



DESCO INDUSTRIES INC

926 JR INDUSTRIAL DRIVE, SANFORD, NC 27332 • PHONE (919) 718-0000 | (909) 627-9634 • StaticControl.com

SCS Facility EOS/ESD Assessment

Date: *****
Company: *****
Contact: *****
Address: *****

Date: *****
Report by: *****
SCS RSM cc: *****
Distributor cc: *****

Facility Static Control Program per ANSI/ESD S20.20-2014

SCS Facility EOS/ESD Assessment Checklist

#	QUESTIONS	Y	N	COMMENTS
1	What is driving the customer's ESD Program?			Need to comply with their ESD standard and to automate testing.
2	Is the customer complying with ANSI/ESD S20.20-2014?	X		
3	Does the customer have a written ESD Control Plan?	X		
4	Does the customer have a QPL (Qualified Parts List) - List of approved ESD protective products	X		
5	Does the customer have a Compliance Verification Plan?	X		
6	Does the customer have an ESD Training Program?		X	
7	What industry is the product produced for? Military, medical, aerospace or any other specific industry?			
8	Does the customer know the most sensitive ESD susceptible item being worked on? If so, specify voltage.	X		<100V CDM
9	How many benches does the customer have on the production floor?			28
10	How many automated tools (i.e. pick and place machine, conveyer, oven, printer, etc.) does the customer have on his SMT line, and how many SMT lines do they have in production?			6
11	Is the customer using single-wire or dual-wire wrist strap technology?			Single wire.
12	How is the customer testing their wrist straps? Does the customer use continuous monitors?			They are not.
13	Is the customer using foot grounders? Are they being worn on both feet?			No and they will not.
14	How is the customer testing their foot grounders?			No and they will not use any.
15	What mat or worksurface does the customer have on their bench? Rubber? Vinyl? Single Layer? Multi Layer? Laminate?			Three layer vinyl.
16	Does the customer have an ESD floor?		X	
17	Is the customer using, pink poly, shielding and/or moisture barrier bags? What contents are being put in the bags?	X		Only using SCS bags.

Additional Notes: Customer requires an automated testing system to minimize testing time.

ANSI/ESD S20.20 EPA ESD Control Items Tested Per ESD TR53

Name of Area 1: Production Floor

Name of Area 2: Tester 1

Name of Area 3: Tester 2

Name of Area 4: IQC

ESD Control Item	Required Limits	SCS Device Used	Area 1	Area 2	Area 3	Area 4
Humidity		770760				
Temperature		770760				
Worksurface	RTG: < 1 x 10 ⁹ ohms	770760	10 ⁹ ohms	10 ⁹ ohms	10 ¹¹ ohms	10 ¹¹ ohms
Floor Mats	RTG: < 1 x 10 ⁶ ohms	770760	NA	NA	NA	NA
ESD Flooring	RTG: < 1 x 10 ⁹ ohms	770760	NA	NA	NA	NA
Shelving	RTG: < 1 x 10 ⁹ ohms	770760	10 ⁹ ohms	10 ⁹ ohms	10 ⁹ ohms	10 ⁹ ohms
Carts-Mobile Equipment	RTG: < 1 x 10 ⁹ ohms	770760	10 ¹² ohms	10 ¹² ohms	10 ¹² ohms	10 ¹² ohms
Groundable Static Control Garments	RTT: < 1 x 10 ⁹ ohms	770760	10 ⁸ ohms			
Process Essential Insulator	< 125 volt static field	718	>450	>230	>300	<100

Other items to test: Trays, Pink Poly Bags, Packaging, Tool Fixtures, Material Handling Containers

Additional Notes: No ionizers in use. Single wire cords used in Class 0 production floor. No real ESD protection at all.

SCS EOS/ESD Assessment Findings

The results of the assessment can be broken down into three categories:

1. **Observations** – for organizational consideration only.
2. **Minor Non-Conformances** – observations that do not represent a breakdown of the EOS/ESD control program and can be easily taken care of right away.
3. **Major Non-Conformances** – observations that do represent a breakdown of the EOS/ESD control program and cannot easily be taken care of right away (ESD instrumentation, monitoring, or further preventive measurement must be purchased).

Note – The below recommendations are based on the ANSI/ESD S20.20-14 standard. A copy of the document and be retrieved here. [Click Here](#)

#	Area	Findings	Type of Findings	Recommendations
1	Production floor	Mats measure irregularly and are dried out due to alcohol cleaning.	Major	Add SMP 77061 constant monitor and new R7 mats on each bench.
2	Production floor	No ionizer in use.	Major	Add ionization in each station.
3	Production floor	The floor is not an ESD floor and is not grounded. The carts are not grounded either.	Major	Purchase ESD containers for transporting products form bench to bench or add ESD flooring and ground carts.
4	Tester 1	Grounded and tested properly.	None	
5	Tester 2	Wrist strap ground point is open and requires grounding.	Major	Add new ESD grounding point and connect primary ground surface to the same grounding point.
6	IQC	Mats measure irregularly and are dried out due to alcohol cleaning.	Major	Add SMP 77061 constant monitor and new R7 mats on each bench.
7	IQC	No ionizer in use.	Major	Add ionization in each station.
8	IQC	The floor is not an ESD floor and is not grounded. The carts are not grounded either.	Major	Purchase ESD containers for transporting products form bench to bench or add ESD flooring and ground carts.

RECOMMENDATIONS

Grounding

Wrist Straps, Footwear, and Groundable Static Control Garment Systems) tested while worn with results logged.

- Operator grounding is the foundation of any ESD Control Program. Therefore, if not using continuous monitors, the daily testing that the grounding device is both operating and worn correctly is paramount.

Wrist Straps –

Wrist Straps worn and grounded when seated, with the resistance of operator-to- ground Required Limit measured at $< 3.5 \times 10^7$ ohms. This is also the upper limit if ESD Garment is used as part of personnel path to ground.

- Seated operators must wear wrist straps. Often, un-grounded people are the biggest cause of ESD damage. Wrist straps are the first line of defense in ESD control. All operators that handle unpackaged ESD susceptible items must be grounded.
- If not using a wrist strap continuous (or constant) monitor, the Compliancance Verification plan should specify how records shall be established and maintained to provide evidence of conformity to the technical requirements. Consider a wrist strap tester with electronic data acquisition.

Foot Grounders –

ESD Footwear should be worn on each foot for mobile personnel. Footwear and Foot Grounder resistance $< 1 \times 10^9$ ohms.

- For proper foot grounder function, operators must wear two foot grounders – one on each foot.
- When both feet are in contact with the ESD floor the resistance is in parallel, if both foot grounders having a 1 megohm resistor the total resistance is not 1 megohm but half that amount or 0.5 megohms. Consider the use of foot grounders with a 2 megohm resistor so that when both feet are on the floor, the operator resistance to the floor mat will always be at least 1 megohm.
- ESD damage is a probability and all ESD Controls are designed to reduce that probability. When using only one foot grounder, the probability of the operator being ungrounded is very high. Charge generation and body capacitance changes can result in significant (1,000's of volts) body charges in microseconds.
- Personnel may be grounded through the use of a footwear/flooring system
- This method is useful when personnel are performing standing/mobile applications, and where using a wrist strap is not possible.
- The path to ground is maintained by the use of conductive or dissipative foot grounders and floors/mats.
- For personnel grounding via a Footwear / Flooring System Test Resistance Measurement in Combination with a Person $< 1 \times 10^9$ ohms (Ref: ANSI/ESD STM 97.1) and < 100 Peak Body Volts (Ref: ANSI/ESD STM 97.2).
- Visitors should be required to use disposable foot grounders.
- Foot grounders should be UL Listed.

Smocks –

A good quality static control garment can be used as part of the “Operator Grounding System”. Consider groundable static control garment with ground snap at the hip and conductive cuffs to allow operators to be grounded “hands free” and save the cost of the wristband.

Single-Wire Smocks

- Implement use of Groundable Static Control Garment System that meets ANSI/ESD S20.20
- (Rtg < 3.5 X 10⁷ ohms) Requirement Tested Per ANSI/ESD STM2.1 and ESD TR53.
- Allows operators and smock to be bonded or electrically connected to remove electrostatic charges to ground to limit ESD events in ESD Protected Areas.

Dual-Wire Smocks

- Implement use of Groundable Static Control Garment System that meets ANSI/ESD S20.20
- (Rtg < 3.5 X 10⁷ ohms) Requirement Tested Per ANSI/ESD STM2.1 and ESD TR53.
- Allows operators and smock to be bonded or electrically connected to remove electrostatic charges to ground to limit ESD events in ESD Protected Areas. Compatible with Dual-Wire Continuous Monitors

Shelving

- ESD Shelving surfaces should measure in the 1 x 10⁶ to < 1 x 10⁹ ohm range Rtg and the same for Rtt for storage of unpackaged ESD sensitive items.

Mobile Equipment / Carts

- ESD cart shelves should measure in the 1 x 10⁶ to < 1 x 10⁹ ohm range Rtg and the same for Rtt for use with unpackaged ESD sensitive items.
- Replace drag chains with a more reliable system
 - Ground cord to 3rd-wire electrical ground or common point ground when stationary
 - Conductive casters

Continuous Monitors -

Because wrist straps have a finite life, it is important to develop a test frequency that will guarantee integrity of the system. Typical test programs recommend that wrist straps that are used daily should be tested daily. However, if the products that are being produced are of such value that knowledge of a continuous, reliable ground is needed, and then continuous monitoring should be considered or even required.

- Daily wrist strap testing may be omitted if continuous (or constant) monitoring is used.
- If monitoring the worksurface it must have a multi layer mat with a conductive layer.

Worksurface Mats -

- Convert to worksurface mats that meet the required limit of ANSI/ESD S20.20 < 1 x 10⁹ ohms with a lower limit meeting the recommendation of Worksurface standard ANSI/ESD S4.1 of 1 x 10⁶ ohms.
- Worksurface matting should cover the entire top worksurface bench area, so ESDS will not be placed off the ESD worksurface.
- Each worksurface mat should be attached individually with its own ground cord connected to the Common Point Ground of the ESD workstation. No daisy-chaining of mats should be allowed.

Flooring -

- Consider adding conductive floor mats in critical areas
- Install ESD flooring that meets the ANSI/ESD S20.20 required limit of $< 1 \times 10^9$ ohms.
- Install ESD conductive flooring that meets ANSI/ESD S20.20 required limit but is $< 1 \times 10^6$ ohms.
- As dirt is typically insulative, increase floor maintenance schedule so ESD flooring will reliably measure within specification.
- For personnel grounding via a Footwear / Flooring System Test Resistance Measurement in Combination with a Person $< 1 \times 10^9$ ohms (Ref: ANSI/ESD STM 97.1) and < 100 Peak Body Volts (Ref: ANSI/ESD STM 97.2).

Insulators -

Non-Process Essential Insulators

- For items that can charge $> \pm 125$ volts or are insulators 1×10^{11} ohms or greater, one of the following recommendations should be used:
- Remove the item from the EPA
- Permanently secure in place keeping insulators that can charge ± 125 volts or greater a minimum of 1" from ESD susceptible items at all times (12" from ESDS if can charge $\pm 2,000$ volts or greater)

Process Essential Insulators

- Where necessary, process essential non-conductors (insulators), are used in the ESD protected (i.e., circuit board materials, some device packages, and test fixtures) for items that can charge $> \pm 125$ volts or are insulators 1×10^{11} ohms or greater, one of the following recommendations should be used:
- Replace insulators with an ESD protective version
- Use ionizers to neutralize the charge on the item
- Permanently secure in place keeping insulators that can charge ± 125 volts or greater a minimum of 1" from ESD susceptible items at all times (12" from ESDS if can charge $\pm 2,000$ volts or greater)

ESD Packaging -

- Implement use of ESD protective packaging to store, transport, and protect ESDS electronic items during all phases of production and shipment.
- ESD Shielding Packaging selected should meet the requirements of ANSI/ESD S20.20 and ANSI/ESD S541.

Ionization -

- Obtain an ionizer that meets the required limits of ANSI/ESD S20.20 tested per ANSI/ESD STM3.1 and ESD TR53.
 - A complete static control program must deal with insulating materials that can create a static charge in an ESDA. Ionizers are introduced when it is not possible to ground process necessary insulators and is used in tandem with other static control measures.

ESD Protected Area (EPA) -

- Add signs indicating the existence of the EPA and place so are clearly visible to personnel prior to entry into the EPA alerting personnel and visitors that they are entering a limited access area where ESD protective precautions are required.
- Entrance into the EPA should be controlled; it is best to have guests and visitors escorted by an ESD trained employee.
- To clearly identify the boundaries of the EPA, aisle tape should be considered.

Test Equipment -

- Obtain Test Equipment capable of measuring AC impedance which is the requirement to equipment ground per ANSI/ESD S20.20. Use to verify low leakage (peak and average voltage) from electrical system ground and neutral.

- Also obtain meter to measure EMI field strength, and to verify meeting IPC-A-610 peak voltage at solder iron tip or automated equipment contacting points.
- Obtain a surface resistance megohmmeter to perform ANSI/ESD S20.20 required compliance verification testing of ESD control products.
- Obtain a Wrist Strap and Footwear Tester to verify the functionality of personnel grounding devices (wrist straps, foot grounders, ESD shoes, smocks).
- Obtain a Charged Plate Analyser or a battery operated ionizer tester to measure the offset voltage balance and the discharge times of ionizers.
- Obtain a static field meter to check if items in the ESD protected area are capable of charging above ± 125 volts. If so, remove them from the EPA or mechanically secure all such items in place to prevent them coming within one inch of ESD sensitive items.

ESD Training -

Document an ESD Training Plan for all personnel who handle ESD sensitive (ESDS) items.

Personnel ESD Training should include initial and recurrent ESD awareness and prevention training that is to be provided to all personnel who handle or otherwise come into contact with any ESDS items. The option that is selected is to include an objective evaluation technique to ensure trainee comprehension and training adequacy.

Suppliers should be trained on ESD control, and/or contractually required to train their personnel.

Report submitted by

On behalf of

SCS

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