

ESD Open Forum
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Testing Installed ESD Protective Products

Q: Are there guidelines for conducting periodic checks on ESD protective products installed in a factory environment?

A: Yes. The ESD Association recently published a technical report ESD TR53-01-06 Compliance Verification of ESD Protective Equipment and Materials.

BACKGROUND

ANSI/ESD S20.20 requires Compliance Verification

S20.20 provides administrative, technical requirements and guidance for establishing, implementing, and maintaining an ESD Control Program to protect electrical or electronic parts, assemblies and equipment susceptible to ESD damage from Human Body Model (HBM) discharges greater than or equal to 100 volts.¹ S20.20 states “A Compliance Verification Plan shall be established to ensure the organization’s compliance with the requirements of the Plan.” It also states that “Verifications should include routine checks of the Technical Requirements in the Plan.”²

Technical Report TR53-01-06

This technical report describes the test methods and instrumentation that can be used to periodically verify the performance of ESD protective equipment and materials. After ESD protective equipment and materials are installed and in their actual use locations, these compliance verification test methods are recommended to provide a baseline for comparison with future compliance verification tests. The objective of these test methods is to identify if significant performance changes in ESD equipment and materials have occurred over time.

What Is In TR-53?

Purpose

The purpose of this technical report is to provide periodic verification test methods and trouble-shooting guidance for ESD protective equipment and materials to assist the user when complying with the Compliance Verification Plan Requirements of ANSI/ESD S20.20.

¹ <http://www.esda.org/standardlistings.html>

² *ANSI/ESD S20.20 section 6.1.3. Compliance Verification Plan*

“A Compliance Verification Plan shall be established to ensure the organization’s compliance with the requirements of the Plan.”

“Verifications should include routine checks of the Technical Requirements in the Plan.

The frequency of verification checks should be based on the control item usage, its durability and associated risk of failure.”

Scope

Grounding/Bonding Systems
Worksurfaces
Wrist Straps
Constant Monitors
Footwear
Flooring
Personnel Grounding with Garment
Garments
Air Ionizers
Seating
Mobile Equipment (Carts)
Packaging

Presented below is the Seating section of TR53, to illustrate the approach and level of detail provided throughout the document.

Seating

Compliance Verification

This periodic test procedure is in part, based on the following publication(s):

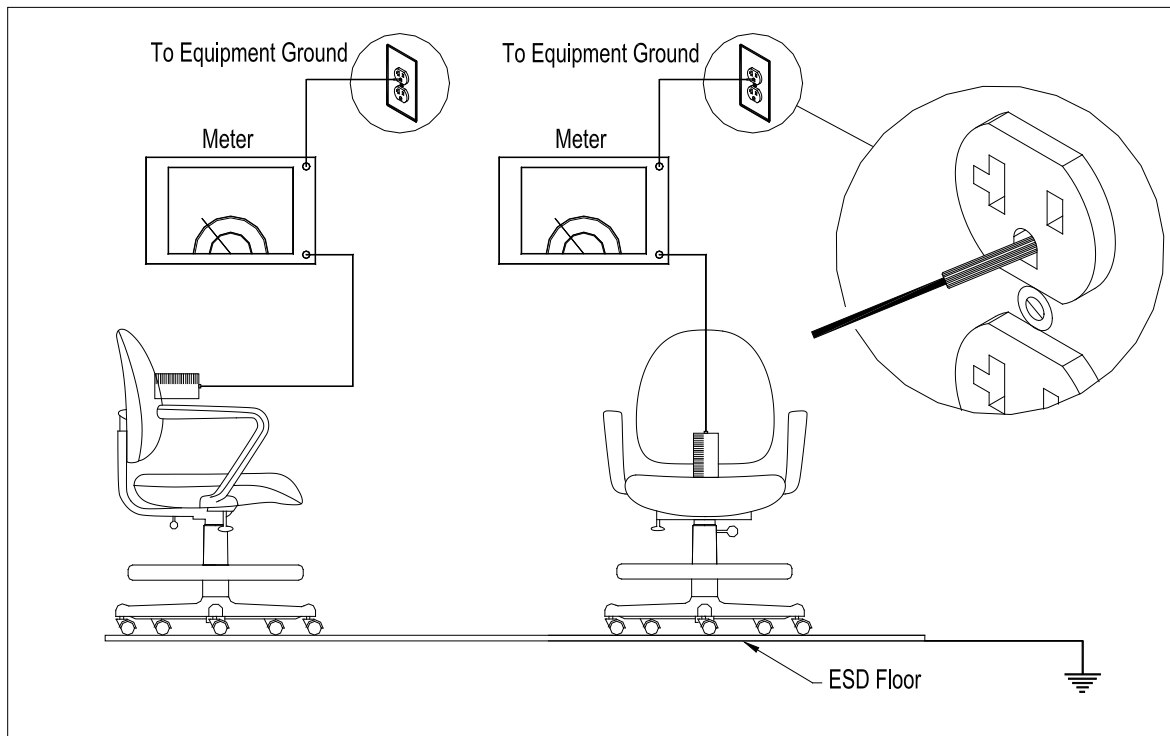
- ANSI/ESD STM12.1, Seating – Resistive Measurement

Objective:

The objective of this periodic test procedure is to verify that the resistance of the ESD chair grounding system (chair through grounded ESD floor) is within the minimum and maximum resistance allowed by the user's specification.

Test Equipment:

- Reference the Test Equipment section in the beginning of TR53-01-06.
- An integrated checker or meter, whether it is a single meter or a collection of instruments that are capable of measuring at least 1.0×10^{10} ohms with a test voltage of 10 and 100 volts ($\pm 10\%$) DC open circuit.
- One electrode
- Two test leads of sufficient length



ESD Chair Test

Test Procedure

- Place the ESD protective chair on an installed ESD floor. Do not clean the ESD floor immediately prior to verification.
- Connect one end of the first test lead to the electrode and connect the other end of the first test lead to the integrated checker or meter.
- Connect one end of the second test lead also to the integrated checker or meter and connect the other end of the second test lead to ground reference.
- Place / hold the electrode on the following areas of the chair (center the electrode on any worn areas) and apply 10 volts:
 - Center of the seat panel
 - Center of the seat back
 - Foot ring (if so equipped)
- Wait for the integrated checker or meter to stabilize.
- If the indicated resistance is less than 1.0×10^6 ohms, continue testing.
- If the indicated resistance is equal to or greater than 1.0×10^6 ohms, switch the integrated checker or meter to 100 volts and retest the ESD chair.
- Tests should include those areas on the ESD chair that are subject to wear or are visibly dirty.

Troubleshooting

- Verify the test equipment is operating properly, check/service the battery (if battery operated), following the manufacturer's operating instructions for proper operation.
- Examine the electrode for dirt buildup. Remove surface contamination by following the manufacturer's recommendations. If using liquids to clean electrode, allow the electrode to dry before retesting.
- Clean the wheels/casters with approved cleaner. Allow the wheels/casters to dry before retesting.
- Verify the resistance of the ESD floor surface to reference ground. If the ESD flooring surface resistance is high, clean the floor with an approved cleaner. Allow the floor to dry before retesting. If the floor passes after cleaning, retest the chair. If the floor fails, go to Troubleshooting in the Flooring section.
- Verify that the resistances of the chair's components have an appropriate resistance using two electrodes (point-to-point resistance testing). This testing will help isolate a defective component (or connection between the chair's components).
- Clean/vacuum the cloth seat, or clean the vinyl seat with an approved cleaner (allow the vinyl to dry) and retest.
- When holding the electrode, ensure you are not a path of lesser resistance to ground. The electrode should be insulated from the operator by a resistance greater than 1.0×10^{10} ohms when measured at 100 volts. This may be accomplished by using either an insulative sleeve over the electrode or body, or by the operator using an insulative glove or similar material.

Summary

Compliance Verification is no small task. With 10 EOS/ESD Standards, 9 Standard Test Methods, and 3 Advisories where do you start? The TR-53 is an excellent starting point and has been created to bring into focus what must be done to insure initial and ongoing compliance to ESD control measures within the factory.

How to Purchase TR-53-01-06

Technical Report ESD TR53-01-06 can be purchased through the ESD Association at www.esda.org.

References

- ESD Association Technical Report TR53-01-06 Compliance Verification of ESD Protective Equipment and Materials, ESD Association, Rome, NY
- ANSI/ESD S20.20-2007, ESD Association Standard for the Development of an Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies, and Equipment (excluding Electrically Initiated Explosive Devices), ESD Association, Rome, NY

About the Authors

This article was prepared on behalf of ESD Association Standards Committee Working Group 53. The members include Chair Cheryl Checketts, General Dynamics; Timothy Jarrett, Boston Scientific; Eugene Chase, Electro-Tech Systems; Melissa Feeney-Jolliff, Aerospace Corp.; Gene Felder, Desco Industries; Bill Ricker, Ricker Engineering Services; Jeff Salisbury, Seagate Technology; Sarah Smith, Walker Forge; and Fred Tenzer, Desco Industries.

About the ESD Association

Founded in 1982, the ESD Association is a not for profit, professional organization dedicated to furthering the technology and understanding of electrostatic discharge. The Association sponsors educational programs, develops ESD standards, holds an annual technical symposium, and fosters the exchange of technical information among its members and others. Additional information may be obtained by contacting the ESD Association, 7900 Turin Rd., Bldg. 3, Rome, NY 13440-2069 USA. Phone: 315-339-6937. Fax: 315-339-6793. Email: info@esda.org. Website: <http://www.esda.org>.