



# AEROSPACE MATERIAL

Society of Automotive Engineers, Inc.

TWO PENNSYLVANIA PLAZA, NEW YORK, N. Y. 10001

# SPECIFICATION

## AMS 6461D

Superseding AMS 6461C

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STEEL WIRE, WELDING  
0.95Cr - 0.20V (0.28 - 0.33C) (SAE 6130)  
Vacuum Melted

### 1. SCOPE:

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

1.2 Application: Primarily for use as filler metal for inert gas arc welding of critical weldments of low-alloy steels where the joint is capable of being heat treated to 180,000 psi (1241 MPa) tensile strength.

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 2635 - Radiographic Inspection

AMS 2814 - Packaging, Welding Wire, Premium Quality

AMS 2815 - Identification, Welding Wire, Line Code System

AMS 6350 - Steel Sheet, Strip, and Plate, 0.95Cr - 0.20Mo (0.28 - 0.33C) (SAE 4130)

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

ASTM A370 - Mechanical Testing of Steel Products

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, 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	0.70	0.90
Silicon	0.20	0.35
Phosphorus	--	0.008
Sulfur	--	0.008
Phosphorus + Sulfur	--	0.012
Chromium	0.80	1.10
Vanadium	0.15	0.25
Nickel	--	0.25
Molybdenum	--	0.06
Oxygen	--	0.0025 (25 ppm)
Nitrogen	--	0.005 (50 ppm)
Hydrogen	--	0.0025 (25 ppm)
Copper	--	0.35

- 3.1.1 **Check Analysis:** Composition variations shall meet the requirements of AMS 2259, paragraph titled "Low Alloy Steels" except that the limit for phosphorus plus sulfur includes the check analysis tolerance.
- 3.2 **Condition:** Cold drawn, bright finish, as-drawn temper. Wire shall be furnished on disposable spools for machine welding and in cut lengths for manual welding operations, 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 neither result in pitting or cause gas absorption by the wire or deposition of substances harmful to welding operations.
- 3.2.2 Residual elements and dissolved gases deposited on, or absorbed by, the welding wire as a result of cleaning or drawing operations shall be removed by vacuum degassing. Annealing, if required, shall be performed in vacuum or inert gas atmosphere.
- 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 mm).
- 3.3.3 **Tensile Properties:** Deposited weld metal shall be capable of meeting the following requirement:
- 3.3.3.1 A single vee-groove, butt-joint weld shall be made between two pieces of AMS 6350 plate 0.25 in. (6.35 mm) thick, which are chamfered full depth to a 60 deg (1.05 rad) included angle. The weld metal shall be finished flush with the parent metal on both faces. The weld area in the location of the tensile specimen or specimens shall be free from defects detrimental to the tensile properties of the weld as revealed by radiographic inspection in accordance with AMS 2635. After heat treating the parent metal to tensile strength not lower than 180,000 psi (1241 MPa), a standard sheet-type tensile test specimen prepared and tested in accordance with ASTM A370, with the weld in the approximate center of the gage length and perpendicular to the longitudinal axis of the specimen, shall have the following properties:

