



PDHonline Course S114 (2 PDH)

Introduction to Steel Utility Poles

Instructor: Richard F. Aichinger, PE & John C. Huang, Ph.D., PE

2020

PDH Online | PDH Center

5272 Meadow Estates Drive
Fairfax, VA 22030-6658
Phone: 703-988-0088
www.PDHonline.com

An Approved Continuing Education Provider

Steel Utility Poles: Frequently Asked Questions

Contributed by Valmont Industries, Inc.

Q. Please explain how steel poles can be called equivalent to wood poles when the materials are so different?

A. The equivalency is based on loading specified by [ANSI 05.1](#) for each wood pole class and then modified by a ratio of overload factors for wood and steel.

Q. Would you comment on the deterioration of wood versus steel?

A. Wood, being a natural grown material, deteriorates with age. It is subject to rot, fungus and decay as well as attack by insects and woodpeckers, all of which will reduce the strength of the material. In most utility applications, the "normal" life of a wood pole is approximated at 30 years. Steel, on the other hand, has an infinite life span when corrosion is kept in check. The use of galvanizing has proven to be an effective deterrent to corrosion for above-ground and many below-grade applications. There are some very good coatings which have been developed for below-grade protection when soil conditions warrant it. These coatings, in conjunction with galvanizing, can extend the life span of steel considerably.

Q. Are Steel Distribution poles on the approved [RUS \(REA\)](#) listing of materials?

A. RUS does not approve material. They have a listing of approved suppliers of material. REA co-ops that have used steel distribution poles have indicated in their work plans that they are being used "to gain experience and to look to the future." The application of steel distribution poles may require conditional approval for use on RUS-funded projects.

Q. We will use the poles per the A1 and C1 REA applications. Are there any problems using steel distribution poles in these applications?

A. Steel distribution poles can be used just like their wood counterparts.

Q. Do steel poles have a provision for grounding equipment such as transformers, arresters, fuse cut-outs, etc.?

A. Some pole manufacturers provide one grounding device at the groundline as a standard for all distribution poles. It is very easy to add an additional ground nut at the transformer location during fabrication should the utility indicate such a need. One manufacturer's standard is a 3/8" diameter threaded insert. This detail will also accept the grounding stud used with transformers. Additional threaded inserts can be easily added in the field by the utility at the time of pole installation should they be required.

Q. Can we mount transformer racks directly to the pole?

A. Because steel poles are round and approximately the same diameter as their wood counterparts, any transformers currently mounted on wood poles should be able to be mounted on steel.

Q. What precautions are required for installing steel poles during "hot insert" applications?

A. The same safety procedures and precautions currently being used for wood poles should be used for steel poles in this type of application.

Q. Do you need to guy steel poles; and if so, how do you guy them?

A. A steel distribution pole would need to be guyed if the wood pole it is replacing would have been guyed. The steel pole can be guyed just as you would a wood pole using the same hardware. By using a stronger class steel pole, it may be possible to eliminate the need for guys all together.

Q. Can guy attachments be included on steel poles for attaching guy wires?

A. Steel poles can be guyed using the same hardware currently used for wood poles. Permanent attachments such as vangs can be welded into the poles for attaching guys, but this will increase the delivery times and pole costs. The use of your current hardware and construction standards means no additional changes have to be done to enable a utility to start using steel distribution poles.

Q. What precautions are required for handling galvanized steel poles?

A. The preferred method of lifting the poles is to use nylon slings. While a galvanized pole is very tough and abrasion-resistant, it is not recommended that chains be used when handling them. During storage in the material yard, blocking should be used to keep the poles off the ground and to separate each layer just as you are currently doing with your wood poles.

Q. Are name plates provided on the poles, and will utilities have problems with tagging the poles with the present lettering systems available?

A. A tag is attached to the pole with the manufacturers' name, pole height and class stamped on it. If the utility wishes to tag the poles with other information, they can easily add an aluminum tag that can be either pop-riveted or expoxied onto the pole.

Q. How many holes do steel poles come with as a standard?

A. For some steel utility pole manufacturers, there is no standard, or default, for the number of holes in a pole. The utility may specify as many holes as they would like and the manufacturer will drill them at the time of fabrication. Additional holes can also be easily drilled in the field, should they be required.

Q. How difficult is it to drill holes in steel poles in the field?

A. Holes can easily be drilled using either a rotabroach type of drill or standard twist drill. The rotabroach works best since it requires less force or energy to drill a hole.

Q. Do you recommend a ground sleeve?

A. Some utilities use ground sleeves. The need for a ground sleeve depends on many of the same factors used to determine the need for below-grade coatings. Corrosive conditions or areas inaccessible for routine inspection may warrant the additional protection and cost of a ground sleeve (typically two feet in length centered on the groundline).

Q. Our standard practice for deadening 3-phase construction is to deaden the outer phases on the arm and the center phase on the pole. When we do this, we take advantage of the insulating properties of the wood. What happens when we go to a steel pole; do we have to go to larger insulators?

A. Larger insulators are one solution. One utility still uses their standard wood construction practice when they deaden on the end of the arm. They get the additional insulation they feel they need, for the center phase, by adding a fiberglass link between the pole and the insulator.

Q. In the western U.S., there is a great deal of emphasis and effort on raptor protection. Will the use of steel poles pose a threat to raptors?

A. Utilities that are concerned with electrocution of raptors, or birds of prey, have modified their distribution configuration to minimize the threat to these birds. Typically, this modification on 3-phase construction consists of dropping the crossarm, with the outside phases, 43". This same construction can be used with steel poles. In addition, it may be necessary to field apply a layer of heat shrink wrap just above the crossarm to prevent the possibility of a phase-to-ground contact.

Q. What finishes are available?

A. The standard finish is hot dip galvanizing. High-tech coating systems such as powder paint are available to apply over the galvanizing in instances where a particular color is desired.

Q. How do we climb these poles when we have to?

A. An optional removable climbing safety step can be provided which fits into holes pre-drilled in the pole.

Q. Can pole manufacturers coat the inside of the poles with galvanizing or paint?

A. During the galvanizing process, the entire pole is immersed in the bath of molten zinc. Because the pole is immersed in both the cleaning solutions, flux and zinc, the inside surface is adequately cleaned and a good layer of zinc bonds to the pole. This process protects the pole inside and out. On painted poles, only the outside of the pole can be painted. Due to their small size, there is no way to mechanically clean the inside of the pole adequately for the paint to bond to the surface. This is why painted steel poles need to be sealed, to prevent moisture from reaching the interior surface and causing corrosion. If paint over galvanizing is specified, there is no need to be concerned about the interior, as the zinc will provide protection.

Q. How does a utility determine which class of steel pole is equivalent to a given class of wood pole?

A. Steel distribution poles are typically designed to be equivalent to wood pole classes under

NESC Grade B Construction requirements. Optional designs are available to meet loading criteria such as NESC Grade C Construction, or virtually any other regulatory or custom requirement.

Q. What prevents a steel pole from sinking into the soil after it has been set in the ground?

A. All poles come with a welded bearing plate to prevent the poles from settling into the soil when a vertical load is applied.

Q. We presently are using the fiberglass crossarms on our wood construction. Will we still be able to use these arms with steel poles?

A. You can use the same hardware currently being used on wood poles.

Q. Will we need to purchase different bolts, washers, etc., in order to use steel poles?

A. The same hardware currently being used for your wood poles will work with steel poles because they are round and of approximately the same diameter.

Q. How thick is the pole wall?

A. Most poles are made from 11 gauge material (0.1196"). Some of the taller poles require 10, 7, or 5 gauge material (0.1345", 0.1793", 0.2092").

Q. Will there be a problem with crushing the pole wall due to over-tightening of the bolts?

A. Although it may be possible if excessive force is used, we are not aware of this problem occurring when standard practices are followed. This includes using 4" square washers under the heads or nuts of the bolts.

Q. Typical wood construction uses grid gains between the pole and the arm. Is this required for steel poles?

A. Most utilities that are using steel poles still put a grid gain between the arm and the pole. The gain provides a good flat surface to mount the arm to, and due to its curved surface also provides good bearing surface to the pole. It keeps the arm from rocking on the pole. We know of one utility that has not installed gains. Utilities use either the standard gain used on wood poles or have switched to a plastic gain, which has a smooth surface both against the pole and the arm.

Q. Is there a problem with twisting or turning of a pole?

A. Normally, twisting or turning of a steel pole is not a problem. However, should a utility feel it could occur for their application, the utility could easily drill a couple of holes in the base and attach either bolts or other equipment to prevent this from occurring.