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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS-5831

Issued 1990-04-01

Submitted for recognition as an American National Standard

ALLOY WELDING WIRE, CORROSION AND HEAT RESISTANT
29Fe - 22Cr - 21Ni - 18.5Co - 3.2Mo - 2.8W - 0.78Ta
0.30Al - 0.05Zr - 0.05La - 0.20N

UNS R30556

1. SCOPE:

1.1 Form: This specification covers a corrosion and heat resistant iron alloy in the form of welding wire.

1.2 Application: Primarily for use as filler metal for gas-tungsten-arc or gas-metal-arc welding of parts fabricated from alloys of similar or dissimilar composition.

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. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

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

2.1.1 Aerospace Material Specifications:

AMS-2248 - Chemical Check Analysis Limits, Wrought Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
AMS-2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock
AMS-2813 - Packaging of Welding Wire, Standard Method
AMS-2815 - Identification, Welding Wire, Line Code System
AMS-2816 - Identification, Welding Wire, Color Code System

2.1.2 Aerospace Recommended Practices:

ARP1876 - Weldability Test for Weld Filler Metal Wire

2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM E 354 - Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E 354, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

	min		max
Carbon	0.05	-	0.15
Manganese	0.50	-	2.00
Silicon	0.20	-	0.80
Phosphorus	--		0.04
Sulfur	--		0.015
Chromium	21.00	-	23.00
Nickel	19.00	-	22.50
Cobalt	16.00	-	21.00
Molybdenum	2.50	-	4.00
Tungsten	2.00	-	3.50
Tantalum	0.30	-	1.25
Aluminum	0.10	-	0.50
Zirconium	0.001	-	0.10
Lanthanum	0.005	-	0.10
Nitrogen	0.10	-	0.30
Columbium	--		0.30
Boron	--		0.02
Iron	remainder		

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS-2248; check analysis limits for lanthanum shall be 0.002 under minimum and 0.01 over maximum.

3.2 Condition: Bright finished in a temper which will provide feeding of the wire in machine welding equipment.

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

3.2.2 Drawing compounds, oxides, dirt, and oil 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.

3.2.2.1 If pickling is necessary to remove surface contamination or scaling, only a light pickle shall be used.

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 in accordance with ARP1876 or other method acceptable to purchaser.

3.3.2 Spooled Wire: Shall conform to 3.3.2.1 and 3.3.2.2.

3.3.2.1 Cast: Wire, wound on standard 12-inch (305-mm) diameter spools, shall have imparted to it a curvature such that a specimen sufficient in length, 4 - 8 feet (1.2 - 2.4 m), to form one loop, when cut from the spool and laid on a flat surface, shall form a circle 15 - 30 inches (381 - 762 mm) in diameter.

3.3.2.2 Helix: The specimen on which cast was determined, when laid on a flat surface and measured between adjacent turns, shall show a vertical separation not greater than 1 inch (25 mm).

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:

TABLE I

Form	Nominal Diameter, Inch	Tolerance, Inch plus	minus
Cut Lengths	0.030, 0.045, 0.062, 0.078	0.002	0.002
Cut Lengths	0.094, 0.125, 0.156, 0.188	0.003	0.003
Spools	0.007, 0.010, 0.015, 0.020	0.0005	0.0005
Spools	0.030, 0.035, 0.045	0.001	0.002
Spools	0.062, 0.078, 0.094	0.002	0.002

TABLE I (SI)

Form	Nominal Diameter Millimetres	Tolerance, Millimetre plus	minus
Cut Lengths	0.76, 1.14, 1.57, 1.98	0.05	0.05
Cut Lengths	2.39, 3.18, 3.96, 4.78	0.08	0.08
Spools	0.18, 0.25, 0.38, 0.51	0.013	0.013
Spools	0.76, 0.89, 1.14	0.03	0.05
Spools	1.57, 1.98, 2.39	0.05	0.05

3.5.2 Length: Cut Lengths shall be furnished in 18, 27, or 36 inch (457, 686, or 914 mm) lengths, as 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 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 sizes and tolerances (3.5) are acceptance tests and shall be performed on each heat or lot as applicable.

4.2.2 Periodic Tests: Tests for weldability (3.3.1), cast (3.3.2.1), and helix (3.3.2.2) 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-2371 and as specified herein.

4.4 Reports: The vendor of wire shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and stating that the wire conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS-5831, nominal size, and quantity.

4.5 Resampling and Retesting: Shall be in accordance with AMS-2371.

5. PREPARATION FOR DELIVERY:

5.1 Heat: Wire on each spool shall be of one continuous length from the same heat of alloy. Butt welding is permissible provided both ends to be joined are verified 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 Identification: Shall be in accordance with AMS-2816 unless AMS-2815 or other method is specified by purchaser. Tab marking of cut lengths is permissible.

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 agreed upon by purchaser and vendor.

5.3 Packaging and Marking: Shall be in accordance with AMS-2813.