

ANSI/ESD SP3.4-2016

ESD Association Standard Practice

ANSI/ESD SP3.4-2016

Reaffirmation of ANSI/ESD SP3.4-2012

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

***Periodic Verification of
Air Ionizer Performance
Using a Small Test Fixture***



*Electrostatic Discharge Association
7900 Turin Road, Bldg. 3
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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 practice¹.

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.

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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.

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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

1.0 PURPOSE AND SCOPE

1.1 Purpose

This standard practice provides a test fixture example and procedures for performance verification of air ionization used in confined spaces where it may not be possible to use the test fixtures defined in ANSI/ESD STM3.1 or ANSI/ESD SP3.3.

1.2 Scope

This standard practice establishes measurement procedures, under recommended conditions, to periodically determine offset voltage (ion balance) and discharge (charge neutralization) times for ionizers in their actual use locations. This standard practice does not include measurements of electromagnetic interference (EMI), or uses of ionizers in connection with ordnance, flammables, explosive items, or electrically initiated explosive devices.

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:

ESD ADV 1.0, ESD Association's Glossary of Terms²

ANSI/ESD STM3.1, Ionization²

ANSI/ESD SP3.3, Periodic Verification of Air Ionizers²

3.0 DEFINITIONS

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.

4.0 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 SHOULD 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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