

# ETS TESTING LABORATORY

An internationally recognized independent testing laboratory providing testing of the electrostatic characteristics of material, finished product and ESD sensitive devices and systems in accordance with commercial, government and military standards.

## Services:

- Material & product testing:**
  - Resistance/Resistivity
  - Static Decay
  - Triboelectric charge generation
  - Static shielding
- ESD Susceptibility**
  - Devices
  - Assemblies
  - Finished Products
- Custom testing**
- Controlled environments**
- Specification development**
- Test standards (typical):**

ESDA	EIA
NFPA	IEC
ASTM	AATCC
USPS	International
Military	Corporate



ETS Controlled Environment Room



ETS Materials Testing Laboratory

## Capabilities:

The Electro-Tech Systems independent testing laboratory has been providing fast, economical answers for development, control and certification of the electrostatic characteristics of materials and products for military and industrial applications since 1970. Many electrostatic standards in use today were developed with either ETS participation or exclusively by ETS.

Refer to the ETS Consulting Services brochure for facility surveys, product development, specification writing, training, group seminars and expert witness testimony services.



**electro-tech systems, inc.**

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## Materials Evaluation:

The electrostatic characteristics of material and product are evaluated using Resistance/Resistivity, Static Decay, Static Shielding and Triboelectric or Corona Charging test methods. Tests are performed at ambient or controlled environment conditions. ETS facilities include microprocessor controlled humidity chambers and a controlled environment room.

**Resistance/Resistivity:** Measured in accordance with most commercial and military standards including all ESD Association (ANSI/ESDA STM 4.1, 11.11, 11.12, 11.13), ASTM (D-257, D-991 and F-150), NFPA (99, and 77) test standards plus IEC electrostatic measurements. Planar, non-planar, finished product, liquids and powders are measured using industry standard or custom test fixtures. Resistivity, when appropriate, is calculated using the dimensions of the electrodes and test sample.



Surface/Volume Probe

5 lb Surface Probe

**Dynamic Resistance** Applies a Human Body Model (HBM) discharge pulse (V) to the material or object under test and the current (I) measured. The "Dynamic Resistance is then calculated using  $R=V/I$ . This resistance may be lower than the standard DC resistance measurement and may be a better indicator of the ability of a material or an object to dissipate a static discharge.

**Static Decay:** Measures the ability of charged material to dissipate when grounded. Federal Test Method Standard (FTM) 101C, Method 4046 is used to evaluate material covered in Mil PRF 81705D, Mil C 83429B, Method 5931, ESDA, IEC, NFPA, CECC and other standards. Typically, samples are electrically charged to  $\pm 5kV$  and the time for the charge to bleed off to either the 10% or 1% level is measured. Variations of this procedure are used to evaluate many other types of material and finished product.



Static Decay Meter

**Static Dissipation:** Measurements utilizing a charged plate monitor or oscilloscope to measure decay time. Material or product is charged electrically, triboelectrically or by corona. It can be connected or placed onto a detector plate, charged then grounded or charged externally then placed on the detector plate and grounded. Decay times to specific points can then be measured. Variations of this procedure are used for special applications such as SAE J1645 to evaluate automotive fuel systems.

**Static Shielding:** Measures the energy or voltage differential inside a static shielding bag. A 1kV Human Body Model discharge is applied to the outside surface of a bag clamped between discharge, capacitive sensor and ground electrodes. The ESD pulse that penetrates the bag is measured. The ETS Test Suite Manager program generates a complete report of the peak current and energy measured inside the bag in accordance with ESDA STM 11.31.

**Triboelectric Charge Generation:** Evaluates the ability of material or objects to generate charge when rubbed or separated from another material or from itself. Variables that can affect the measurement include environmental, mechanical, electrical, material and data interpretation. ESDA Adv 11.2 describes several test methods including the inclined test that

measures the charge build-up on quartz and Teflon® cylinders that are rolled down a 12” (305mm) sample of material mounted on a grounded surface inclined at 15°.

Other tests measure charge build-up on non-planar materials, objects, powders and liquids. Data is obtained using nanocoulombmeters, charge plate monitors and high-speed oscilloscopes.

**Static Propensity:** Measures static charge build-up on personal either walking across a floor or performing a defined step and scuff sequence on flooring samples. Used to evaluate footwear and/or flooring. This test is expanded to include static charge build-up of seating, carts and other mobile furnishings as they are moved about.

## ESD Susceptibility:

Evaluates the electrostatic discharge (ESD) susceptibility of electronic components, systems and non-electronic devices. ESD simulators configured with Human Body Model (HBM), Machine Model (MM) or IEC61000-4-2 discharge networks are used to apply ESD pulses to the Device Under Test (DUT) per Mil Std 883, ANSI/ESDA STM-1 & 2 plus IEEE, JEDEC, EIA and other similar standards. Testing is performed from  $< \pm 5$  to 30,000 Volts.

**ESD Simulation (Components):** Performed using the HBM at voltages from  $< \pm 5$  to 8,000 Volts or MM up to  $\pm 2000V$ . Single or multiple discharges are applied to defined pin combinations in stepped voltage increments until deterioration or failure occurs. Simple resistance or other function tests are used to determine DUT functionality before and after test. Devices can also be exposed to a defined ESD protocol and then returned to the client for analysis.



Component ESD Simulator

**ESD Simulation (Systems):** ESD simulators determine likely failure points and voltage susceptibility levels. Can be configured with either HBM or IEC networks up to  $\pm 30kV$  and MM or CDM networks up to  $\pm 6kV$ .

Non-electronic material or products that can be adversely affected by ESD are evaluated using the above or custom discharge networks with capacitance up to  $0.5\mu f$  and resistance down to 0 Ohms. Voltage/capacitance limits apply.



System ESD Simulator

**Personnel/Charged Object Analysis:** Personnel or objects stand or are placed on an insulated surface then charged up to  $\pm 10,000V$ . The subject or object is then discharged to a SUT or to ground. This test recreates actual movement or operation using defined voltages to create the ESD event.

## Custom Testing:

Designed for products that cannot be evaluated using standard test methods. Typically, guidelines of one or more standards are referenced with appropriate modifications. Specific applications, however, may require development of a new test protocol including custom apparatus design.