



AEROSPACE MATERIAL SPECIFICATION	AMS6414™	REV. N
	Issued	1964-01
	Revised	2023-03
Superseding AMS6414M		
Steel, Bars, Forgings, Mechanical Tubing, and Forging Stock 0.80Cr - 1.8Ni - 0.25Mo (0.38 - 0.43C) (SAE 4340) Vacuum Consumable Electrode Remelted (Composition similar to UNS G43406)		

RATIONALE

AMS6414N is the result of a Five-Year Review and update of the specification. The revision updates the title to match the scope, prohibits unauthorized exceptions (3.7, 4.4.4, 5.2.1.1, 8.7), updates composition testing (3.1, 3.1.1), updates heat treatment specification (3.3.2), updates macrostructure (3.4.1.1, 3.4.1.2, 8.9), modifies Jominy requirements (3.4.4), updates decarburization test methods (3.4.5), heat treatment updated to table format (3.4.6), adds note on stock removal (8.6), and allows prior revisions (8.8).

1. SCOPE

1.1 Form

This specification covers a premium aircraft-quality, low-alloy steel in the form of bars, forgings, mechanical tubing, and forging stock.

1.2 Application

These products have been used typically for parts requiring a through-hardening capability up to 3.5 inches (89 mm) in nominal thickness at time of heat treatment and subject to rigid magnetic particle inspection standards, but usage is not limited to such applications.

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.

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.

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<https://www.sae.org/standards/content/AMS6414N/>

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.

AMS2251	Tolerances, Low-Alloy Steel Bars
AMS2253	Tolerances, Carbon and Alloy Steel Tubing
AMS2259	Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS2300	Steel Cleanliness, Premium Aircraft-Quality, Magnetic Particle Inspection Procedure
AMS2310	Qualification Sampling and Testing of Steels for Transverse Tensile Properties
AMS2370	Quality Assurance Sampling and Testing, Carbon and Low-Alloy Steel Wrought Products and Forging Stock
AMS2372	Quality Assurance Sampling and Testing, Carbon and Low-Alloy Steel 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
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 A255	Determining Hardenability of Steel
ASTM A370	Mechanical Testing of Steel Products
ASTM A604	Macroetch Testing of Consumable Electrode Remelted Steel Bars and Billets
ASTM A751	Chemical Analysis of Steel Products
ASTM E45	Determining the Inclusion Content of Steel
ASTM E112	Determining 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
ASTM E1077	Estimating the Depth of Decarburization of Steel Specimens

2.3 Definitions

Terms used in AMS are defined in AS7766.

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	0.38	0.43
Manganese	0.65	0.90
Silicon	0.15	0.35
Phosphorus	--	0.010
Sulfur	--	0.010
Chromium	0.70	0.90
Nickel	1.65	2.00
Molybdenum	0.20	0.30
Copper	--	0.35

3.1.1 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 AMS2259.

3.2 Melting Practice

Steel shall be multiple melted using vacuum consumable electrode process in the remelt cycle.

3.3 Condition

The product shall be supplied in the following condition; hardness and tensile strength shall be determined in accordance with ASTM A370:

3.3.1 Bars

Bar shall not be cut from plate (see 4.4.2).

3.3.1.1 Bars 0.500 Inch (12.70 mm) and Under in Nominal Diameter or Least Distance between Parallel Sides

Cold finished having tensile strength not higher than 125 ksi (862 MPa), or equivalent hardness (see 8.2).

3.3.1.2 Bars Over 0.500 Inch (12.70 mm) in Nominal Diameter or Least Distance between Parallel Sides

Hot finished and annealed, unless otherwise ordered, having hardness not higher than 235 HBW, or equivalent (see 8.3). Bars ordered cold finished may have hardness as high as 255 HBW, or equivalent (see 8.3).

3.3.2 Forgings

Normalized and tempered in accordance with AMS2761 to a hardness not higher than 269 HBW, or equivalent (see 8.3).

3.3.3 Mechanical Tubing

Cold finished, unless otherwise ordered, having hardness not higher than 25 HRC, or equivalent (see 8.3). Tubing ordered hot finished and annealed shall have hardness not higher than 99 HRB, or equivalent (see 8.3).