



Standard Test Method for Hot-Surface Ignition Temperature of Dust Layers¹

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1. Scope

1.1 This test method covers a laboratory procedure to determine the hot-surface ignition temperature of dust layers, that is, measuring the minimum temperature at which a dust layer will self-heat. The test consists of a dust layer heated on a hot plate.^{2,3}

1.2 Data obtained from this test method provide a relative measure of the hot-surface ignition temperature of a dust layer.

1.3 This test method should be used to measure and describe the properties of materials in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire hazard risk of materials, products, or assemblies under actual fire conditions. However, results of this test method may be used as elements of a fire risk assessment that takes into account all of the factors that are pertinent to an assessment of the fire hazard risk of a particular end use product.

1.4 *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.

2. Referenced Documents

2.1 ASTM Standards:

D 3175 Test Method for Volatile Matter in the Analysis Sample of Coal and Coke⁴

E 771 Test Method for Spontaneous Heating Tendency of Materials⁵

E 1445 Terminology Relating to Hazardous Potential Chemicals⁵

E 1491 Test Method for Minimum Autoignition Temperature of Dust Clouds⁵

2.2 IEC Standard:⁶

IEC 1241-2-1 Electrical Apparatus for Use in the Presence of Combustible Dust; Part 2: Test Methods—Section 1: Methods for Determining the Minimum Ignition Temperatures of Dusts, Method A

3. Terminology

3.1 *Definitions:* For definitions of other terms used in this standard see Terminology E1445.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *hot-surface ignition temperature of a dust layer, n*—lowest set temperature of the hot plate that causes ignition of the dust layer.

3.2.2 *ignition of a dust layer, n*—initiation of self-heating or combustion in a material under test.

3.2.3 *ignition time, n*—time between the start of heating and the point at which the maximum temperature or flaming combustion is reached.

3.2.4 *temperature rise, ΔT , n*—the difference between $T_{\max}$ and the initial set temperature of the hot plate.

3.2.5 $T_{\max}$, *n*—maximum temperature measured during test.

4. Summary of Test Method

4.1 The test material is placed within a metal ring on top of a hot plate, that is at a preset constant temperature.

4.2 The sample temperature is monitored to determine temperature rise due to oxidative reactions or decomposition reactions, or both.

4.3 Ignition is considered to have taken place when either of the following occurs:

4.3.1 Temperature in the dust layer at position of thermocouple rises at least 50°C above the hot plate temperature, or

4.3.2 Visible evidence of combustion is apparent, such as red glow or flame.

4.4 Hot plate surface temperature is varied from test to test, as necessary, until the hot-surface ignition temperature is determined.

5. Significance and Use

5.1 This test method is applicable to dusts and powders, and provides a procedure for performing laboratory tests to evaluate hot-surface ignition temperatures of dust layers.

¹ This test method is under the jurisdiction of ASTM Committee E27 on Hazard Potential of Chemicals and is the direct responsibility of Subcommittee E27.04 on the Flammability and Ignitability of Chemicals.

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² This test method is based on recommendations of the National Materials Advisory Board of the National Academy of Sciences (1).³

³ The boldface numbers in parentheses refer to the list of references at the end of this standard.

⁴ *Annual Book of ASTM Standards*, Vol 05.05.

⁵ *Annual Book of ASTM Standards*, Vol 14.02.

⁶ Available from ANSI, 11 W. 42nd Street, New York, NY, 10036.