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400 Commonwealth Dr., Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS 4181

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ALUMINUM ALLOY WELDING WIRE
7.0Si - 0.38Mg - 0.10Ti (4008)

UNS A94008

1. SCOPE:

1.1 Form: This specification covers an aluminum alloy in the form of two types of welding wire.

1.2 Application: Primarily for use as filler metal for gas-metal-arc and gas-tungsten-arc welding of aluminum alloy castings having similar composition and requiring in the weld zone comparable response to heat treatment, properties, and corrosion resistance to those of the castings.

1.3 Classification: Wire supplied to this specification is classified as follows:

Type 1 - As extruded and sized
Type 2 - As drawn

1.3.1 Unless a specific type is ordered, either type may be supplied.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply.

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

2.1.1 Aerospace Material Specifications:

AMS 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings
MAM 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings, Metric (SI) Units
AMS 2813 - Packaging of Welding Wire, Standard Method

Printed in U.S.A

REAFFIRMED
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2.1.1 (Continued):

AMS 2815 - Identification, Welding Wire, Line Code System
AMS 2816 - Identification, Welding Wire, Color Code System

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined in accordance with AMS 2355 or MAM 2355:

	min	max
Silicon	6.5	7.5
Magnesium	0.30	0.45
Titanium	0.04	0.15
Iron	--	0.09
Copper	--	0.05
Zinc	--	0.05
Manganese	--	0.05
Beryllium	--	0.0008
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition: Wire may be made by any method unless a specific method is specified but shall be in a temper which will provide proper feeding of the wire in machine-welding equipment.

3.2.1 Wire shall be furnished on disposable spools for machine welding and in cut lengths for manual welding, as ordered.

3.2.2 Oxides, dirt, and drawing compounds shall be removed by cleaning processes which will neither result in pitting nor cause gas absorption by the wire or deposition of substances harmful to welding operations.

3.3 Properties: Wire shall conform to the following requirements:

3.3.1 Weldability: Melted wire shall flow smoothly and evenly during welding and shall produce acceptable welds, determined by a procedure agreed upon by purchaser and vendor.

3.4 Quality: Wire, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to welding operations, operation of welding equipment, or properties of the deposited weld metal.

3.5 Sizes and Tolerances: Wire shall be supplied in the sizes and to the tolerances of Table I unless drawn wire is specified in which case wire shall conform to the tolerances of Table II.

3.5.1 Diameter:

3.5.1.1 Extruded Wire:

TABLE I

Form	Nominal Diameter Inch	Tolerance, Inch plus	Tolerance, Inch minus
Cut Lengths	0.045, 0.062, 0.078, 0.094, 0.125	0.007	0.007
Spools	0.030, 0.035, 0.045, 0.062, 0.094	0.002	0.002

TABLE I (SI)

Form	Nominal Diameter Millimetres	Tolerance, Millimetre plus	Tolerance, Millimetre minus
Cut Lengths	1.15, 1.55, 1.95, 2.35, 3.10	0.18	0.18
Spools	0.75, 0.90, 1.15, 1.55, 2.35	0.05	0.05

3.5.1.2 Drawn Wire:

TABLE II

Form	Nominal Diameter Inch	Tolerance, Inch plus	Tolerance, Inch minus
Cut Lengths	0.045, 0.062, 0.078, 0.094, 0.125	0.003	0.003
Spools	0.030, 0.035, 0.045,	0.001	0.002
Spools	0.062, 0.094	0.002	0.002

TABLE II (SI)

Form	Nominal Diameter Millimetres	Tolerance, Millimetre plus	Tolerance, Millimetre minus
Cut Lengths	1.15, 1.55, 1.95, 2.35, 3.10	0.08	0.08
Spools	0.75, 0.90, 1.15	0.025	0.05
Spools	1.55, 2.35	0.05	0.05

3.5.2 Length: Cut lengths shall be furnished in 36-in. (900-mm) lengths and shall not vary more than +0, -1 in. (-25 mm) from the length ordered.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of wire 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 wire conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1) and tolerances (3.5) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for weldability (3.3.1) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling: Shall be in accordance with AMS 2355 or MAM 2355.

4.4 Reports:

4.4.1 The vendor of wire shall furnish with each shipment a report showing the results of tests for chemical composition of each lot and stating that the wire conforms to the other acceptance test requirements of this specification. This report shall include the purchase order number, AMS 4181, lot number, nominal size, and quantity from each lot.

4.4.2 When castings or parts requiring use of this welding wire are supplied, the casting supplier or part manufacturer shall inspect each lot of wire to determine conformance to the requirements of this specification and shall furnish with each shipment a report stating that the wire conforms. This report shall include the purchase order number, AMS 4181, casting or part number, and quantity.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2355 or MAM 2355.

5. PREPARATION FOR DELIVERY:

5.1 Layer Winding: Wire furnished on spools shall be closely wound in layers but adjacent turns within a layer need not necessarily be touching; shall be wound so as to avoid producing kinks, waves, and sharp bends; and shall be free to unwind without restriction caused by overlapping or wedging. The outside end of the spooled wire shall be so treated that it may be readily located. An 8-in. (200-mm) length of wire shall be made accessible at both ends of each spool for alloy verification.

5.1.1 Wire on each spool shall be of one continuous length from the same lot. Butt welding is permissible if both ends to be joined are verified and the weld will not interfere with uniform feeding of the wire in machine welding equipment. Packages of cut lengths shall not contain wire from more than one lot of alloy.

5.2 Identification: Wire shall be identified in accordance with AMS 2815 unless identification in accordance with AMS 2816 is specified by purchaser. Tab marking of cut lengths is permissible.

5.2.1 Alloy verification shall be performed by a method agreed upon by purchaser and vendor.