ANSI/ESD STM3.1-2015
Revision of ANSI/ESD STM3.1-2006

ESD Association Standard Test Method

For the Protection of Electrostatic Discharge Susceptible Items

Ionization

ANSI/ESD STM3.1-2015

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

An American National Standard
Approved November 19, 2015

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

Ionization

Approved June 18, 2014
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FOREWORD

The primary method used to limit static charge for the protection of electrostatic discharge susceptible items in the work environment is grounding. However, grounding methods are not effective in removing static charges from the surfaces of non-conductive (insulative) or isolated conductive materials. Air ionization techniques may be employed to reduce these charges. The active parameters in charge neutralization are the conductivities of the air for each polarity. It would be appropriate to measure either the conductivities themselves or the ion concentrations for each polarity. This would determine the ability of the ionized air to neutralize a charge in a given location. (Annex B has been provided as an informative annex on performance of ionizers.)

In practice, these measurements are difficult to make. A more feasible way of evaluating the ability of an ionizer to neutralize a static charge is to directly measure the charge decay time. Charges to be neutralized may be located on insulators as well as on isolated conductors. It is difficult to charge an insulator reliably and repeatably. Charge neutralization is more easily evaluated by measuring the rate of decay of the voltage of an isolated conductive plate. The measurement of this decay should not interfere with or change the nature of the actual decay. Four practical methods of air ionization are addressed in this standard test method:

1. Radioactive Emission
2. High Voltage Corona from AC Electric Fields
3. High Voltage Corona from DC Electric Fields
4. Soft X-ray Emission

This standard test method[1] provides test methods and procedures that can be used when evaluating ionization equipment. The objective of the test methods described in this document is to generate meaningful, reproducible data. The test methods are not meant to be a recommendation for any particular ionizer configuration. The wide variety of ionizers, and the environments within which they are used, will often require test methods different from those described in this standard test method. Users of this document should be prepared to adapt the test methods as required to produce meaningful data in their own application of ionizers.

Similarly, the test conditions chosen in this standard test method do not represent a recommendation for acceptable ionizer performance. There is a wide range of item sensitivities to static charge. There is also a wide range of environmental conditions affecting the operation of ionizers. Performance specifications should be agreed between the user and manufacturer of the ionizer in each application. Users of this standard test method should be prepared to establish reasonable performance requirements for their own application of ionizers.

Annex A has been provided as a normative annex to provide a method for measuring capacitance of the isolated conductive plate.

The 2014 version of this document includes the use of contacting plate voltage measurements in addition to the previous non-contacting plate voltage measurements. Charged plate monitors (CPMs) using these technologies have been in use in the industry for many years. References were also added to ESD TR53 – Compliance Verification of ESD Protective Equipment and Materials.

[1] 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 yield a **reproducible test** result.

This document was originally designated ANSI/EOS/ESD S3.1-1991 and approved on June 6, 1991. ANSI/EOS/ESD S3.1-1991 was revised, redesignated ANSI/ESD STM3.1-2000 and was approved on February 6, 2000. ANSI/ESD STM3.1-2000 was reaffirmed, redesignated ANSI/ESD STM3.1-2006 and was approved on February 26, 2006. ANSI/ESD STM3.1-2015 is a revision of ANSI/ESD STM3.1-2006 and was approved on June 18, 2014.

At the time the ANSI/ESD STM3.1-2015 was prepared, the 3.0 Ionization subcommittee had the following members:

Kevin Duncan, Chair
Seagate Technology

Eugene Felder Desco Industries, Inc.	Vladimir Kraz BestESD Technical Services	Huan Li JDSU
Gregory Manning NASA Goddard Space Flight Center	Chuck McClain Micron Technology	Gene Monroe NASA-LARC
Dale Parkin Seagate Technology	Donald Pritchard Monroe Electronics	Arnold Steinman, Vice Chair Electronics Workshop
Matt Strickland L-3 Communications, Inc.	David Swenson, TAS Rep Affinity Static Control Consulting	Julius Turangan Ovation, Inc.
Bob Vermillion RMV Technology Group	Joshua Yoo Core Insight, Inc.	Craig Zander Transforming Technologies

The following individuals made significant contributions to ANSI/ESD STM3.1-2015:

Brent Beamer	Donn Bellmore Advanced ESD Services +	Roger Peirce Simco-Ion
	Jeff Salisbury Finisar	

At the time the ANSI/ESD STM3.1-2006 was prepared, the 3.0 Ionization subcommittee had the following members:

Richard Rodrigo, Chair
Simco

Donn Bellmore Universal Instruments	Eugene Felder Desco Industries, Inc.	Tim Jarrett Guidant Corp.
Vladimir Kraz Credence Technologies	Carl Newberg Microstat Labs / River's Edge Technical Service	Maciej Noras Trek
Dale Parkin IBM	Donald Pritchard Monroe Electronics	Jeff Salisbury Seagate Technology
Arnold Steinman, Vice Chair Ion Systems	David Swenson, TAS Rep Affinity Static Control Consulting	Julius Turangan Western Digital

At the time the ANSI/EOS/ESD S3.1-1991 was prepared, the 3.0 Ionization Subcommittee had the following members:

Joel Weidendorf, Chair
IBM

Godfrey (Ben) Baumgartner Lockheed	Chris Campbell JES International, Inc.	James Curtis NRD, Inc.
Robert Elder Eastman Kodak Company	Steven Gerken U.S. Air Force	Ron Gibson, Secretary IBM Canada, Ltd.
Niels Jonassen, Technical Advisor Technical University of Denmark	John Kinnear, Recorder IBM	James Lonborg Jet Propulsion Laboratory
Howard Meyers Motorola	Richard Rodrigo Simco Company, Inc.	Arnold Steinman, Vice Chair Ion Systems, Inc.
David Swenson 3M - ESD	Edward Weggeland Static Prevention, Inc.	Lester Wenger Pinion Corporation

Gene Williams
Static Control Services, Inc.

The following individuals made significant contributions to ANSI/EOS/ESD S3.1-1991:

Lawrence Burich
Lockheed

Tom Caffarella
NRD, Inc.

Doug Chesleigh
Static Prevention, Inc.

Charlotte Hampton
JES International, Inc.

James Horvat
U.S. Air Force

Stephen Koehn
3M Company

Robert Parr
Motorola GEG

Scott Shelton
Simco Company, Inc.

Harlan Snyder
IBM

Anna Maria Steriti
Pinion Corporation

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1.0 PURPOSE, SCOPE AND APPLICATION

1.1 Purpose

This document provides test methods and procedures for evaluating and selecting air ionization equipment and systems (ionizers).

1.2 Scope

This standard test method establishes measurement techniques, under specified conditions, to determine offset voltage (ion balance) and discharge time (charge neutralization time) for ionizers. This standard test method does not include measurements of electromagnetic interference (EMI), or uses of ionizers in connection with ordnance, flammables, explosive items, or electrically initiated explosive devices.

1.3 Application

As contained in this document, the test methods and test conditions may be used by manufacturers of ionizers to provide performance data describing their products. Users of ionizers are urged to modify the test methods and test conditions for their specific application in order to qualify ionizers for use, or to make periodic verifications of ionizer performance (refer to ANSI/ESD SP3.3, Periodic Verification of Air Ionizers). For compliance verification of ionizers used in static control programs, refer to ESD TR53, Compliance Verification of ESD Protective Equipment and Materials. The user will need to decide the extent of the data required for each application.

2.0 REFERENCED PUBLICATIONS

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

The references listed below are not meant to be inclusive of all that might be applicable to the operation of ionizers. There may be additional local, state, national and international documents that are relevant. Users of this standard test method are encouraged to determine if other regulations and references apply.

ESD ADV1.0, ESD Association's Glossary of Terms[2]

ESD SP3.3, Periodic Verification of Air Ionizers[2]

ESD TR53, Compliance Verification of ESD Protective Equipment and Materials[2]

29 CFR PART 1910.1000, Ozone, (OSHA) Air Contaminants[3]

29 CFR PART 1910.95, (OSHA) Occupational Noise Exposure[3]

29 CFR PART 1910.242 (b), (OSHA) Compressed Air Used For Cleaning[3]

10 CFR PART 20, (NRC) Standards for Protection against Radiation[3]

21 CFR PART 1020, (FDA) Performance Standards for Ionizing Radiation Emitting Products[3]

[2] ESD Association, 7900 Turin Road, Bldg. 3, Ste. 2, Rome, NY 13440-2069, 315-339-6937

[3] CFR (Code of Federal Regulations) U.S. Government Printing Office, 732 N. Capitol Street NW, Washington, DC 20401, 866-512-1800, http://bookstore.gpo.gov