



AEROSPACE MATERIAL SPECIFICATIONS

AMS 6461C

Superseding AMS 6461B

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SOCIETY OF AUTOMOTIVE ENGINEERS, Inc.

485 Lexington Ave., New York, N. Y. 10017

STEEL WIRE, WELDING

0.95Cr - 0.20V (0.28 - 0.33C) (SAE 6130)

Vacuum Melted

1. **ACKNOWLEDGMENT:** A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.
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 tensile strength.
3. **COMPOSITION:**

	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 **Check Analysis:** Composition variations shall meet the requirements of the latest issue of AMS 2259, paragraph titled "Low Alloy Steels"; phosphorus plus sulfur shall not exceed 0.012 including check analysis tolerances.
4. **CONDITION:** Unless otherwise specified, wire shall be 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.
 - 4.1 Drawing compounds, oxides, and dirt shall be removed.
 - 4.2 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.
5. **TECHNICAL REQUIREMENTS:**
 - 5.1 **Welding:** Melted wire shall flow smoothly and evenly during welding and shall be capable of producing acceptable welds.
 - 5.2 **Tensile Properties:** Deposited weld metal shall be capable of meeting the following requirement:

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5.2.1 A single vee-groove, butt-joint weld shall be made between two pieces of AMS 6350 plate 1/4 in. thick, which are chamfered full depth to a 60 deg 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 radiography. After heat treating the parent metal to tensile strength not lower than 180,000 psi, a standard sheet-type tensile test specimen prepared in accordance with the issue of ASTM E8 specified in the latest issue of AMS 2350, having the weld in the approximate center of the gage length and perpendicular to the longitudinal axis of the specimen, shall meet the following requirements:

Tensile Strength Through Weld Zone,	
% of Parent Metal	90 min
Elongation, % in 2 in.	5 min

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

5.3.1 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. and not greater than 30 in. in diameter.

5.3.2 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 inch.

5.3.3 Layer Winding: Wire 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.

5.4 Heat: Wire on each spool shall be one continuous length from the same heat of material. Cut lengths in any one package shall be from the same heat of material.

6. QUALITY: Unless otherwise specified, steel 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.

7. SIZES AND TOLERANCES: Unless otherwise specified, wire shall be supplied in the following sizes and to the tolerances shown.

7.1 Diameter:

Form	Nominal Diameter Inch				Tolerance, Inch Plus or Minus
Cut Lengths	0.045,	0.062,	0.093,	0.125	0.003
Spools	0.030,	0.035,	0.045,	0.062, 0.093	0.001
Spools	0.007,	0.010,	0.015,	0.020	0.0005

7.2 Length: Cut lengths shall be furnished in 18, 27, or 36 in. lengths, as ordered, and shall not vary more than + 1/4 in. from the length ordered.

8. REPORTS:

8.1 Unless otherwise specified, 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 indicating the method used for determining interstitial gases and a statement that the product conforms to the technical requirements of this specification. This report shall include the purchase order number, heat number, material specification number, nominal size, and quantity from each heat.