



Learning about Electrostatic Discharge - Part 4: Choosing the Right Matting



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How Antistatic Mats Work

Antistatic matting is designed to drain static charge from items placed on its surface. They also protect 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 e.g. most plastics.

Mat materials

Antistatic mats are generally available in vinyl or rubber material:

Vinyl mats

Vinyl is the most widely used material for table top or work surface applications. Vinyl mats are cost effective, easy to cut to size and provide excellent static dissipation.

Rubber mats

These are used where high resistance to heat and chemicals is required.

Mat applications

Antistatic mats are divided into two categories, table top/work surface mats and floor mats:

Table top/work surface mats

These mats have smooth or lightly embossed surface and are available in light colours. They 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.

Floor mats

These mats have heavy embossing or groves to improve traction, a cushioned surface to help reduce stress on the body for increased ergonomic safety and are available in dark colours to hide dirt.

Performance of matting

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

Electrical Properties

To work properly, a mat must be able to conduct electricity so the 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

ESD STM 4.1-2017 outlines test methods for antistatic 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. The ESD STM 4.1-2017 guideline for R_{TG} is $<10^6$ to 10^9 ohms.

Resistance top to top (R_{TT})

This test measures 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 centre layers in multi-layer mats. ESD STM 4.1-2017 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 antistatic 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

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

Structure of Homogeneous Mats (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 Mats (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 Mats (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 and is the more cost effective option.

Two Layer Mats (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 at a premium cost.

Guide to Selecting the Right Antistatic Mat

Test Results and Information

Below is a basic guide to help you select the right materials for your application:

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

Smooth vs textured

Most mats come with either smooth or textured surfaces. Both come with their own unique benefits and choice is down to user requirements.

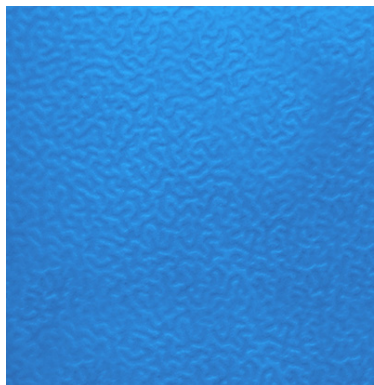
Antistatic bench mats with textured surfaces are used to break down the surface's reflective properties, reducing glare and improving operator comfort.

Smooth bench mats, however, are much easier to clean and should be used where there may be large amounts of contamination.

Smooth



Textured



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Guide to Selecting the Right Flooring

While standard matting can be used on the floor of an EPA there are other flooring options which can be used with specific key benefits. Choosing these over standard matting is highly recommended.

Anti-fatigue matting

Anti-fatigue matting is perfect for operators who stand around in the EPA for many hours at a time. Its soft ergonomic style provides additional support for production staff improving standing comfort by around 50%, creating a durable floor surface for your EPA.

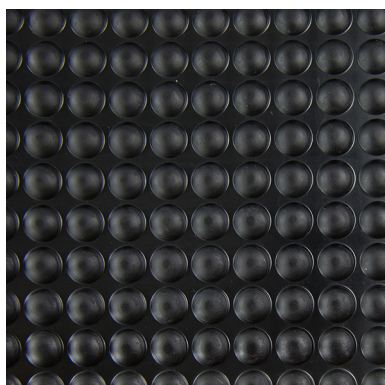
Bubble, Disc or Cone?

These mats are available in three surface variations each offering particular features.

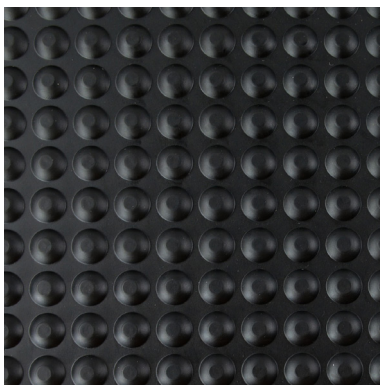
Bubble surface offers highest standing comfort, the **Disc surface** offers comfort and easy access for material vehicles, both are also available with Fire-retardant properties.

The **Cone surface** offers the optimum ergonomic solution for wet, oily and slippery industrial areas due to its resistance to most industrial oils and fluids.

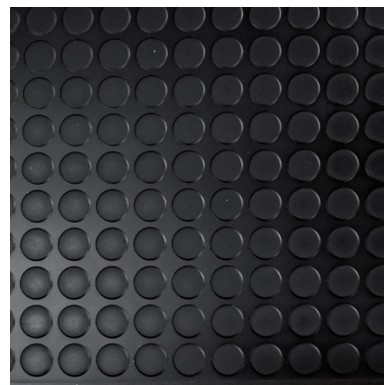
Bubble



Cone



Disc



Deck Matting: This style of matting incorporates a deck plate surface design featuring yellow safety borders on 2 sides and ramped edges on all sides – this matting has high standing comfort and positive anti-fatigue effects on employees.



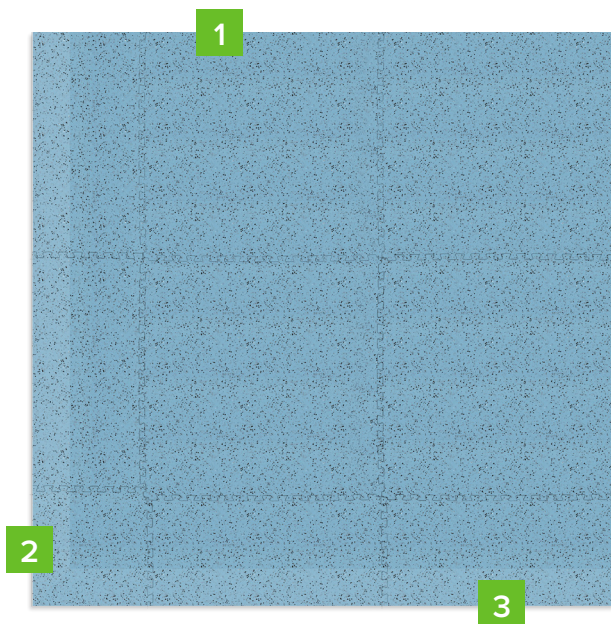
Scan the QR code to the left for a video detailing our range of Anti-Fatigue matting.

Floor tiles

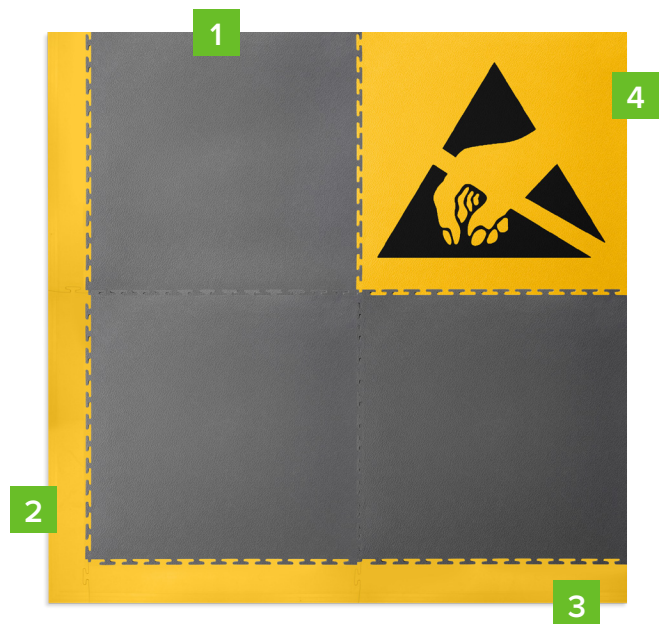
Floor tiles are used as a permanent flooring solution and can be used as your primary ground. They are tough, durable and can cover wide areas depending on the size of your EPA.

We offer both Vinyl Connecting Tiles and Interlocking Floor Tiles. The choice of which one to buy is merely up to user preference, both sets provide the same functionality and have similar styled tiles as shown below:

ESD Vinyl Connecting Tiles



ESD Interlocking Floor Tiles



1 Standard tile

Comes with interlocking joints on all four sides.

2 Corner tile/ramp

Used to neaten corners of the tiles.

3 Ramp tile

Used to allow easy accessibility for vehicles and dollies.

4 Pictotile

Used to caution those entering an EPA area.
Exclusive to the Interlocking Floor Tile range.

The interlocking tiles above are easy to install - Scan the QR codes below for their product pages including a download link to the respective guides.

ESD Vinyl Connecting Tiles



For our full range of Vinyl Connecting Tiles and installation guide, follow this QR code.

ESD Interlocking Floor Tiles



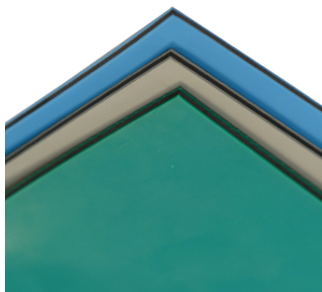
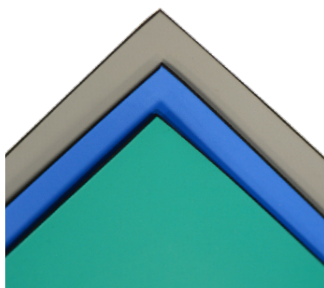
For our full range of Interlocking Floor Tiles and installation guide, follow this QR code.

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Our Range

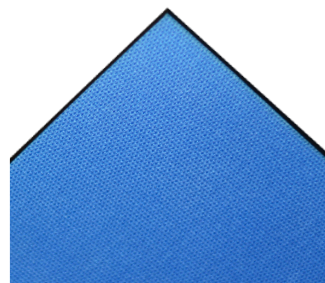
Smooth Mats

Smooth Antistatic Mat - 2 Layer Smooth Antistatic Mat - 3 Layer



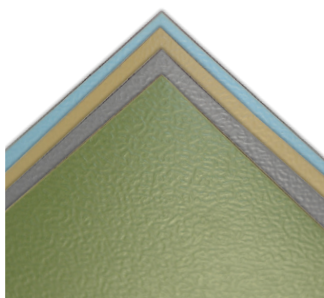
Anti-Slip Mat

Floor Matting Anti-Slip



Textured Mats

Premium Textured Antistatic
Mat - 2 Layer



Textured Antistatic Mat
- 2 Layer Roll



Conductive Mat

Black Conductive Mat



For all our matting and flooring,
follow the QR code to the left.
For more information please talk
to our expert team.

Visit our website: www.antistat.co.uk

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Updated 5 January 2024 10:45 am

