

## Conductive Versus Static Dissipative ESD Control Tile

The question most often asked about VPI static control tile is: What is the difference between Conductile and Statmate, and in what applications should they be used?

In answering both parts of this question, several other questions are appropriate: Why are two resistance ranges of ESD control tile available? How exactly do their properties and end-use performance differ? In what applications is it appropriate to use one versus the other?

Per ASTM F 150, NFPA 99, and ANSI/ESD STM7.1, conductive tile is defined as having a resistance range from 25,000 ohms to 1,000,000 ohms. Static dissipative tile is specified as having a resistance range from 1,000,000 ohms to 100,000,000 ohms. All physical performance properties and chemical resistance ratings are identical. In addition, installation procedures, maintenance requirements and adhesives are the same for both our conductive (Conductile) and dissipative (Statmate) products.

The difference in resistance (or, conversely, conductivity) results in significantly different static decay times. Federal Test Standard 101C, Method 4046 measures the time for a flooring material to decay from 5000 volts to zero volts. For conductive tile this time is < 0.01 seconds; for static dissipative tile this time is ~ 0.2 seconds, or at least 20 times slower. This difference means that conductive tile will drain static charges from personnel 20 times faster than static dissipative tile, resulting in significantly greater protection for electronic equipment against damage from static generation, especially since many of today's sensitive components can be damaged by less than 100 volts static charge.

This data clearly shows that conductive tile is much more effective than static dissipative tile in protecting electronic equipment, assemblies and components against ESD damage. Based on this, why would static dissipative tile be specified or selected?



The conductive version was the first to be developed, and sold by VPI, in 1949. Conductile was specifically developed for hospital operating rooms, as protection against potential explosions from the use of ether and oxygen. Conductive tile drained static charges from operating room personnel, assisting in the prevention of explosion-generating static discharges.

As other industries became aware of Conductile, its use was extensively adopted by the developing transistor and printed circuit electronics industries, to protect against personnel-generated static charges damaging electronic components.

As the benefits of ESD control tile became better known, some electronic facility engineers requested a less conductive ESD control tile. In the early days of the electronics industry, equipment was not grounded or insulated as well as they are today. This was in the era before three-prong (grounded) plugs and plastic, doubled insulated enclosures.

Some engineers thought that conductive tile might be more conductive than was needed, and could present a potential life safety hazard due to the increased possibility of electrical shock. At the same time, components were not yet as sensitive to static charge as modern devices, so very fast static decay might not be needed. In response to these concerns, static dissipative tile was developed.

Today, communication equipment and computers are so well insulated that static dissipative tile can be used in communication facilities and computer rooms without fear of damage to the sensitive components inside. This is true as long as the equipment is not serviced in these areas. However, because at the same time modern equipment is so well grounded, there is no shock hazard created by installing conductive tile in these areas as well.

On the other hand, conductive tile should always be used in areas where electronic components are handled, such as in service areas, server rooms, and fabrication facilities.

Therefore, based strictly on electrical considerations, there is no compelling reason not to use conductive tile for all applications.

Facilities increasingly want to comply with *ANSI/ESD S20.20, Protection of Electrical and Electronic Parts, Assemblies and Equipment*. This document defines a systems approach towards establishing and maintaining a facility ESD Control Program. It includes measurement and specification of the total resistive path to ground from the personnel wrist strap, through the footwear and flooring. The specification is  $< 35 \times 10^6$  ohms.

Quoting an article from Conformity magazine (2007 Annual Guide) by David Long, Common Mistakes When Selecting a Static Control Floor:



**“In general, most experts agree that conductive flooring offers distinct advantages over static dissipative flooring. This fact becomes obvious through a careful reading of the ESD Association’s document *ANSI/ESD S20.20*, which ...recommends a flooring footwear total system resistance of no greater than 35 megohms. This total resistance would be difficult to achieve if the flooring material, by itself, measured in the upper range of static dissipative (a material can measure as high as 1000 megohms and still be characterized as static dissipative).” (The entire article can be viewed at: [http://www.conformity.com/artman/publish/article\\_181.shtml](http://www.conformity.com/artman/publish/article_181.shtml)).**

**In summary, after consideration of all available test data and application parameters, when in doubt, choose a conductive floor.**

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