Designation: D6120 – 97 (Reapproved 2017)ε1

Standard Test Method for Electrical Resistivity of Anode and Cathode Carbon Material at Room Temperature[1]

This standard is issued under the fixed designation D6120; 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.

ε1 NOTE—Units formatting was corrected editorially in February 2017.

1. Scope

1.1 This test method covers the determination of the electrical resistivity at room temperature of solid cylindrical specimens cored from commercial sized carbon anodes and cathodes. This test method also applies to samples from carbon blocks prepared in a laboratory.

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

1.3 *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 limitation prior to use.* For specific warning information, see .

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C611 Test Method for Electrical Resistivity of Manufactured Carbon and Graphite Articles at Room Temperature

D5502 Test Method for Apparent Density by Physical Measurements of Manufactured Anode and Cathode Carbon Used by the Aluminum Industry

3. Terminology

3.1 *Definitions:*

3.1.1 *electrical resistivity, n*—the electrical resistance offered by a material to the flow of current, times the cross-sectional area of current flow and per unit length of current path, the reciprocal of conductivity. It is also known as resistivity, or specific resistance.[3]

4. Summary of Test Method

4.1 An electrical current is passed through a carbon cylinder and the voltage drop or electrical resistance is measured between two points along its length. The resistivity is calculated based on the voltage drop or electrical resistance, distance between the two points, and the cross-sectional area of the cylinder.

4.2 This test method are used to determine electrical resistivity for various carbon materials typically found in the aluminum industry. Electrical resistivity of other carbon artifacts such as graphite and specialty carbons is more appropriately determined by Test Method C611.

5. Significance and Use

5.1 The electrical resistivity of anode and cathode carbon material is important for efficient aluminum cell operation. It is a quality parameter that determines the suitability of an anode/cathode for operation in an aluminum cell.

5.2 The electrical resistivity may be selected as a requirement in a customer specification.

6. Apparatus

6.1 *Specimen Holder* (Fig. 1), a device for holding a specimen of 50 mm diameter and a minimum of 120 mm in length between two flat copper plates. One of the plates is swivel mounted to ensure good contact in case the ends of the specimen are not perfectly parallel. The plates shall be as large as the ends of the specimen and electrically insulated from each other.

6.1.1 *Voltage Drop Contact Points*—The contact points shall be conical or knife edge in shape and securely fastened to rigid insulating material with a minimum spacing of 50 mm and a maximum spacing of 80 % of the length of the specimen.

[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 D02.05 on Properties of Fuels, Petroleum Coke and Carbon Material.

Current edition approved Jan. 1, 2017. Published February 2017. Originally approved in 1997. Last previous edition approved in 2012 as D6120 – 97 (2012). DOI: 10.1520/D6120-97R17E01.

[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.

[3] Parker, Sybil P., Ed in Chief, *Dictionary of Scientific and Technical Terms*, McGraw Hill Book Co., Fourth Ed., 1989, p 615.