



AEROSPACE MATERIAL SPECIFICATION

AMS6468™**REV. G**

Issued 1978-04
Reaffirmed 2008-04
Revised 2023-11

Superseding AMS6468F

Steel, Welding Wire
1.0Cr - 10Ni - 3.8Co - 0.45Mo - 0.08V (0.14 - 0.17C)
Vacuum Melted, Environment Controlled Packaging
(Composition Similar to UNS K91461)

RATIONALE

AMS6468G is the result of a Five-Year Review and update of the specification. The revision adds testing options for hydrogen, revises composition reporting (see Table 1, 3.1.1.2, and 3.1.2), and updates the prohibition on unauthorized exceptions (see 4.4.2, 5.3.1, and 8.5).

1. SCOPE

1.1 Form

This specification covers an 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 having similar composition and requiring a combination of high strength and high notch toughness without the need for post-weld heat treatment, but usage is not limited to such applications.

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 +1 724-776-4970 (outside USA), www.sae.org.

AMS2259	Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS2300	Steel Cleanliness, Premium Aircraft-Quality, Magnetic Particle Inspection Procedure
AMS2370	Quality Assurance Sampling and Testing, Carbon and Low-Alloy Steel Wrought Products and Forging Stock
AMS2813	Packaging and Marking of Packages of Welding Wire, Standard Method

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SAE WEB ADDRESS:

For more information on this standard, visit
<https://www.sae.org/standards/content/AMS6468G>

AMS2814	Packaging and Marking of Packages of Welding Wire, Premium Quality
AMS2816	Identification, Welding Wire, Tab Marking Method
AMS2819	Identification, Welding Wire, Direct Color Code System
AMS6523	Steel, Sheet, Strip, and Plate, 0.75Cr - 9.0Ni - 4.5Co - 1.0Mo - 0.09V (0.17 - 0.23C), Vacuum Consumable Electrode Melted, Annealed
ARP1876	Weldability Test for Weld Filler Metal Wire
ARP4926	Alloy Verification and Chemical Composition, Inspection of Welding Wire
AS7766	Terms Used in Aerospace Metals Specifications

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, www.astm.org.

ASTM A751	Chemical Analysis of Steel Products
ASTM D2650	Chemical Composition of Gases by Mass Spectrometry
ASTM E1032	Radiographic Examination of Weldments
ASTM E1820	Measurement of Fracture Toughness

2.3 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Wire Composition

Wire composition shall conform to the percentages by weight shown in Table 1, determined in accordance with ASTM A751 or by other analytical methods acceptable to the purchaser.

Table 1 - Composition

Element	Min	Max
Carbon (3.1.1.1)	0.14	0.17
Manganese	0.40	0.55
Silicon	0.15	0.25
Phosphorus	--	0.006
Sulfur	--	0.005
Chromium	0.90	1.05
Nickel	9.75	10.25
Cobalt	3.50	4.00
Molybdenum	0.40	0.50
Vanadium	0.06	0.10
Copper	--	0.10
Oxygen (3.1.1.1)	--	0.0025 (25 ppm)
Nitrogen (3.1.1.1)	--	0.0050 (50 ppm)
Hydrogen (3.1.1.1, 3.1.1.2)	--	0.0005 (5 ppm)

3.1.1 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.

- 3.1.1.1 Carbon, oxygen, nitrogen, and hydrogen shall also be determined periodically on finished wire (see 4.2.2).
- 3.1.1.2 The hydrogen content of the wire shall be determined at final diameter in accordance with ASTM D2650 or by other method acceptable to the purchaser.
- 3.1.2 The producer may test for any element not listed in Table 1 and include this analysis in the report of 4.4. Reporting of any element not listed in the composition table is not a basis for rejection unless limits of acceptability are specified by the purchaser.
- 3.1.3 Check Analysis

Composition variations shall meet the applicable requirements of AMS2259.

3.2 Melting Practice

Steel shall be vacuum induction melted; it may be remelted using consumable electrode vacuum practice (VAR) in the remelt cycle, but remelting is not required.

- 3.2.1 Steel shall be premium aircraft quality conforming to AMS2300.

3.3 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.

3.4 Fabrication

- 3.4.1 In-process annealing, if required between cold rolling or drawing operations, shall be performed in vacuum or protective atmosphere to avoid surface oxidation and adsorption of other extraneous elements.
- 3.4.2 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 other alloys 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.
- 3.4.3 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.
- 3.4.4 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 weld metal shall be removed.

3.5 Properties

Wire shall conform to the following requirements:

3.5.1 Weldability

Melted wire shall flow smoothly and evenly during welding and shall produce acceptable welds. ARP1876 may be used to resolve disputes.

3.5.2 Spooled Wire

Spooled wire shall conform to 3.5.2.1 and 3.5.2.2.

3.5.2.1 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.

3.5.2.2 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).

3.5.3 Fracture Toughness

When specified by the purchaser, test specimens prepared as in 4.3.1 shall be fracture toughness tested in accordance with ASTM E1820. Standards for acceptance for fracture toughness, when specified, shall be as agreed upon by the purchaser and producer.

3.6 Quality

Wire, as received by the 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.

3.6.1 Surface irregularities inherent with a forming process that do not tear the wire surface are acceptable provided the wire conforms to the tolerance of 3.7.

3.7 Sizes and Tolerances

Wire shall be supplied in the sizes and to the tolerances shown in 3.7.1 and 3.7.2.

3.7.1 Wire diameter shall be as shown in Table 2.

Table 2A - Sizes and diameter tolerances, inch/pound units

Form	Nominal Diameter Inches	Tolerance Inches Plus and Minus
Cut Lengths	0.030, 0.035, 0.045	0.001
Cut Lengths	0.062, 0.094, 0.125	0.002
Spools	0.020, 0.025	0.0005
Spools	0.030, 0.035, 0.045	0.001
Spools	0.062, 0.094	0.002

Table 2B - Sizes and diameter tolerances, SI units

Form	Nominal Diameter Millimeters	Tolerance Millimeters Plus and Minus
Cut Lengths	0.76, 0.089, 1.14	0.025
Cut Lengths	1.57, 2.39, 3.18	0.05
Spools	0.51, 0.64	0.013
Spools	0.76, 0.89, 1.14	0.025
Spools	1.57, 2.39	0.05

3.7.2 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.

3.8 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.2.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of wire shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The 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 (see 3.1.1), alloy verification (see 5.2), sizes and tolerances (see 3.7), and, when specified, fracture toughness (see 3.5.3) are acceptance tests and shall be performed on each heat or lot as applicable.

4.2.2 Periodic Tests

Determination of carbon, oxygen, nitrogen, and hydrogen on finished wire (see 3.1.1), weldability (see 3.5.1), cast (see 3.5.2.1), and helix (see 3.5.2.2) are periodic tests and shall be performed at a frequency selected by the producer unless frequency of testing is specified by the purchaser.

4.3 Sampling and Testing

Shall be in accordance with AMS2370.

4.3.1 Specimens for fracture toughness testing shall be prepared from a single-vee-groove or double-vee-groove, butt joint weld made between two pieces of AMS6523 steel plate, 1.00 to 1.25 inches (25.4 to 31.8 mm) in thickness, which have been chamfered full depth to a 45 degree included angle if a single-vee-groove joint is used and to a 60 degree included angle if a double-vee-groove is used; the weld shall be perpendicular to the longitudinal grain direction of the test pieces. If a single-vee-groove joint is used, a backing bar 0.25 by 1.00 inch (6.4 by 25.4 mm) in cross section shall be used with a root gap of 0.25 inch (6.4 mm). The weld metal shall be in the direction of the specimen notch, in the center of the specimen, and shall be free from imperfections detrimental to properties of weld metal, determined by radiographic inspection in accordance with ASTM E1032. The number and configuration of test specimens for fracture toughness testing shall be as agreed upon by the purchaser and producer.

4.4 Reports

4.4.1 The producer of wire shall furnish with each shipment a report showing the producer's identity, country where the metal was melted (e.g., final melt in the case of metal processed by multiple melting operations), results of tests for chemical composition of each heat, and stating that the wire conforms to the other technical requirements. This report shall include the purchase order number, heat and lot numbers, AMS6468G, nominal size, and quantity.

4.4.2 When material produced to this specification has exceptions taken to the technical requirements listed in Section 3, the report shall contain a statement "This material is certified as AMS6468G(EXC) because of the following exceptions:" and the specific exceptions shall be listed.

4.5 Resampling and Retesting

Resampling and retesting shall be in accordance with AMS2370.