

Overhead Distribution Specification – Rev 0

1. GENERAL

All construction work shall be done in accordance with the staking sheets, plans and specifications, and the construction drawings.

The 2017 or latest edition of the National Electrical Safety Code (NESC), ANSI C2, shall be followed, except where local regulations are more stringent, in which case local regulations shall govern.

2. DISTRIBUTION OF POLES

In distributing the poles, the large, choice, dense poles shall be used at transformer, deadend, angle and corner locations.

3. POLE SETTING

The minimum depth for setting poles shall be as follows:

<u>Length of Pole (feet)</u>	<u>Setting in Soil (feet)</u>	<u>Setting in All Solid Rock (feet)</u>
20	4.0	3.0
25	5.0	3.5
30	5.5	3.5
35	6.0	4.0
40	6.0	4.0
45	6.5	4.5
50	7.0	4.5
55	7.5	5.0
60	8.0	5.0

"Setting in Soil" depths shall apply:

1. Where poles are to be set in soil.
2. Where there is a layer of soil of more than 2 feet in depth over solid rock.
3. Where the hole in solid rock is not substantially vertical or the diameter of the hole at the surface of the rock exceeds approximately twice the diameter of the pole at the same level.

"Setting in All Solid Rock" depths shall apply where poles are to be set in solid rock and where the hole is substantially vertical, approximately uniform in diameter and large enough to permit the use of tamping bars the full depth of the hole.

Where there is a layer of soil 2 feet or less in depth over solid rock, the depth of the hole shall be the depth of the soil in addition to the depth specified under "Setting in All Solid Rocks" provided, however, that such depth shall not exceed the depth specified under "Setting in Soil."

On sloping ground, the depth of the hole shall be measured from the low side of the hole.

Poles shall be set so that alternate crossarm gains face in opposite directions, except at terminals and dead ends where the gains of the last two poles shall be on the side facing the terminal or dead end. On unusually long spans, the poles shall be set so that the crossarm is located on the side of the pole away from the long span. Where pole top insulator brackets or pole top pins are used, they shall be located on the opposite side of the pole from the gain.

Poles shall be set in alignment and plumb, except at corners, terminals, angles, junctions or other points of strain, where they shall be set and raked against the strain so that the conductors are in line.

Poles shall be raked against the conductor strain not less than 1 inch for each 10 feet of pole length nor more than 2 inches for each 10 feet of pole length after conductors are installed at the required tension.

The use of pole tongs and cant hooks will not be acceptable on wood products which will be located below the groundline.

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Two pneumatic tamps will be operated in semicircles for each shovel used to feed the backfilling operation.

All installations will be thoroughly tamped for the full depth of each pole. Backfill shall be placed in lifts not to exceed 9 inches in height in the loose state. All lifts shall be thoroughly tamped to specifications before placing the next lift.

Any backfill placed in the bottom of holes to adjust the installation elevation shall be thoroughly tamped prior to the placement of the poles.

Backfill shall be placed around each pole installation to create a crest height of 6 inches as a minimum with a side slope of 45°.

Violation of any of the above procedures shall be deemed by the Engineer or Owner as reasons for rejection of the installed unit(s).

Poles which have been in storage for more than one year from the date of treatment shall be ground line treated when installed.

4. FIELD DRILLING AND TREATING

Misdrilled holes shall be plugged using treated wood dowel pins 3 inches in length. When a hole is misdrilled, the Engineer shall be notified. A pole may be rejected by the Engineer if two or more misdrilled holes occur at a connection. If a pole is rejected due to misdrilling of holes by the Contractor, the Contractor shall replace the damaged pole at no additional cost to the Owner.

5. GRADING OF LINE

When using high poles to clear obstacles, such as buildings, foreign wire crossings, railroads, etc., there shall be no upstrain on pin-type or post-type insulators in grading the line each way to lower poles.

6. GUYS AND ANCHORS

Guys shall be placed before the conductors are strung and shall be attached to the pole as shown in the construction drawings.

All guys will be checked and adjusted by the Contractor for proper tension after the conductor has been strung, sagged and clipped. The Contractor must follow the sag and tension guidelines provided by the Engineer.

The cost of checking and adjusting guy units for proper tension will be considered to be part of the unit cost and no additional compensation will be allowed.

All anchors and rods shall be in line with the strain and shall be installed so that approximately 6 inches of the rod remain out of the ground. In cultivated fields or other locations, as deemed necessary, the projection of the anchor rod above earth may be increased to a maximum of 12 inches to prevent burial of the rod eye. The backfill of all anchor holes must be thoroughly tamped for the full depth.

7. FASTENERS

Fasteners shall be sized so that they extend not less than ½ of an inch nor more than 2½ inches beyond the face of the last nut or lock nut. Galvanized bolts shall not be cut off unless the Engineer allows it for special requirements. Where bolts are not of proper length due to variations in the material, the Contractor shall replace the fasteners with ones of proper length at no cost to the Owner.

8. LOCKNUTS

A locknut shall be installed with each nut, eyenut or other fastener on all bolts or threaded hardware such as insulator pins and studs, upset bolts, double arming bolts, etc.

9. CONDUCTORS

Conductors must be handled with care. Conductors shall neither be trampled on nor run over by vehicles. Each reel shall be examined and the wire shall be inspected for cuts, kinks or other injuries. Injured portions shall be

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cut out and the conductor spliced. The conductors shall be pulled over suitable rollers or stringing blocks properly mounted on the pole or crossarm if necessary to prevent binding while stringing.

The neutral conductor should be maintained on one side of the pole (preferably the road side) for tangent construction and for angles not exceeding 20°.

With pin-type or post-type insulators, the conductors shall be tied in the top groove of the insulator on tangent poles and on the side of the insulator away from the strain at angles. Pin-type and post-type insulators shall be tight on the pins and brackets, respectively, and the top groove must be in line with the conductor after tying.

For line angles of 0° to 5° in locations known to be subject to considerable conductor vibration, insulated brackets may be substituted for the single and double upset bolts used for supporting the neutral and secondary conductors.

All conductors shall be cleaned thoroughly by wire brushing before splicing or installing connectors or clamps. A suitable inhibitor shall be used before splicing or applying connectors over aluminum conductor.

One piece suspension insulators will be used on distribution deadend units and will replace the two piece porcelain insulator type.

10. SPLICES AND DEADENDS

All deadend assembly for ACSR shall be the bolted types, and a torque wrench is to be used for installation.

Conductors shall be spliced and deadended as shown on the construction drawings. There shall not be more than one splice per conductor in any span, and splices shall be located at least 10 feet from the conductor support. No splices shall be located in Grade B crossing spans and preferably not in the adjacent spans. Splices shall be installed in accordance with the manufacturer's recommendations.

No sleeve or deadend will be made until the necessary equipment to do so is on the site. The equipment will include, but will not be limited to, a bastard steel file, wire brush, conductor inhibitor as recommended by the conductor manufacturer, tape and tools for cutting the conductor.

Before a sleeve or deadend is made on ACSR conductor, the end of the conductor steel stranding and aluminum will be filed to remove burrs and sharp points. The contact surface of the sleeve or compression deadend will be clean of any foreign materials, such as grease, dirt or mud. An approved inhibitor shall be applied to the cleaned area, then steel brushed thoroughly to remove oxidation.

All conductor splices shall be the full tension compression type and installed according to manufacturer instructions.

The Contractor will follow the manufacturer's instructions carefully when making up a sleeve and deadend. Attention will be given to the cutback lengths and insertion depths. Torque wrenches shall be used on all deadends with designated torque values. Splices will be automatic type.

11. TAPS AND JUMPERS

Jumpers and other leads connected to line conductors shall be insulated and have sufficient slack to allow free movement of the conductors. Where slack is not shown on the construction drawings, it will be provided by at least two bends in a vertical plane, or one in a horizontal plane, or the equivalent. In areas where aeolian vibration occurs, special measures to minimize the effects of jumper breaks shall be used as specified.

All leads on equipment, such as transformers, reclosers, etc., shall be a minimum of #6 copper conductivity. Where aluminum jumpers are used, a connection to an unplated bronze terminal shall be made by splicing a short stub of copper to the aluminum jumper using a compression conductor suitable for the bimetallic connection.

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12. HOT-LINE CLAMPS AND CONNECTORS

Connectors and hot-line clamps suitable for the purpose shall be installed as shown on the guide drawings. On all hot-line clamp installations, the clamp and jumper shall be installed so that they are permanently bonded to the load side of the line, allowing the jumper to be de-energized when the clamp is disconnected. Tap saddles shall be used on all hot line clamp installations.

13. CONDUCTOR TIES

Factory-formed ties shall be installed in accordance with the manufacturer's recommendations. Hand formed ties shall be in accordance with the construction drawings.

14. CONDUCTOR SAGGING

Conductors shall be sagged in accordance with sag and tension charts or tables furnished by the Engineer and with the conductor manufacturer's recommendations. The sag of all conductors, after stringing, shall be in accordance with the sag charts and instructions a maximum increase of 3 inches of the specified sag in any span will be acceptable; provided the required clearances are obtained. Under no circumstances will a decrease in the specified sag be allowed.

The air temperature at the time and place of stringing shall be determined by a certified etched-glass thermometer. The temperature at which the conductor is sagged and the span(s) in which sags are measured shall be recorded and the information provided to the Engineer in written form.

The conductor shall be sagged within 48 hours after it has been strung.

The conductor will be sagged either by using a Stop Watch or Dynamometer method. The Contractor is encouraged to use the same methods for checking sag as those which will be used by the Engineer or Owner.

The Contractor will furnish and have on hand all of the necessary equipment, materials and personnel to accomplish the sagging of the conductors. These costs are a part of the conductor unit.

The maximum pulling tensions shall not exceed 110% of the final sag tension.

The length of conductor sagged in one operation shall be limited to the length that can be sagged satisfactorily and as approved by the Engineer.

15. CLIPPING OR TYING CONDUCTOR

The conductor will not be clipped or tied sooner than 2 hours after completing the sag of the conductor, except for the "clip pole(s)." All of the conductor within the sag section will be clipped or tied within 48 hours after the sagging operation is complete.

Deadends will be made up before any of the tangents or angles are clipped or tied in. Care will be exercised in making up the deadends so the true sag is maintained.

The angle poles will be clipped or tied in after all of the deadends have been completed and before the tangent poles are clipped.

The "clip pole(s)" are those tangent poles which are the last or the second to last in conductor sag section. They are to be clipped or tied in before the next sag is begun so the conductor will not shift during the next sagging operation. The poles will be temporarily guyed, if necessary, to secure their vertical position. This will allow the sag to "settle out" in each sag section independently. The temporary guys will be removed after both sag sections have been clipped or tied on each side of the "clip pole." Any temporary guying (or anchoring) on "clip poles" is considered to be part of the conductor unit and no additional compensation will be allowed. Temporary guying materials shall be Contractor-furnished.

The Contractor will furnish the Engineer the date the conductor was strung, sag dates, sag temperature and amount of sag.

16. GUARD STRUCTURES

Guard structures shall be furnished and installed by the Contractor to prevent the conductor or overhead ground

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wires which are being pulled from coming into contact with existing overhead electric supply lines, communication lines, roads, highways and railroads crossed by the transmission or distribution lines. All labor and materials required shall be furnished by the Contractor and included in the unit cost for wire units.

Permission to install guard structures on private property or public highway right-of-way shall be obtained by the Contractor.

After completion of all wire work, the Contractor shall remove the guard structures, fill and tamp all pole holes, and restore the right-of-way and access to its original condition.

17. SECONDARIES AND SERVICE DROPS

Secondary and service conductors shall have two parallel groove clamps in tandem to insure good mechanical and electrical connections.

Secondary conductors may be covered wires or multi-conductor service cable. The conductors shall be sagged in accordance with the manufacturer's recommendations.

Service drops shall be covered wire or service cable.

Secondaries and service drops shall be so installed as not to obstruct climbing space. There shall not be more than one splice per conductor in any span, and splices shall be located at least 10 feet from the conductor support. Where the same covered conductors or service cables are to be used for the secondary and service drop, they may be installed in one continuous run.

18. GROUNDS

Ground rods shall be driven full length in undisturbed earth in accordance with the construction drawings. The top shall be at least 12 inches below the surface of the earth. The ground wire shall be attached to the rod with a clamp and shall be secured to the pole with staples. The staples on the ground wire shall be spaced 2 feet apart, except for a distance of 8 feet above the ground and 8 feet down from the top of the pole where they shall be 6 inches apart.

All equipment shall have at least two connections from the frame, case or tank to the multi-grounded neutral conductor.

The equipment ground, neutral wires and surge-protection equipment shall be interconnected and attached to a common ground wire.

19. PROTECTION AND RESTORATION OF RIGHT-OF-WAY

Care will be taken to protect the right-of-way against rutting and disturbances. All ruts that are made by the Contractor during the course of construction, on the right-of-way or entry and exit thereto, shall be restored to the satisfaction of the Owner and property owner. Any fills made to allow passage of Contractor's equipment shall be removed if such fill would interfere with natural drainage or would cause soil erosion.

Construction may be suspended during wet weather if the movement of equipment would cause surface damage to the terrain.

The Contractor is required to make his own arrangements with property owners for passage through fences traversing the right-of-way. All fences shall be restored to a condition at least equal to that which existed prior to construction.

The public image of the Owner is of paramount importance. The Contractor and his workmen will conduct themselves and their operations in a professional, workmanship like manner while working on the Owner's facilities.

20. TOOLS AND EQUIPMENT

Modern tools and equipment of sufficient quantity and in good condition shall be used in stringing, sagging, clipping and/or tying the conductor. All work shall be done in a manner conforming to the recommendations of the conductor manufacturer and good workmanship practices.

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Cable grips, or "come-alongs," for pulling the conductor shall be of such size and type as to apply the required tension without damage to any conductor strands and meet with the Engineer's or Owner's approval.

Sheaves (or travelers), if used, shall be designed and used so that the pulling line does not damage the sheaves or deposit foreign matter in the liner which may damage the conductor or cause foreign matter to be deposited on the conductor.

Compression type conductor splices shall be installed with a hydraulic compressor designed to develop the pressure required to properly seat the joints on the conductor and so operated as to exert its full pressure. The compressor and dies shall be as recommended by the manufacturer of the materials and equipment. No section of the sleeve shall be pressed more than once, nor will they be accepted if the dies fail to close completely.

Conductor reel stands will be placed so that they are stationary while paying off conductor. The construction of the reel stands will be sufficient to withstand the pressures applied to them during the operation, and must have a braking system which contributes to maintaining the maximum and minimum pulling tensions. V-notch grooves will not be permitted as a braking system.

Spreader bars shall be used when lifting or lowering the conductor reels. Loaded or partially loaded reels shall not be dropped or rolled under any circumstances.