

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 5641E

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Superseding AMS 5641D

STEEL BARS AND FORGINGS, CORROSION RESISTANT
18.5Cr - 10Ni - 0.22Se (SAE 30303Se)
Free-Machining; Swaging or Upsetting
Solution Heat Treated

UNS S30323

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: Primarily 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. Corrosion resistance is similar to that of the standard 18-8 type.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

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, Wrought Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys

AMS 2350 - Standards and Test Methods

AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock

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2.1.1 (Continued):

- AMS 2374 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Forgings and Forging Stock
AMS 2806 - Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Heat and Corrosion Resistant Steels and Alloys
AMS 2808 - Identification, Forgings

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

- ASTM A370 - Mechanical Testing of Steel Products
ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.2.3.1 Military Standards:

MIL-STD-163 - Steel Mill Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353 or by spectrochemical or other analytical methods approved by purchaser:

	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 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 in. (70 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 in. (70 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 A370. Properties of forging stock shall be as agreed upon by purchaser and vendor.

3.3.1 Tensile Properties: Shall be as follows:

Tensile Strength	75,000 - 115,000 psi (515 - 795 MPa)
Elongation in 4D, min	35%

3.3.1.1 Elongation requirements apply only to bars and wire 0.125 in. (3.10 mm) and over in nominal diameter or distance between parallel sides.

3.3.2 Hardness:

3.3.2.1 Bars: Shall be as follows, or equivalent, determined at approximate mid-radius or quarter thickness:

Nominal Diameter or Distance Between Parallel Sides		Brinell Hardness	
Inches	Millimetres	min	max
Up to 2.00, incl	Up to 50.0, incl	140 - 255	
Over 2.00	Over 50.0	--	255

3.3.2.2 Forgings: Shall be not higher than 187 HB, or equivalent.

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 Forgings shall have substantially uniform macrostructure. Standards for acceptance shall be as agreed upon by purchaser and vendor.

3.4.2 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 re-entrant flow.

3.5 Sizes: Except when exact lengths or multiples of exact lengths are ordered, straight bars and wire will be acceptable in mill lengths of 6 - 20 ft (2 - 6 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 ft (3 m).

3.6 Tolerances: Bars and wire shall conform to all applicable requirements of AMS 2241 or MAM 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 performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling: Shall be in accordance with the following:

4.3.1 Bars and Wire: AMS 2371.

4.3.2 Forgings and Forging Stock: 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 chemical composition of each heat and for tensile properties and for each lot. This report shall include the purchase order number, heat number, AMS 5641E, size, and quantity. If forgings are supplied, the part number and 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 chemical composition of each heat. This report shall include the purchase order number, heat number, AMS 5641E, size, and quantity.

4.4.3 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 5641E, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification and shall include in the report either a statement that the material conforms or copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: Shall be in accordance with the following:

4.5.1 Bars and Wire: AMS 2371.

4.5.2 Forgings and Forging Stock: AMS 2374.