

WHY MINES TEST GROUNDING SYSTEMS

Educational Series: Why Test?



What Is the Policy?

Parts 56/57.12028 of the Mining Safety and Health Administration (MSHA) Title 30, states:

“Continuity and resistance of grounding systems shall be tested immediately after installation, repair, or modification, and annually if conductors are subjected to vibration, flexing or corrosive environments. A record of the most recent resistance tests conducted must be kept and made available to the Secretary or his authorized representative upon request. When a record of testing is required by the standard, MSHA intends that the test results be recorded in resistance value in ohms.”

The intent of this standard is to ensure that continuity and resistance tests of grounding systems are conducted on a specific schedule. These tests will alert the mine operator if a problem exists in the grounding system which may not allow the circuit protective devices to quickly operate when faults occur. With the exception of fixed installations, numerous fatalities and injuries have occurred due to the high resistance or lack of continuity in equipment ground systems. These accidents could have been prevented by proper testing and maintenance of grounding systems.

To Whom Does the Policy Apply?

This policy applies to all metal and nonmetal mine operators and metal and nonmetal MSHA enforcement personnel.

What Equipment Needs to Be Tested?

Grounding systems typically include the following:

Equipment Grounding Conductors

The conductors used to connect the non-current carrying parts of equipment and enclosures of electrical equipment to the grounding electrode conductor at the service or source of power.

Grounding Electrode Conductors

The conductors connecting the grounding electrode to the equipment grounding conductor at the service or source of power.

Grounding Electrode

Metal water pipes, concrete encased electrodes (Ufer), and driven rods connected to each other by suitable means, buried metal, or other effective methods located at the source, to provide a low resistance earth connection.

What Tests Are to Be Performed?

The following tests should be performed:

Equipment Grounding Conductors

Continuity and resistance must be tested immediately after installation, repair, or modification, and annually if conductors are subjected to vibration, flexing, or corrosive environments.

Grounding Electrode Conductors

Continuity and resistance must be tested immediately after installation, repair, or modification, and annually if conductors are subjected to vibration, flexing or corrosive environments.

Grounding Electrodes

Resistance must be tested immediately after installation, repair, modification, and annually thereafter. Since the earth connection depends greatly on the moisture content of the soil, variances in water table levels, such as from mining operations, can greatly affect the earth resistance of a grounding electrode.

Conductors in fixed installations, such as rigid conduit, armored cable, cable trays, etc., that are not subjected to vibration, flexing, or corrosive environments may be examined annually by visual observation to check for damage in lieu of the annual resistance test. When operators elect to conduct this visual examination as a method of compliance with Title 30, CFR, Parts 56/57.12028, MSHA requires that a record be maintained of the most recent annual visual examination.

Grounding conductors in trailing cables and power cables that supply power to mobile equipment must be tested as prescribed in the regulation. Extension cords that supply portable electric tools must comply with an "assured grounding" program. The grounding conductor test requirement does not apply to double insulated tools or to circuits protected by ground-fault-circuit interrupters (GFCI) which trip at 5 milliamperes or less.

Testing of equipment grounding conductors and grounding electrode conductors is not required if a fail-safe ground wire monitor is used to continuously monitor the grounding circuit and alert when grounding conductor continuity is broken.

A record of the most recent resistance tests conducted must be kept and made available to MSHA upon request.

When a record of testing is required by the standard, MSHA intends that the test results be recorded in resistance value in ohms.