



Standard Specification for 60 % Palladium-40 % Silver Electrical Contact Material¹

This standard is issued under the fixed designation B 731; 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 Department of Defense.

1. Scope

1.1 This specification covers 60 % palladium-40 % silver rod, wire, strip, and sheet material for 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 Material Safety Data Sheet (MSDS) 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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

B 476 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, heat treating, annealing, turning, grinding, or pickling) as are required to produce the prescribed properties.

4. Chemical Requirements

4.1 Material produced under this specification shall meet the requirements for chemical composition prescribed in **Table 1**, in accordance with the practices prescribed in Specification **B 476**.

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.

Current edition approved June 1, 2006. Published June 2006. Originally approved in 1996. Last previous edition approved in 2001 as B 731 – 96 (2001).

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 Composition

Element	Weight
Pd (by difference)	59.5 % min.
Ag	39.1 to 40.5 %
Cu	0.1 max
Total other noble metals ^A	0.2 max
Other Impurities:	
Individual elements ^B	0.01 max
Collective total	0.10 max

^A Other noble metals are Au, Pt, Rh, Ir, Ru, and Os.

^B Typical metals are as indicated: Pb, Sn, Zn, Fe, Si, Mg, Ca, Al, Ni, Cr, Mn, Sb, B, Co, Mo, and Te, Cd, and In.

4.2 Uniformity of composition shall be assured by the use of good commercial preparation practices.

5. Mechanical Requirements

5.1 The contract or order may specify ultimate tensile strength, elongation, microhardness (Knoop or Vickers), or a combination of these mechanical properties (as listed in **Table 2** or **Table 3**) 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.

5.2 All test specimens shall be full thickness or diameter when practical.

5.3 All tests are to be conducted at room temperature, about 68°F (20°C).

6. Inspection and Testing

6.1 Material furnished under this specification shall be inspected by the manufacturer in accordance with Specification **B 476**.

7. Keywords

7.1 clad materials; contact material; palladium alloy; precious metal; silver alloy

TABLE 2 Mechanical Properties of Sheet and Strip

Temper	Reduction in B&S Numbers (Reference)	Percent Reduction (Reference)	Ultimate Tensile Strength, psi (MPa)		Minimum Elongation in 2 in., %	Typical Microhardness HK 100g
			min	max		
A	0	0	50 000 (344)	80 000 (551)	30	120
1/2 H	2	21	70 000 (482)	90 000 (620)	2	170
Hard	4	37	80 000 (551)	100 000 (689)	1	180
Spring	8	60	90 000 (620)	120 000 (827)	...	200

TABLE 3 Mechanical Properties of Wire, Rod, and Tubing

Temper	Reduction in B&S Numbers (Reference)	Percent Reduction (Reference)	Ultimate Tensile Strength, psi (MPa)		Minimum Elongation in 2 in., %	Knoop Hardness (25 g, load)
			min	max		
A	0	0	40 000 (275)	60 000 (414)	25 ^A	90–120
1/8 H	1/2	11	60 000 (414)	70 000 (482)	2	120–140
1/4 H	1	21	70 000 (482)	80 000 (551)	1	140–160
1/2 H	2	37	80 000 (551)	90 000 (620)	1	160–200
Hard	4	60	90 000 (620)	100 000 (689)	1	200–240

^A Wire in sizes less than 0.020 in. (0.5 mm) diameter and tubing of less than 0.010 in. (0.25 mm) wall thickness may be down to 15 %.

APPENDIX

(Nonmandatory Information)

X1. TYPICAL PROPERTY VALUES

X1.1 The following is a list of typical property values that are useful for engineering calculations in electrical contact design and application.

Electrical conductivity, % IACS
Resistivity, $\Omega \cdot \text{cmil/ft}$
Microhm-cm

4
258
43

Solidus temperature, °C
Liquidus temperature, °C
Density:
g/cm³
tr oz/in.³

1290
1340
11.35
5.98

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).