SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS4784 | REV. G

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Superseding AMS4784F

Gold-Palladium-Nickel Alloy, Brazing Filler Metal, High Temperature
50Au - 25Pd - 25Ni
2015 to 2050 °F (1102 to 1121 °C) Solidus-Liquidus Range

(Composition similar to UNS P00500)

RATIONALE

AMS4784G results from a Five Year Review and update of this specification. Metric equivalents sieve sizes were incorporated in Table 5B.

1. SCOPE

1.1 Form

This specification covers a gold-palladium-nickel alloy in the form of wire, rod, sheet, strip, foil, pig, powder, shot, chips, preforms, and a viscous mixture (paste) of the powder in a suitable binder.

1.2 Application

This filler metal has been used typically for joining corrosion and heat-resistant steels and alloys where corrosion and oxidation-resistant joints with good strength at elevated temperatures are required, but usage is not limited to such applications.

1.3 Classifications

Filler metal supplied to this specification is classified as follows:

Class 1 Standard composition
Class 2 Supplementary composition control

Where no class is specified, Class 1 shall apply.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS4784G

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2222 Tolerances, Copper and Copper Alloy Sheet, Strip, and Plate

AMS2224 Tolerances, Copper and Copper Alloy Wire

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B 214 Sieve Analysis of Granular Metal Powders

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined by spectrochemical methods or other analytical methods acceptable to purchaser (See 8.3).

TABLE 1 - COMPOSITION

Element	min	max
Gold	49.50	50.50
Palladium	24.50	25.50
Nickel	24.50	25.50
Other Elements, total (3.1.1)	--	0.15

3.1.1 Determination not required for routine acceptance.

3.1.2 For Class 2, copper shall be limited to 0.06% maximum, carbon to 0.005% maximum, and the following elements shall be limited to 0.002% maximum each; aluminum, cadmium, lead, magnesium, phosphorus, silicon, and zinc. The total of these elements shall not exceed 0.05% maximum.

3.2 Condition

The product shall be supplied in the following condition:

3.2.1 Wire

Clean and bright. Annealed temper, unless otherwise specified.

3.2.2 Rod

As fabricated, and cleaned.

3.2.3 Sheet, Strip, and Foil

Cold rolled and annealed unless otherwise specified.

3.2.4 Pig, Powder, Shot, and Chips

As fabricated.

3.2.5 Paste

Unless otherwise specified by the purchaser, shall consist of 84 to 90% by weight powder in a suitable binder and shall not contain flux.

3.2.6 Preforms

As fabricated.

3.3 Properties

Filler metal shall conform to the following requirements:

3.3.1 Color

Shall be yellow-white.

3.3.2 Flatness

When unrolled, strip and foil shall lie flat with no undue tendency to re-coil.

3.3.3 Paste

3.3.3.1 Paste shall have a shelf life of not less than 6 months from date of manufacture; not more than thorough mixing shall be required to restore paste for use during that time.

3.3.3.2 Paste without flux shall leave no adherent residue when heated in a protective atmosphere to a temperature higher than 1000 °F (538 °C).

3.4 Quality

The product, as received by purchaser, shall be uniform in color, quality, and condition and free from foreign materials and from imperfections detrimental to its working qualities. Wire, rod, sheet, strip, and foil shall be clean, sound, bright, and free from slivers, splitting, ragged edges, damaged ends, and other injurious imperfections. Pig, powder, shot, and chips shall have a metallic luster.

3.5 Sizes and Tolerances

The product shall be supplied in the following standard sizes and to the tolerances shown.

3.5.1 Wire and Rod

3.5.1.1 Nominal Diameters

Shall be as shown in Table 2.

TABLE 2 - STANDARD DIAMETER SIZES

Inch	Millimeters
0.005	0.13
0.007	0.18
0.010	0.25
0.015	0.38
0.025	0.64
0.031	0.79
0.040	1.02
0.047	1.19
0.062	1.57
0.094	2.39
0.125	3.18
0.175	4.44
0.188	4.78
0.225	5.72
0.250	6.35

3.5.1.2 Diameter Tolerances for Drawn Wire and Rod

Shall be in accordance with AMS2224 as applicable to refractory alloys.

3.5.1.3 Diameter Tolerances for Rolled or Extruded Wire and Rod

Shall be as shown in Table 3.

TABLE 3A - DIAMETER TOLERANCES, INCH/POUND UNITS

Nominal Diameter or Distance Between Parallel Sides Inch	Tolerances, Inch Plus and Minus Rounds	Tolerances, Inch Plus and Minus Squares
0.031 to 0.062, incl	0.005	0.008
Over 0.062 to 0.125, incl	0.006	0.009
Over 0.125 to 0.188, incl	0.007	0.009
Over 0.188 to 0.250, incl	0.008	0.010

TABLE 3B - DIAMETER TOLERANCES, SI UNITS

Nominal Diameter or Distance Between Parallel Sides Millimeters	Tolerances, Millimeter Plus and Minus Rounds	Tolerances, Millimeter Plus and Minus Squares
0.79 to 1.57, incl	0.13	0.20
Over 1.57 to 3.18, incl	0.15	0.23
Over 3.18 to 4.78, incl	0.18	0.23
Over 4.78 to 6.35, incl	0.20	0.25

3.5.2 Sheet, Strip, and Foil

3.5.2.1 Nominal Thicknesses

Shall be as shown in Table 4.

TABLE 4 - STANDARD THICKNESSES

Inch	Millimeter
0.001	0.025
0.0015	0.038
0.002	0.05
0.003	0.08
0.004	0.10
0.005	0.13
0.006	0.15
0.008	0.20
0.010	0.25
0.014	0.36
0.020	0.51
0.030	0.76

3.5.2.2 Tolerances

3.5.2.2.1 Thickness

Nominal thicknesses under 0.002 inch (0.05 mm) shall have a tolerance of ±0.0002 inch (±5 µm); nominal thicknesses 0.002 inch (0.05 mm) and over shall have tolerances conforming to AMS2222 as applicable to refractory alloys.

3.5.2.2.2 Width of Individual Rolls

Nominal widths under 6 inches (152 mm) shall vary not more than ±0.010 inch (±0.25 mm) from the width ordered. Nominal widths 6 inches (152 mm) and over shall vary not more than ±0.015 inch (±0.38 mm) from the width ordered.

3.5.2.2.3 Length in Individual Roll

Shall not be limited except that no roll shall weigh more than 75 pounds (34 kg).

3.5.3 Powder

3.5.3.1 Mesh Designations

60 (250 µm), 100 (150 µm), 140 C or F (106 µm C or F), 200 (75 µm), and 325 (45 µm). When a mesh designation is not specified, 140F (106F) shall be supplied.

3.5.3.2 Powder shall be supplied in accordance with the limits on particle size distribution shown in Table 5, unless some other distribution is specified. Tests shall be in accordance with ASTM B 214.

TABLE 5A - PARTICLE SIZE DISTRIBUTION

U.S.Mesh Designation	U.S. Standard Sieve No.	Distribution %
60	Through a 40	100
	Through a 60	95 min.
	Through a 325	10 max.
100	Through a 60	100
	Through a 100	95 min.
	Through a 325	15 max.
140C	On a 100	0.5 max.
	On a 140	10 max.
	Through a 325	20 max.
140F	On a 100	0.5 max.
	On a 140	10 max.
	Through a 325	55 max.
200	On a 140	0.5 max.
	On a 200	10 max.
	Through a 325	65 max.
325	On a 200	0.5 max.
	On a 325	10 max.
	Through a 325	90 min.

TABLE 5B PARTICLE SIZE DISTRIBUTION (METRIC)

µm Mesh Designation	Sieve Opening µm	Distribution %
250	Through a 425	100
	Through a 250	95 min.
	Through a 45	10 max.
150	Through a 250	100
	Through a 150	95 min.
	Through a 45	15 max.
106C	On a 150	0.5 max.
	On a 106	10 max.
	Through a 45	20 max.
106F	On a 150	0.5 max.
	On a 106	10 max.
	Through a 45	55 max.
75	On a 106	0.5 max.
	On a 75	10 max.
	Through a 45	65 max.
45	On a 75	0.5 max.
	On a 45	10 max
	Through a 45	90 min

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

All technical requirements, other than shelf life of paste (3.3.3.1), are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests

Shelf life of paste (3.3.3.1) is a periodic test and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing

Shall be in accordance with the following:

4.3.1 Composition

One sample shall be taken from each furnace charge.