

ADOPTION NOTICE

SAE- AMS 6375, "Steel, Welding Wire 0.50Cr - 0.55Ni - 0.20Mo (0.18 - 0.23C) (SAE 8620) Vacuum Melted, Environment Controlled Packaging" was adopted on 5 August 1996 for use by the Department of Defense (DoD). Proposed changes by DoD activities must be submitted to the DoD Adopting Activity: Air Force, ASC/ENSI, 2530 Loop Road West, Wright-Patterson AFB OH 45433-7101. DoD activities may obtain copies of this standard from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094. The private sector and other Government agencies may purchase copies from the Society of Automotive Engineers Inc., 400 Commonwealth Drive, Warrendale, PA 15096-0001.

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AEROSPACE MATERIAL SPECIFICATION



AMS 6375A

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Superseding AMS 6375

Submitted for recognition as an American National Standard

STEEL, WELDING WIRE
0.50Cr - 0.55Ni - 0.20Mo (0.18 - 0.23C) (SAE 8620)
Vacuum Melted, Environment Controlled Packaging

UNS G86200

1. SCOPE:

1.1 Form:

This specification covers a low-alloy steel in the form of welding wire.

1.2 Application:

This wire has been used typically as filler metal for gas-metal-arc or gas-tungsten-arc welding of steels of similar composition where the weld area is required to have strength and toughness comparable to those of the parent metal, but usage is not limited to such applications.

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 the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2259 Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS 2370 Quality Assurance Sampling and Testing, Carbon and Low-Alloy Steel Wrought Products and Forging Stock
AMS 2635 Radiographic Inspection
AMS 2813 Packaging and Marking of Packages of Welding Wire, Standard Method
AMS 2814 Packaging and Marking of Packages of Welding Wire, Premium Quality
AMS 2816 Identification, Welding Wire, Tab Marking Method
AMS 2819 Identification, Welding Wire, Direct Color Code System
AMS 6350 Steel Sheet, Strip, and Plate, 0.95Cr - 0.20Mo - (0.28 - 0.33C) (SAE 4130)

ARP1876 Weldability Test for Weld Filler Metal Wire

ARP4926 Alloy Verification and Chemical Composition Inspection of Welding Wire

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2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 8 Tension Testing of Metallic Materials

ASTM E 8M Tension Testing of Metallic Materials (Metric)

ASTM E 350 Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

3. TECHNICAL REQUIREMENTS:

3.1 Wire Composition:

(R)

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 350, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	min	max
Carbon	0.18	0.23
Manganese	0.70	1.00
Silicon	0.15	0.35
Phosphorus	--	0.008
Sulfur	--	0.008
Phosphorus + Sulfur	--	0.012
Chromium	0.40	0.60
Nickel	0.40	0.70
Molybdenum	0.15	0.25
Copper	--	0.35
Oxygen (3.1.1)	--	0.0025 (25 ppm)
Nitrogen (3.1.1)	--	0.0050 (50 ppm)
Hydrogen (3.1.1)	--	0.0010 (10 ppm)

3.1.1 Determination of oxygen, nitrogen, and hydrogen not required for cut lengths.

3.1.2 Chemical analysis of initial ingot, bar, or rod stock before drawing is acceptable provided
(R) the processes used for drawing or rolling, annealing, and cleaning are controlled to ensure continued conformance to composition requirements.

3.1.3 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2259.

3.2 Melting Practice:

Steel shall be vacuum induction melted.

3.3 Condition:

Cold worked, bright finish, in a temper and with a surface finish which will provide proper feeding of the wire in machine welding equipment.

3.4 Fabrication:

- 3.4.1 In-process annealing between cold roiling or drawing operations shall be performed in a protective atmosphere to avoid surface oxidation and adsorption of other extraneous elements. (R)
- 3.4.2 Butt welding is permissible provided both ends to be joined are alloy verified using a method or methods capable of distinguishing the alloy from all other alloys processed within the facility or the repair is made at the wire processing station. The butt weld shall not interfere with uniform, uninterrupted feeding of the wire in machine welding equipment. (R)
- 3.4.3 Drawing compounds, oxides, dirt, oil, and other 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.
- 3.4.4 Residual elements and dissolved gases deposited on, or absorbed by, the welding wire as a result of cleaning or cold working operations shall be removed by vacuum degassing.

3.5 Properties:

Wire shall conform to the following requirements:

- 3.5.1 Weldability: Melted wire shall flow smoothly and evenly during welding and shall produce acceptable welds. ARP1876 may be used to resolve disputes.
- 3.5.2 Spooled Wire: Shall conform to 3.5.2.1 and 3.5.2.2.
- 3.5.2.1 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 to form one loop with a 1-inch (25-mm) overlap, when cut from the spool and laid on a flat surface, shall form a circle 15 to 50 inches (381 to 1270 mm) in diameter. (R)
- 3.5.2.2 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).
- 3.5.3 Tensile Properties: Specimens, prepared in accordance with 4.3.1 and tested in accordance with ASTM E 8 or ASTM E 8M, shall have average tensile strength not lower than 90% of the average of the control specimens of 4.3.1; elongation of the welded specimens shall be not less than 6% in 2 inches (50.8 mm).

3.6 Quality:

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.

3.7 Sizes and Tolerances:

Wire shall be supplied in the sizes and to the tolerances shown in 3.7.1 and 3.7.2.

3.7.1 Diameter: Shall be as shown in Table 2.

TABLE 2A - Sizes and Diameter Tolerances, Inch/Pound Units

Form	Nominal Diameter Inch	Tolerance	
		Inch Plus	Inch Minus
Cut Lengths	0.030, 0.035, 0.045, 0.062	0.002	0.002
Cut Lengths	0.094, 0.125	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, 0.094	0.002	0.002

TABLE 2B - Sizes and Diameter Tolerances, SI Units

Form	Nominal Diameter Millimeters	Tolerance	
		Millimeter Plus	Millimeter Minus
Cut Lengths	0.76, 0.89, 1.14, 1.57	0.05	0.05
Cut Lengths	2.39, 3.18	0.08	0.08
Spools	0.18, 0.25, 0.38, 0.51	0.013	0.013
Spools	0.76, 0.89, 1.14	0.025	0.05
Spools	1.57, 2.39	0.05	0.05

3.7.2 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, -0.5 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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the wire conforms to specified requirements.

4.2 Classification of Tests:

- 4.2.1 Acceptance Tests: Composition (3.1), tensile properties (3.5.3), sizes and tolerances (3.7), and alloy verification (5.2) are acceptance tests and shall be performed on each heat or lot as applicable.
- 4.2.2 Periodic Tests: Weldability (3.5.1), cast (3.5.2.1), and helix (3.5.2.2) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:

Shall be in accordance with AMS 2370 and as specified herein.

- 4.3.1 (R) Specimens for tensile testing shall be obtained from a single-vee-groove, butt-joint weld made between two pieces of AMS 6350 steel plate, 0.250 inch (6.35 mm) in nominal thickness, chamfered full depth to a 60-degree included angle; the weld shall be perpendicular to the longitudinal grain direction of the test pieces. Test pieces, prior to machining the test specimens, shall be heat treated to a tensile strength not lower than 150 ksi (1034 MPa). After heat treatment, the weld metal shall be finished flush with the parent metal on both faces and standard sheet-type, rectangular specimens shall be prepared in accordance with ASTM E 8 or ASTM E 8M, with the weld in the approximate center of the gage length. The weld in the specimens, prior to tensile testing, shall be free from defects detrimental to tensile properties of the weld, determined in accordance with AMS 2635. Three control, standard sheet-type, rectangular tensile specimens shall be machined from 0.250 inch (6.35 mm) AMS 6350 steel plate of the same heat as that used for the welded specimens, heat treated with the welded specimens, and tested for comparative tensile properties in accordance with ASTM E 8 or ASTM E 8M.

4.4 Reports:

The vendor of wire shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and stating that the wire conforms to the other technical requirements. This report shall include the purchase order number, heat and lot numbers, AMS 6375A, nominal size, and quantity.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2370.

5. PREPARATION FOR DELIVERY:

- 5.1 (R) Wire shall be supplied either on spools in one continuous length for machine welding or in cut lengths for manual welding, as ordered. Wire on each spool or in each package of cut lengths shall be from the same heat of steel.