



# Standard Test Method for D-C Resistance or Conductance of Moderately Conductive Materials<sup>1</sup>

This standard is issued under the fixed designation D4496; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers the determination of electrical resistance and electrical resistivity of materials that are generally categorized as moderately conductive and are neither good electrical insulators nor good conductors.

1.2 This test method applies to the materials that exhibit volume resistivity in the range of  $10^0$  to  $10^7 \Omega\text{-cm}$  or surface resistivity in the range of  $10^3$  to  $10^7 \Omega$  (per square).

1.3 This test method is designed for measurements at standard conditions of 23°C and 50 % relative humidity, but its principles of operation can be applied to specimens measured at lower or higher temperatures and relative humidities.

1.4 *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.* Specific precautionary statements are given in 8.3.

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

**D257** Test Methods for DC Resistance or Conductance of Insulating Materials

**D374** Test Methods for Thickness of Solid Electrical Insulation (Withdrawn 2013)<sup>3</sup>

**D991** Test Method for Rubber Property—Volume Resistivity Of Electrically Conductive and Antistatic Products

**D1711** Terminology Relating to Electrical Insulation

**D6054** Practice for Conditioning Electrical Insulating Materials for Testing (Withdrawn 2012)<sup>3</sup>

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D09 on Electrical and Electronic Insulating Materials and is the direct responsibility of Subcommittee D09.12 on Electrical Tests.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

### 2.2 ASTM Adjuncts:

Carbon black test cell (two drawings)<sup>4</sup>

## 3. Terminology

### 3.1 Definitions:

3.1.1 *moderately conductive*—a solid material having volume resistivity between  $10^0$  and  $10^7 \Omega\text{-cm}$ .

3.1.2 For definitions of the terms used, but not defined in this standard, refer to Terminology **D1711**.

### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *steady state*—for the purpose of this test method, steady-state is attained if any rate of change in the observed resistance (or conductance) averages less than 0.25 %/s.

## 4. Summary of Test Method

4.1 Specimens of the test material are conditioned at prescribed conditions and subjected to direct-voltage stress. Resistance or conductance is measured and used with the dimensional aspects of the specimen to compute the resistivity of the material. The apparatus and techniques used in this test method are selected in accordance with the general principles set forth in Test Methods **D257**.

## 5. Significance and Use

5.1 This test method is useful for the comparison of materials, as a quality control test, and for specification purposes.

5.2 This test method is useful in the selection and use of materials in wires, cables, bushings, high-voltage rotating machinery, and other electrical apparatus in which shielding or the distribution of voltage stress is of value.

5.3 Commercially available “moderately conductive” materials frequently are comprised of both conductive and resistive components (that is, cellulose fibers with colloidal carbon black particles attached to portions of the surfaces of those fibers, or discrete conductive particles adhered to the surfaces of electrical insulating polymers). Such commercially available materials are often manufactured in a manner that results in

<sup>4</sup> Available from ASTM International Headquarters. Order Adjunct No. **ADJD4496**.