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ESD Association Technical Report

ESD TR20.20-2016

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

***Handbook for the Development
of an Electrostatic Discharge
Control Program for the Protection of
Electronic Parts, Assemblies,
and Equipment***



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

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*ESD Association Technical Report for
the Protection of Electrostatic Discharge
Susceptible Items*

*Handbook for the Development
of an Electrostatic Discharge
Control Program for the
Protection of Electronic Parts,
Assemblies, and Equipment*

EOS/ESD Association, Inc.



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1.0 INTRODUCTION

1.1 Overview

The Electrostatic Discharge Association (ESDA) Standards Committee developed this ESD handbook for individuals and organizations that are faced with controlling ESD. It provides guidance that can be used for developing, implementing, and monitoring an electrostatic discharge control program in accordance with ANSI/ESD S20.20. This handbook applies to activities that include manufacturing, processing, assembling, installing, packaging, labeling, servicing, testing, inspecting, or otherwise handling electrical or electronic parts, assemblies, and equipment susceptible to damage by electrostatic discharges greater than or equal to 100 volts human body model (HBM), 200 volts charged device model (CDM), and exposure to charged isolated conductors.

ANSI/ESD S20.20 is the culmination of ESDA's response to the US Department of Defense's request to write a commercial version of MIL-STD-1686, Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies, and Equipment (Excluding Electrically Initiated Explosive Devices). This handbook is a living document that is periodically updated as new ESD control technology emerges.

The fundamental ESD control principles that form the basis of ANSI/ESD S20.20 are as follows.

All conductive and dissipative items in the environment, including personnel, should be bonded or electrically connected and attached to a known ground or contrived ground (as on shipboard or on aircraft). This attachment creates an equipotential balance between all items and personnel. Electrostatic protection can be maintained at a potential above a "zero" voltage ground potential as long as all items in the system are at the same potential. However, there are times when it is not possible to ground all the conductors that come into contact with electrostatic discharge sensitive (ESDS) items. Some examples include in-circuit testers (ICT), device-level microprobes, or cables that need to be connected for testing purposes. In these cases, the requirement in ANSI/ESD S20.20 is for the isolated conductors to have between - 35 and + 35 volts before contacting the ESDS item.

Insulators in the environment that have been triboelectrically charged cannot lose their electrostatic charge by attachment to ground. Circuit board materials and some device packages are examples of necessary insulators. Properly deployed ionization systems can reduce the residual charge on these necessary insulative items over time. Assessment of the ESD hazard created by electrostatic charge on the necessary insulators in the work place is required to ensure that appropriate actions are implemented, commensurate with risk.

TRANSPORTATION OF ESDS ITEMS OUTSIDE AN ESD-PROTECTED AREA (EPA), REQUIRES ENCLOSURE IN STATIC PROTECTIVE MATERIALS, ALTHOUGH THE TYPE OF MATERIAL DEPENDS ON THE SITUATION AND DESTINATION. INSIDE AN EPA, LOW CHARGING AND DISSIPATIVE MATERIALS MAY PROVIDE ADEQUATE PROTECTION. OUTSIDE AN EPA LOW CHARGING AND STATIC DISCHARGE SHIELDING MATERIALS ARE RECOMMENDED. THE REQUIREMENTS FOR PACKAGING INSIDE THE EPA AND OUTSIDE THE EPA CAN BE FOUND IN ANSI/ESD S541.

2.0 BASICS OF STATIC ELECTRICITY

2.1 INTRODUCTION

For most people, static electricity is represented by the noise or crackle heard on a radio that interferes with good reception or the shock experienced when touching a metal object after walking across a carpeted room or sliding across a car seat. Static electricity is also observed as static cling when clothes are stuck together after coming out of a clothes' dryer. Most of the time, people observe static electricity when the weather is cold and dry.