SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

AMS 5641G

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Superseding AMS 5641F

Steel, Corrosion-Resistant, Bars, Wire, and Forgings 18.5Cr - 10Ni - 0.22Se (SAE 30303Se) Free-Machining; Swaging or Upsetting Solution Heat Treated

(Composition similar to UNS S30323)

RATIONALE

AMS 5641G is a Five Year Review and update of this specification.

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 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS 2241	Tolerances, Corrosion and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
AMS 2248	Chemical Check Analysis Limits, Wrought Corrosion and Heat-Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

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 International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

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 following percentages by weight as shown in Table 1, determined by wet chemical methods in accordance with ASTM E 353 or by spectrochemical or other analytical methods approved by 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 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 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.

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

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

3.3.2 Hardness

3.3.2.1 Bars

Shall be as shown in Table 3, or equivalent (See 8.2), determined at approximate mid-radius or quarter thickness.

TABLE 3 - HARDNESS OF BARS

Nominal Diameter or Distance Between Parallel Sides Inches	Nominal Diameter or Distance Between Parallel Sides Millimeters	Brinell Hardness min	Brinell Hardness max
Up to 2.00, incl	Up to 50.8, incl	140	255
Over 2.00	Over 50.8	--	255

3.3.2.2 Forgings

Shall be not higher than 187 HB, or equivalent (See 8.2).

3.3.2.3 Properties of forging stock shall be as agreed upon by purchaser and vendor.

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.

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.

4.2 Classification of Tests

All technical requirements are acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling and Testing

4.3.1 Bars, Wire, and Forging Stock

Shall be in accordance with AMS 2371.

4.3.2 Forgings

Shall be in accordance with AMS 2374.

4.4 Reports

4.4.1 The vendor of bars, wire, and forgings shall furnish with each shipment a report showing the results of tests for composition of each heat and for tensile properties and hardness of each lot. This report shall include the purchase order number, heat and lot numbers, AMS 5641G, size, and quantity. If forgings are supplied, the size and melt source of stock used to make the forgings shall also be included.

4.4.2 The vendor of forging stock shall furnish with each shipment a report showing the results of tests for composition of each heat. This report shall include the purchase order number, heat number, AMS 5641G, size, and quantity.

4.5 Resampling and Retesting

4.5.1 Bars, Wire, and Forging Stock

Shall be in accordance with AMS 2371.

4.5.2 Forgings

Shall be in accordance with AMS 2374.

5. PREPARATION FOR DELIVERY

5.1 Sizes

Except when exact lengths or multiples of exact lengths are ordered, straight bars and wire will be acceptable in mill lengths of 6 to 20 feet (1.8 to 6.1 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 feet (3 m).

5.2 Identification

The product shall be identified as follows:

5.2.1 Bars and Wire

In accordance with AMS 2806.