ESD Association Standard Test Method

ANSI/ESD STM7.1-2020

ANSI/ESD STM7.1-2020

Revision of ANSI/ESD STM7.1-2013

For the Protection of Electrostatic Discharge Susceptible Items

Flooring Systems Resistive Characterization

Electrostatic Discharge Association
7900 Turin Road, Bldg. 3
Rome, NY 13440

An American National Standard
Approved XXXXXXXX

ESD Association Standard Test Method for the Protection of Electrostatic Discharge Susceptible Items

Flooring Systems
Resistive Characterization

Approved September 1, 2020
EOS/ESD Association, Inc.

CAUTION NOTICE

Electrostatic Discharge Association (ESDA) standards and publications are designed to serve the public interest by eliminating misunderstandings between manufacturers and purchasers, facilitating the interchangeability and improvement of products, and assisting the purchaser in selecting and obtaining the proper product for his particular needs. The existence of such standards and publications shall not in any respect preclude any member or non-member of the Association from manufacturing or selling products not conforming to such standards and publications. Nor shall the fact that a standard or publication that is published by the Association preclude its voluntary use by non-members of the Association, whether the document is to be used either domestically or internationally. Recommended standards and publications are adopted by the ESDA in accordance with the ANSI Patent policy.

Interpretation of ESDA Standards: The interpretation of standards in-so-far as it may relate to a specific product or manufacturer is a proper matter for the individual company concerned and cannot be undertaken by any person acting for the ESDA. The ESDA Standards Chairman may make comments limited to an explanation or clarification of the technical language or provisions in a standard, but not related to its application to specific products and manufacturers. No other person is authorized to comment on behalf of the ESDA on any ESDA Standard.

DISCLAIMER OF WARRANTIES

THE CONTENTS OF ESDA'S STANDARDS AND PUBLICATIONS ARE PROVIDED "AS-IS," AND ESDA MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESSED OR IMPLIED, OF ANY KIND, WITH RESPECT TO SUCH CONTENTS. ESDA DISCLAIMS ALL REPRESENTATIONS AND WARRANTIES, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR USE, TITLE, AND NON-INFRINGEMENT.

DISCLAIMER OF GUARANTY

ESDA STANDARDS AND PUBLICATIONS ARE CONSIDERED TECHNICALLY SOUND AT THE TIME THEY ARE APPROVED FOR PUBLICATION. THEY ARE NOT A SUBSTITUTE FOR A PRODUCT SELLERS' OR USERS' OWN JUDGEMENT WITH RESPECT TO ANY PARTICULAR PRODUCT DISCUSSED, AND ESDA DOES NOT UNDERTAKE TO GUARANTEE THE PERFORMANCE OF ANY INDIVIDUAL MANUFACTURERS' PRODUCTS BY VIRTUE OF SUCH STANDARDS OR PUBLICATIONS. THUS, ESDA EXPRESSLY DISCLAIMS ANY RESPONSIBILITY FOR DAMAGES ARISING FROM THE USE, APPLICATION, OR RELIANCE BY OTHERS ON THE INFORMATION CONTAINED IN THESE STANDARDS OR PUBLICATIONS.

LIMITATION ON ESDA's LIABILITY

NEITHER ESDA, NOR ITS PRESENT OR FORMER MEMBERS, OFFICERS, EMPLOYEES OR OTHER REPRESENTATIVES WILL BE LIABLE FOR DAMAGES ARISING OUT OF, OR IN CONNECTION WITH, THE USE OR MISUSE OF ESDA STANDARDS OR PUBLICATIONS, EVEN IF ADVISED OF THE POSSIBILITY THEREOF. THIS IS A COMPREHENSIVE LIMITATION OF LIABILITY THAT APPLIES TO ALL DAMAGES OF ANY KIND, INCLUDING, WITHOUT LIMITATION, LOSS OF DATA, INCOME OR PROFIT, LOSS OF OR DAMAGE TO PROPERTY, AND CLAIMS OF THIRD PARTIES.

Published by:

Electrostatic Discharge Association
7900 Turin Road, Bldg. 3
Rome, NY 13440

Printed in the United States of America

ISBN: 1-58537-322-2

(This foreword is not part of ESD Association Standard Test Method ANSI/ESD STM7.1-2020)

FOREWORD

This standard test method[1] is intended to provide test methods for evaluating flooring systems used to control electrostatic charge. This standard test method covers flooring systems, including floor mats, floor coverings, coatings, paints, raised access panels, and floor finishes.

This standard test method is limited to defining procedures for measuring electrical resistance. Electrical resistance is one property that can be used to evaluate the electrostatic performance of flooring systems. However, resistance does not fully characterize these systems. An additional property to be considered in the selection and use of flooring systems includes triboelectric charge generation combined with personnel and mobile equipment. See ANSI/ESD STM97.2 for the test method for voltage generation in combination with a person.

A common source of electrostatic charge in a work environment is the separation of a foot from the floor or rolling a caster or wheel across the floor, resulting in the generation of electrostatic charge that can accumulate on personnel and equipment. This generation's effect and accumulation of electrostatic charge can be minimized with appropriate selection or treatment of the flooring system.

To effectively control electrostatic charge, flooring systems should be used in conjunction with ESD controlled footwear, foot grounders, seating (chairs), shelving, and mobile equipment (carts/trolleys), as appropriate.

In this latest revision, the test method's scope was changed to a flooring system test rather than floor materials. This highlights that the test is applied to a system of materials combined to make the flooring system and that those materials' interactions can affect the overall resistance measured.

There was also a minor change in the definition of conductive versus dissipative systems so that conductive systems have a measured resistance of $< 1.0 \times 10^6$ ohms. In prior versions, measurements of $\leq 1.0 \times 10^6$ ohms were characterized as conductive.

Finally, an Annex was added to provide some historical context of the characterization of flooring systems as either conductive or dissipative, along with the potential pitfalls of using these definitions. This is a particular concern in the case of materials with a resistance of $\geq 1.0 \times 10^6$ ohms when measured with a test voltage of 10 volts but a resistance of $< 1.0 \times 10^6$ ohms when measured with a test voltage of 100 volts.

This standard test method was originally designated ESD S7.1-1994 and was approved on February 27, 1994. ANSI/ESD STM7.1-2001 was a reaffirmation, re-designation of ESD S7.1-1994 and was approved on May 20, 2001. ANSI/ESD S7.1-2005 was a revision, re-designation of ANSI/ESD STM7.1-2001 and was approved on February 15, 2005. ANSI/ESD STM7.1-2013 was a revision and re-designation of ANSI/ESD S7.1-2005 and was approved on July 15, 2013. ANSI/ESD STM7.1-2020 is a revision of ANSI/ESD STM7.1-2013 and was approved on September 1, 2020.

[1] **ESD Association Standard Test Method (STM):** A definitive procedure for the identification, measurement, and evaluation of one or more qualities, characteristics, or properties of a material, product, system, or process that yields **reproducible test** results.

At the time ANSI/ESD STM7.1-2020 was prepared, the 7.0 Flooring Subcommittee had the following members:

	Thomas Ricciardelli SelecTech/StaticStop	
John Anderson Machines II	Nate Ashworth Julie Industries, Inc. StaticSmart Flooring	Donn Bellmore ESD Services +
Eric Borrero ARES Technical Services	Mary Kay Botkins ACL Staticide, Inc.	Kevin Duncan, TAS Rep Seagate Technology
David Girard Staticon Support Services	Shane Heinle Digi-Key Corporation	Charles McClain Micron Technologies, Inc.
Julian Montoya Intel Corporation	Andrew Nold Teradyne, Inc.	Dale Parkin Seagate Technology
Rachel Rienstra Lockheed Martin Space Systems Company	Robert Vermillion RMV Technology Group, LLC	Craig Zander Transforming Technologies

The following individuals contributed to the development of ANSI/ESD STM7.1-2013, ANSI/ESD S7.1-2005, and ESD S7.1-1994:

Brent Beamer 3M	Mike Brandt Marketing Resources, Ltd.	Larry Burich Lockheed Martin
Rejean Dion Bystat International	Bill Foster Harris Specialties	Stephen Fowler Fowler Associates
Dale Gross Flexco Corporation	Bruno Guidotti Forbo Flooring	Tom Hume Feudenberg Building Systems
Laszlo Kende Forbo	Bill Klein K&S Laboratories	Andreas Mueller Freudenberg Building Systems
Dale Parkin IBM, Rochester	Paul Petersen 3M Canada	Martin Rudat DuPont Flooring
Jose Sancho NASA/GSFC/Honeywell TSI	Dale Tucker Floorfolio Industries	Bob Vermillion RMV Technology Group, LLC
Merle Weight, TAS Rep. UNISYS		Karen Yi Lockheed Martin

TABLE OF CONTENTS

FIGURES

ANNEXES

ESD Association Standard Test Method for the Protection of Electrostatic Discharge Susceptible Items - Flooring Systems - Resistive Characterization

1.0 PURPOSE, SCOPE, AND APPLICATION

1.1 Purpose

This document is intended to be used for the resistive characterization of flooring systems used for controlling electrostatic charge. It also provides test methods for the qualification of flooring systems before installation or application and test methods for acceptance of flooring systems after installation or application.

1.2 Scope

This document is intended for testing flooring systems used for grounding personnel and equipment in areas engaged in working with ESD sensitive items. The resistances measured here are from the flooring system's top surface to its groundable point (or the ground reference) and from top surface to top surface locations. This document provides a method for measuring the resistance of flooring systems with resistance greater than 1.0×10^4 ohms and less than 1.0×10^9 ohms.

Use of this document or the procedures defined herein does not apply to facilities where ordnance, flammables, or explosives are stored or handled. For these concerns, refer to ASTM F150.

1.3 Application

Resistance to groundable point measurements on product qualification samples may differ from resistance to ground measurements performed on installed areas, especially when evaluating materials such as floor finishes. Product qualification is typically done in a laboratory, and product acceptance is done on the flooring system after it is installed. This test method provides procedures for both situations.

This standard test method relies on resistance measurements utilizing standard instruments to evaluate flooring systems.

2.0 REFERENCED PUBLICATIONS

Unless otherwise specified, the following documents of the latest issue, revision, or amendment form a part of this standard test method to the extent specified herein:

ESD ADV1.0, Glossary[2]

ANSI/ESD S6.1, Grounding[2]

ANSI/ESD STM11.11, Surface Resistance Measurement of Static Dissipative Planar Materials[2]

ASTM D257, Standard Test Methods for DC Resistance or Conductance of Insulating Materials[3]

ANSI/IICRC S100, Standard for Professional Cleaning of Textile Floor Coverings[4]

AATCC 171, Test Method for Carpets: Cleaning of; Hot Water Extraction[5]

AATCC 138, Cleaning: Washing of Textile Flooring Coverings[5]

[2] EOS/ESD Association, Inc. 7900 Turin Road, Bldg 3, Rome, NY 13440, USA, 315-339-6937, www.esda.org

[3] American Society for Testing and Materials (ASTM), 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA 19428-2959, USA, 877-909-2786, www.astm.org

[4] Institute of Inspection, Cleaning and Restoration Certification (IICRC), 4043 South Eastern Ave., Las Vegas, NV 89119

[5] AATCC, P.O. Box 12215, Research Triangle Park, N.C. 27709-2215, 919-549-8141