

BONDLINE



KNOW STATIC

What Is Static Electricity?

All items are made of small atoms. These atoms are made up of even smaller items called protons, neutrons and electrons. The protons are charged positive, the neutrons have no charge and the electrons are charged negative. Under normal conditions there are the same amount of protons and electrons giving atoms no charge.

However, these electrons can move. When separating or rubbing together of materials, electrons can move from atom to atom or from one material to another (triboelectric charging). This can mean that atoms can hold a positive or negative charge, (dependant on movement and direction of electrons). If the material in question is an insulator, this charge can be held and not move. **This is called static electricity.**

The rapid movement or decay of these charges can cause expensive problems, whether it is huge and dangerous charges such as lightening or simply an annoying (and sometimes painful) “electric shock” when touching a filing cabinet or when getting out of a car. (The charges are normally on you!).

These charges can be a huge problem for small sensitive electronic devices. Some devices can be damaged or destroyed by as little as 10 volts. Charges on your body, simply by walking or even sitting at your chair, can be in excess of 5000 volts, (human body model). This can be caused by items of clothing rubbing together or by shoes separating from insulating flooring such as carpets.

Imagine the damage this could cause. This is why it is important that insulators should be avoided and all possible static electricity generators (such as you) should (must) be grounded to eliminate any build up of charges.

“Know” Static

E.S.D.	Electro Static Discharge. An uncontrolled surge of “static” between objects with different voltage potentials.
E.P.A.	Electrostatic Protected Area. A static safe handling area could be a bench, a room or any other designated area and should not have any “static field” greater than 100v maximum!
STATIC	An electrical charge/field that isn’t moving.
ANTISTATIC	Minimal generation or retention of a “static” charge.
CONDUCTIVE	Low resistance. i.e. less than 1 meg-ohm (10^6) – the closer to 1 meg-ohm, the slower the discharge.
STATIC DISSIPATIVE	Increased resistance, which protects better against an E.S.D. i.e. between 1 meg-ohm (10^6) and 1000 meg-ohm (10^9).
INSULATIVE	Does not allow the free flow of electrons, therefore, it will more than likely cause problems e.g. prevent a path to earth, hold a “static” field, etc.
FARADAY CAGE	A conductive barrier against E.S.D. e.g. Metalised Shielding Bag, Conductive Box etc.
TRIBOCHARGE	To generate “static” by the rubbing or separating of surfaces.
POTENTIAL DIFFERENCE	A static voltage difference between two items.

For detailed explanations of the above, please see IEC61340-5.

Handling Unpowered Products

- Q What does “earthing” myself actually do?
A It puts you at the same voltage potential as your E.P.A.
- Q What if I don’t bother with “earthing” myself?
A You may cause an E.S.D. onto a component/PCB.
- Q If I can’t feel it, is it still a problem?
A YES!! We start to hear it from 2000v, feel it from 3000v, and see it from 5000v. Considering that there are components around with thresholds of less than 10v, we are better off being safe rather than sorry.
- Q Is a damaged component obviously scrap?
A If a component has “catastrophic” damage it will show up in test, BUT “latent” damage may not appear as a failure until later; i.e. tomorrow, next week, next month, maybe next year.....nobody knows!!!

**Always follow correct procedures when handling pcb’s and static sensitive devices.....
It’s up to you!!!**

ESD Footwear

ESD shoes, heel & toe straps are effective methods of grounding operators when mobility is an issue, but, only if used in conjunction with flooring that can be bonded to ground. (i.e. matting, tiles, resin, coatings etc.).

When wearing heel or toe straps, there should be a strap on each foot in order to ensure the best possible contact to ground when walking and standing. Whether the “earthing ribbon” fits under your foot or inside your sock doesn’t really matter, as long as the contact is a good and reliable one.

When sitting, wrist straps must also be worn.

Testing is very important because

- a) 0.9 meg-ohm is checking that you don’t have a short circuit to ground, which could be dangerous. It has been calculated that 0.75 meg-ohm will offer protection against 250v a.c. (500v d.c.).

- b) 35 meg-ohm ensures that you are not too resistive to ground.

If you fail a test, don't try and fiddle it, find out what's wrong. For example, Damaged? Dirty? Dry skin? No resistor?

Cheating the test is cheating on your responsibility!!!

Wrist Straps And Cords

A wrist strap is the most effective method of bonding an operator to ground when mobility is not an issue. It discharges the static being generated on the body to ground instantly.

Wrist straps must be worn while sitting, even when E.S.D. Footwear is being used.

Straps should be clean, snug and comfortable. If your strap is loose and/or dirty, you run the risk of having an intermittent contact to ground.

Coil cords should have a 1meg-ohm safety resistor in the snap that attaches to the wrist strap. The strain relief should be intact and the coil tight so that it doesn't hang and catch too easily.

The outer surface of the wrist strap should be insulative for operator safety.

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Always wear your wrist-strap!!!

Bags and packaging – which one and when?

Using the correct packaging and materials not only protects your static sensitive components, but can save money too!

Metalised shielding bags (silver in colour)

If bags, holding static sensitive components, are to be handled outside of an EPA, they should be metalised shielding bags, a faraday cage!

Metalised shielding bags can be an effective faraday cage, subject to the quality of material and physical condition.

Do not crease the bag, as this can breakdown the integrity of the metalised shield!

You should not use any bags damaged with tears and /or punctures, as these can destroy the function of the faraday cage!

Metalised shielding bags can deteriorate with use, monitoring them for effectiveness is very important!

Moisture barrier bags

Moisture barrier bags are designed for the packaging of SMD's protecting them from moisture and static damage. Dry devices are placed inside the moisture barrier bag and the moisture laden is evacuated.

Antistatic bags (pink, clear etc.)

- These are the only acceptable “plastic” bags in an EPA!
- Antistatic bags offer no effective protection against a contact ESD!
- They should only be used for non static sensitive components, e.g. Nuts, bolts, paper.
- Antistatic bags deteriorate with time and wear, monitoring them is very important.

Ordinary plastic bags can generate and hold static charges in excess of 10,000v!

Antistatic bubble wrap

These bubble wraps do not offer effective protection against a contact ESD!

They are an acceptable method of having mechanical protection for packaging of static sensitive devices, again, monitoring their effectiveness is crucial.

High density black conductive foam

Used for inserting legged static sensitive components, because it “shorts out” all of the pins, ensuring no potential difference between any of them.

Black conductive boxes (cardboard, plastic, fibreboard etc.)

A conductive box offers a more substantial faraday cage than most bags because of its increased mass and a lid. Ideally, there should be an air gap between the static sensitive component and the outer side of the box.

Conductive or static dissipative materials (Tote boxes, work-mats, etc.)

Black conductive bags should never lose their conductive properties, although all damaged bags should be thrown away. Beware, no batteries should be stored inside black conductive bags, as their possible discharge may cause damage!

Workstation items

Hand tools

All hand tools used in an EPA should have static-dissipative handles. Normal insulating handles can generate high voltages. (Usually in the centre of the EPA !)

Ionizers

Ionizers generate positive and negative ions which neutralise any static charges on insulating materials which cannot be grounded in the normal way.

Bondline ESD Audits

We can offer on site surveys to meet customers individual requirements. Surveys can be formal offering detailed written reports or informal which could simply be a 'walk round' with one of our technical sales team. (Free ESD health check).

Bondline ESD Training

We also offer a comprehensive training facility.

- On customers premises.
- Tailored to customers requirements.
- Effective through personal involvement.

Suitable for production personnel, engineers, support staff and managers. Training focuses on the causes of static generation, the effects of static discharge and the materials and methods necessary for prevention and product protection.

Course content will reflect the customers facilities and current practice.

Understanding of the phenomenon is enhanced through practical demonstrations and audience participation.

Courses can also be presented on a one to one 'train the trainer' basis.

Designed to meet the requirements of IEC61340-5.

