



Getting Grounded

Higher performance devices renew the need for proper ESD control.

The ability of devices to withstand ESD events is again becoming an issue. While design engineers during the 1980s and '90s made devices less sensitive, the demand for performance and the scaling of devices is causing a reverse in the withstand voltages that cause catastrophic failure. Processes need to be reviewed with sensitivities in mind to ensure that ESD controls are adequate.

Unlike when ESD process control standards were just beginning to be written, today's users can start with basic standard and control issues. For example, the ESD Association standard for ESD process control, *ANSI/ESD S20.20 – 1999*, has the basic principles for ESD control written in its foreword:

- All conductors in the environment, including personnel, must be bonded or electrically connected and attached to a known ground or a contrived ground.
- Assessment of the ESD hazard created by electrostatic charges on the necessary non-conductors in the work place is required to ensure that appropriate actions are implemented, commensurate with risk.
- Transportation of ESD-sensitive items outside an Electrostatic Protected Area requires enclosure in static protective materials, although the type of material depends on the situation and destination. Inside a Protected Area, low charging and static dissipative materials may provide adequate protection. Outside a Protected Area, low charging and static discharge shielding materials are recommended.

The main points of the *ANSI/ESD S20.20* program are to ground or connect all conductors including people, remove all unnecessary insulators, establish a plan for insulators that are required and physically package ESD-sensitive items when not in a protective area.

Accomplishing these tasks means considering certain options: What type of grounding system is available for use? Are the people highly mobile? What level of process-required insulators are considered a threat, and how are they handled? What is the proper packaging? How does staff know what to do? How do I make sure all my control measures are still working?

In North America, some of these questions are readily answered. Grounding is usually accomplished through the third wire or equipment ground. The connection of ESD control items and conductors to equipment ground is controlled by the standards in the

National Electric Code. If there is a need to establish a secondary or auxiliary ground path, ensure that the two grounds are at the same potential and connected to prevent any ground loops or safety exposures.

Once grounding is established, the question of grounding people can be addressed. Two effective ways are the use of a wrist strap (which is required when at a seated operation) or a footwear/flooring system. The latter has the greatest flexibility, but may be expensive to implement should the facility lack the proper floor.

As protected areas are identified, items that will be used in them must be identified. *ANSI/ESD S20.20*, Table 1, lists items that can be considered for inclusion in protected areas. Each should be reviewed to determine if it is needed. For example, does the Protected Area need a work surface? Most do, but there could be exceptions. For example, if the process is simply to take a part from the ESD protective package and install it into an assembly or subassembly, a work surface may not be needed. If parts need to be placed on a surface for inspection, assembly or temporary storage, then the work surface must be ESD-controlled.

If an ESD control item is selected, then there must be a method to verify it is working on a periodic basis. Each ESD control item needs to be verified; the test and frequency of testing is defined by the user. The table in *ANSI/ESD S20.20* suggests which standards information can be used to establish a test method. An example would be to verify wrist straps on a daily basis with a wrist strap test, or quarterly verifying a work surface's resistance to ground.

An established training plan helps ensure the requirements for the process are known. Also, initial and recurrent training ensures proper protocol and procedures. A way to verify understanding must be defined, whether it is a test, observations or any other documented method. ■

Bibliography

1. *ANSI/ESD S20.20-1999 - Protection of Electrical and Electronic Parts, Assemblies, and Equipment (Excluding Electrically Initiated Explosive Devices)*, ESD Association, Rome, NY.
2. *ESD TR20.20-2000 - ESD Handbook*, ESD Association, Rome, NY.

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