

Understanding the Risks Associated with FIB sand Electrostatic Hazards

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Flexible Intermediate Bulk Containers (FIBCs) have found their niche in the worldwide transportation of powdered, flaked and granulated products. Since many of these products are also combustible particulate solids or may be processed in environments containing flammable vapors, the inherent electrostatic discharge hazard from handling the material cannot be overlooked.

FIBCs are typically made of woven plastic with some type of liner insert and are often referred to as super sacks, big bags or bulk bags in industry. Electrostatic ignition hazards are prevalent in almost any process environment where material (solid or liquid) is being transferred. During filling and emptying of FIBCs there is a steady accumulation of static charge that can result in electrostatic discharges from the FIBC. This may in turn provide sufficient energy for ignition of combustible particulate solids or flammable vapors, not to mention unsettling shocks to nearby personnel. Proper use of grounding and bonding can be effective in mitigating these hazards. Mitigation requires correctly choosing the FIBC "Type" and appropriate implementation of bonding and grounding.

Understanding the Minimum Ignition Energy (MIE) of your combustible dust or flammable vapor is a necessary component for selecting the correct FIBC Type for your application.

NFPA 654, Standard for the Prevention of Fire and Dust Explosions from Combustible Particulate Solids provides some guidance on selecting the appropriate type of FIBC. In the recently released 2013 edition of this standard, the appropriate FIBC Type can be determined based on the MIE of the material present in that environment, whether for a given combustible particulate solid; or for applications where the FIBC will be used in a flammable vapor environment. The various bag types are broken down into four main categories:

Type A: Limited to use with noncombustible particulate solids or combustible particulate solids having an MIE greater than 1000 mJ

Type B: Permitted for use when combustible dusts with an MIE greater than 3 mJ but less than 1000 mJ are present

Type C: Permitted for use when combustible dusts (regardless of MIE) are present or in locations where flammable vapors with an MIE greater 0.14 mJ are present. FIBCs of this type can be used with conductive powders

Type D: Permitted for use when combustible dusts are present or in locations where flammable vapors with an MIE greater than 0.14 mJ are present. FIBCs of this type are not appropriate for use with conductive powders

Obtaining an MIE for a material should be as easy as checking the Material Safety Data Sheet (MSDS); however, this data is rarely provided or is presented in a manner which fails to demonstrate the validity of the data. If a call to the supplier cannot answer the question, request that the supplier test the material to provide this information. Either the supplier or third party can have the material tested in accordance with ASTM E2019, "Standard Test Method for Minimum Ignition Energy of a Dust Cloud In Air". When testing be sure to request that the test is conducted without inductance in the circuit as this best simulates electrostatic discharges.

Aside from the MIE of the process material or environment, a few other caveats need to be considered for proper FIBC Type selection. Types A, B and D FIBCs are not permitted to be used with conductive powders, and Types A and B may not be used in areas where flammable vapors are present. Type C bags must be grounded during filling and emptying operations and the resistance to ground must be less than 25 ohms. The conductive components of type C bags must terminate at the grounding tab and have a resistance equal to or less than 108 ohms. In addition, bag Types B, C, and D must be tested and verified safe for their intended use in accordance with IEC 61340-4-4 before being used in hazardous environments. This test method is used for the electrostatic classification of FIBCs.

When shipping or receiving a material, using the wrong type of FIBC can be the precursor to a preventable accident. Understanding the ignition sensitivity of your material in your process environment and confirming that the correct type of bag has been certified can greatly reduce explosion and fire hazards associated with transfer operations at your facility. Please contact Fauske & Associates, LLC at 877-FAUSKE1 for more information regarding evaluating the electrostatic hazards associated with use of FIBCs.



MIKE MIE Test Apparatus