



Standard Test Method for Carbon Black—Individual Pellet Hardness¹

This standard is issued under the fixed designation D 3313; 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 standard describes a method for measuring the crush strength 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:

D 1511 Test Method for Carbon Black—Pellet Size Distribution²

D 1799 Practice for Carbon Black—Sampling Packaged Shipments²

D 1900 Practice for Carbon Black—Sampling Bulk Shipments²

D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries²

E 11 Specification for Wire-Cloth Sieves for Testing Purposes³

3. Significance and Use

3.1 Pellet crush strength 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 crush strength. Acceptable pellet hardness must be agreed to by the user and the producer.

NOTE 1—Test Method D 5230 is the preferred standard for testing of individual pellet crush strength. It is recognized that Test Method D 3313 relies on operator judgement, thus adding an additional source of variation for this test.

¹ This practice is under the jurisdiction of ASTM Committee D-24 on Carbon Black and is the direct responsibility of Subcommittee D24.51 on Carbon Black Pellet Properties.

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² *Annual Book of ASTM Standards*, Vol 09.01.

³ *Annual Book of ASTM Standards*, Vol 14.02.

4. Apparatus

4.1 *Pellet-Hardness Tester*,⁴ of a type capable of measuring the crush strength of the individual pellet in grams-force (millinewtons). A suitable tester must exhibit the following characteristics:

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

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

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

4.1.4 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 strength tester, as needed.

4.2 *Mechanical Sieve Shaker*,⁵ (see Test Method D 1511).

4.3 *Sieves*—U.S. Standard sieves or equivalents, conforming to Specification E 11. Sieves Nos. 12 (1700-μm) and 14 (1400-μm) shall be used.

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

4.5 *Sample Splitter*, single-stage, riffle-type.

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

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

5. Sampling

5.1 Samples shall be taken in accordance with Practices D 1799 or D 1900.

6. Calibration

6.1 Equipment used for this test shall be calibrated by dead weights or a force-measuring device that will verify the accuracy of the equipment over the range to be tested.

7. Procedure

7.1 Prepare a sample of carbon black, as follows:

⁴ The Model-S Pellet Strength Tester, A. L. Sweigart, Technical Service Shop, 1206 Hemlock St., Borger, TX 79007, with lab jack has been found satisfactory for this purpose.

⁵ A Ro-Tap sieve shaker has been found satisfactory for this purpose.