

ESD Open Forum

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Q: As a general rule should I use conductive or static dissipative flooring?

A: While there are exceptions, generally the answer is to use conductive flooring. The primary exception to this is if personnel exposure to open high-voltage lines in the area is likely.

ANSI/ESD S20.20-1999 recommends a floor that is $<1.0 \times 10^9$ ohms when tested according to ANSI/ESD STM 7.1-2001. The floor system should also not generate over 100 volts when tested according to ANSI/ESD STM97.2-1999, nor should the floor have a resistance greater than 3.5×10^7 ohms when tested according to ANSI/ESD STM97.1-1999. These levels can be achieved with an ESD flooring material in the static dissipative range, but there is little margin for error. The 3.5×10^7 ohms resistance specification for the person, footwear, and flooring can only be achieved with a dissipative floor at the lower end of the ANSI/ESD STM 7.1-2001 resistance range.

With a static dissipative floor (1.0×10^6 to 1.0×10^9) ohms when tested using ANSI/ESD STM 7.1-2001 the flooring material generally needs to be in the lower end of the range to meet the requirements of <100 volts. With most materials, the lower the resistance of the floor the lower the voltage that is generated due to fewer accumulated charges. On a static dissipative floor, a small amount of contamination, dirt, or spillage, can greatly affect the resistance of the floor and the voltage that can be generated.

Another factor that comes into play is that several dissimilar materials are being used together as a system: the floor, footwear, body contact with the footwear, and the variations in the individual on the floor. In an ideal world if the floor is 1.0×10^8 and the footwear is 1.0×10^6 the total resistance would be approximately 1.0×10^8 . Math is great in theory but in the real world of flooring the resistance can easily be 1.0×10^9 or greater. When starting out with a floor slightly less than 1.0×10^9 there is a better than even chance the system will be greater than 1.0×10^9 and not in compliance with ANSI/ESD S20.20-1999. If there is contamination on the floor or footwear, the problem is compounded.

With a floor in the conductive range there is a high probability the system will be within the recommended limits since the starting resistance of the floor is less than 1.0×10^6 .

Q: What are the most common things that can affect the performance of an ESD floor?

A: There are several factors that can affect the performance of an ESD floor. Some materials are hygroscopic by design and rely on a minimum level of relative humidity to perform properly; ANSI/ESD STM 7.1-2001 identifies these materials in the section referring to low-humidity testing. Excessive moisture in the concrete sub-floor can lower the resistance levels in many flooring materials. The most common and easiest factor to control is contamination of the floor surface. Proper maintenance procedures can usually resolve these issues.

ESD Association Standards Working Group 7.0 Floor Materials is preparing a Technical Report that comments in detail on many common issues that concern ESD flooring.

References

ANSI/ESD S20.20-1999 Protection of Electrical and Electronic Parts, Assemblies, and Equipment (excluding Electrically Initiated Explosive Devices), ESD Association, Rome, NY

ANSI/ESD STM 7.1-2001 Resistive Characterization of Materials—Floor Materials, ESD Association, Rome, NY

ANSI/ESD STM 97.1-1999 Floor Materials and Footwear—Resistance Measurement in Combination with a Person, ESD Association, Rome, NY

ANSI/ESD STM 97.2-1999 Floor Materials and Footwear—Voltage Measurement in Combination with a Person, ESD Association, Rome, NY

About the Author

Dale Tucker is director ESD sales at Associated/AC. He has been involved in the manufacturing and sales of ESD flooring since 1977 and has been active with ASTM F-06 since 1990. Tucker is currently chair of the ESD Association Standards Working Group 7.0 Floor Materials.

About the ESD Association

Founded in 1982, the ESD Association is a not for profit, professional organization dedicated to furthering the technology and understanding of electrostatic discharge. The Association sponsors educational programs, develops ESD standards, holds an annual technical symposium, and fosters the exchange of technical information among its members and others. Additional information may be obtained by contacting the ESD Association, 7900 Turin Rd., Bldg. 3, Rome, NY 13440-2069 USA. Phone: 315-339-6937. Fax: 315-339-6793. Email: info@esda.org. Website: <http://www.esda.org>.