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Standard Terminology Relating to Electrostatic Discharge (ESD) Packaging Materials[1]

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1. Scope

1.1 The terms and definitions in this standard are related to Electrostatic Discharge (ESD) Packaging Materials and ESD Protective Materials.

1.2 *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]

D996 Terminology of Packaging and Distribution Environments

2.2 *EIA Standard:*

EIA-541 Packaging Material Standards for ESD, Sensitive Items[3]

3. Terminology

antistatic agent, *n*—a chemical compound which, when impregnated or formulated into or topically applied to a primary material or substrate, gives the primary material antistatic properties. See **antistatic property**.

antistatic property, *n*—the prevention of triboelectric charge generation by effectively minimizing the production of a static charge when materials are separated from another surface.

Discussion—The forword of EIA-541 states, "'Antistatic' no longer refers to a resistivity range ... 'Antistatic' refers to a material's ability to resist triboelectric charge generation. A material's antistatic propensity depends upon the nature of the material itself and the material with which it is in contact along with the means of surface separation. The antistatic property is not a dependent function of material resistivity. Material resistivity is an intrinsic property used to define its degree of conductivity without regard to other materials."

conductor, *n*—a substance or body that allows a flow of electric current to pass continuously along it or through it when a sufficient voltage is applied across any two points.

dielectric breakdown, *n*—a threshold effect in a dielectric medium where, at some electric field strength across the medium, bound electrons become unbound and travel through the medium as a current. In solid media, the region of the current path is permanently damaged. The unit of measurement is usually volts per unit of thickness.

electrically continuous surface, *n*—a surface that is electrically conductive in that current can be passed at an applied voltage between any two points of its physical surface.

electrical overstress (EOS), *n*—overstress which may be due to ESD or the operation of items beyond their electrical specifications.

electromagnetic shield, *n*—a screen or other housing placed around a device or circuit to reduce the effects on them from both electric and magnetic fields.

electrostatic discharge, *n*—the transfer of electrostatic charge between bodies at different electrostatic potentials.

electrostatic discharge (ESD) protective, *n*—a property of materials capable of one or more of the following:
preventing the generation of static electricity.
dissipating electrostatic changes over its surface or volume.
providing shielding from ESD or electrostatic fields.

electrostatic discharge sensitive (ESDS), *n*—a property of items in which they are inherently sensitive (ESDS) susceptible to either catastrophic failure or latent damage when exposed to sources of ESD. Items are often categorized as to their levels of sensitivity but in all cases require some means of ESD protective packaging and handling.

electrostatic shield, *n*—a barrier or enclosure that prevents the penetration of an electrostatic field.

Discussion—An electrostatic shield may not offer much protection against the effects of an electromagnetic field. Electromagnetic shields, however, are good electrostatic shields.

[1] This terminology is under the jurisdiction of ASTM Committee D10 on Packaging and is the direct responsibility of Subcommittee D10.11 on Terminology (definitions).

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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] Available from the Electronic Industries Association, 2001 Eye St., N.W., Washington, DC 20006.

ground, *n*—a metallic connection with the earth to establish zero potential.

DISCUSSION—The ground is the voltage reference point in a circuit. There may or may not be an actual connection to earth, but it is understood that a point in the circuit said to be at ground potential could be connected to earth without disturbing the operation of the circuit in any way. Grounds that can be used for static control work stations include metal water pipes, any power ground, or any large metal structural member of a building, vessel hull, etc. (See **grounding**.)

grounding, *n*—connecting to ground or to a conductor that is grounded.

insulator (electric), *n*—a device having high electrical resistance and used for supporting or separating conductors to prevent undesired flow of current from them to other objects. (Also known as electrical insulator.)

ionization, *n*—the process by which neutral atoms or molecules, such as air, acquire a positive or negative charge.

packaging, *n*—see Terminology D996.

DISCUSSION—The term packaging as used in this context should not be confused with the term as it is used in the electronics industry where it describes the assembly, black box enclosure, or physical encasing of microelectronic devices.

surface resistivity, ρ_s, *n*—the surface resistivity of a material is the ratio of the potential gradient parallel to the current along its surface to the current per unit width of the surface.

DISCUSSION—Surface resistivity of a material is numerically equal to the surface resistance between two electrodes forming opposite sides of a square. The size of the square is immaterial.

volume resistivity, ρ_v, *n*—the volume resistivity of a material is the ratio of the potential gradient parallel to the current in the material to the current density.

DISCUSSION—In the metric system, volume resistivity of an electrical insulating material in ohm-cm is numerically equal to the volume resistance in ohms between opposite faces of a 1-cm cube of the material. (Volume resistivity in$\Omega \cdot$ m has a value of 1⁄100 of the value in $\Omega \cdot$ cm.)