



Designation: D 4100 – 82 (Reapproved 1989)^{ε1}

AMERICAN SOCIETY FOR TESTING AND MATERIALS
1916 Race St., Philadelphia, Pa. 19103

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Standard Test Method for Gravimetric Determination of Smoke Particulates From Combustion of Plastic Materials¹

This standard is issued under the fixed designation D 4100; 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.

^{ε1} NOTE—Editorial changes were made throughout in January 1989.

1. Scope

1.1 This test method covers a laboratory test procedure for gravimetric determination of smoke particulate matter produced from the combustion or pyrolysis of plastic materials. This method applies to standard-size samples of plastic materials in a slab configuration. The test is conducted in the laboratory under dynamic conditions in a flaming mode of combustion.

1.2 Percent char and total amount of plastic burned at a designated time period are recorded in this test. However, there is not necessarily a relationship between these measurements.

1.3 *This standard should be used to measure and describe the properties of materials, products, or assemblies 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 which takes into account all of the factors which 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 may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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 hazard statements are given in Section 7.*

2. Referenced Documents

2.1 ASTM Standards:

C 778 Specification for Standard Sand²

D 618 Methods of Conditioning Plastics and Electrical Insulating Materials for Testing³

D 883 Definitions of Terms Relating to Plastics⁴

D 1784 Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds⁵

D 1898 Practice for Sampling of Plastics⁶

E 176 Terminology Relating to Fire Standards⁷

3. Terminology

3.1 Definitions:

3.1.1 *General*—Definitions are in accordance with Terminology E 176 or Definitions D 883, unless otherwise indicated.

3.2 Description of Term Specific to This Standard:

3.2.1 *smoke particulate, n*—airborne particles of 0.3- μ m size or larger, resulting from pyrolysis or incomplete combustions, consisting of free carbon tars or soot; and present in sufficient quantity to be observable under conditions of this test.

4. Summary of Test Method

4.1 A specimen and glass-fiber filter are weighed separately on an analytical balance. The specimen and filter are positioned in a laboratory test chamber with a high-capacity vacuum source and filtration system. Air is drawn through the test chamber at a prescribed rate. A propane fueled micro bunsen burner ignition source is ignited. The ignition source is applied to the specimen and smoke particulates from the flaming combustion of the specimen impinge upon the filter. The sample is allowed to burn for 30 s, unless greater burn times are necessary, to generate the minimum smoke particulates required for accuracy. The ignition flame is then extinguished and the air flow is allowed to continue for 30 additional seconds to collect any particulates in the chimney. On completion of the burn, the specimen and filter are removed from the instrument and weighed upon an analytical balance. Char is mechanically or manually removed from the burned specimen and then the sample is reweighed. Smoke particulate and char mass are calculated by difference and expressed as percentages of the total amount of sample burned.

5. Significance and Use

5.1 This test method provides a means for comparing the smoke particulate generation properties of a plastic material

¹ This method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.30 on Thermal Properties (Section D20.30.03).

Current edition approved April 28, 1982. Published May 1982.

² Annual Book of ASTM Standards, Vol 04.01.

³ Annual Book of ASTM Standards, Vol 08.01.

⁴ Annual Book of ASTM Standards, Vols 08.01 and 08.04.

⁵ Annual Book of ASTM Standards, Vols 08.02 and 08.04.

⁶ Annual Book of ASTM Standards, Vol 08.02.

⁷ Annual Book of ASTM Standards, Vol 04.07.