NOTICE OF
ADOPTION

ADOPTION NOTICE
15 August 1990 for
AMS 6463B
1 January 1990
SUPERSEDING
AMS 6463A
10 August 1984

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Title of Document: Wire, Steel Welding
18.5Ni - 8.5Co - 5.2Mo - 0.72Ti - 0.10Al
Vacuum Melted, Environment Controlled Packaging

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SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 6463B

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Superseding AMS 6463A

WIRE, STEEL WELDING
18.5Ni - 8.5Co - 5.2Mo - 0.72Ti - 0.10Al
Vacuum Melted, Environment Controlled Packaging

UNS K93130

1. SCOPE:

1.1 Form: This specification covers a maraging steel in the form of welding wire.

1.2 Application: Primarily for use as filler metal for gas-tungsten-arc and inert gas-metal-arc welding of maraging steels requiring a joint capable of being heat treated to 280,000 psi (1931 MPa) tensile strength.

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 as specified in AMS 2350.

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

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 2350 - Standards and Test Methods
AMS 2370 - Quality Assurance Sampling of Carbon and Low-Alloy Steels, Wrought Products Except Forgings and Forging Stock
AMS 2635 - Radiographic Inspection
AMS 2814 - Packaging of Welding Wire, Premium Quality
AMS 2815 - Identification, Welding Wire, Line Code System
AMS 2816 - Identification, Welding Wire, Color Code System
AMS 6521 - Steel Sheet, Strip, and Plate, Maraging, 18.5Ni - 9.0Co - 4.9Mo - 0.65Ti - 0.10Al, Consumable Electrode Melted, Solution Heat Treated

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.

ASTM E 8 - Tension Testing of Metallic Materials
ASTM E 8M - Tension Testing of Metallic Materials (Metric)
ASTM E 353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, Ø determined by wet chemical methods in accordance with ASTM E 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

	min	max
Carbon	--	0.010
Manganese	--	0.10
Silicon	--	0.10
Phosphorus	--	0.010
Sulfur	--	0.010
Nickel	18.00	19.00
Cobalt	8.00	9.00
Molybdenum	4.50	6.00
Titanium	0.65	0.80
Aluminum	0.05	0.15
Oxygen	--	0.0025 (25 ppm)
Nitrogen	--	0.005 (50 ppm)
Hydrogen	--	0.0025 (25 ppm)

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2248. No variation is permitted for oxygen, nitrogen, and hydrogen.

3.2 Condition: Cold drawn, bright finish, 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 Surface texture of spooled wire shall be as agreed upon by purchaser and vendor.

3.2.3 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.

3.2.4 Residual elements and gases deposited on, or absorbed by, the welding wire as a result of cleaning or drawing operations shall be removed by vacuum degassing.

3.2.5 Annealing, if required, shall be performed in vacuum or in an inert gas atmosphere.

3.3 Properties: Wire shall conform to the following requirements:

3.3.1 Weldability: Melted wire shall flow smoothly and evenly during welding Ø and shall produce acceptable welds, determined by a procedure agreed upon by purchaser and vendor. The referee method of ARP1876 may be used to resolve weldability disputes.

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 to 8 feet (1219 to 2438 mm), 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).

3.3.3 Tensile Properties: A tensile specimen, prepared in accordance with 4.3.1, shall have the following properties, determined in accordance with ASTM E 8 or ASTM E 8M, after being solution heat treated by heating in air to 1500°F ± 25 (816°C ± 14), holding at heat for not less than 30 minutes, and cooling in air, and maraged by heating to 900°F ± 15 (482°C ± 8), holding at heat for 3 - 5 hours, and cooling in air:

Tensile Strength, minimum	280,000 psi (1931 MPa)
Yield Strength at 0.2% Offset, minimum	270,000 psi (1862 MPa)
Elongation in 2 Inches (50.8 mm), minimum	3%

3.4 Quality:

3.4.1 Steel shall be produced by vacuum induction melting; it may be remelted using consumable electrode vacuum process but remelting is not required.

3.4.2 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:
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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, -1/2 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. 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 for composition (3.1) and sizes and tolerances (3.5) are acceptance tests and shall be performed on each heat or lot as applicable.