



Standard Test Method for Carbon Black—Individual Pellet Hardness¹

This standard is issued under the fixed designation D3313; 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.

^{ε1} NOTE—Corrected 5.1 editorially in October 2016.

1. Scope

1.1 This test method covers a method for measuring the hardness of individual pellets of carbon black.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D1511 Test Method for Carbon Black—Pellet Size Distribution

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

D5230 Test Method for Carbon Black—Automated Individual Pellet Hardness

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

3. Summary of Test Method

3.1 A sample of carbon black is passed through two sieves to isolate a fraction of uniform size. The most spherical pellets from this portion are selected and brought into contact with a

¹ This test method is under the jurisdiction of ASTM Committee D24 on Carbon Black and is the direct responsibility of Subcommittee D24.51 on Carbon Black Pellet Properties.

Current edition approved June 1, 2012. Published September 2012. Originally approved in 1974. Last previous edition approved in 2005 as D3313 – 05a. DOI: 10.1520/D3313-12E01.

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.

measuring device as force is applied. Pellet hardness is the maximum force required to crush the pellets.

4. Significance and Use

4.1 Pellet hardness is related to several carbon black characteristics. Among these are mass strength and attrition. The subsequent level of dispersion obtained in some mixed compounds containing the carbon black may be affected by pellet hardness. Acceptable pellet hardness must be agreed to by the user and the producer.

NOTE 1—Test Method **D5230** is the preferred standard for testing of individual pellet hardness. It is recognized that Test Method D3313 relies on operator judgement, thus adding an additional source of variation for this test.

5. Apparatus

5.1 *Pellet-Hardness Tester*, of a type capable of measuring the pellet hardness of the individual pellet in grams-force (centinewtons). A suitable tester must exhibit the following characteristics:

5.1.1 Initial contact force must be applied so that the force area rests lightly on the pellet before proceeding,

5.1.2 It must be capable of applying force at a constant rate,

5.1.3 It must possess an accurate means of measuring the applied force, and

5.1.4 During the test, the applied force and base plate must be controlled so as not to cause the pellet to move or roll prior to crushing.

NOTE 2—A two-pan torsion balance with 100-g dial and transparent foot mounted so it can be moved directly over the pellet will serve to convert a balance to a pellet hardness tester, as needed.

5.2 *Mechanical Sieve Shaker*, conforming to Test Method **D1511**.

5.3 *Sieves*—U.S. Standard sieves or equivalents, conforming to Specification **E11**. Sieve Nos. 12 (1700- μm) and 14 (1400- μm) shall be used.

5.4 *Bottom-Receiver Pan and Top-Sieve Cover*.

5.5 *Container*, shallow, flat approximately 305 mm (12 in.) long.

5.6 *Forceps*, fitted with sponge tips. A very low-density urethane foam sponge has been found to be acceptable.