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Consideration of incendive electrostatic discharges in the use and production of hand sanitizers

Many companies are reconfiguring production lines, or starting up new ones, to increase the supply of hand sanitizer in response to the current pandemic. However, industry groups like the Solvents Industry Association are concerned with reports of inappropriate packaging of solvents and an incident of a static discharge igniting vapors present on an operator's hand after the application of hand sanitizer.

This short note will outline what approaches can be taken in terms of managing the risk of solvents (including alcohols) being ignited by uncontrolled discharges of electrostatic sparks.

The importance of grounding people

Managers of facilities where operators have exposure to potentially flammable or combustible atmospheres need to ensure the operators are grounded. This is because people isolated from a ground source *(e.g. flooring capable of dissipating static charge to ground)* can accumulate large electrical potentials *(voltages)* beyond 20,000 volts without even realizing it until they discharge a spark.

In addition, if operators are regularly applying hand sanitizers, either inside or outside a designated hazardous location, it is important to ensure that they do not have the potential to accumulate electrostatic charge on their bodies. Ignition of vapors emanating from the hand can occur if the person approaches or touches a grounded object (e.g. door handle, stair railing) resulting in a static spark discharge with enough energy to ignite the vapor.

The most effective means of grounding personnel is to ensure that they are provided with safety footwear that meets the static dissipative criteria specified in standards like ASTM F2413-18 or EN ISO 20345. Testing all footwear prior to entry into the facility is recommended. Easy to use footwear testers can be installed at designated entry points to hazardous locations in the facility, (or to the overall facility if required).

Such testers utilize a simple plate on which an individual stands, with their safety shoes on, and presses a button with their index finger to initiate the test. If the resistance threshold of the shoes is below the required level, as specified in ASTM F2413-18 or EN ISO 20345, the test will indicate a positive output with a green LED indicator that provides the operator with a "GOOD-TO-GO" message that he/she can enter the hazardous location.

If the shoes fail the test the indicator will stay red and the tester's buzzer alarm will activate. At this point the operator should not enter the hazardous location and should report the failed shoe test to the most relevant authority in the facility. An interlockable dry output contact can be specified to control the door entry system and prevent access to the hazardous location.

Containers used in production and transportation

In relation to the use of containers, particularly IBCs (totes), they should, ideally, be of an all metal construction so that when they are grounded, electrostatic charge cannot accumulate on the surface of the container. If the supply or use of fully metal IBCs is not possible, then the metal cages that contain the plastic container should be grounded. Splash filling should be avoided as this increases the rate of charge generation.

If electrostatic charge is permitted to accumulate the voltage of the IBC will rise very rapidly and result in this energy being discharged in the form of an electrostatic spark onto a grounded object like an operator. If the spark energy is sufficiently high it will ignite the surrounding vapors with little effort. A discharge at 20,000 volts would be capable of releasing up to 60 mJ of energy via the static spark.

Additional sources of best practice information

It is not possible to discuss every potential process involving the use of solvents, however, a more comprehensive summary of the various processes at risk of static discharges in solvent processing and handling operations can be viewed on the European Solvents Industry Group website.

https://www.esig.org/solvents-and-static-electricity/

You can also check the latest guidance and recommended practices in: IEC 60079-32-1, NFPA 77 & API 2003

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