Designation: B522 – 01 (Reapproved 2017)

Standard Specification for Gold-Silver-Platinum Electrical Contact Alloy[1]

This standard is issued under the fixed designation B522; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers 69 % gold, 25 % silver, 6 % platinum alloy tubing, rod, wire, and sheet material for sliding electrical contacts.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered 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 and health 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]

B476 Specification for General Requirements for Wrought Precious Metal Electrical Contact Materials

3. Manufacture

3.1 Raw materials shall be of such quality and purity that the finished product will have the properties and characteristics prescribed in this specification.

3.2 The material shall be finished by such operations (cold working, annealing, turning, grinding, pickling) as are required to produce the prescribed properties.

4. Chemical Composition

4.1 Material produced under the specification shall meet the requirements for chemical composition prescribed in Table 1.

5. Mechanical and Electrical Requirements

5.1 The contract or order may specify ultimate tensile strength, elongation, microhardness (Knoop or Vickers), hardness (Rockwell or Rockwell Superficial), or a combination of these mechanical properties as temper criterion. If the contract or order does not specify a temper criterion, then the criterion for temper designation will be ultimate tensile strength and elongation.

5.1.1 Knoop hardness indentations shall be made so that the long axis of the indenter is parallel to the rolling or drawing direction of the material.

5.2 Mechanical and electrical properties shall conform to the requirements of Table 2 and Table 3.

5.3 All test specimens shall be the supplied size when practical.

5.4 All tests are to be conducted at room temperature (65 to 80°F) (18 to 27°C).

6. General Requirements

6.1 Specification B476 shall apply to all materials produced to this specification.

7. Inspection and Testing

7.1 Material furnished under this specification shall be inspected by the manufacturer as follows:

7.1.1 Visual inspection of 10×,

7.1.2 Temper test (hardness or tensile),

7.1.3 Dimensional tests, and

7.1.4 Spectrographic or chemical analysis when indicated by the purchase order.

7.2 The purchaser shall perform such tests as are required to verify the quality of material procured under this specification.

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[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.

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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.

TABLE 1 Chemical Requirements

Element	Composition, weight %	
	Class I	Class II
Gold	68.0–70.0	68.5–69.5
Silver	23.5–26.5	24.5–25.5
Platinum	5.0–7.0	5.5–6.5
Selected base metals (Pb, Sb, Bi, Sn, As, Cd, Ge, Ti, and Ga), max	...	0.01
Sulfur, max	...	0.01
Total platinum group metal impurities, max	0.15	0.15
Total base metal impurities, max	0.20	0.1

TABLE 2 Mechanical Properties, Wire 0.010 to 0.020-in. (0.25 to 0.51-mm) Diameter Strip 0.003 to 0.020 in. (0.08 to 0.51 mm) thick

Properties	Temper	
	Annealed	Work-Hardened
Knoop hardness, 100-gf load (50 gf below 0.005 in. (0.13 mm) thick), HK	70 to 105	120 to 170
Ultimate tensile strength, psi,	35 000 to 45 000	60 000 to 85 000
MPa	240 to 310	410 to 590
Elongation in 2 in. or 50 mm, %	25 min	1 min

TABLE 3 Mechanical Properties, Wire over 0.020 to 0.060-in. (0.51 to 1.52-mm) Diameter

Properties	Temper	
	Annealed	Work-Hardened
Knoop hardness, 100-gf load, HK	70 to 105	125 to 170
Ultimate tensile strength, psi,	35 000 to 45 000	55 000 to 75 000
MPa	240 to 310	380 to 520
Elongation in 2 in. or 50 mm, %	25 min	1 min

8. Keywords

8.1 contact alloy; electrical contact alloy; gold-silver-platinum

APPENDIX

(Nonmandatory Information)

X1. REFERENCE PROPERTIES OF GOLD-SILVER-PLATINUM ELECTRICAL CONTACT ALLOY

X1.1 Table X1.1 provides a list of typical property values which are useful for engineering calculations in electrical contact design and application.

TABLE X1.1 Typical Physical Properties

Properties	Temper	
	Annealed	Work-Hardened
Resistivity, Ωcmil/ft,	95	95
μΩ·cm	15.7	15.7
Density,[A] g/cm^3,	16.0	16.0
dwt/in.^{3}	169	169
Solidus temperature,°C	1025	1025
Modulus of elasticity in tension, psi,	13×10^6	13×10^6
MPa	89.6×10^3	89.6×10^3
Proportional limit, psi,	18 000	30 000
MPa	120	210

[A] dwt is the abbreviation for pennyweight, which equals 1/20 of a troy ounce.