



TECHNICALLY SPEAKING

Are Chemtronics Ultrajet Dusters ESD Safe?

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Lately I have been asked this question a lot. The answer is no and yes!!! No in that we don't do anything specific to make it "ESD safe" (as we do for our Freez-It Antistat) and yes, in that dusters do not generate a static charge when sprayed against a surface.

Static electricity is generated whenever two dissimilar surfaces rub against each other and then are quickly separated. Electrons will migrate from one surface to the other surface. One surface gains electrons (builds a negative electric charge) and one surface loses electrons (builds a positive electric charge). The magnitude of this effect depends on a number of factors: the speed of movement or separation between the surfaces (which relates to the kinetic energy of the molecules in the two surfaces), the relative humidity, the types of materials involved, and the characteristics and geometry of the surfaces involved.

Walk across a carpet in the winter, in a room with relatively low humidity, then touch a doorknob or another person, and you may get an uncomfortable electric shock. We're all familiar with this occurrence of static electricity. As the soles of your shoes rub against the carpet surface your body builds up an electric charge, either positive or negative, with the carpet building up the exact opposite in charge. This is called a triboelectric charge, a static charge produced by rubbing.

If the relative humidity in the room is low enough, walking speed produces enough kinetic energy (energy of motion) to cause a transfer of charge (transfer of electrons) during the collision of the molecules that make up the soles of your shoes with the molecules of the carpet's surface. If you touch a grounded object you'll discharge this electricity, sometimes painfully!

For an aerosol product to be rated as ESD safe the aerosol spray must generate a static charge of less than 100 volts when sprayed against a surface. In the case of a gas duster, no triboelectric charge can develop because, at normal temperatures, the gas molecules do not develop enough energy of motion (kinetic energy) to cause a migration of electrons during collision with another surface or molecule. **The amount of kinetic energy a gas molecule contains depends on its mass (weight) and its velocity (speed). A gas molecule will be moving very fast across a stationary surface, but it has very little mass, so the energy or force with which it collides with the surface is not enough to cause a transfer of electrons between the molecule and the surface.** Therefore duster products, which emit a stream of gas molecules, could be said to be "naturally" ESD safe, in that they cannot produce a triboelectric charge



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We can even back up this claim with laboratory test data. We have a device in the lab that measures the voltage on a charged metal plate. We can set the initial charge on the plate to zero, then spray a duster directly onto the plate and note the voltage of the triboelectric charge that develops on the plate due to contact with the gas stream. In all our tests the voltage on the plate remained at zero. This is sufficient evidence to conclude that an aerosol gas stream does not produce triboelectric charging and to qualify our dusters as ESD safe for all charge sensitive environments.

A substantial static charge can be generated when a stream of liquid passes through the components of an aerosol can. As the material stream rubs against the inside of the diptube or aerosol valve and the inner walls of the extension tube, electrons migrate from one surface to the other surface and the material stream develops either a positive or negative triboelectric charge. Since circuit refrigerants (freezers) deliver a liquid stream of super-cold liquified gas, we have created Freez-It Anti-Stat, which has a built-in static dissipative agent.

So, to wrap-up this discussion, aerosol gas streams do not produce a build-up of static electricity when sprayed against a surface. Since aerosol dusters emit a gas stream they will not produce a build-up of static electricity on any surface they are sprayed onto, therefore they're ESD safe.

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