



Difference between Conductive, Dissipative, Insulative and Antistatic

For ESD purposes, materials are classified by how quickly electricity moves through the material. The speed is referred to as the “resistance” of the material i.e. how strongly the material resists charge movement.

Results are measured in Ohms and are typically displayed in powers of 10. The lower the number, the more conductive the material and may be considered “Antistatic”.

Classification	Charge Movement	Resistance	Ohms	Is it Antistatic?
Conductive	Very Fast	Low Resistance	$10^3 - 10^5$	Yes
Dissipative	At a controlled speed. Fast but Slower than Conductive	Medium Resistance	$10^6 - 10^{10}$	Yes
Insulative	Slow or No Movement	High Resistance	$10^{11} - 10^{12}$	No

The following ranges and definitions are found in ESD Association or EIA standards publications:

Conductive materials: With a low electrical resistance, electrons flow easily across the surface or through the bulk of these materials. Charges go to ground or to another conductive object that the material contacts or comes close to. Conductive materials have a surface resistivity less than $1 \times 10^5 \Omega/\text{sq}$ or a volume resistivity less than $1 \times 10^4 \Omega\text{-cm}$.

Dissipative materials: For these materials, the charges flow to ground more slowly and in a somewhat more controlled manner than with conductive materials. Dissipative materials have a surface resistivity equal to or greater than $1 \times 10^5 \Omega/\text{sq}$ but less than $1 \times 10^{12} \Omega/\text{sq}$ or a volume resistivity equal to or greater than $1 \times 10^4 \Omega\text{-cm}$ but less than $1 \times 10^{11} \Omega\text{-cm}$.

Insulative materials: Insulative materials prevent or limit the flow of electrons across their surface or through their volume. Insulative materials have a high electrical resistance and are difficult to ground. Static charges remain in place on these materials for a very long time. Insulative materials are defined as those having a surface resistivity of at least $1 \times 10^{12} \Omega/\text{sq}$ or a volume resistivity of at least $1 \times 10^{11} \Omega\text{-cm}$.

Anti-Static: Is a term used to describe materials that prevent the buildup of static electricity. Both conductive and dissipative materials are classified as Antistatic. Insulative materials are not.

How to Measure Surface Resistivity

The **Surface Resistance Meter** is an easy to use tester for measuring surface resistivity. This SRM200 uses parallel electrodes and concentric rings to accurately measure RTT, RTG, or resistivity for periodic verification, factory audits or test lab evaluation of product.

This meter is designed to be used in all facets of material production including engineering, maintenance, quality control, incoming inspection, manufacturing, research, or sales departments for the testing of anti-static mats, floor finishes, paints, wrist straps, smocks, footwear, bags and containers.