

Static Control Flooring

Introduction

Static electricity is an electric charge generated by the contact of two surfaces that have different resistance to electric current. The static electricity will discharge when brought in contact with an electrical conductor, resulting in the familiar static shock. In most cases static electricity is an annoyance, but in many laboratories static electricity can damage sensitive electronic equipment and ignite flammable material so it must be controlled.

One method of controlling static electricity is to provide a floor that does not generate a static charge, and which allows all items on the floor (people, equipment and furniture) to dissipate static charges safely and effectively to grounds. Electricity will follow all available pathways, but seeks the path of least electrical resistance. The surface of static control flooring creates a low resistance path for the flow of electricity, providing an immediate pathway to ground and preventing the accumulation of electrostatic charges.

Static control flooring can be used in a wide range of facilities but is frequently required in areas with diagnostic and imaging equipment, sensitive and calibrated electronics, data centers, clean rooms, operating rooms and rooms with flammable materials.

Types of Static Control Flooring

Static control floors are available from a number of manufacturers. Systems are proprietary, and must be installed using all flooring components and following installation instructions. Most static control floors in healthcare and laboratory facilities are vinyl, but rubber and carpet (sheet and tile) and epoxy (fluid applied) are available for special applications.

Static control flooring can be conductive or static dissipative. 'Conductive' and 'static dissipative' define different ranges of electrical resistance measured in ohms.

Conductive: The surface of a conductive floor provides a path of moderate electrical conductivity to prevent the accumulation of static charges. ANSI Defines "Conductive" as a material with a resistance of less than 1 million Ohms.¹

Conductive vinyl flooring is generally constructed with embedded conductive filaments, so its conductive properties are intrinsic and special polish or wax is not required. Flooring is installed with conductive adhesive and/or a grid of conductive strips which is connected to the building grounding system.

Static dissipative: The charges flow through a static dissipative floor slowly and in a somewhat more controlled manner than with conductive floor. ANSI defines "Static Dissipative" as materials with a resistance between 1 million and 1 billion Ohms.¹

Static dissipative vinyl flooring generally gains its conductive properties from a field-applied conductive polish or wax which must be maintained and reapplied. Flooring is installed with conductive adhesive which is connected by a conductive strip to the building grounding system.

Whether a conductive or static dissipative floor is specified should be reviewed carefully in consultation with the facility users, the processes to be conducted and the equipment to be protected. A floor that is too conductive may raise safety concerns for staff working with electricity. A floor that is not sufficiently conductive may not provide adequate protection. Best practice is to obtain an optimal resistance range in Ohms to use as a basis for product specification.

Other factors affecting static control in a room include humidity and the footwear of occupants. Moisture increases the conductance of air and will absorb and dissipate a static charge, so some sensitive facilities have minimum room humidity requirements. Shoes or shoe straps made of non-conductive material will generate less static and are required in some sensitive facilities.

Testing

STM7.1, Resistive Characterization of Materials - Floor Materials. This standard test method provides procedures for measuring the electrical resistance of floor materials used for the control of electrostatic charge and discharge. It also provides test methods for the qualification of floor materials prior to their installation or application, as well as test methods for acceptance and monitoring of floor materials after installation or application.

STM97.2 Floor Materials and Footwear- Voltage Measurement in Combination with a Person. This document provides test methods for the measurement of the voltage on personnel that use a footwear-flooring system where protection of electrostatic discharge (ESD) susceptible items is required.

ANSI/ESD S20.20 Protection of Electrical and Electronic Parts, Assemblies and Equipment. This standard provides administrative and technical requirements for establishing, implementing, and maintaining an ESD Control Program to protect electrical or electronic parts, assemblies, and equipment susceptible to ESD damage from Human Body Model (HBM) discharges greater than or equal to 100 volts.

Reference

1. ANSI/ESD STM 11.11-2005 Surface Resistance Measurements of Static Dissipative Planar Materials

