



How to Choose the Right Anti-Static Brush

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Every time you dry brush a surface, whether for cleaning, finishing or applying; a static charge is created. *Tribo* in the word triboelectric means rubbing. The effect of this charge can range from critical in static-sensitive environments like munitions plant where a static charge can be dangerous or lethal, to extremely serious when working with sensitive (and expensive) electronic components, to problematic throughout the world of manufacturing wherever non-conductive parts are machined or moved or ungrounded conductive parts or machined or moved.

Static charges come in very large packages. Walking across a carpet on a dry day wearing leather shoes will create upwards of 30,000v of static charge [the spark when you touch the light switch].

Frequently, the term "anti-static" is used as a generalization to encompass low charging, static dissipative and conductive properties. Each of these types of brushes has its own unique properties and recommended uses.

Types of Anti-Static Brushes:

Conductive brushes are used for applications where it is necessary to reduce the static charge to 0v because even a small charge obstructs the operation and the medium being discharged is not sensitive to high current flow. An example is the brushes inside copy machines. The charge on the paper is small but its presence is sufficient to make individual sheets of paper cling together. The current created by the rapid discharge [$I = E/R$ and R is near 0] of the paper through the conductive fiber is not harmful to the equipment. Another example is in brushing off plastic chips that cling to the block from which they were produced. Again, the rapid discharge is not harmful to the medium and a small charge is problematic.

Static Dissipative brushes are used for applications where high current flow would be damaging to the product being discharged. Static dissipative brushes introduce a high resistance [R] between the charged surface and ground thereby reducing the current flow proportionally. This is the only fiber recommended when working around Class 1 electrical components. The limitation to static dissipative fiber is that it doesn't reduce the static charge to 0v. At some point, the charge is insufficient to overcome the resistance and that amount of charge will remain on the medium.

Low Charging brushes are used for applications where the creation of a charge of <200v when using the brush is not important. These brushes do NOT remove an existing charge. These brushes are used for non-electronic purposes. Because of the unique properties of the low charging fibers [horse hair, tampico, goat hair, and hog bristle], these brushes find extensive application.

Anti-Static Brush Materials:

- Natural fibers: goat hair, horse hair, tampico and hog bristle.
- Synthetic fibers: static dissipative nylon, Thunderon™, Statigo9, and carbon fiber can be used for clean room applications.
- Metal fibers: Brass, phosphor bronze, aluminum, and stainless steel are often used for conductive brushes and some cleanroom applications.

If the brush is being used exclusively for electronic purposes, choose small diameter fibers because they abrade much slower than stiffer fibers but accomplish the same task. When using the brush for non-electronic purposes, the metal and synthetic fiber diameters can be increased to stiffen the brush or decreased to soften it. Always choose the minimum diameter that will accomplish the task to minimize brush wear.

Handles:

- Wood is least expensive brush handle material for low charging applications, but cannot be used for cleanroom applications.
- Aluminum, brass and stainless steel are frequently used in conductive applications.
- Plastic that has been modified to have either conductive or static dissipative properties.

Environmental Factors:

Frequently, environmental factors determine which fiber and handle is best suited for the application. Temperatures, chemical environments, FDA requirements, and outgassing concerns are a few among the many considerations that go into fiber and handle selection.

Automated or Manual Applications:

If the brush is going to be used for a manual application, the shape and size of the handle will be important.

Handles need to be comfortable to those using them and not be so heavy that they cause stress from repetitive use. The size is also important: Using too small of a brush creates additional work; using too large of a brush can be ineffective or cumbersome. If the brush is going to be used for an automated application, you may need anti-static brushes that are custom made to fit into your equipment or processes. Finding a partner who has the manufacturing capabilities to meet your requirements and timeline can be challenging.

Prototypes, Testing and Production:

Finally, you may need to have one or multiple prototypes created so you can test their performance in your

environment. Find a partner that will work with your engineers to make sure you get the right anti-static brush for the job. This partner will also need the right equipment to manufacture the brushes to meet your requirements. In addition to meeting manufacturing requirements, they will also need to deliver your brushes in the timeframe you need.

An industrial brush manufacturer, like Gordon Brush, will have the experience and knowledge to help you choose the right brush. With more than 20 years of working with anti-static materials, they can help you find the right solution, create your prototypes and manufacture your product.