

AEROSPACE
MATERIAL
SPECIFICATION

AMS 4769C

Superseding AMS 4769B

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BRAZING FILLER METAL, SILVER

45Ag - 24Cd - 16Zn - 15Cu

1125° - 1145°F (605° - 620°C) Solidus-Liquidus Range UNS P07450

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, where high joint strength up to 400°F (205°C) is required, and for joining 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 Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

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
AMS 2350 - Standards and Test Methods

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B214 - Sieve Analysis of Granular Metal Powders
ASTM E56 - Chemical Analysis of Silver Brazing Alloys

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

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."

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

2.4 AWS Publications: Available from American Welding Society, Inc. 550 North LeJeune Road, Miami, FL 33135.

ANS Z49.1 - Safety in Welding and Cutting

3. TECHNICAL REQUIREMENTS:

- 3.1 Composition: Shall conform to the following percentages by weight,
Ø determined by wet chemical methods in accordance with ASTM E56, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser:

	min	max
Silver	44.0	46.0
Cadmium	23.0	25.0
Zinc	14.0	18.0
Copper	14.0	16.0
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.
Ø

- 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
Ø cleaned.

- 3.2.2 Rod: Cold drawn, cold rolled, or extruded, as ordered, in hard temper,
Ø and cleaned.

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

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

- 3.2.5 Paste: Shall consist of 84 - 90% by volume powder in a suitable binder
Ø 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
 Ø 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
 Ø 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 undesirable residue when heated in a protective
 Ø atmosphere to 1000°F (540°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
 Ø 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, unless otherwise specified:

3.5.1 Wire and Rod:

3.5.1.1 Nominal Diameters:

<u>Inch</u>		<u>Millimetres</u>	
0.001	0.062	0.12	1.55
0.007	0.094	0.18	2.35
0.010	0.125	0.25	3.12
0.015	0.175	0.38	4.40
0.025	0.188	0.62	4.70
0.031	0.225	0.78	5.60
0.040	0.250	1.00	6.25
0.047		1.18	

3.5.1.2 Diameter Tolerance: 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	Tolerance, 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 Millimetres	Tolerance, Millimetre Plus and Minus	
	Rounds	Squares
0.78 to 1.55, incl	0.12	--
Over 1.55 to 3.12, incl	0.15	--
Over 3.12 to 4.75, incl	0.18	0.22
Over 4.75 to 6.25, incl	0.20	0.25

3.5.2 Sheet, Strip, and Foil:

3.5.2.1 Nominal Thicknesses:

Inch		Millimetre	
0.001	0.006	0.02	0.15
0.0015	0.008	0.038	0.20
0.002	0.010	0.05	0.25
0.003	0.014	0.08	0.35
0.004	0.020	0.10	0.50
0.005	0.030	0.12	0.75

3.5.2.2 Tolerances:

- 3.5.2.2.1 Thickness: Nominal thicknesses under 0.002 in. (0.05 mm) shall have a tolerance of ± 0.0002 in. ($\pm 5 \mu\text{m}$); nominal thicknesses 0.002 in. (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 in. (150 mm) shall vary not more than ± 0.010 in. (± 0.25 mm) from the width ordered. Nominal widths 6 in. (150 mm) and over shall vary not more than ± 0.015 in. (± 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 lb (35 kg).

3.5.3 Powder:

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

3.5.3.2 Tolerances: Nominal sizes shown in 3.5.3.1 shall be supplied in accordance with the following limit on particle size distribution, tested in accordance with ASTM B214:

	Nominal Size	Not Less Than 95% Through U.S. Standard or Tyler Sieve Number
	-60	60
	-100	100
	-200	200
	-325	325

3.5.3.2.1 Control of fines shall be as specified by purchaser.

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. Results of such tests shall be reported to the purchaser as required by 4.4. 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 to determine conformance to all technical requirements of this specification are classified as acceptance tests and shall be performed on each lot.

4.3 Sampling: 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.

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

4.3.5 A lot of powder shall be a uniform blend of powder produced from one or
more furnace charges and presented for vendor's inspection at one time.

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

4.4 Reports:

4.4.1 The vendor of the product shall furnish with each shipment three copies of
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 of this specification. This report shall
include the purchase order number, lot number, AMS 4769C, form, size, and
quantity from each lot.

4.4.2 When parts made of this filler metal or assemblies requiring use of this
filler metal are supplied, the part or assembly manufacturer shall inspect
each lot of filler metal to determine conformance to the technical
requirements of this specification and shall furnish with each shipment
three copies of a report stating that the filler metal conforms. This
report shall include the purchase order number, AMS 4769C, part or
assembly number, and quantity.

4.5 Resampling and Retesting: If any specimen used in the above tests fails to
meet the specified requirements, disposition of the product may be based on
the results of testing three additional specimens for each original
nonconforming specimen. Failure of any retest specimen to meet the
specified requirements shall be cause for rejection of the product
represented and no additional testing shall be permitted. Results of all
tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification:

5.1.1 The product shall be identified as agreed upon by purchaser and vendor.