Decision No. 83420, Application No. 54714 (Filed March 6, 1974 amended June 28, 1974)

In the matter of Application of PACIFIC GAS AND ELECTRIC COMPANY for an Order Modifying General Order No. 95 by Amending Rules 49.4-C(4); 58.3-C(3); 59.4-A(1); 59.4-A(2); 38, Table 2 Cases 4, 5, and 6, Column "G" and Case 7 Columns D, E, F, and G; 38, Table 2 Case 9, Column "G" and the Guide for Installation of Temporary Decorations.

O P I N I O N

Pacific Gas and Electric Company (PG&E) seeks an order of the Commission modifying G.O., 95 by amending Rules 58.3.C(3); 59.4-A(1); 59.4-A(2); 38, Table 2, Cases 4, 5, and 6, Column "G" and Case 7, Columns D, E, F and G 36, Table 2, Case 9, Column "D"; The Guide for Installation of Temporary Decorations and, by amendment to the application, requests a dev1ation from Rule 49.4-C(4) under certain specified conditions.

During the past six years, PG&E has been in the process of raising the nominal operat1ng voltage of many of its existing distribution lines to 20.8 kv. This conversion has been necessitated by the constant increase in suburban load densities and the related problem of supplying these loads at the former lower voltages.

RULE 49.4-c(4)

This rule requires that conductors of voltages exceeding 17 kv crossing conductors of less than 17 kv or crossing a public highway shall have a strength at least equal to No.4 AWG stranded medium-hard drawn copper. Many of the high voltage conductors involved in the conversions to 20.6 kv are No.6 AWG solid medium-hard drawn copper. The present necessity of replacing the existing No.6 AWG copper when the line in question crosses a public highway or other conductor of lesser voltage results in significant cost with little corresponding benefit. Rule No. 44 requires that lines and elements of lines provide min1mum safety factors as specified in Table 4. Under these limitations, a conductor equal in strength to No.6 AWG can be utilized for all applications without any limitations in regard to voltage including crossing major communication l1nes and major railways. The only exception is when conductors over 17,000 volts cross over public highways and/or conductors of a lower voltage, in which case No.4 AWG is required.

PG&E estimates that it would presently cost approximately $500 to $550 to convert each crossing to No.4 AWG stranded copper, when a distribution voltage has been converted to 20.8 kv. At this rate, the total cost of conversion of PG&E's existing system over the life of the conversion program would be in excess of $1,000,000. In addition, certain amounts of street traffic and electric service interruption would be necess1tated by the replacement work.

In order to avoid additional expense and inconvenience to the general public, PG&E requests to be allowed to deviate from the provisions of Rule 49.4-C(4) when converting existing distribution lines to 20.8 kv. Such deviation would result in significant savings to PG&E's customers and will not weaken the general order since the existing rule will still apply to new construction and all other cases except conversion from 12 to 20.8 kv.

This deviation would apply only to PG&E. Other utilities in similar circumstances may wish to request deviation likewise.

RULE 58.3-C(3)

PG&E seeks a revision of this rule to allow use of a metal bracket to support three transformers without the use of crossarms. The present rule requires that no transformer case shall be in contact with a metal crossarm or a metal beam attached to a wood pole or a wood structure.

There is a danger that a transformer case might become energized through insulation failure or other cause. A metal crossarm which became energized through contact with an energized transformer case might constitute a greater hazard than the transformer alone. In a letter dated October 30,1961, the staff indicated that three transformers would not be permitted on a single metal bracket unless the transformers were insulated from the bracket by means of a nonmetallic insulating spacer providing a minimum of 1 ½" creepage distance. The assumption was that if a transformer case were to accidentally become energized the insulators would prevent the bracket from also becoming energized.

In tests conducted in 1968 PG&E found that the spacers insulating the transformer from the bracket had a tendency to deteriorate. Due to this deterioration, dirt and carbon tracking, the effectiveness of isolation insulators on transformers was found not to be dependable. PG&E feels, and the staff agrees, that it is safer to fasten the transformer solidly to the bracket and to approach the bracket and transformers with as much caution as would be utilized when approaching the normal pole-mounted single transformer.

The bracket that PG&E proposes to use supports the two outer transformers well away from the pole. They are actually further away from the climbing and working space than when mounted on crossarms. PG&E states that use of the proposed bracket would improve the appearance of their overhead lines and would be more compatible with their new construction which uses horizontal and vertical post insulators and brackets. The proposed bracket is similar to a two-transformer bracket which has been used by PG&E for many years. PG&E states that there have been no accidents attributed to the two-transformer type of bracket.

RULE 59.4-A(1)

This rule presently requires that a grounding conductor equal in strength to No.1 AWG be run from the grounding electrode to the base of the pole. The conductor running up the pole must be splice-free and equal in strength to No.4 AWG copper. PG&E is requesting that splices with an approved type of compression connector be allowed and that the strength requirements for the conductor from the grounding electrode to the base of the pole be reduced to No.4 AWG.

The present rule requires that the conductor from the grounding electrode to the pole be buried a minimum or 12 inches below the ground. PG&E states that this provides sufficient protection against damage for a conductor of size No.4 AWG and that there is no longer any reason why the size and strength specifications for the grounding conductor extending from the ground electrode to the base of the pole should differ from those for the grounding conductor on the pole. One splice is already required at the base of the pole between the No.1 AWG conductor and the No.4 AWG conductor. When properly installed, the strength of a modern compression type connector is equal to or greater than that of the conductor with which it is used. PG&E states that very often when reconstructing, rearranging, or repairing facilities, full length grounding conductors must be replaced because they are just inches short and the rule will not allow a second splice.

Permitting the same size conductor to be used from the grounding electrode to the common neutral line conductor will, in many cases, permit the grounding conductor to be run splice-free saving the labor and expense of a splice at the base of the pole. Permitting more than one splice in a conductor will save the labor and expense involved in replacing the entire ground1ng conductor when making repairs or rearrangements. The safety and electrical effectiveness of grounding installations will not be adversely effected by the proposed changes.

RULE 59.4-A(2)

The rule presently requires that all ground rods used on common neutral circuits be placed at least two feet from the base of the pole so that they will be in undisturbed earth. PG&E proposes to limit this requirement to branch circuits extending from the common neutral grid without a loop return.

The importance of low resistance grounds on the common neutral grid where there are two or more metallic return paths i8 less than on branch circuits where there is no loop return. On branch circuits a broken or high resistance ground could allow the buildup of dangerous voltage levels on the neutral conductor. This is far less likely where there are at least two metallic return paths as required for the common neutral grid.

The proposed change would allow use of existing ground electrodes when converting to the 20.8 kv common-neutral distribution system. PG&E states that the cost of replacing an existing gl'\1und rod is approximately $35 where pavement does not need to be broken or three-times that where concrete must be broken. PG&E states it has encountered considerable customer resistance to the necessary pavement breaking and excavation involved in replacing existing ground electrodes.

Allowing use of ground rods placed less than two feet from the base of the pole on common neutral grid systems will not materially affect the safety of workmen or the general public and will result in significant savings on conversion costs.

RULE 38. TABLE 2

PG&E proposes to reduce the clearances between conductors below 22.5 kv and not supported on the same poles from 96 inches to 72 inches. These clearances appear in Table 2, Cases 4,5, and 6 for Column "a" and Case 7, Columns "D, E, F and G".

Twelve kv distribution conductors are required to have a radial clearance of 72 inches from trolley contact conductors and communication conductors and 48 inches from supply conductors, service drops and trolley feeders. Supply conductors operating between 20 kv and 35 kv must have a 96-inch clearance in the same cases. Converting existing distribution lines from 12 kv to 20.8 kv frequently requires increasing clearances by 2 feet resulting in considerable expense and numerous pole replacements. PG&E proposes to allow a 72-inch clearance for conductors operating between 20 kv and 22.5 kv.

Present 12 kv distribution lines are required to have a vertical clearance of 48 inches from supply conductors and service drops operating between 0 and 750 volts as shown in Table 2, Case 9, Column G. Again, increasing the voltage to above 20 kv requ1rea increasing the clearance by 24 inches. Considerable additional costs are incurred and pole replacement is frequently required. PG&E

proposes to apply the 48-inch clearance to conductors operating between 20 kv and 22.5 kv.

PG&E states that safety would not be sacrificed by the reduction in clearance because the same live-line tools, protective equipment, operating procedures an~ rigging devices are used for construction, operation and maintenance of overhead lines carrying voltages of 750 volts to 75 kv.

PG&E states that in Application 47540 the Commission declined to reduce any clearances in Table 2 because of the necessity for keeping certain clearances for 20.8 kv conductors greater than those for 12 kv conductors; however, vertical clearance between 20.8 kv conductors and 0-750 volt conductors was not an issue.

Reducing the clearances for conductors below 22.5 kv as proposed will not materially jeopardize safety of the general public or workmen and will result in considerable savings during conversion.

GUIDE FOR INSTALLATION OF TEMPORARY DECORATIONS

PG&E proposes to revise the current "guide" to allow energized decorations, on non-climbable poles to be less than 15 inches from the center line of the pole.

The Guide for Installation of Temporary Decorations is an informal interpretive document prepared and revised from time to time by the staff. No formal action is required by the Commission in its revision.
Decisions Nos. 70489 and 71094 issued in 1966 revised General Order No. 95 to permit PG&E to utilize the 12/20.8 kv tour wire common neutral distribution system. The present application follows 6 years of experience with this system. The purpose of most of the proposed revisions is to effect economies in conversion without affecting safety of workmen or the general public.

PG&E submitted its proposals to: Southern California Edison Company, San Diego Gas & Electric Company, Pacific Power and Light Company, Los Angeles Department of Water and Power, Sierra Pacific Power Company, Sacramento Municipal Utility District and the International Brotherhood of Electrical Workers, AFL-CIO. No objections to the proposed modifications were received.

Since it appears that the proposed revisions will not affect the safety of workmen or the general public and significant economies can be obtained thereby and since the proposals were reviewed by other electric utilities and representatives of the workmen involved and no objections were raised, the

Commission finds that the application should be granted and that a public hearing is not necessary.

IT IS ORDERED that:

1. The Commission's General Order No. 95 "Rules For Overhead Electric Line Construction" is hereby amended to read as set forth in the appendix attached to this order.

2. Pacific Gas and Electric Company is hereby authorized to deviate from the provisions of Rule No. 49.4-C(4) of General Order No. 95 to the extent that existing conductors may be used in crossing conductors of less than 17 kv, or crossing a public highway when 12 kv distribution circuits are being converted to operate at 20.8 kv.

3. The Secretary shall cause a copy of this order and its appendix to be served upon each electric and telephone utility operating within Ca11fornia and the State Division *of* Industrial Safety.

The effective date of this order is the date hereof.

Dated at San Francisco California, this 11th day of September, 1974.

Appendix

The Commission's General Order No. 95, "Rules For Overhead Electric line construction," is amended to read as follows:

RULE 58.3-C3 (Last sentence, second paragraph)

> No transformer case shall be in contact with a metal <u>support (crossarm, metal beam. metal bracket)</u> attached to a wood pole or wood structure, excepting <u>when no portion of a transformer case or its metal support extends beyond a vertical plane through the center line of pole.</u>

RULE 59.4 Grounding

A MATERIAL AND SIZE

(1) Grounding conductors: The grounding conductor from each ground electrode to the base of pole shall be not less then 1 foot below the surface of the ground and shall have not less conductivity and mechanical strength than <u>the grounding conductor from the base of the pole to the common neutral line conductor. The grounding conductor to the common neutral line conductor shall be continuous unless suitable electrical compression connections are used and shall be not less than No. 4 AWG cooper.</u>

RULE 59.4-A2 (First sentence, second paragraph)

> <u>On branch circuits extending from the grid where return metallic paths arc not available,</u> the driven ground rod, pipe or equivalent shall be located not less than 24 inches from the surface of the pole.

RULE 38, TABLE 2

Add a footnote *(nn) 1n reference to Case. 9, Column "G" which would permit a reduced vertical separation between supply conductors and service drops of 0-750 volts for 20,000-22,500-volt supply conductors.

*(nn) The vertical separation between supply conductors and service drops Of 0-750 volts and 20,000-22,500-volt conductors may be reduced to 48 inches.

Add a footnote *(oo) in reference to Cases 4,5,6, Column “G” and Case 7, Columns D, E, F, and G.

*(oo) May be reduced to 72 inches for conductors of 20,000-22,500 volts.

Strikeout and Underline Section added on July 26, 2002 by Raymond G Fugere

Original Version
Table 2
Basic Minimum Allowable Clearance of Wires from Other Wires at Crossings and at Supports
(Letter references Denote Modifications of Minimum Clearances Referred to in Notes Following this Table)
All Clearances Are in Inches

Case No.	Nature of Clearance and Class of Voltage of wire, cable or conductor concerned	Other Wire, cable or conductor concerned										
					Supply conductor (including supply cables)							
		A Span wires, guys and messengers	B Trolley contact conductors 0-750 volts	C Communication conductors (including open wire, cables and service drops)	D 0-750 volts (including service drops and trolley feeders (a))	E 750-7,500 Volts	F 7,500-20,000 volts	G 20,000-35,000 volts	H 35,000-75,000 volts	I 75,000-150,000 volts	J 150,000 - 300,000 volts	K 300,000 - 550,000 volts
	Clearance between wires, cables, and conductors not supported on the same poles, vertically at crossings in spans, and radially where collinear or approaching crossing											
1	Span wires, guys and messengers (b)	18 (c)	48 (d, e)	24 (e)	24 (e)	36 (f)	36	72	72	78	78(gg)	138(hh)
2	Trolley contact conductors 0-750 volts	48 (d, e)	-------------	48 (d)	48 (d, h)	48	72	96	96	96	96 (gg)	156(hh)
3	Communication conductors	24 (e)	48 (d)	24	48 (i)	48 (dd)	72	96	96	96	96 (gg)	156(hh)
4	Supply conductors, service drops and trolley feeders 0-750 volts	24 (e)	48 (d, h)	48 (i)	24	48	48	96	96	96	96 (gg)	156(hh)
5	Supply conductors, 750-7500 volts	36 (f)	48	48 (dd)	48	48 (h)	72	96	96	96	96 (gg)	156(hh)
6	Supply conductors 7500-20,000 volts	36	72	72	48	72	72	96	96	96	96 (gg)	156(hh)
7	Supply conductors, more than 20,000 volts	72(g)	96(g)	96(g)	96(g)	96(g)	96(g)	96(g)	96 (g)	96	96 (gg)	156(hh)
	Vertical separation between conductors and / or cables on separate crossarms or other supports at different levels											

	(excepting on related line and buck arms on the same pole)											
8	Communication conductors and service drops	-------------	-------------	12 (j)	48 (k, l, m, n)	48 (k)	72 (m, n)	72(m)	72	78	87 (gg)	147(hh)
9	Supply Conductors, service drops and trolley feeders 0-750 volts	-------------	-------------	48 (k, l, m, n)	24 (h, k, m, o)	48 (k, m, p)	48 (k, m, q)	72(m)	72	78	87 (gg)	147(hh)
10	Supply conductors, 750-7500 volts	-------------	-------------	48 (k)	48 (k, m, p)	48 (m, o, r, ee)	48 (m, q)	48(q)	48(q)	60(ff)	90 (gg)	150(hh)
11	Supply conductors 7500-20,000 volts	-------------	-------------	72 (m, n)	48 (k, m, q)	48 (m, q)	48 (m, o, q, r, ee)	48(q)	48(q)	60(ff)	90 (gg)	150(hh)
12	Supply conductors 20,000-~~68,000~~ 75,000 volts	-------------	-------------	72 (m)	72 (m)	48 (m, q)	48 (m, q)	48(o, q)	48(o, q)	60(ff)	90 (gg)	150(hh)
13	Supply conductors, more than ~~68,000~~ 75,000 volts	-------------	-------------	72	72	60 (q)	60 (q)	60(q)	60(q)	60(ff)	90 (gg)	150(hh)
	Vertical arms above or below conductors on related line arms and buck arms.											
14	Line arms above or below related buck arms (s, t)	-------------	-------------	6	12 (u)	18 (u)	18 (u)	24	48	60(ff)	90 (gg)	150(hh)
	Horizontal separation of conductors on same crossarm											
15	Pin spacings of longitudinal conductors, vertical conductors and service drops (v, w)	-------------	-------------	3(x)	11 ½ (h, x)	11 ½ (x)	17 ½ (x)	24 (x)	48	60(ff)	90 (gg)	150(hh)
	Radial separation of conductors on same crossarm, pole or structure Incidental pole wiring											
16	Conductors, tap or lead wires of different circuits (v, y, z)	-------------	-------------	3 (x)	11 ½ (h, x)	11 ½ (x)	17 ½ (x)	24 (x)	48	60(ff)	90 (gg)	150(hh)
17	Conductors, tap or lead wires of same circuits (v, z, aa)	-------------	-------------	3	3	6	6	12	24	60(ff)	90 (gg)	150(hh)
	Radial separation between guys and conductors		-------------									
18	Guys passing conductors supported on other poles (excluding poles of same circuit), and guys approximately parallel to	-------------	-------------	3 (bb)	12	18	18	30	36	36 (ff)	78 (gg)	138(hh)

	conductors supported on the same poles											
19	Guys and spans wires passing conductors supported on the same poles	(ee)		3	3	6	9	12	18	24	48 (ll)	86 (jj)
20	Vertical Clearance between conductors of the same circuit on Horizontal post insulators	-	-	-	-	24	24	30	36 or 48 (ii) (mm)	48 (mm)	48(mm)	48(mm)

(a)	The clearances in Column D are also applicable to supply cables of any voltage under certain conditions	57.4
(b)	Clearances for guys and span wires apply vertically at crossings; see Case 18 for radial clearances from conductors. 1. Supply guys and span wires from conductors 2. Supply guys and span wires from guys and span wires 3. Communication guys and span wires from conductors 4. Communication guys and span wires from guys and span wires	 56.4-C 56.4-D1 86.4-C 86.4-D1
(c)	Not applicable between messengers or span wires of the same system. 1. Supply messengers 2. Trolley span wires 3. Communication messengers	 57.4-E 77.4-D 87.4-G
(d)	Protection required on guys, span wires, messengers, and cables where within trolley throw 1. Supply Guys and Span wires 2. Supply Messengers and Cables 3. Communication guys and span wires 4. Communication messengers	 56.4-B2 57.4-B2 86.4-B2 87.4-B2
(e)	Not applicable to certain conductors supported on trolley span wires. 1. Trolley contact and feeder conductors 2. Trolley feeder conductors 3. Trolley system communication conductors 4. Foreign conductors	 74.4-G 78.1 78.2 78.3
(f)	Increased clearance required over trolley contact conductors of 750-7500 volts	 74.4-G2
(g)	Shall be increased for conductors of more than 75,000 volts. As required by Table 2 Columns I, J, and K	
(h)	May be reduced for certain conductors of Class T circuits of the same system	 74.4-C

(i)	May be reduced for service drops under special conditions. 1. Supply service drops and communication line conductors 2. Supply service drops and communication service drops 3. Communication service drops and supply line conductors 4. Communication service drops and supply service drops	54.8-C1a 54.8-C4 84.8-D1a 84.8-D4
(j)	May be reduced or shall be increased for certain communication conductors or cables. 1. Open wire conductors, attached to poles, within 3 feet of topmost conductor 2. Line conductors of police or fire-alarm circuits and service drops from other communication circuits. 3. Cables and messengers attached to poles	84.4-C1a 84.8-D1b 87.4-C3
(k)	Special clearances for 0-750 volt conductors in rack configuration and messengers and cables attached to poles. 1. Supply conductors of 0-750 volts in rack configuration 2. Supply cables and messengers attached to poles 3. Communication cables and messengers attached to poles 4. On Jointly used poles	54.9 57.4-F 87.4-C3 92.1
(l)	May be reduced for service drops, and police or fire-alarm conductors, under special conditions. 1. Supply service drops and communication line conductors 2. Supply service drops on clearance arms 3. Supply service drops on pole-top extensions 4. Supply service drops and communication service drops 5. Communication service drops and police, fire-alarm or supply line conductors 6. Communication service drops on clearance arms 7. Communication service drops on pole-top extensions 8. Communication service drops and supply service drops 9. Police or fire-alarm conductors	54.8-C1b 54.8-C2 54.8-C3 54.8-C4 84.8-D1b 84.8-D2 84.8-D3 84.8-D4 92.2

(m)	May be reduced for lead wires 1. Supply lead wires above supply conductors 2. Supply drip loops above communication conductors	 54.4-C6 92.1-F3
(n)	May be reduced for supply conductors and private communication conductors of the same ownership	89.2-B
(o)	May be reduced or increased for triangular or vertical configuration or for pole-top construction. 1. Triangular or vertical configuration on crossarms 2. Dead-ended on pole in vertical configuration 3. Conductors of 0-7500 volts in triangular configuration at top of pole 4. Conductors of more than 7500 volts at top of pole	 54.4-C1c 54.4-C4 54.4-D8a 54.4-D8b
(p)	May be reduced for supply service drops of 0-750 volts	54.8-C6
(q)	Shall be increased between circuits where conductors of more than 7500 volts are at pole top.	54.4-D8b
(r)	May be reduced under special conditions 1. Supply conductors of 750-7500 volts 2. Supply conductors of 7500-20,000 volts	 54.4-C1a 54.4-C1b
(s)	Does not apply where conductors do not cross. 1. Supply conductors of different phase polarity 2. Communication conductors	 54.4-C2a 84.4-C1a
(t)	Shall not be applied consecutively both above and below the same supply conductors	54.4-2a
(u)	Shall be increased where conductors of different classifications are supported on the same crossarms. 1. Supply conductors of 0-750 volts and conductors of 7500-20,000 volts 2. Supply conductors of 0-750 volts and conductors of 750-7500 volts	 32.4-A2 32.4-A3
(v)	Not applicable to certain kinds of conductors. 1. Supply conductors of same phase or polarity 2. Insulated supply conductors in multiple-conductor cables 3. Communication insulated conductors or multiple-conductor cables	 54.4-C3c 57.4-C 87.4-C1

(w)	Shall apply radially to conductors on brackets attached to crossarms. 1. Supply conductors 2. Communication conductors	54.4-C3b 84.8-C1b
(x)	Shall be increased between conductors of different classifications supported on the same crossarm. 1. Supply conductors of different voltage classification 2. Supply circuits of 0-750 volts and communication circuits 3. Supply circuits and private communication circuits.	32.4-A 32.4-B 89.2-A
(y)	Special clearances for unprotected supply conductors from one level to another level	54.6-A 58.2-B3 92.1-F5
(z)	Not applicable to the following: 1. Clearances between conductors at different levels specified in Cases 8 to 13 inclusive. 2. Supply lateral conductors, suitably protected 3. Supply vertical runs, suitably protected 4. Supply risers, suitably protected 5. Communication Conductors	54.6-C 54.6-D 54.6-E 87.4-C1
(aa)	Not applicable between cables and their supporting messengers. 1. Supply 2. Communication	57.4-D 87.4-F
(bb)	May be reduced for communication guys and communication conductors supported on the same poles 1. Supply 2. Communication	56.4-C 86.4-C
(cc)	Clearance required between guys. 1. Supply guys, crossing 2. Supply guys, approximately parallel 3. Communication guys, crossing 4. Communication guys, approximately parallel	56.4-D2 56.4-D3 86.4-D2 86.4-D3
(dd)	Shall be increased where within 6 feet of a pole	103.5
(ee)	May be decreased in partial underground distribution	54.4-C4c
(ff)	shall be increased by 0.40 inches per kV in excess of 75 kV	
(gg)	shall be increased by 0.40 inches per kV in excess of 150 kV	
(hh)	shall be increased by 0.40 inches per kV in excess of 300 kV	
(ii)	shall be increased by 0.25 inches per kV in excess of 150 kV	

(jj)	shall be increased by 0.25 inches per kV in excess of 300 kV	
(kk)	proposed clearances to submitted to the CPUC prior to construction for circuits in excess of 550 kV	
(ll)	36-inch clearance applies 35 kV to 68kV 48-inch clearance applies over 68 kV	
(mm)	vertical clearance shall be increased by ½ inch for each kilovolt over 68 kV	

Strikeout and Underline Version

Table 2

Basic Minimum Allowable Clearance of Wires from Other Wires at Crossings and at Supports

(Letter references Denote Modifications of Minimum Clearances Referred to in Notes Following this Table)

All Clearances Are in Inches

Case No.	Nature of Clearance and Class of Voltage of wire, cable or conductor concerned	Other Wire, cable or conductor concerned										
					Supply conductor (including supply cables)							
		A Span wires, guys and messengers	B Trolley contact conductors 0-750 volts	C Communication conductors (including open wire, cables and service drops)	D 0-750 volts (including service drops and trolley feeders (a))	E 750-7,500 Volts	F 7,500-20,000 volts	G 20,000-35,000 volts	H 35,000-75,000 volts	I 75,000-150,000 volts	J 150,000 - 300,000 volts	K 300,000 - 550,000 volts
	Clearance between wires, cables, and conductors not supported on the same poles, vertically at crossings in spans, and radially where collinear or approaching crossing											
1	Span wires, guys and messengers (b)	18 (c)	48 (d, e)	24 (e)	24 (e)	36 (f)	36	72	72	78	78(gg)	138(hh)
2	Trolley contact conductors 0-750 volts	48 (d, e)	-------------	48 (d)	48 (d, h)	48	72	96	96	96	96 (gg)	156(hh)
3	Communication conductors	24 (e)	48 (d)	24	48 (i)	48 (dd)	72	96	96	96	96 (gg)	156(hh)
4	Supply conductors, service drops and trolley feeders 0-750 volts	24 (e)	48 (d, h)	48 (i)	24	48	48	96 (oo)	96	96	96 (gg)	156(hh)
5	Supply conductors, 750-7500 volts	36 (f)	48	48 (dd)	48	48 (h)	72	96(oo)	96	96	96 (gg)	156(hh)
6	Supply conductors 7500-20,000 volts	36	72	72	48	72	72	96(oo)	96	96	96 (gg)	156(hh)
7	Supply conductors, more than 20,000 volts	72(g)	96(g)	96(g)	96(g) (oo)	96(g) (oo)	96(g) (oo)	96(g) (oo)	96 (g)	96	96 (gg)	156(hh)
	Vertical separation between conductors and / or cables on separate crossarms or other supports at different levels (excepting on related line and buck arms on the											

	same pole)											
8	Communication conductors and service drops	-------------	-------------	12 (j)	48 (k, l, m, n)	48 (k)	72 (m, n)	72(m)	72	78	87 (gg)	147(hh)
9	Supply Conductors, service drops and trolley feeders 0-750 volts	-------------	-------------	48 (k, l, m, n)	24 (h, k, m, o)	48 (k, m, p)	48 (k, m, q)	72(m) <u>(nn)</u>	72	78	87 (gg)	147(hh)
10	Supply conductors, 750-7500 volts	-------------	-------------	48 (k)	48 (k, m, p)	48 (m, o, r, ee)	48 (m, q)	48(q)	48(q)	60(ff)	90 (gg)	150(hh)
11	Supply conductors 7500-20,000 volts	-------------	-------------	72 (m, n)	48 (k, m, q)	48 (m, q)	48 (m, o, q, r, ee)	48(q)	48(q)	60(ff)	90 (gg)	150(hh)
12	Supply conductors 20,000-~~68,000~~ <u>75,000</u> volts	-------------	-------------	72 (m)	72 (m)	48 (m, q)	48 (m, q)	48(o, q)	48(o, q)	60(ff)	90 (gg)	150(hh)
13	Supply conductors, more than ~~68,000~~ <u>75,000</u> volts	-------------	-------------	72	72	60 (q)	60 (q)	60(q)	60(q)	60(ff)	90 (gg)	150(hh)
	Vertical arms above or below conductors on related line arms and buck arms.											
14	Line arms above or below related buck arms (s, t)	-------------	-------------	6	12 (u)	18 (u)	18 (u)	24	48	60(ff)	90 (gg)	150(hh)
	Horizontal separation of conductors on same crossarm											
15	Pin spacings of longitudinal conductors, vertical conductors and service drops (v, w)	-------------	-------------	3(x)	11 ½ (h, x)	11 ½ (x)	17 ½ (x)	24 (x)	48	60(ff)	90 (gg)	150(hh)
	Radial separation of conductors on same crossarm, pole or structure **Incidental pole wiring**											
16	Conductors, tap or lead wires of different circuits (v, y, z)	-------------	-------------	3 (x)	11 ½ (h, x)	11 ½ (x)	17 ½ (x)	24 (x)	48	60(ff)	90 (gg)	150(hh)
17	Conductors, tap or lead wires of same circuits (v, z, aa)	-------------	-------------	3	3	6	6	12	24	60(ff)	90 (gg)	150(hh)
	Radial separation between guys and conductors		-------------									
18	Guys passing conductors supported on other poles (excluding poles of same circuit), and guys approximately parallel to conductors supported on the same poles	-------------	-------------	3 (bb)	12	18	18	30	36	36 (ff)	78 (gg)	138(hh)

19	Guys and spans wires passing conductors supported on the same poles	(ee)		3	3	6	9	12	18	24	48 (ll)	86 (jj)
20	Vertical Clearance between conductors of the same circuit on Horizontal post insulators	-	-	-	-	24	24	30	36 or 48 (ii) (mm)	48 (mm)	48(mm)	48(mm)

(a)	The clearances in Column D are also applicable to supply cables of any voltage under certain conditions	57.4
(b)	Clearances for guys and span wires apply vertically at crossings; see Case 18 for radial clearances from conductors. 1. Supply guys and span wires from conductors 2. Supply guys and span wires from guys and span wires 3. Communication guys and span wires from conductors 4. Communication guys and span wires from guys and span wires	 56.4-C 56.4-D1 86.4-C 86.4-D1
(c)	Not applicable between messengers or span wires of the same system. 1. Supply messengers 2. Trolley span wires 3. Communication messengers	 57.4-E 77.4-D 87.4-G
(d)	Protection required on guys, span wires, messengers, and cables where within trolley throw 1. Supply Guys and Span wires 2. Supply Messengers and Cables 3. Communication guys and span wires 4. Communication messengers	 56.4-B2 57.4-B2 86.4-B2 87.4-B2
(e)	Not applicable to certain conductors supported on trolley span wires. 1. Trolley contact and feeder conductors 2. Trolley feeder conductors 3. Trolley system communication conductors 4. Foreign conductors	 74.4-G 78.1 78.2 78.3
(f)	Increased clearance required over trolley contact conductors of 750-7500 volts	74.4-G2
(g)	Shall be increased for conductors of more than 75,000 volts. As required by Table 2 Columns I, J, and K	
(h)	May be reduced for certain conductors of Class T circuits of the same system	74.4-C

(i)	May be reduced for service drops under special conditions. 1. Supply service drops and communication line conductors 2. Supply service drops and communication service drops 3. Communication service drops and supply line conductors 4. Communication service drops and supply service drops	54.8-C1a 54.8-C4 84.8-D1a 84.8-D4
(j)	May be reduced or shall be increased for certain communication conductors or cables. 1. Open wire conductors, attached to poles, within 3 feet of topmost conductor 2. Line conductors of police or fire-alarm circuits and service drops from other communication circuits. 3. Cables and messengers attached to poles	84.4-C1a 84.8-D1b 87.4-C3
(k)	Special clearances for 0-750 volt conductors in rack configuration and messengers and cables attached to poles. 1. Supply conductors of 0-750 volts in rack configuration 2. Supply cables and messengers attached to poles 3. Communication cables and messengers attached to poles 4. On Jointly used poles	54.9 57.4-F 87.4-C3 92.1
(l)	May be reduced for service drops, and police or fire-alarm conductors, under special conditions. 1. Supply service drops and communication line conductors 2. Supply service drops on clearance arms 3. Supply service drops on pole-top extensions 4. Supply service drops and communication service drops 5. Communication service drops and police, fire-alarm or supply line conductors 6. Communication service drops on clearance arms 7. Communication service drops on pole-top extensions 8. Communication service drops and supply service drops 9. Police or fire-alarm conductors	54.8-C1b 54.8-C2 54.8-C3 54.8-C4 84.8-D1b 84.8-D2 84.8-D3 84.8-D4 92.2

(m)	May be reduced for lead wires 1. Supply lead wires above supply conductors 2. Supply drip loops above communication conductors	 54.4-C6 92.1-F3
(n)	May be reduced for supply conductors and private communication conductors of the same ownership	89.2-B
(o)	May be reduced or increased for triangular or vertical configuration or for pole-top construction. 1. Triangular or vertical configuration on crossarms 2. Dead-ended on pole in vertical configuration 3. Conductors of 0-7500 volts in triangular configuration at top of pole 4. Conductors of more than 7500 volts at top of pole	 54.4-C1c 54.4-C4 54.4-D8a 54.4-D8b
(p)	May be reduced for supply service drops of 0-750 volts	54.8-C6
(q)	Shall be increased between circuits where conductors of more than 7500 volts are at pole top.	54.4-D8b
(r)	May be reduced under special conditions 1. Supply conductors of 750-7500 volts 2. Supply conductors of 7500-20,000 volts	 54.4-C1a 54.4-C1b
(s)	Does not apply where conductors do not cross. 1. Supply conductors of different phase polarity 2. Communication conductors	 54.4-C2a 84.4-C1a
(t)	Shall not be applied consecutively both above and below the same supply conductors	54.4-2a
(u)	Shall be increased where conductors of different classifications are supported on the same crossarms. 1. Supply conductors of 0-750 volts and conductors of 7500-20,000 volts 2. Supply conductors of 0-750 volts and conductors of 750-7500 volts	 32.4-A2 32.4-A3
(v)	Not applicable to certain kinds of conductors. 1. Supply conductors of same phase or polarity 2. Insulated supply conductors in multiple-conductor cables 3. Communication insulated conductors or multiple-conductor cables	 54.4-C3c 57.4-C 87.4-C1

(w)	Shall apply radially to conductors on brackets attached to crossarms. 1. Supply conductors 2. Communication conductors	54.4-C3b 84.8-C1b
(x)	Shall be increased between conductors of different classifications supported on the same crossarm. 1. Supply conductors of different voltage classification 2. Supply circuits of 0-750 volts and communication circuits 3. Supply circuits and private communication circuits.	32.4-A 32.4-B 89.2-A
(y)	Special clearances for unprotected supply conductors from one level to another level	54.6-A 58.2-B3 92.1-F5
(z)	Not applicable to the following: 1. Clearances between conductors at different levels specified in Cases 8 to 13 inclusive. 2. Supply lateral conductors, suitably protected 3. Supply vertical runs, suitably protected 4. Supply risers, suitably protected 5. Communication Conductors	54.6-C 54.6-D 54.6-E 87.4-C1
(aa)	Not applicable between cables and their supporting messengers. 1. Supply 2. Communication	57.4-D 87.4-F
(bb)	May be reduced for communication guys and communication conductors supported on the same poles 1. Supply 2. Communication	56.4-C 86.4-C
(cc)	Clearance required between guys. 1. Supply guys, crossing 2. Supply guys, approximately parallel 3. Communication guys, crossing 4. Communication guys, approximately parallel	56.4-D2 56.4-D3 86.4-D2 86.4-D3
(dd)	Shall be increased where within 6 feet of a pole	103.5
(ee)	May be decreased in partial underground distribution	54.4-C4c
(ff)	shall be increased by 0.40 inches per kV in excess of 75 kV	
(gg)	shall be increased by 0.40 inches per kV in excess of 150 kV	
(hh)	shall be increased by 0.40 inches per kV in excess of 300 kV	
(ii)	shall be increased by 0.25 inches per kV in excess of 150 kV	

(jj)	shall be increased by 0.25 inches per kV in excess of 300 kV	
(kk)	proposed clearances to submitted to the CPUC prior to construction for circuits in excess of 550 kV	
(ll)	36-inch clearance applies 35 kV to 68kV 48-inch clearance applies over 68 kV	
(mm)	vertical clearance shall be increased by ½ inch for each kilovolt over 68 kV	
*(nn)	The vertical separation between supply conductors and service drops Of 0-750 volts and 20,000-22,500-volt conductors may be reduced to 48 inches.	
(oo)	May be reduced to 72 inches for conductors of 20,000-22,500 volts.	

Final Version

Table 2

Basic Minimum Allowable Clearance of Wires from Other Wires at Crossings and at Supports

(Letter references Denote Modifications of Minimum Clearances Referred to in Notes Following this Table)

All Clearances Are in Inches

Case No.	Nature of Clearance and Class of Voltage of wire, cable or conductor concerned	Other Wire, cable or conductor concerned										
					Supply conductor (including supply cables)							
		A Span wires, guys and messengers	B Trolley contact conductors 0-750 volts	C Communication conductors (including open wire, cables and service drops)	D 0-750 volts (including service drops and trolley feeders (a))	E 750-7,500 Volts	F 7,500-20,000 volts	G 20,000-35,000 volts	H 35,000-75,000 volts	I 75,000-150,000 volts	J 150,000 - 300,000 volts	K 300,000 - 550,000 volts
	Clearance between wires, cables, and conductors not supported on the same poles, vertically at crossings in spans, and radially where collinear or approaching crossing											
1	Span wires, guys and messengers (b)	18 (c)	48 (d, e)	24 (e)	24 (e)	36 (f)	36	72	72	78	78(gg)	138(hh)
2	Trolley contact conductors 0-750 volts	48 (d, e)	-------------	48 (d)	48 (d, h)	48	72	96	96	96	96 (gg)	156(hh)
3	Communication conductors	24 (e)	48 (d)	24	48 (i)	48 (dd)	72	96	96	96	96 (gg)	156(hh)
4	Supply conductors, service drops and trolley feeders 0-750 volts	24 (e)	48 (d, h)	48 (i)	24	48	48	96 (oo)	96	96	96 (gg)	156(hh)
5	Supply conductors, 750-7500 volts	36 (f)	48	48 (dd)	48	48 (h)	72	96(oo)	96	96	96 (gg)	156(hh)
6	Supply conductors 7500-20,000 volts	36	72	72	48	72	72	96(oo)	96	96	96 (gg)	156(hh)
7	Supply conductors, more than 20,000 volts	72(g)	96(g)	96(g)	96(g) (oo)	96(g) (oo)	96(g) (oo)	96(g) (oo)	96 (g)	96	96 (gg)	156(hh)
	Vertical separation between conductors and / or cables on separate crossarms or other supports at different levels (excepting on related line and buck arms on the											

	same pole)											
8	Communication conductors and service drops	-------------	-------------	12 (j)	48 (k, l, m, n)	48 (k)	72 (m, n)	72(m)	72	78	87 (gg)	147(hh)
9	Supply Conductors, service drops and trolley feeders 0-750 volts	-------------	-------------	48 (k, l, m, n)	24 (h, k, m, o)	48 (k, m, p)	48 (k, m, q)	72(m) (nn)	72	78	87 (gg)	147(hh)
10	Supply conductors, 750-7500 volts	-------------	-------------	48 (k)	48 (k, m, p)	48 (m, o, r, ee)	48 (m, q)	48(q)	48(q)	60(ff)	90 (gg)	150(hh)
11	Supply conductors 7500-20,000 volts	-------------	-------------	72 (m, n)	48 (k, m, q)	48 (m, q)	48 (m, o, q, r, ee)	48(q)	48(q)	60(ff)	90 (gg)	150(hh)
12	Supply conductors 20,000-~~68,000~~ <u>75,000</u> volts	-------------	-------------	72 (m)	72 (m)	48 (m, q)	48 (m, q)	48(o, q)	48(o, q)	60(ff)	90 (gg)	150(hh)
13	Supply conductors, more than ~~68,000~~ <u>75,000</u> volts	-------------	-------------	72	72	60 (q)	60 (q)	60(q)	60(q)	60(ff)	90 (gg)	150(hh)
	Vertical arms above or below conductors on related line arms and buck arms.											
14	Line arms above or below related buck arms (s, t)	-------------	-------------	6	12 (u)	18 (u)	18 (u)	24	48	60(ff)	90 (gg)	150(hh)
	Horizontal separation of conductors on same crossarm											
15	Pin spacings of longitudinal conductors, vertical conductors and service drops (v, w)	-------------	-------------	3(x)	11 ½ (h, x)	11 ½ (x)	17 ½ (x)	24 (x)	48	60(ff)	90 (gg)	150(hh)
	Radial separation of conductors on same crossarm, pole or structure **Incidental pole wiring**											
16	Conductors, tap or lead wires of different circuits (v, y, z)	-------------	-------------	3 (x)	11 ½ (h, x)	11 ½ (x)	17 ½ (x)	24 (x)	48	60(ff)	90 (gg)	150(hh)
17	Conductors, tap or lead wires of same circuits (v, z, aa)	-------------	-------------	3	3	6	6	12	24	60(ff)	90 (gg)	150(hh)
	Radial separation between guys and conductors		-------------									
18	Guys passing conductors supported on other poles (excluding poles of same circuit), and guys approximately parallel to conductors supported on the same poles	-------------	-------------	3 (bb)	12	18	18	30	36	36 (ff)	78 (gg)	138(hh)

19	Guys and spans wires passing conductors supported on the same poles	(ee)		3	3	6	9	12	18	24	48 (ll)	86 (jj)
20	Vertical Clearance between conductors of the same circuit on Horizontal post insulators	-	-	-	-	24	24	30	36 or 48 (ii) (mm)	48 (mm)	48(mm)	48(mm)

(a)	The clearances in Column D are also applicable to supply cables of any voltage under certain conditions	57.4
(b)	Clearances for guys and span wires apply vertically at crossings; see Case 18 for radial clearances from conductors. 1. Supply guys and span wires from conductors 2. Supply guys and span wires from guys and span wires 3. Communication guys and span wires from conductors 4. Communication guys and span wires from guys and span wires	 56.4-C 56.4-D1 86.4-C 86.4-D1
(c)	Not applicable between messengers or span wires of the same system. 1. Supply messengers 2. Trolley span wires 3. Communication messengers	 57.4-E 77.4-D 87.4-G
(d)	Protection required on guys, span wires, messengers, and cables where within trolley throw 1. Supply Guys and Span wires 2. Supply Messengers and Cables 3. Communication guys and span wires 4. Communication messengers	 56.4-B2 57.4-B2 86.4-B2 87.4-B2
(e)	Not applicable to certain conductors supported on trolley span wires. 1. Trolley contact and feeder conductors 2. Trolley feeder conductors 3. Trolley system communication conductors 4. Foreign conductors	 74.4-G 78.1 78.2 78.3
(f)	Increased clearance required over trolley contact conductors of 750-7500 volts	 74.4-G2
(g)	Shall be increased for conductors of more than 75,000 volts. As required by Table 2 Columns I, J, and K	
(h)	May be reduced for certain conductors of Class T circuits of the same system	 74.4-C

(i)	May be reduced for service drops under special conditions. 1. Supply service drops and communication line conductors 2. Supply service drops and communication service drops 3. Communication service drops and supply line conductors 4. Communication service drops and supply service drops	54.8-C1a 54.8-C4 84.8-D1a 84.8-D4
(j)	May be reduced or shall be increased for certain communication conductors or cables. 1. Open wire conductors, attached to poles, within 3 feet of topmost conductor 2. Line conductors of police or fire-alarm circuits and service drops from other communication circuits. 3. Cables and messengers attached to poles	84.4-C1a 84.8-D1b 87.4-C3
(k)	Special clearances for 0-750 volt conductors in rack configuration and messengers and cables attached to poles. 1. Supply conductors of 0-750 volts in rack configuration 2. Supply cables and messengers attached to poles 3. Communication cables and messengers attached to poles 4. On Jointly used poles	54.9 57.4-F 87.4-C3 92.1
(l)	May be reduced for service drops, and police or fire-alarm conductors, under special conditions. 1. Supply service drops and communication line conductors 2. Supply service drops on clearance arms 3. Supply service drops on pole-top extensions 4. Supply service drops and communication service drops 5. Communication service drops and police, fire-alarm or supply line conductors 6. Communication service drops on clearance arms 7. Communication service drops on pole-top extensions 8. Communication service drops and supply service drops 9. Police or fire-alarm conductors	54.8-C1b 54.8-C2 54.8-C3 54.8-C4 84.8-D1b 84.8-D2 84.8-D3 84.8-D4 92.2

(m)	May be reduced for lead wires 1. Supply lead wires above supply conductors 2. Supply drip loops above communication conductors	 54.4-C6 92.1-F3
(n)	May be reduced for supply conductors and private communication conductors of the same ownership	89.2-B
(o)	May be reduced or increased for triangular or vertical configuration or for pole-top construction. 1. Triangular or vertical configuration on crossarms 2. Dead-ended on pole in vertical configuration 3. Conductors of 0-7500 volts in triangular configuration at top of pole 4. Conductors of more than 7500 volts at top of pole	 54.4-C1c 54.4-C4 54.4-D8a 54.4-D8b
(p)	May be reduced for supply service drops of 0-750 volts	54.8-C6
(q)	Shall be increased between circuits where conductors of more than 7500 volts are at pole top.	54.4-D8b
(r)	May be reduced under special conditions 1. Supply conductors of 750-7500 volts 2. Supply conductors of 7500-20,000 volts	 54.4-C1a 54.4-C1b
(s)	Does not apply where conductors do not cross. 1. Supply conductors of different phase polarity 2. Communication conductors	 54.4-C2a 84.4-C1a
(t)	Shall not be applied consecutively both above and below the same supply conductors	54.4-2a
(u)	Shall be increased where conductors of different classifications are supported on the same crossarms. 1. Supply conductors of 0-750 volts and conductors of 7500-20,000 volts 2. Supply conductors of 0-750 volts and conductors of 750-7500 volts	 32.4-A2 32.4-A3
(v)	Not applicable to certain kinds of conductors. 1. Supply conductors of same phase or polarity 2. Insulated supply conductors in multiple-conductor cables 3. Communication insulated conductors or multiple-conductor cables	 54.4-C3c 57.4-C 87.4-C1

(w)	Shall apply radially to conductors on brackets attached to crossarms. 1. Supply conductors 2. Communication conductors	54.4-C3b 84.8-C1b
(x)	Shall be increased between conductors of different classifications supported on the same crossarm. 1. Supply conductors of different voltage classification 2. Supply circuits of 0-750 volts and communication circuits 3. Supply circuits and private communication circuits.	32.4-A 32.4-B 89.2-A
(y)	Special clearances for unprotected supply conductors from one level to another level	54.6-A 58.2-B3 92.1-F5
(z)	Not applicable to the following: 1. Clearances between conductors at different levels specified in Cases 8 to 13 inclusive. 2. Supply lateral conductors, suitably protected 3. Supply vertical runs, suitably protected 4. Supply risers, suitably protected 5. Communication Conductors	54.6-C 54.6-D 54.6-E 87.4-C1
(aa)	Not applicable between cables and their supporting messengers. 1. Supply 2. Communication	57.4-D 87.4-F
(bb)	May be reduced for communication guys and communication conductors supported on the same poles 1. Supply 2. Communication	56.4-C 86.4-C
(cc)	Clearance required between guys. 1. Supply guys, crossing 2. Supply guys, approximately parallel 3. Communication guys, crossing 4. Communication guys, approximately parallel	56.4-D2 56.4-D3 86.4-D2 86.4-D3
(dd)	Shall be increased where within 6 feet of a pole	103.5
(ee)	May be decreased in partial underground distribution	54.4-C4c
(ff)	shall be increased by 0.40 inches per kV in excess of 75 kV	
(gg)	shall be increased by 0.40 inches per kV in excess of 150 kV	
(hh)	shall be increased by 0.40 inches per kV in excess of 300 kV	
(ii)	shall be increased by 0.25 inches per kV in excess of 150 kV	

(jj)	shall be increased by 0.25 inches per kV in excess of 300 kV	
(kk)	proposed clearances to submitted to the CPUC prior to construction for circuits in excess of 550 kV	
(ll)	36-inch clearance applies 35 kV to 68kV 48-inch clearance applies over 68 kV	
(mm)	vertical clearance shall be increased by ½ inch for each kilovolt over 68 kV	
(nn)	The vertical separation between supply conductors and service drops Of 0-750 volts and 20,000-22,500-volt conductors may be reduced to 48 inches.	
(oo)	May be reduced to 72 inches for conductors of 20,000-22,500 volts.	

Original Version
Rule 58.3-C3

58.3-C Grounding

3 Transformer Case Grounding or Bonding: Cases of transformers and metal parts in contact therewith shall not be grounded where supported on wood poles or wood structures.

Except in the case of partial underground distribution systems (see Rule 21.10),the hanging or placing of transformers on metal poles or structures is not recommended, particularly with respect to transformers connected to circuits of less than 14,000 volts. Transformers shall not be supported on metal poles or metal supports in contact with the ground unless the cases are securely bonded to the metal poles or parts of structures in contact with the ground and such poles or structures are effectively grounded. No transformer case shall be in contact with a metal crossarm or a metal beam attached to a wood pole or a wood structure, excepting a metal heel arm or rest which does not extend beyond the sides of any transformer case.

The bonding of cases of transformers whose high voltage windings are connected to circuits of less than 20,000 volts is not recommended but where such cases are bonded the case bonding system shall not be electrically connected to any unassociated hardware or to other bonds.

Except from the provisions of this Rule 58.3-C3 applying to the grounding of transformer cases supported on wood poles or structures are the following:

> Any transformer whose high-voltage winding is connected to a circuit of more than 14,000 volts, which may have its case grounded provided all such transformer installations on the system are so grounded, warning signs calling attention to the case grounding condition are posted on the structure so as to be readily legible from the climbing space or spaces, and no such grounded transformer case is

less than 8 feet vertically or 4 feet horizontally from the unprotected conductors of any other supply-line circuit than those to which the transformer windings are connected;

Any transformer whose high-voltage is connected to a circuit of 750-14,000 volts, which may have its case grounded provided no unprotected conductors (including lead wires) of 750-14,000 volts shall be less than 8 feet vertically or 4 feet horizontally from the nearest part of such grounded case; and

Any transformer the case of which is less than 8 feet above the ground.

Transformer cases which are grounded in accordance with any provision of this rule shall be effectively grounded (see Rule 33.3).

Strikeout and Underline Version
Rule 58.3-C3

58.3-C Grounding

3 Transformer Case Grounding or Bonding: Cases of transformers and metal parts in contact therewith shall not be grounded where supported on wood poles or wood structures.

Except in the case of partial underground distribution systems (see Rule 21.10),the hanging or placing of transformers on metal poles or structures is not recommended, particularly with respect to transformers connected to circuits of less than 14,000 volts. Transformers shall not be supported on metal poles or metal supports in contact with the ground unless the cases are securely bonded to the metal poles or parts of structures in contact with the ground and such poles or structures are effectively grounded. No transformer case shall be in contact with a metal support (crossarm, metal beam. metal bracket) ~~crossarm or a metal beam~~ attached to a wood pole or a wood structure, excepting ~~a metal heel arm or rest which does not extend beyond the sides of any transformer case.~~ when no portion of a transformer case or its metal support extends beyond a vertical plane through the center line of pole.

The bonding of cases of transformers whose high voltage windings are connected to circuits of less than 20,000 volts is not recommended but where such cases are bonded the case bonding system shall not be electrically connected to any unassociated hardware or to other bonds.

Except from the provisions of this Rule 58.3-C3 applying to the grounding of transformer cases supported on wood poles or structures are the following:

Any transformer whose high-voltage winding is connected to a circuit of more than 14,000 volts, which may have its case grounded provided all such transformer installations on the system are so grounded, warning signs calling attention to the case grounding condition are posted on the structure so as to be readily legible from the climbing space or spaces, and no such grounded transformer case is less than 8 feet vertically or 4 feet horizontally from the unprotected conductors of any other supply-line circuit than those to which the transformer windings are connected;

Any transformer whose high-voltage is connected to a circuit of 750-14,000 volts, which may have its case grounded provided no unprotected conductors (including lead wires) of 750-14,000 volts shall be less than 8 feet vertically or 4 feet horizontally from the nearest part of such grounded case; and

Any transformer the case of which is less than 8 feet above the ground.

Transformer cases which are grounded in accordance with any provision of this rule shall be effectively grounded (see Rule 33.3).

Strikeout and Underline Version
Rule 58.3-C3

58.3-C Grounding

3 Transformer Case Grounding or Bonding: Cases of transformers and metal parts in contact therewith shall not be grounded where supported on wood poles or wood structures.

Except in the case of partial underground distribution systems (see Rule 21.10),the hanging or placing of transformers on metal poles or structures is not recommended, particularly with respect to transformers connected to circuits of less than 14,000 volts. Transformers shall not be supported on metal poles or metal supports in contact with the ground unless the cases are securely bonded to the metal poles or parts of structures in contact with the ground and such poles or structures are effectively grounded. No transformer case shall be in contact with a metal support (crossarm, metal beam. metal bracket) attached to a wood pole or a wood structure, excepting when no portion of a transformer case or its metal support extends beyond a vertical plane through the center line of pole.

The bonding of cases of transformers whose high voltage windings are connected to circuits of less than 20,000 volts is not recommended but where such cases are bonded the case bonding system shall not be electrically connected to any unassociated hardware or to other bonds.

Except from the provisions of this Rule 58.3-C3 applying to the grounding of transformer cases supported on wood poles or structures are the following:

Any transformer whose high-voltage winding is connected to a circuit of more than 14,000 volts, which may have its case grounded provided all such transformer installations on the system are so grounded, warning signs calling attention to the case grounding condition are posted on the structure so as to be readily legible from the climbing space or spaces, and no such grounded transformer case is less than 8 feet vertically or 4 feet horizontally from the unprotected conductors of any other supply-line circuit than those to which the transformer windings are connected;

Any transformer whose high-voltage is connected to a circuit of 750-14,000 volts, which may have its case grounded provided no unprotected conductors (including lead wires) of 750-14,000 volts shall be less than 8 feet vertically or 4 feet horizontally from the nearest part of such grounded case; and

Any transformer the case of which is less than 8 feet above the ground.

Transformer cases which are grounded in accordance with any provision of this rule shall be effectively grounded (see Rule 33.3).

Original Version
Rule 59.4-A

59.4-A Material and Size

1 Grounding Conductors: The grounding conductor from each ground electrode tot eh base of pole shall be not less than 1 foot below the surface of the ground and shall have not less conductivity and mechanical strength than No. 1 AWG medium-hard-drawn stranded copper. From the No. 1 AWG or larger conductor to the common neutral line conductor, the grounding conductor shall be continuous without splices and shall be not less than No. 4 AWG copper.

2 Grounding Electrodes: Ground electrodes on common neutral systems shall be one-piece corrosion-resisting metal rods or pipes (or equivalent in physical and electrical properties) not less than 5/8 inch in diameter by 8 feet in length and driven to a minimum depth of 8 feet below the surface of the ground. Pole-butt plates or wrappings shall not be used either in lieu of the aforesaid rods or pipes or as electrodes supplementary thereto.

The driven ground rod, pipe, or equivalent shall be located not less than 2 feet from the surface of the pole. Where two or more such rods are installed, they shall be located at not less than 6-foot centers and separation required from the surface of the pole shall not be held to apply to the connection between rods.

Strikeout and Underline Version
Rule 59.4-A

59.4-A Material and Size

1 Grounding Conductors: The grounding conductor from each ground electrode tot eh base of pole shall be not less than 1 foot below the surface of the ground and shall have not less conductivity and mechanical strength than ~~No. 1 AWG medium-hard-drawn stranded copper. From the No. 1 AWG or larger conductor to the common neutral line conductor, the grounding conductor shall be continuous without splices and shall be not less than No. 4 AWG copper.~~ <u>the grounding conductor from the base of the pole to the common neutral line conductor. The grounding conductor to the common neutral line conductor shall be continuous unless suitable electrical compression connections are used and shall be not less than No. 4 AWG cooper.</u>

2 Grounding Electrodes: Ground electrodes on common neutral systems shall be one-piece corrosion-resisting metal rods or pipes (or equivalent in physical and electrical properties) not less than 5/8 inch in diameter by 8 feet in length and driven to a minimum depth of 8 feet below the surface of the ground. Pole-butt plates or wrappings shall not be used either in lieu of the aforesaid rods or pipes or as electrodes supplementary thereto.

<u>On branch circuits extending from the grid where return metallic paths arc not available,</u> the driven ground rod, pipe, or equivalent shall be located not less than 2 feet from the surface of the pole. Where two or more such rods are installed, they shall be located at not less than 6-foot centers and separation required from the surface of the pole shall not be held to apply to the connection between rods.

Final Version
Rule 59.4-A

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