



Designation: D4470 – 18

## Standard Test Method for Static Electrification<sup>1</sup>

This standard is issued under the fixed designation D4470; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

### 1. Scope

1.1 This test method covers the generation of electrostatic charge, the measurement of this charge and its associated electric field, and the test conditions which must be controlled in order to obtain reproducible results. This test method is applicable to both solids and liquids. This test method is not applicable to gases, since a transfer of a gas with no solid impurities in it does not generate an electrostatic charge. This test method also does not cover the beneficial uses of static electrification, its associated problems or hazards, or the elimination or reduction of unwanted electrostatic charge.<sup>2</sup>

1.2 The values stated in SI units are to be regarded as the standard.

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, health, and environmental 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:*<sup>3</sup>

[D618 Practice for Conditioning Plastics for Testing](#)

[D1711 Terminology Relating to Electrical Insulation](#)

[D5032 Practice for Maintaining Constant Relative Humidity](#)

<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> Vosteen, R. E., and Bartnikas, R., Chapter 5, “Electrostatic Charge Measurements,” *Engineering Dielectrics, Vol. IIB, Electrical Properties of Solid Insulating Materials, Measurement Techniques*, R. Bartnikas, Editor, ASTM STP 926, ASTM, Philadelphia, 1987.

<sup>3</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.

[by Means of Aqueous Glycerin Solutions](#)

[E104 Practice for Maintaining Constant Relative Humidity by Means of Aqueous Solutions](#)

### 3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this specification, refer to Terminology [D1711](#).

3.1.2 *conducting material (conductor), n*—a material within which an electric current is produced by application of a voltage between points on or within the material.

3.1.2.1 *Discussion*—The term “conducting material” is usually applied only to those materials in which a relatively small potential difference results in a relatively large current since all materials appear to permit some conduction current. Metals and strong electrolytes are examples of conducting materials.

3.1.3 *electric field strength, n*—the magnitude of the vector force on a point charge of unit value and positive polarity.

3.1.4 *excess electrostatic charge, n*—the algebraic sum of all positive and negative electric charges on the surface of, or in, a specific volume.

3.1.5 *insulating material (insulator), n*—a material in which a voltage applied between two points on or within the material produces a small and sometimes negligible current.

3.1.6 *resistivity, surface, n*—the surface resistance multiplied by that ratio of specimen surface dimensions (width of electrodes defining the current path divided by the distance between electrodes) which transforms the measured resistance to that obtained if the electrodes formed the opposite sides of a square.

3.1.6.1 *Discussion*—Surface resistivity is expressed in ohms. It is popularly expressed also as ohms/square (the size of the square is immaterial). Surface resistivity is the reciprocal of surface conductivity.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *apparent contact area, n*—the area of contact between two flat bodies.

3.2.1.1 *Discussion*—It is the area one would calculate by measuring the length and width of the rectangular macroscopic contact region.

3.2.2 *dissipative material, n*—a material with a volume resistivity greater than  $10^4$  ohm-cm and less than  $10^{12}$  ohm-cm,