



AEROSPACE MATERIAL SPECIFICATION

AMS6514™

REV. K

Issued 1970-05

Revised 2022-02

Superseding AMS6514J

Steel, Maraging, Bars, Forgings, Mechanical Tubing, Rings and Forging Stock
18.5Ni - 9.0Co - 4.9Mo - 0.65Ti - 0.10Al
Consumable Electrode Vacuum Melted, Annealed
(Composition similar to UNS K93120)

RATIONALE

AMS6514K is the result of a Five-Year Review and update of the document. The revision updates the title form and application consistent with similar specifications (1.1, 1.2), prohibits unauthorized exceptions (3.5.5.1.5, 3.8, 4.4.3, 5.2.1.1, 8.7), updates composition test methods (3.1), adds heat treatment control (3.4), updates macrostructure requirements (3.5.1.1, 3.5.1.2, 8.8), revises micro-inclusion rate requirements (3.5.2), adds strain rate control (3.5.5.1.4), updates definitions (8.3), allows prior revisions (8.6), and adds a note on use of AS1182 (8.5).

1. SCOPE

1.1 Form

This specification covers a premium aircraft-quality steel in the form of bars, forgings, mechanical tubing, flash welded rings up through 10.000 inches (254.00 mm) inclusive in diameter or least distance between parallel sides, and stock of any size for forging or flash welded rings.

1.2 Application

These products have been used typically for parts requiring through-hardening, without liquid quenching, to a minimum yield strength of 270 ksi (1862 MPa) and where such parts may require welding during fabrication, 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.

AMS2248 Chemical Check Analysis Limits, Corrosion- and Heat-Resistant Steels and Alloys, Maraging and Other Highly Alloyed Steels, and Iron Alloys

AMS2251 Tolerances, Low-Alloy Steel Bars

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AMS2253	Tolerances, Carbon and Alloy Steel Tubing
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
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
AMS7496	Rings, Flash Welded Carbon and Low-Alloy Steels
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	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

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	--	0.03
Manganese	--	0.10
Silicon	--	0.10
Phosphorus	--	0.010
Sulfur	--	0.010
Nickel	18.00	19.00
Cobalt	8.50	9.50
Molybdenum	4.60	5.20
Titanium	0.50	0.80
Aluminum	0.05	0.15
Chromium	--	0.50
Copper	--	0.50

3.1.1 Any additions of calcium, zirconium, and boron shall be made prior to pouring the first melt into electrodes; these elements shall not exceed 0.05% calcium, 0.02% zirconium, and 0.004% boron and shall be analyzed and reported in the final heat analysis

3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

3.2 Melting Practice

Steel shall be produced by multiple melting using consumable electrode vacuum remelt (VAR) practice in the remelt cycle.

3.3 Condition

The product shall be supplied in the following condition:

3.3.1 Bars

Annealed and descaled. Bar shall not be cut from plate (also see 4.4.2).

3.3.2 Forgings, Mechanical Tubing, and Flash Welded Rings

Annealed and descaled.

3.3.3 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 AMS7496.

3.3.4 Stock for Forging or Flash Welded Rings

As ordered by the forging or flash welded ring manufacturer.

3.4 Annealing

Bars, forgings, mechanical tubing, and flash welded rings shall be annealed in accordance with AMS2761 by heating to a temperature within the range 1500 to 1700 °F (816 to 927 °C), holding at the selected temperature within ±25 °F (±14 °C) for a minimum of 1 hour and cooling to room temperature in air or other atmosphere at a rate equivalent to an air cool or faster.

3.5 Properties

The product shall conform to the following requirements; hardness and tensile testing shall be performed in accordance with ASTM A370: