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AEROSPACE MATERIAL SPECIFICATION

AMS 5835

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Revised

ALLOY WELDING WIRE, CORROSION AND HEAT RESISTANT
72Ni - 3.2Mn - 20Cr - 2.5(Cb+Ta) - 0.48Ti
Vacuum Induction Melted, Environment Controlled Packaged

1. SCOPE:

1.1 Form: This specification covers a corrosion and heat resistant nickel 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 nickel-chromium alloys.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications and Aerospace Recommended Practices shall apply. The applicable issue of other documents 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 2269 - Chemical Check Analysis Limits, Wrought Nickel Alloys and Cobalt Alloys
AMS 2350 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock
AMS 2814 - Packaging of Welding Wire, Premium Quality
AMS 2815 - Identification, Welding Wire, Line Code System
AMS 2816 - Identification, Welding Wire, Color Code System

2.1.2 Aerospace Recommended Practices:

ARP 1313 - Determination of Trace Elements in High Temperature Alloys

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM E354 - Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel and Cobalt Alloys

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E354, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser except that selenium, lead, and bismuth shall be determined in accordance with ARP 1313 and oxygen and nitrogen shall be determined by Leco Analyzer or equivalent:

	min	max
Carbon	--	0.03
Manganese	3.00	3.50
Silicon	--	0.10
Phosphorus	--	0.010
Sulfur	--	0.007
Chromium	18.00	22.00
Nickel	67.00	--
Columbium	2.00	3.00
Titanium	0.20	0.75
Cobalt	--	0.10
Tantalum	--	0.30
Aluminum	--	0.10
Boron	--	0.001
Selenium	--	0.0006
Iron	--	1.00
Copper	--	0.25
Tin	--	0.005
Lead	--	0.001
Bismuth	--	0.0002
Magnesium	--	0.05
Oxygen	--	0.0050 (50 ppm)
Nitrogen	--	0.010 (100 ppm)

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2269. No variation is permitted for oxygen and nitrogen.

3.2 Condition: Cold finished 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 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.

3.2.3 Gases deposited on, or absorbed by the welding wire as a result of cleaning or drawing operations shall be removed. Annealing, if required, shall be performed in vacuum or 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 and shall produce acceptable welds, determined by a procedure agreed upon by purchaser and vendor.

3.3.2 Spooled Wire: Shall conform to 3.3.2.1 and 3.2.2.2.

3.3.2.1 Cast: Wire wound on standard 12-in. (300-mm) diameter spools shall have imparted to it a curvature such that a specimen sufficient in length, 4 - 8 ft (1.2 - 2.4 m), to form one loop, when cut from the spool and laid on a flat surface, shall form a circle not less than 15 in. (375 mm) and not greater than 30 in. (750 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 in. (25 mm).

3.4 Quality:

3.4.1 Alloy shall be vacuum induction melted; it may be multiple melted using consumable electrode practice in the remelt cycle 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: Unless otherwise specified, 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	0.094, 0.125, 0.156, 0.188	0.003	0.003
Cut Lengths	0.030, 0.045, 0.062, 0.078	0.002	0.002
Spools	0.062, 0.078, 0.094	0.002	0.002
Spools	0.030, 0.035, 0.045	0.001	0.002
Spools	0.007, 0.010, 0.015, 0.020	0.0005	0.0005

TABLE I (SI)

Form	Nominal Diameter Millimetres	Tolerance, Millimetre plus	minus
Cut Lengths	2.35, 3.10, 4.00, 4.75	0.08	0.08
Cut Lengths	0.75, 1.15, 1.55, 2.00	0.05	0.05
Spools	1.55, 2.00, 2.35	0.05	0.05
Spools	0.75, 0.90, 1.15	0.02	0.05
Spools	0.20, 0.25, 0.40, 0.50	0.015	0.015

3.5.2 Length: Cut lengths shall be furnished in 18, 27, or 36 in. (450, 675, or 900 mm) lengths, as ordered, and shall not vary more than +0, -0.5 in. (-12 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 to determine conformance to requirements for composition (3.1) and tolerances (3.5) are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for weldability (3.3.1), cast (3.3.2.1), and helix (3.3.2.2) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.