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SECTION V

DETAILED CONSTRUCTION REQUIREMENTS FOR  
SUPPLY LINES

(CLASS H, L AND T CIRCUITS)

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## SECTION V

### DETAILED CONSTRUCTION REQUIREMENTS FOR SUPPLY LINES

(CLASS H, L AND T CIRCUITS)

#### 50. GENERAL

The following rules cover certain special details for the construction of supply lines. These rules are supplemented, in certain cases, by rules in other sections. See Section VII for special rules applicable to Class T circuits; see Section IX for special rules applicable to supply lines on poles jointly used; see Section X for special rules applicable to line crossings or conflicts; see Section XI for special rules applicable to lines crossing railroad.

#### 51. POLES, TOWERS AND STRUCTURES

51.1 Definition (see Rules 21.7-C and 22.0)

51.2 Maintenance and Inspection (see Rules 31.1 and 31.2)

51.3 Material and Strength (see Section IV)

51.4 Clearances

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

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

51.6 Marking and Guarding

A. Marking of Poles Where Conductors Are Not on Crossarms

Wood or metal poles which support conductors of more than 750 volts in vertical configuration and not on crossarms shall have bands of bright yellow color not less than one foot in width painted around them. The top of such a band shall be neither less than 2½ feet nor more than 3 feet below the lowest conductor of each circuit of more than 750 volts so supported.

In lieu of the paint required by this rule, similarly located signs, showing the words "High Voltage" in letters not less than 3 inches in height, shall be used. The letters on such signs shall be white on a green or black background, or such signs shall be plastic or other weather and corrosion-resisting material, with the letters cut out therefrom and clearly legible.



The provisions of this rule, 51.6-A, shall not apply to the marking of poles at the levels of supply circuits of more than 20,000 volts in rural districts.

See Rule 65 for the marking of towers.

B. Guarding of Latticed Metal Poles and Other Latticed Structures

Where the pole or structure is of latticed metal or of similar construction and supports supply conductors in excess of 750 volts and is located in urban districts, or in rural areas adjacent to schools, dwellings, permanent or seasonal camps, or in orchards, or near roads or trails which are frequently traveled, a barrier shall be so located on the structure as to prevent easy climbing. If the bottom of the barrier is within 12 feet of the ground line, the top shall be not less than 15 feet above the ground line but in no event shall the barrier be less than 8 feet in length. If the bottom of the barrier is more than 12 feet above the ground line, it shall be not less than 6 feet in length.

The provisions of this rule, 51.6-B, shall not apply to poles or structures on which all conductors have 5 feet or more horizontal clearance from the supporting structure, nor to poles or structures within fenced substation yards.

Note. It is the intent of Rule 51.6-B to require such guarding as will prevent easy climbing of these poles by young persons who do not realize the danger of contact with live conductors supported thereon. It is not intended that such guarding will be required in sparsely settled districts, mountainous and desert areas, and similar locations.

51.7 Stepping

The lowest step on any stepped pole, tower or structure shall be not less than 7 feet 6 inches from the ground line and above this point the spacing between steps on the same side of pole, tower or structure shall not exceed 36 inches.

52. CROSSARMS

52.1 Definition (see Rule 20.9)

52.2 Maintenance and Inspection (see Rules 31.1 and 31.2)

52.3 Material and Strength (see Rule 49.2)

52.4 Marking

Crossarms supporting conductors of more than 750 volts and arms supporting equipment connected to or containing conductors of more than 750 volts shall be marked, by the methods described in Rule 52.4-A, as specified in Rules 52.4-B, 52.4-C, and 52.4-D with the exceptions specified in Rule 52.4-E.

A. Methods

Crossarms which are required by these rules to be marked as high voltage shall be painted a bright yellow color, or in lieu thereof signs showing the words "High Voltage" (or pairs of signs showing the words "High" and "Voltage") in letters not less than 3 inches in height shall be placed on the face and back of such crossarms, unless either face or back is exempted by provisions of the following Rules (52.4-B, C, D, and E). The letters on such signs shall be white on a green or black background or such signs shall be of weather and corrosion-resisting material including plastic with the letters cut out therefrom and clearly legible.

The letters of signs and the color of paint specified above shall be maintained in such condition that letters are legible and color is distinguishable.

B. Crossarms Supporting Conductors of More Than 750 Volts and No Conductors of 0-750 Volts

The crossarms treated in this Rule 52.4-B may also support certain equipment in addition to conductors of more than 750 volts, and when so utilized the provisions of Rule 52.4-D will also apply.

- (1) In Urban Districts: All crossarms supporting conductors of more than 750 volts in urban districts shall be marked as high voltage, except as provided in Rule 52.4-B3.
- (2) In Rural Districts: Crossarms supporting only conductors of more than 750 volts in rural districts shall be marked as high voltage in accordance with the following:
  - a) Supporting Conductors of 750-7500 Volts: All crossarms supporting conductors of 750-7500 volts shall be marked as high voltage.

- b) Supporting Conductors of Constant Current Circuits of More Than 750 Volts: All crossarms supporting conductors of constant current circuits of more than 750 volts shall be marked as high voltage, except as provided in Rule 52.4-B3.
  - c) Supporting Conductors of 7500-20,000 Volts at Certain Locations: At all crossings over public thoroughfares and at locations adjacent to structures such as water tanks, windmills and buildings, adjacent to wells, and at similar locations, crossarms supporting conductors of 7500-20,000 volts shall be marked as high voltage.
  - d) Supporting Conductors of More Than 7500 Volts At or Below the Level of Conductors of 7500 Volts or Less: In rural districts, all crossarms supporting conductors of more than 7500 volts at or below the level of conductors of 7500 volts or less supported on the same structure shall be marked as high voltage.
  - e) Supporting Conductors of 7500-20,000 Volts on the Same Structure With Conductors of 750 Volts or Less: Where, on the same structures in rural districts, crossarms supporting conductors of 7500-20,000 volts are above conductors of 750 volts or less, the crossarm supporting conductors of 7500-20,000 volts next above the conductors of 750 volts or less shall be marked as high voltage. All crossarms supporting conductors of 7500-20,000 volts below conductors of 750 volts or less supported on the same structures shall be marked as high voltage.
- (3) On Guarded Metal Poles: On latticed metal poles which are guarded with barriers as required in Rule 51.6-B, the following crossarms shall be marked as high voltage:

Crossarms supporting conductors of 750-7500 volts;

Crossarms supporting conductors of 7500-20,000 volts next above the level of conductors of 7500 volts or less;

Crossarms supporting conductors of 7500-20,000 volts below the level of conductors of 7500 volts or less; and

Crossarms supporting any conductor of more than 7500 volts within 15 feet of walls, fire escapes, exits, windows and similar objects.

Where all conductors on a latticed metal pole which is guarded carry more than 7500 volts and the lowest crossarm supporting them is not required to be marked in accordance with the foregoing provisions of this rule, the entire pole shall be marked as high voltage by means of signs placed on any two opposite sides of the pole at a point above the barrier and below the lowest conductor level.

- (4) On Systems Using Combination Arms: On systems where conductors of 0-750 volts and conductors of 750-7500 volts are usually carried on the same crossarms, any crossarm supporting conductors of 750-7500 volts on both sides of a pole shall be marked as high voltage on both portions to show that the entire crossarm carries high voltage conductors.

C. Crossarms Supporting Conductors of 750-7500 Volts and Conductors of 750 Volts or Less. (Combination Arms)

- (1) High Voltage Marking: Combination arms shall be marked as high voltage on the portions supporting conductors of 750-7500 volts. Where painting is used as the method of marking on such portions of combination arms, the painting shall extend from the ends of the arms to the center line of pole, or to a position approximately midway between the nearest conductors of different voltage classifications on alley arms or bridge arms.
- (2) Marking of Conductors of 750 Volts or Less: On systems where the use of combination arms is so unusual that the requirements of Rule 52.4-B4 are not applied, all combination arms shall be marked as high voltage as specified in Rule 52.4-C1 and in addition thereto a readily legible designation shall be placed on the portions supporting conductors of 750 volts or less. Such designation shall read "0-750 Volts" or shall indicate the nominal voltage of the circuits of 750 volts or less and shall not read "Low Voltage."

The requirements of this rule do not apply to conductor supporting timbers on transformer structures on systems where no other combination arms are used.

Note. The gradual expansion of the use of combination arms on a system will cause the requirements of Rule 52.4-B4 to become applicable to the entire system.

#### D. Crossarms Supporting Miscellaneous Equipment

Included in this group are arms supporting transformers, cutouts, regulators, oil switches, air switches, capacitors, series controllers, and similar apparatus which are connected to or are a part of a circuit in excess of 750 volts. These arms shall be marked in accordance with methods specified in Rule 52.4-A.

- (1) Hanger Arms, Cutout Arms, Etc.: Where yellow paint is used as the method of marking, such arms shall be fully painted except as provided in Rule 52.4-C1.

Where high voltage signs are used as the method of marking, they are required on the face toward the climbing space of hanger arms or of arms supporting cutouts, excepting that signs are not required on any arm supporting cutouts only where such cutout arm is within 30 inches vertically from either a line arm or a hanger arm which is marked as high voltage.

Where high voltage signs are used as the method of marking, they are not required on the face away from the climbing space of hanger arms which do not support line conductors or of arms supporting cutouts only or of line arms which are not combination arms and which are used as hanger arms, under any of the following conditions:

Where two or more transformers, regulators, or similar pieces of apparatus are supported on the same arm;

Where one or more transformers and one or more oil switches or air switches are supported on the same arm;

Where one or more constant current transformers or regulators and the accompanying series controller are supported on the same arm;

Where one transformer and one or more primary cutouts used in connection therewith are supported on the same arm providing the conductors leading to these pieces of apparatus are supported on crossarms immediately adjacent thereto (maximum vertical separation of 30 inches) which are marked as high voltage; or

Where a separate arm used to support cutouts only is within 30 inches vertically from either a line arm or a hanger arm which is marked as high voltage.

- (2) Heel Arms: Heel arms, while treated in these rules as supporting high voltage equipment, are not required to be marked as high voltage.

#### E. Exceptions

- (1) Double Arms: Where high voltage signs are used as the method of marking, they are not required on the inside faces of double arms.
- (2) Brackets: Where extension brackets or clearance brackets are used to extend or supplement crossarms, and support conductors of more than 750 volts, such supplementary supports are not required to be marked as high voltage.

### 52.5 Metal Arms

Metal crossarms on wood poles shall not be used to support conductors of both 750-7500 volts and more than 7500 volts.

#### A. Supporting Conductors of 0-7500 Volts

Metal crossarms installed on wood poles and supporting conductors of 0-7500 volts shall not be permanently grounded and shall be proven by test to be nonenergized immediately preceding each period of work at that location. Metal crossarms at the location of work on de-energized conductors shall be temporarily and securely grounded and securely connected to any de-energized conductors involved during the time of all work at that location.

B. Supporting Only Conductors of More Than 7500 Volts

Metal crossarms installed on wood poles and supporting conductors of more than one circuit of more than 7500 volts shall be effectively grounded or, in lieu of this requirement, such crossarms supporting such energized conductors at the location of work on other de-energized conductors shall be connected to the de-energized conductors and securely grounded during the period of work.

52.6 Clearance Arms (see Rules 20.9-C, 32.3 and 54.8-C2)

52.7 Hardware

A. Protection Against Corrosion (see Rule 49.8)

B. Metal Braces

- (1) For Wood Crossarms: Metal crossarm braces on wood crossarms shall be not less than  $1\frac{1}{2}$  inches from lead wires, ground wires, and bond wires (except as provided in Rule 53.4), metal pins and other insulator hardware, switch and cut-out hardware, conduits and fittings of riser cables and cable runs, and metal braces which extend to a crossarm at another conductor level; except that on wood crossarms supporting conductors of only one circuit of more than 7500 volts, metal crossarm braces may contact bond wires, metal pins and other insulator hardware where such contact is intentionally and securely made and the lower extremity of such metal braces is not less than 3 feet above the next conductor level below such braces.

Metal crossarm braces attached to wood arms shall clear transformer cases and hangers by not less than 1 inch of air space and by not less than  $1\frac{1}{2}$  inches of creepage distance along wood or insulating surfaces.

- (2) For Metal Crossarms: The lower extremities of metal crossarm braces attached to metal crossarms on wood poles shall be not less than 3 feet above the next conductor level below such braces. See Rule 52.5 for the grounding of metal arms.

C. Separation From Bond Wires and Ground Wires

Bond wires and ground wires shall have a clearance of not less than  $1\frac{1}{2}$  inches from metal pins, bolts, and other hardware on wood crossarms except where the hardware is intended to be connected to the bond or ground wires, and in being so connected does not violate other rules of this Order, in which case suitable electrical contact shall be made.

D. Separation From Metal Pins and Dead-End Hardware

Through bolts, metal signs, conduits, metal braces, mounting bolts and hardware for cutouts or other apparatus, metal street light fixtures, metal pole top extensions and metal arm extensions supported by or attached to the surfaces of wood poles and wood crossarms shall have a clearance of not less than  $1\frac{1}{2}$  inches from metal pins and dead-end hardware. Guys and space bolts shall have a clearance of not less than  $1\frac{1}{2}$  inches from metal pins and dead-end hardware unless contact is intended, in which case a positive electrical contact shall be made. Any guy contacting or connected to a metal pin or part of dead-end hardware shall not be placed in the climbing space.

Bolts and hardware of line equipment and bolts and hardware of insulators, all of which are associated with the same circuit, and on the same crossarm may be metallicly interconnected provided positive electrical contact is made.

This rule 52.7-D shall not be held to apply to:

- (1) Through bolts, metal braces or space bolts and dead-end hardware associated with circuits of 0-750 volts in any configuration at any level on a pole or structure;
- (2) Through bolts or space bolts and dead-end hardware associated with circuits of 750 to 7,500 volts in any configuration at any level on a pole or structure, provided that the end of such bolts which project into a climbing space are covered with a suitable non-conducting shield or cover having the insulating efficiency and mechanical strength of impregnated fibre 5/16 inches thick;



- (3) Through bolts or space bolts and dead-end hardware associated with circuits of more than 7,500 volts in any configuration at any level on a pole or structure provided that the ends of such bolts which project into a climbing space are covered with a suitable non-conducting shield or cover as described above: with this exception that no covers shall be required if the bolts are associated with a single circuit constructed in vertical, flat, or triangular construction at the top level of a pole.

#### E. Metal Back Braces

The use of metal back braces is not recommended. (See Rule 54.7-A3 for climbing space requirements.)

#### F. Grounding

- (1) Circuits of 0-7500 Volts: On wood crossarms, wood poles, or wood structures, hardware which is less than 3 feet above or 6 feet below unprotected conductors of 0-7500 volts shall be non-grounded. Excepted from the requirements of this rule are the following:

Hardware of riser terminals treated as specified in Rule 54.6-F;

Hardware associated with grounded cables and messengers supported on crossarms with vertical clearances and pole clearances as specified in Tables 1 and 2 for such cables and messengers; and

Hardware associated with guarded cables and messengers which are treated as specified in Rule 57.4-F.

- (2) Circuits of More Than 7500 Volts: Hardware of circuits of more than 7500 volts shall be securely and permanently grounded where such hardware can act as a bond between metal parts of the insulating supports of an energized conductor and of a de-energized portion of the same conductor or of the de-energized portion of another conductor where work is to be performed on the de-energized conductor. Such hardware includes the bases of air-break switches and the tanks of oil switches. Bond wires are excepted from this requirement, and are not required to be grounded.

The permanent grounding specified in this rule will not be required provided the regular written operating (safety) rules of the utility concerned require that:

Conductors of circuits exceeding 7500 volts which are de-energized for work thereon shall be securely grounded during all periods of such work, and

When work is to be performed at the location of hardware described in this rule, such hardware shall be temporarily and securely grounded and securely connected to any de-energized conductors involved during all work at that location, or in lieu of temporary grounding such hardware shall be proven by test to be nonenergized immediately preceding each period of work at that location.

(3) Transformer Cases and Hardware: See Rule 58.3-C3.

53. PINS, DEAD ENDS, CONDUCTOR SUSPENSIONS AND FASTENINGS

53.1 Maintenance and Inspection (see Rules 31.1 and 31.2)

53.2 Material and Strength (see Rule 49.3)

53.3 Pin, Dead End, and Suspension Spacing (Table 1, Case 8, and Table 2, Case 15)

53.4 Bonding

Bonding is not required by these rules. Bonding is not recommended for circuits of 7500 volts or less but it is recognized that under certain conditions it may be deemed necessary.

Where bonding is used the bond wire or strap shall have a conductivity of not less than No. 10 AWG copper wire, shall in no case be installed on the top surface of any crossarm, and the bonding shall comply with the following requirements:

A. Circuits of More Than 7500 Volts

(1) At Top of Pole:

a) Single Circuit: The bond wire of a single circuit in horizontal, triangular or vertical configuration at the top circuit position of

the pole may be installed on the face, back or underside of wood crossarms and on the surface of pole without a protective covering. Such bond wire on the surface of a wood pole shall be covered by a suitable protective covering (see Rule 22.2) where within 3 feet vertically of the next conductor level below the top circuit. Crossarm braces may be connected to such bond wire only where positive electrical contact is made and the brace is not less than 3 feet vertically above the next conductor level below the top circuit.

- b) More Than One Circuit: The bonding of any circuit where more than one circuit is installed at the top position of pole shall be in accordance with the provision of Rule 53.4-A3 below.
- (2) Below Top of Pole: Bond wires of any circuit below the top circuit position of the pole shall be covered by a suitable protective covering (see Rule 22.2) except where such bond wires are installed on the underside of crossarms or where bonds (wires or straps) are installed vertically between crossarms at a distance of not less than 30 inches from center line of pole. Metal braces shall clear such bond wires by not less than  $1\frac{1}{2}$  inches (see Rules 52.7-B1 and 52.7-C) and in order to clear braces, an uncovered bond wire carried on the under side of crossarm may be placed on the face or back of a limited portion of crossarms and need not be covered for this limited distance of its run.

The requirement that portion of bond wire, which extend from the under side of one crossarm of a double arm to the underside of a companion arm of the double arm, be covered by a suitable protective covering may be omitted provided such portions of bond wires are approximately perpendicular to the arms, extend directly between arms and are not less than 30 inches from center line of pole.

- (3) Conductors of More Than One Circuit at Same Level: Where conductors of more than one circuit are at the same level, bond wires shall be covered by a suitable protective covering (see Rule 22.2) except where such bond wires are installed on the

under side of crossarms or where bonds (wire or straps) are installed vertically between crossarms at a distance of not less than 30 inches from center line of pole. Metal braces shall clear such bond wires by not less than 1½ inches (see Rules 52.7-B1 and 52.7-C) and in order to clear braces, an uncovered bond wire carried on the under side of crossarms may be placed on the face or back of a limited portion of crossarms and need not be covered for this limited distance of its run.

Bond wires, that extend from the under side of one arm to the companion arm of a double arm, shall be exempt from the required protective covering specified by this rule provided such wires are substantially perpendicular to the arms, extend directly between the arms, and are not less than 30 inches from the center of the pole.

- a) Separately Bonded Circuits: Where conductors of more than one circuit are at the same level and separately bonded, such bond wires shall be separated on crossarm and on surface of pole by not less than 6 inches. Neither circuit shall be worked on while de-energized unless the de-energized conductors are shorted and securely grounded and the bond wire of the de-energized circuit is connected to the de-energized and grounded conductors on the pole where work is done.
- b) Commonly Bonded Circuits: Where conductors of more than one circuit are at the same level and a common bonding system is used, neither circuit shall be worked on de-energized unless the de-energized conductors are shorted and securely grounded and connected to the bonding system on the poles where work is done.

#### B. Circuits of 7500 Volts or Less

The bonding of circuits of 7500 volts or less shall comply with the following:

Bond wires on wood poles and wood crossarms shall be fully covered by a suitable protective covering;

Bond wires shall be not less than 1½ inches from metal braces and all other hardware except the metal pins and dead ends which are bonded; and

Bond wires of separate circuits shall be separated on crossarm and poles by not less than 3 inches.

#### 54. CONDUCTORS

54.1 Definition (see Rule 20.8)

54.2 Maintenance and Inspection (see Rule 31.1 and 31.2)

54.3 Material and Strength (see Rule 49.4)

54.4 Clearances

Allowable variations in clearances due to side swing of suspension insulators, temperature, loading, etc., are given in Rules 37 and 38.

##### A. Above Ground

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

- (1) Across Arid or Mountainous Areas: Across arid or mountainous areas supply circuits carrying 20,000-30,000 volts, inclusive, may have a clearance of less than 30 feet (Table 1, Case 4, Column F) but not less than 25 feet above ground subject to a reduction of not more than 10 per cent because of temperature and loading as specified in Rule 43. Upon special permission from this Commission, a minimum clearance of 25 feet above ground may be applied in similar areas to circuits in excess of 30,000 volts, in which case no reduction of the 25 feet will be permitted for conditions less than maximum loadings or temperature specified in Rule 43.1 and 43.2.
- (2) In Rural Districts, Conductors of 750-20,000 Volts:
  - a) Crossing Roads or Driveways: In rural districts the minimum clearance of 25 feet specified in Table 1, Case 3, Column E may be reduced to 22 feet above ground for conductors crossing or overhanging traversable portions of public or private roads or driveways. This modified minimum clearance of 22 feet shall in no case be reduced because of temperature or loading at conditions less than the maximum loadings or temperature specified in Rules 43.1 and 43.2.

b) Above Agricultural Areas and Along Roads: In rural districts the minimum clearance of 25 feet specified in Table 1, Case 4, Column E may be reduced to 18 feet above ground for lines across areas capable of being traversed by agricultural equipment and along roads where no part of the line overhangs any traversable portion of a public or private roadway. This modified minimum clearance of 18 feet shall in no case be reduced because of temperature or loading at conditions less than maximum loadings or temperature specified in Rules 43.1 and 43.2. Care should be exercised in using this minimum clearance along roads, above or along ditches where mechanical devices are used for maintenance, near trees in orchards, near trees or structures which can be climbed and in other similar situations.

(3) Lead Wires for Transformers: Transformer lead wires shall have clearances above ground as specified in Table 1 except as modified by the provisions of Rule 58.3-B1a.

(4) Above Swimming Pools: Crossings of conductors above swimming pools shall be avoided where practicable. Unprotected line conductors shall have radial clearances from the top edge of the swimming pool walls and vertical clearances above the highest water level of the pool surface not less than the clearances specified in Table 1, Case 3, Columns D, E and F.

#### B. Above Railways and Trolley Lines

(1) Which Transport Freight Cars: The clearances specified in Table 1, Case 1, are based upon a maximum height of standard freight cars of 15 feet 6 inches from top of rail to top of running board. The clearance specified in Table 1, Case 1, Column C shall not be reduced because of temperature or loading. The clearance specified in Table 1, Case 1, Columns A, B, D, E and F, shall not be reduced more than 5%, because of temperature or loading.

(2) Operated by Overhead Trolley: The clearances specified in Table 1, Case 2, Columns D, E, and F are based upon a trolley pole throw of 26 feet, the usual maximum height of a free trolley pole

above the top of rails or surface of streets used by trolley cars or coaches. Above trolley lines having a maximum trolley pole throw at variance to 26 feet, the specified clearances shall be increased or may be reduced accordingly provided that the clearances specified in Column F shall not be reduced to less than 30 feet and the clearances specified in Columns D and E shall not be reduced to less than 25 feet. See Rule 57.4-B2 for the clearances required for grounded cables and messengers.

Where railways operated by overhead trolley transport freight cars, the clearance requirements of Rule 54.4-B1 also apply.

C. Between Conductors

The minimum allowable clearances between conductors are specified in Rule 38, Table 2, with the following modifications for supply conductors: These modifications, like the tabular values, are also subject to the allowable variations specified in Rule 38.

(1) On Different Crossarms on the Same Pole:

- a) Conductors of 750-7500 Volts: The 4-foot vertical clearance between conductors of 750-7500 volts, as specified in Table 2, Case 10, Column E, may be reduced to not less than 2 feet, provided all of the following conditions are met:

The conductors involved are of one ownership and the circuits are operated and maintained by the same crews of workmen;

Under no conditions is this reduced clearance to be applied in new construction involving new poles;

Buck arm construction, transformers, or capacitors are not involved;

More than one reduced clearance of 2 feet shall not be used on any pole; and

It is not practicable to obtain the normally required 4-foot clearance.

- b) Conductors of 7500-20,000 Volts: The 4-foot vertical clearance between conductors of 7500-20,000 volts, as specified in Table 2, Case 11, Column F, may be reduced to not less than 3 feet, provided all of the following conditions are met:

The conductors involved are of one ownership and the circuits are operated and maintained by the same crews of workmen;

Under no conditions is this reduced clearance to be applied in new construction involving new poles;

Buck arm construction, transformers, or capacitors are not involved;

More than one reduced clearance of 3 feet shall not be used on any pole; and

It is not practicable to obtain the normally required 4-foot clearance.

- c) Triangular and Vertical Configuration: Cross-arms used to support conductors of a circuit at different levels (as in triangular or vertical configuration) need not be spaced as in Table 2, Cases 9 to 13, but may be arranged so that the vertical separation of conductors of the same circuit shall be not less than the pin spacings of Table 2, Case 15.

Rule 54.4-D8 applies for pole-top triangular construction involving one circuit.

Where circuits are installed in vertical or triangular configuration with vertical conductor separations less than as specified in Table 2, Cases 9 to 13, not more than two circuits shall be installed on the same crossarms and the conductors of both circuits shall be arranged in identical physical configuration on opposite sides of pole except at points of transposition. In the event different voltage classifications are involved, the vertical separation of the conductors shall be not less than the pin spacing for the highest voltage concerned.