



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N. Y. 10001

AMS 6458D

Superseding AMS 6458C

Issued 6-30-60

Revised 11-15-71

STEEL WIRE, WELDING

0.65Si - 1.25Cr - 0.50Mo - 0.30V (0.28 - 0.33C)

Vacuum Melted

1. SCOPE:

1.1 Form: This specification covers a vacuum-melted, low-alloy steel in the form of welding wire.

1.2 Application: Primarily for use as filler metal for inert-gas arc welding low-alloy steels capable of heat treatment to high strength levels.

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., Two Pennsylvania Plaza, New York, New York 10001.

2.1.1 Aerospace Material Specifications:

AMS 2259 - Chemical Check Analysis Limits, Wrought Low Alloy and Carbon Steels

AMS 2350 - Standards and Test Methods

AMS 2370 - Quality Assurance Sampling of Carbon and Low Alloy Steels, Wrought Products Except Forgings

AMS 2814 - Packaging, Welding Wire, Premium Quality

AMS 2815 - Identification, Welding Wire, Line Code System

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

ASTM E350 - Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Ave., 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 E350, 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."

	min	max
Carbon	0.28	0.33
Manganese	0.45	0.65
Silicon	0.55	0.75
Phosphorus	--	0.008
Sulfur	--	0.008
Chromium	1.15	1.35
Molybdenum	0.40	0.60
Vanadium	0.20	0.40
Oxygen	--	0.0025 (25 ppm)
Hydrogen	--	0.0025 (25 ppm)
Nitrogen	--	0.005 (50 ppm)
Nickel	--	0.25
Copper	--	0.35

- 3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2259, paragraph titled "Low Alloy Steels".
- 3.2 Condition: Cold drawn, bright finish, as drawn temper. Wire shall be furnished on disposable spools for machine welding or in cut lengths for manual welding, as ordered. Surface roughness of spooled wire shall be as agreed upon by purchaser and vendor.
- 3.2.1 Oxides and foreign materials 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:
- 3.3.1 Weldability: Melted wire shall flow smoothly and evenly during welding and shall be capable of producing acceptable welds.
- 3.3.2 Spooled Wire: Shall conform to the following, unless otherwise agreed upon by purchaser and vendor:
- 3.3.2.1 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.
- 3.3.2.2 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. (25.4 mm).
- 3.4 Quality: Material shall be multiple melted using vacuum consumable electrode process in the remelt cycle or shall be vacuum induction melted. Wire shall be uniform in quality and condition, clean, sound, smooth, 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 Table I.

3.5.1 Diameter:

TABLE I

Form	Nominal Diameter Inch	Tolerance, Inch plus and minus
Cut Lengths	0.045, 0.062, 0.078, 0.093, 0.125, 0.156	0.003
Spools	0.030, 0.035, 0.045, 0.062, 0.078, 0.093	0.001
Spools	0.007, 0.010, 0.015, 0.020	0.0005

TABLE I (SI)

Form	Nominal Diameter Millimeters	Tolerance, MM plus and minus
Cut Lengths	1.143, 1.575, 1.981, 2.362, 3.175, 3.962	0.076
Spools	0.762, 0.889, 1.143, 1.575, 1.981, 2.362	0.025
Spools	0.178, 0.254, 0.381, 0.508	0.013

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 $\pm 1/4$ in. (6.35 mm) from the length ordered.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product 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 product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Routine Control Tests: Tests to determine conformance to composition (3.1) and tolerance (3.5) requirements are classified as routine control tests.

4.2.2 Periodic Control Tests: Tests to determine conformance to weldability (3.3.1), cast (3.3.2.1), and helix (3.3.2.2) requirements are classified as qualification and/or periodic control tests.

4.3 Sampling: Shall be in accordance with AMS 2370.

4.4 Reports:

4.4.1 The vendor of the product 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 product 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 this specification and shall furnish with each shipment three copies of a report stating that the wire conforms to the requirements of this specification. 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: If any specimen used in the above tests fails to meet the specified requirements, disposition of the product may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the product represented and no additional testing shall be permitted. Results of all tests shall be reported.