



Designation: ~~B541 – 01 (Reapproved 2012)~~ B541 – 01 (Reapproved 2018)

Standard Specification for Gold Electrical Contact Alloy¹

This standard is issued under the fixed designation B541; 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 a gold-rich, age-hardenable alloy in rod, wire, and strip form applicable to 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 The following precautionary statement pertains to the test method portion only, Section 7, of this specification. *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~~)(~~SDS~~) for this product/material as provided by the manufacturer, to establish appropriate ~~safety~~ safety, health, and ~~health~~ 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

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

~~E8E8/E8M~~ Test Methods for Tension Testing of Metallic Materials [~~Metric~~] E0008 – E0008M

~~E384~~ Test Method for Microindentation Hardness of Materials

3. Materials and 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, age hardening, etc.) as are required to produce the prescribed properties.

4. Chemical Composition

4.1 Material produced under this specification shall meet the requirements of **Table 1** for chemical composition.

5. Condition

5.1 This specification covers the conditions and forms listed in **Table 2**.

6. Mechanical Properties

6.1 Mechanical properties shall conform to **Table 3** and **Table 4** as appropriate.

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 ~~May 1, 2012~~ Nov. 1, 2018. Published ~~May 2012~~ November 2018. Originally approved in 1970. Last previous edition approved in ~~2006~~ 2012 as B541 – 01 (~~2006~~)(2012). DOI: ~~10.1520/B0541-01R12~~ 10.1520/B0541-01R18.

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~~ standard's Document Summary page on the ASTM website.

TABLE 1 Chemical Requirements

Element	Composition, Weight %	
	Nominal	Range
Gold	71.5	70.5–72.5
Platinum	8.5	8.0–9.0
Silver	4.5	4.0–5.0
Copper	14.5	13.5–15.5
Zinc	1.0	0.7–1.3
Total base metal impurities	...	0.2 max
Total platinum group metal impurities	...	0.2 max

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TABLE 2 Conditions and Forms

Process	Symbol	Form		
		Wire	Strip	Rod
Annealed	A	X	X	X
Stress-relieved	S-R	X	X	X
Annealed	A	X	X	X
Stress-relieved	S-R	X	X	X
Age hardened from solution annealed condition	HT-A	X	X	X
Age hardened from solution annealed and cold-worked condition	HT-CW	X	X	X

TABLE 3 Mechanical Properties of Wire (0.004 to 0.020-in. (0.12 to 0.5-mm) diameter)^A

Property	Condition			
	A	S-R	HT-A	HT-CW
Tensile strength, ksi	85–110	130–170	130–165	150–200
Tensile strength, MPa	590–760	900–1170	900–1140	1030–1380
Elongation, % in 5 in. or 125 mm	20 min	5–15	7–14	2–10
Hardness, Knoop, HK ₁₀₀ ^B	180–240	270–340	280–350	310–380
Hardness, Vickers HV ₁₀₀ ^B	180–250	270–340	285–360	290–370

^A See 6.2.

^B See 7.3.

TABLE 4 Mechanical Properties of Wire (0.021 to 0.080-in. (0.51 to 0.200-mm) diameter)^A

Property	Condition			
	A	S-R	HT-A	HT-CW
Tensile strength, ksi	80–110	130–170	130–160	145–195
Tensile strength, MPa	550–760	900–1170	900–1100	1000–1340
Elongation, % in 2 in. or 50 mm	16 min	4–14	5–14	2–10
Hardness, Knoop HK ₁₀₀ ^B	180–240	270–340	270–340	290–370
Hardness, Vickers HV ₁₀₀ ^B	180–250	270–340	285–360	290–370

^A See 6.2.

^B See 7.3.

6.2 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.

6.3 Mechanical properties of flattened wire, less than 0.012 in. (0.30 mm) thick shall conform to 6.1 (Table 5).

7. Test Methods

7.1 Test methods are in accordance with Specification B476.