



Designation: B664 – 18 (Reapproved 2023)

Standard Specification for 80 % Silver-20 % Graphite Sliding Contact Material¹

This standard is issued under the fixed designation B664; 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 This specification defines the criteria for composition and other requirements for brushes with a nominal silver content of 80 %, by weight, with the balance being substantially graphite.

1.2 The values stated in inch-pound 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 become familiar with all hazards including those identified in the appropriate Safety Data Sheet (SDS) for this product/material as provided by the manufacturer, to establish appropriate safety, health, and environmental practices, and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

B613 Guide for Preparing Specifications for Miniature Brushes of Composite Materials for Sliding Electric Contacts

E18 Test Methods for Rockwell Hardness of Metallic Materials

2.2 NEMA Standard:

CB-1 Brushes for Electrical Machines³

¹ This specification is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.05 on Precious Metals and Electrical Contact Materials and Test Methods.

Current edition approved April 1, 2023. Published May 2023. Originally approved in 1979. Last previous edition approved in 2018 as B664 – 18. DOI: 10.1520/B0664-18R23.

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 Available from National Electrical Manufacturers Association (NEMA), 1300 N. 17th St., Suite 1752, Rosslyn, VA 22209, <http://www.nema.org>.

3. Requirements

3.1 *Chemical Composition*, shall be as follows:

Silver	80 ± 3 % (weight)
Graphite	balance
Total metal impurities	1 % max
Percent ash in graphite (NEMA CB-1)	5 % max

3.2 *Physical Properties*—The following lot average properties must be met. Unless otherwise agreed between the producer and the user, the number of samples shall be five.

3.2.1 *Density*—The minimum acceptable density shall be 5.15 g/cm³ as determined by the measurement and weight method defined by NEMA CB-1.

3.2.2 Shear Strength:

3.2.2.1 The shear strength for the normal and transverse directions shall be measured for rectangular parallelepipeds and shall be 2000 psi (14 MPa), minimum.

3.2.2.2 The shear strength for the longitudinal shear direction shall be measured for cylinders and shall be 1000 psi (6.9 MPa), minimum.

3.3 *Microstructure*—Parts shall be visually free of structural defects, cracks, etc., upon examination at 50 \times . The press direction, as evidenced by laminations, shall be as defined by the purchase order. Also the brush material shall not contain abrasive particles that will sliver a metal alloy ring with a hardness \geq 110 HK₁₀₀ when the brush force is equal to 30 g or that necessary for 5.0 psi (34 kPa) pressure, whichever is greater. A sliver is defined as a loose wear particle with one dimension \geq 50 \times the next smaller dimension. Although slivering can be caused by coarse abrasive particles, other parameters can contribute to slivering (for example, very high brush force).

3.4 Source or grade of raw materials (for example, graphite) or methods of manufacture shall not be changed without notifying users.

4. Reference Properties

4.1 Because of their size, the following properties for miniature brushes cannot always be determined; however, these properties are typical for larger parts.

4.1.1 *Superficial Hardness*—The typical Rockwell superficial hardness for this material is 44 R15W as determined by Test Method E18 with a 1/8 in. steel ball.

4.1.2 *Specific Resistance*—The typical specific resistance for the material is $4 \times 10^{-6} \Omega\text{-in.}$ ($1 \times 10^{-7} \Omega\text{-m}$) as determined by the method detailed in NEMA CB-1.

5. Certification

5.1 Material supplied under this specification shall be certified as meeting the requirements of this specification by the producer of the material.

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6. Keywords

6.1 electrical contacts; graphite; silver; sliding contacts

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