

Self-monitoring earthing systems - Cost-effective explosion protection for companies

Dealing with electrostatic issues is unavoidable in many industrial processes. Electrostatic discharge can cause explosions and lead to product damage. As part of explosion protection measures, it is therefore critical to avoid "effective ignition sources" by using suitable protective procedures.



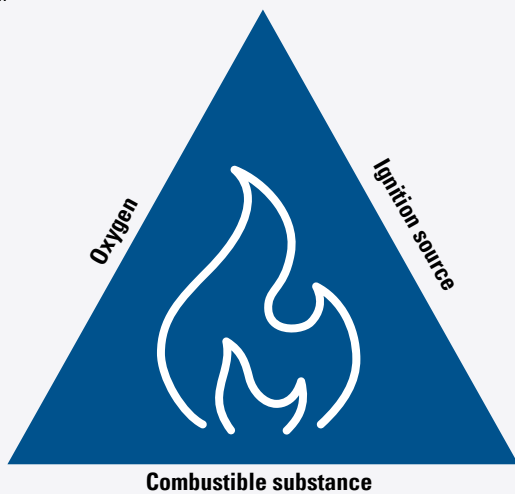
Protecting employees

Both of the European community explosion protection directives (ATEX equipment directive 94/9/EC and ATEX workplace directive 1999/92/EC) oblige all persons, from suppliers to company management, to use corresponding best practise methods and equipment to protect the workforce. Consistent earthing to avoid electrostatic discharge is the most important protective measure for the mostly "open" procedures of emptying, filling and dispensing flammable liquids or bulk goods. The flow of gases, liquids and solids creates a high probability of electrostatic charges in processing workplaces. Due to their high potential risk from spark discharge, they are a possible source of ignition in potentially flammable and combustible atmospheres.

Avoiding electrostatic discharges

The most effective and most practical method to avoid electrostatic discharge is to prevent equipment and plant or people from becoming electrostatically charged from the outset. Simple earthing and equipotential bonding allow electrical charges to be effectively and reliably dissipated away from an explosive atmosphere, therefore avoiding spark discharge. In practice however, safe earthing is not always carried out reliably and consistently. This is a concern especially for mobile objects (e.g. drums, containers) which always need to be earthed again each time they are moved. Qualified training of the workforce, suitable earthing equipment and professional handling are vital to avoid accidents, especially when handling flammable substances.

Three things are always needed for an explosion to occur: a combustible material, oxygen in the required concentration and a source of ignition. Under the right conditions, electrostatic discharge can lead to ignition.



Earthing systems as an effective protection

Often the earthing of mobile objects (drums, IBCs etc or tankers) is achieved using simple, passive clamps where in each situation a direct connection with the object is made without further testing. The contact of the clamp with the object can however be affected by product deposits or protective coatings. Cable connections may also become corroded or deteriorate in other ways, which may lead to an unsafe connection. For efficient control, self-monitoring, active earthing systems with a status display have therefore been developed. These systems offer the best protection from electrostatic ignition hazards in many regards. They continually check the integrity of the connection between the equipment and objects and there is a visual display for the worker to show that the earthing connection is intact. There is a choice of a mobile or stationary earthing system, both of which have self-monitoring and a status display. Mobile earthing systems are useful when working at frequently changing locations or when using mobile drums and containers. In addition to the visual signal, stationary, lockable earthing systems can also stop the process automatically thanks to an integral safety switch, if safe earthing is no longer ensured.

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Practical applications

In a typical drum filling process the visually checkable connection to the site earthing network may be achieved using a mobile earthing system. The worker just connects the clamps to the drum and the workshop earthing point, and ensures that the green LED start to flash. The earthing system then continually monitors the circuit to ensure that the electrostatic charges produced during the process are dissipated away from the explosive atmosphere. The continually flashing green LED on one of the clamps shows that there is a resistance of 10 Ohm or less between the drum in question and the tested workshop earthing network. If the safe earthing connection is broken, the LED display extinguishes and the worker can then clearly recognise that there is a static discharge hazard and can interrupt the filling process. It should not be restarted until the earthing has been checked. The mobile "EZ" system therefore meets the recommendations e.g. of the international guideline 60079-32-1.



Advantages for the operator - Proof of conformity with the guidelines

As part of the operator's duties, earthing equipment must be regularly checked for safety (see TRBS2153, 8.7). This also includes a resistance check of the dissipation path. However, as this does not often happen in practice, a poor connection (e.g. due to a wire breakage or corrosion) is often not immediately noted. As the earthing system described continually monitors the connections between the contacts of the earthing clamp and the earthing rail, and a positive notification is given by the LED when there is a sufficiently good connection, the time and expense of an inspection can be minimised. In addition, the use of a certified system can demonstrate compliance with the applicable regulations and recommendations. This not only ensures process safety for the user, but also offers the company and those persons responsible for safety in the company the knowledge that they are acting within the set parameters.

