



AEROSPACE MATERIAL SPECIFICATION

AMS5643™

REV. W

Issued	1951-10
Reaffirmed	2007-08
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Superseding AMS5643V

Steel, Corrosion-Resistant, Bars, Wire, Forgings, Mechanical Tubing, and Rings
16Cr - 4.0Ni - 0.30Cb (Nb) - 4.0Cu
Solution Heat Treated, Precipitation Hardenable
(Composition similar to UNS S17400)

RATIONALE

AMS5643W prohibits unauthorized exceptions (3.8, 3.4.3.2.1, 8.9, 8.10), revises composition (3.1) to replace obsolete chemical analysis standards, updates finish categories (3.2.1.1, 8.10), updates heat treatment specification (3.3.1), deletes requirement for CEO approval of heat treatment test (3.4.3.2), adds strain rate for tensile tests (3.4.3.2.1.1), updates requirements for product stock testing (3.4.3.2.2, 3.4.3.2.3), adds quality requirements of AS1182 (3.5.2, 8.8), changes microstructure from acceptance to periodic (4.2.1.3, 4.2.2, 4.4.1), and results from a Five-Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers a corrosion-resistant steel in the form of bars, wire, forgings, mechanical tubing, flash welded rings in the solution heat treated condition up to 8.0 inches (203 mm) in diameter or least distance between parallel sides, and stock of any size for forging, flash welded rings, or heading (see 8.4).

1.1.1 For purchase of solution treated and aged product, use the applicable AMS slash specification (see 8.4). If a slash sheet description is not specified, solution annealed material shall be supplied. A specific example of a slash specification is:

AMS5643/H1025 - Precipitation Hardened to H1025 condition.

1.2 Application

These products have been used typically for parts requiring corrosion resistance and high strength up to 600 °F (316 °C), but usage is not limited to such applications.

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

1.2.2 For applications, such as bolting, where stress-corrosion is a possibility, the product should be precipitation heat treated for not less than 4 hours at the highest temperature compatible with the strength requirements but in no case lower than 1025 °F (552 °C).

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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
AMS2243	Tolerances Corrosion and Heat-Resistant Steel Tubing
AMS2248	Chemical Check Analysis Limits, Corrosion and Heat-Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
AMS2315	Determination of Delta Ferrite Content
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
AMS2761	Heat Treatment of Steel Raw Materials
AMS2806	Identification Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat-Resistant Steels and Alloys
AMS2808	Identification Forgings
AMS5643/H1025	Steel, Corrosion-Resistant, Bars, Wire, Forgings, Tubing and Rings, 16Cr – 4.0Ni - 0.30Cb (Nb) – 4.0Cu, Solution and Precipitation Heat Treated (H1025)
AMS7490	Rings, Flash Welded, Corrosion and Heat-Resistant Austenitic Steels, Austenitic-Type Iron, Nickel, or Cobalt Alloys, or Precipitation-Hardenable Alloys
ARP1110	Minimizing Stress Corrosion Cracking in Wrought Forms of Steels and Corrosion Resistant Steels and Alloys
ARP1917	Clarification of Terms Used in Aerospace Metals Specifications
AS1182	Standard Stock Removal Allowance Aircraft-Quality and Premium Aircraft-Quality Steel Bars and Mechanical Tubing
AS6279	Standard Practices for Production, Distribution, and Procurement of Metal Stock

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 A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

ASTM E340 Macroetching Metals and Alloys

3. TECHNICAL REQUIREMENTS

3.1 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 purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.07
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	15.00	17.50
Nickel	3.00	5.00
Columbium (Niobium)	5xC	0.45
Copper	3.00	5.00
Molybdenum	--	0.50

3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.2 Condition

The product shall be supplied in the following condition:

3.2.1 Bars and Wire

3.2.1.1 Rounds

Solution heat treated and descaled Bars 2.00 inch (50.8mm) and under in nominal diameter shall be cold finished (see 3.5.2). Bars over 2.0 inches (50.8 mm) in nominal diameter shall be hot or cold finished (see 3.5.2). When a specific finish is required, it must be ordered (see 8.10).

3.2.1.2 Hexagons

Cold drawn, solution heat treated, and descaled.

3.2.1.3 Squares and Flats

Hot finished, solution heat treated, and descaled.

3.2.1.4 Bar shall not be cut from plate (see also 4.4.6).

3.2.2 Forgings and Flash Welded Rings

Solution heat treated and descaled.

3.2.2.1 Flash welded rings shall not be supplied unless specified or permitted on purchaser's part drawing. When supplied, rings shall be manufactured in accordance with AMS7490.