection E 123.06(1) (b)1.a., for separation of conductors from each other at supports.

(a) Exception: Conductors on vertical racks or separate brackets other than wood placed vertically meeting the requirements of subsection E 123.06(1) (d), may have the separations specified in that subsection.

(3) SEPARATION BETWEEN CONDUCTORS ATTACHED TO BRIDGES. Supply conductors attached to bridges and supported at frequent intervals may have less separation at supports than required by subsections E 123.06(1) (b)1.a. and b. The separation shall not be less than the clearance between supply conductors and the surfaces of poles or crossarms, required by subsection E 123.06 (1)(c)1., or less than the following:

Span Length	Separation
	Inches
0 to 20 feet	6
20 to 50 feet	9

History: Cr. Register, November, 1961, No. 71, eff. 12–1–61; am. (1) (a) 2.; (1) (b) 1. b.; (1) (b) 2.; (1) (c) 1. and 2.; am. (3), Register, April, 1964, No. 100, eff. 5–1–64.

E 123.07 Climbing space. (1) LOCATION AND DIMENSIONS. (a) A climbing space having the horizontal dimensions specified in subsection E 123.07(5), shall be provided past any conductors, crossarms, or other parts.

(b) The climbing space need be provided on one side or corner of the pole only.

(c) The climbing space shall extend vertically past any conductor or other part between levels above and below the conductor as specified in subsections E 123.07(5),(6),(7) and (8), but may otherwise be shifted from any side or corner of the pole to any other side or corner.

(2) PORTIONS OF SUPPORTING STRUCTURES IN CLIMBING SPACE. Portions of the pole or structure when included in one side or corner of the climbing space are not considered to obstruct the climbing space.

(3) CROSSARM LOCATION RELATIVE TO CLIMBING SPACE.

Note: Recommendation: All crossarms should be located on the same side of the pole.
Exception: This recommendation does not apply where double crossarms are used on any pole or where crossarms on any pole are not all parallel.

(4) LOCATION OF SUPPLY APPARATUS RELATIVE TO CLIMBING SPACE. Transformers, regulators, lightning arresters, and switches when located below conductors or other attachments shall be mounted outside of the climbing space.

(5) CLIMBING SPACE THROUGH CONDUCTORS ON CROSSARMS. (a) *Conductors of same voltage classification on same crossarm.* Climbing space between conductors shall be of the horizontal dimensions specified in table 10, (subsection E 123.07(5)(c)), and shall be provided both along and across the line, and shall be projected vertically not less than 40 inches above and 40 inches below the limiting conductors. Where communication conductors are above supply conductors of more than 8,700 volts between conductors, the climbing space shall be projected vertically at least 60 inches above the highest supply conductor.

1. Exception 1: This rule does not apply if it is the unvarying practice of the employers concerned to prohibit employees from ascending beyond the conductors of the given line, unless the line is killed.

2. Exception 2: For supply conductors carried on a pole in a position below communication facilities in the manner permitted in subsection E 122.01(2)(c), the climbing space need not extend more than 2 feet above such supply space.

(b) *Conductors of different voltage classifications on the same crossarm.* The climbing space shall be that required by table 10 (subsection E 123.07(5)(c)), for the highest voltage of any conductor bounding the climbing space. The climbing space shall extend vertically to the limits specified in subsection E 123.07 (5)(a), and the exception thereto.

(c) *Horizontal climbing space dimensions.* See Table 10.

(6) CLIMBING SPACE ON BUCKARM CONSTRUCTION. The full width of climbing space shall be maintained on buckarm construction and shall extend vertically in the same position at least 40 inches (or 60 inches where required by subsection E 123.07(5)(a)), above and below any limiting conductor.

(a) *Method of providing climbing space on buckarm construction.* With circuits of less than 8,700 volts and span lengths not exceeding 150 feet and sags not exceeding 15 inches for wires of No. 2 and larger sizes, or 30 inches for wires smaller than No. 2, a six-pin crossarm having pin spacing of 14½ inches may be used to provide a 30-inch climbing space on one corner of a junction pole by omitting the pole pins on all arms, and inserting pins midway between the remaining pins so as to give a spacing of 7¼ inches, provided that each conductor on the end of every arm is tied to the same side of its insulator, and that the spacing on the next pole is not less than 14½ inches.

TABLE 10

MINIMUM HORIZONTAL DIMENSIONS OF CLIMBING SPACE

Character of Conductors Adjacent to Climbing Space	Voltage of Conductor	Horizontal Dimensions of Climbing Space (Inches)			
		On Poles Used Solely By		On Jointly Used Poles	
		Communication Conductors	Supply Conductors	Supply Conductors Above Communication Conductors	Communication Conductors Above Supply Conductors (a)
Communication Conductors	0 to 150	No Requirement	------------	(b)	No Requirement
	Exceeding 150	24 recommended	------------	(b)	24 Recommended
Supply Conductors	Less than 300	------------	24	24	30
	300 to 8,700	------------	30	30	30
	8,700 to 15,000	------------	36	36	36
	Exceeding 15,000	------------	More than 36(c)	More than 36(c)	More than 36(c)

(a) This relation of levels is not, in general, desirable and should be avoided.

(b) The climbing space shall be the same as required for the supply conductors immediately above, with a maximum of 30 inches, except that a climbing space of 16 inches across the line may be employed for communication cables or conductors where the only supply conductors at a higher level are secondaries (0 to 750 volts) supplying airport or airway marker lights or crossing over the communication line and attached to the pole top or to a pole-top extension fixture.

(c) Where practicable. Attention is called to the operating requirements of section E 142.03.

(7) CLIMBING SPACE PAST LONGITUDINAL RUNS NOT ON CROSSARMS. The full width of climbing space shall be provided past longitudinal runs and shall extend vertically in the same position from 40 inches below the run to a point 40 inches above (or 60 inches where required by subsection E 123.07(5)(a)). The width of climbing space shall be measured from the longitudinal run concerned. Longitudinal runs on racks, or supply cables on messengers, are not considered as obstructing the climbing space if all wires concerned are covered by rubber protective equipment or otherwise guarded as an unvarying practice before workmen climb past them. This does not apply where communication conductors are above the longitudinal runs concerned.

(a) *Exception 1:* If a supply longitudinal run is placed on the side or corner of the pole where climbing space is provided, the width of climbing space shall be measured horizontally from the center of the pole to the nearest supply conductors on crossarms, under the following conditions: Where the longitudinal run consists of open supply conductors carrying not more than 750 volts; or supply cable having effectively grounded continuous metal sheath, or insulated conductors lashed to or twisted with an effectively grounded messenger or neutral, all voltages and is supported close to the pole as by brackets, racks or pins close to the pole and where the nearest supply conductors on crossarms are parallel to and on the same side of the pole as the longitudinal run and within 4 feet above or below the run.

(b) *Exception 2:* For supply conductors carried on a pole in a position below communication facilities in the manner permitted in subsection E 122.01(2) (c), the climbing space need not extend more than 2 feet above such supply space.

(8) CLIMBING SPACE PAST VERTICAL CONDUCTORS. Vertical runs incased in suitable conduit or other protective covering and securely attached to the surface of the pole or structure are not considered to obstruct the climbing space.

(9) CLIMBING SPACE NEAR RIDGE-PIN CONDUCTORS. The climbing space specified in subsection E 123.07(5) (c), shall be provided above the top crossarm and past the ridge-pin conductor.

(a) *Exception:* Where a single crossarm carrying only two conductors is mounted so that the conductors are 2 feet below a single ridge-pin conductor, the climbing space specified in subsection E 123.07 (5) (c), shall be carried up to the ridge-pin conductor, but need not be carried past it.

(10) CLIMBING SPACE IN RACK CONSTRUCTION. A climbing space shall be maintained through the levels of conductors supported in rack construction and for a vertical distance of not less than 4 feet above the top conductor and not less than 4 feet below the bottom conductor so supported. The width of the climbing space measured horizontally through the center of the pole shall be not less than 5 inches plus the diameter of the pole and the extremities of such width shall be equidistant from the center line of the pole. The depth of the climbing space shall be not less than 30 inches measured perpendicularly to this climbing space boundary through the center line of pole. The width of the climbing space, perpendicular to and at the extremity of this 30-inch depth dimension, shall be not less than 38 inches and neither of the other 2 side boundaries shall make an angle of less than 90 degrees with the boundary through the center line of pole. The position of the climbing space through the levels of conductors in rack construction shall be related to climbing spaces through the levels of conductors on crossarms in accordance with requirements of section E 123.07(5). The climbing spaces through the levels of conductors of two or more rack groups which are separated less than 6 feet shall be maintained in the same quadrant or on the same side of pole. Vertical conductors are not permitted in the climbing spaces through conductors in rack construction.

History: Cr. Register, November, 1961, No. 71, eff. 12-1-61.

E 123.08 Lateral working space. (1) LOCATION OF WORKING SPACES. Working spaces shall be provided on the climbing face of the pole at each side of the climbing space.

(2) DIMENSIONS OF WORKING SPACES. (a) *Along the crossarm.* The working space shall extend from the climbing space to the outmost pin position on the crossarm.

(b) *At right angles to the crossarm.* The working space shall have the same dimension as the climbing space (see subsection E 123.07 (5)). This dimension shall be measured horizontally from the face of the crossarm.

(c) *Vertically.* The working space shall have a height not less than that required by section E 123.09 for the vertical separation of line conductors carried at different levels on the same support.

(3) Location of vertical and lateral conductors relative to working spaces. The working spaces shall not be obstructed by vertical or lateral conductors. Such conductors shall be located on the opposite side of the pole from the climbing side or on the climbing side of the pole at a distance from the crossarms at least as great as the width of climbing space required for the highest-voltage conductors concerned. Vertical conductors enclosed in suitable conduit may be attached on the climbing side of the pole. Cutouts and their leads may be installed in the working space but not in the climbing space. Switches and their leads may extend into the working space but not into the climbing space.

(4) Location of buckarms relative to working spaces. Buckarms may be used under any of the following conditions, provided the climbing space is maintained. Climbing space may be obtained as in subsection E 123.07(6).

(a) *Standard height of working space.* Lateral working space of height required by table 11, (subsection E 123.09(1)(a)) may be provided between the buckarms and adjacent line arms to which conductors on the buckarms are not attached.

1. Method of meeting requirements. This may be accomplished by increasing the spacing between the line crossarm gains.

(b) *Reduced height of working space.* Where no circuits exceeding 8,700 volts between conductors are involved, and the clearances of subsections E 123.06(1)(b), 1., a. and b., are maintained, buckarms may be placed between line arms having normal spacing; even though such buckarms obstruct the normal working space; provided that a working space of not less than 18 inches in height is maintained either above or below each line arm and each buckarm.

1. Exception: The above working space may be reduced to 12 inches if both of the following conditions exist: Not more than 2 sets of line arms and buckarms are involved. Working conditions are rendered safe by providing rubber protective equipment or other suitable devices to insulate and cover line conductors and equipment which are not being worked on.

History: Cr. Register, November, 1961, No. 71, eff. 12-1-61; am. (3), Register, April, 1964, No. 100, eff. 5-1-64.

E 123.09 Vertical separation between line conductors, cables, and equipment located at different levels on the same pole or structure. All line conductors, cables, or equipment located at different levels on the same pole or structure shall have the vertical separations set forth below.

(1) Vertical separations between horizontal crossarms. Crossarms supporting line conductors shall be spaced in accordance with table 11. Vertical separations between crossarms shall be measured from center to center.

(a) *Basic separations.* The separations given in table 11 are for crossarms carrying conductors of 0 to 50,000 volts attached to fixed supports.

TABLE 11

VERTICAL SEPARATION OF CROSSARMS CARRYING CONDUCTORS

Conductors Usually at Lower Levels	Supply Conductors: Preferably at Higher Levels (g)				
	Open Wires 0 to 750 Volts; supply cable having effectively grounded continuous metal sheath or insulated conductors lashed to or twisted with an effectively grounded messenger or neutral, all voltages; messengers associated with such cable or conductors	750 to 8,700 Volts	8,700 to 15,000 Volts	15,000 to 50,000 Volts Same Utility	15,000 to 50,000 Volts Diff. Utilities
	Feet	Feet	Feet	Feet	Feet
Communication Conductors:					
General	(a)(b)4	4	6	--------	6
Used in operation of supply lines	2	(c)2	4	4	6
Supply Conductors:					
0 to 750 volts	2	(d)2	4	4	6
750 to 8,700 volts	--------	(d)2	4	4	6
8,700 to 15,000 volts	--------	--------	4	(e)4	(e)6
15,000 to 50,000 volts	--------	--------	--------	(e)4	(e)6

Footnotes to table 11

(a) When supply circuits of 550 volts or less, with transmitted power of 3,200 watts or less, are run below communication circuits in accordance with subsection E 122.01(2)(c), the clearance may be reduced to 2 feet.

(b) In localities where the practice has been established of placing on jointly used poles, crossarms carrying supply circuits of less than 300 volts and crossarms carrying communication circuits at a vertical separation less than specified in the table, such existing construction may be continued until the said poles are replaced provided that—

The minimum separation between existing crossarms is not less than 2 feet, and that—

Extensions to the existing construction shall conform to the clearance requirements specified in table 11.

When communication conductors are all in cable, a supply crossarm carrying only wires of not more than 300 volts may be placed at not less than 2 feet above the point of attachment of the cable to the pole provided that—

The nearest supply wire on such crossarm shall be at least 30 inches horizontally from the center of the pole, and that—

The cable be placed so as not otherwise to obstruct the climbing space.

(c) This shall be increased to 4 feet when the communication conductors are carried above supply conductors unless the communication-line conductor size is that required for grade C supply lines.

(d) Where conductors are operated by different utilities, a minimum vertical spacing of 4 feet is recommended.

(e) These values do not apply to adjacent crossarms carrying phases of the same circuit or circuits. The vertical separation between adjacent crossarms carrying conductors of the same circuit or circuits may be reduced by 25% from that given in the table but not to less than that given for horizontal separation in subsection E 123.06(1)(b).

(f) Conductors which are grounded in accordance with subsection E 103.02(2)(e) and are associated with circuits of 0 to 22,000 volts may have the clearances specified for open supply line wires of 0 to 750 volts.

(g) A conductor which is effectively grounded throughout its length and is associated with a supply circuit of 0 to 22,000 volts may have clearances specified for cables having effectively grounded continuous metal sheath or messenger.

(b) *Increased separations for voltages exceeding 50,000.* For voltages greater than 50,000, the clearances of table 11 shall be increased at the rate of 0.4 inch per 1,000 volts of the excess.

(2) VERTICAL SEPARATION BETWEEN LINE CONDUCTORS ON HORIZONTAL CROSSARMS. Where line conductors are supported on horizontal crossarms spaced as required in subsection E 123.09(1), the vertical separation between such conductors shall be not less than the following:

(a) *Where conductors on the crossarm are of the same voltage classification.* Under these conditions, the vertical separation required by table 11 may be reduced as follows:

Where Crossarm Separation Required by Table 11 is	Separation Between Conductors May Be Reduced to
2 feet	16 inches
4 feet	40 inches
5 feet	50 inches
6 feet	60 inches

(b) *Where conductors of different voltage classifications are on same crossarm.* Under these conditions, the vertical separation between conductors on adjacent crossarms shall be that required by table 11 (subsection E 123.09(1) (a)) above for the highest voltage classification concerned.

(c) *Conductors of different sags on same support.* 1. Variation in clearances. Line conductors supported at different levels on the same structure and strung to different sags shall have vertical spacings at the supporting structures so adjusted that the minimum spacing at any point in the span, at 60° F., with no wind, shall not be reduced more than 25% from that required at the supports by subsections E 123.06(1) (b), 1. a. and b. and E 123.09 (2).

2. Readjustment of sags. Sags should be readjusted when necessary to accomplish the foregoing, but not reduced sufficiently to conflict with the requirements of subsection E 126.02(6) (d). In cases where conductors of different sizes are strung to the same sag for the sake of appearance or to maintain unreduced clearance throughout storms, the chosen sag should be such as will keep the smallest conductor involved in compliance with the sag requirements of subsection E 126.02(6) (d).

3. Increased vertical separation at supports. For span lengths in excess of 150 feet, vertical separation at the pole between open supply conductors and communication cables or conductors shall be adjusted so that under conditions of 60° F., no wind and final unloaded sag, no supply conductor of 750 volts or less shall be lower in the span than a straight line joining the points of support of the highest communication cable or conductor, and no supply conductor of over 750 volts but less than 50,000 volts shall be lower in the span than 30 inches above such straight line.

Exception: Effectively grounded supply conductors associated with systems of 22,000 volts or less need meet only the provisions of subsection E 123.09(2) (c), 1.

(3) SEPARATION IN ANY DIRECTION. The separation in any direction between conductors of the same or different voltage classification when carried on the same structure, but on crossarms which are not horizontal, or on different types of supports at the two levels (such as a horizontal crossarm and a vertical rack) shall be not less than the

values given in subsections E 123.09(2) (a) and E 123.09 (2) (b) for vertical separation. The separation in any direction shall not in any case be less than the horizontal separation specified in subsections E 123.06(1)(b)1., a. and b.

(4) VERTICAL SEPARATION FOR LINE CONDUCTORS NOT CARRIED ON CROSSARMS. The vertical separation between conductors not carried on crossarms shall be the same as required in subsection E 123.09(2)(a) for conductors on crossarms.

(a) *Exception 1:* Conductors on vertical racks or separate brackets other than wood placed vertically, meeting the requirements of subsection E 123.06(1)(d), may have separations as specified in that rule.

(b) *Exception 2:* Where communication service drops cross under supply conductors on a common crossing pole, the separation between the communication conductor and an effectively grounded supply conductor may be reduced to 4 inches, provided the separation between the communication conductor and supply conductors not effectively grounded meet the requirements of subsections E 123.09(2)(a), E 123.09(2)(b) or E 123.09(4) as appropriate.

(5) VERTICAL SEPARATION BETWEEN CONDUCTORS AND NONCURRENT-CARRYING METAL PARTS OF EQUIPMENT. (a) *Equipment.* For the purpose of measuring separations under this rule, "equipment" shall be taken to mean noncurrent-carrying metal parts of equipment, including metal supports for cables or conductors, and metal supply-crossarm braces which are attached to metal crossarms or are less than 1 inch from transformer cases or hangers which are not effectively grounded.

(b) *Separations in general.* Vertical separations between supply conductors and communication equipment, between communication conductors and supply equipment, and between supply and communication equipment shall be as follows, except as provided in (c) below.

Supply Voltage	Vertical Separation
	Inches
0 to 8,700	(a) 40
Exceeding 8,700	(a) 60

Note a. Where noncurrent-carrying parts of equipment and supply cables are effectively grounded consistently throughout well-defined areas, and where communication is at lower levels, separations may be reduced to 30 inches.

(c) *Separations for span wires and brackets.* Span wires or brackets carrying lamps or trolley conductors shall have at least the vertical separations in inches from communication equipment set forth below.

(d) *Separation from drip loops of street light brackets.* Drip loops of conductors entering street light brackets from the surface of the pole, shall be at least 12 inches above communication cables or through bolts.

History: Cr. Register, November, 1961, No. 71, eff. 12-1-61.

E 123.10 Clearances of vertical and lateral conductors from other wires and surfaces on the same support. Vertical and lateral conduc-

	Span Wires and Brackets			
	Carrying Lamps		Carrying Trolley Conductors	
	Not Effectively Grounded	Effectively Grounded	Not Effectively Grounded	Effectively Grounded
	Inches	Inches	Inches	Inches
Above Communication Crossarms	20a	20a	20a	20a
Below Communication Crossarms	24	24	24	24
From Messenger Carrying Communication Cables	20a	4	12	4
From Terminal Box of Communication Cable	20a	4	12b	4
From Communication Brackets, Bridle Wire Rings or Drive Hooks	16a	4	4	4

Note a. This may be reduced to 12 inches for either span wires or metal parts of brackets at points 40 inches or more from the pole surface.

Note b. Where it is not practicable to obtain a clearance of 1 foot from terminal boxes of communication cables, all metal parts of terminals shall have the greatest possible separation from fixtures or span wires including all supporting screws and bolts of both attachments.

tors shall have the clearances and separations required by this rule from other conductors, wires, or surfaces on the same support.

Exception 1: This rule does not prohibit the placing of supply circuits of the same or next voltage classification in the same iron pipe, if each circuit or set of wires be enclosed in a metal sheath.

Exception 2: This rule does not prohibit the placing of paired communication conductors in rings attached directly to the pole or to messenger.

Exception 3: This order does not prohibit placing grounding conductors, neutral conductors which are effectively grounded throughout their length and associated with supply circuits of 0 to 22,000 volts, metal sheathed supply cables, or conductors enclosed in conduit, directly on the pole.

Exception 4: This order does not prohibit placing supply circuits of 550 volts or less and not exceeding 3,200 watts and properly insulated in the same cable with control circuits with which they are associated.

(1) LOCATION OF VERTICAL OR LATERAL CONDUCTORS RELATIVE TO CLIMBING SPACES, WORKING SPACES, AND POLE STEPS. Vertical or lateral conductors shall be located so that they do not obstruct climbing spaces, or lateral working spaces between line conductors at different levels or interfere with the safe use of existing pole steps.

(a) *Exception 1:* This rule does not apply to portions of the pole which workmen do not ascend while the conductors in question are alive.

(b) *Exception 2:* This rule does not apply to vertical runs incased in suitable conduit or other protective covering. (See subsection E 123.07(8))

(2) CONDUCTORS NOT IN CONDUIT. Conductors not incased in conduit shall have the same clearances from conduits as from other surfaces of structures.

(3) MECHANICAL PROTECTION NEAR GROUND. For a distance of 8 feet above the ground, floor, or platforms from which grounding conduc-

tors are accessible to the public, the conductors shall be protected by a substantial insulating conduit or wood molding.

(a) Where the ground resistance is less than 3 ohms a metallic guard may be used provided that in the case of lightning arrester ground the ground conductor must be electrically connected to both ends and the metallic guard covered by an insulating conduit or molding.

(b) In rural areas other than in farm and school yards, or spaces where people congregate, grounding conductors of a multi-grounded system may be weatherproof insulation instead of an insulating conduit or molding.

(c) Grounding conductors whose only purpose is to protect a pole against lightning need not be protected.

(4) REQUIREMENTS FOR VERTICAL AND LATERAL SUPPLY CONDUCTORS ON SUPPLY LINE POLES OR WITHIN SUPPLY SPACE ON JOINTLY USED POLES. (a) *General clearances.* In general, clearances shall be not less than the values specified in table 12.

TABLE 12

Clearance of Vertical and Lateral Conductors	Clearances (in Inches) for Highest Voltage Concerned in the Clearance	
	0 to 8,700 Volts	Exceeding 8,700 Volts (add the Following for Each 1,000 in Excess)
From surfaces of supports	3	0.20
From span, guy or messenger wires	6	.40
From line conductors rigidly supported on fixed supports	3	.25
From line conductors not rigidly supported on fixed supports	(a)	(a)

(a) The clearances shall be increased beyond the values given above from line conductors on fixed supports. (See subsections E 123.06(1)(b)2., and b., 3.)

(b) *Special cases.* The following apply only to portions of a pole which workmen ascend while the conductors in question are alive.

1. Side-arm construction. Vertical conductors in metal-sheathed cables and grounding wires may be run without insulating protection from supply line conductors on poles used only for supply lines and employing side-arm construction on the side of the pole opposite to the line conductors if climbing space is provided on the line conductor side of pole.

2. On insulators. Vertical and lateral conductors of less than 8,700 volts if on poles used only for supply lines may be run in multiple-conductor cables having suitable substantial insulating covering, if such cable is held taut on standard insulators supported on pins or brackets and is arranged so that the cable is held at a distance of approximately 5 inches from the surface of the pole, and from any pole step.

3. Conductors to street lamps. On poles used only for supply lines, open wires may be run from the supply line arm directly to the head of a street lamp, provided the clearances of table 12 are obtained and the open wires are substantially supported at both ends.

4. Conductors of less than 300 volts. Vertical or lateral secondary supply conductors of not more than 300 volts may be run in multiple-conductor cable attached directly to the pole surface or to crossarms

in such a manner as to avoid abrasion at the point of attachment. Each conductor of such cable which is not effectively grounded, or the entire cable assembly, shall have an insulating covering required for a conductor of at least 600 volts.

5. Other conditions. If open wire conductors are within 4 feet of the pole, vertical conductors where within a zone of 4 feet above and below such line conductors of not more than 8,700 volts or where within a zone 6 feet above and below such line conductors of more than 8,700 volts, shall be run in one of the following ways:

a. So as to clear the pole center by not less than 15 inches if the vertical conductors are of 8,700 volts or less, or 20 inches if more than 8,700 volts;

b. Enclosed in insulating conduit, or in metal conduit or cable protected by an insulating covering;

c. Conductors with weatherproof covering and covered by wood molding;

d. Methods a. and b. apply also to lateral runs and to grounding conductors, except that conductors for grounding lightning protection wires are not required to be covered within 6 feet above or below circuits of 15,000 volts or more.

(5) REQUIREMENTS FOR VERTICAL AND LATERAL COMMUNICATION CONDUCTORS ON COMMUNICATION LINE POLES OR WITHIN THE COMMUNICATION SPACE ON JOINTLY USED POLES. (a) *Clearances from wires.* The clearances and separations of vertical and lateral conductors from other conductors (except those in the same ring run) and from guy, span, or messenger wires shall be 3 inches.

(b) *Clearances from pole and crossarm surfaces.* Vertical and lateral insulated communication conductors may be attached directly to a pole or crossarm. They shall have a vertical clearance of at least 40 inches from any supply conductors (other than vertical runs or lamp leads) of 8,700 volts or less, or 60 inches if more than 8,700 volts between conductors.

(c) *Exception:* These clearances do not apply where the supply circuits involved are those carried in the manner specified in subsection E 122.01(2)(c).

(6) REQUIREMENTS FOR VERTICAL SUPPLY CONDUCTORS PASSING THROUGH COMMUNICATION SPACE ON JOINTLY USED POLES. Vertical supply conductors, including grounding wires, which pass through communication line space on joint poles shall be installed as follows:

(a) *Metal-sheathed supply cables.* Metal-sheathed supply cables shall be covered as follows:

1. Extent of covering. Covering shall extend from the lowest points of such cables up to 40 inches above the highest communication conductors.

2. Nature of covering. The covering shall consist of wood molding or other suitable insulating material at points higher than 8 feet above the ground.

a. Exception 1: Metal pipe may be used throughout, under the following conditions:

On poles where there are no trolley attachments and the metal pipe is effectively grounded, no insulating covering is required.

On poles where there are trolley attachments or where the metal pipe is not effectively grounded, the pipe shall be covered with the wood molding or other suitable insulating material from a point 6 feet below the lowest communication wire or trolley attachment to a point 40 inches above the highest communication wire or trolley attachment.

b. Exception 2: No insulating covering is required over supply secondary multi-conductor cables attached directly to the pole surface in accordance with the requirements of subsection E 123.10(6)(b)3.

c. Exception 3: Where there are no trolley attachments on the pole, no insulating covering is required over supply cables having effectively grounded lead sheath, or supply cables having effectively grounded metal sheath of other types where mutually agreed to by the parties concerned.

(b) *Supply conductors.* Supply conductors shall be installed in one of the following ways:

1. In conduit. Conductors of all voltages may be enclosed in the same way and to the same extent as required in (a) above for metal-sheathed cables.

2. On pins and insulators. Vertical and lateral conductors of street-lighting circuits and service leads of less than 750 volts may be run in multiple-conductor cable having suitable substantial insulating covering if such cable is held taut on standard insulators supported on pins or brackets and arranged so that the cable shall be held at a distance of approximately 5 inches away from the surface of the pole or from any pole steps.

3. Installed on the pole surface. Secondary supply conductors of not more than 300 volts may be run in multiple-conductor cables attached directly to the pole surface in such a manner as to avoid abrasion at the points of attachment. In the case of aerial services, the point where such cables leave the pole shall be at least 40 inches above the highest, or 40 inches below the lowest communication attachment. Each conductor of such cable which is not effectively grounded shall be insulated for a potential of at least 600 volts.

4. Suspended from supply crossarm. Lamp leads of street-lighting circuits may be run from supply crossarms directly to a street lamp bracket or luminaire under the following conditions:

a. The vertical run shall consist of paired wires or multiple-conductor cable securely attached at both ends to suitable brackets and insulators.

b. The vertical run shall be held taut at least 40 inches from the surface of the pole (through the communication space), at least 12 inches beyond the end of any communication crossarm by which it passes, at least 6 inches from communication drop wires, and at least 20 inches from any communication cable.

c. Insulators attached to lamp brackets for supporting the vertical run shall be capable of meeting, in the position in which they are installed, the same flashover requirements as the luminaire insulators.

d. Each conductor of the vertical run shall be No. 10 A.W.G. or larger.

(c) *Supply grounding wires.* Supply grounding wires shall be covered with wood molding or other suitable insulating covering to the extent required for metal-sheathed cables in (a) above.

(d) *Separation from through bolts.* Vertical runs of supply conductors shall be separated from the ends of through bolts associated with communication line equipment by one-eighth of the circumference of the pole where practicable, but in no case less than 2 inches. Vertical runs of effectively grounded supply conductor may have a separation of one inch from the end of communications through bolts.

(7) REQUIREMENTS FOR VERTICAL COMMUNICATION CONDUCTORS PASSING THROUGH SUPPLY SPACE ON JOINTLY USED POLES. All vertical runs of communication conductors passing through supply space shall be installed as follows:

(a) *Metal-sheathed communication cables.* Vertical runs of metal-sheathed communication cables shall be covered with wood molding, or other suitable insulating material, where they pass trolley feeders or other supply-line conductors. This insulating covering shall extend from a point 40 inches above the highest trolley feeders, or other supply conductors to a point 6 feet below the lowest trolley feeders or other supply conductors but need not extend below the top of any mechanical protection which may be provided near the ground.

1. Exception: Communication cables may be run vertically on the pole through space occupied by railroad signal supply circuits in the lower position, as permitted in subsection E 122.01(2) (c), without insulating covering within the supply space.

(b) *Communication conductors.* Vertical runs of insulated communication conductors shall be covered with wood molding, or other suitable insulating material, to the extent required for metal-sheathed communication cables in (a) above, where such conductors pass trolley feeders or other supply conductors.

1. Exception: Communication conductors may be run vertically on the pole through space occupied by railroad-signal supply circuits in the lower position, as permitted in subsection E 122.01(2) (c), without insulating covering within the supply space.

(c) *Communication grounding conductors.* Vertical communication grounding conductors shall be covered with wood molding or other insulating material between points at least 6 feet below and 40 inches above any trolley feeders or other supply line conductors by which they pass.

1. Exception: Communication grounding conductors may be run vertically on the pole through space occupied by railroad-signal supply circuits in the lower position, as permitted in subsection E 122.01 (2) (c), without insulating covering within the supply space.

(d) *Separation from through bolts.* Vertical runs of communication conductors shall be separated from the ends of through bolts associated with supply-line equipment by one-eighth of the circumference of the pole where practicable, but in no case less than 2 inches.

History: Cr. Register, November, 1961, No. 71, eff. 12-1-61; am. (4) (b) 1.; am. (6) (c); r. (6) (c) 1., Register, April, 1964, No. 100, eff. 5-1-64.