



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AMS 5776A
Superseding AMS 5776

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STEEL WIRE, WELDING, CORROSION AND MODERATE HEAT RESISTANT
12.5Cr (SAE 51410)

1. SCOPE:

- 1.1 Form: This specification covers a corrosion and moderate heat resistant steel in the form of welding wire.
- 1.2 Application: Primarily for use as filler metal for gas metal-arc welding of steels of similar composition requiring joints with strength and corrosion resistance comparable to those of the basis metal.
2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pennsylvania 15096.

2.1.1 Aerospace Material Specifications:

AMS 2248 - Chemical Check Analysis Limits, Wrought Heat and Corrosion Resistant Steels and Alloys
AMS 2350 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Alloys, Wrought Products Except Forgings
AMS 2813 - Packaging, Welding Wire, Standard Method
AMS 2816 - Identification, Welding Wire, Color Code System
AMS 5504 - Steel Sheet, Strip, and Plate, Corrosion and Moderate Heat Resistant, 12.5Cr (SAE 51410)

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

ASTM E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and other Similar Chromium-Nickel-Iron Alloys

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 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 E353, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

SAE Technical Board rules provide that: "All technical reports, including standards approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

3.1 (Cont'd.)

Ø		min	max
	Carbon	--	0.15
	Manganese	--	1.00
	Silicon	--	1.00
	Phosphorus	--	0.025
	Sulfur	--	0.015
	Phosphorus + Sulfur	--	0.030
	Chromium	11.50	13.50
	Nickel	--	0.75
	Molybdenum	--	0.50
	Aluminum	--	0.05
	Nitrogen	--	0.08
	Copper	--	0.50
	Tin	--	0.05

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2248.

3.2 Condition: Cold drawn, bright finish, in a temper which will provide proper feeding of the wire in machine welding equipment. Wire shall be furnished on disposable spools for machine welding and in cut lengths for manual welding, as ordered.

3.2.1 In-process annealing between cold-rolling or -drawing operations shall be performed in a suitable protective atmosphere.

3.2.2 Oxides, dirt, and drawing compounds shall be removed by 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:

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 Response to Heat Treatment: Weld metal deposits approximately 0.250 in. (6.35 mm) in thickness deposited on AMS 5504 sheet shall attain hardness of 35 - 45 HRC or equivalent, determined in accordance with ASTM E18, after being heated to 1750° F ± 10 (954.4° C ± 5.6), held at heat for 30 min. ± 3, and cooled in still air.

3.3.3 Spooled Wire: Shall conform to the following, unless otherwise agreed upon by purchaser and vendor:

3.3.3.1 Cast: Wire shall have imparted to it a curvature such that a specimen sufficient in length to form one loop, when cut from the spool and laid on a flat surface, shall form a circle not less than 15 in. (381 mm) and not greater than 30 in. (762 mm) in diameter.

3.3.3.2 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: Wire shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external 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, 0.093, 0.125	0.003	0.003
Spools	0.030, 0.035, 0.045	0.001	0.002
Spools	0.062, 0.093	0.002	0.002

TABLE I (SI)

Form	Nominal Diameter Millimetres	Tolerance, Millimetre	
		Plus	Minus
Cut Lengths	0.76, 1.14, 1.57, 2.36, 3.18	0.08	0.08
Spools	0.76, 0.89, 1.14	0.03	0.05
Spools	1.57, 2.36	0.05	0.05

3.5.2 Length: Cut lengths shall be furnished in 18, 27, or 36 in. (457, 686, or 914 mm) lengths, as ordered, and shall not vary more than +0, -1/2 in. (-12.7 mm) from the length ordered.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the wire shall supply all samples 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 perform such confirmatory testing as he deems necessary to assure 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 composition (3.1) and tolerance (3.5) requirements are classified as acceptance or routine control tests.

4.2.2 Qualification Tests: Tests to determine conformance to weldability (3.3.1), response to heat treatment (3.3.2), cast (3.3.3.1), and helix (3.3.3.2) requirements are classified as qualification or periodic control tests.

∅ 4.3 Sampling: Shall be in accordance with AMS 2371.

4.4 Reports:

4.4.1 The vendor of wire shall furnish with each shipment three copies of a report of the results of tests for chemical composition of each heat in the shipment and a statement that the wire conforms to the other technical requirements of this specification. This report shall include the purchase order number, heat number, material specification number and its revision letter, nominal size, and quantity from each heat.

4.4.2 When parts made of this wire or assemblies requiring use of this welding wire are supplied, the part or assembly manufacturer shall inspect each lot of wire to determine conformance to the requirements of this specification and shall furnish with each shipment three copies of a report stating that the wire conforms. This report shall include the purchase order number, material specification number and its revision letter, part or assembly number, and quantity.

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