



Designation: D1603 – 20

Standard Test Method for Carbon Black Content in Olefin Plastics¹

This standard is issued under the fixed designation D1603; 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 test method covers the determination of the carbon black content in polyethylene, polypropylene, and polybutylene plastics. Its use with acrylic or other polar monomer modifications which might affect the accuracy is not recommended. Determinations of carbon black content are made gravimetrically after pyrolysis of the sample under nitrogen. This test method is not applicable to compositions that contain nonvolatile pigments or fillers other than carbon black.

1.1.1 This test method is not applicable to materials containing brominated flame retardant additives at the end.

1.2 The values stated in SI units are to be regarded as standard. The values in parentheses are given for information only.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—This standard and ISO 6964-1986(E) address the same subject matter, but differ in technical content.

1.4 *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.*

2. Referenced Documents

2.1 ASTM Standards:²

D883 Terminology Relating to Plastics

D4218 Test Method for Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique

E456 Terminology Relating to Quality and Statistics

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E2935 Practice for Conducting Equivalence Testing in Laboratory Applications

2.2 ISO Standard:

ISO 6964-1986(E) Polyolefin Pipes and Fittings—Determination of Carbon Black by Calcination and Pyrolysis—Test Method and Basic Specification³

3. Terminology

3.1 Terms used in this standard are defined in accordance with Terminology D883, unless otherwise specified. For terms relating to precision and bias and associated issues, the terms used in this standard are defined in accordance with Terminology E456.

4. Significance and Use

4.1 The information provided by this test method is useful for manufacturing quality control, technical service, and research purposes; and is required by various material specifications and for the calculation of optical absorptivity.

4.2 Test Method D4218 is available for determining the carbon black content of polyethylene compounds if so desired.

5. Apparatus

5.1 *Electric Furnace*, at least 20 cm (7.9 in.) long suitable for use with the tubing described in 5.2.

5.2 *High Temperature Glass Combustion Tube*⁴, of appropriate diameter and approximately twice as long as the furnace described in 5.1.

5.3 *Stoppers*—Two rubber or neoprene stoppers, to fit the tube described in 5.2, unless the tube is fitted with ground joints and mating connectors.

¹ This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.70 on Analytical Methods (Section D20.70.01).

Current edition approved Feb. 1, 2020. Published March 2020. Originally approved in 1958. Last previous edition approved in 2014 as D1603 - 14. DOI: 10.1520/D1603-20.

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 ISO/IEC *Selected Standards for Testing Plastics, Second Edition*, published by ASTM. Also available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁴ Borosilicate, high-silica, or equivalent glass tubing has been found satisfactory for this purpose.

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