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400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

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AMS 4787D

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Superseding AMS 4787C

Submitted for recognition as an American National Standard

GOLD-NICKEL ALLOY BRAZING FILLER METAL, HIGH TEMPERATURE
82Au - 18Ni
1740 °F (949 °C) Solidus-Liquidus Temperature

UNS P00820

1. SCOPE:

1.1 Form:

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

1.2 Application:

Primarily for joining corrosion and heat resistant steels and alloys where corrosion and oxidation resistant joints with good strength up to 1300 °F (704 °C). This filler metal is normally used for brazing, without flux, using a protective atmosphere.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2222 Tolerances, Copper and Copper Alloy Sheet, Strip, and Plate
MAM 2222 Tolerances, Metric, Copper and Copper Alloy Sheet, Strip, and Plate
AMS 2224 Tolerances, Copper and Copper Alloy Wire
MAM 2224 Tolerances, Metric, Copper and Copper Alloy Wire

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 214 Sieve Analysis of Granular Metal Powders

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2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-2073-1 DOD Materiel, Procedures for Development and Application of Packaging Requirements

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.

TABLE 1 - Composition

Element	min	max
Gold	81.50	82.50
Nickel	17.50	18.50
Other Elements, total (3.1.1)	--	0.15

3.1.1 Determination not required for routine acceptance.

3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Wire: Cold drawn or cold rolled, as ordered, annealed, and pickled clean or bright annealed.

3.2.2 Rod: Cold drawn, cold rolled, or extruded, as ordered, annealed, and pickled clean or bright annealed.

3.2.3 Sheet, Strip, and Foil: Cold rolled, hard.

3.2.4 Pig, Powder, Shot, and Chips: As fabricated.

3.2.5 Paste: Shall consist of 84 to 90% by weight powder in a suitable binder (R) and, unless otherwise ordered, shall not contain flux.

3.3 Properties:

Filler metal shall conform to the following requirements:

3.3.1 Color: Shall be as follows:

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3.3.1.1 Wire, Rod, Sheet, Strip, and Pig: Gold to yellow-white.

3.3.1.2 Powder, Shot, and Chips: Nickel gray.

3.3.2 Flatness: When unrolled, strip and foil shall lie flat with no undue tendency to recoil.

3.3.3 Paste:

3.3.3.1 Paste shall have a shelf life of not less than six 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 (R) 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:

TABLE 2 - Standard Diameter Sizes

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

3.5.1.2 Diameter Tolerances for Drawn Wire and Rod: AMS 2224 or MAM 2224 as applicable to refractory alloys.

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3.5.1.3 Diameter Tolerances for Rolled or Extruded Wire and Rod:

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	--
Over 0.062 to 0.125, incl	0.006	--
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	--
Over 1.57 to 3.18, incl	0.15	--
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:

TABLE 4 - Standard Thicknesses

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

3.5.2.2 Tolerances:

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- 3.5.2.2.1 Thickness: Nominal thicknesses under 0.002 inch (0.05 mm) shall have a tolerance of ± 0.0002 inch ($\pm 5 \mu\text{m}$); nominal thicknesses 0.002 inch (0.05 mm) and over shall have tolerances conforming to AMS 2222 or MAM 2222 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, 100, 140, 200, and 325.
- 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 5 - Particle Size Distribution

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

- 3.5.3.2.1 When a mesh designation is not specified, 140F shall be supplied.

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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 performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for 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: Tests for shelf life of paste (3.3.3.1) are periodic tests 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.
(R)

4.3.2 Properties Except Shelf Life of Paste: One sample from each lot.
(R)

4.3.3 A lot shall be all product, other than powder or paste, which has been tested and found to conform to Table 1, in the same temper and size, and presented for vendor's inspection at one time.

4.3.4 A lot of powder shall be a uniform blend of powder produced from one or more furnace charges, each meeting the requirements of Table 1, and presented for vendor's inspection at one time.

4.3.5 A lot of paste shall be that paste produced from a single lot of powder, combined with binder from the same manufacturing batch, and presented for vendor's inspection at one time.

4.4 Reports: (R)

The vendor of the product shall furnish with each shipment a report showing the results of tests to determine conformance to the composition requirements and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, lot number or numbers, AMS 4787D, form, size, and quantity.

4.5 Resampling and Retesting: (R)

Not applicable.