ESD Open Forum
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Q: I work out on a production line and we use gloves to work with open parts. I was wondering if we were still grounded when working with parts?"

A: I assume by "open parts" you mean that your parts may be electronic components that are bare, not in a protected package or do not have their leads shorted. Therefore, these parts are susceptible to damage from electrostatic discharge (ESD) from handling or mechanical damage from handling. If all the above is correct then a grounded operator using ordinary insulated gloves can be an ESD hazard to your parts. The insulating gloves will accumulate charge from contact and separation from handling the parts. The amount of charge on the glove will determine how much charge is induced into the part and the ESD susceptibility of the part will govern whether it will be damaged.

It is suggested that you handle your "open parts" with ESD protective gloves that have an "In-Use" resistance well within the static dissipative range. It is suggested that the "In-Use" resistance of the glove or finger cot be in the range of $1x10^5$ ohms to $1x10^9$ ohms. With a grounded operator using ESD gloves any charge accumulated on the gloves should be quickly bled to ground.

The ESD Association Glove and Finger Cot Working Group has developed an ESD glove test that can measure the "In-Use" properties of gloves and finger cots. The details of this test are contained in ANSI/ESD SP15.1, Standard Practice for In-Use Resistance Testing of Gloves and Finger Cots. Although a planar resistance measurement or a volume resistance measurement will yield the resistance properties of a glove by itself, the "In-use" resistance measurement will give the user a more accurate result of how a glove will perform. For example, some types of gloves, mainly Nitrile, will hydrate when donned and often show an order of magnitude less resistance then the planar resistance. There could be a case where the planar resistance of a Nitrile glove measures above the dissipative range, but performs adequately into the static dissipative range when donned. As described in SP15.1, the "In-Use" resistance test uses an electrode with a fixed diameter flat polished metal button slightly smaller than one's finger tip. It is designed to be balanced on a person's finger with a donned glove or finger cot while the resistance measurement is taken.

Materials accumulate charge when contacted and separated. Because gloves may accumulate charge from handling items such as devices, tools or materials, the ESD Association ESD Glove Working Group is in the process of developing test methods to determine the charge accumulation properties of gloves when handling items for various applications. The user needs test methods to characterize their combination of gloves and materials to choose the best gloves. For example, suppose there is a cleanliness specification for flexible circuit assemblies that require handling by gloved hands. The objective of the ESD Glove Working Group is to recommend a charge accumulation test method to find the best type of gloves for handling your device or assembly while maintaining cleanliness.

It should be noted that the use of ESD protective gloves and finger cots is one part of a multi-parameter ESD control program as outlined in ANSI/ESD S20.20.

References

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

ANSI/ESD SP15.1 Standard Practice for In-Use Resistance Testing of Gloves and Finger Cots.

ANSI/ESD S1.1 Wrist Straps

ANSI/ESD STM11.11 Surface Resistance Measurement of Static Dissipative Planar Materials.

ANSI/ESD STM 11.12 Volume Resistance Measurement of Static Dissipative Planar Materials.

ANSI/ESD STM 11.13 Two-Point Resistance Measurement of Dissipative and Insulative Materials.

About the Author

Gene Chase is a member of the ESD Association, active in ESD Association Standards and is presently the chairman of the ESD Glove Working Group and a member of the Periodic Verification Working Group.

He has written Bellcore (Telcordia Technologies) Generic Requirements for Electrostatic Discharge (ESD) Controlling Floor Finishes, ESD Controlling Floor Covering, ESD Protective Workstations, ESD-Protective Chairs and Carts, and revised the Bellcore ESD Protective Packaging requirements. He wrote Bellcore practices for ESD Controls and ESD Audits to mitigate ESD at telephone company facilities. From 1993 to 1996, he was chairman of the Bellcore ESD Team consisting of client members from the Seven Regional Telephone Companies, Southern New England Telephone, and Cincinnati Bell

Presently, Mr. Chase is a NARTE ESD Engineer and ESD Technical Consultant for Electro-Tech Systems, Inc., Glenside, PA. His duties include solving industrial ESD control issues, as well as, ESD control in electronic systems, ESD materials testing, and ESD audits. He has presented over 70 talks and papers.

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