AEROSPACE MATERIAL SPECIFICATION

AMS5642	REV. K

Issued 1942-09
Revised 2002-01
Reaffirmed 2013-11

Superseding AMS5642J

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

RATIONALE

AMS5642K has been reaffirmed to comply with the SAE five-year review policy.

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 which 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.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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http://www.sae.org/technical/standards/AMS5642K

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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

AMS 2241	Tolerances, Corrosion and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
MAM 2241	Tolerances, Metric, Corrosion and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
AMS 2248	Chemical Check Analysis Limits, Corrosion and Heat-Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
AMS 2371	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS 2374	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steel and Alloy Forgings
AMS 2806	Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat-Resistant Steels and Alloys
AMS 2808	Identification, Forgings

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM A 262	Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
ASTM A 370	Mechanical Testing of Steel Products
ASTM E 353	Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 353, by spectrochemical methods, or by other analytical methods acceptable to 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	10 X C	1.10	10 x C	1.10
Selenium	--	--	0.15	0.35
Molybdenum	--	0.75	--	0.75
Tantalum (see 3.1.1)	--	0.05	--	0.05
Copper	--	0.75	--	0.75

3.1.1 Determination not required for routine acceptance.

3.1.2 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2248.

3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Bars, Wire, and Forgings: 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.

3.2.2 Forging Stock: 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 A 370.

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: Shall be as shown in Table 2, or equivalent (See 8.2), determined approximately at midradius or quarter-thickness.

TABLE 2 - Hardness

Nominal Diameter or Least Distance Between Parallel Sides Inches	Nominal Diameter or Least Distance Between Parallel Sides mm	Hardness, HB min	Hardness, HB max
Up to0.75, incl	Up to19.0, incl	170	255
Over0.75	Over 19.0	140	241

3.3.2.2 Forgings: Shall be not higher than 187 HB, 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 A 262, Practice E.

3.4 Quality:

The product, as received by 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 which contain flash-line end grain, shall follow the general contour of the forgings showing no evidence of reentrant grain flow.

3.5 Tolerances:

Bars and wire shall conform to all applicable requirements of AMS 2241 or MAM2241.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

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