Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10000

AEROSPACE MATERIAL SPECIFICATION

AMS 5635A
Superseding AMS 5635
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STEEL BARS AND FORGINGS, CORROSION RESISTANT
18Cr - 9Ni (303Pb)
Free-Machining

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: 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 but not subjected to temperatures exceeding 700 F (371 C) during fabrication or in service.

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

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., Two Pennsylvania Plaza, New York, New York 10001.

2.1.1 Aerospace Material Specifications:

AMS 2241 - Tolerances, Corrosion and Heat Resistant Steel Bars and Wire and Titanium and Titanium Alloy Bars and Wire
AMS 2248 - Chemical Check Analysis Limits, Wrought Heat and Corrosion Resistant Steels and Alloys
AMS 2350 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Alloys, Wrought Products Except Forgings
AMS 2375 - Approval and Control of Critical Forgings
AMS 2808 - Identification, Forgings

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 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 Government Publications: Available from Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods.

	min	max
Carbon	--	0.15
Manganese	--	2.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	0.12	0.30
Chromium	17.00	19.00
Nickel	8.00	10.00
Lead	0.12	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. All hexagons, other bars 2.75 in. (69.85 mm) and under in diameter or distance between parallel sides, and wire shall be cold finished.

3.2.1.1 Forgings shall not be supplied except when specified on the drawing or purchase order.

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:

3.3.1 Tensile Properties: Shall be as follows:

3.3.1.1 Hot Finished Bars:

Tensile Strength, min	75,000 psi (517 MN/m^2)
Yield Strength at 0.2% Offset, min	30,000 psi (207 MN/m^2)
Elongation in 2 in. (50.8 mm) or 4D, min	40%
Reduction of area (round specimens), min	50%

3.3.1.2 Cold Finished Bars and Wire:

TABLE I

Nominal Diameter or Distance Between Parallel Sides Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 in. or 4D % min	Reduction of Area % min
Up to 0.500, incl	90,000	45,000	35	45
Over 0.500	75,000	30,000	40	50

TABLE I (SI)

Nominal Diameter or Distance Between Parallel Sides Millimeters	Tensile Strength MN/m^2, min	Yield Strength at 0.2% Offset MN/m^2, min	Elongation in 50.8 mm or 4D % min	Reduction of Area % min
Up to 12.70 incl	621	310	35	45
Over 12.70	517	207	40	50

3.3.2 Hardness:

3.3.2.1 Bars: Shall be as follows, or equivalent, determined approximately midway between outer surface and center.

Nominal Diameter or Distance Between Parallel Sides		
Inches	(Millimeters)	Brinell Hardness
Up to 0.75, incl	(Up to 19.05 incl)	170 - 255
Over 0.75	(Over 19.05)	140 - 241

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

3.4 Quality: The product shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external imperfections, consistant with the type of steel involved, detrimental to fabrication or to performance of parts.

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

3.6 Tolerances: Unless otherwise specified, tolerances for bars and wire shall conform to all applicable requirements of AMS 2241.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to assure that material 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 routine control tests.

4.3 Sampling: Bars and wire shall be sampled in accordance with AMS 2371. Forgings and forging stock shall be sampled as agreed upon by purchaser and vendor.

4.4 Approval: When specified, approval and control of critical forgings shall be in accordance with AMS 2375.

4.5 Reports:

4.5.1 The vendor of the product shall furnish with each shipment three copies of a report of the results of tests for chemical composition of each heat in the shipment and the results of tests on each size from each heat to determine conformance to the hardness and tensile property requirements. This report shall include the purchase order number, heat number, material specification number and its revision letter, size, and quantity from each heat. If forgings are supplied, the part number and size of stock used to make the forgings shall also be included.

4.5.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, 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 a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.