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An American National Standard

Standard Test Method for Scleroscope Hardness Testing of Carbon and Graphite Materials[1]

This standard is issued under the fixed designation C 886; 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 apparatus and procedure for determining the hardness of carbon and graphite materials using the Model C-2 scleroscope[2] with the hammer calibrated for use on carbon and graphite materials with particles smaller than 0.8 mm (0.032 in.).[3]

1.2 The values given in acceptable metric units are to be regarded as the standard. The values given in parentheses are provided for information purposes 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:*

E 171 Specification for Standard Atmospheres for Conditioning and Testing Materials[4]

E 448 Practice for Scleroscope Hardness Testing of Metallic Materials[5]

2.2 *ANSI Standard:*

ANSI C 64.1 Brushes for Electrical Machines[6]

3. Summary of Test Method

3.1 The specimen is held in position, and the height of rebound of a diamond-tipped hammer is observed and recorded as the hardness number.

4. Significance and Use

4.1 The scleroscope is a rebound hardness tester with a scale divided into 140 equal parts. For carbon and graphite materials, there is no established correlation between the Scleroscope hardness scale and other hardness scales. The test is useful in the evaluation and the manufacturing control of carbon and graphite materials.

5. Interferences

5.1 Lack of alignment of the instrument as specified in Section 10, will cause low readings.

5.2 The specimen must be held firmly in position and must have adequate support from the anvil on which the sample rests. Neglect of alignment, positioning, or support will result in low readings.

5.3 Rough surface finish, above 3175-nm (125-µin.) AA, may cause low readings.

5.4 Indentations that are superimposed or spaced too closely together (approximately 3 mm (⅛ in.)) will cause incorrect readings.

6. Apparatus

6.1 *Table*, or equivalent, firm, for support.

6.2 *Scleroscope*, Model C-2, equipped with a hammer calibrated by the manufacturer for use on carbon and graphite materials.

7. Test Specimen

7.1 The specimen may be of any convenient size, but test surfaces smaller than 5 by 5 mm (0.2 by 0.2 in.) are not recommended.

7.2 The recommended specimen shall have a minimum thickness of 5 mm (0.2 in.).

7.3 The test surface shall not exceed 3175-nm (125-µin.) AA in surface finish.

7.4 The test surface-to-opposite side parallelism shall be within 1 % (0.010 % per linear inch). For all specimens, the test surfaces must be maintained normal to the axis of the scleroscope tube.

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[1] This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.F on Manufactured Carbon and Graphite Products.

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[2] Registered trademark of the Shore Instrument and Manufacturing Co., Inc., 80-A Commercial St., Freeport, NY 11520.

[3] This test method may be more readily understood by referring to the following documents: Practice E 448, ANSI C 64.1, Brushes for Electrical Machines, available from American National Standards Institute, 1430 Broadway, New York, NY 10017, and Lysaght and DeBellis, *Indentation Hardness Testing*, American Chain and Cable Corp., Reinhold Publishing Co., 1969.

[4] *Annual Book of ASTM Standards*, Vol 15.09.

[5] *Annual Book of ASTM Standards*, Vol 03.01.

[6] Available from American National Standards Institute, 1430 Broadway, New York, NY 10017.

8. Calibration and Standardization

8.1 Check the calibration of the Scleroscope with carbon test blocks obtained from the instrument manufacturer.

8.2 Make a series of tests on carbon test blocks that cover the range of hardness to be tested.

8.3 Make at least five tests on each carbon test block. Do not make any tests closer than 6 mm (0.25 in.) from the sides of the test blocks.

8.4 Consider the instrument calibrated if 90 % of the readings deviate no more than ±4 %, or ±3 points, whichever is larger, from the mean of the hardness numbers stamped on the carbon test blocks.

9. Conditioning

9.1 Allow the specimen to reach equilibrium with room temperature air, and test under the same conditions in accordance with Specification E 171.

9.2 Keep specimens free of contamination.

10. Procedure

10.1 Place the instrument on a firm support.

10.2 Level the instrument using the plumb bob or bubble level.

10.3 Check the calibration in accordance with Section 8.

10.4 Place the specimen on the anvil.

10.5 Be certain that the hammer is in the "UP'' (locked) position.

10.6 Lower the tube against the specimen, and hold firmly.

10.7 Release the hammer and read the height of the rebound.

10.8 Return the hammer to the "UP'' (locked) position.

10.9 Repeat 10.6 through 10.8 four or more times, using a different impact point each time in accordance with 8.4.

10.10 Record the average reading to the nearest whole number.

10.11 A single reading substantially different from the other shall be reported, but not included in the average or standard deviation calculations.

11. Report

11.1 Report the following information:

11.1.1 Material identification,

11.1.2 Specimen dimensions,

11.1.3 Surface conditions, that is, as formed or machined, wet or dry,

11.1.4 Orientation of the test surface with respect to anisotropy of material (parallel or perpendicular),

11.1.5 Number of readings taken,

11.1.6 Average hardness reading to the nearest whole number,

11.1.7 Standard deviation where applicable,

11.1.8 Testing conditions, including test date, serial number of test machine, and operator's name, and

11.1.9 Special environmental conditions, if any.

12. Precision and Bias [7]

12.1 Precision among six laboratories is ±3 points.

12.2 Bias of a properly calibrated instrument is ±4 %, or ±3 points, whichever is larger.

13. Keywords

13.1 carbon; graphite; hardness; Scleroscope

[7] Supporting data are available from ASTM International Headquarters. Request RR: C05–1005.