



Standard Test Method for Measurement of Soil Resistivity Using the Two-Electrode Soil Box Method¹

This standard is issued under the fixed designation G187; 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 test method covers the equipment and procedures for the measurement of soil resistivity, for samples removed from the ground, for use in the assessment and control of corrosion of buried structures.

1.2 Procedures allow for this test method to be used in the field or in the laboratory.

1.3 The test method procedures are for the resistivity measurement of soil samples in the saturated condition and in the as-received condition.

1.4 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only. Soil resistivity values are reported in ohm-centimeter.

1.5 *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 to determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

D1193 Specification for Reagent Water

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

G57 Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method

G193 Terminology and Acronyms Relating to Corrosion

2.2 UNS Standards:³

UNS Designation S30400 & S30403

UNS Designation S31600 & S31603

¹ This test method 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.

Current edition approved Nov. 1, 2012. Published March 2013. Originally approved in 2005. Last previous edition approved in 2012 as G187–12. DOI: 10.1520/G0187-12A.

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 UNS (Unified Numbering System) was developed jointly by ASTM International and SAE International.

3. Terminology

3.1 Definitions:

3.1.1 *Ohm's law, n*—The relationship between the electromotive force, the current, and the resistance. Mathematically: current = electromotive force/resistance or $I = E/R$; where “I” is measured in amperes, “E” in volts, and “R” in ohms.

3.1.2 *resistivity (soil), n*—The electrical resistance between opposite faces of a unit cube of material; the reciprocal of conductivity.

3.1.3 *saturated soil, n*—soil whose entire soil porosity is filled with water.

3.1.4 *soil box factor, n*—A factor which is determined by a two-electrode soil box's internal dimensions (cross sectional area/distance between electrode plates). The soil box factor is multiplied by the measured resistance of a substance in the soil box to obtain that substance's resistivity.

3.1.5 *soil resistance meter, n*—An instrument capable of measuring soil resistance.

3.1.6 *two-electrode soil box, n*—A non-conductive container of known internal dimensions with two end plate electrodes for measuring a substance's resistivity.

3.2 The terminology used herein, if not specifically defined otherwise, shall be in accordance with Terminology G193. Definitions provided herein and not given in Terminology G193 are limited only to this standard.

4. Summary of Test Method

4.1 The two-electrode soil box method is predicated on measuring the resistance between two opposite faces of a box containing a substance or solution. That resistance measurement through the substance being tested is then converted to resistivity based on the conversion formula of Eq 1.