

SECTION CONTENTS

SECTION VIII

DETAILED CONSTRUCTION REQUIREMENTS FOR
COMMUNICATION LINES

(Class C Circuits)

RULE	PAGE
80. GENERAL -----	224
81. POLES, TOWERS AND STRUCTURES -----	224
81.1 Definition -----	224
81.2 Maintenance and Inspection -----	224
81.3 Material and Strength -----	224
A. Replacement in Grade F Construction -----	224
81.4 Clearances -----	225
A. From Railroad Tracks -----	225
81.5 Dimensions and Settings -----	225
81.6 Stepping -----	225
82. CROSSARMS -----	225
82.1 Definition -----	225
82.2 Maintenance and Inspection -----	225
82.3 Material and Strength -----	225
82.4 Hardware -----	225
A. Protection Against Corrosion -----	225
B. Metal Back Braces -----	225
83. PINS, DEAD ENDS AND CONDUCTOR FASTENINGS -----	225

SECTION CONTENTS

SECTION VIII

RULE	PAGE
83.1 Maintenance and Inspection -----	225
83.2 Material and Strength -----	225
83.3 Pin and Dead-End Spacing -----	225
84. CONDUCTORS -----	225
84.1 Definition -----	225
84.2 Maintenance and Inspection -----	225
84.3 Material and Strength -----	225
84.4 Clearances -----	226
A. Above Ground -----	226
(1) Across Arid or Mountainous Areas -----	226
(2) In Rural Districts -----	226
(3) Accessible to Pedestrians Only -----	226
(4) Fenced Railway Rights of Way -----	226
(5) Above Swimming Pools -----	227
B. Above Railways and Trolley Lines -----	227
(1) Which Transport Freight Cars -----	227
(2) Operated by Overhead Trolleys -----	227
C. Between Conductors -----	228
(1) Open Wire -----	228
a) On Related Line and Buck Arms -----	228
b) On Brackets Attached to Crossarms --	228
c) Attached Directly to Poles -----	229
(2) Duplex, Triplex, and Cables -----	229
D. From Poles and Crossarms -----	229
(1) Conductors Supported on Crossarms -----	230
(2) Conductors Not Supported on Crossarms --	231
(3) Colinear, Conflicting or Crossing Lines-	231
a) Where Clearance Arms are Used -----	231
b) Where Clearance Arms are Not Used --	231
(4) Conductors Passing Supply Poles and	231
Unattached Thereto -----	231

SECTION CONTENTS

SECTION VIII

RULE		PAGE
	E. Above or Beside Buildings, Bridges and Other Similar Structures -----	232
	F. Under or Through Bridges, Viaducts or Similar Structures -----	232
	G. From Guys and Messengers -----	233
84.5	Sags -----	233
84.6	Vertical and Lateral Conductors -----	233
	A. Open Wire -----	233
	B. Ground Wires -----	234
	C. Risers -----	234
	D. Protective Covering -----	234
84.7	Climbing Space -----	235
	A. Where Line Arms Only are Involved -----	235
	(1) On Poles Which Support Communication Conductors Only -----	236
	(2) On Poles Jointly Used With Supply Conductors -----	236
	B. Where Buck Arms are Involved -----	236
	(1) Double Line Arm and Double Buck Arm -----	236
	(2) Double Buck Arm and Single Line Arm, or Vice Versa -----	236
	(3) Single Line Arm and Single Buck Arm -----	237
	(4) Alternative -----	237
	C. Through Conductors Not on Crossarms -----	237
	D. Through Service Drops Not on Crossarms -----	237
	E. Allowable Climbing Space Obstructions -----	237
	F. Colinear, Conflicting or Crossing Lines -----	238

SECTION CONTENTS

SECTION VIII

RULE		PAGE
84.8	Service Drops -----	238
	A. Material and Size -----	238
	B. Attached to Surface of Pole -----	239
	(1) Service Drops From Open Wire Lines -----	239
	(2) Service Drops From Cabled Lines -----	239
	a) Cable Supported on Crossarm -----	239
	b) Cable Without Guard Arm, Supported on Surface of Pole -----	239
	c) Cable With Guard Arm, Supported on Surface of Pole -----	239
	C. Clearances Above Ground and Buildings -----	240
	(1) Above Public Thoroughfares -----	240
	(2) Above Private Thoroughfares or Private Property -----	240
	a) Industrial and Commercial Premises --	240
	b) Residential Premises -----	240
	(3) Above Ground in Areas Accessible to Pedestrians Only -----	241
	a) Industrial and Commercial Premises --	241
	b) Residential Premises -----	241
	c) Above Ground on Fenced Railway Rights-of-Way -----	241
	(4) From Buildings and Structures -----	241
	(5) Above Swimming Pools -----	242
	D. Clearances Between Conductors -----	242
	(1) Above or Below Supply Line Conductors ---	243
	a) Crossings in Spans -----	243
	b) Supported on the Same Pole, Table 15-	243
	(2) On Clearance Crossarms -----	243
	(3) On Pole-Top Extensions -----	244
	(4) Above or Below Supply Service Drops -----	244
	(5) Above Trolley Contact Conductors -----	244
	E. Clearance From Other Poles -----	245
85.	CONDUCTOR INSULATORS -----	245
85.1	Material -----	245
85.2	Strength -----	245

SECTION CONTENTS

SECTION VIII

RULE	PAGE
86. GUYS AND ANCHORS -----	245
86.1 Definition -----	245
86.2 Use -----	245
86.3 Material and Strength -----	245
86.4 Clearances -----	245
A. Above Ground -----	246
(1) Across or Along Public Thoroughfares ----	246
(2) Over Private Property -----	246
(3) Above Swimming Pools -----	246
B. Above Railways and Trolley Lines -----	247
(1) Which Transport Freight Cars -----	247
(2) Operated by Overhead Trolley -----	247
C. From Conductors -----	247
(1) Crossing in Spans -----	247
(2) On Colinear Lines -----	247
(3) Parallel on Same Poles -----	247
(4) Passing on Same Poles -----	248
a) Overhead Guys -----	248
b) Anchor Guys -----	248
D. From Span Wires or Other Guys -----	248
(1) Crossing in Spans -----	248
(2) Passing and Attached to Same Pole -----	248
(3) Approximately Parallel and Attached to Same Poles -----	248
E. From Poles -----	249
F. Above Buildings -----	249
86.5 Fastenings -----	250
86.6 Sectionalizing and Grounding Requirements -----	250
A. Where Not Exposed to Supply Conductors -----	250

SECTION CONTENTS

SECTION VIII

RULE	PAGE
B. Sectionalized Because of Exposure or Proximity to Supply Conductors -----	250
(1) Overhead Guys Exposed to Supply Conductors of 250-20,000 Volts -----	250
(2) Guys in Proximity -----	251
C. Exposed to Supply Conductors of More Than 20,000 Volts -----	251
D. Guys Attached to Grounded Poles or Structures -----	251
E. Anchor Guys Through Supply Conductor Levels -----	252
86.7 Location of Sectionalizing Insulators -----	252
A. Overhead Guys -----	252
(1) Exposed -----	252
(2) In Proximity -----	252
B. Anchor Guys -----	252
C. Truss Guys -----	253
86.8 Guy Insulators -----	254
A. Material -----	254
B. Strength -----	254
C. Voltage Requirements, Table 16 -----	254
86.9 Protection -----	255
87. CABLES AND MESSENGERS -----	255
87.1 Definition -----	255
87.2 Use of Messenger -----	255
87.3 Material and Strength -----	255

SECTION CONTENTS

SECTION VIII

RULE		PAGE
87.4	Clearances -----	255
	A. Above Ground -----	255
	B. Above Railways and Trolley Lines -----	255
	(1) Which Transport Freight Cars -----	255
	(2) Operated by Overhead Trolley -----	255
	C. Between Conductors and Cables -----	256
	(1) Cable Conductors -----	256
	(2) Between Separate Cables -----	256
	(3) Attached to Poles -----	256
	D. From Poles -----	257
	(1) Cables or Messengers Supported on Crossarms -----	257
	(2) Cables or Messengers Not Supported on Crossarms -----	257
	(3) Colinear Lines -----	258
	(4) Cables or Messengers Passing Supply Poles and Unattached Thereto -----	258
	E. Above or Beside Buildings, Bridges and Other Structures -----	258
	F. Between Cables and Messengers -----	258
	G. Between Messengers -----	258
87.5	Fastenings -----	258
87.6	Sectionalizing of Messengers -----	258
87.7	Covering or Guarding -----	258
	A. Vertical and Lateral Cables -----	258
	B. Longitudinal Aerial Cables or Messengers -----	258
	C. Crossing Trolley Lines -----	259
87.8	Sags -----	259

SECTION CONTENTS

SECTION VIII

RULE	PAGE
88. MISCELLANEOUS EQUIPMENT -----	259
88.1 Cable Terminals or Boxes -----	259
89. PRIVATE COMMUNICATION CIRCUITS -----	259
89.1 Definition -----	259
89.2 Construction and Operation -----	259
A. Private Communication Circuits and Supply Circuits on the Same Crossarms -----	260
(1) Supply Conductors of 7500-20,000 volts, Same Ownership -----	260
(2) Supply Conductors of 750-7500 volts, Same Ownership -----	260
(3) Supply Conductors of 0-750 volts, Same Ownership -----	260
(4) Supply Conductors of 0-750 volts, Different Ownership -----	261
(5) Change in Location With Respect to Supply Conductors -----	261
B. Private Communication Circuits and Supply Circuits on the Same Pole -----	261
89.3 Telephone Instruments on Poles or Structures -----	262
89.4 Cables and Messengers -----	262

SECTION VIII

DETAILED CONSTRUCTION REQUIREMENTS FOR
COMMUNICATION LINES

(Class C Circuits)

80. GENERAL

The following rules cover detailed construction requirements for communication lines. These rules are supplemented, in certain cases, by rules in other sections. See Section IX for additional rules applicable to communication lines on poles jointly used with supply lines; see Section X for additional rules applicable to line crossings or conflicts; see Section XI for additional rules applicable to lines crossing railroads.

81. POLES, TOWERS AND STRUCTURES

81.1 Definition (see Rules 21.7-C and 22.0)

81.2 Maintenance and Inspection (see Rules 31.1 and 31.2)

81.3 Material and Strength

Communication poles shall meet the material and strength requirements specified in Section IV.

A. Replacement in Grade F Construction

Wood poles in Grade F construction shall be replaced or reinforced before the safety factor has been reduced to less than one-half, except that the circumference of sound solid wood within 18 inches above the below the ground line on such poles before replacement or reinforcement shall in no case be less than as follows:

Poles supporting 10 wires or less of open-wire
local exchange conductors ----- 9 inches

Poles supporting cable, interexchange conductors
or more than 10 wires of open-wire local
exchange conductors -----12 inches

Examples of replacement circumferences which meet these requirements are given in Tables 26 and 27 of Appendix D.

81.4 Clearances

A. From Railroad Tracks (see Rule 36; also Appendix E)

81.5 Dimensions and Settings (see Rules 49.1-B and 49.1-C)

81.6 Stepping

The lowest step on any stepped pole shall be not less than 7 feet 6 inches from the ground line where supply conductors are supported on the same pole with communication conductors. On poles supporting communication conductors only, the lowest metal step may be placed not less than 6 feet 6 inches above the ground and one wood step may be placed 3 feet 6 inches above the ground.

82. CROSSARMS

82.1 Definition (see Rule 20.9)

82.2 Maintenance and Inspection (see Rules 31.1 and 31.2)

82.3 Material and Strength (see Rule 49.2)

82.4 Hardware

A. Protection Against Corrosion (see Rule 49.8)

B. Metal Back Braces

Metal back braces shall be considered as one of the arms of double arm construction.

83. PINS, DEAD ENDS AND CONDUCTOR FASTENINGS

83.1 Maintenance and Inspection (see Rules 31.1 and 31.2)

83.2 Material and Strength (see Rule 49.3)

83.3 Pin and Dead-End Spacing (see Table 1, Case 8 and Table 2, Case 15)

84. CONDUCTORS

84.1 Definition (see Rule 20.8)

84.2 Maintenance and Inspection (see Rules 31.1 and 31.2)

84.3 Material and Strength (see Rule 49.4)

84.4 Clearances

Allowable variations in clearances due to temperature, loading, dead ending, etc., are given in Rules 37 and 38.

A. Above Ground

The minimum vertical clearances shall be those specified in Rule 37 and Table 1, with the following modifications:

- (1) Across Arid or Mountainous Areas: The clearance of 15 feet specified in Table 1, Case 4, Column B may be reduced to not less than 13 feet over arid or mountainous areas which are not under cultivation and over which there is no likelihood of vehicular travel.
- (2) In Rural Districts: The clearance of Table 1, Case 4, Column B may be reduced to not less than 13 feet above ground along thoroughfares in rural districts where no part of the line overhangs any part of the thoroughfare which is ordinarily traveled and where it is unlikely that vehicles will be required to cross under the communication conductors.
- (3) Accessible to Pedestrians Only: Communication conductors of not more than 160 volts which transmit not more than 50 watts and communication cables having grounded metal sheaths may have a clearance of 8 feet above ground accessible to pedestrians only.
- (4) Fenced Railway Rights-of-Way: Railway signal cables between line poles and signaling devices, which are entirely on fenced railway rights-of-way, and which are exposed to vehicular traffic but do not cross thoroughfares, may have clearances above ground less than as specified in Table 1, Column B, Case 4 (15 feet) but not less than 10 feet. Such cables which are entirely on fenced railway rights-of-way and which are in areas accessible to pedestrians only may have clearances above ground less than as specified in Table 1, Column B, Case 5 (10 feet) but not less than 7 feet.

- (5) Above Swimming Pools: Crossings of communication line conductors above swimming pools shall be avoided where practicable. Line conductors shall have radial clearances from the top edge of the pool wall and vertical clearances above the highest water level of the pool of not less than 18 feet. Grounded metallic sheathed cables, plastic-jacketed cables with an inner grounded metallic sheath, and grounded messengers and grounded span wires which support cable may have minimum radial and vertical clearances as hereinabove stated of not less than 16 feet.

Service drops having coverings of materials specially approved by the Commission for installation above swimming pools and used in line cable construction may have minimum radial and vertical clearances as hereinabove stated of not less than 14 feet.

B. Above Railways and Trolley Lines

- (1) Which Transport Freight Cars: The clearance specified in Table 1, Case 1, Column B (25 feet) is based upon the maximum height of standard freight cars, 15 feet 1 inch between top of rail and top of running board. This clearance shall in no case be reduced more than 5% because of temperature and loading as specified in Rule 43.
- (2) Operated by Overhead Trolleys: The clearance specified in Table 1, Case 2, Column B (26 feet) is based upon a trolley pole throw of 26 feet, the usual maximum height of a free trolley pole above the rails or other traveled surfaces used by trolley cars or coaches. Where trolley lines have a maximum trolley throw at variance with 26 feet the specified clearance shall be increased or may be reduced accordingly except that in no case shall the clearance be reduced such that there is less than 4 feet vertical separation from trolley contact wires. Where the trolley system consists of buses with retractable trolley poles, trolley span wires will be considered adequate guarding for telephone drop wires which are attached to the same poles as the span wires if the drop wires are essentially in the same vertical plane with the span wires. In such cases the drop wires will be placed such that there is a minimum separation of 4 feet between the drop wires and the trolley contact wire.

See Rule 87.4-B2 for the clearance of grounded cables and messengers.

Where railways operated by overhead trolleys transport freight cars, the clearance requirements of Rule 84.4-B1 also apply.

C. Between Conductors

The minimum clearances shall be those specified in Rule 38, Table 2, (see also Rule 32.2-D) with the following modifications:

(1) Open Wire

- a) On Related Line and Buck Arms: The clearance of 6 inches specified in Table 2, Case 14, Column C is not required between conductors on line arm and related buck arm where the conductors supported by such arms do not cross.
- b) On Brackets Attached to Crossarms: Line conductors supported on brackets or extensions attached to crossarms shall be maintained at, or outside of, the outer pin or dead-end positions on the crossarm with a radial separation not less than the minimum pin spacing specified in Table 2, Case 15 (3 inches) from any other line conductors supported by the same crossarm, except that not more than two conductors on the same side of pole on any crossarm may be supported on brackets within the outer pin position and below conductors normally supported on pins on the crossarm provided that all conductors concerned do not carry more than 160 volts and the power transmitted does not exceed 50 watts and the vertical separation between conductors so supported on brackets and those attached on pins or dead ends on crossarms not supporting the bracket shall be not less than 12 inches. The vertical clearances specified in Table 2, Cases 1 to 14 shall be provided between the conductor on the bracket and the conductor level of any other conductors not supported on the crossarm to which the bracket is attached.

This rule shall not be held to apply to clearances between conductors of the same or similar circuits at points of transposition.

- c) Attached Directly to Poles: On poles which carry no crossarms, open wire conductors which are attached to the sides of poles by means of hooks, knobs or brackets may be placed in any position within the 3 feet next below the topmost conductor on the pole. The vertical separation between conductor supports on the same side of pole in this space of 3 feet shall be not less than 6 inches. Below this point (3 feet below the topmost conductor) conductors shall be attached to one side of pole only, not more than 6 conductors shall be so attached, and the vertical separation between these conductors shall be not less than 12 inches.

On poles which carry communication crossarms only, one pair of open wire conductors may be attached to opposite sides of the pole by means of hooks, knobs, or brackets, at a point not less than 2 feet below the lowest level of conductors supported on crossarms. Below this point (2 feet below conductors on crossarm) other conductors which are attached to surface of pole shall be attached to one side of pole only, not more than six conductors shall be so attached, and their vertical separation shall be not less than 12 inches.

Branch or tap lines and service drops from conductors attached to poles may be similarly attached to the face or back of a pole, but not both.

- (2) Duplex, Triplex, and Cables: Insulated single conductors (rubber insulated), duplex, triplex, and paired conductors are considered as cables (see definition, Rule 20.3) and the clearances for such conductors are specified in Rule 87.4.

D. From Poles and Crossarms

Table 1, Case 8, Column B specifies a minimum clearance of 15 inches from center line of pole which is applicable to communication conductors including cables and service drops. Modifications of this basic 15-inch clearance are specified in Rule 37 and by the following provisions where

conductors are not on poles jointly used for supporting supply conductors excepting supply service drop clearance attachments (see Rules 54.8-C2 and 54.8-C3). On poles jointly used for supporting supply conductors the basic 15-inch clearance may be reduced to 9 inches on one side of the pole provided that it is increased to not less than 21 inches on the other side of the pole.

The clearance of 3 inches specified in Table 1, Case 9, Column B is not intended to apply to communication conductors.

- (1) Conductors Supported on Crossarms: The 15-inch minimum clearance from center line of pole specified for communication conductors supported on crossarms may be reduced under the following conditions:

For open wire toll and other open wire line conductors not used for exchange or local distribution, a clearance of not less than 9 inches from center line of pole may be used;

For open wire exchange or local distribution conductors which were originally installed as toll line conductors, a clearance of not less than 9 inches may be used provided such exchange conductors do not carry more than 160 volts and 50 watts;

For open wire local exchange and local distribution conductors in rural districts, the conductor clearance from center line of pole may be not less than 9 inches provided the voltage of such conductors is not more than 160 volts, power transmitted does not exceed 50 watts;

Cables or messengers may be attached to opposite sides of pole and have clearances less than 15 inches from center line of pole where placed 2 feet or more below the level of the lowest communication conductors supported on crossarms;

Cables or messengers may have clearances less than 15 inches from center line of pole where placed between crossarms or less than 2 feet below the level of the lowest communication conductor supported on crossarms.

(2) Conductors Not Supported on Crossarms: Communication conductors which are not supported on crossarms may be attached to poles by means of hooks, knobs, or brackets and thus are not required to be any specified distance from center line of poles provided the clearance between conductors complies with the requirements of Rule 84.4-C1c. The minimum clearance of such conductors from the surface of poles shall be such that suitable insulation is maintained.

(3) Colinear, Conflicting or Crossing Lines (See Rule 32.3): Where two communication lines are colinear or otherwise in conflict or where a pole of one line is interset in another line at crossings, the clearances of Rule 32.3 and Table 1, Case 8, Column B may be modified as follows:

In applying any of the provisions of this Rule 84.4-D3 an unobstructed climbing space on each pole concerned shall be maintained with horizontal dimensions of not less than 30 inches square for conductors carrying more than 160 volts and 50 watts, and not less than 18 inches in width and 30 inches in depth for conductors carrying lower voltage and power.

a) Where Clearance Arms are Used: Where clearance arms are used, on poles which support only communication conductors, to support the conductors of a colinear or conflicting communication line the clearance of such conductors from the center line of pole shall be not less than 15 inches for conductors carrying more than 160 volts and 50 watts and shall be not less than 9 inches for conductors carrying lower voltage and power.

b) Where Clearance Arms are Not Used: Communication conductors which in passing another communication pole unattached would be less than 15 inches from the center line of pole or less than 5 inches from the surface of pole shall be attached to the pole in accordance with the provisions of Rules 84.4-C1c and 84.4-D2.

(4) Conductors Passing Supply Poles and Unattached Thereto: The center line clearance between poles supporting supply conductors and any communication conductors which pass such poles unattached shall be not less than 22½ inches (1½ times the clearance specified in Table 1, Case 8), except where the supply pole

is within 10 feet of the pole on which the communication conductors are supported. Where poles of the two lines are less than 10 feet apart, clearances not less than as specified in Table 1, Case 8, shall be maintained.

- a. Cable sheath and messenger are suitably insulated for the street lighting and other voltages involved. For metallic poles, insulation to extend 3 feet horizontally from pole center line.
- b. Cable and messenger to be mechanically protected from abrasion where necessary.

E. Above or Beside Buildings, Bridges and Other Similar Structures

Conductors (including cables) shall be so arranged as to hamper and endanger firemen and workmen as little as possible in the performance of their duties. The basic clearances of conductors from buildings are specified in Table 1, Cases 6 and 7. The requirements of Table 1, Case 7, also apply at fire escapes, exits, windows, etc., at which human contact may be expected.

Communication cables are not required to be any specified distance from the sides of buildings, but they shall be installed so that they do not interfere with the free use of fire escapes, exits, etc.

The vertical clearance of communication conductors (including cables) above buildings as specified in Table 1, Case 6, may be reduced to not less than 2 feet under the following conditions:

Over roofs of $3/8$ pitch (37 degrees from the horizontal) or greater,

Over roofs where the conductor does not overhang the building by more than 6 feet

See Rule 84.8-C4 for service drop clearance requirements.

F. Under or Through Bridges, Viaducts or Similar Structures

Open wire communication conductors which cross under or through bridges, viaducts, or similar structures shall be maintained at clearances above ground and walkways as specified in Table 1, Cases 1 to 6; at a radial

clearance from unprotected conductors of other classifications of not less than as specified in Table 2, Case 3; at clearances from walls and the underside of such structures as specified in Table 1, Case 7 except where it is not practicable to obtain the 3-foot clearance therein specified this clearance may be reduced to not less than 6 inches where the voltage does not exceed 160 volts; or where supported on the walls or underside of such structures, at clearances as specified in Table 1, Case 9 with supports at least every 50 feet.

In lieu of the above requirements, conductors which cross under or through bridges, viaducts, or similar structures shall be enclosed in metal sheaths, run in metal conduits, or be placed in ring construction on a messenger.

- G. From Guys and Messengers (see Table 2, Cases 18 and 19, Column C; also Rules 86.4-C and 87.4).

84.5 Sags

The minimum conductor sags shall be such that under the specified loading conditions, the safety factor specified in Table 4, Rule 44 shall be met. See Table 25 in Appendix C for suggested minimum sags.

84.6 Vertical and Lateral Conductors

A. Open Wire

Open wire conductors from one level to another level on a pole or structure shall not pass within the climbing space (see Rule 84.7), and shall not pass between conductors of any other circuit except between pole-in-conductor positions.

B. Ground Wires

Ground wires, other than lightning protection wires not attached to equipment or ground wires on grounded structures, shall be covered by metal pipe or suitable covering of wood or metal or of plastic pipe material designated as Type II in the standard specified in Rule 22.2, for a distance above ground sufficient to protect against mechanical injury, but in no case shall such distance be less than 7 feet. Such covering may be omitted providing the ground wire in this 7-foot section has a mechanical strength at least equal to the strength of No. 6 AWG medium-hard-drawn copper.

Portions of ground wires which are on the surface of wood poles and within 6 feet vertically of unprotected supply conductors supported on the same pole, shall be covered with a suitable protective covering (see Rule 22.2).

C. Risers

Risers of wires or underground cables shall be encased in securely grounded iron or steel pipe (or other covering of equal strength) from the ground line to a level not less than 8 feet above the ground line. Risers from underground cables of Class C circuits may be encased in plastic pipes in lieu of the grounded iron or steel pipe required by this rule. Such plastic pipe shall be of material as specified in Rule 22.2-D:

"A cable U-guard made of No. 14 gauge steel shall be considered adequate to meet the requirements of this rule."

Risers shall be covered by a suitable protective covering as defined in Rule 22.2, where within a vertical distance of 3 feet above or 6 feet below the level of unprotected supply conductors supported on the same pole or structure.

Vertical risers of wires or cables shall be encased in grounded iron or steel pipe, or protected by other suitable grounded metal covering of equal strength, from the ground line to a level not less than 8 feet above the ground line.

Risers where within both a 6-foot radius of another pole supporting supply conductors and within a vertical distance of 3 feet above or 6 feet below the level of any unprotected supply conductor shall be covered.

Exception: The dimension of 6 feet below the level of unprotected supply conductors as specified in the preceding two paragraphs may be changed to 40 inches provided that the electric and communications utilities involved agree that the basic minimum clearances specified by this general order, and its revisions, are adequate for their requirements.

D. Protective Covering

Protective covering shall be attached to poles, crossarms, and structures by means of corrosion-resistant metal straps or staples which are adequate to maintain such covering in a fixed position.

Where such covering consists of hardwood moulding the distance between straps or staples shall not exceed 3 feet.

Where such covering consists of a wood trough, due care shall be exercised to avoid the possibility of nails protruding through any inner surface.

84.7 Climbing Space

Climbing space shall be provided on one side or quadrant of all poles or structures supporting communication conductors excepting at the level of the one pair of conductors attached to the pole below the lowest crossarm (Rules 84.4-C1c, 84.4-D1 and 87.4-C3) and the top 3 feet of poles carrying communication conductors only which are attached directly to pole in accordance with the provisions of Rule 84.4-C1c.

The climbing space shall be maintained in the same position on the pole for a minimum vertical distance of 4 feet above and below each conductor level through which it passes excepting that where a cable is attached to a crossarm or a pole with the cable less than 9 or 15 inches from the center line of the pole supporting conductors on line arms (no buck arm construction involved) in accordance with the provisions of Rules 84.4-D1 or 87.4-C3, the 4 foot vertical distance may be reduced to not less than 3 feet.

The position of the climbing space shall not be shifted more than 90 degrees around the pole within a vertical distance of less than 8 feet.

The climbing space shall be kept free from obstructions excepting those obstructions permitted by Rule 84.7-E.

A. Where Line Arms Only are Involved (see App. G, Fig. 34)

The climbing space through the levels of conductors supported on line arms only should be so located that the center line of pole is approximately midway on the side of the climbing space parallel to the crossarms. The horizontal dimensions of such climbing spaces, with widths measured perpendicularly to the conductors, and with depths measured from center line of pole and parallel to the conductors, shall be not less than those specified in Rules 84.7-A1 and 84.7-A2, except at angles in lines in which cases the widths of 18 and 30 inches may be reduced provided the horizontal separation or pole pin conductors measured parallel to the crossarm shall be not less than 16 and 30 respectively.

- (1) On Poles Which Support Communication Conductors Only: The climbing space for toll, trunk and for exchange or local distribution conductors shall be not less than 18 inches in width and not less than 30 inches in depth.
- (2) On Poles Jointly Used With Supply Conductors: The climbing space through the levels of communication conductors on line arms on poles jointly used with supply conductors, shall be not less than 30 inches in width and not less than 30 inches in depth, except that climbing spaces of the dimensions specified in Rule 84.7-A1 may be used where the only supply conductors supported by the pole are on service drop clearance attachments as permitted by Rules 54.8-C2 and 54.8-C3.

B. Where Buck Arms are Involved

The horizontal dimensions of the climbing space on jointly used poles shall be fixed according to the following crossarm combinations of line arms and related buck arms. For this purpose a metal back brace shall be considered as one of the arms of double arm construction and where used the requirements for double arm construction shall be met.

- (1) Double Line Arm and Double Buck Arm: Where the combination is double line arm and double buck arm the climbing space shall be not less than $26\frac{1}{2}$ inches square measured horizontally from the center line of pole (see App. G, Fig. 37).
- (2) Double Buck Arm and Single Line Arm, or Vice Versa: Where the combination is double buck arm and single line arm, or vice versa, and the climbing space is left open on the opposite side of pole from the single arm, the climbing space (measured horizontally from center line of pole) shall be not less than 20 inches perpendicular to the single arm, and not less than $26\frac{1}{2}$ inches perpendicular to the double arms (see App. G, Fig. 36).

- (3) Single Line Arm and Single Buck Arm: Where the combination is single line arm and single buck arm and the climbing space is left open on the sides of pole opposite the crossarms, the climbing space shall be not less than 20 inches square measured horizontally from center line of pole (see App. G, Fig. 35).
- (4) Alternative: Where a combination of a single line arm and a single buck arm or a double line arm and single buck arm (or vice versa) is involved and it is impracticable to locate the climbing space on the side of the pole opposite the single arm or arms, it may be located in another quadrant provided that any arm within such climbing space is treated as one of the arms of a double arm installation and that where a change of quadrant is involved the provisions of Rule 84.7 are observed.

C. Through Conductors Not on Crossarms

Where communication conductors are not supported on crossarms, an unobstructed climbing space not less than 30 inches square shall be maintained on jointly used poles through all conductor levels of such conductors (see App. G, Fig. 38).

D. Through Service Drops Not on Crossarms

Where hooks, knobs, or brackets are used for the support of service drops and other conductors are supported at a higher level on the pole, an unobstructed climbing space 30 inches square shall be maintained on jointly used poles through such attachments, and for not less than 4 feet above and below such attachments, using any one of the service drops as one side of the climbing space and having one other side perpendicular to it and tangent to the surface of the pole (see App. G, Fig. 39).

For clearance of service drop attachments above or below supply conductors see Rule 84.8-D1.

E. Allowable Climbing Space Obstructions

Vertical conductors, when in a suitable protective covering attached directly to the surface of the pole, terminal boxes or similar equipment which do

not extend more than 5 inches from the surface of the pole, and guys, will not be held to obstruct the climbing space provided not more than one guy and one other of the above named obstructions are installed in any 4-foot vertical section of climbing space.

Crossarms and their supporting members are allowed in climbing spaces provided that, where buck arms are involved, any arms within climbing spaces are treated as double arms.

A guard arm, a longitudinal run of messenger, cable or insulated wire will not be held to obstruct the climbing space where they are placed in the climbing space because the presence of a building wall or similar obstacle will not permit the cable to be placed on the side of pole opposite the climbing space. Pole steps shall be suitably placed for the purpose of facilitating climbing past the level of terminal box, cable, drop wires and guard arm.

Unnecessary impairment of the climbing space is not permitted by the application of this Rule 84.7-E.

F. Colinear, Conflicting or Crossing Lines

(see Rule 84.4-D3)

84.8 Service Drops

A. Material and Size

Communication service drops shall be of material and size as specified in Table 8 and Rule 49.4-C7b with a covering at least equivalent to standard double-braid weather-proofing.

The following conductor covering materials are authorized for communications drop installations above swimming pools at the reduced clearances permitted in Rule 84.8C(5) (Page 242) provided the voltage of such conductors is not more than 160 volts and the power transmitted does not exceed 50 watts.

- a. Neoprene-jacketed, reinforced, rubber-insulated parallel conductor drop wire conforming to Rural Electrification Administration Specification PE-7, dated May, 1956, or to American Telephone and Telegraph Company Specification AT-7412, Issue 3, dated Jan. 12, 1960.

- b. Conductors which are protected by weather-resistant, abrasion-resistant suitably insulated tubing throughout that portion of their length which is over the pool and within a 20-foot radius of the top edge of the pool wall.

B. Attached to Surface of Pole

- (1) Service Drops From Open Wire Lines: Where open wire communication line conductors are supported on cross-arms, service drop attachments (by means of hooks, knobs or brackets) on the surface of pole shall be not less than 6 feet below or 4 feet above the level of the nearest unprotected supply conductor supported on the same pole.
- (2) Service Drops From Cabled Lines:
 - a) Cable Supported on Crossarm: Service drops attached to crossarms supporting cables shall be not less than 15 inches from center line of pole as required by Table 1, Case 8, Column B.
 - b) Cable Without Guard Arm, Supported on Surface of Pole: Where the cable is supported on the surface of pole with messenger and cable 6 feet or more below the level of the nearest unprotected supply conductor, service drops may be attached to opposite sides of poles but not more than two sides (there being four sides). Such service drop attachments shall be not less than 6 feet below the level of any supply conductor of more than 750 volts and shall be not less than 5 feet vertically below the level of any unprotected supply conductor of 0-750 volts. Where drive hooks are used, they shall occupy pole surface areas not more than 8 inches in vertical extent and 1 inch in width, and not more than four hooks shall be placed in each of these areas.
 - c) Cable With Guard Arm, Supported on Surface of Pole: Where the cable is supported on the surface of pole at a minimum of 4 feet below the nearest unprotected supply conductor supported on the same pole, and is below a guard arm, service drop attachments may be

attached to the face, back and bottom of the guard arm, provided such attachments are not less than 15 inches from center line of pole, the drop wires are below the top surface of the guard arm and the lateral run of the drop wires is installed in accordance with the provisions of Rule 84.6-C.

- (3) With the agreement of the communications and electric utilities concerned with any joint use situation, a basic minimum clearance of 40 inches may be maintained between any supply conductor of 0-7500 volts and any communication service drop.

C. Clearances Above Ground and Buildings

The vertical clearances of communication service drops shall be not less than the minimum clearances specified in Rule 37, Table 1, Column B, with the following modifications.

- (1) Above Public Thoroughfares: Service drop conductors shall have a vertical clearance of not less than 18 feet above public thoroughfares, except that this clearance may grade from 18 feet at a position not more than 12 feet horizontally from the curb line to a clearance of not less than 16 feet at the curb line, provided the clearance at the center line of any public thoroughfare shall in no case be less than 18 feet. Where there are no curbs the foregoing provisions shall apply using the outer limits of possible vehicular movement in lieu of a curb line.
- (2) Above Private Thoroughfares or Private Property:
 - a) Industrial and Commercial Premises: Over private driveways or lanes, or over private property accessible to vehicles, service drops shall have a vertical clearance of not less than 16 feet.
 - b) Residential Premises: Over residential driveways or lanes, or over residential property accessible to vehicles, service drops shall have a vertical clearance of not less than 12 feet. If the building served does not permit an attachment which

will provide this 12-foot clearance without the installation of a structure on the building the clearance shall be as great as possible but in no case less than 10 feet.

(3) Above Ground in Areas Accessible to Pedestrians Only:

- a) Industrial and Commercial Premises: Over areas accessible to pedestrians only, service drops shall have a vertical clearance of not less than 12 feet.
- b) Residential Premises: Over areas accessible to pedestrians only, service drops shall be maintained at a vertical clearance of not less than 8 feet.
- c) Above Ground on Fenced Railway Rights-of-Way: Service drops to railway signal devices shall be maintained at clearances as specified in Rule 84.4-A4. Service drops which are entirely on fenced railway rights-of-way in areas accessible to pedestrians only may have clearances above ground less than as specified in Table 1, Column B, Case 5 (10 feet), but not less than 7 feet.

(4) From Buildings and Structures: Service drops shall be so arranged as to hamper and endanger firemen and workmen as little as possible in the performance of their duties.

Service drops are not required to clear buildings any specified horizontal distance but shall be so installed that they do not interfere with the free use of fire escapes, exits, windows, doors and other points at which ingress or egress might be expected.

Service drops of less than 160 volts and 50 watts are not required to clear the roofs of buildings on the premises served any specified vertical distance. The vertical clearance above buildings on premises other than the one being served shall be not less than 8 feet, except that a reduction to not less than 2 feet is permitted for service drops of less than 160 volts and 50 watts under the following conditions:

Over roofs of 3/8 pitch (37 degrees from the horizontal) or greater;

Over roofs where the conductor does not overhang the building by more than 6 feet.

Service drops of other communication lines (greater than 160 volts and 50 watts) shall have vertical clearances above buildings as specified for supply service drops in Table 10 (Rule 54.8-B4b).

- (5) Above Swimming Pools: Service drop installations above swimming pools shall be avoided where practicable. Where service drop conductors are installed above a swimming pool, the conductors shall have radial clearances from the top edge of the pool walls of not less than 18 feet and shall have the vertical clearances of not less than 18 feet above the highest water level of the pool. Service drops having coverings of materials specially approved by the Commission for installation above swimming pools may have vertical clearances above the pool and radial clearances from the top edge of the pool wall of not less than 14 feet for public and commercially operated pools and not less than 10 feet for residential pools. (see Rule 84.8A)

No service drop may be installed less than 14 feet vertically above the horizontal plane through a diving board or platform, the area of such plane being within 8 feet radially of the diving board or platform and over the water surface of the pool.

No service drop may be installed less than 10 feet vertically above the horizontal plane through a diving board or platform, the area of such plane being the area within 3 feet radially of the diving board or platform and not over the water surface of the pool.

D. Clearances Between Conductors

The clearances of communication service drop conductors from other conductors shall be not less than the minimum clearances specified in Rule 38, Table 2, Column C, with the following modifications:

(1) Above or Below Supply Line Conductors: (See Rule 32.2-F).

- a) Crossings in Spans: Service drops which cross below supply line conductors of 0-750 volts, or above supply line cables where treated as in Rule 57.8, may have a vertical clearance less than as specified in Table 2, Case 4, Column C (48 inches), from such supply conductors, but not less than 24 inches; provided the crossing is 6 feet or more from any pole which supports any conductor involved in the crossing but which does not support both conductors involved in the crossing.
- b) Supported on the Same Pole: Service drops which are supported on a pole which also support supply conductors and which are not on a pole-top clearance attachment may have a vertical clearance less than as specified in Table 2, Case 9, Column C (48 inches), above or below supply line conductors provided not less than the clearance shown in Table 15 are maintained:

TABLE 15

MINIMUM RADIAL CLEARANCE BETWEEN COMMUNICATIONS SERVICE DROPS AND LINE CONDUCTORS

<u>Radial Distance of Crossing from Supporting Pole (Feet)</u>	<u>Minimum radial clearance (inches)</u>	
	<u>From police and fire alarm line conductors</u>	<u>From supply line conductors</u>
5 or less -----	6	12
10 or less, but more than 5 -----	9	18
15 or less, but more than 10 -----	15	24
20 or less, but more than 15 -----	21	24
More than 20 -----	24	24

(2) On Clearance Crossarms: Communication service drops may be supported on a clearance crossarm at a vertical distance less than as specified in Table 2, Case 9, Column C (48 inches), but not less than 24 inches above or below supply circuits of 0-750 volts, or above supply cables when treated as in Rule 57.8, provided the communication service drop

conductors are at least 25 inches horizontally from the center line of pole or are attached to suitable brackets on each end of the clearance arm and carried on the underside of the clearance arm from end to end in fiber or plastic conduit or under wood protective covering as specified in Rule 54.6-C. Service drops installed in accordance with this rule will not entail any change in the supply conductors supported on the pole.

- (3) On Pole-Top Extensions: Communication service drops may be carried in a clearance crossing on pole-top extensions or brackets above supply conductors of 0-750 volts with a minimum vertical conductor separation of 24 inches, provided the service drop conductors clear the center line of pole (projected) not less than 25 inches horizontally, and further provided the service drop conductors clear the outside pin position conductors of the other circuit not less than 24 inches. Where, in addition to the pole-top extension or bracket, the communication service drops are supported on a bracket on the end of the 0-750 volt supply line crossarm, a minimum radial clearance of 12 inches will be permitted at the point of crossing of the outside pin position conductor. In such construction the crossarm of the extension shall be of wood.

Service drops installed in accordance with this rule will not entail any change in the supply conductors supported on the pole.

- (4) Above or Below Supply Service Drops: The radial clearance between communication service drop conductors and supply service drop conductors may be less than 48 inches as specified in Table 2, Column C, Cases 4 and 9; Column D, Cases 3 and 8, but shall be not less than 24 inches. Where within 15 feet of the point of attachment of either service drop on a building, this clearance may be further reduced but shall be not less than 12 inches.
- (5) Above Trolley Contact Conductors: Service drops may cross above trolley contact conductors, including messenger in catenary construction, at a vertical distance of not less than 4 feet. See also Rule 32.2-F.

E. Clearance From Other Poles

Service drops shall clear the center line of any pole by which they are not supported by not less than 22½ inches, except where such pole is less than 10 feet from the pole which supports the service drops. Where these two poles are less than 10 feet apart this clearance may be less than 22½ inches but shall be not less than 15 inches.

85. CONDUCTOR INSULATORS

85.1 Material

Insulators used on lines shall be porcelain, glass, or other equally suitable material.

85.2 Strength (see Rule 49.5)

86. GUYS AND ANCHORS

86.1 Definition (see Rule 21.3)

86.2 Use

Where mechanical loads imposed on poles, towers or structures are greater than can be supported with the safety factors as specified in Rule 44, additional strength shall be provided by the use of guys or other suitable construction.

Where guys are used with poles or similar structures capable of considerable deflection before failure, the guys shall be able to support the entire stress, the pole below the point of guy attachment acting merely as a strut.

Guys shall be attached to structures as nearly as practicable at the center of load. They shall be maintained taut and of such strength as to meet the safety factors of Rule 44.

86.3 Material and Strength (see Rule 49.6)

86.4 Clearances

The basic minimum clearances of guys above the ground and from other wires or cables are specified in Tables 1 and 2. Modifications of these basic clearances are specified in Rules 37 and 38 and by the following provisions: