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An American National Standard

Standard Test Methods for Apparent Porosity, Apparent Specific Gravity, and Bulk Density of Graphite Electrodes[1]

This standard is issued under the fixed designation C1039; 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.

1. Scope

1.1 These test methods cover the determination of apparent porosity, apparent specific gravity, and bulk density of cores taken from graphite electrodes manufactured for use in electric arc furnaces. (See also C559 and C838.)

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:*[2]

C559 Test Method for Bulk Density by Physical Measurements of Manufactured Carbon and Graphite Articles

C783 Practice for Core Sampling of Graphite Electrodes

C838 Test Method for Bulk Density of As-Manufactured Carbon and Graphite Shapes

3. Significance and Use

3.1 The results of these test methods can be used as a quality control or quality assurance check of electrodes either during their manufacture or at the user's location. The results of these methods tend to be operator-sensitive, therefore, care must be taken in the execution of the test in order to obtain reproducible results.

4. Apparatus

4.1 *Drying Oven*.

4.2 *Analytical Balance*, capable of weighing to 0.1 g.

4.3 *Autoclave or Pressure Vessel*, capable of withstanding one atmosphere externally and designed to withstand at least 448 to 483 kPa (65 to 70 psi) internal pressure.

4.3.1 The pressure vessel shall be provided with an opentop container to hold the specimens and a means of introducing water around the specimens while specimens are being held at low pressure.

4.4 *Vacuum Pump*.

4.5 *Wire Loop, Halter or Stirrup*, fabricated with 22 AWG (9.643 mm) copper wire shall be provided for determining suspended weight.

4.6 *Smooth Linen or Cotton Cloth*.

5. Test Specimens and Sampling

5.1 Electrodes can be sampled using Practice C783 that result in a specimen with approximately 50 mm (2 in.) diameter and 191 mm (7½ in.) long or a specimen of equivalent volume.

5.2 If sizes and shapes which are different from those described in 5.1, these shall be included in the report.

5.3 For each test, select at least five electrodes, at random, to represent a lot. The lot size will be determined by agreement of the parties desiring the tests.

6. Calibration

6.1 Prior to obtaining the suspended weights of the specimens, the balance shall be adjusted to zero with the wire stirrup suspended from the balance and immersed into a container of the liquid to the same depth in the liquid as occurs when a specimen is in place.

7. Procedure

7.1 *Determinations of Dry Weight, D*:

7.1.1 Dry the test specimens to constant weight by heating to 100 to 110°C (212 to 230°F). Cool and determine the dry weight, *D*, in grams to the nearest 0.1 g. If the time between drying and weighing exceeds 8 h, the specimens must be stored in a desiccator.

7.1.2 The determination of dry weight may be done either before or after the saturation operation. If the specimen is friable or there is evidence that particles have broken loose during the saturation operation, the dry weight shall be obtained after the suspended and saturated weights have been determined. Drying as described in 7.1.1 must be carried out.

7.2 *Saturation*:

[1] These test methods are 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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[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.