

*Institute of Environmental Sciences and  
Technology*

## **IEST-RP-CC052**

Contamination Control Division  
Recommended Practice 052

# **Understanding, Identifying, and Controlling Electrostatic Charge in Cleanrooms and Other Controlled Environments**



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## **Justification for RP-CC052: Understanding, Identifying and Controlling Electrostatic Charge in Cleanrooms and Other Controlled Environments**

Electrostatic charge is a contaminant of energy that is rarely understood by those responsible for and working in cleanrooms. Typically referred to as ESD in most lab and manufacturing environments, it can be controlled through grounding of all conducting objects in the cleanroom including personnel, by eliminating insulators where possible, and by use of ionizers to avoid damage to products as workers sit and work at assembly or test benches.

However, in cleanrooms where people and product typically move around while working and the very nature of cleanroom materials, airflow and low relative humidity in the clean environment generates a myriad of electrostatic phenomena. The results caused by these phenomena can include electrostatic discharge (ESD) that damages product but also can manifest in other more subtle ways that also can modify the environment causing spurious particle events, interfere with processing equipment, and other problems that can hinder productivity or plague equipment maintenance efforts.

Since it is impossible to see electrostatic charge and its associated manifestations, one must be knowledgeable in the science that creates it and be able to analyze the environment to discover weakness that allows the electrostatic event to develop and play out.

IEST-RP-CC022: *Electrostatic Charge in Cleanrooms and Other Controlled Environments* was written over 20 years ago to address this topic. The overview provided some instruction for describing electrostatic risks and testing developed by the ESD Association. In a sense, it was a lite version of the ESDA formulas for addressing static charge. Unfortunately, both the ESDA documents and RP-CC022 both have little applicability to the needs of cleanroom operators and managers. Most people responsible for cleanroom operations do not have enough technical background in physics to understand how these charges are generated in the dynamic working environment of the cleanroom. As expected, this RP found little usefulness to cleanroom professionals. Several attempts were made in the past to consider revising the RP but its existing form, the Title and Scope would need to be substantially altered and results might not be well received.

A different approach was taken to provide cleanroom personnel with the background necessary to understand the science of electrostatic charge phenomena and thus understand the basis for charge control protocols. It is hoped that the information provided will lead the user to be able to apply the fundamentals they learn in the RP to recognize deficiencies in their own environment and lead them to choose appropriate remedies to avoid potential product losses, equipment failures or spurious particle events. The focus and scope of this RP is much different and more comprehensive than RP-C022, which should be sunset when the new RP is issued. IEST-RP-CC052: *Understanding, Identifying and Controlling Electrostatic Charge in Cleanrooms and Other Controlled Environments* is a comprehensive document that will be of great use to managers and operators of all cleanrooms.

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# Understanding, Identifying, and Controlling Electrostatic Charge in Cleanrooms and Other Controlled Environments

## IEST-RP-CC052.1

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## IEST-RP-CC052.1

### 1 SCOPE AND LIMITATIONS

#### 1.1 Scope

This Recommended Practice (RP) provides a basis for understanding how electrostatic charge occurs. This RP discusses problems caused by electrostatic charge in cleanrooms, as related to particle management, physical damage from discharge and process interruptions from transient electromagnetic interference (EMI). This RP also provides suggestions for identifying and resolving such risks by means such as dissipation of charge from conductors and process-essential insulators that have an opportunity to interact with ESD sensitive (ESDS) items. Such conductors include personnel, conductive components in production equipment and associated fixtures.

This RP discusses sources of electrostatic charge generation in cleanrooms and other controlled environments and how the environment, products and equipment will be affected when such charges are uncontrolled. Methods for monitoring the risk of electrostatic charge issues, minimizing generation, and selection of equipment for the remediation of charges will also be discussed.

The user is referred to step by step procedures for measurement of electrostatic issues in standards and recommended practice documents by the ESD Association. This RP provides supplemental information which is required to understand and execute the prescribed measurements.

#### 1.2 Limitations

This RP excludes specific evaluation and qualification related to the protection of ordnance, flammable materials, and explosives. This RP does not prescribe design or control limits; quality acceptance standards; process issues; or health, safety, and environmental issues and practices outside of contamination control issues. Users should establish their own quality standards.

Whereas there is a summary of tests of electrostatic control parameters shown in Appendix B, the main emphasis of this document remains on understanding how to deal with static charge rather than quantifying the appliances of charge mitigation.

This RP does not purport to address safety problems associated with its use. It is the responsibility of the user to consult and establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use of this RP.