



Standard Test Methods for Carbon Black—Dispersion in Rubber¹

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1. Scope

1.1 These test methods determine the degree of dispersion of carbon black in rubber. Three test methods are described as follows:

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Test Method A—Visual Inspection	3-11
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Test Method C—Microroughness Measurement	24-34

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 1765 Classification System for Carbon Blacks Used in Rubber Products²
- D 3051 Practice for Carbon Black—Stating the Precision of ASTM Test Methods²
- D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets²
- D 3396 Practice for Carbon Black—Measuring the Precision of ASTM Test Methods²

TEST METHOD A—VISUAL INSPECTION

3. Scope

3.1 Test Method A is a qualitative visual test method. Ratings are made against a set of standard photographs (Fig. 1),³ and the results are expressed on a numerical scale. This test method cannot be used for compounds that contain fillers other than carbon black.

¹ These test methods are under the jurisdiction of ASTM Committee D24 on Carbon Black and are the direct responsibility of Subcommittee D24.71 on Carbon Black Testing in Rubber.

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² Annual Book of ASTM Standards, Vol 09.01.

³ A separate 8 by 10-in. glossy print of Fig. 1 is available at a nominal charge from ASTM Headquarters, 1916 Race St., Philadelphia, PA 19103. Request Adjunct No. 12-426630-20.

4. Summary of Test Method

4.1 The compound rubber is torn or cut to expose a fresh surface for examination by the eye, aided preferably by a hand lens or a low-power binocular microscope. The dispersion level of the carbon black is compared against a series of five photographic standards and then rated numerically from 1 (very low) to 5 (high) (see Fig. 1).

5. Significance and Use

5.1 Visual dispersion ratings correlate with certain important physical properties of the compound. A rating of 5 indicates a state of dispersion developing near maximum properties, while a rating of 1 would indicate a state of dispersion developing considerably depressed properties. Normally, the visual dispersion ratings indicate the following levels of compound quality:

Visual Dispersion Rating	Classification
4 to 5	High
3 to 4	Intermediate
2 to 3	Low
1 to 2	Very low

6. Apparatus

- 6.1 *Sharp Knife or Razor Blade.*
- 6.2 *Hand Lens* (10×) or binocular microscope (10 to 20×).
- 6.3 *Illuminator*, microscopical-type.
- 6.4 *Knife Heater.*
- 6.5 *Series of Photographic Standards*, rating 1 to 5. These standards give the following percent dispersion ratings by the Agglomerate Count Method:

Visual Rating	Black Dispersed, %
1	70
2	80
3	91
4	96
5	99

7. Test Specimen

7.1 *Vulcanized Compounds*—Use a slab of rubber about 2 mm in thickness. Tear it so that a fresh surface is exposed. The tear may be initiated by a small cut. The most nearly flat part of the tear is used for rating.

7.2 *Unvulcanized Compounds*—Unvulcanized rubber may be examined as follows: