UNDERSTANDING DIELECTRIC, CONDUCTIVE AND STATIC DISSIPATING EPOXY FLOORING SYSTEMS

Hallemite includes both fluid applied ESD and non-conductive dielectric epoxy flooring systems. ESD epoxy flooring systems for years have been considered to be only functional, but never aesthetically pleasing.

WHAT DOES "DIELECTRIC" MEAN?

Materials with relatively low electrical conductivity are referred to as dielectric, however only a vacuum is considered a perfect dielectric environment. A true vacuum has a rating of zero conductivity.

Dielectric materials are imperfect compared to a vacuum and are rated on their insulative value. Their dielectric strength value is determined based on the current that flows through it and the associated current lose. The loss is referred to as "leakage current".

Leakage current is the amount of electricity that escapes through a medium during the test. To test the dielectric strength of a material, 2500 volts DC is applied to the sample and the leakage is recorded. The voltage is increased and the leakage is recorded, if there is no increase in the leakage current, then there is not an electrical breakdown.

Eventually, as the voltage is increased the flooring system will break down creating a leakage path. Generally, dielectric strengths of 50,000 volts DC or more are required of an epoxy dielectric flooring system.

Thickness of material, moisture content of the aggregate, humidity and standing water will affect the dielectric performance of the material. As the moisture content is increased the materials resistivity decreases, therefore, the more hydrophobic an epoxy flooring system is the better.

WHY IS DIELECTRIC FLOORING SYSTEMS NECESSARY IN TODAY'S ENVIRONMENT?

The main purpose of a dielectric flooring system is to minimize the possibility of injury to people and machinery.

For long term durability, epoxy dielectric flooring systems should be designed to minimize their break down under voltage induced stress, since the flooring system is intended to insulate people and equipment from electrical shock.

Hallemite dielectric flooring system, when tested in accordance with ASTM D 149 Dielectric Strength, pass test requirement of 40,000 volts DC.

WHAT DOES "CONDUCTIVE " MEAN?

The term conductive refers to the ability of electricity to pass through a material. A conductive material will only allow a certain amount of electricity through it without restricting its flow. When the flow of electricity is restricted, it is called resistance and the amount of resistance is measured. The electrical resistance of a system is measured in ohms. Conductance is the reciprocal of electrical resistance.

WHAT DOES AN EPOXY, CONDUCTIVE FLOORING DO?

An epoxy conductive floor is similar to an "electrical instrument" that controls the flow of static electricity. Epoxy conductive floors allow a static electric charge to slowly and continually bleed off to an electric ground before it reaches a voltage level high enough to cause an electrical spark.

CONDUCTIVE STANDARDS: WHY IS CONDUCTIVE SPARKPROOF FLOORING NECESSARY IN TODAY'S ENVIRONMENTS?

Historically, spark proof flooring systems were used in an explosive environment but in today's electronics industry, small sparks, ones that can be neither seen nor felt, may damage sensitive electronic components. Electronic components can be damaged by as little as 100 volts of static electricity. In the near future, components may be vulnerable to as little as 10 volts. As a point of comparison, the electrostatic discharge one sees and feels as a spark in a dry air environment when touching a light switch registers between 5,000 and 25,000 volts.

CONDUCTIVE STANDARDS:

The conductive standards were established to maintain conductivity levels as low as possible without making the flooring system extraordinarily dangerous to use. The conductivity is measured by the resistance of the floor in ohms. The standards are 0 to 250,000 ohms for explosive handling areas and 25,000 to 1,000,000 ohms for medical suites. The measurements are taken at 36 inches with 500 volts. At these levels, electricity flowed with very little restriction. 25,000 to 1,000,000 ohms is considered standard for "Conductive Floors".

MICROELECTRONICS REQUIRES DEVELOPMENT OF NEW STANDARDS:

The increased vulnerability of electronics has created a new level of quantitative measure for conductivity called "Electro Static Discharge" also known as "ESD". The special needs of microelectronics have caused new standards to be developed. The most accepted standard for flooring is a resistance from 1,000,000 to 100,000,000 ohms.

Although these numbers appear to represent a dramatic change in resistance values, they are not, because, along with the change in resistance levels, the testing voltage has also been reduced from 500 to 100 volts. Therefore, many existing conductive floors, when tested at 100 volts fall into the "ESD" resistance ranges.

HOW QUICKLY DOES STATIC ELECTRICITY DISSIPATE?

A second evaluation criterion for electronics is the length of time it takes for a static electric charge to dissipate through the floor. The precept is that an electrical charge looses all of its potential immediately when grounded by a conductive floor, but that is not true. The fact is static electricity does not and some highly conductive floors can be very slow to discharge a static charge.

A number of standards exist, but the most common is 10% decay in 0.5 seconds. Testing is done under Test Method Standard No. 101, Method No. 4046 according to MIL Standard.

TRIBO-ELECTRIC CHARGING:

Tribo-electric charges are produced by friction. When two dissimilar materials are rubbed together a friction charge is developed. Tribo-electricity tests evaluate the coefficients of friction between two materials. This critical evaluation criterion is currently being established. The test criteria will determine the ability of the flooring material, even a conductive flooring material, to build a static electric charge when dissimilar materials, such as the sole of a shoe, come into contact with the floor. Most conductive epoxy flooring systems, particularly those in the "ESD" range, can promote what is known as "Tribo-Electric Charging."

Tribo-Electric charges are normally lower values than traditional static charges, usually less than 500 volts, but they can be just as damaging to a micro-electronic circuit.

At present, very little data is available on the Tribo-Electric charge potential of epoxy dielectric and conductive flooring systems, since the test equipment, the test methods, and industry standards have not been established. It is likely most epoxy flooring systems are "Tribo generators", which is the exact opposite of what is expected and what is ultimately desired.

HALLEMITE DIELECTRIC AND STATIC DISCIPATING FLOORING SYSTEMS:

As new standards develop, Hallemite will stay on the leading edge of the latest technology. Hallemite seamless fluid applied epoxy and static dissipating surfacing systems help to reduce electrical component losses associated with electrostatic discharge (ESD), while Hallemite dielectric flooring system provides insulation.

The Hallemite Floor System works by reducing the potential for static charge buildup on the individuals and equipment that may come in close proximity to the sensitive electrical components and explosive elements. Hallemite ESD flooring systems provide a passive avenue for discharge for individuals and equipment that have become electrically charged.

The reduction of electrostatic discharges (ESD) on the human body and equipment will reduce the damage and associated time and monetary losses.

Hallemite Static Dissipative Flooring Systems are used where static control is required. The electrical resistance level of the static dissipative flooring system is greater than a conductive floor.

Hallemite Dielectric, and (ESD) Static Dissipative Flooring Systems meet various standard and test requirements depending on the system chosen, such as, National Board of Underwriters, National Fire Protective Association Bulletin 99 and ESD Association S 7.1. Mil Standard test Method Standard No. 101, Method No. 4046, and ASTM D 149 Dielectric Test Method.

Current Dielectric, Conductive and E.S.D. Standards

1. Dielectric Flooring - 40,000 volts DC, passing
2. Conductive Flooring - 25,000 to 1,000,000 ohms
3. ESD Flooring - 10^6 to 10^9 ohms
(1,000,000 to 100,000,000)
4. Charge Decay - 10% every 0.5 seconds
5. Tribo Generation - less than 100 volts

LIMITED WARRANTY (abridged)
Neither seller nor manufacturer has any knowledge or control concerning the purchaser's use of the system or product. No express warranty is made by the seller or manufacturer with respect to the results of any use of the product. NO IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO AN IMPLIED WARRANTY OF MERCHANTABILITY, OR AN IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE ARE MADE WITH RESPECT TO THIS SYSTEM or PRODUCT. Neither seller nor manufacturer assumes any liability for personal injury, loss, or damage resulting from the use of this product. In the event that the product shall prove defective, buyer's exclusive remedy shall be as follows: Seller or manufacturer shall, upon written request of buyer, replace any quantity of the system or product which is proven to be defective, or shall, at its option, refund the purchase price for the system or product upon return of the system or product.
(See Hallemite Price Schedule for full limited warranty)
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