



## Combined Cathodic Protection and Grounding System

### What causes the corrosion?

Corrosion occurs when there is an electrical current flow from the anchor shaft to the surrounding soil. Material migration accompanies the current flow with more refined metals sacrificing to more noble metals. Galvanic Corrosion occurs when there is a self generated current due to an electrochemical reaction between dissimilar metals. A guy tower anchor is a perfect example. The copper ground system is electrically connected to the galvanized steel anchor shaft through the guy wires. If the soil is conductive (low ground resistance) the difference in the electrical potential of the connected metals will create an electromotive force and the guy anchor shaft will sacrifice to the copper grounding system.

Electrolytic Corrosion is similar to galvanic corrosion and occurs when the current source is external. Radiated or stray current captured by

the guy wires or grounding system provide the electromotive force for Electrolytic Corrosion. However, the result is the same, deterioration of the steel anchor shaft. This is a particular concern for Microwave and AM transmission sites.

### What is Cathodic Protection?

A Cathodic Protection system reverses the direction of the current. The result is current and material flowing to the anchor shaft, thus preventing corrosion of the anchor. The MAG-ROD reduces the corrosion possibility by reversing the polarity of the electromotive potential. If a corrosive cell is present, the material flow is from the MAG-ROD to the anchor shaft. The positive electromotive force of magnesium/aluminum alloy MAG-ROD is constantly refreshed by the internally stored magnesium minerals.

### Avoid Harmful Over Protection.

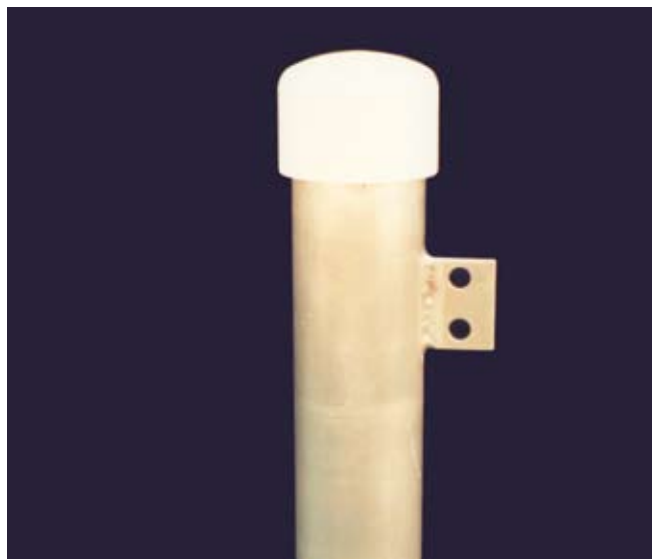
The MAG-ROD avoids the destructive problem of “over protection” which is possible when using impressed current protection devices. The MAG-ROD will only generate an electrical current if a corrosive cell is active. The MAG-ROD does not require an external voltage source, testing mechanism, and continuous monitoring or adjustments. The effectiveness and maintenance requirements can be determined by a visual inspection of the stored minerals.

### Loss of Electrical Grounding.

Copper anchor grounding rods are also affected by the corrosion process. Excavation of old copper grounding systems reveals grounding rods encrusted with a mineral residue to several times their original diameter. This insulative covering greatly increases the electrical surge impedance of the grounding rod and reduces its ability to provide good lightning protection.

The MAG-ROD is also an excellent ground rod and provides a stable low impedance interface with true earth in a variety of soil conditions. While protecting the anchor, the MAG-ROD is continuously shedding electrically charged millimicron size particles. This shedding action prevents a non-conductive residue from coating the rod and reducing conductivity.

The migration of electrically charged particles establishes microscopic low impedance trails into the surrounding soil. These conductive radial tracks further increase the MAG-ROD’s ability to provide a steady, low resistance path to earth and electrical ground.



### Purpose

- Cathodic Corrosion Protection for tower anchor shafts
- Electrical Grounding System for guy wires and anchors

### Features

- Low impedance electrical grounding
- Prevents underground corrosion
- Eliminates need for sacrificial anodes
- No external voltage source required
- No test cell monitoring necessary
- Simple and quick installation
- Easy, above ground inspection and maintenance

For maximum efficiency, the MAG-ROD should be used in conjunction with ELF, an electrolytic fill. ELF absorbs and retains ground moisture which activates the magnesium minerals stored in the MAG-ROD. Back-filling the MAG-ROD’s installation with ELF will insure reliable cathodic protection and low impedance grounding in all soil conditions. ELF is available in 33lb. sealed plastic containers from ERI.

The Telecommunications Industry Association in issuing the 1996 Structural Standard for steel antenna structures stated corrosion controls in addition to hot-dip galvanizing may be required to prevent the premature deterioration of guy wire anchors. The TIA report further stated that guy anchor hot-dip galvanized coatings have been destroyed within two years of installation in electrically conductive soils. Cathodic corrosion protection can remedy this hidden and dangerous problem. ERI’s MAG-ROD meets and exceeds the requirements for a cathodic corrosion protection system.