



Standard Test Method for Compressive Strength of Carbon and Graphite¹

This standard is issued under the fixed designation C695; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This test method covers the determination of the compressive strength of carbon and graphite at room temperature.

1.2 *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:*²

C709 Terminology Relating to Manufactured Carbon and Graphite

E4 Practices for Force Verification of Testing Machines

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Terminology

3.1 *Definitions:* For definitions of terms relating to manufactured carbon and graphite, see Terminology **C709**.

4. Significance and Use

4.1 Carbon and graphite can usually support higher loads in compression than in any other mode of stress. This test, therefore, provides a measure of the maximum load-bearing capability of carbon and graphite objects.

5. Apparatus

5.1 *Test Machine*, conforming to Practice **E4** and to the requirements for speed of testing prescribed in Section 8 of this test method.

¹ This test method is under the jurisdiction of ASTM Committee **D02** on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee **D02.F0** on Manufactured Carbon and Graphite Products.

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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.

5.2 *Spherical Bearing Blocks* attached to the upper or lower head of the machine in such a manner that the spherical surfaces are in full contact when not loaded. The center of curvature of the spherical surface shall lie on the surface that contacts the specimen and on the machine axis. The spherical surfaces shall be well-lubricated. The radius of the spherical surface shall be equal to or greater than the radius of the test specimen.

5.3 *Steel Contact Blocks* may be used above or below the specimen, or both, to protect fixture and test machine surfaces from damage, as illustrated in **Fig. 1** and **Fig. 2**. Contact block surfaces shall be plane and parallel to within 0.0005 in./in. (0.0005 mm/mm).

5.4 All load-bearing machine and fixture surfaces shall have a minimum hardness of 45 HRC and surface finish of 16 $\mu\text{in.}$ (0.4 μm) rms maximum. Surfaces in contact with the specimen shall be flat to less than 0.0005 in./in. (0.0005 mm/mm).

5.5 Examples of arrangements of the load train are shown schematically in **Fig. 1** and **Fig. 2**.

6. Sampling

6.1 Samples may be taken from locations and orientations that satisfy the objectives of the test.

7. Test Specimen

7.1 The test specimen shall be a right cylinder with ends machined to yield planar and parallel faces. These faces shall be perpendicular to the cylindrical surface to within 0.001 in./in. (0.001 mm/mm) of diameter total indicator reading. All surfaces shall have a surface finish visually comparable to 32 $\mu\text{in.}$ (0.8 μm) rms or better. Reasonable care should be exercised to assure that all edges are sharp and without chips or other flaws.

7.2 The diameter of the test specimen shall be greater than ten times the maximum particle size of the carbon or graphite. The ratio of height to diameter may vary between 1.9 and 2.1. The recommended minimum test specimen size is $\frac{3}{8}$ in. (9.5 mm) diameter by $\frac{3}{4}$ in. (19 mm) high.

8. Procedure

8.1 Center the specimen in the machine between the contact surfaces. The deviation of the specimen axis from the machine