We are Stonehouse process safety

Hello,

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Process Safety Dispatch

In this Issue

Static Electricity Hazards from Splash Filling, Steam Leaks, Spray Washing...

We're going to look at fires and explosions CAUSED by static electricity on suspended liquid **DROPLETS**. Everything from **steam leaks** to **spray washing**, **splash filling,** to **lightening** is implicated here, so follow closely. We're going to take you on a journey of discovery that begins in Old London Town, England, May 14th, 1853, where a crowd is gathered in the packed lecture theatre of the Royal Institution. But before we do, read this:

In Early 1970 the New York Times (Ref. 1) ran an article about the loss of **THREE** large oil tankers off the coast of Africa. Crew members died, were injured, or were reported missing as a result of explosions inside the holds of the ships. In all cases it was believed that the explosions had occurred during tank cleaning – a process involving the use of **high-pressure water jets** directed at the cargo-tank walls.

More recent: "I was walking through the plant, and something caught my eye. Was I really seeing a long, continuous **spark** adjacent to one of our low-pressure steam lines – and in the middle of the chemical plant? We handle flammables solvents. This is a classified Hazardous Location! The sparking was visible through a **cloud of steam** that seemed to have formed at a drain valve on the steam line. It looked like the spark was coming from the metal cladding that surrounded the insulation on the pipe."

Something interesting is going on here. And it's clear that that 'something' involves liquid droplets.

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Expert Consulting

- Dust Explosion Prevention & Mitigation
- Control of Static Electricity
- Hazardous (Electrical) Area Classification

- Process Hazard Analysis
- Process Safety Management
- Fire and Explosion Hazard Assessment
- Incident Investigation
- Organizational Process Safety Competency Assessment

Specialist Laboratory Testing

- Combustible Dust Testing
- Electrostatic Testing
- Self-Heating / Thermal Instability Testing
- Flammability Testing of Gases & Vapors

EXPLAINERS: Static Electricity

How do I check plant grounding to control static electricity?

Answer: Conduct an electrostatics/ resistance measurement audit on plant.
Why do it: Build-up of electrostatic charge on ungrounded metal plant and equipment can

give rise to hazardous sparks, fires and explosions.

Performing resistance-to-ground measurements on plant is not necessarily a straightforward task when your purpose is concerned with protection against static electricity. If you have fixed metal plant that is interconnected to other fixed metal plant, then there is usually no reason why resistance-to-ground measured will be anything other than zero ohms. An appropriately trained electrician would be able to confirm this for you. The problem is more likely to come from moveable plant and equipment and from plant components that by design do not make metal-to-metal contact. Many of our clients invite us to undertake such specialist resistance checking and electrostatics audit work, and here are a few examples that reveal why they might do this.

How do you address:

- A vessel stirrer with bearing and coupling design that prevents metal to metal contact,
- A drum or flask (or even an operator) standing on an insulating floor,
- The supporting spiral wire inside a plastic dust extraction or liquid conveying hose,
- The indispensable vacuum cleaner on nylon wheels with no ground connection,

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What is a safe resistance-to-ground value to protect against static electricity?

Answer: The easy answer to give here is "less than 10 ohms". This value is a practical value that is often used as a base case when undertaking electrostatic hazards resistance checks. In fact, much higher resistances – hundreds or even thousands of ohms - can still be safe in many situations since currents generated by static electricity are generally tiny and ohms law tells us that the voltage that will be generated on a component is a product of the electrostatic charging current and the component's resistance to ground. A current of 1mA to a nozzle handle, for example, with a resistance of 1k Ohm would only generate 1 volt on the nozzle; not an ignition hazard.

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