Designation: B 476 – 01

Standard Specification for General Requirements for Wrought Precious Metal Electrical Contact Materials[1]

This standard is issued under the fixed designation B 476; 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 general requirements common to wrought precious metal electrical contact alloy products in the form of sheet, strip, wire, and rod. Unless otherwise specified in the purchase order or in an individual specification, these general requirements shall apply to wrought electrical contact materials where indicated in the applicable product specifications issued by ASTM.

1.2 In case of conflict, the requirements on the purchase order, the individual specification, and this general specification shall prevail in the sequence named.

1.3 The values stated in inch-pound units are to be regarded as the standard. The metric equivalents of inch-pound units may be approximate.

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 establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.5 It is the responsibility of the user to become familiar with all hazards including those identified in the appropriate Material Safety Data Sheet for this product/material as provided by the manufacturer.

2. Referenced Documents

The following documents of the issue in effect, on the date of material purchase, form a part of this specification to the extent referenced herein:

2.1 *ASTM Standards:*

B 63 Test Method for Resistivity of Metallically Conducting Resistance and Contact Materials[2]

B 772 Guide for Specifying the Chemical Compositions for Electrical Contact Materials (Arcing and Nonarcing)[3]

E 3 Methods of Preparation of Metallographic Specimens[4]

E 8 Test Methods of Tension Testing of Metallic Materials[4]

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications[5]

E 55 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition[6]

E 112 Test Methods for Determining Average Grain Size[4]

E 384 Test Method for Microhardness of Materials[4]

3. Terminology

3.1 *Definition:*

3.1.1 *lot*—the quantity of material of the same type, size, and finish produced at one time from the same cast or heat, and heat treated in the same heat-treatment cycle.

4. Ordering Information

4.1 Orders for material to this specification shall include the following information:

4.1.1 Designation and revision date of this specification.

4.1.1.1 If a revision date is not designated, the latest revision should be used.

4.1.2 Designation and revision date of the applicable product specification.

4.1.2.1 If a revision date is not designated, the latest revision of the product specification should be used.

4.1.3 Description of material form,

4.1.4 Dimensions of the material,

4.1.5 Total quantity of each size,

4.1.6 Temper of the material (annealed, cold worked, etc.),

4.1.7 Temper test (hardness or tensile) (Section 10),

4.1.8 Special requirements (if any), and

4.1.9 Certification (Section 14).

4.2 Specify the following, if required:

4.2.1 Certificate of compliance of physical and chemical requirement.

4.2.2 *Test Data*—Specify tests and analyses to be performed and reported.

4.2.3 Special packaging, if required.

[1] This test method 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.

Current edition approved May 10, 2001. Published July 2001. Originally published as B476 –68. Last previous edition B476 – 90 (1995)$^{\epsilon 1}$.

[2] *Annual Book of ASTM Standards*, Vol 03.04.

[3] *Annual Book of ASTM Standards*, Vol 02.04.

[4] *Annual Book of ASTM Standards*, Vol 03.01.

[5] *Annual Book of ASTM Standards*, Vol 14.02.

[6] *Annual Book of ASTM Standards*, Vol 03.05.

5. Materials and Manufacture

5.1 The raw material shall be of such quality and purity that the finished product shall have the properties and characteristics prescribed in the applicable product specification issued by ASTM.

5.2 The product shall be produced by a combination of hot or cold working operations. it shall be finished, unless otherwise specified, by such cold working, annealing, or heat treatment as may be necessary to meet the specified properties.

6. Dimensions and Permissible Variations

6.1 *General*—For the purpose of determining conformance with the dimensional requirements prescribed in this specification, any measured value outside the specified limiting values for any dimension may be cause for rejection.

6.2 Tolerance tables to cover all forms of products can become quite voluminous. For this reason, it is recommended that tolerances be established and agreed upon between the producer and user at the time of placing an order or an inquiry for quotation of price and delivery. Refer to Section 16 (Supplementary Requirements). Details of form and tolerances for products not covered by this specification, such as, the types of materials listed below, and means of measurement, should be established between producer and user.

6.2.1 Sawed products,

6.2.2 Square sheared products,

6.2.3 Flat wire, thickness, width and edge radius tolerances,

6.2.4 Edge rolled flat wire, thickness, width and corner radius tolerances.

6.3 *Wire and Rod*:

6.3.1 The standard tolerances applied to the diameter of wire and rod shall be as prescribed in Table 1.

6.3.2 The rod straightness and length tolerance shall be those prescribed in Table 2.

6.4 *Strip and Sheet*—Supplied in the form of coils, flat lengths or on spools.

6.4.1 The thickness tolerances shall be those prescribed in Table 3.

6.4.2 The width standard tolerance for slit products shall be those prescribed in Table 4.

6.4.3 The straightness (camber or edgewise curvature) tolerance for slit strip is prescribed in Table 4 also.

6.5 *Flatness*—The flatness of blanks, shims, circles, or other forms should be negotiated between the manufacturer and the purchaser. The following suggestion is to be used for guidance only when the manufacturer and the purchaser discuss flatness requirements. It is not a requirement of this specification, unless agreed upon and made part of the purchase order or request for quotation. The flatness of a flat form shall be that the maximum deviation from the flat surface shall be less than 1 % of the measurement distance specified for the product, such as diameter for circles, length or width of blanks, or any specific measurement length; that is, maximum of 0.20 in. (5.08 mm) deviation in any 20 in. (508 mm) length in any direction.

TABLE 1 Round Wire and Rod Diameter Tolerance

Diameter, in. (mm)	Tolerance, ±, in. (mm)
Up to 0.010 (0.25), incl	0.0001 (0.002)
Over 0.010 to 0.020 (0.25 to 0.51), incl	0.0002 (0.005)
Over 0.020 to 0.030 (0.51 to 0.76), incl	0.0003 (0.008)
Over 0.030 to 0.040 (0.76 to 1.02), incl	0.0004 (0.010)
Over 0.040 to 0.187 (1.02 to 4.75), incl	0.0005 (0.013)
Over 0.187 to 0.250 (4.75 to 6.35), incl	0.001 (0.03)
Over 0.250 to 0.375 (6.35 to 9.52), incl	0.0015 (0.04)
Over 0.375 to 0.750 (9.52 to 19.0), incl	0.002 (0.05)

7. Workmanship

7.1 Surfaces of all material furnished to this specification shall be smooth, clean, and free from scratches, stains, rough spots, slivers, laps, scale, pits, and any other injurious defects within limits consistent with the best possible practice.

8. Sampling

8.1 *Sampling*—The portion size and selection of pieces shall be as follows:

8.1.1 *Chemical Analysis*—Samples for chemical analysis shall be taken and prepared in accordance with Practice E 55. The minimum weight of the composite sample that is to be divided into three equal parts shall be 6 g.

8.1.2 *Physical Tests*—For physical tests, a test specimen shall be taken from each of four randomly selected individual units of finished product from a lot. If the lot consists of less than four units, a piece shall be taken from each individual unit.

9. Number of Tests and Retests

9.1 If any specimen tested shows a defective test method or extraneous flaws, it may be discarded and another specimen substituted.

9.2 If the chemical analysis fails to conform to the specified limits, analysis shall be made on a new composite sample, prepared from samples selected in accordance with Practice E 55 or 8.1.2 after the physical tests have been performed. The results of this retest shall comply with the specified requirements.

9.3 The required physical tests shall be performed on 2 of 4 of the pieces selected in accordance with 8.1.2.

9.3.1 If one of the two tests made to determine any of the physical properties fails to meet a specified limit, this test shall be repeated on each of the two remaining pieces selected in accordance with 8.1.2 and the results of both of these tests shall comply with the specified requirements.

9.4 In the case of micro hardness, the number of readings shall not be less than 5 on each test specimen.

10. Test Methods

10.1 The properties enumerated in the applicable product specification shall be determined in accordance with the following: Test Methods B 63 and E 384, Methods E 3, E 8, and E 112, and Practice E 55.

10.2 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.