



Standard Test Methods for Tension Testing of Carbon and Graphite Mechanical Materials¹

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1. Scope

1.1 These test methods, and the figures that are part of the test methods, cover the apparatus, specimen, and procedures for the tension testing of carbon and graphite mechanical materials with a grain size smaller than 0.79 mm ($1/32$ in.).

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:

C 709 Terminology Relating to Manufactured Carbon and Graphite²

C 749 Test Method for Tensile Stress-Strain of Carbon and Graphite²

E 4 Practices for Force Verification of Testing Machines³

E 6 Terminology Relating to Methods of Mechanical Testing³

3. Terminology

3.1 *Definitions:* For definitions of terms relating to manufactured carbon and graphite, see Terminology C 709. The definitions of terms relating to tension testing in Definitions E 6 shall be considered as applying to the terms used in these test methods.

4. Significance and Use

4.1 These test methods may be used for quality control testing of established grades of carbon and graphite materials, in the development of new grades, and for other purposes where relative strength levels are the primary quantities of

interest. This test method may be applicable only if the ratio of specimen diameter to grain size, or flaw size, is greater than 5.

4.2 These test methods do not substitute for that described in Test Method C 749, but are useful where less sophisticated data and less expensive techniques are sufficient.

4.3 Carbon and graphite materials exhibit significant physical property differences within parent materials. Exact sampling patterns and grain orientations must be specified in order to make meaningful tensile strength comparisons.

5. Apparatus

5.1 *Testing Machine*— The machine used for tension testing shall conform to the requirements of Practices E 4. The testing machine shall have a capacity that the breaking load of the test specimen falls between 10 and 90 % of the scale capacity.

5.2 *Gripping Devices*— Gripping devices that conform to those illustrated in Fig. 1 shall be used. These gripping devices shall be attached to the heads of the testing machine through chain connectors. Fig. 2 shows the gripping device connected to the heads. Extreme care shall be taken that the axis of the test specimen is located on the center line of the head of the testing machine.

6. Test Specimens

6.1 Test specimens shall be produced to the configuration shown in Fig. 3.

6.2 Improperly prepared test specimens often cause unsatisfactory test results. It is important, therefore, that care be exercised in the preparation of specimens, particularly in the machining and polishing.

6.3 The specimen shall be hand polished with No. 000 dry paper until no circular grooves are visible to the naked eye.

6.4 The acceptable fracture zone of the specimen shall be 19 mm ($3/4$ in.) long with the center of the zone at the point of minimum diameter. Marks indicating fracture zone limits may be applied with ink or layout dope, but no scratching, punching, or notching of the specimen is permissible.

6.5 To determine the cross-sectional area, the diameter of the specimen at the narrowest point shall be used. The dimension shall be recorded to the nearest 0.02 mm (0.001 in.).

¹ These test methods are under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and are the direct responsibility of Subcommittee D02.F on Manufactured Carbon and Graphite Products.

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² *Annual Book of ASTM Standards*, Vol 05.05.

³ *Annual Book of ASTM Standards*, Vol 03.01.