



Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials¹

This standard is issued under the fixed designation E662; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This fire-test-response standard covers determination of the specific optical density of smoke generated by solid materials and assemblies mounted in the vertical position in thicknesses up to and including 1 in. (25.4 mm).

1.2 Measurement is made of the attenuation of a light beam by smoke (suspended solid or liquid particles) accumulating within a closed chamber due to nonflaming pyrolytic decomposition and flaming combustion.

1.3 Results are expressed in terms of specific optical density which is derived from a geometrical factor and the measured optical density, a measurement characteristic of the concentration of smoke.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *This standard measures and describes the response of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazard or fire risk assessment of the materials, products or assemblies under actual fire conditions.*

1.6 *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.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This test method is under the jurisdiction of ASTM Committee E05 on Fire Standards and is the direct responsibility of Subcommittee E05.21 on Smoke and Combustion Products.

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2. Referenced Documents

2.1 ASTM Standards:²

C1186 Specification for Flat Fiber-Cement Sheets

C1288 Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets

D2843 Test Method for Density of Smoke from the Burning or Decomposition of Plastics

E176 Terminology of Fire Standards

E662 Test Method for Specific Optical Density of Smoke Generated by Solid Materials

3. Terminology

3.1 *Definitions*—For definitions of terms found in this test method refer to Terminology E176.

4. Summary of Test Method

4.1 This test method employs an electrically heated radiant-energy source mounted within an insulated ceramic tube and positioned so as to produce an irradiance level of 2.2 Btu/s·ft² (2.5 W/cm²) averaged over the central 1.5-in. (38.1-mm) diameter area of a vertically mounted specimen facing the radiant heater. The nominal 3 by 3-in. (76.2 by 76.2-mm) specimen is mounted within a holder which exposes an area measuring 2⁹/₁₆ by 2⁹/₁₆ in. (65.1 by 65.1 mm). The holder is able to accommodate specimens up to 1 in. (25.4 mm) thick. This exposure provides the nonflaming condition of the test.

4.2 For the flaming condition, a six-tube burner is used to apply a row of equidistant flamelets across the lower edge of the exposed specimen area and into the specimen holder trough. This application of flame in addition to the specified irradiance level from the heating element constitutes the flaming combustion exposure.

4.3 The test specimens are exposed to the flaming and nonflaming conditions within a closed chamber. A photometric system with a vertical light path is used to measure the varying

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.

*A Summary of Changes section appears at the end of this standard