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.

Designation: D4821 – 20

Standard Guide for Carbon Black—Validation of Test Method Precision and Bias[1]

This standard is issued under the fixed designation D4821; 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 guide covers procedures for using the ASTM Standard Reference Blacks[2] (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.

1.5 *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:*[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

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

D7854 Test Method for Carbon Black-Void Volume at Mean Pressure

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

[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.

Current edition approved Nov. 1, 2020. Published November 2020. Originally approved in 1988. Last previous edition approved in 2019 as D4821 – 19. DOI: 10.1520/D4821-20.

[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.

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

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