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TECHNICAL ARTICLE

Testing the resistance of static dissipative footwear

Through their own movement people can generate large amounts of static charge if they are not grounded. Over 30,000 volts can be carried by people who are completely unaware that they themselves are the potential source of an electrostatic spark discharge that could ignite a flammable atmosphere.

Discharges of static electricity have been identified as an ignition source for a broad range of processes that cut right across a wide selection of industry groups with both plant equipment and personnel based operations.

Static charge accumulation on workers can be mitigated by issuing them with footwear that is designed in accordance with **EN ISO 20345:2011** and **ASTM F2413** safety standards or recommended practice documents like **NFPA 77** and **IEC TS 60079-32-1** that incorporate static dissipative properties in the structure of the footwear.

Static dissipative footwear is designed to mitigate hazards that may arise due to excessively high footwear resistance with respect to ground. Regular testing of static dissipative footwear is strongly recommended to ensure the static dissipative properties of the shoes do not change during the duration of their use. The provision of footwear to plant personnel only reduces the risk if properly maintained, and this cannot be detected by visual inspection of the shoes alone. It should therefore be a fundamental requirement of organizations that have employees handling flammable and combustible materials in hazardous environments to ensure that the product is capable of fulfilling its designed function of dissipating electrostatic charges. There is an obligation to perform electrical resistance tests via in-house footwear testers.

The **Sole-Mate™** tester from Newson Gale provides a time efficient and cost effective method of ensuring personnel operating in hazardous areas are wearing static dissipative shoes that are capable of mitigating electrostatic charge accumulation on their bodies. The system tests the condition by checking the resistance of the footwear to ensure static is capable of dissipating from personnel through their shoes to ground.

IEC TS 60079-32-1, 11.3 "Dissipative and conductive footwear" states:

"Resistances can be measured with commercially available footwear conductivity testers which measure the resistance between a hand-held metal bar via body and feet to a metal plate on which the person stands. Alternatively, the resistance between a shoe filled with shot pellets and a steel plate on which the shoe is pressed can be measured according to IEC TS 61340-4-3.

The resistance of footwear can increase with the accumulation of debris on the footwear, use of orthopedic insoles, and reduced floor contact area. The conductivity of footwear should be tested frequently to confirm functionality."

Remember: Always check for and read the latest version of the International Standards, Guidance and/or Recommended Practices.

The **Sole-Mate™** testing station is typically located at the entrance to a hazardous area and plant personnel are provided with a quick 'pass' or 'fail' reading instantly. If the resistance of the shoes is too high, the **Sole-Mate™** tester will indicate that the shoes have failed the test via a red LED and buzzer alarm. If the shoes pass the test a green LED will indicate to the operator that the shoes are fit for purpose.

For those companies that want to interlock the system to certain areas of their facility with entry access or audible alarms, an integral volt free relay contact makes it possible for the system to prevent access to a hazardous area without a pass reading on the tester, indicating that only suitable footwear is being worn upon entry.

It is not uncommon to find that footwear fails; after-all that is what the tester is designed to do. If footwear fails due to conditions – these present a risk as it indicates there is not a dissipative path through the person to ground to the required standard (for example, **EN ISO 20345)** and this presents a risk to operators and other plant personnel on site.

It is important to consider factors that could affect the resistance between the test button and foot plate. The electrical resistance of static dissipative footwear can be changed significantly by a number of factors such as (to name a few):

1. **New footwear** – new shoes can have a slightly higher resistance due to the material coating on the sole. Once the footwear has been worn in, typically a pass is registered.

2. **Coated footwear** – common in the coatings industry where the Sole-Mate II test is vital, a build-up of paints or coatings on the sole of the shoe regularly occurs. Again, a cleaner sole will usually give off a lower resistance.

3. **Insulating inner sole** – although a common occurrence in everyday footwear, the inserting of an inner sole isolates the body of the individual from the shoes. Only safety footwear inner soles should be used.

4. **Wrong certification** – if shoes manufactured in accordance with **EN ISO 20345** are tested on a footwear tester designed to test shoes at **NFPA 77** recommended practice, there is a strong possibility that the tester will fail the shoes.

The **Sole-Mate™** footwear tester is just part of the static grounding and bonding equipment available from Newson Gale. Newson Gale offers a wide range of static grounding and bonding equipment which is made to provide optimum safety in explosive atmospheres for a variety of process applications. The Newson Gale range mitigates static charge accumulation by using practical and innovative design, and ensures effective static control on three levels – grounding and bonding clamps, visual verification systems and interlockable control systems.

Recommended Solution:

Sole-Mate™

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