



Designation: E 1515 – 00

Standard Test Method for Minimum Explosible Concentration of Combustible Dusts¹

This standard is issued under the fixed designation E 1515; 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.

INTRODUCTION

This test method describes procedures for measuring the minimum concentration of a combustible dust (dispersed in air) that is capable of propagating a deflagration. The tests are made in laboratory chambers that have volumes of 20 L or larger.

1. Scope

1.1 This test method covers the determination of the minimum concentration of a dust-air mixture that will propagate a deflagration in a near-spherical closed vessel of 20 L or greater volume.

NOTE 1—The minimum explosible concentration (MEC) is also referred to as the lower explosibility limit (LEL) or lean flammability limit (LFL).

1.2 Data obtained from this test method provide a relative measure of the deflagration characteristics of dust clouds.

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 risk of materials, products, or assemblies under actual fire conditions. However, results of this test 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 of a particular end use.

1.4 The values stated in SI units are to be regarded as the 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.

2. Referenced Documents

2.1 ASTM Standards:

D 3173 Test Method for Moisture in the Analysis Sample of Coal and Coke²

D 3175 Test Method for Volatile Matter in the Analysis Sample of Coal and Coke²

E 681 Test Method for Concentration Limits of Flammability of Chemicals³

E 1226 Test Method for Pressure and Rate of Pressure Rise for Combustible Dusts³

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *dust concentration, n* —the mass of dust divided by the internal volume of the chamber.

3.1.2 $(dP/dt)_{ex}$, *n* —the maximum rate of pressure rise during the course of a single deflagration test.

3.1.3 *minimum explosible concentration (MEC), n* —the minimum concentration of a combustible dust cloud that is capable of propagating a deflagration through a uniform mixture of the dust and air under the specified conditions of test.

3.1.4 $P_{ignition}$, *n* —the absolute pressure at the time of ignition.

3.1.5 $\Delta P_{ignitor}$, *n* —the pressure rise in the chamber due to the ignitor by itself.

3.1.6 $P_{ex,a}$, *n* —the maximum explosion pressure (absolute) reached during the course of a single deflagration test (see Figs. 1 and 2).

3.1.7 *pressure ratio (PR), n* —defined as $PR = (P_{ex,a} - \Delta P_{ignitor}) / P_{ignition}$.

4. Summary of Test Method

4.1 A dust cloud is formed in a closed combustion chamber by an introduction of the material with air. The test is normally made at atmospheric pressure.

4.2 Ignition of this dust-air mixture is then attempted after a specified delay time by an ignition source located near the center of the chamber.

4.3 The pressure time curve is recorded on a suitable piece of equipment.

¹ This test method is under the jurisdiction of ASTM Committee E-27 on Hazard Potential of Chemicals and is the direct responsibility of Subcommittee E27.05 on Explosibility and Ignitability of Dust Clouds.

Current edition approved March 10, 2000. Published July 2000. Originally published as E 1515 – 93. Last previous edition E 1515 – 96.

² Annual Book of ASTM Standards, Vol 05.05.

³ Annual Book of ASTM Standards, Vol 14.02.