

Explosives Measurement And Test
Instrumentation:

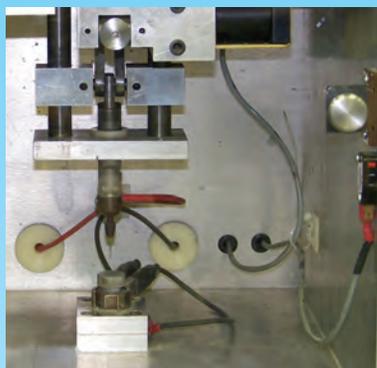
Electrostatic Discharge Test Instrument



Electrostatic discharge is one of the most frequent and the least characterized cause of accidental explosions of energetic materials. To have reliable data on electrostatic spark sensitiveness of energetic materials is thus a critical component within the manufacturing process, in research & development, physical processing, loading, or demilitarization.

Electrostatic Discharge (ESD) Testing

ESD testing is used to determine the response of an explosive when subjected to various levels of electrostatic discharge energy. Electrostatic energy stored in a charged capacitor is discharged to the test sample. The test sample is placed on a special holder that assures the electrostatic discharge will pass through the sample. A capacitor is charged with a known volt potential (typically 5000 volts). The discharge needle is lowered until a spark is drawn through the sample. The approaching needle method is most commonly used because it best models the safety issues involved with ESD sensitivity.



Electrostatic Discharge is an arcing of electric charge across a gap between two points not in contact or through a nonconductor when the voltage exceeds the dielectric breakdown voltage of the nonconductor. All static electricity hazards are initiated by this sudden energy release or discharge mechanism. The primary parts of the test instrument are a sample cup, a discharge needle, and a capacitor bank to provide the electrical energy.

This test simulates conditions in processing, where an electrical discharge could take place as electrostatic energy builds up on process equipment or operators as they move about. Conditions leading to discharge could include lack of appropriate grounding of equipment or use of static generating materials. Solid, liquid, or powdered materials may be tested.

The desired energy is determined by selecting a capacitance value from the capacitor bank. The test is then initiated by dropping the discharge needle rapidly toward the sample. The electrical discharge between the needle and the ground passes through the sample.

Testing for ESD, or “spark” sensitivity of energetic materials and explosives, is performed with the ESD machine designed to discharge from a capacitor through a prepared sample. UTEC’s ESD instrument employs a dipping needle that punctures a sample cell and discharges the spark simultaneously. The amount of energy discharged into the cell becomes the variable in which Bruceton analysis or Neyer d-optimal test is performed to determine spark sensitivity.



Designed and manufactured to perform the following defined tests:

- Test method 1031 (NSWC method)
- Test method 1032 (ARDEC method)
- Test method 1033 (NAWC method) as detailed in MIL-STD 1751A

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