



Designation: D4218 – 15

Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique¹

This standard is issued under the fixed designation D4218; 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.

1. Scope

1.1 This test method covers the determination of black polyethylene compounds containing channel or furnace black. It is not applicable to thermal black.

1.2 This test method is not suitable for plastics that char on pyrolysis.

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

1.4 *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 hazard statements are given in Section 7.

NOTE 1—There is no known ISO equivalent to this standard.

2. Referenced Documents

2.1 *ASTM Standards:*²

D883 Terminology Relating to Plastics

D1603 Test Method for Carbon Black Content in Olefin Plastics

D2741 Test Method for Susceptibility of Polyethylene Bottles to Soot Accumulation (Withdrawn 2011)³

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

IEEE/ASTM SI-10 Standard for Use of the International System of Units (SI): The Modern Metric System

3. Terminology

3.1 *Definitions*—For definitions of plastics terms used in this test method, see Terminology D883.

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).

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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.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *channel black*—those carbon blacks produced by a process that operates in an open system in which a multitude of small diffusion flames burn in air and carbon is deposited on cooled surfaces.

3.2.2 *furnace black*—those carbon blacks produced using the principle of continuous oxidative combustion in closed systems.

3.2.3 *thermal black*—those carbon blacks based on a process that uses thermal decomposition in the absence of oxygen and operates in a closed system. Particles grow very slowly and can become very large and filamentous structures.

3.3 *Symbols*—Units and symbols used in this test method are those recommended in Practice IEEE/ASTM SI-10.

4. Summary of Test Method

4.1 Black polyethylene compound contained in a disposable aluminum weighing dish is pyrolyzed in a muffle furnace for a short period. During the pyrolysis of the polymer, the air in the muffle furnace becomes oxygen-deficient to prevent the combustion of the residual carbon black. Any soot, as defined in Test Method D2741, produced by the initial combustion of the gases is consumed before the carbon black itself.

4.2 After cooling and weighing for residual carbon black, the dish and contents are reinserted into the muffle furnace to determine ash content and the results used to determine true carbon black content. This is done only if the compound is suspected of containing mineral fillers as well as carbon black.

5. Significance and Use

5.1 This test method is capable of yielding duplicate test data, in 20 min or less, for a simple carbon black content determination.

5.2 This test method is suitable for manufacturing quality control, technical service, and research work.

5.3 For referee requirements, the number of replicate measurements is increased. Alternatively, a control sample of known carbon black content is tested with the unknown sample.

5.4 Test Method D1603 is available for referee testing.