



Standard Specification for Platinum-Iridium Electrical Contact Materials¹

This standard is issued under the fixed designation B 684; 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 an 85 % platinum—15 % iridium alloy, and a 90 % platinum—10 % iridium alloy, in the form of 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 The original specification, B 684 - 81, covered the 85 % platinum 15 % iridium alloy. The 1997 revision of this specification added the 90 % platinum 10 % iridium alloy.

1.4 *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 277 Test Method for Hardness of Electrical Contact Materials

B 476 Specification for General Requirements for Wrought Precious Metal Electrical Contact Materials

E 8 Test Methods for Tension Testing of Metallic Materials

E 384 Test Method for Microindentation Hardness of Materials

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	85 Pt/15 Ir	90 Pt/10 Ir
	Weight %	Weight %
Pt	balance	balance
Ir	14.50-15.50	9.50-10.50
Total Impurities	0.2 max.	0.2 max.
Total Platinum Group (Pd, Rh, Os, Ru), Au	0.1 max.	0.1 max.
Total Other Impurities (including the elements below)	0.1 max.	0.1 max.
Pb, Sb, Bi, Sn, As, Cd, Zn	0.01 max each	0.01 max each
Fe	0.015 max each	0.015 max each
Other elements	0.02 max each	0.02 max each

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, or pickling) as are required to produce the prescribed properties.

4. General Requirements

4.1 The provisions of Specification B 476 shall apply to all materials produced to this specification.

5. Chemical Requirements

5.1 Material produced under the specification shall meet the requirements of chemical composition prescribed in Table 1.

5.2 By agreement between purchaser and manufacturer, analysis may be required and limits established for elements or compounds not specified in the table of chemical composition.

NOTE 1—Analysis is regularly made for the elements for which specific limits are listed. If, however, the presence of “other” elements is suspected or indicated in the course of routine analysis, further analysis shall be made to determine that the total of these “other” elements and the listed impurities is not in excess of the total impurities limit.

6. Mechanical Requirements

6.1 The contract or order may specify ultimate tensile strength, elongation, microhardness (Knoop or Vickers), hardness (Rockwell or Rockwell Superficial), or a combination of



TABLE 2 Mechanical Properties of Wire

Property	85 Pt/15 Ir		90 Pt/10 Ir	
	Annealed	Work Hardened	Annealed	Work Hardened
Ultimate Tensile Strength, ksi (MPa)	75 - 85 (520-590)	90 - 120 (620-830)	35 - 60 (240-410)	70 minimum (480 minimum)
Elongation, % in 2 in. gage length (51 mm)	30 minimum	1 - 10	30 minimum	1 - 10
Microhardness, HK	—	—	—	—

TABLE 3 Mechanical Properties of Strip

Property	85 Pt/15 Ir		90 Pt/10 Ir	
	Annealed	Work Hardened	Annealed	Work Hardened
Ultimate Tensile Strength, ksi (MPa)	75 - 85 (520-590)	90 - 120 (620-830)	35 - 60 (240-410)	70 minimum (480 minimum)
Elongation, % in 2 in. gage length (51 mm)	30 minimum	1 - 10	30 minimum	1 - 10
Microhardness, HK	130 - 190	200 minimum	130 - 190	200 minimum

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.

6.2 The mechanical properties shall conform to those properties listed in Table 2 and Table 3. The term “work hardened,” as used in these tables, refers to material which has been subjected to a minimum of 30 % reduction in cross-sectional area.

6.3 All test specimens shall be full size when practical.

6.4 All tests are to be conducted at room temperature, 65 to 85°F (18 to 29°C).

7. Test Methods

7.1 Test methods shall be in accordance with Specification B 476.

7.1.1 Knoop hardness tests shall be in accordance with Test Method E 384. Material 0.005 in. (0.13 mm) in thickness (diameter) and larger shall be tested using a 100-g indenter load. Material less than 0.005 in. (0.13 mm) in thickness (diameter) shall be tested using a 50-g indenter load. A minimum of five hardness indentations shall be made on each specimen. All indentations shall be made so that the long axis

of the indenter is parallel to the rolling or drawing direction of the material. The hardness value reported shall be the average of the five indentations.

7.1.2 All tension test specimens shall be full cross-section size when practical (see Test Methods E 8).

7.1.3 All tests shall be conducted in room temperature, 65 to 85°F (18.3 to 29.4°C).

7.2 Chemical analysis shall be performed by spectrochemical or wet analysis methods.

8. Inspection and Testing

8.1 Material furnished under this specification shall be inspected and tested by the manufacturer as listed below:

8.1.1 Visual inspection per Specification B 476

8.1.2 Tension or hardness tests, or both, for temper verification,

8.1.3 Dimensional inspection, and

8.1.4 Chemical analysis.

9. Keywords

9.1 electrical contact materials; iridium alloy; medical material; platinum alloy; platinum iridium alloys

APPENDIX

(Nonmandatory Information)

X1. TYPICAL PROPERTY VALUES

X1.1 Typical property values of 85 % platinum–15 % iridium are as follows:

Density, g/cm ³	21.6
resistivity, $\mu\Omega\cdot\text{cm}$ at 20°C approx.	28
solidus temperature, °C approx.	1790
liquidus temperature, °C approx.	1820

 B 684 – 97 (2008)

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