



Standard Test Method for Carbon Black—Automated Individual Pellet Hardness¹

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1. Scope

1.1 This test method covers a procedure for measuring the crush strength of individual pellets of carbon black by the automated pellet hardness tester.²

1.2 The values stated in SI units are to be regarded as the standard. The values 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 Distribution³

D 1799 Practice for Carbon Black—Sampling Packaged Shipments³

D 1900 Practice for Carbon Black—Sampling Bulk Shipments³

D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries³

E 11 Specification for Wire-Cloth Sieves for Testing Purposes⁴

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.

4. Apparatus

4.1 *Automated Pellet Hardness Tester*,² capable of achieving an absolute measuring accuracy of ± 2 cN (2 gf) for the

force measurement and ± 0.1 mm for the diameter measurement and a relative accuracy of ± 0.5 cN (0.5 gf) for the force measurement and 0.02 mm for the diameter measurement and consisting of the following major components and characteristics.

4.1.1 A means for automatic loading of a pellet on the transport platen for transporting the pellet so as to contact the second platen with a minimum force. Typically one platen contains a force measuring device. The required force to detect the contact shall not exceed 2 cN (2 gf),

4.1.2 A means for applying the force at a constant rate,

4.1.3 A means for transporting the pellet so to minimize its movement during the application of force.

4.1.4 A means for measuring the diameter of the individual pellet under test as measured along the axis of the application of force.

4.1.5 A control device for directing the instrument through the test cycle that includes crushing the pellet under controlled conditions, measuring and storing the results of the initial diameter and crush force determinations, cleaning the fragments from the platen surfaces, and starting the next cycle.

4.1.6 An algorithm for determining the individual test end point (determination) as the maximum observed force prior to the first occurrence of either a specified reduction in diameter or a specified reduction in force from the maximum force observed,

4.1.7 A program for calculating for a specified number of pellets the data as requested in Section 8, and

4.1.8 A means for identifying, viewing, printing, and storing the data in an ASCII file.

4.2 *Mechanical Sieve Shaker*, conforming to Test Method D 1511.

4.3 *Sieves*, U.S. Standard No. 12 (1700 μm) and No. 14 (1400 μm) conforming to E-11 shall be used to test grades of black that can be segregated in a -12/+14 fraction. For grades of black that are too small to be retained on a No. 14 sieve, i.e., acetylene and thermal blacks, it is acceptable to test with U.S. Standard No. 16 (1180 μm) and No. 18 (1000 μm) sieves.

4.4 *Sieves*, U.S. standard, or equivalent, conforming to Specification E 11. Sieve Nos. 12 (1700 μm) and 14 (1400 μm) shall be used.

NOTE 1—Pellet size to be tested is 12/14 by program default. Another size may be selected if desired by pressing menu item “6”.

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

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.

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² The Concarb Titan Automated Pellet Hardness Tester is available from Titan Specialties, Inc., P.O. Box 2316, Pampa, TX 79065. The HITEC IPHT is available from HITEC Luxembourg, 5 rue de L' Eglise, L-1458, Luxembourg.

³ *Annual Book of ASTM Standards*, Vol 09.01.

⁴ *Annual Book of ASTM Standards*, Vol 14.02.