



AEROSPACE MATERIAL SPECIFICATION

AMS5617™**REV. L**

Issued 1969-05
Reaffirmed 2012-02
Revised 2024-01

Superseding AMS5617K

Steel, Corrosion-Resistant, Bars, Wire, Forgings and Forging Stock
12Cr - 8.5Ni - 1.2Ti - 2.0Cu
Vacuum Induction Plus Vacuum Consumable Electrode Melted
Solution Heat Treated, Precipitation Hardenable
(Composition similar to UNS S45500, S45503)

RATIONALE

AMS5617L is the result of a Five-Year Review and update of the specification. The revision updates the Title to match the Scope adding an additional reference UNS number, updates Scope adding section size limits and clarifying conditions (see 1.1), revises composition testing and reporting requirements (see 3.1 and 3.1.1), prohibits bar cut from plate (see 3.3.1.1.3 and 4.4.2), adds strain rate to tensile test requirements (see 3.5.1.2.1), changes E45 method consistent with table requirements (see 3.5.1.1.5), adds bar quality requirements (see 3.6.1.2 and 8.4), clarifies testing based on response to heat treatment (see 4.2.1), addresses forging properties (see 4.4.3 and 8.7), adds response to heat treatment to reports (see 4.4) updates the exception requirements (see 3.5.1.3 and 8.6), and adds ordering requirements based on above changes (see 8.7).

1. SCOPE

1.1 Form

This specification covers two grades of a premium aircraft-quality, corrosion-resistant steel in the form of bars, wire, forgings in the solution heat treated condition, and forging stock. Product covered by this specification is limited to a nominal 6.00 inches (152.4 millimeters) and under diameter or maximum cross-sectional dimension between parallel sides (thickness), unless the product is tested in the response to H1000 condition (see 3.5.1.2 and 8.7). When product is tested in the H1000 condition, the product is limited to 8.00 inches (203.2 millimeters) and under diameter or maximum cross-sectional dimension between parallel sides (thickness). Stock for forging may be of any size.

1.2 Application

These products have been used typically for parts requiring corrosion resistance and high strength up to 800 °F (427 °C). The steel can be precipitation hardened to minimum tensile strengths up to 225 ksi (1551 MPa).

1.2.1 Certain design and processing procedures may cause these products to become susceptible to stress-corrosion cracking after heat treatment; ARP1110 recommends practices to minimize such conditions.

1.3 Classification

Steels covered by this specification are classified as follows:

Grade 1: Transverse ductility, not specified
Grade 2: Transverse ductility, specified

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Documents

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- 1.3.1 Unless a specific type is ordered, Grade 1 shall be supplied for product under 3.00 inches (76.2 mm) in nominal diameter, or least distance between parallel sides, and Grade 2 shall be supplied for larger sizes.

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.

AMS2241	Tolerances, Corrosion- and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
AMS2248	Chemical Check Analysis Limits, Corrosion- and Heat-Resistant Steels and Alloys, Maraging and Other Highly Alloyed Steels, and Iron Alloys
AMS2300	Steel Cleanliness, Premium Aircraft-Quality, Magnetic Particle Inspection Procedure
AMS2371	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS2374	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steel and Alloy Forgings
AMS2750	Pyrometry
AMS2806	Identification Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels, and Corrosion and Heat-Resistant Steels and Alloys
AMS2808	Identification, Forgings
ARP1110	Minimizing Stress Corrosion Cracking in Wrought Forms of Steels, and Corrosion Resistant Steels and Alloys
AS1182	Standard Stock Removal Allowance Aircraft-Quality and Premium Aircraft-Quality Steel Bars and Mechanical Tubing
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 A370	Mechanical Testing of Steel Products
ASTM A604	Macroetch Testing of Consumable Electrode Remelted Steel Bars and Billets
ASTM A751	Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products
ASTM E45	Determining the Inclusion Content of Steel
ASTM E112	Determining the Average Grain Size
ASTM E140	Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness

2.3 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

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	Grade 1	Grade 1	Grade 2	Grade 2
	Min	Max	Min	Max
Carbon	--	0.03	--	0.010
Manganese	--	0.50	--	0.50
Silicon	--	0.50	--	0.20
Phosphorus	--	0.015	--	0.010
Sulfur	--	0.015	--	0.010
Chromium	11.00	12.50	11.00	12.50
Nickel	7.50	9.50	7.50	9.50
Titanium	0.90	1.40	1.00	1.35
Copper	1.50	2.50	1.50	2.50
Molybdenum	--	0.50	--	0.50
Columbium (Niobium)	--	0.50	--	0.50
Nitrogen	--	0.015	--	0.010

3.1.1 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.

3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.2 Melting Practice

Product shall be multiple melted using vacuum induction melting followed by vacuum consumable electrode melting.

3.3 Condition

The product shall be supplied in the following condition:

3.3.1 Bars, Wire, and Forgings

Bars wire and forgings shall be solution heat treated.

3.3.1.1 Bars

3.3.1.1.1 Rounds

Round bars shall be centerless ground after solution heat treatment, except that bars 0.500 inch (12.70 mm) and under in nominal diameter may be cold drawn, and bars over 4.000 inches (101.60 mm) in nominal diameter may be rough turned.