



Standard Test Method for Bulk Density by Physical Measurements of Manufactured Carbon and Graphite Articles¹

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1. Scope

1.1 This test method covers the determination of the bulk density of manufactured articles of carbon and graphite of at least 500 mm³ volume. The bulk density is calculated to an accuracy of 0.25 %, using measurements of mass and dimensions in air at 25 $\pm$ 5°C.

1.2 *This standard does not purport to address 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:

IEEE/ASTM SI-10 Standard for Use of the International System of Units (SI) (the Modern Metric System)²

3. Terminology

3.1 Definition of Term Specific to This Standard:

3.1.1 *bulk density* —the mass of a unit volume of material including both permeable and impermeable voids.

4. Significance and Use

4.1 Bulk density as determined by this test method is a basic material property of importance in manufacturing and application of carbon and graphite.

4.2 This test method can be used for quality and process control, material characterization and description, and other purposes.

5. Preparation of Test Specimens

5.1 Machine test specimens from the manufactured article in the form of a rectangular parallelepiped or a right circular cylinder. The minimum mass of the specimen shall be 2000 times the sensitivity of the balance used to weigh the specimen,

and the volume of the specimen shall not be less than 500 mm³. The minimum dimension of the specimen shall be the larger of:

5.1.1 Ten times the length of the largest visible particle and

5.1.2 2000 times the resolution of the device used for measuring the dimension.

5.2 During the machining operation, use no lubricant having a boiling point above 100°C. All corners, edges, and faces of the specimen should be free of chips or gouges. Ensure that the specimen is free of any residue from the machining operation. Dry the specimen for a minimum of 2 h at 110°C, and then allow it to cool to 25 $\pm$ 5°C in a desiccator. The specimen shall not be removed from the desiccator until immediately prior to weighing.

6. Procedure

6.1 Weigh the specimen to an accuracy of 0.05 % using a balance or scale. During the weighing operation, handle the specimen with soft-tipped tongs.

6.2 Measure each dimension of the test specimen to an accuracy of 0.05 %.

6.2.1 If the specimen is a rectangular parallelepiped, make four measurements of the length (longest dimension). Take each measurement along the center of each of the four long faces of the specimen. Measure the width and thickness at each end and at two intermediate points along the length of the specimen. Determine the mean of each dimension.

6.2.2 If the specimen is a right circular cylinder, measure the length at four points, 90° apart on the periphery of the circular end faces. Make two sets of diameter measurements. Each set shall consist of four measurements, one at each end and two at intermediate points along an axial line. These sets shall lie at 90° to each other. Determine the mean length and the mean of each of the two sets of diameter measurements.

7. Calculation

7.1 Convert the mass to milligrams and the dimensions to millimetres, or convert the mass to megagrams and the dimensions to metres. Conversion factors are available in IEEE/ASTM SI-10.

7.2 The volume of the specimen may be calculated as follows:

For a rectangular parallelepiped:

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² *Annual Book of ASTM Standards*, Vol 14.02.

