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VTI Services Technical Bulletin (TB)
DC Resistance Testing of Earth Protective Bonding Network
2-Point Test or "Dead Earth" Test

Text in *Blue Italics* is derived from Standards.

Applicability

The following is applicable to testing the d.c. resistance of a protective bonding network between any two points of interest.

Introduction

1. The d.c. resistance of a protective bonding (earthing) network in a telecommunications installation, which provides connection to the protective earthing network of the electrical power installation, determines how safely and reliably any stray or fault current can be diverted safely to ground.
2. The d.c. resistance also determines the value of any hazardous voltage that may appear on installed distributors, frames or terminal equipment with the potential to cause harm to persons or the equipment itself.

Conformance requirements

AS/CA S009 Installation requirements for customer cabling (Wiring Rules) 20.11.2.4 states:

The resistance of the communications bonding conductor shall not exceed 0.5 Ω.

Note 1: This resistance is measured between the point where the bonding conductor connects to the electrical earthing system and the CET (bonding method 1 or 2) or the bar, terminal or backmount in the telecommunications equipment (bonding method 3). See AS/CA S009 Figures 4 and 5.

AS/CA S009 Installation requirements for customer cabling (Wiring Rules) 20.12.4 states:

The resistance of the earthing conductor between the point of connection to the earthing system of the electrical installation and the earthing bar or terminal at any MDF, NTD, distributor or CAE shall not exceed 1 Ω.

Note 1: This resistance includes the bonding conductor resistance (see Clause 20.11.2.4) which, in most cases, should be negligible.

ISO/IEC 11801-2 to 6, Clause 4 e) Conformance states:

The requirements of ISO/IEC 30129 shall be met.

ISO/IEC 30129 Telecommunications bonding networks for buildings and other structures, 6.3.2.2 & 3 states:

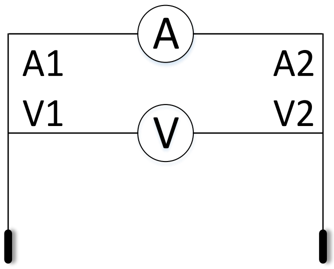
The d.c. resistance between points on a protective electrical or telecommunications bonding network shall be a maximum of 1.67 mΩ/m.

6.3.3.1 states:

The d.c. resistance measurement is done using a resistance tester that is configured for a continuity test, otherwise known as a two-point test or a "dead earth" test.

The earth ground resistance tester generates a specific alternating current (a.c.) test current that is less susceptible to the influences of stray currents in the telecommunications bonding network and is a more accurate testing device (for low resistance values) than a standard volt-ohm-milliampere meter.

1. 2-Point resistance test method



1.1. Set up the resistance tester for the 2-point test method according to the manufacturer's instructions. This is usually done by connecting the A1 V1 terminals and the A2 V2 terminals on the tester. Some testers make these connections internally and therefore have only two external terminals/sockets for attaching test leads.

1.2. A short test lead, say 2 m, is connected to the A1/V1 terminal. A long test lead is connected to the A2/V2 terminal. The long test lead must be long enough to reach the far-end of the earthing/bonding conductor under test.

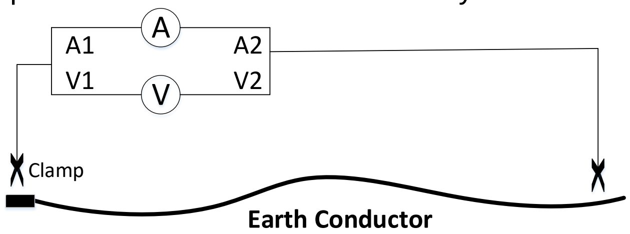
1.3. Connect the remote ends of the short and long leads together to measure the resistance of the test leads. It is recommended to reverse the polarity and re-test to ensure a stable reading. Most testers allow this reading to be set as a reference thereby eliminating the test lead resistance from the final measurement result. Other zeroing methods also exist.

1.4. A short test lead is connected to the near-end point of interest, say, *the point of the disconnected bonding conductor before it connects to the electrical earthing system*.

1.5. The long test lead is taken to the far-end of the earthing/bonding system under test. The path this long test lead should follow is the shortest accessible walking path to the far-end. Measure the length of the earthing/bonding conductor between the two test locations.

1.6. Ensure the earthing/bonding conductor has no parallel conductive paths.

1.7. The attachment of the test leads needs to be done to achieve the lowest stable attachment resistance. Hand-held pointed probes need to be sharp or they may not provide an accurate or repeatable result. An Alternative may be to use clean sharp clamps.



1.8. Connect the long test lead to the far-end point of interest, say, *the CET* or *the earthing bar or terminal at any MDF, NTD, distributor or CAE.*

1.9. Conduct the resistance test and record the result. Subtract initial lead resistance if needed.

2. **AS/CA S009 Conformance**: compare the result with the S009 conformance requirements.

3. **ISO/IEC 30129 Conformance**: divide the resistance by the length (m) between the points of measurement to get mΩ/m and compare to ISO/IEC 30129 conformance requirements.

Note: The 4-probe Wenner method of resistance testing may also be acceptable if agreed in the quality plan but it is more complicated to do due to taking 2 test leads and probes to each end. However, zeroing out the test lead resistance is done automatically using the 4-probe Wenner method of resistance testing.

Acknowledgement

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