Designation: E 789 – 95 (Reapproved 2001)

Standard Test Method for Dust Explosions in a 1.2-Litre Closed Cylindrical Vessel[1]

This standard is issued under the fixed designation E 789; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the determination of the ignition of a dust dispersed in air, within a closed vessel.

1.2 This test method provides a measure of dust explosion pressure and rate of pressure rise. It does not provide a definitive determination of the flammability of a dust and has other severe limitations which are identified in Section 5. The preferred method for the design of safety equipment is Test Method E 1226.

1.3 *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. For specific safety precautions see Section 7.*

1.4 The values stated in inch-pound units are to be regarded as the standard. The values in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:*

D 3173 Test Method for Moisture in the Analysis Sample of Coal and Coke[2]

D 3175 Test Method for Volatile Matter in the Analysis Sample of Coal and Coke[2]

E 1226 Test Method for Pressure and Rate of Pressure Rise for Combustible Dusts[3]

2.2 *Other ASTM Document:*

STP 447A Manual on Test Sieving Methods

3. Summary of Test Method

3.1 A dust cloud is formed in a closed steel combustion chamber by a jet of clean compressed air and ignited by a continuous electric arc.

3.2 The pressure is detected by a transducer and recorded by appropriate measuring equipment from which pressure and rate of pressure rise may be determined.

4. Significance and Use

4.1 This test method provides a procedure for measuring pressure and rate of pressure rise.

4.2 This test method may be used to determine whether a dust will ignite using an electric arc ignition source.

5. Limitation

5.1 The values determined by this test method are specific to the material tested and equipment and procedure used and are not to be considered inherent, fundamental properties.

5.2 The size and shape of the vessel have a direct bearing on the data obtained. Extrapolation to vessels having a different volume and shape should not be made.

5.3 The data cannot be used for direct calculation of explosion venting or containment.

5.4 A dust cloud that does not ignite by this test method may still be flammable. This test method does not provide a definitive determination of the flammability of a dust.

6. Apparatus

6.1 The equipment consists of a vertically mounted closed steel combustion chamber (commonly known as the Hartmann tube), a dust dispersion system using clean air, ignition source, pressure sensor, and recording system.

6.2 Fig. 1 is a schematic diagram of the apparatus.

6.3 Construction details and tables are presented in the annexes.

6.4 The pressure transducer should be installed and operated according to the manufacturer's recommendations.

7. Safety Precautions

7.1 Prior to handling a dust material, the toxicity of the sample and its combustion products must be considered; this information is generally obtained from the manufacturer or supplier. Appropriate safety precautions must be taken if the material has toxic or irritating characteristics. Tests using this apparatus must be in a ventilated hood or other area having adequate ventilation.

7.2 Before initiating a test check and secure the Hartmann apparatus, fittings, and gaskets to prevent leakage.

7.3 All testing should start using 0.1 g of sample to prevent over-pressurization due to high-energy materials. No experiments should be run so that the explosion pressure exceeds 175 psig (1.21 MPa).

[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 Dusts.

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[2] *Annual Book of ASTM Standards*, Vol 05.05

[3] *Annual Book of ASTM Standards*, Vol 14.02.

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