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Ignition risk due to electrostatic discharges obtained from small scoops

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Abstract:

The IEC 60079-32-1 Table 3 gives restrictions of size of insulating solid materials in hazardous areas, giving a limit of 10000 mm^2 (100 cm^2) for Group IIA and IIB Zone 1. For curved or irregularly shaped objects the area is the projection of the object giving the maximum area. Note 5 to the table states that these limits are not absolute values that prevent incendive discharges, but they reduce them to a generally accepted low level. At the same time, 60079-32-1 Table 4 specifies that discharges that have charge transfer greater than 60 nC for Group IIA and 25 nC for Group IIB should be considered potentially incendive. (EPL Gb is defined as “Equipment for explosive gas atmospheres, having a high level of protection, which is not a source of ignition in normal operation or during expected malfunctions.) In this work, small scoops such as might be used to handle powders are charged by scooping a sample material (glass beads). Discharges from the scoops are evaluated using a test method based on IEC 60079-32-2. Although the projected area of the scoops was less than 10000 mm^2, ESD with charge transfer greater than 60 nC were regularly obtained. It is concluded that digging a scoop into glass beads is an effective means of charging, likely to represent some real-world activities. When applying the IEC 60079-32-1 maximum area guidance, an evaluation of the charging mechanism should also be considered. Where appropriate, charge transfer measurements of ESD should be made to ensure that a sufficiently low risk of ignition is present in practice.

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