AEROSPACE MATERIAL SPECIFICATION

AMS4181™	REV. D

Issued 1986-10
Reaffirmed 2014-09
Revised 2022-05

Superseding AMS4181C

Aluminum Alloy, Welding Wire
7.0Si - 0.38Mg - 0.10Ti (4008 or 356)
(Composition similar to UNS A94008)

RATIONALE

AMS4181D results from a Five-Year Review and update of this specification with changes to prohibit unauthorized exceptions (3.7, 4.4.1, 5.3.1, 8.5), update applicable documents (Section 2, 8.2), note on units (8.3), and allow the use of the immediate prior specification revision (8.4).

1. SCOPE

1.1 Form

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

1.2 Application

This wire has been used typically as filler metal for gas-tungsten-arc or gas-metal-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, but usage is not limited to such applications.

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 issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS4181D/

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2355 Quality Assurance, Sampling and Testing, Aluminum Alloys and Magnesium Alloy, Wrought Products (Except Forging Stock), and Rolled, Forged, or Flash Welded Rings

AMS2813 Packaging and Marking of Packages of Welding Wire, Standard Method

AMS2814 Packaging and Marking of Packages of Welding Wire, Premium Quality

AMS2816 Identification, Welding Wire, Tab Marking Method

AMS2819 Identification, Welding Wire, Direct Color Code System

ARP1876 Weldability Test for Weld Filler Metal Wire

ARP4926 Alloy Verification and Chemical Composition Inspection of Welding Wire

AS7766 Terms Used in Aerospace Metals Specifications

3. TECHNICAL REQUIREMENTS

3.1 Wire Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS2355.

Table 1 - Composition

Element	Min	Max
Silicon	6.5	7.5
Iron	--	0.09
Copper	--	0.05
Manganese	--	0.05
Magnesium	0.30	0.45
Zinc	--	0.05
Titanium	0.04	0.15
Beryllium	--	0.0008 (8 ppm)
Other elements, each	--	0.05
Other elements, total	--	0.15
Aluminum	remainder	

3.1.1 Chemical analysis of initial ingot, bar, or rod stock before drawing is acceptable provided the processes used for drawing or rolling, annealing, and cleaning are controlled to ensure continued conformance to chemical composition requirements, and the facility employs procedures to ensure traceability of wire to the originally analyzed source.

3.2 Condition

As drawn or extruded and sized, as ordered. Wire shall be in a temper and with a surface finish which will provide proper feeding of the wire in machine welding equipment.

3.3 Fabrication

3.3.1 Butt welding is permissible provided both ends to be joined are identified by chemical analysis or the repair is made at the wire processing station. The butt weld shall not interfere with uniform, uninterrupted feeding of the wire in machine welding equipment.

3.3.2 Drawing compounds, oxides, dirt, oil, and other foreign materials 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.

3.4 Weldability

Melted wire shall flow smoothly and evenly during welding and shall produce acceptable welds. ARP1876 may be used to resolve disputes.

3.5 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.

3.6 Sizes and Tolerances

Wire shall be supplied in the sizes and to the tolerances shown in 3.6.1 and 3.6.2.

3.6.1 Diameter

3.6.1.1 Extruded Wire

Shall be as shown in Table 2.

Table 2A - Sizes and diameter tolerances, inch/pound units

Form	Nominal Diameter Inches	Tolerance Inches Plus and Minus
Cut Lengths	0.047, 0.062, 0.079, 0.094, 0.098, 0.125, 0.156, 0.188, 0.197, 0.250	0.007
Spools	0.030, 0.035, 0.039, 0.047, 0.062, 0.079, 0.094, 0.098, 0.125	0.002

Table 2B - Sizes and diameter tolerances, SI units

Form	Nominal Diameter Millimeters	Tolerance Millimeters Plus and Minus
Cut Lengths	1.19, 1.57, 2.00, 2.39, 2.50, 3.18, 3.96, 4.78, 5.00, 6.35	0.18
Spools	0.76, 0.89, 1.00, 1.19, 1.57, 2.00, 2.39, 2.50, 3.18	0.05

3.6.1.2 Drawn Wire

Shall be as shown in Table 3.

Table 3A - Sizes and diameter tolerances, inch/pound units

Form	Nominal Diameter Inches	Tolerance Inches Plus	Tolerance Inches Minus
Cut Lengths	0.047, 0.062, 0.079, 0.094, 0.098, 0.125, 0.156, 0.188, 0.197, 0.250	0.003	0.003
Spools	0.030, 0.035, 0.039, 0.047	0.001	0.002
Spools	0.062, 0.079, 0.094, 0.098, 0.125,	0.002	0.002

Table 3B - Sizes and diameter tolerances, SI units

Form	Nominal Diameter Millimeters	Tolerance Millimeters Plus	Tolerance Millimeters Minus
Cut Lengths	1.19, 1.57, 2.00, 2.39, 2.50, 3.18, 3.96, 4.78, 5.00, 6.35	0.08	0.08
Spools	0.76, 0.89, 1.00, 1.19	0.025	0.05
Spools	1.57, 2.00, 2.39, 2.50, 3.18	0.05	0.05

3.6.2 Length

Cut lengths shall be furnished in 36 inch (914 mm) lengths or as ordered and shall not vary more than +0, -1 inch (-25 mm) from the length ordered.

3.7 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the wire conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (3.1), sizes and tolerances (3.6), and alloy verification (5.2) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests

Weldability (3.4) is a periodic test 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 AMS2355.

4.4 Reports

The vendor of wire shall furnish with each shipment a report stating that the wire conforms to the chemical composition and other technical requirements. This report shall include the purchase order number, inspection lot number, AMS4181D, nominal size, type, and quantity.