

AEROSPACE MATERIAL SPECIFICATION

SAE

AMS 4774D

Issued 15 JAN 1959

Revised 1 JUL 1991

Superseding AMS 4774C

Submitted for recognition as an American National Standard

BRAZING FILLER METAL, SILVER
63Ag - 28.5Cu - 6.0Sn - 2.5Ni
1275° - 1475°F (691° - 802°C) Solidus-Liquidus Range

UNS P07630

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, including austenitic steels and alloys, requiring moderate joint strength up to 700°F (371°C) for short-time service or up to 400°F (204°C) for long-time service, and for joining nonferrous metals except those having base of aluminum, magnesium, or titanium.

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.

2.1.1 Aerospace Material Specifications:

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

SAE Technical Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

- 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

- 2.3 U.S. Government Publications: Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

- 2.3.1 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

- 3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E 56, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

| | min | max |
|-------------------------------|------|------|
| Silver | 62.0 | 64.0 |
| Copper | 27.5 | 29.5 |
| Tin | 5.0 | 7.0 |
| Nickel | 2.0 | 3.0 |
| 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 Rod: Cold drawn, cold rolled, or extruded, as ordered, in hard temper, and cleaned.

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

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

- 3.2.5 Paste: Shall consist of 84 - 90% by weight powder in a suitable binder and, unless otherwise agreed upon by purchaser and vendor, shall not contain flux.

- 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 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 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, 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:

| 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 I

| Nominal Diameter or Distance Between Parallel Sides Inch | Tolerances, Inch Plus and Minus | |
|--|------------------------------------|---------|
| | Rounds | 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 I (SI)

| Nominal Diameter or Distance Between Parallel Sides Millimeters | Tolerances, Millimeter Plus and Minus | |
|---|--|---------|
| | Rounds | 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:

| 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 ($\pm 5 \mu\text{m}$); 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 Sizes:

3.5.3.1 Nominal Sizes: 60, 100, 140, 200, and 325.

- 3.5.3.2 Tolerances: Powder shall be supplied in accordance with the following limits on particle size distribution unless some other distribution is specified. Tests shall be in accordance with ASTM B 214.

| Nominal Size | U.S. Standard Sieve |
|--------------|---|
| 60 mesh | Through a No. 40 sieve - 100% Through a No. 60 sieve - 95% minimum Through a No. 325 sieve - 10% maximum |
| 100 mesh | Through a No. 60 sieve - 100% Through a No. 100 sieve - 95% minimum Through a No. 325 sieve - 15% maximum |
| 140C mesh | On a No. 100 sieve - 0.5% maximum On a No. 140 sieve - 10% maximum Through a No. 325 sieve - 20% maximum |
| 140F mesh | On a No. 100 sieve - 0.5% maximum On a No. 140 sieve - 10% maximum Through a No. 325 sieve - 55% maximum |
| 200 mesh | On a No. 140 sieve - 0.5% maximum On a No. 200 sieve - 10% maximum Through a No. 325 sieve - 65% maximum |
| 325 mesh | 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 nominal size 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: Tests for all technical requirements are acceptance tests and shall be performed on each lot.
- 4.3 Sampling and Testing: Shall be in accordance with the following:
- 4.3.1 Composition: One sample from each lot.
- 4.3.2 Properties: One sample from each lot.
- 4.3.3 Other Technical Requirements: As agreed upon by purchaser and vendor.