

ANSI/ESD STM4.1-2017

A revision and redesignation of ESD S4.1-2006

ANSI/ESD STM4.1-2017

ESD Association Standard Test Method

***For the Protection of Electrostatic
Discharge Susceptible Items***

***Worksurfaces –
Resistance Measurements***

***(Including Shelving and Mobile
Equipment)***

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

*An American National Standard
Approved February 27, 2018*



This is a preview of "ANSI/ESD STM4.1-2017". [Click here to purchase the full version from the ANSI store.](#)

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

*Worksurfaces –
Resistance Measurements
(Including Shelving and Mobile Equipment)*

Approved September 7, 2017
EOS/ESD Association, Inc.



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Published by:

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

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Printed in the United States of America

ISBN: 1-58537-297-8

(This foreword is not part of ESD Association Standard Test Method ANSI/ESD STM4.1-2017)

FOREWORD

The purpose of an ESD protective worksurface is to aid in the prevention of damage to ESD-susceptible items. There are several ways these surfaces may act to provide this protection and they are often confused in practice. One involves the removal of charge residing on the surface of a conductive/dissipative material. A second charge-removal task involves the charge on an object such as a conductive or dissipative tote box that is placed on the surface. In this case, the charge must flow across the zone between the object and the worksurface, which can interpose a considerable contact resistance. A third charge removal task involves current flow from a charged, susceptible item placed on the surface. In this case, a low discharge current is desirable.

The degree of protection afforded by a worksurface is strongly related to the time needed to discharge an object. In practice, some form of resistance value is commonly given as an indication of the effectiveness of the worksurface. Strictly speaking, this description is incomplete since discharge time depends on several other factors such as the effective capacitance of the worksurface, contact resistance and the actual discharge path.

However, the capacitance does not usually vary as much as resistance. The other effects are very dependent on the individual situation. As a result, resistance seems the best single predictor of performance of ESD-protective worksurfaces. This standard test method relies on resistance measurements, utilizing standard instruments, to provide a means of evaluation of worksurface materials. Conversely, resistivity is an intrinsic material property and is not within the scope or purpose of the standard test method.

This standard test method¹ sets forth resistance test methods that can be used to qualify worksurfaces and to obtain relative estimates of their ability to remove electrical charge from non-insulative objects placed on the surface.

A worksurface, which is conductive enough to discharge an object, may also pose a safety hazard. The work performed on the worksurface often entails the use of tools and test instruments, which operate at voltages high enough to cause electrical shock. The presence of a worksurface tested using the methods described in this document will not guarantee personnel safety.

This document was originally designated ANSI/ESD S4.1-1997 and approved on September 20, 1997. ANSI/ESD S4.1-2006 was a reaffirmation of ANSI/ESD S4.1-1997 and approved on February 26, 2006. ANSI/ESD S4.1-2006 was redesignated ESD S4.1-2006 upon administrative withdrawal from the American National Standards Institute on July 14, 2016. ANSI/ESD STM4.1-2017 is a revision and redesignation of ESD S4.1-2006 and was approved on September 7, 2017.

¹ESD Association Standard Test Method (STM): A precise statement of a set of requirements to be satisfied by a material, product, system or process that also specifies the procedures for determining whether each of the requirements is satisfied.

ANSI/ESD STM4.1-2017

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ESD Association Standard Test Method for the Protection of Electrostatic Discharge Susceptible Items – Worksurfaces – Resistance Measurements

1.0 PURPOSE

This document provides test methods for evaluating and qualifying worksurfaces, including shelving and mobile equipment.

2.0 SCOPE

This document establishes methods for resistance measurements of worksurfaces, shelving and mobile equipment used at workstations where protection of ESD susceptible items is required.

3.0 REFERENCED DOCUMENTS

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

ESD ADV1.0, ESD Association's Glossary of Terms²

ASTM D257, Standard Test Method for D-C Resistance or Conductance of Insulating Materials³

4.0 DEFINITION OF TERMS

The terms used in the body of this document are in accordance with the definitions found in ESD ADV1.0, ESD Association's Glossary of Terms available for complimentary download at www.esda.org.

5.0 PERSONNEL SAFETY

THE PROCEDURES AND EQUIPMENT DESCRIBED IN THIS DOCUMENT MAY EXPOSE PERSONNEL TO HAZARDOUS ELECTRICAL CONDITIONS. USERS OF THIS DOCUMENT ARE RESPONSIBLE FOR SELECTING EQUIPMENT THAT COMPLIES WITH APPLICABLE LAWS, REGULATORY CODES, AND BOTH EXTERNAL AND INTERNAL POLICY. USERS ARE CAUTIONED THAT THIS DOCUMENT CANNOT REPLACE OR SUPERSEDE ANY REQUIREMENTS FOR PERSONNEL SAFETY.

GROUND FAULT CIRCUIT INTERRUPTERS (GFCI) AND OTHER SAFETY PROTECTION SHOULD BE CONSIDERED WHEREVER PERSONNEL MIGHT COME INTO CONTACT WITH ELECTRICAL SOURCES.

ELECTRICAL HAZARD REDUCTION PRACTICES SHALL BE EXERCISED AND PROPER GROUNDING INSTRUCTIONS FOR EQUIPMENT SHOULD BE FOLLOWED.

THE RESISTANCE MEASUREMENTS OBTAINED THROUGH THE USE OF THIS TEST METHOD SHALL NOT BE USED TO DETERMINE THE RELATIVE SAFETY OF PERSONNEL EXPOSED TO HIGH AC OR DC VOLTAGES.

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³ American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103-1187, 215-299-5400