



Designation: G165 – 99 (Reapproved 2017)

Standard Practice for Determining Rail-to-Earth Resistance¹

This standard is issued under the fixed designation G165; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the procedures necessary to follow for measuring resistance-to-earth of the running rails which are used as the conductors for returning the train operating current to the substation in electric mass transit systems.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

G15 Terminology Relating to Corrosion and Corrosion Testing (Withdrawn 2010)³

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *cross bond*—insulated copper cables that connected between adjacent sections of track to ensure electrical continuity between them.

3.1.2 *direct fixation fastener*—a device for fastening running rails to their support structures.

3.1.3 *impedance bond*—a device connected to running rails for automatic train operations.

3.1.4 The terminology used herein, if not specifically defined otherwise, shall be in accordance with Terminology **G15**. Definitions provided herein, and not given in Terminology **G15**, are limited to this practice.

4. Significance and Use

4.1 Low resistance between the rails and earth could result in large magnitudes of stray earth currents with the attendant corrosion damage to underground metallic structures.

4.2 These measurements are of a low voltage type and are not designed to evaluate the high voltage dielectric characteristics of the rail insulating elements.

4.3 Sections of track with rail-to-earth resistances less than acceptable minimums must be tested in greater detail to determine the reason(s) for this condition. Determination of the reason(s) for any low rail-to-earth resistance may require the use of special testing techniques or special instruments, or both, beyond the scope of this practice.

4.4 The electrical tests call for the use of electric meters that have varying characteristics depending on cost, manufacture, and generic type. It is assumed that any person employing the test procedures contained herein will know how to determine and apply proper correction factors and that they will have sufficient knowledge to ensure reasonable accuracy in the data obtained.

4.5 This practice does not encompass all possible field conditions to obtain rail-to-earth resistance characteristics. No general set of test procedures will be applicable to all situations.

5. Equipment

5.1 Indicating dc; high impedance (minimum ten megohm) voltmeter (two required); multi-scale, capable of reading positive and negative values without removing test leads; and covering at least the following full scale ranges:

- 5.1.1 0 to 10 mV,
- 5.1.2 0 to 100 mV,
- 5.1.3 0 to 1 V,
- 5.1.4 0 to 10 V, and
- 5.1.5 0 to 100 V.

¹ This practice is under the jurisdiction of ASTM Committee **G01** on Corrosion of Metals and is the direct responsibility of Subcommittee **G01.10** on Corrosion in Soils.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.