



Standard Test Method for Explosibility of Dust Clouds¹

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INTRODUCTION

Particulate solids of combustible materials present a significant risk of dust explosion if suspended in air and subjected to an ignition source. The methods of this standard can be used to determine if a dispersed dust cloud is “explosible” and, if so, to what degree it is explosible, that is, its “explosibility.” Knowledge that a dust may be explosible if dispersed as a dust cloud is important in the conduct of a process hazard safety review. Contained herein is an explosibility or go/no-go screening test procedure for the purpose of determining whether a dust sample is explosible.

If a dust is explosible, the explosibility parameters, maximum explosion pressure, $P_{\max}$; maximum rate of pressure rise, $(dP/dt)_{\max}$; and explosibility index, K_{St} , are useful in the design of explosion prevention and control measures as described in national (NFPA) and international (ISO, CEN and others) explosion protection standards.

1. Scope

1.1 Purpose. The purpose of this test method is to provide standard test methods for characterizing the “explosibility” of dust clouds in two ways, first by determining if a dust is “explosible,” meaning a cloud of dust dispersed in air is capable of propagating a deflagration, which could cause a flash fire or explosion; or, if explosible, determining the degree of “explosibility,” meaning the potential explosion hazard of a dust cloud as characterized by the dust explosibility parameters, maximum explosion pressure, $P_{\max}$; maximum rate of pressure rise, $(dP/dt)_{\max}$; and explosibility index, K_{St} .

1.2 Limitations. Results obtained by the application of the methods of this standard pertain only to certain combustion characteristics of dispersed dust clouds. No inference should be drawn from such results relating to the combustion characteristics of dusts in other forms or conditions (for example, ignition temperature or spark ignition energy of dust clouds, ignition properties of dust layers on hot surfaces, ignition of bulk dust in heated environments, etc.)

1.3 Use. It is intended that results obtained by application of this test be used as elements of an explosion risk assessment that takes into account other pertinent risk factors; and in the specification of explosion prevention systems (see, for example

NFPA 68, NFPA 69, and NFPA 654) when used in conjunction with approved or recognized design methods by those skilled in the art.

NOTE 1—Historically, the evaluation of the deflagration parameters of maximum pressure and maximum rate of pressure rise has been performed using a 1.2-L Hartmann Apparatus. Test Method E789, which describes this method, has been withdrawn. The use of data obtained from the test method in the design of explosion protection systems is not recommended.

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.*

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

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

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 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.