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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4191D

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Superseding AMS 4191C

Submitted for recognition as an American National Standard

ALUMINUM ALLOY, WELDING WIRE
6.3Cu - 0.30Mn - 0.18Zr - 0.15Ti - 0.10V (2319)

UNS A92319

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 2219 type aluminum alloys where the joint is capable of being heat treated to a strength level comparable to that of the parent metal, but usage is not limited to such applications.

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.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2355 Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings
MAM 2355 Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings, Metric (SI) Units
AMS 2813 Packaging and Marking of Packages of Welding Wire, Standard Method
AMS 2814 Packing and Marking of Packages of Welding Wire, Premium Quality
AMS 2816 Identification, Welding Wire, Tab Marking Method
AMS 2819 Identification, Welding Wire, Direct Color Code System
ARP1876 Weldability Test for Weld Filler Metal Wire

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS 2355 or MAM 2355.

TABLE 1 - Composition

Element	min	max
Copper	5.8	6.8
Manganese	0.20	0.40
Zirconium	0.10	0.25
Titanium	0.10	0.20
Vanadium	0.05	0.15
Iron	--	0.30
Silicon	--	0.20
Zinc	--	0.10
Magnesium	--	0.02
Beryllium	--	0.0008
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition:

As drawn 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, oil, 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 (R) Weldability: Melted wire shall flow smoothly and evenly during welding and shall produce acceptable welds, determined by a procedure acceptable to purchaser. The referee methods of ARP1876 may be used to resolve disputes.

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 shown in 3.5.1 and 3.5.2.

3.5.1 Diameter:

Tolerances shall be in accordance with Table 2.

TABLE 2 - Diameter Tolerances, Inch/Pound Units

Form	Nominal Diameter Inch	Tolerance, Inch Plus	Minus
Cut Lengths	0.047, 0.062, 0.078, 0.094	0.003	0.003
Cut Lengths	0.125, 0.156, 0.188, 0.250	0.003	0.003
Spools	0.030, 0.035, 0.047	0.001	0.002
Spools	0.062, 0.078, 0.094, 0.125	0.002	0.002

TABLE 2 - Diameter Tolerances, SI Units

Form	Nominal Diameter Millimeters	Tolerance, Millimeter Plus	Minus
Cut Lengths	1.19, 1.57, 1.98, 2.39	0.08	0.08
Cut Lengths	3.18, 3.96, 4.78, 6.35	0.08	0.08
Spools	0.76, 0.89, 1.19	0.03	0.05
Spools	1.57, 1.98, 2.39, 3.18	0.05	0.05

3.5.2 Length: 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, -1/2 inch (-12.7 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. 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 for composition (3.1) and tolerances (3.5) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests for weldability (3.3.1) are periodic tests 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 AMS 2355 or MAM 2355.

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, lot number, AMS 4191D, nominal size, and quantity.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2355 or MAM 2355.

5. PREPARATION FOR DELIVERY:

5.1 (R) Wire on each spool shall be of one continuous length from the same lot of alloy.

5.1.1 (R) 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 and the weld will not interfere with uniform, uninterrupted feeding of the wire in machine welding equipment. Verification shall consist of either repairing the broken ends at the draw bench or qualitative chemical analysis of the two ends to be joined.

5.2 (R) Identification:

Shall be by tab marking in accordance with AMS 2816 unless color coding in accordance with AMS 2819 or other method is specified by purchaser.

5.2.1 An 8-inch (203-mm) length of wire shall be made accessible at both ends of each spool for alloy verification. Alloy verification shall be performed by a method acceptable to purchaser.

5.3 (R) Packaging and Marking:

Shall be in accordance with AMS 2813 unless AMS 2814 or other method is specified by purchaser.

6. ACKNOWLEDGMENT:

A vendor 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.