DESCO

ESD CONTROL PROGRAM CONSIDERATIONS WHEN DEALING WITH CLASS ZERO ITEMS

ANSI/ESD S20.20 Foreword states:

- "This standard covers … electrical or electronic parts, assemblies and equipment susceptible to damage by electrostatic discharges greater than or equal to 100 volts Human Body Model (HBM)."
- "When handling devices susceptible to less than 100 volts HBM, more stringent ESD Control Program Technical Requirements may be required, including adjustment of program Technical Element Recommended Ranges."

HMB Classification Class 0 is
Per ESD-STM5.1 Human Body Model (HBM) Table 1 Class 0 has ESD Voltage Range < 250 Volts

Basically, to control the environment to decrease the probability of ESD damage in "Class Zero" situations, involves increasing ESD protective redundancies and periodic verifications to those ESD Control technical elements.

Improved Grounding

- Personnel: Decrease Wrist Strap and ESD Footwear upper limit permitted (The ESD Association has test data showing charge on a person is less as the path-to-ground resistance is less)
  The use of continuous monitors, smocks, use / increased use of ESD flooring, sole or full coverage foot grounders (HBM & CDM)
- Worksurfaces: Dissipative (CDM) i.e. change < 10^9 to a requirement of 10^6 to 10^8 ohms
- Bonded grounds – Carts, shelves, equipment
- Conductors: Minimizing isolated conductors like devices on PC Boards (CDM)

Minimize Charge Generation

The best form of control is to minimize charge generation. Grounding and ionization eliminate charges once generated. Shielding protects from generated charges.

- Personnel – Low Charging floor finish
- Surfaces – Use of low charging (anti-static) topical treatments

Insulators

- Eliminate as best as possible all non-process necessary insulators
- Topically treat where ever possible insulators that cannot be removed
- Consider use of ESD Chairs or treat to reduce charge generation
- Shield charges on clothing by using ESD Smocks

Ionization

- Can be critical to reduce induction charging caused by process necessary insulators (CDM)
- Can be critical is eliminating charges on isolated conductors like devices on PCB's (CDM)
- Balance and discharge time are critical considerations depending on the actual application (CDM). This can mean ionizers with better off-set balance controls, alarm capabilities, increased (faster) discharge (neutralization) capabilities

Dissipative items (>1.0 X 10^4 and < 1.0 X 10^11 ohms)

- Consideration of optimal range for surfaces (> 1.0 X 10^6 and < 1.0 X 10^9 ohms RTG)
- Gloves / Finger cots: Less conductive than human skin (HBM)
- Surfaces: Minimize conductive surfaces (CDM)

Defining and controlling areas that are considered "ESD Protective"

- Label or otherwise identify ESDS "Class 0" devices as requiring handling only at Class 0" ESD protective workstations
- Minimize insulators (>1.0 X 10^11 ohms)
- Shielding packaging / handling materials for ESDS items when outside of "ESD Protective" area
- ESDS item in intimate contact with dissipative & low charging materials (> 1.0 X 10^6 and < 1.0 X 10^11 ohms). Low charging is a material characteristic that is independent of resistance
- ESD worksurface max resistance of <10^9 ohms RTG may be reduced to <10^8 ohms RTG

Increase Training

- Supervisor & line worker ESD Awareness Training
- Testing to verify the effectiveness of the ESD Training program
- Training on proper verification procedures
- Training on the proper use of equipment used for verification

Development of Verification Plan with possible greater frequency of internal audits

- Use of Computer based operator touch testers for wrist straps and foot grounders
- Increase testing frequency of operator grounding devices from once per day to every time the operator enters the class zero area
- Use on continuous monitors where operators are grounded via wrist straps. Consider computer based monitor data collection system. This should include continuous monitoring of the mat ground. At a large facility, the most frequent reoccurring violation was ESD mat ground cord either becoming disconnected from the mat or grounding point. While these will only test the fact that the mat is grounded, it is still imperative that the RTG of the mat is regularly tested. The use of improper mat cleaners can raise mat surface resistance above the upper recommended level of <10^9 ohms RTG
- Test ionizers more frequently, consider self monitoring ionizers, consider computer based data collection
- Increased use of field meter and nano coulomb testing to verify that automated processes (like auto insertion, tape and reel, etc) are not generating charges above acceptable limits.