



Designation: D 5230 – 04

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 individual pellet hardness 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:³

- D 1511 Test Method for Carbon Black—Pellet Size Distribution
- D 1799 Practice for Carbon Black—Sampling Packaged Shipments
- D 1900 Practice for Carbon Black—Sampling Bulk Shipments
- D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries
- E 11 Specification for Wire Cloth and Sieves for Testing Purposes

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 placed into the tester. The individual pellets are pressed against a platen with a load cell for measuring force. As pressure is applied the pellet will either break with a rapid force reduction or the pellet will simply

compress. The individual pellet hardness is the maximum force prior to a force reduction of at least 3 cN or the maximum force required to compress the pellet to 90 %, whichever comes first.

4. Significance and Use

4.1 Individual 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.

5. Apparatus

5.1 *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.

5.1.1 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),

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

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

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

5.1.5 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.

5.1.6 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,

5.1.7 A program for calculating for a specified number of pellets the data as requested in Section 9, and

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, E-mail: sales@titanspecialties.com. The HITEC IPHT is available from HITEC Luxembourg, 5 rue de L' Eglise, L-1458, Luxembourg, E-mail: info@hitec.lv.

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.