



MORENCI OPERATIONS

BEST
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Equipment Grounding & Testing Policy

The policy is to use these tests to determine the integrity of the grounding path from the point of test back to the substation, source panel, supply transformer or main grounding system. A low impedance grounding path is necessary to facilitate operation of the overcurrent devices under ground fault conditions and also provides a zero voltage reference for reliable operation.

Instruments are available to measure the impedance of the grounding path. When using these instruments, one should remember that although a high impedance value is an indication of a problem (for example a loose connection or excessive conductor length) a low impedance readout does not necessarily indicate that the grounding path is adequate. A grounding path that is found to have a low impedance by the use of relatively low test currents might not have sufficient capacity to handle large ground faults. Visual examinations and physical checks of connection integrity (tightness, torque) are still necessary to ensure the efficacy of the grounding path.

EQUIPMENT GROUND TEST PROCEDURE

1. Equipment grounding conductors must be tested immediately following installation, repair or modification and annually if conductors are subjected to vibration, flexing or corrosive environments. The results from the ground resistance test must be documented with the date, equipment tested, equipment tag number, location, test instrument utilized and the name of the person who performed the test.
2. Equipment grounding conductors in fixed installations and not subjected to vibration, flexing or corrosive environments only require annual visual inspections to check for damage in lieu of resistance testing.
3. The test is to verify ground continuity and measure the ground resistance from the substation or main grounding system to each piece of electrical equipment subject to testing. Due to the large distances between the substation or main grounding system and all major electrical equipment frames, electrical enclosures, system neutral and/or derived neutral points, a method of point to point resistance testing shall be used. Using this method of testing, several resistance measurements will be taken and the sum of these measurements will be recorded as the total ground resistance from the substation

to each piece of electrical equipment. Investigate point to point resistance values that exceed 0.5 ohm.

4. All testing will be conducted with an approved test instrument such as a digital low resistance ohmmeter (DLRO), volt-ohm-meter or clamp-on ground resistance (leakage) tester. These test instruments shall be calibrated at recommended frequencies. Always use the digital low resistance ohmmeter when the readings are questionable.
5. The installation of an external ground on equipment in conjunction with the internal ground is preferred. This method provides ease of visual inspection of the external equipment grounding conductor.
6. Measure resistance from the substation test well or main grounding system to the building ground.
7. The test point on electrical equipment shall be located on the equipment chassis.
8. Test points shall be separated by no more than 200 feet.
9. No point to point test (from one equipment grounding connection to the next) shall exceed 0.5 ohms.
10. The cumulative ground resistance from the source (substation test well or main grounding system) to each specific piece of equipment shall be below 1 ohm.
11. For any equipment having a measured ground resistance of more than one ohm cumulative or more than 0.5 ohm point to point, action must be taken to lower the ground resistance to acceptable levels.

REFERENCES

NETA - 2001 Maintenance Testing Specifications
NFPA 70B - 1998 Edition
IEEE Std. 81 & 142
MSHA 56/57.12028