

**AEROSPACE
MATERIAL
SPECIFICATION**

SAE AMS 5780B

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Superseding AMS 5780A

Submitted for recognition as an American National Standard

STEEL WELDING WIRE, CORROSION AND MODERATE HEAT RESISTANT
15.5Cr - 4.5Ni - 2.9Mo - 0.10N
Annealed

UNS S35500

1. SCOPE:

1.1 Form: This specification covers a corrosion and moderate heat resistant steel in the form of welding wire.

1.2 Application: Primarily for use as filler metal for gas-tungsten-arc or gas-metal-arc welding of parts fabricated from steels of similar composition.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2248 - Chemical Check Analysis Limits, Wrought Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys

AMS 2350 - Standards and Test Methods

AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock

AMS 2813 - Packaging of Welding Wire, Standard Method

AMS 2815 - Identification, Welding Wire, Line Code System

AMS 2816 - Identification, Welding Wire, Color Code System

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

ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, \emptyset determined by wet chemical methods in accordance with ASTM E353 or by spectrographic or other analytical methods approved by purchaser:

| | min | max |
|------------|-------|-------|
| Carbon | 0.10 | 0.15 |
| Manganese | 0.50 | 1.25 |
| Silicon | -- | 0.50 |
| Phosphorus | -- | 0.04 |
| Sulfur | -- | 0.03 |
| Chromium | 15.00 | 16.00 |
| Nickel | 4.00 | 5.00 |
| Molybdenum | 2.50 | 3.25 |
| Nitrogen | 0.07 | 0.13 |
| Copper | -- | 0.50 |

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2248.

3.2 Condition: Cold drawn, annealed, and descaled in a temper which will \emptyset provide proper feeding of the wire in machine welding equipment.

3.2.1 Wire shall be furnished on disposable spools for machine welding or in cut lengths for manual welding, as ordered.

3.2.2 Drawing compounds, oxides, dirt, and oil 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.

3.3 Heat Treatment: Wire shall be annealed by heating to a temperature within the range 1850° - 1975°F (1010° - 1080°C), holding at the selected temperature within $\pm 25^\circ\text{F}$ ($\pm 15^\circ\text{C}$) for not less than 90 min. per inch (25 mm) of nominal diameter, and quenching in water or otherwise cooling as rapidly as practicable to room temperature.

3.4 Properties: Wire shall conform to the following requirements:

3.4.1 Weldability: Melted wire shall flow smoothly and evenly during welding and shall produce acceptable welds, determined by a procedure agreed upon by purchaser and vendor.

3.4.2 Spooled Wire: Shall conform to 3.4.2.1 and 3.4.2.2.

3.4.2.1 Cast: Wire wound on standard 12-in. (300-mm) diameter spools shall have imparted to it a curvature such that a specimen sufficient in length, 4 - 8 ft (1.2 - 2.4 m), to form one loop, when cut from the spool and laid on a flat surface, shall form a circle not less than 15 in. (375 mm) and not greater than 30 in. (750 mm) in diameter.

3.4.2.2 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).

3.5 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.

3.6 Sizes and Tolerances: Wire shall be supplied in the sizes and to the tolerances shown in 3.6.1 and 3.6.2.

3.6.1 Diameter:

TABLE I

| Form | Nominal Diameter Inch | Tolerance, Inch | |
|-------------|----------------------------|-----------------|--------|
| | | Plus | Minus |
| Cut Lengths | 0.030, 0.045, 0.062, 0.078 | 0.002 | 0.002 |
| Cut Lengths | 0.094, 0.125, 0.156, 0.188 | 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, 0.078, 0.094 | 0.002 | 0.002 |

TABLE I (SI)

| Form | Nominal Diameter Millimetres | Tolerance, Millimetre | |
|-------------|---------------------------------|-----------------------|-------|
| | | Plus | Minus |
| Cut Lengths | 0.75, 1.15, 1.55, 2.00 | 0.05 | 0.05 |
| Cut Lengths | 2.35, 3.10, 4.00, 4.75 | 0.08 | 0.08 |
| Spools | 0.20, 0.25, 0.40, 0.50 | 0.015 | 0.015 |
| Spools | 0.75, 0.90, 1.15 | 0.02 | 0.05 |
| Spools | 1.55, 2.00, 2.35 | 0.05 | 0.05 |

3.6.2 Length: Cut lengths shall be furnished in 18, 27, or 36 in. (450, 675, or 900 mm) lengths, as ordered, and shall not vary more than +0, -0.5 in. (-12 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 performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to sample and to perform any confirmatory testing deemed 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 sizes and tolerances (3.6) are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for weldability (3.4.1), cast (3.4.2.1), and helix (3.4.2.2) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling: Shall be in accordance with AMS 2371 and as specified herein.

4.4 Reports:

4.4.1 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 of this specification. This report shall include the purchase order number, heat number, AMS 5780B, nominal size, and quantity from each heat.

4.4.2 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 requirements of this specification and shall furnish with each shipment a report stating that the wire conforms. This report shall include the purchase order number, AMS 5780B, part or assembly number, and quantity.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2371.

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. An 8-in. (200-mm) length of wire shall be made accessible at both ends of each spool for alloy verification.

5.2 Heat: Wire on each spool shall be of one continuous length from the same heat of steel. Butt welding is permissible providing both ends to be joined are verified and the weld will not interfere with uniform, uninterrupted feeding of the wire in machine welding equipment. Packages of cut lengths shall not contain wire from more than one heat of steel.