



# Ground Rods Marking & Compliance Requirements

by Jim Lund

In today's electrical environment, a wide array of installed ground rod electrodes does not meet the requirements of the *National Electrical Code*. Ground rods less than 0.625 in diameter, rods that were cut in half either because of driving difficulty or to reduce expenses, or rods with less than the required coating thickness (e.g., copper, zinc) are all examples of ground rods that are presently being installed in violation of the *NEC* and/or local electrical codes.

## Ground rods that are cut in half

*NEC* 250.52(A)(5) states: "Rods and pipe electrodes shall not be less than 2.44 m (8 ft.) in length."

Once a rod is in the ground how does the electrical inspector know that the electrode is 8 feet in length? The best way for the inspector to have the highest degree of confidence that the rod was manufactured in compliance with the minimum length (8 feet) is to assure that the permanent certification marking is easily visible on the rod electrode. Listing agencies including CSA, ETL, UL, etc., only certify rods that are 8 feet or longer.

If an individual were to cut a legitimate rod in half and attempt to use both portions as complete electrodes, the listing mark would be on only one of the two rod sections. Also, should a rod be driven only to a portion of the depth due to rock or other restraints and the top portion were to be cut off, the driven section would *not* contain the certification marking. The location of the

marking adds to the credibility of the inspection process for the authority having jurisdiction (AHJ). Therefore, one may conclude that by verifying the listing mark, one has the highest degree of certainty that the ground rod electrode fulfills all requirements of the *NEC*, specifically the required 8-foot length.

## Ground rods less than 0.625 in diameter

With regard to diameter requirements, *NEC* 250.52(A)(5)(b) states, "Grounding electrodes of stainless steel and copper or zinc coated steel shall be at least 15.87 mm (5/8 in.) in diameter, unless listed and not less than 12.70 mm (1/2 in.) in diameter."

Unless an electrical inspector has a micrometer or similar device, how can he be sure that the rod is 5/8-inch (0.625) in diameter? Visually confirming the listing marks' presence indicates the highest degree of certainty that the rod fully complies with the diameter requirements of the *NEC*. Listing agencies CSA, ETL, MET, UL, etc., will only list rods that are greater than 1/2 inch in diameter and that have the correct minimum amount of copper or zinc (galvanized) mil thickness coating.

For many years galvanized rods were sold that were smaller than 0.625 inches in diameter; nor were they listed. The non-compliant rods measured approximately 0.605 inches in diameter, too small of a variance for the naked eye of the inspectors to detect. They did not meet *Code*. It wasn't until the inspectors started rejecting



these non-compliant diameter rods that the market was forced to offer either a full 5/8 inch (0.625) diameter rod or a ground rod that is listed by a certification agency.

### Ground rods with less than the required coating thickness

Today there are 1/2 inch copper ground rods sold in select U.S. markets that do not meet the *NEC* either for length, for coating mil thickness, or for minimum diameter requirements. They are not listed, and do not conform to the listing agencies' requirement of a minimum of 10 mils of copper. They are smaller than the required 1/2 inch (0.500) in diameter. Again, the difference is too small to be detected by the naked eye of the electrical inspector. These are examples of why it is important for an inspector (AHJ) to look for the listing mark on all electrical products during these times of rampant violations of product compliance. The best way to do this is to require listed products which provide the highest product quality, safety of equipment for long term use, and personnel safety during the installation and maintenance process.

A few inspectors who possess a micrometer may be able to accurately measure the diameter of a driven ground rod, but once the electrode is driven into the earth they are unable to verify the length for *NEC*-compliance. To comply with listing certification specifications ground rods must be permanently marked within the top 12 inches of the drive or chamfer end. Not only is the marking within the top 12-inches, but that is the *only* acceptable location of the marking per product standard UL 467, the governing specification in this case.

### Role of the listing agencies

There has been some confusion regarding the involvement of the listing agencies. *NEC*-2008 Article 100, Definitions, states, "Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or

*service meets appropriate designated standards or has been tested and found suitable for a specific purpose."*

There are several agencies that list equipment, materials and/or services including CSA, ETL/Intertek, MET, UL and others. A legitimate listed marking from these agencies suffices in regards to the listed requirement in 250.52(A)(5) of the *National Electrical Code*, which pertains to ground rods.

There is another aspect to the marking of a ground rod and that is the fact that the markings provide traceability. If there were to be a problem or question regarding the ground rod and there were no markings on the ground rod, what manufacturer would one go to for information or clarification? If there is no marking, there would be no way to trace it to a manufacturer or to a specific distributor. For this fact alone, there is a need for the ground rod to be marked by some identifying means. Having a manufacturer's name permanently marked on products is becoming commonplace, though not required by the *NEC*. When there is no name marking, low-quality inferior products can flood the market as substitutes. Then, even if the products are identified as inferior, they cannot be traced to a supplier.

### Actions to be taken

Action must be taken by the certification agencies to have non-compliant products officially rejected and returned to the distributor so the product may find its way back to the manufacturer, rather than this rejected material being sent to other parts of the country in an attempt for it to be sold and installed. We must as a responsible electrical industry assure our customers of this potential safety issue and have non-compliant material destroyed, possibly under the auspices of a regulatory agency.

Not only is the use of non-conforming material in violation of the *NEC*, where it carries a certification mark of a listing agency, its non-conformance places it in violation of use of that certification. Situations have been documented where a legitimate certification is being violated with material being produced at other plants, often in foreign countries, not legitimately certified.

We must maintain our vigilance and not allow the use of non-conforming products in the U.S. market. The public's safety depends on the use of products of the highest quality and design in our electrical installations.✍

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