



AEROSPACE MATERIAL SPECIFICATION

AMS4190™**REV. K**

Issued	1948-05
Noncurrent	2008-01
Revised	2015-12

Superseding AMS4190J

Aluminum Alloy, Welding Wire
5.2Si (4043)

(Composition similar to UNS A94043)

RATIONALE

AMS4190K revises Fabrication (3.1.1) and Preparation for Delivery (5.1.1), and is a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

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

1.2 Application

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

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.

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 Alloys, 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

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- 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

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	4.5	6.0
Iron	--	0.8
Copper	--	0.30
Manganese	--	0.05
Magnesium	--	0.05
Zinc	--	0.10
Titanium	--	0.20
Beryllium	--	0.0003 (3 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 composition requirements, and the facility employs procedures to ensure traceability of wire to the originally analyzed source.

3.2 Condition

As drawn, 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 only at diameters larger than final finished product size provided both ends to be joined are either alloy verified using a method or methods capable of distinguishing the alloy from all other alloys processed within the facility, 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 material 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

Shall be as shown in Table 2.

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

Form	Nominal Diameter Inch	Tolerance Inch Plus	Tolerance Inch 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 2B - Sizes and diameter and tolerances, SI units

Form	Nominal Diameter Millimeter	Tolerance Millimeter Plus	Tolerance Millimeter 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 Lengths

Cut lengths shall be furnished in 36 inch (914 mm) lengths unless 27 inch (686 mm) or 18 inch (457 mm) lengths are ordered, and shall not vary more than +0, -0.5 inch (-13 mm) from the length ordered.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of wire shall supply all samples for producer'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 inspection lot.

4.2.2 Periodic Tests

Weldability (3.4) is a periodic test and shall be performed at a frequency selected by the producer unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing

Shall be in accordance with AMS2355.

4.4 Reports

The producer of wire shall furnish with each shipment a report stating that the wire conforms to the composition and other technical requirements. This report shall include the purchase order number, inspection lot number, AMS4190K, nominal size, and quantity from each lot.

4.5 Resampling and Retesting

Shall be in accordance with AMS2355.

5. PREPARATION FOR DELIVERY

5.1 Wire

Wire shall be supplied either on spools in one continuous length for machine welding, or in cut lengths for manual welding as ordered. Wire on each spool or in each package of cut lengths shall be from the same heat of alloy.

5.1.1 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 electrode (the end where welding is to begin) shall be identified so it can be located readily and shall be fastened to avoid unwinding. The winding shall be level winding.

5.2 Alloy Verification

Wire on each spool or in each package of cut lengths shall be alloy verified by a method acceptable to purchaser. The alloy verification procedures of ARP4926 are recommended.

5.2.1 An 8 inch (203 mm) length of wire shall be made accessible at both ends of each spool for alloy verification.

5.3 Identification

Shall be by tab marking in accordance with AMS2816 unless color coding in accordance with AMS2819 or other method is specified by purchaser.

5.4 Packaging and Marking

Shall be by standard method in accordance with AMS2813 unless premium quality method in accordance with AMS2814 or other method is specified by purchaser.

6. ACKNOWLEDGMENT

A producer shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS

Wire not conforming to this specification, or to modifications authorized by purchaser, will be subject to rejection.

8. NOTES

8.1 Revision Indicator

A change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.

8.2 Terms used in AMS are clarified in ARP1917.