Facility Safety

Why Your Shop Needs ESD Protection Training, Matting and PPE

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In today's complex manufacturing environments, where metalworking teams might work side by side with electronics component groups, managing electrostatic discharge can be important to ensure worker and equipment safety.

Often metalworking and manufacturing facilities do not focus too extensively on ESD, or "electrostatic discharge," grounding requirements. The emphasis is on lockout/tagout practices to avoid injuries, which makes sense given LOTO ranks No. 4 on the Occupational Safety and Health Administration's ***Top 10 list of violations***.

Typically, there is the belief that *only* plants that build electronics and technology components or those that have stockpiles of explosive chemicals or sawdust residue need worry about static discharge. "In reality, most manufacturing facilities have to keep an eye on ESD," points out a ***myth-busting article by Kimco Distributing***.

Why? The use of more electronics in the equipment used and maintained on the modern shop floor (think robotics and the latest CNC machines), coupled with the growing complexity of what manufacturers produce, can introduce the need to consider ESD protection training. Plus, the possible use of highly flammable chemicals in some metalworking facilities can magnify the need for grounding.

"Although static shocks themselves may not be very painful, they can cause serious injuries and health complications when allowed to escalate," explains an ***Antistat blog post***. "In extreme circumstances, static shocks can even cause fires and severe electrical shocks."

ESD Protection 101: What Is Grounding?

Grounding is essentially any method that keeps processes and materials at the same electrostatic potential.

"Electrostatic charge is most commonly created by the contact and separation of two materials," explains the ESD Association's "***An Introduction to ESD***." For instance, a worker's shoes as they cross the plant floor generate static. And, ESDA notes, "dissimilar materials tend to liberate higher levels of static charge."

Grounding provides paths to reduce such static accumulation or generated charge.

Safety procedures to ensure grounding are called ***ESD*** control programs and follow six steps:

- Plan work processes to reduce ESD risk.
- Define the controls you need in your facility.
- Identify the areas where ESD controls will be needed.
- Reduce ESD generation wherever possible.
- Dissipate and neutralize ESD.
- Protect people and products from ESD.

Matting can do more than just protect from ESD. Find out how in "5 Ways the Right Floor Mats Can Help Reduce Workplace Injuries."

What Are the ESD Requirements?

A useful source of standards information is the ***ESD Association***.

"Determining the product sensitivities within the facility and then mapping this information helps in choosing the right materials to keep each work area under control. Using the ESDA or other related standards will help your ESD control program comply with industry-accepted requirements and procedures that govern the materials, products, systems or processes," notes the white paper "***ESD Control Standards: Setting Up an ESD Control Program***."

Obviously, if your facility produces electronics, the requirements will be more extensive, but understanding the basics will be helpful in most manufacturing environments. The use of ESD controls when needed will keep workers safe but also protect expensive equipment from damage.

Static Electricity Can Build Up Quickly

Here's quick look at some examples of activities common in many workplaces and the static electricity that they generate. It's important to note that humidity level will also affect static buildup; the lower the humidity, the higher the static voltage generated.

Walking across carpeting:

1,500 volts (65% to 90% relative humidity)

35,000 volts (10% to 25% RH)

Walking across vinyl flooring:

250 volts (65% to 90% RH)

12,000 volts (10% to 25% RH)

Sitting at a workbench:

100 volts (65% to 90% RH)

6,000 volts (10% to 25% RH)

Sitting in a chair with urethane foam:

1,500 volts (65% to 90% RH)

18,000 volts (10% to 25% RH)

SOURCE: ***ESD Association***

What Are the Different Types of ESD Flooring and ESD Matting?

At minimum, safety teams need to plan for and think about the use of ESD flooring and grounding mats for tabletops and floors. Here are the options:

- **Tabletop matting** should be used for areas where electrical and circuit board work happens.
- **ESD flooring mats** should be installed in areas where workers have the potential of a static discharge and if ESD is a risk within proximity of chemicals.

There are two types of ESD mats: anti-static and conductive.

Anti-static mats prevent the buildup of static electricity. They are usually two-ply, with a top dissipative rubber layer and a bottom carbon conductive layer. A snap between the two conducts the charge from the top layer, where it has been reduced by spreading it out. The mat is grounded by being plugged into an electrical outlet.

Typically, ***anti-static mats*** are used on tabletops or as runners along a production line.

Conductive mats are infused with carbon to dissipate any charge, and a corner snap allows connection of ***mat grounding cord*** to plug the mat into an outlet.

These mats are always used on the floor and often also are anti-fatigue so workers can stand for long periods at their equipment. ***Conductive matting*** usually will also be beveled to reduce slips, trips and falls. This matting is much more widely used in metalworking shops and manufacturing facilities because of its crossover benefits.

PPE Gear: Anti-Static Footwear, Grounding Wristbands and More

Depending on the environment, a safety team might also want to provide personal protective equipment to ground its workers.

The most common PPE includes ***grounding wristbands*** and anti-static footwear, which can include ***straps*** that go over a worker's shoes or ***boots and shoes*** that dissipate electrostatic charges.

Have you dealt with ESD hazards on the shop floor before? Share your experience.