

ELECTRO-STATIC-DISCHARGE INFO SHEET

WHAT IS IT?

Static electricity is everywhere. When it's released into an electronic device it's known as Electro-Static-Discharge or ESD. ESD can cause irreparable damage to some electronic components.

Static electricity plays havoc with an electronic part by traveling from a charged surface with a voltage potential into the actual part. If static electricity moves through a device that can't handle this voltage movement, the device can be stressed, damaged or even destroyed.

WHAT CAUSES IT?

The threat of ESD looms everywhere in electronic work areas. Floors, chairs, work surfaces, packaging materials, plastics and papers all give rise to static electricity.

HUMIDITY

ESD becomes a more serious problem on low humidity days when the lack of moisture permits a more rapid static charge build-up.

VOLTAGE LEVELS

Component damage increases with the voltage level or charge.

MATERIALS

Common plastics and other synthetic materials cause the most trouble because they're insulators and prevent the free-flow of electricity by trapping the charge on the surface.

YOU

You pose the greatest danger to sensitive electronic materials because the human body can generate the biggest static charge of anything likely to come near these devices.

For example, on a dry day, we can generate a static field of more than 100 volts by just the slight raising of an arm. It's not unlikely that during normal, everyday activity at an unprotected workbench, you can easily generate 6,000 volts or more.

FACTS

These five little known facts about ESD can make a big difference in its elimination:

1. ESD often can't be seen, heard or felt.
2. Devices can be stressed or damaged even without physical contact.
3. Smaller, miniaturized devices are sensitive to 50 volts or less.
4. ESD problems can occur to devices at anytime – even after they are installed on circuit cards.
5. Everyone involved in the handling, installing, test, shipping and storing of electronic devices or boards must take preventative measures against the threat of ESD.



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PROTECTION

Here are eight rules to follow to keep ESD out of your workplace:

1. Always wear a properly grounded wrist strap. Test it to make sure it's in good working order.
2. For areas where wrist straps are impractical wear grounded heel straps or special footwear.
3. When using anti-static packaging materials take special care in the number of times the material is re-used. Time and use reduce its non-charging capabilities.
4. When using conductive static shielding make sure the material completely envelops the objects and that it's closed properly. Open only at a protected workstation and when wearing a wrist strap.
5. If you are in doubt about what kind of ESD packaging material to use, remember this simple rule: put antistatic material next to the sensitive part and then place conductive shielding around it.
6. Eliminate the use of plain plastic and synthetic items in the workplace.
7. Even when wearing a grounded wrist strap at a protected workstation, keep sensitive devices away from common plastics, clothing and hair.
8. Don't wear long sleeves unless a static dissipative smock covers them.

ALWAYS REMEMBER...

You control the destiny of the electronic commodities you're working on. ESD damage is costly in terms of dollars, your company and even lives. That's why it is critical that you take pride in your work as well as taking the necessary steps to eliminate ESD today.

WHAT IT IS ALL ABOUT

INTRODUCTION

Electrostatic charging has been around since the beginning of time. So even the Greeks, first to record the effect, were really johnny-come-latelys. They noted that amber, rubbed with cat's fur, was then good at "pricing up" bits and pieces of almost any light material – in short, it was charged.

Today, walking across a synthetic rug with leather-soled shoes, we get charged. Then we touch a keyboard or a control and discharge our body's 100-250-pfd capacitance, charged to 5, 10 or even 25 KV into a computer, numerical machine controller or what-have-you. And there it is, an electrostatic discharge (ESD).

Our modern society has rapidly come to depend on electronics. And modern computers are based increasingly on low-power logic chips, all with ESD sensitivity due to MOS dielectric breakdowns and bipolar reverse junction current limits.

In addition, the end's not yet in sight: still newer devices will soon be coming on stream with ever-shrinking geometries and escalating tenderness.

Over the next few years the existing, already-sensitive Schottky and CMOS logic forms will be joined by even more sensitive technologies: silicon-on-sapphire (SOS), Gallium Arsenide (GsAs) and others based on Photolithography and Electron Beam (or E-Beam) Lithography.



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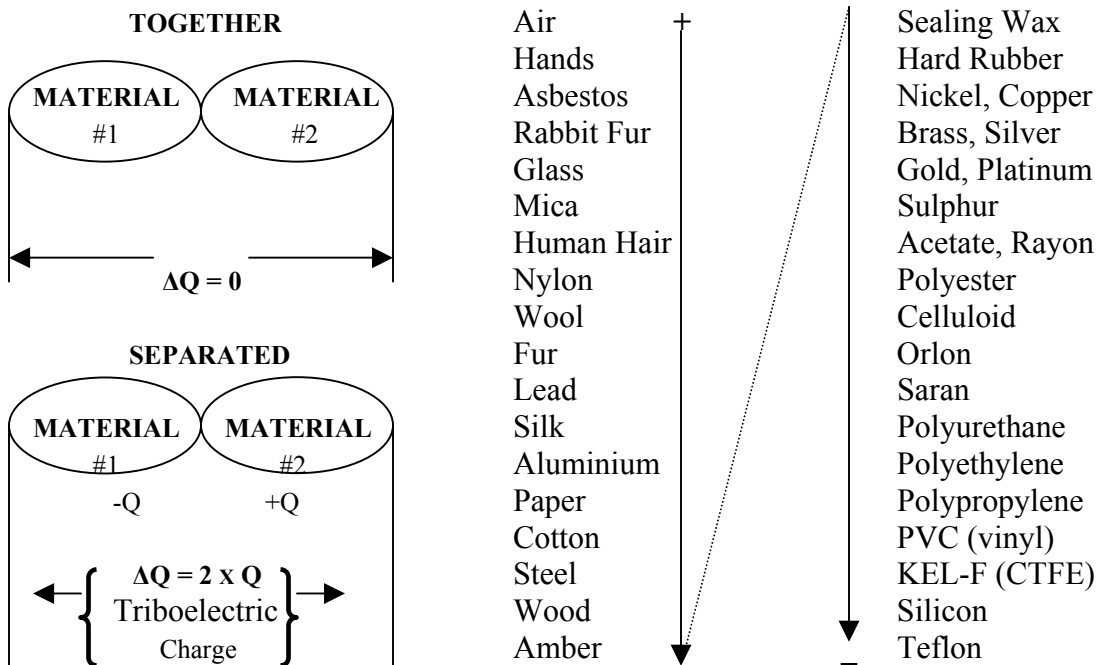
And we're just starting to cope with ESD problems at the Schottky and CMOS level!

Triboelectric – To “Rub Together”

The Greeks names it – *tribein* means to rub; *tribos* is the action of rubbing. Following them, we've come up with *tribophysics* for the physics of friction. While an instrument to measure sliding friction is a *tribometer*.

Triboelectric charging results from bringing tow different materials into intimate contact and then separating them. The result is a (+) charge on the one higher up in what's called the *triboelectric* series and an equal (-) charge on the one below it in the same series.

Here's an up-to-date version of the series:



The mystery of triboelectricity is very possibly just contact potential. Rubbing may simply increase the number of small areas in close contact.

And don't take *any* triboelectric series as gospel. Versions of the series can differ somewhat, since varying surface conditions can make it difficult to get reliable data correlation.

