ANSI/ESD SP3.3-2006
Reaffirmation of ESD SP3.3-2000

ESD Association Standard Practice

for the Protection of Electrostatic Discharge Susceptible Items –

Periodic Verification of Air Ionizers

ANSI/ESD SP3.3-2006

Electrostatic Discharge Association
7900 Turin Road, Bldg. 3
Rome, NY 13440-2069

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

Periodic Verification of Air Ionizers

Approved June 11, 2006
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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 deal with charge on isolated conductors (conductors that cannot be grounded), and insulating materials (e.g., most common plastics).

The ionization standard ANSI/ESD STM3.1 defines test procedures and instrumentation for evaluating the discharge time and balance performance of four types of air ionization equipment. These test methods are applicable to the process of selecting an air ionizer for a specific application, as well as subsequently determining that incoming product meets the selection criteria. The test methods and procedures of the standard are also useable for the periodic verification of ionizer performance.

Detailed performance testing under laboratory conditions may be required during selection and acceptance testing due to the variety of use environments for ionizers. Periodic verification, however, is most often performed under actual use conditions. In general, all ionizers must be tested, rather than a sample 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. Periodic 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 selection or acceptance testing, as well as for periodic verification. However, these procedures require a typically expensive test instrument and a substantial amount of time to test each ionizer. The cost of this testing is often unacceptable for purposes of periodic verification.

There is a need for a simpler verification procedure using a less expensive, preferably portable test instrument. Periodic verification provides a relative measure of performance and can indicate when it is necessary to check the calibration of the ionizer under test with the charged plate monitor (CPM) (refer to ANSI/ESD STM3.1).

This standard practice presents a test method and instrumentation for periodic verification of the four classes of ionizers contained in existing ionization standard ANSI/ESD STM3.1. These classes are room, laminar flow hood, worksurface and compressed gas ionizers. The verification test method can be carried out under actual use conditions and is capable of rapidly demonstrating ionizer performance. Discharge time and offset voltage (balance) testing contained in the ionization standard was adapted to the verification test method. It is important that a simplified verification procedure correlate reasonably with CPM test results.

The objective of the test method described in this document is to identify if a significant change in ionizer performance has occurred. 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 periodic verification, it is important that ionizers are tested in their normal operating configuration. Users of this standard practice should be prepared to adapt the test method and setups as required to produce meaningful data in their own application of ionizers.

Similarly, the test method 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 static 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.

The 2006 revision of this document contains various minor changes from the previous document. The voltage source for testing was changed from "at least 1200 volts" to "in excess of the initial test voltage" to provide flexibility in user selection of initial and final test voltages. Maximum time to measure offset voltage was added for each ionizer type (it was previously one value for all ionizer types). Various editorial changes to the text were made to clarify the document.

Suggestions for improvement of this standard practice will be welcome. They should be sent to: ESD Association, 7900 Turin Road, Bldg. 3, Rome, NY 13440-2069.

This standard practice was originally designated ESD SP3.3-2000 and approved on February 6, 2000. This standard practice is a reaffirmation of ESD SP3.3-2000. It was approved on June 11, 2006 and was prepared by the 3.0 Ionization Subcommittee. The 2000 version was prepared by the 3.0 Ionization Subcommittee. At that time the 3.0 Ionization Subcommittee had the following members:

Richard Rodrigo, Chair
Simco

Ron Gibson, TAS Celestica International	Tim Jarrett CPI – Guidant Corp	Carl Newberg River's Edge Technical Service
Dale Parkin IBM	Donald Pritchard Trek, Inc.	Jeff Salisbury Semtronics Corp.
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1.0 PURPOSE

This standard practice provides test methods and procedures for periodic verification of the performance of air ionization equipment and systems (ionizers).

2.0 SCOPE

This standard practice establishes a measurement technique, under recommended conditions, to periodically determine offset voltage (ion balance) and discharge (neutralization) time 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.

3.0 REFERENCED PUBLICATIONS

ESD ADV1.0, ESD Association's Glossary of Terms[1]

ANSI/ESD STM3.1, Ionization[1]

ESD TR20.20, ESD Handbook[1]

ESD TR3.0-02-05, Selection and Acceptance of Air Ionizers[1]

4.0 DEFINITIONS

Initial Test Voltage. The voltage on the test plate of the periodic verification instrument at which the discharge time test begins.

Final Test Voltage. The voltage on the test plate of the periodic verification instrument at which the discharge time test ends.

Periodic Verification. Testing done to indicate that the performance of an air ionizer has not changed from initial baseline values to exceed selected limits.

5.0 PERSONNEL SAFETY

5.1 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 may come into contact with electrical sources.

Electrical hazard reduction practices should be exercised and proper grounding instructions for the equipment must be followed.

[1] ESD Association, 7900 Turin Road, Bldg. 3, Rome, NY 13440-2069, 315-339-6937, www.esda.org

6.0 TEST FIXTURES

The following sections describe the instrumentation required for periodic verification of air ionization equipment and systems (ionizers). The instrumentation may consist of separate components (voltage monitor, isolated plate, HV source and timer), or these components may be integrated into a single instrument. A Charged Plate Monitor (CPM) as described in ANSI/ESD STM3.1 may be used for periodic verification.

6.1 The test fixture is to consist of an isolated conductive plate separated from a ground plate on insulating standoffs (refer to Figure 1).

6.2 The isolated conductive plate, when charged to a desired initial test voltage, shall not decay more than 10% of the test voltage within 1 minute, in the absence of ionization.

6.3 The voltage on the plate shall be monitored in such a way that the system conforms to 6.2. The response time of the monitoring device shall be sufficient to accurately measure changing plate voltages.

6.4 A voltage source providing in excess of the initial test voltage of each polarity is required to charge the isolated plate of the test fixture. The voltage source should be current limited so as to meet the requirements of Section 5.

6.5 A stopwatch or other appropriate means should be used to measure the discharge time.

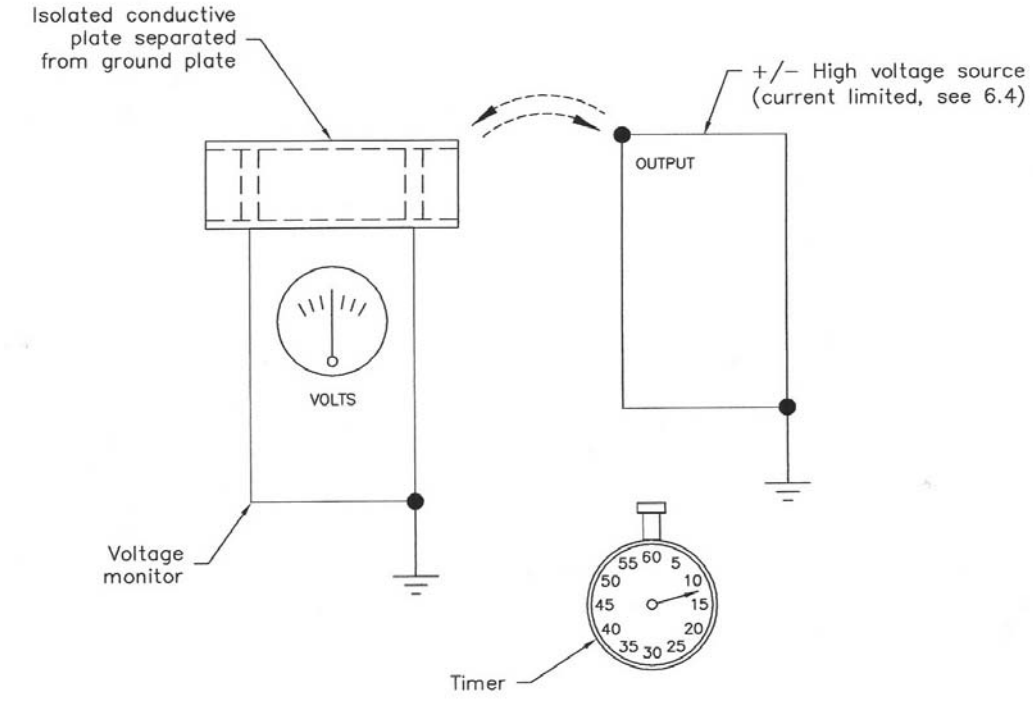

Figure 1: Test Fixture Components

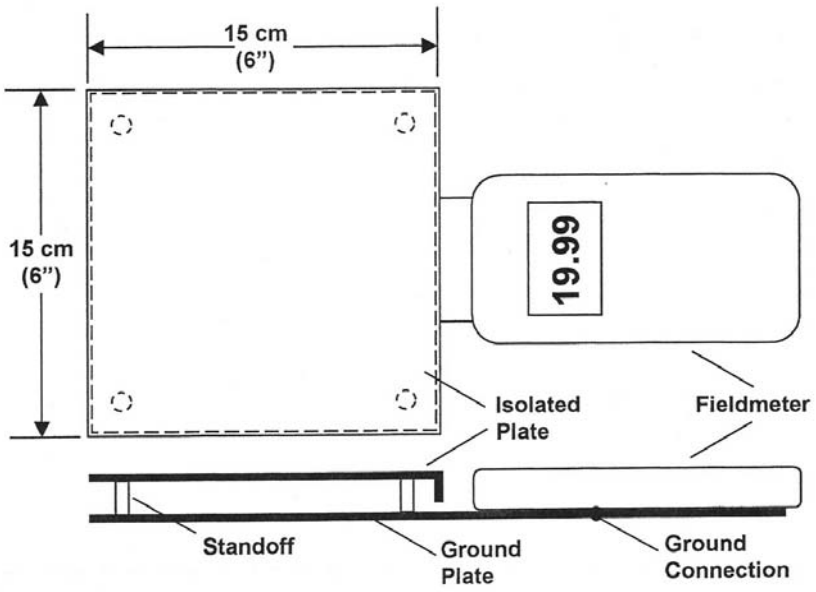

Figure 2: Example of a Test Fixture with 15 cm x 15 cm Plate

7.0 GENERAL MEASUREMENT PROCEDURE

Each type of ionizer will require a different test setup for periodic verification testing. Initial and final test voltages may be changed as desired. The actual test procedures and parameters (e.g., equipment, test voltages, test plate distance and location, air velocity, fan speed settings, compressed air pressure, etc.) should be documented and attached to the test data for use during subsequent verification testing. Periodic verification procedures should be a part of the initial acceptance process to provide baseline data for comparison with future measurements. A schedule should be established for periodic verification testing.

The following test steps are common elements to the periodic verification testing of all types of ionizers:

7.1 All test areas are to be surveyed just after initial installation. Large metal objects or obstructions to airflow are to be noted, but are not to be removed from the test area. The documented test parameters and test results from initial testing will be used for comparison during subsequent periodic verification.

7.2 The test technician and test fixtures are to be properly grounded during the test. The test fixture may be held by the test technician in the test location during testing.

7.3 The test plate is to be charged to a convenient voltage in excess of the initial test voltage for each polarity (e.g., 1200–1500 volts).

7.4 The discharge time measurement begins when the test plate voltage has decayed to the initial test voltage (e.g., 1000 volts) and stops when the test plate voltage has decayed to the final test voltage (e.g., 100 volts). Repeat 7.3 and 7.4 for the opposite polarity. A stopwatch or other suitable device should be used for the time measurement.