



AEROSPACE MATERIAL SPECIFICATION

AMS5641™**REV. K**

Issued 1942-06
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Superseding AMS5641J

Steel, Corrosion-Resistant, Bars, Wire, Forgings and Forging Stock,
18.5Cr - 10Ni - 0.22Se (303Se),
Free-Machining; for Swaging or Upsetting,
Solution Heat Treated
(Composition similar to UNS S30323)

RATIONALE

AMS5641K is the result of a Five-Year Review and update of the specification. The revision addresses composition reporting (see 3.1.1), updates strain rate requirements for tensile testing (see 3.3.1.1), moves hardness test requirements and limits them to cold-finished product (see 3.3.2.1 and 4.3.1.1), adds a hardness testing caveat, updates wording for bar from plate restrictions (see 4.4.2), adds option for forging stock properties (see 4.4.3 and 8.8), and adds source information for naming convention (see 8.7).

1. SCOPE

1.1 Form

This specification covers a free-machining, corrosion-resistant steel in the form of bars, wire, forgings, and forging stock.

1.2 Application

These products have been used typically for parts which may be swaged or hot upset during fabrication and on which the amount of machining warrants use of a free-machining grade of steel, but usage is not limited to such applications. Corrosion resistance is similar to that of the standard 18-8 type steel.

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 (U.S. and Canada only) or +1 724-776-4970 (outside U.S. and Canada), www.sae.org.

AMS2241 Tolerances, Corrosion- and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire

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AMS2248	Chemical Check Analysis Limits, Corrosion- and Heat-Resistant Steels and Alloys, Maraging and Other Highly Alloyed Steels, and Iron Alloys
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
AMS2806	Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels, and Corrosion and Heat-Resistant Steels and Alloys
AMS2808	Identification, Forgings
AS1182	Standard Stock Removal Allowance, Aircraft-Quality and Premium Aircraft-Quality Steel, Bars and Mechanical Tubing
AS7766	Terms Used in Aerospace Metals Specifications
HS-1086	Metals and Alloys in the Unified Numbering System

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	Chemical Analysis of Steel Products
ASTM E140	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 following percentages by weight as shown in Table 1, determined in accordance with ASTM A751 or by other analytical methods approved by the purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.12
Manganese	--	2.00
Silicon	--	0.70
Phosphorus	0.11	0.17
Sulfur	--	0.040
Chromium	17.00	20.00
Nickel	8.00	12.00
Selenium	0.15	0.30
Molybdenum	--	0.75
Copper	--	0.75

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 Condition

The product shall be supplied in the following condition:

3.2.1 Bars, Wire, and Forgings

Bars, wire, and forgings shall be solution heat treated free from continuous carbide network.

3.2.1.1 All hexagons, other bars 2.75 inches (69.8 mm) and under in nominal diameter or distance between parallel sides, and wire shall be cold finished.

3.2.1.2 Bars, other than hexagons, over 2.75 inches (69.8 mm) in nominal diameter or distance between parallel sides shall be hot finished or cold finished.

3.2.1.3 Bars shall not be cut from plate (see 4.4.2).

3.2.2 Forging Stock

Forging stock shall be as ordered by the forging manufacturer.

3.3 Properties

Bars, wire, and forgings shall conform to the following requirements; hardness and tensile testing shall be performed in accordance with ASTM A370:

3.3.1 Tensile Properties

Tensile properties shall be as shown in Table 2.

Table 2 - Tensile properties

Property	Value
Tensile Strength	75.0 to 115 ksi (517 to 793 MPa)
Elongation in 4D, minimum	35%

3.3.1.1 Unless otherwise specified, the strain rate shall be set at 0.005 in/in/min (0.005 mm/mm/min) and maintained within a tolerance of ± 0.002 in/in/min (± 0.002 mm/mm/min) through 0.2% offset yield strain.

3.3.1.2 Elongation requirements apply only to bars and wire 0.125 inch (3.18 mm) and over in nominal diameter or distance between parallel sides.

3.3.1.3 Elongation requirements for bars and wire outside the size range of 3.3.1.2 shall be agreed upon between the purchaser and producer.