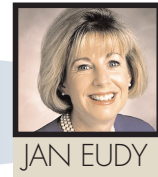


ASK JAN:

We are looking to improve our ESD control in our cleanroom. What are our options?

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The Institute of Environmental Sciences and Technology recently published a revision of IEST-RP-CC0022.2, "Electrostatic Charge in Cleanrooms and Other Controlled Environments." It is an excellent resource to enable you to improve control in your cleanroom. Additional information and ESD standards are available from the ESD Association.

Controlling ESD in the cleanroom should be a multi-faceted approach. Each individual parameter supports the total ESD program. The most common components in a complete ESD control program are: personnel, personnel apparel, shoes and grounding straps, ionizers, temperature and humidity control, flooring, work surfaces, and packaging. It is impossible for any one of the above components to individually control static electricity.

People working in the cleanroom are the major generators of static electricity. Therefore the training of personnel to control movement in the cleanroom in-and-around ESD sensitive devices is imperative.

Static dissipative cleanroom garments and shoes may impart some ESD control in the cleanroom. Grounded static dissipative garments, when worn correctly, are designed to minimize the charges that may or may not be present on an operator's undergarments. However, it is recommended that other measures of ESD control are also used.

Wrist straps are typically used to control static electricity on personnel working in and around ESD sensitive materials. When properly worn and connected to ground, a wrist strap keeps the person wearing near ground potential. Daily testing and/or continuous monitoring of the wrist straps is recommended.

Insulative grounders, casters and wheels prevent static charge and enable control of static electricity on carts. These are used in combination with grounding foot straps and ESD protective flooring to reduce triboelectric charging when movement of carts and personnel is required during the production process.

Air Ionizers are used to neutralize static charge in the cleanroom by charging the molecules of the gases on the air.

Temperature and relative humidity are usually controlled in the cleanroom for operator comfort. The cleanroom temperature should remain at approximately 60°F with a relative humidity of 30-50%. If the relative humidity is less than 30%, the incidence of static discharge is increased. Therefore, it is advised to control relative humidity in the cleanroom as a part of the complete ESD program.

Packaging materials (shielding bags or boxes) provide direct protection of the ESD sensitive device if it is constructed of anti-static materials. The inside of the packaging is usually a layer of conductive material with the outside surface constructed of static dissipative material.

Regular auditing of your cleanroom is the best method for assessing the status and effectiveness of your ESD program.

Where do I find technical information to qualify a garment system for my cleanroom?

I always recommend turning to Institute of Environmental Sciences and Technology (IEST) documentation on a cleanroom subject. The IEST recently published the latest revision of IEST-RP-CC003.3, "Garment Considerations for Cleanrooms and Other Controlled Environments." It outlines all aspects of cleanroom garment systems. According to the IEST, validation of a garment system should cover three main areas:

- Installation Qualification
- Operation Qualification
- Performance Qualification

During the Installation Qualification, the fabric and construction of the garment system are evaluated. Different AATCC and ASTM tests are performed on the fabric to determine weight, pore size, moisture vapor transmission rate, tensile strength, and surface resistivity. The construction of the garment is evaluated for its ability to entrain particles and durability. The body box test evaluates the ability of the garment system to entrain particles while the operator is performing a series of prescribed movements inside a classified cleanroom atmosphere. The seams are inspected for loose threads and flat-felled construction. The components of the garment system are evaluated for durability and cleanroom compatibility. An audit of the fabric manufacturer and the garment manufacturer is also performed.

The durability of the garment system is evaluated during the Operation Qualification. Validation of a reuseable garment system will require an audit of the cleanroom laundry service provider. The ASTM F-51-2000 test results of the cleanroom laundered garment indicates the number of particles greater than 5 microns and number of fibers per square foot of fabric present after processing. The Helmke Tumble Test results indicate the number of cumulative particles greater than 0.3 microns per cubic foot of air per minute present after cleanroom laundering. Additionally, the effects of sterilization must be validated for a sterile garment system. Cleanroom garments may be sterilized by E-Beam (Electron Beam) sterilization, ETO (Ethylene Oxide) sterilization, Gamma sterilization or steam sterilization (autoclaving). The cleanroom garment launderer validates the gamma dose and provides documented evidence of the sterility assurance level. An audit of the contract sterilizer is also performed during this qualification phase.

The durability and reproducibility of the garment system over time is evaluated during the Performance Qualification. The same testing parameters used to evaluate the garment system during the Operation Qualification are performed to establish documented evidence of durability of the garment system.

If you have questions for Jan, please send them to Chief Editor Paul Nesdore at pnesdore@a2c2.com.

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