



# Standard Test Method for Rockwell Hardness of Graphite Materials<sup>1</sup>

This standard is issued under the fixed designation C748; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers Rockwell L scale hardness testing of graphite materials with grain size less than 0.8  $\mu\text{m}$  (0.032 in.) and a hardness range between 0 and 120.

1.2 Test Methods E18 shall be followed except where otherwise indicated.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are provided for information purposes only.

1.4 *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:*<sup>2</sup>

E18 Test Methods for Rockwell Hardness of Metallic Materials

E171 Specification for Atmospheres for Conditioning and Testing Flexible Barrier Materials

## 3. Summary of Test Method

3.1 The specimen is held in position and the load is applied. Final position of the indicator on the scale is observed and recorded as the hardness number.

## 4. Significance and Use

4.1 A Rockwell L scale hardness number is a number derived from the net increase in depth of impression as the load on a 6.3500-  $\pm$  0.0025-mm (0.2500-  $\pm$  0.0001-in.) diameter steel-ball indenter is increased from a fixed 10-kg minor load to a 60-kg major load and then returned to the minor load.

4.2 A Rockwell hardness number is directly related to the indentation hardness of a material; the higher the Rockwell L

scale reading, the harder the material. The test is useful in the evaluation and the manufacturing control of carbon and graphite materials.

## 5. Apparatus

5.1 *Rockwell Hardness Tester*, calibrated in accordance with the requirements of Section 7.

5.2 *Rockwell Hardness Tester Anvil*, appropriate for the material shall be used as the specimen base plate.

## 6. Test Specimen

6.1 The recommended test specimen shall be flat and have a minimum thickness of 6.35 mm ( $\frac{1}{4}$  in.).

6.2 The test surface roughness shall not exceed 3175-nm (125- $\mu\text{in.}$ ) arithmetical average.

6.3 The test surface to opposite face parallelism for flat specimens shall be within 1 %. For all other specimen shapes, the test surface must be maintained normal to the direction of load application.

## 7. Verification of Calibration

7.1 Level the Rockwell hardness tester in accordance with the manufacturer's instructions.

7.2 The adjustment of speed-of-load application is of great importance. Adjust the dashpot on the Rockwell tester so that the operating handle completes its travel in 4 to 7 s with no specimen on the machine or no load applied by the indenter to the anvil. The major load shall be 60 kg for this calibration. When so adjusted, the period taken for the mechanism to come to a stop with the specimen in place will vary from 5 to 15 s, depending upon the particular specimen, the indenter, and the load used. The operator should check the instrument manual for this adjustment.

7.3 Select a test block for Rockwell L scale ball-type indenters and make five impressions on the test surface of the block. Compare the average of these five tests against the hardness calibration of the block. If the error is more than  $\pm 2$  hardness numbers, the machine or penetrator, or both, must be checked to determine and correct the cause of error.

## 8. Conditioning

8.1 Allow the specimen(s) to reach equilibrium with room-temperature air, and test under the same conditions in accordance with Specification E171.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.F0 on Manufactured Carbon and Graphite Products.

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<sup>2</sup> 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.