



AEROSPACE MATERIAL SPECIFICATION

AMS5642™**REV. N**

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Superseding AMS5642M

Steel, Corrosion- and Heat-Resistant, Bars, Wire, Forgings
and Forging Stock
18Cr - 10.5Ni - 0.60Cb (347F, 347FSe)
Free-Machining, Solution Heat Treated
(Composition similar to: Type 1 UNS S34720)
(Composition similar to: Type 2 UNS S34723)

RATIONALE

AMS5642N is the result of a Five-Year Review and update of the specification. The revision updates the Title to match the scope and include the common names, updates composition testing, frequency, and reporting (see 3.1 and 3.1.1), adds bar quality requirements (see 3.4.2 and 8.6), adds forging stock ordering option (see 4.4.3 and 8.7), and updates the exceptions requirements (see 8.5).

1. SCOPE

1.1 Form

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

1.2 Application

These products have been used typically for parts on which the amount of machining warrants the use of a free-machining grade of steel requiring corrosion resistance similar to the 18-8 type of steel and that will be subjected to high temperatures during fabrication or in service, but usage is not limited to such applications.

1.2.1 This steel is not intended for parts to be brazed at temperatures higher than 1350 °F (732 °C) or to be fusion welded.

1.3 Classification

The steels covered by this specification are classified as follows:

Type 1 - 18Cr - 10.5Ni - 0.26S - 0.60Cb

Type 2 - 18Cr - 10.5Ni - 0.14P - 0.25Se - 0.60Cb

1.3.1 Unless a specific type is specified, either type may be supplied.

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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
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

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 A262	Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
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 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	Type 1 Min	Type 1 Max	Type 2 Min	Type 2 Max
Carbon	--	0.08	--	0.08
Manganese	--	2.00	--	2.00
Silicon	--	1.00	--	1.00
Phosphorus	--	0.040	0.11	0.17
Sulfur	0.18	0.35	--	0.030
Chromium	17.00	19.00	17.00	19.00
Nickel	9.00	12.00	9.00	12.00
Columbium (Niobium)	10 x C	1.10	10 x C	1.10
Selenium	--	--	0.15	0.35
Molybdenum	--	0.75	--	0.75
Tantalum	--	0.05	--	0.05
Copper	--	0.75	--	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 and descaled.

3.2.1.1 Bars and Wire

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

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

3.2.1.1.3 Bars shall not be cut from plate (see 4.4.1).

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

Wire shall have tensile strength not higher than 125 ksi (862 MPa).

3.3.2 Hardness

3.3.2.1 Bars

Bar hardness shall be as shown in Table 2, or equivalent (see 8.2), determined approximately at mid-radius or quarter-thickness.

Table 2 - Hardness

Nominal Diameter or Least Distance Between Parallel Sides Inch	Nominal Diameter or Least Distance Between Parallel Sides Millimeters	Hardness, HBW Min	Hardness, HBW Max
Up to 0.75, incl	Up to 19.0, incl	170	255
Over 0.75	Over 19.0	140	241

3.3.2.2 Forgings

Forging hardness shall be not higher than 187 HBW, or equivalent (see 8.2).

3.3.3 Susceptibility to Intergranular Attack

The product, after sensitizing treatment, shall pass the intergranular corrosion acid test performed in accordance with ASTM A262, Practice E.

3.4 Quality

The product, as received by the purchaser, shall be uniform in quality and condition, sound, and, consistent with the type of steel involved, free from foreign materials and from imperfections detrimental to usage of the product.

3.4.1 Grain flow of die forgings, except in areas that contain flash-line end grain, shall follow the general contour of the forgings showing no evidence of reentrant grain flow.

3.4.2 Bars shall be free from seams, laps, tears, and cracks after removal of the standard stock removal allowance in accordance with AS1182.

3.5 Tolerances

Bars and wire shall conform to all applicable requirements of AMS2241.

3.6 Exceptions

Any exception shall be authorized by the purchaser and reported as in 4.4.2.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of the product shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (see 3.1), tensile strength of wire (see 3.3.1), hardness of bar (see 3.3.2.1) and forgings (see 3.3.2.2), susceptibility to intergranular attack (see 3.3.3), and tolerances (see 3.5) are acceptance tests and shall be performed on each heat or lot as applicable.