Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 5739A
Superseding AMS 5739

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STEEL BARS, FORGINGS, AND RINGS, CORROSION AND MODERATE HEAT RESISTANT
14.5Cr - 6.5Ni - 0.72Ti
Solution Treated and Maraged, 180,000 psi (1241 MPa) Tensile Strength

1. SCOPE:

1.1 Form: This specification covers a corrosion and moderate heat resistant steel in the form of bars, wire, forgings, flash welded rings, and stock for forging or flash welded rings.

1.2 Application: Primarily for parts requiring corrosion resistance and high strength at temperatures up to 600°F (316°C).

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., 400 Commonwealth Drive, Warrendale, Pennsylvania 15096.

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 and Forging Stock
AMS 2375 - Approval and Control of Critical Forgings
AMS 2808 - Identification, Forgings
AMS 7490 - Rings, Flash Welded, Corrosion and Heat Resistant Austenitic Steels and Austenitic-Type Alloys

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 Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

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	--	0.05
Manganese	--	0.50
Silicon	--	0.30
Phosphorus	--	0.03
Sulfur	--	0.03
Chromium	14.00 -	15.00
Nickel	6.00 -	7.00
Titanium	0.55 -	0.90

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:

3.2.1.1 Rounds: Hot finished, solution heat treated, maraged, and centerless ground.

3.2.1.2 Squares, Flats, and Hexagons: Solution heat treated, maraged, and cold drawn.

3.2.2 Wire: Cold-drawn, solution heat treated, and maraged.

3.2.3 Forgings and Flash Welded Rings: Solution heat treated and maraged.

3.2.3.1 Flash welded rings shall not be supplied unless specified or permitted on purchaser's part drawing. When supplied, they shall be manufactured in accordance with AMS 7490.

3.2.4 Stock for Forging or Flash Welded Rings: As ordered by the forging or flash welded ring manufacturer.

3.3 Heat Treatment: Bars, wire, forgings, and flash welded rings shall be solution heat treated by heating to 1500°F ± 25 (815.6°C ± 14), holding at heat for not less than 1 hr, and cooling as required and maraged by heating to 900°F ± 25 (482.2°C ± 14), holding at heat for not less than 2 hr, and cooling in air.

3.4 Properties: The product shall conform to the following requirements; hardness and tensile testing shall be performed in accordance with ASTM A370:

3.4.1 Bars, Wire, Forgings, and Flash Welded Rings:

3.4.1.1 Tensile Properties (Parallel to Grain Flow): Shall be as follows except as specified in 3.4.1.1.1:

Tensile Strength, min	180,000 psi (1241 MPa)
Yield Strength at 0.2% Offset, min	175,000 psi (1207 MPa)
Elongation in 2 in. (50.8 mm) or 4D, min	10%
Reduction of Area (round specimens), min	40%

3.4.1.1.1 Properties of bars 3 in. (76 mm) and over in nominal diameter or distance between parallel sides shall be as agreed upon by purchaser and vendor.

3.4.1.2 Hardness: Should be 353 - 432 HB or equivalent but the product shall not be rejected on the basis of hardness if the tensile property requirements are met.

3.4.2 Stock for Forging or Flash Welded Rings: When a sample of stock is forged to a test coupon and heat treated as in 3.3, specimens taken from the heat treated coupon shall conform to the requirements of 3.4.1.1 and 3.4.1.2. If specimens taken from the stock after heat treatment as in 3.3 conform to the requirements of 3.4.1.1 and 3.4.1.2, the tests shall be accepted as equivalent to tests of a forged coupon.

3.5 Quality: The product shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.

3.6 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 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 ft (3 m).

3.7 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 of the product 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 the product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests of the product to determine conformance to all technical requirements of this specification are classified as acceptance or routine control tests.

4.3 Sampling: Shall be in accordance with the following:

4.3.1 Bars, Wire, Flash Welded Rings, and Stock for Flash Welded Rings: AMS 2371.

4.3.1.1 Specimens from flash welded rings shall be cut from parent metal not including the weld-heat-affected zone.

4.3.2 Forgings and Forging Stock: 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 other technical requirements of this specification. 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 the size and melt source of stock used to make the forgings shall also be included.