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

AEROSPACE MATERIAL SPECIFICATION

AMS 6458E
Superseding AMS 6458D
Issued 6-30-60
Revised 1-15-79

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 premium-quality, low-alloy steel in the form of welding wire.

1.2 Application: Primarily for use as filler metal for gas-tungsten-arc and gas-metal-arc welding of low-alloy steels of similar composition where the weld area is required to have strength comparable to that of the parent 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, PA 15096.

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 and Forging Stock
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, PA 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 Avenue, Philadelphia, PA 19120.

2.3.1 Federal Standards:

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

2.3.2 Military Specifications:

MIL-W-10430 - Welding Rods and Electrodes; Preparation for Delivery of

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:

	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
Nickel	--	0.25
Copper	--	0.35
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 applicable requirements of AMS 2259 Ø except that no variation is permitted for oxygen, nitrogen, and hydrogen.

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 Drawing compounds, oxides, and dirt shall be removed by cleaning processes which will Ø neither result in pitting nor cause gas absorption by the wire or deposition of substances harmful to welding operations.

3.2.2 Residual elements and dissolved gasses deposited on, or absorbed by, the welding wire as a Ø result of cleaning or drawing operations shall be removed by vacuum degassing. Annealing, if required, shall be performed under 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 and shall produce Ø acceptable welds, determined by a procedure agreed upon by purchaser and vendor.

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. (380 mm) and not greater than 30 in. (760 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 Steel shall be multiple melted using vacuum consumable electrode process in the remelt cycle or shall be vacuum induction melted.

3.4.2 Wire, as received by purchaser, shall be uniform in quality and condition, 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: 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	0.030, 0.045, 0.062, 0.078, 0.093, 0.125, 0.156	0.003	0.003
Spools	0.062, 0.078, 0.093	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	0.76, 1.14, 1.57, 1.98, 2.36, 3.18, 3.96	0.08	0.08
Spools	1.57, 1.98, 2.36	0.05	0.05
Spools	0.76, 0.89, 1.14	0.03	0.05
Spools	0.18, 0.25, 0.38, 0.51	0.013	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 +0, -0.5 in. (-13 mm) from the length ordered.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of 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 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems 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 lot.

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.

4.2.3 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classifed as preproduction tests and shall be performed on the initial shipment of wire to a purchaser, when a change in material or processing requires reapproval, or when purchaser deems confirmatory testing is required.

4.2.3.1 For direct U.S. Military procurement, substantiating test data and, when requested, Ø preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be in accordance with the following:

4.3.1 Acceptance Tests: AMS 2370.

Ø 4.3.2 Periodic Tests and Preproduction Tests: As agreed upon by purchaser and vendor.

4.4 Approval:

4.4.1 Sample wire shall be approved by purchaser before wire for production use is supplied, unless Ø such approval be waived. Results of tests on production wire shall be essentially equivalent to those on the approved sample wire.

4.4.2 Vendor shall use materials, manufacturing procedures, processes, and methods of inspection on production wire which are essentially the same as those used on the approved sample Ø wire. If any change is necessary in materials or in manufacturing procedures and processes, vendor shall submit for reapproval a statement of the proposed changes in material and processing and, when requested, sample wire. Production wire made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Reports:

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

4.5.2 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 technical 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.

Ø 4.6 Resampling and Retesting: Shall be in accordance with AMS 2370.

5. PREPARATION FOR DELIVERY:

5.1 Layer Winding: Wire furnished on spools shall be closely wound in layers but adjacent turns within a layer need not necessarily be touching; shall be wound so as to avoid producing kinks, waves, and sharp bends; and shall be free to unwind without restriction caused by overlapping or wedging. The outside end of the spooled wire shall be so treated that it may be readily located.

5.2 Heat: Wire on each spool shall be one continuous length from the same heat of steel. No package of cut lengths shall contain wire from more than one heat of steel.

5.3 Identification: Wire shall be identified in accordance with AMS 2815. Tab marking of cut lengths is permissable.

5.4 Packaging and Marking: