

Proper Grounding as Part of an Electric Fencing System

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Electric fencing provides a successful boundary by shocking an animal when there is contact between the animal and the fence wire. For electric fencing to work properly, current or electricity from the fence must travel through the animal, into the ground, and back to the energizer. The grounding on the energizer works as an “antenna” to collect the current and complete the circuit, which allows the animal to feel the shock. Frustration with electric fencing occurs when animals do not receive a proper shock when they first come in contact with the fence.

Most of the problems associated with low voltage on an electric fence are caused by an improperly constructed grounding system. The goal of an electric fencing system is to make it as conductive as possible, and that includes the grounding. For the ground to carry the same amount of charge back to the charger that the energizer and live wires send out, the return or the ground needs to be constructed with appropriate materials and sized correctly. The grounding system includes the ground rods, wire, and connectors.

When grounding systems are not functioning effectively, there are steps that can be taken to check the grounding system. This publication provides recommendations for building a ground system as well as testing its effectiveness.



Figure 1. A series of ground rods are placed 10 feet apart along the north side of a barn.

Tips for an Effective Grounding System

Use at least three ground rods, 10 feet apart and 6 feet into the soil. Soil has limited conductivity; it’s important to have enough surface area around ground rods in contact with the soil to handle the current provided by the energizer. The 10-foot spacing between ground rods allows each rod to act independent of the others in receiving some of the current in a circuit (Figure 1). In areas with sandy, rocky, or dry soils or extremely long runs of fencing additional ground rods may be required to handle the total energy in the electric fencing system.

Choose a location for the grounding system with moist soil. Ground rods get better conductivity in moist soils. Ideally, the grounding system should be set up in areas that remain damp. Often along the side of the building, particularly the north side, or in an exclusion fence line near a water body make good site selections.

Avoid setting up a grounding system adjacent to other grounding systems. Grounding systems for electric fencing should be set 50 or more feet away from ground rods for your home or barn electrical systems as well as any lightning diverters.

Use galvanized ground rods. When developing an electric fencing system, the goal is always to match like metals (Figure 2). Because electric fencing is typically done with galvanized steel wire the same metal is desired for the ground rods. Using copper ground rods will create electrolysis (corrosion) at the connection reducing the conductivity back to the energizer. Similarly, used rebar or T-posts are not designed or galvanized like ground rods and will rust, reducing their ability to transfer current.



Figure 2. This galvanized ground rod is a good example of using like metal for the wire, clamp, and ground rod.

Use 12.5-gauge or larger wire with a Class III galvanization from the energizer to the ground rods. Wire running from the ground connector on the energizer to the ground rods should be sized the same or larger than wire run on the fence itself. Never use residential grade or copper wire for electric fencing. This wire is designed to carry 120 volts NOT 10,000 volts and again the goal is to avoid using dissimilar metals. Ideally, one strand of wire runs from the energizer to all three ground rods (Figure 3). While insulating this wire will prevent contact with any energized wires in the fence, it is important to only strip the wire where it attaches to the rods and not break the wire where the wire connects to the rods. This wire needs to carry exactly as much power as the fence; under sizing this wire adds a chokepoint to the whole fencing system.

Regularly check the wire from the energizer to the ground rods. The wire running from the energizer to the ground rods typically runs along the ground and can be susceptible to additional wear and tear with mowing, weed eating, and animal pressure causing it to rust or break (Figure 4). It is important to regularly check that this wire is intact.

Use proper connectors to attach wire to the ground rods. There are specialized designed ground rod clamps that create a strong connection between the ground rod and the connector and provide a strong point of contact for the wire as well (Figure 5).



Figure 4. A ground system placed in a fence line is susceptible to damage from weed eaters, mowers, and other traffic. These systems should be checked regularly for continuity in the wire and good connections to the ground rods.



Figure 3. Ground wire is the same 12.5 gauge as the three fence wires above.



Figure 5. Ground rod clamps ensure a strong connection between the ground rod and the connector.

Testing Your Grounding System

Required tools: voltmeter

- Check voltage across the energizer.
 - Using a voltmeter, ensure the energizer is providing enough charge between the 'hot' and 'ground' ports on the energizer itself while the energizer is not hooked up to the fence or grounding system (Figure 6).
 - The ground system cannot be easily checked if the energizer has failed.
- Confirm connectivity of the ground system.
 - This includes ensuring the ground wire is properly connected to the energizer port and to the connectors on all ground rods with no breaks in the wire.
 - The ground rod connectors need to be firmly attached to the ground rods.
 - Check that there is no significant rust or corrosion on the wire, connectors, or ground rods.
- Check earth return with an intentional fault.
 - Use a metal post that is embedded in the ground to intentionally ground out your fence at least 330 feet away from the grounding system. The fence should have less than 2,000V remaining on it if the fault was adequate or a second fault can be added to further reduce voltage on the fence.
 - Using a voltmeter or fault finder, place the ground probe into the soil and connect the 'hot' end to one of the three ground rods in your grounding system.
- Voltage differences greater than 250V Indicate the ground system is not able to handle the current produced by the fault. If the value is greater than 250V add an additional ground rod and recheck the performance of the ground system



Figure 6. Voltmeters typically have a ground probe (white wire) that can be placed into the soil and a metal tip which can be placed onto an energized wire or port on the energizer. The output can be digital or analog, but both provide a reading in volts or kilovolts (1,000 volts) showing how 'hot' the fence is.

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