



Designation: D7633 – 13

## Standard Test Method for Carbon Black—Carbon Content<sup>1</sup>

This standard is issued under the fixed designation D7633; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the instrumental determination of carbon content in a carbon black sample. Values obtained represent the total carbon content.

1.2 The method is applicable to tread, carcass and specialty type carbon blacks obtained from partial combustion or thermal decomposition processes, which typically contain 95 to 100 % carbon.

1.3 The results of these tests can be expressed as mass % carbon.

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:*<sup>2</sup>

D1799 Practice for Carbon Black—Sampling Packaged Shipments

D1900 Practice for Carbon Black—Sampling Bulk Shipments

D4483 Practice for Evaluating Precision for Test Method Standards in the Rubber and Carbon Black Manufacturing Industries

### 3. Summary of Test Method

3.1 In this test method, a sample is weighed in a combustion boat and the carbon content is determined by placing the boat in a tube furnace operating at 1350°C in a stream of oxygen

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D24 on Carbon Black and is the direct responsibility of Subcommittee D24.66 on Environment, Health, and Safety.

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<sup>2</sup> 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.

resulting in complete combustion. Carbon in the sample is oxidized to carbon dioxide. Moisture and particulates are removed from the gas stream by traps filled with anhydrous magnesium perchlorate. The gas stream is then passed through a cell in which carbon dioxide concentration is measured by an infrared (IR) absorption detector at a precise wavelength in the IR spectrum.

3.2 This test method is for use with commercially available carbon analyzers equipped to carry out the combustion and measurement operations automatically.

3.3 The carbon analyzer must be calibrated using an appropriate calibration standard (see 6.4).

### 4. Significance and Use

4.1 The total carbon content of a carbon black is a requirement for the calculation and reporting of carbon dioxide emissions. It can also be used in calculations to estimate yield of the process.

### 5. Apparatus

5.1 *Analytical Balance*, or equivalent, capable of a weighing sensitivity of 1 mg or better resolution.

5.2 *Gravity Convection Drying Oven*, capable of maintaining  $125 \pm 5^\circ\text{C}$ .

5.3 *Measurement Apparatus*, equipped to automatically combust the sample and measure carbon content.

5.4 *Combustion tube and boat* made of a suitable material such as mullite, porcelain or zircon.

### 6. Reagents

6.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.<sup>3</sup> Other grades may be used, provided it is first ascertained that the reagent is of

<sup>3</sup> "Reagent Chemicals," *American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K. and the United States Pharmacopeia and National Formulary, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.