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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4765D

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Superseding AMS 4765C

Submitted for recognition as an American National Standard

SILVER ALLOY BRAZING FILLER METAL
56Ag - 42Cu - 2.0Ni
1420 to 1640 °F (771 to 893 °C) Solidus-Liquidus Range

UNS P07560

1. SCOPE:

1.1 Form:

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

1.2 Application:

Primarily for joining ferrous metals, particularly austenitic steels and alloys, by atmosphere furnace brazing without flux, where high joint strength up to 800 °F (427 °C) is required, or for nonferrous metals except those having base of aluminum or magnesium.

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
ASTM E 56 Chemical Analysis of Silver Brazing Alloys

Printed in U.S.A.
91-0942/ EG

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 wet chemical methods in accordance with ASTM E 56, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	min	max
Silver	55.0	57.0
Copper	41.0	43.0
Nickel	1.5	2.5
Other Elements, total (3.1.1)	--	0.15

3.1.1 Determination not required for routine acceptance.

3.1.2 The requirements of 3.1 apply to paste after removal of the binder.

3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Wire: Cold drawn or cold rolled, as ordered, in annealed temper, and cleaned.

3.2.2 (R) Rod: Cold drawn, cold rolled, or extruded, as ordered, in as-fabricated temper, and cleaned.

3.2.3 Sheet, Strip, and Foil: Cold rolled in a hard temper.

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

3.2.5 (R) Paste: Paste not containing flux (3.2.5.1) shall be supplied unless paste containing flux (3.2.5.2) is specified.

3.2.5.1 Paste Without Flux: Shall consist of 84 to 90% by weight powder in a suitable binder.

3.2.5.2 (R) Paste Containing Flux: Shall consist of 55 to 80% by weight powder in a suitable binder and flux combination.

3.3 Properties:

Filler metal shall conform to the following requirements:

3.3.1 Color: Shall be white.

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

3.4 Quality:

The product, as received by purchaser, shall be uniform in color, quality, condition, free from foreign materials and from imperfections detrimental to its working qualities. Wire, rod, sheet, strip, and foil shall be clean, sound, bright, 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.

3.5.1.3 Diameter Tolerance for Rolled or Extruded Wire and Rod:

TABLE 3A - Diameter Tolerances, Inch/Pound Units

Nominal Diameter or Distance Between Parallel Sides Inch	Tolerance, Inch Plus and Minus Rounds	Tolerance, 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	Tolerance, Millimeter Plus and Minus Rounds	Tolerance, 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:

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 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 Sizes:

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 mesh designation is not specified, 140F mesh shall be supplied.

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 (R) 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 (R) 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 (R) Composition: For all product except powder, one sample from each lot; for powder, one sample from each furnace charge.

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

4.3.3 Other Technical Requirements: As agreed upon by purchaser and vendor.

4.3.4 A lot shall be all product, other than powder or paste, which has been tested and found to conform to 3.1, in the same temper and size, and presented for vendor's inspection at one time.

4.3.5 (R) A lot of powder shall be a uniform blend of powder produced from one or more furnace charges, each meeting the requirements of 3.1, and presented for vendor's inspection at one time.

4.3.6 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:

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 4765D, form, size, and quantity.