



Designation: D1514 – 23

Standard Test Method for Carbon Black—Sieve Residue¹

This standard is issued under the fixed designation D1514; 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 test method covers the determination of the water wash sieve residue in regular untreated carbon blacks. It may not be applicable to oil-treated carbon blacks because the oil would prevent proper wetting of the black by water.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary statements, see Section 6.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D1799 Practice for Carbon Black—Sampling Packaged Shipments

D1900 Practice for Carbon Black—Sampling Bulk Shipments

D4483 Practice for Evaluating Precision for Test Method Standards in the Rubber and Carbon Black Manufacturing Industries

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

¹ This test method is under the jurisdiction of ASTM Committee D24 on Carbon Black and is the direct responsibility of Subcommittee D24.31 on Non-Carbon Black Components of Carbon Black.

Current edition approved April 1, 2023. Published April 2023. Originally approved in 1957. Last previous edition approved in 2020 as D1514 – 15 (2020). DOI: 10.1520/D1514-23.

² 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.

3. Summary of Test Method

3.1 A sample of carbon black is washed with water through a wire-mesh screen of a specified size until all that remains is a non-carbon black residue. This residue is dried, weighed, and the amount of residue is expressed as mg/kg (ppm) of the original sample.

4. Significance and Use

4.1 The quantity of sieve residue of carbon black is important in some molded or extruded products as it may relate to the surface appearance of those products. The maximum residue in each application is normally determined and agreed to between the user and the producer.

5. Apparatus

5.1 *Sieve and Filtering Apparatus*,^{3,4} as shown in Fig. 1.

5.2 *Balance*, with a sensitivity of 0.01 g.

5.3 *Analytical Balance*, with a sensitivity of 0.1 mg.

5.4 *Oven*, gravity-convection type, capable of temperature regulation within $\pm 1^\circ\text{C}$ at 125°C and temperature uniformity within $\pm 5^\circ\text{C}$.

5.5 *Sieves*, of either phosphor bronze or stainless steel. The sieve shall be in accordance with Specification E11. The sieve to be used shall be agreed upon between the purchaser and the seller.

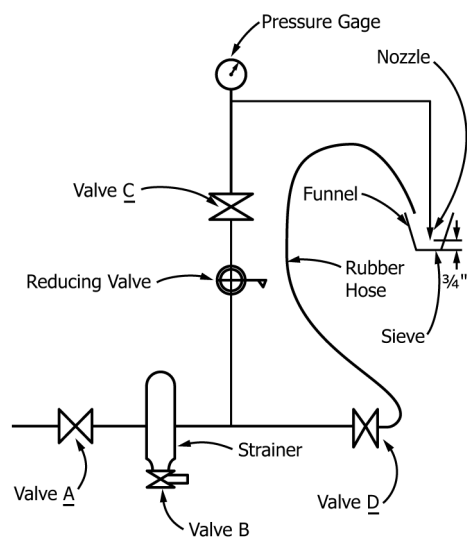
5.6 *Weighing Dishes*.

6. Precautions

6.1 Keep the apparatus clean at all times to prevent contamination.

³ Sieve and filtering apparatus available from Jaron Technologies LLC, 2338 Duncan St., Pampa, TX 79065, has been found suitable. The A2000 Test Set from HITEC Luxembourg S.A., 49 rue du Baerendall, L-8212 Mamer, Luxembourg, has been found suitable. An ASTM specified apparatus modified with an enlarged funnel leg ID (5.080 cm or 2.0 in.) and sieve screen OD (6.032 cm or 2.375 in.) has also been found suitable.

⁴ The sole source of supply of housing No. 20 and cartridge No. 30 known to the committee at this time is Amtek, Plymouth Products Division, 562 Indiana Ave., Sheboygan, WI 53081. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.



NOTE 1—Industrial/O.E.M. filter and pleated polyester fabric reusable cartridges have been found to be a satisfactory strainer.⁴

NOTE 2—Corrosion-free piping must be used.

NOTE 3—Detailed drawings can be obtained from Test Method D1514 – 88a.

NOTE 4—Spray nozzle: Part No. 460.746.30 BE available from Lechler Inc., 445 Kautz Rd., St. Charles, IL 60174, or Titan Specialties Inc., P.O. Box 2316, Pampa, TX 70066-2316.

FIG. 1 Schematic Diagram of Apparatus for Sieve Residue Determination

6.2 Examine the sieves each time they are used to make sure that no cracks or holes have developed.

6.3 Examine the strainer periodically to ascertain that the filter screen is in good condition.

7. Sampling

7.1 Samples shall be taken in accordance with Practice D1799 or Practice D1900.

8. Calculation

8.1 Calculate the sieve residue to the nearest mg/kg (ppm) as follows:

$$R = (W/S) \times 10^6 \quad (1)$$

where:

- R = sieve residue, mg/kg (ppm),
- W = mass of sieve residue, g, and
- S = mass of sample, g.

9. Procedure

9.1 Prior to making a test, clean the strainer by opening valves A and B and closing valve C as shown in Fig. 1. Allow the strainer to wash for 2 min.

9.2 Close valve B and open valve C. With valves A and C completely open, regulate the water pressure by means of a reducing valve. The recommended water pressure is 207 ± 34 kPa (30 ± 5 lbf/in.²).

9.3 After the water pressure has been regulated, attach the sieve holder with a 50-mm (2-in.) diameter sieve to the funnel

and allow the water to run through it for 3 min. Stop the water flow by closing valves A and C. Examine the sieve for particles; if none are observed, the apparatus is ready for use.

9.4 Weigh 100.0 g of the carbon black on the balance.

9.5 Attach the proper sieve to the funnel and start the water flow by opening valves A and C.

9.6 Add the carbon black slowly to the funnel to prevent plugging of the sieve.

NOTE 1—If desired it is permissible to utilize wetting agents to facilitate dispersion. Care must be taken to ensure that all of the solid material is transferred from the vessel used for dispersing the black into the funnel of the washing apparatus.

9.7 Use a gentle stream of water from the hose attached to valve D to wash down any carbon black on the sides of the funnel.

9.8 Continue washing until the wash water coming through the sieve is clear.

9.9 Remove the sieve holder and sieve from the funnel and rub the residue lightly with the finger to disaggregate any hard carbon black lumps which may not have been thoroughly wet by the water.

9.10 Replace the sieve holder and sieve and wash for an additional 2 min.

9.11 Remove the sieve holder and sieve and dry for 1 h at 125°C.

9.12 Transfer the dried residue to a piece of smooth white bond paper and rub gently to remove any carbon black remaining on the residue. Rub until the white paper no longer shows any smears.

NOTE 2—The purpose of gently rubbing the residue is to remove any black that may be clinging to the gritty residue. Do not apply excessive force when rubbing, as this action may fracture the residue allowing it to escape, or may trap the residue in the paper causing a low grit determination. Similarly, do not wear gloves when performing this step, as the residue may be trapped in the glove material, giving a low result.

9.13 Brush all the loose residue to a tared weighing dish and weigh to the nearest 0.1 mg using the analytical balance.

10. Report

10.1 Report the following information:

- 10.1.1 Proper identification of the sample,
- 10.1.2 Identification of the sieve number, and
- 10.1.3 Result of the determinations reported to the nearest mg/kg (ppm).

11. Precision and Bias

11.1 These precision statements have been prepared in accordance with Practice D4483. Refer to this practice for terminology and other statistical details.

11.2 The precision results in this precision and bias section give an estimate of the precision of this test method with the materials used in the particular interlaboratory program described below. The precision parameters should not be used for acceptance or rejection testing of any group of materials