ANSI/ESD SP3.4-2016
Reaffirmation of ANSI/ESD SP3.4-2012

ESD Association Standard Practice

For the Protection of Electrostatic Discharge Susceptible Items -

Periodic Verification of Air Ionizer Performance Using a Small Test Fixture

ANSI/ESD SP3.4-2016

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

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

Periodic Verification of Air Ionizer Performance Using a Small Test Fixture

Approved September 23, 2016
ESD Association

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FOREWORD

Grounding of conductive and static dissipative materials, personnel, and equipment is the primary method used to limit static charge for the protection of electrostatic discharge susceptible items in the work environment. A static control program may include air or nitrogen ionization techniques to mitigate charge on isolated conductors (conductors that are not grounded), and insulating materials (e.g., most common plastics).

The ionization standard test method, ANSI/ESD STM3.1, defines test methods and instrumentation, the Charged Plate Monitor (CPM), for making discharge (charge neutralization) time and offset voltage (ion balance) measurements of air ionization equipment in defined environments. These standard test methods are applicable for product qualification, selecting an air ionizer for a specific application, as well as subsequently determining that the incoming product meets the selection criteria.

The test instrumentation and methods of the standard test method are also usable for compliance verification of ionizer performance per ESD TR53. ANSI/ESD STM3.1 also contains additional information regarding ionizer physics, ionizer measurement issues, and sources of measurement error. The user is advised to review ANSI/ESD STM3.1 before using the procedures described in this standard practice[1].

Detailed performance testing under laboratory conditions may be required during selection, product qualification, and acceptance testing due to the variety of environments in which ionizers are used. Periodic and compliance verification, however, are most often performed under actual use conditions. In general, all ionizers should be tested, rather than a sampling of product types or incoming lots.

Periodic verification procedures should also be part of the initial acceptance process to provide a baseline for comparison with future measurements. Compliance verification may be necessary to meet audit requirements.

The test procedures in the ionization standard ANSI/ESD STM3.1 are complete enough to be used for product qualification, selection or acceptance testing, as well as for periodic verification. Additional periodic verification procedures are described in ANSI/ESD SP3.3, Periodic Verification of Air Ionizers.

ANSI/ESD STM3.1 describes a measuring instrument, the CPM, which utilizes a 15 cm x 15 cm (6 inch x 6 inch) isolated conductive plate assembly. ANSI/ESD SP3.3 allows for alternative instrumentation, as long as the alternative instrumentation correlates to measurements made with the standard CPM (see Annex B for more information). Neither of these standards directly addresses the issues of making measurements in small confined spaces or making measurements that better describe the effects of ionization on small objects (for example, integrated circuits or magnetoresistive heads).

There is a need for a smaller, standardized test fixture that can be correlated to measurements made with the test fixture described in ANSI/ESD STM3.1. It should be as small as possible to allow measurements to be made in confined spaces (for example, the interior of automated equipment).

This standard practice presents an example of a 2.54 cm x 2.54cm (1 inch x 1 inch) square test fixture and test procedures for performance verification of ionizers. This test fixture can also be used to better characterize the performance of air ionizers in neutralizing static charge on small objects. Refer to Annex A3 for additional information. This small test fixture was used in developing this standard practice. It is not the intent of this standard practice to limit the design of the test fixture or instrumentation in any way.

[1] **ESD Association Standard Practice:** A procedure for performing one or more operations or functions that may or may not yield a test result. Note, if a test result is obtained it may not be reproducible.

The performance verification test procedures can be carried out under actual use conditions, and are capable of demonstrating ionizer performance. Discharge time and offset voltage testing contained in ANSI/ESD STM3.1 was adapted for this performance verification test procedure. It is important that the performance verification procedure results correlate reasonably with standard CPM test results. It is anticipated that both the directly measured data and the correlated data will be available.

The objective of the test procedures described in this document is to characterize the ionizer performance at specific locations, particularly those in which it is not possible to use a large test fixture. The test setups proposed 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 setups different from those described in this standard practice. For purposes of performance verification, it is important that ionizers are tested in their normal operating configuration.

While the CPM or the test fixture described in this document provides a standardized performance measure for ionizers, they provide little information about the discharge performance on other objects. It is recommended that users of this document with critical static control requirements use other means to measure the charge neutralization time on the actual objects of concern. Electrostatic fieldmeters and voltmeters are commonly used for this purpose. The presence of these measuring instruments themselves will affect the neutralization time.

Users of this standard practice should be prepared to adapt the test procedures and setups as required to produce meaningful data in their own application of ionizers. Similarly, the test procedures and conditions chosen in this standard practice do not represent a recommendation for acceptable ionizer performance. There is a wide range of item sensitivities to electrostatic charge. There is also a wide range of environmental conditions affecting the operation of ionizers.

Performance specifications should be an agreement between the user and manufacturer of the ionizer in each application. Compliance with these specifications should be demonstrated during selection and acceptance testing of the ionizers. Users of this standard practice will be able to establish baseline performance in the actual use location for their own application of ionizers.

At any time in the future, using the same procedures in this standard practice, the user will be able to verify whether or not the ionizer is providing a comparable level of performance. The user will need to decide the extent of the data required for each application.

This standard practice was originally designated ANSI/ESD SP3.4-2012 and approved on September 9, 2012. ANSI/ESD SP3.4-2016 is a reaffirmation of ANSI/ESD SP3.4-2012 and was approved on September 23, 2016.

At the time ANSI/ESD SP3.4-2016 was prepared, the 3.0 Ionization Subcommittee had the following members:

Charles McClain, Chair
Micron Technology, Inc.

Kevin Duncan, TAS Rep Seagate Technology	Eugene Felder Desco Industries, Inc.	David Girard Honeywell Aerospace
Shane Heinle Digi-Key Corporation	Vladimir Kraz OnFILTER, Inc.	Gregory Manning NASA/ARES Technical Services
Gene Monroe NASA - LARC	Dale Parkin Seagate Technology	Timothy Prass Raytheon
Arnold Steinman Electronics Workshop	Matt Strickland L-3 Communications, Inc.	David Swenson Affinity Static Control Consulting, LLC
Julius Turangan Dou Yee Enterprises	Robert Vermillion RMV Technology Group, LLC	Joshua Yoo Core Insight, Inc.
	Craig Zander Transforming Technologies	

The following individuals contributed to the development of ANSI/ESD SP3.4-2012.

Brent Beamer 3M	Donn Bellmore Advanced ESD Services+	Kevin Duncan Seagate Technology
Eugene Felder Desco Industries, Inc.	Jay Hamlin Medtronic	Steve Heymann Ion Systems, Inc.
Vladimir Kraz Best ESD Technical Services	Jim Krzmarzick	Chris Lemke TREK, Inc.
Gene Monroe NASA - LARC	Dale Parkin Seagate Technology	Roger Peirce SIMCO-Ion
Tim Prass Raytheon	Donald Pritchard Monroe Electronics, Inc.	Richard Rodrigo SIMCO
Jeff Salisbury Flextronics	Jose Sancho NASA/GSFC/Honeywell TSI	Arnold Steinman Electronics Workshop
David Swenson, TAS Rep Affinity Static Control Consulting, LLC	Julius Turangan Ovation, Inc.	Robert Vermillion RMV Technology Group
	Craig Zander Prostat Corporation	

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