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Choosing the Right Matting

Antistat provide a wide range of static table and floor mats for use in EPA Areas. This information sheet has been compiled to allow you to make an informed decision on the best matting to use, however should you need any further advice then please contact one of our experienced sales advisors who will be happy to discuss your requirements.

HOW STATIC MAT WORKS?

Static matting is designed to drain static charge from items placed on its surface, they also protects the surface of the ESD sensitive devices from wear and tear. For a mat to effectively ground an item, the item must be either conductive or dissipative as insulative items will not allow charge to drain to ground eg most plastics.

MAT MATERIALS

ESD mats are generally available in Vinyl or Rubber material.

- ESD Vinyl mats are the most widely used material for table top or work surface applications. They are cost effective, easy to cut to shape and provide excellent static dissipation.
- ESD Rubber mats are used where high resistance to heat and chemicals is required.

ESD mats are divided into two categories, ESD table top mats or ESD Work surface mats and floor mats.

- ESD table top or ESD worksurface mats have smooth or lightly embossed surface and are available in light colors. ESD table top mats are available in single layer vinyl homogeneous material, two layer rubber material and three layer with homogeneous vinyl top and foamed vinyl on the back with carbon layer in the middle.
- ESD floor mats have heavy embossing or groves to improve traction, have anti fatigue style to reduce stress and are available in dark colors to hide dirt.

PERFORMANCE OF MATTING

The performance of static matting is based on the material it is constructed from. The performance is based on electrical properties, tolerance to heat, chemicals, mechanical abrasion and cost.

ELECTRICAL PROPERTIES

To work properly, a mat must be able to conduct electricity and its range of conductivity is important. If the mat's resistance is too low, static transfers to the mat and a spark is created causing an electrostatic discharge (ESD) which will in turn damage electronic devices. If the mat's resistance is too high, static transfers slowly and any items placed on the mat will not lose their charge. When the item is removed from the mat, the static charge will be capable of discharging to other items.

TEST METHODS

EOS/ESD Standard 4.1 outlines test methods for static mats. There are two electrical measurements made: Resistance Top to Top (R_{TT}) and Resistance Top to Ground (R_{TG}).

Resistance Top to Ground (R_{TG})

This is the most important electrical test for mats showing a mat's ability to conduct static from a point on the mat's surface to the mat's ground point. EOS/ESD Standard 4.1 guideline for R_{TG} is $<10^6$ to 10^9 ohms.

Resistance Top to Top (R_{TT})

This test measure the resistance between two widely separated points on the surface of the mat to confirm that all areas of the mat conduct static at the same rate. The measurement also exposes cut or damaged center layers in multi-layer mats. EOS/ESD Standard 4.1 guideline for R_{TT} is $>10^6$ ohms.

Surface Resistivity

This test does not reveal much about the mat's ability to perform correctly, however it does allow differentiation between ESD mats and non-ESD mats. However dirt can act as an insulator on the surface of a mat, so it is a useful test to monitor the mat after cleaning. By monitoring this resistivity a cleaning schedule can be arranged.



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CONSTRUCTION

Static mats can be made from solid sheets, multiple layers and suspended particles, offering differing electrical performance.

HOMOGENEOUS (VINYL AND RUBBER)

Dissipative Vinyl or Rubber

Homogeneous or solid mats consist of the same material throughout. These mats provide good mechanical service with electrical performance normally limited to about 10^9 to $10^{10} R_{TG}$.

THREE LAYER (VINYL)

Dissipative Vinyl

Conductive Metallized Layer

Dissipative Vinyl Foam

Three layer mats are constructed from a conductive metal / carbon layer between a top surface of vinyl and a layer of foamed vinyl on the back. The conductive layer improves the electrical properties by acting as a fast track to move static charge to ground. The foam back layer provides a cushion for operators making it easier to pick up parts.

TWO LAYER (VINYL)

Dissipative Vinyl

Dissipative Vinyl Foam

This two layer mat combines the foam from the three layer mat and the dissipative vinyl from solid mats. As it contains no metallized layer it will provide average electrical performance, it does however make it more cost effective option.

TWO LAYER (RUBBER)

Dissipative Rubber

Dissipative Rubber Foam

This option provides a top layer of static dissipative rubber and the back layer of conductive rubber giving the same electrical performance as the vinyl three layer mat with great tolerance to heat and chemicals. This type of matting does come with a cost premium.

GUIDE TO SELECTING THE RIGHT MAT

Please find detailed below a basic guide to help you select the right materials for your application:

Table Mats	<ul style="list-style-type: none"> • Use light colors to make finding small parts easier. • Have smooth or lightly embossed surfaces. • Are usually thinner than floor mats.
Floor Mats	<ul style="list-style-type: none"> • Use dark colors to hide dirt. • Have heavy embossing or groves to improve traction. • Are usually thicker than table mats to absorb more wear.

Mat Type:	Electrical Properties:		Usage:	Features:
	R_{TG}	R_{TT}		
Homogeneous	$10^9 - 10^{10}$	$10^9 - 10^{10}$	Table / Floor	Durable material
Three Layer	$10^7 - 10^8$	$10^7 - 10^8$	Table	Excellent electrical properties
Two Layer Vinyl	10^{10}	10^{10}	Table	Low cost
Two Layer Rubber	$10^7 - 10^8$	$10^7 - 10^8$	Table	Heat / solder tolerant Chemical resistant Excellent electrical properties