ESD Association Technical Report

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Selection and Acceptance of Air Ionizers

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(This forward is not part of ESD Association Technical Report TR3.0-02-05)

Foreword

The primary method used to limit static charge for the protection of electrostatic discharge susceptible items in the work environment is grounding. A variety of methods are available for grounding conductive materials, static dissipative materials, and personnel. A static control program must also deal with charge on isolated conductors that cannot be grounded, insulating materials (e.g. most common plastics). Air ionization techniques may be employed to limit charges in these instances.

Air ionization creates mobile positive and negative charge carriers in the surrounding air. Static charge present on objects in the working environment of an ionizer will be neutralized by attracting opposite polarity charges from the air.

Air ionization is not a replacement for grounding methods. It is one component of a complete static control program dealing with the variety of objects found in a work environment. Ionizers are used when it is not possible to ground everything. Specialized areas such as cleanrooms, low humidity environments, or work places with exposed high voltages, may not be able to use grounding methods, conductive material, static dissipative materials, and chemical antistatic sprays. Air ionization may be one of the few methods of static control applicable in these environments.

The ESD (Electrostatic Discharge) Association has issued the Ionization Standard Test Method ANSI/ESD STM3.1. This standard defined test procedures and instrumentation for evaluating the discharge and balance performance of four types of air ionization equipment. These test methods should be a beginning part of the process of selecting an air ionizer for a specific application, and subsequently verifying that incoming product meets the selection criteria. This document presents additional factors which may be considered before making a final selection.

There is a wide variety of problems caused by static charge, and a wide variety of products and processes affected by these problems. When a performance specification is established for an ionizer, it should take into account the nature of the static problem, the sensitivity of the product or process to static charge, the environment in which the ionizer will be used, and the operating characteristics of the ionization equipment.

The selection process begins by determining which types of ionizers are appropriate to the application. Ionizer compatibility with the airflow, cleanroom operation, physical installation, or process speeds, should be investigated. The selection process then establishes which ionizers will meet the predetermined discharge and balance performance requirements. Next, application specific testing should confirm that the air ionizer is able to reduce or eliminate the static problem. Finally, testing should establish that no adverse effects result from the ionizer operation.

Once the selection process has established that ionizers will prevent a static problem, a set of tests should be created for acceptance testing, or qualification, of ionizers. These tests should demonstrate that the ionizer will satisfy the end user requirements. During the selection process the user should determine the critical test parameters, test methods, and test fixtures for subsequent acceptance testing of incoming product. Sometimes ionizers will be tested only after they have been installed in the use location. Acceptance testing standards should then be a part of the procurement process.

This document reviews the four ionizer types contained in the Ionization Standard Test Method: room (systems), laminar flow hood, worksurface (e.g. blowers), and compressed gas (nozzles & guns). For each type it provides a guideline for creating a performance specification. Included is a description of the types of ionizers available for the application, general design requirements, performance requirements, test method references, and safety requirements.

These guidelines are not meant to be a recommendation for any particular ionizer configuration. There are a wide variety of ionizers, and environments in which they are used. Users of this technical report should be prepared to choose the selection and acceptance criteria that are important in their own application of ionizers.

The 2004 revision and redesignation of this document contain various minor changes from the previous document, ESD-ADV3.2-1995. The designation has been changed from “Advisory” to “Technical Report’. The body of the document was reviewed and additional information, such as; cleanroom consideration, and reference to ANSI ESD 20.20, was added. The A.1 Appendix - Safe Voltage Levels and Ionizer Offset Voltage was edited to reflect developments in the field of ESD testing.

This Technical Report was originally approved ESD ADV3.2-1995. The Advisory was then revised and redesignated a Technical Report TR3.0-02-05. At the time of the revision and redesignation, the 3.0 Ionization Subcommittee had the following members:

At the time this Technical Report was submitted for publication, the 3.0 Ionization Subcommittee had the following members.

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At the time this Advisory was originally approved by the Standards committee on June 5, 1995, the 3.0 Ionization Subcommittee had the following members.

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1.0 PURPOSE AND SCOPE

1.1 Purpose

This document provides guidance in establishing a performance specification for an ionizer. It takes into account the nature of the static problem, the sensitivity of the product or process to static charge, and the environment in which the ionizer will be used. These will determine the desired operating characteristics of the ionization equipment.

1.2 Scope

This document reviews the four ionizer types contained in ESD Association Standard Test Method ANSI/ESD STM3.1, Ionization. It provides a guideline for creating performance criteria.

1.3 Applicability

Users of ionizers are urged to modify test methods and test conditions based on the requirements of their specific application, in order to qualify ionizers for use. The user will need to determine the extent of the data required for each application. This document does not include measurements of electromagnetic interference (EMI), or uses of ionizers in connection with ordnance, flammable, explosive items, electrically initiated explosive devices or explosive atmospheres.

2.0 NORMATIVE REFERENCES

The following documents contain provisions which, through reference in this text, constitute provisions of this ESD Association document. The latest revision or most recent edition of the documents apply.

ESD ADV1.0, "Glossary of Terms"

ANSI/ESD S20.20, “Electrostatic Discharge Control Program”

ANSI/ESD STM3.1, "Ionization"

ESD STM5.1, Electrostatic Discharge Sensitivity Testing "Human Body Model (HBM) - Component Level"

ANSI/ESD STM5.2, Electrostatic Discharge Sensitivity Testing "Machine Model (MM) - Component Level"

ANSI/ESD STM5.3, Electrostatic Discharge Sensitivity Testing "Charged Device Model (CDM) - Component Level"

ESD TR11-04, “Electrostatic Guidelines and Considerations for Cleanrooms and Clean Manufacturing”

ANSI/NFPA 70, National Electrical Code (NEC)

29 CFR 1910.1000, Occupational Safety & Health Administration (OSHA) Ozone, “Air contaminants.”

29 CFR 1910.95, (OSHA) “Occupational noise exposure.”

29 CFR 1910.242 (b), (OSHA) “Compressed air used for cleaning.”

10 CFR 20, Nuclear Regulatory Commission (NRC) “Standards for Protection Against Radiation.”