



Standard Test Method for Minimum Ignition Energy of a Dust Cloud in Air¹

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1. Scope

1.1 This test method determines the minimum ignition energy of a dust cloud in air by a high voltage spark.

1.2 The Minimum Ignition Energy (MIE) of a dust-cloud is primarily used to assess the likelihood of ignition during processing and handling. The likelihood of ignition is used to evaluate the need for precautions such as explosion prevention systems. The MIE is determined as the electrical energy stored in a capacitor which, when released as a high voltage spark, is just sufficient to ignite the dust cloud at its most easily ignitable concentration in air. The laboratory test method described in this standard does not optimize all test variables that affect MIE. Smaller MIE values might be determined by increasing the number of repetitions or optimizing the spark discharge circuit for each dust tested.

1.3 In this test method, the test equipment is calibrated using a series of reference dusts whose MIE values lie within established limits. Once the test equipment is calibrated, the relative ignition sensitivity of other dusts can be found by comparing their MIE values with those of the reference dusts or with dusts whose ignition sensitivities are known from experience. **X1.1** of this test method includes guidance on the significance of minimum ignition energy with respect to electrostatic discharges.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Specific precautionary statements are given in Section 8.*

¹ This test method is under the jurisdiction of ASTM Committee E27 on Hazard Potential of Chemicals and is the direct responsibility of Subcommittee E27.05 on Explosibility and Ignitability of Dust Clouds.

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2. Referenced Documents

2.1 ASTM Standards:²

D3173 Test Method for Moisture in the Analysis Sample of Coal and Coke

D3175 Test Method for Volatile Matter in the Analysis Sample of Coal and Coke

E582 Test Method for Minimum Ignition Energy and Quenching Distance in Gaseous Mixtures

E789 Test Method for Dust Explosions in a 1.2-Litre Closed Cylindrical Vessel (Withdrawn 2007)³

E1226 Test Method for Explosibility of Dust Clouds

E1445 Terminology Relating to Hazard Potential of Chemicals

2.2 IEC Standards:⁴

1241-2-3, 1994 Electrical Apparatus for Use in the Presence of Combustible Dusts, Part 2: Test Method, Section 3: Method for Determining Minimum Ignition Energy of Dust-Air Mixtures

3. Terminology

3.1 *Definitions*—For additional definitions, see Terminology E1445.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *spark discharge, n*—transient discrete electric discharge, which takes place between two conductors, which are at different potentials. The discharge bridges the gap between the conductors in the form of a single ionization channel.

3.2.2 *minimum ignition energy (MIE), n*—electrical energy discharged from a capacitor, which is just sufficient to effect ignition of the most easily ignitable concentration of fuel in air under the specific test conditions.

3.2.3 *ignition delay time, n*—the time between the onset of dispersion of the dust sample into a cloud and the activation of the ignition source.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from International Electrotechnical Commission (IEC), 3 rue de Varembe, Case postale 131, CH-1211, Geneva 20, Switzerland, <http://www.iec.ch>.