Designation: ~~C565 – 93 (Reapproved 2010)$^{\varepsilon 1}$~~ C565 – 15

An American National Standard

Standard Test Methods for Tension Testing of Carbon and Graphite Mechanical Materials[1]

This standard is issued under the fixed designation C565; 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.

~~ε^1 NOTE—Updated units information in 1.2 and 5.2 editorially in May 2010.~~

1. ~~Scope~~ Scope*

1.1 These 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.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.2.1 *Exception*—All of the figures are dimensioned in inches in accordance with the original standard.

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:*[2]

~~C709 Terminology Relating to Manufactured Carbon and Graphite~~

C749 Test Method for Tensile Stress-Strain of Carbon and Graphite

E4 Practices for Force Verification of Testing Machines

E6 Terminology Relating to Methods of Mechanical Testing

3. Terminology

~~3.1 *Definitions*—For definitions of terms relating to manufactured carbon and graphite, see Terminology C709. The definitions of terms relating to tension testing in Terminology E6 shall be considered as applying to the terms used in these test methods.~~

3.1 *Definitions:*

3.1.1 The definitions of terms relating to tension testing in Terminology E6 shall be considered as applying to the terms used in these test methods.

3.1.2 *tensile strength, n*—property of solid material that indicates its ability to withstand a uniaxial tensile load, converted to unit stress based on the original cross-section area of the tensile test specimen.

3.1.3 *ultimate tensile strength, n*—the maximum tensile stress applied in stretching a specimen to rupture.

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 C749, but are useful where less sophisticated data and less expensive techniques are sufficient.

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[1] These test methods are under the jurisdiction of ASTM Committee D02 on Petroleum ~~Products~~ Products, Liquid Fuels, and Lubricants and are 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.

***A Summary of Changes section appears at the end of this standard**

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 E4. The testing machine shall have a capacity that the breaking load of the test specimen falls between ~~10~~10 % and 90 % of the scale capacity.

5.2 *Gripping Devices*—Gripping devices that conform to the principles of those illustrated in Fig. 1 shall be used (dimensions that reflect the use of SI units are permissible). 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

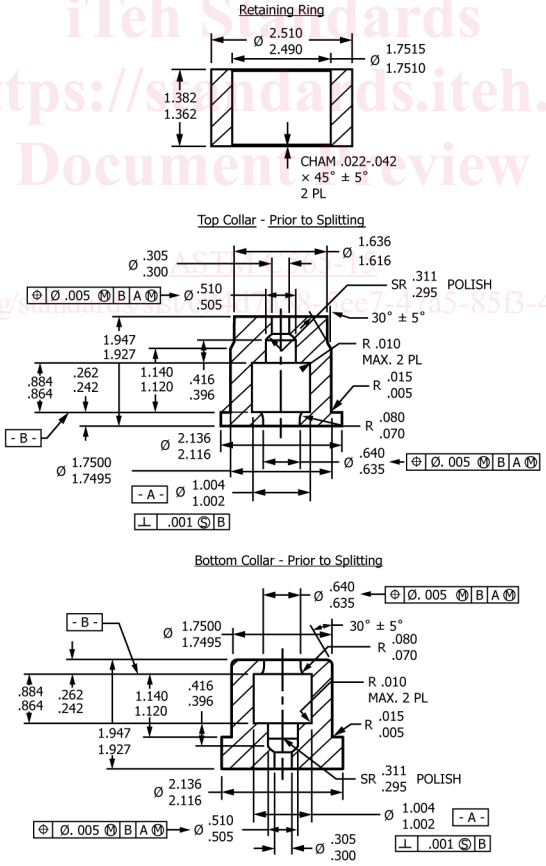
6.1 Test specimens shall be produced to the configuration shown in Fig. 3.

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 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.



NOTE 1—All dimensions are in inches.
NOTE 2—Material is stainless steel.
NOTE 3—Surface finish of working surfaces, 11 microinches AA or better.
NOTE 4—Break all sharp corners.
NOTE 5—Top and bottom collars to be split into two 180° sections. Max cutwidth not to exceed 1/16 in.

FIG. 1 Gripping Devices