



Standard Guide for Carbon Black—Validation of Test Method Precision and Bias¹

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1. Scope

1.1 This guide covers procedures for using the ASTM Standard Reference Blacks² (SRBs) and the HT and INR Iodine Number Standards to continuously monitor the precision of those carbon black test methods for which reference values have been established. It also offers guidelines for troubleshooting various test methods.

1.2 This guide defines the environmental conditions that are required for laboratories that perform carbon black testing activities for those test methods under D24's jurisdiction.

1.3 This guide establishes procedures for the use of x-charts to continuously monitor those tests listed in Section 2 for within-lab precision (repeatability) and between-lab accuracy (reproducibility).

1.4 This guide provides a statistical procedure for improving test reproducibility when a laboratory cannot physically calibrate its apparatus to obtain the reference values of the ASTM reference blacks, within the ranges given in this guide.

2. Referenced Documents

2.1 ASTM Standards:³

- D1510 Test Method for Carbon Black—Iodine Adsorption Number
- D1513 Test Method for Carbon Black, Pelleted—Pour Density
- D1765 Classification System for Carbon Blacks Used in Rubber Products
- D2414 Test Method for Carbon Black—Oil Absorption Number (OAN)
- D3265 Test Method for Carbon Black—Tint Strength

¹ This guide is under the jurisdiction of ASTM Committee D24 on Carbon Black and is the direct responsibility of Subcommittee D24.61 on Carbon Black Sampling and Statistical Analysis.

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² Standard Reference Blacks are available from Laboratory Standards & Technologies, Inc., 227 Somerset St., Borger, TX 79007.

³ 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.

D3324 Practice for Carbon Black—Improving Test Reproducibility Using ASTM Standard Reference Blacks (Withdrawn 2002)⁴

D3493 Test Method for Carbon Black—Oil Absorption Number of Compressed Sample (COAN)

D6556 Test Method for Carbon Black—Total and External Surface Area by Nitrogen Adsorption

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E2282 Guide for Defining the Test Result of a Test Method

E2586 Practice for Calculating and Using Basic Statistics

3. Terminology

3.1 Definitions:

3.1.1 *accepted reference value, n*—a value that serves as an agreed-upon reference for comparison, and which is derived as: (1) a theoretical or established value, based on scientific principles, (2) an assigned or certified value, based on experimental work of some national or international organization, or (3) a consensus or certified value, based on collaborative experimental work under the auspices of a scientific or engineering group.

3.1.1.1 *Discussion*—A national or international organization, referred to in (2), generally maintains measurement standards to which the reference values obtained are traceable. **E177**

3.1.2 *accuracy, n*—the closeness of agreement between a test result and an accepted reference value.

3.1.2.1 *Discussion*—The term accuracy, when applied to a set of test results, involves a combination of a random component and of a common systematic error or bias component. **E177**

3.1.3 *ASTM reference blacks, n*—a set of carbon blacks that span the useful range of the test method for which they are reference materials. **D3324**

3.1.4 *bias, n*—the difference between the expectation of the test results and an accepted reference value.

3.1.4.1 *Discussion*—Bias is the total systematic error as

⁴ The last approved version of this historical standard is referenced on www.astm.org.