# AEROSPACE MATERIAL SPECIFICATION

| AMS5034™ | REV. B |
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Superseding AMS5034A


## Steel, Welding Wire
## 0.95Cr - 0.20Mo (0.28 - 0.33C) (SAE 4130)
## (Composition similar to UNS G41300)

RATIONALE

AMS5034B is stabilized as a similar specification is available.

STABILIZED NOTICE

AMS5034B has been declared "STABILIZED" by AMS Committee E. This document will no longer be updated and may no longer represent standard industry practice. This document was stabilized because this document is no longer state of the art and other documents contain similar but not necessarily equivalent requirements Previously this document was revised. The last technical update of this document occurred in May 2006. Users of this document should refer to the cognizant engineering organization for disposition of any issues with reports/certifications to this specification; including exceptions listed on the certification. NOTE: In many cases, the purchaser may represent a sub tier supplier and not the cognizant engineering organization.

AMS Committee E recommends that the following similar, but not identical specification, may be considered for future procurement. This listing does not constitute authority to substitute this specification for the “STABILIZED” specification.

AMS6457 Steel, Welding Wire, 0.95Cr - 0.20Mo (0.28 - 0.33C) Vacuum Melted, Environment Controlled Packaging SAE 4130






**TO PLACE A DOCUMENT ORDER:** **Tel: 877-606-7323 (inside USA and Canada)**
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## 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-tungsten-arc and gas-metal-arc welding of low-alloy steels where the joint is capable of being heat treated to a minimum tensile strength up to 180 ksi (1241 MPa), but usage is not limited to such applications.

### 1.3 Classification

Wire shall be classified as follows:

Type 1 - Bare Wire
Type 2 - Copper Coated

Type 1 shall be supplied unless Type 2 is specified.

## 2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), or www.sae.org.

| | |
|---|---|
| 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 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 |
| ARP1876 | Weldability Test for Weld Filler Metal Wire |
| ARP4926 | Alloy Verification and Chemical Composition Inspection of Welding Wire |

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P. O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, or www.astm.org.

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

3. TECHNICAL REQUIREMENTS

3.1 Composition

Wire 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 (3.1.2) | 0.28 | 0.33 |
| Manganese | 0.40 | 0.60 |
| Silicon | 0.15 | 0.35 |
| Phosphorus | -- | 0.008 |
| Sulfur | -- | 0.008 |
| Phosphorus + Sulfur | -- | 0.012 |
| Chromium | 0.80 | 1.10 |
| Molybdenum | 0.15 | 0.25 |
| Nickel | -- | 0.25 |
| Copper (3.1.2) | -- | 0.35 |
| Vanadium | -- | 0.06 |



3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS 2259; the limit for phosphorus plus sulfur shall be 0.005 over maximum.

3.1.2 Shall be determined on finished wire for carbon, and on finished wire for copper if wire is supplied copper clad.

3.1.3 Chemical analysis of initial ingot, bar, or rod stock before drawing, other than those analyses required to be done on the finished wire, is acceptable provided the processes used for drawing or rolling, annealing, and cleaning are controlled to ensure continued conformance to requirements.

3.2 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.

3.3 Fabrication

3.3.1 Wire shall be formed from rod or bar descaled by a process that does not affect the composition of the wire.

3.3.2 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.

3.3.3 In-process annealing, if required, between cold rolling or drawing operations, shall be performed in vacuum or protective atmosphere to avoid surface oxidation and absorption of other extraneous elements.

3.3.4 Butt welding is permissible provided both ends to be joined are either alloy verified using a method or methods capable of distinguishing the alloy from all others processed in 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.

3.3.5 Residual elements and dissolved gases picked up during wire processing that can adversely affect the welding characteristics, the operation of the equipment, or the properties of the weld metal, shall be removed.

3.3.6 When Type 2 copper coated wire is specified, the copper coating shall be clean, bright, and uniform in appearance. A maximum of four discontinuities in any 36 inch (914 mm)-length are acceptable provided the exposed wire is clean and bright. The maximum allowable discontinuity size shall be 0.25 inch (6.25 mm) in length. The thickness of the copper coating shall not exceed 0.0005 inch (0.0127 mm) on the diameter.

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. ARP1876 may be used to resolve disputes.

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-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.

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 inch (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 standard sizes and to the tolerances shown in 3.6.1 and 3.6.2.

3.6.1 Diameter

Shall be as shown in Table 2.

TABLE 2A - SIZES AND DIAMETER TOLERANCES, INCH/POUND UNITS

| Form | Nominal Diameter Inch | Tolerance Inch plus/minus |
|---|---|---|
| Cut Lengths | 0.030, 0.045 | 0.001 |
| Cut Lengths | 0.062, 0.078, 0.094, 0.125 | 0.002 |
| Spools | 0.007, 0.010, 0.015, | 0.0005 |
| Spools | 0.020, 0.030, 0.035, 0.045 | 0.001 |
| Spools | 0.062, 0.078, 0.094 | 0.002 |

TABLE 2B - SIZES AND DIAMETER TOLERANCES, SI UNITS

| Form | Nominal Diameter Millimeters | Tolerance Millimeter plus/minus |
|---|---|---|
| Cut Lengths | 0.76, 1.14 | 0.025 |
| Cut Lengths | 1.57, 1.98, 2.39, 3.18 | 0.05 |
| Spools | 0.18, 0.25, 0.38, | 0.013 |
| Spools | 0.51, 0.76, 0.89, 1.14 | 0.025 |
| Spools | 1.57, 1.98, 2.39 | 0.05 |



3.6.2 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 (+0, -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), sizes and tolerances (3.6), and alloy verification (5.2) are acceptance tests and shall be performed on each heat or lot as applicable.