AERONAUTICAL MATERIAL SPECIFICATIONS

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

AMS 6461A

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STEEL WIRE, WELDING
0.95Cr - 0.2V (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.

Ø 3. COMPOSITION:

Carbon	0.28 - 0.33
Manganese	0.70 - 0.90
Silicon	0.20 - 0.35
Phosphorus	0.008 max
Sulfur	0.008 max
Phosphorus + Sulfur	0.012 max
Chromium	0.80 - 1.10
Vanadium	0.15 - 0.25
Oxygen	0.0025 max
Hydrogen	0.0025 max
Nitrogen	0.005 max

3.1 Check Analysis: Composition variations shall meet the requirements of the Ø latest issue of AMS 2259, paragraph titled "Low Alloy Steels".

4. CONDITION: Unless otherwise specified, wire shall be cold drawn, bright finish, as drawn temper. Wire shall be furnished on disposable spools for machine Ø 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.

Ø 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 Ø 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 butt joint vee groove weld shall be made between two pieces of AMS 6350 plate 1/4 in. thick, which are chamfered to a 60 deg included angle and to full depth. 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 Ø the weld as revealed by radiography. After heat treating the parent metal to tensile strength not lower than 180,000 psi, a tensile test specimen machined in accordance with ASTM E8-57T, cut with 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 Area	90% min of parent metal
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 6 - 8 ft in length, when cut from the spool and suspended freely from its approximate Ø midlength, shall form a circle not less than 20 in. and not greater than 36 in. in diameter (see Fig. 1).

5.3.2 Helix: A specimen cut and suspended as in 5.3.1 and measured between adjacent Ø turns shall show a separation not greater than 4 in. (see Fig. 1).

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 Ø 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 Ø 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 Ø ordered, and shall not vary more than ± 1/4 in. from the length ordered.

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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.

8.2 Unless otherwise specified, when parts made of this wire or assemblies requiring the 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, part or assembly number, and quantity.

Ø 9. PACKAGING AND MARKING:

9.1 Cut Lengths: Shall be marked (Code 112), cleaned, and packaged in accordance with the latest issue of AMS 2815, unless otherwise specified.

9.2 Spooled Wire:

9.2.1 Spools shall be of such materials and construction as to provide adequate strength and rigidity to prevent damage or distortion in normal handling and use and to insulate the wire from the spindle.

9.2.2 Unless otherwise specified, spool dimensions shall conform to the approximate dimensions shown in Fig. 2. Barrel diameter B shall be such as to permit proper feeding of the wire.

9.2.3 Unless otherwise specified, wire shall be furnished on spools of approximately 5, 10, or 25 lb net weight, as ordered; up to 20% of the net weight of any lot in the shipment may be on spools containing not less than 50% of the ordered spool net weight.

9.2.4 Unless otherwise specified, spooled wire shall be packaged in hermetically sealed containers with a desiccant or dry inert atmosphere.

9.2.5 Both sides of each spool and one end of each container shall be permanently and legibly marked with the following information; purchase order number will be required only on the container:

STEEL WIRE, WELDING
AMS 6461A
SIZE _____
QUANTITY _____
HEAT NUMBER _____
PURCHASE ORDER NUMBER _____
MANUFACTURER'S IDENTIFICATION _____
AMS 2815 CODE 112 _____
CODE SYMBOL _____ / _____ / _____ // _____

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10. REJECTIONS: Material not conforming to this specification or to authorized modifications will be subject to rejection.

NOTE. SIMILAR SPECIFICATIONS: (a) This specification exceeds the minimum requirements of MIL-R-5632, Class 2, dated 17 February 1950.

(b) MIL-R-5632 is listed for information only and shall not be construed as an acceptable alternate unless all requirements of this AMS are met.

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