



Designation: D 3493 – 03

Standard Test Method for Carbon Black—Oil Absorption Number of Compressed Sample (COAN)¹

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1. Scope

1.1 This test method covers the procedure for the mechanical compression of a carbon black sample and the determination of the oil absorption number of the compressed sample.

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 1799 Practice for Carbon Black—Sampling Packaged Shipments²

D 1900 Practice for Carbon Black—Sampling Bulk Shipments²

D 2414 Test Method for Carbon Black—Oil Absorption Number²

D 3324 Practice for Carbon Black—Improving Test Reproducibility Using ASTM Standard Reference Blacks³

D 4821 Guide for Carbon Black—Validation of Test Method Precision and Bias²

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

3. Summary of Test Method

3.1 A sample of carbon black is compressed four times in a compression cylinder at a pressure of 165 MPa (24 000 psi) and then tested in an absorptometer to determine the oil absorption number.

3.2 n -Dibutyl phthalate or paraffin oil is added by means of a constant-rate buret to the compressed sample of carbon black

in the mixer chamber of an absorptometer. As the sample absorbs the oil, the mixture changes from a free-flowing state to one of a semiplastic agglomeration, with an accompanying increase in viscosity. This increased viscosity is transmitted to the torque-sensing system of the absorptometer. When the viscosity of the mixture reaches a predetermined torque level, the absorptometer and buret will simultaneously shut off. The volume of oil added is read from the direct reading buret. The volume of oil per unit mass of carbon black is the oil absorption number. Referee testing between suppliers and users should use DBP oil until such time that precision data is available for paraffin oil.

4. Significance and Use

4.1 The oil absorption number of a carbon black is related to the processing and vulcanizate properties of rubber compounds containing the carbon black.

4.2 The difference between the regular oil absorption number and the oil absorption number of compressed sample is some measure of the stability of the structure of the carbon black.

5. Apparatus⁴

5.1 *Balance*, analytical, 0.01-g sensitivity.

5.2 *Oven*, gravity-convection type, capable of maintaining $125^\circ \pm 5^\circ\text{C}$.

5.3 *Carbon Black Press*, capable of compressing a 25 g sample to 165 MPa (24 000 psi).⁵

5.4 *Absorptometer*,⁶ equipped with a constant-rate buret which delivers $67 \pm 0.4 \text{ mm}^3/\text{s}$ ($4 \pm 0.024 \text{ cm}^3/\text{min}$).

5.5 *Spatula*, rubber, 100-mm.

5.6 *Sieve*, 850 μm (U.S. No. 20), approximately 125-mm (5-in.) diameter with receiver pan.

5.7 *Brush*, approximately 40-mm (1.5-in.), stiff bristle.

5.8 *Desiccator*.

¹ This test method is under the jurisdiction of ASTM Committee D24 on Carbon Black and is the direct responsibility of Subcommittee D24.11 on Absorptive Properties of Carbon Black.

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

³ Discontinued. See 2002 *Annual Book of ASTM Standards*, Vol 09.01. Replaced by D 4821.

⁴ All apparatus is to be operated and maintained in accordance with the manufacturer's directions for optimum performance.

⁵ Carbon black presses from the following companies have been found satisfactory for this test method: EG&G Engineering, P.O. Box 470710, Tulsa, OK 74147-0710 and Titan Specialties, Inc., P.O. Box 2316, Pampa, TX 79066-2316.

⁶ Available from C. W. Brabender Instruments, Inc., 50 E. Wesley St., South Hackensack, NJ 07606 and from HITEC Luxembourg, 5 Rue de l'Église, L-1458, Luxembourg.