Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

AEROSPACE MATERIAL SPECIFICATION

AMS 5745A
Superseding AMS 5745
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STEEL BARS AND FORGINGS, CORROSION AND MODERATE HEAT RESISTANT
16.5Cr - 4.5Ni - 2.9Mo - 0.10N
Equalized and Tempered

1. SCOPE:

1.1 Form: This specification covers a hardenable corrosion and moderate heat resistant steel in the form of bars, forgings, and forging stock.

1.2 Application: Primarily for parts requiring oxidation resistance and high strength up to 800° F (427° C) where such parts may require welding during fabrication.

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 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:

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	min	max
Carbon	0.07	0.11
Manganese	0.50	1.25
Silicon	--	0.50
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	16.00	17.00
Nickel	4.00	5.00
Molybdenum	2.50	3.25
Nitrogen	0.07	0.13

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: Equalized and tempered, and ground, turned, or polished.

3.2.1.2 Shapes: Cold drawn, equalized, and tempered, and descaled.

3.2.1.3 Flats: Hot finished, equalized and tempered, and descaled.

3.2.2 Forgings: Equalized and tempered, and descaled.

3.2.3 Forging Stock: As ordered by the forging manufacturer.

3.3 Heat Treatment: Bars and forgings shall be equalized by heating to 1400° F ± 50 (760° C ± 28), holding at heat for not less than 3 hr, and cooling in air, reheating to 1100° F ± 25 (593.3° C ± 14), holding at heat for not less than 3 hr, and cooling in air.

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

3.4.1 As Received:

3.4.1.1 Hardness: Not higher than 363 HB or equivalent except that bars 0.625 in. (15.88 mm) and under in diameter may have hardness as high as 375 HB or equivalent.

3.4.2 After Solution Heat Treatment, Sub-Zero Cooling, Austenite Conditioning, Sub-Zero Cooling, and Tempering: Bars and forgings shall conform to the following requirements after being heat treated as follows: Solution heat treat by heating to 1900° F ± 25 (1037.8° C ± 14), holding at heat for 1 - 3 hr, and quenching in water or otherwise cooling as rapidly as possible to room temperature; cool to -100° F (-73° C) or colder, hold at this temperature for not less than 3 hr, and warm in air to room temperature; austenite condition by heating to 1750° F ± 25 (954.4° C ± 14), holding at heat for 10 - 60 min., and quenching in water or otherwise cooling as rapidly as possible to room temperature; cool to -100° F (-73° C) or colder, hold at this temperature for not less than 3 hr, and warm in air to room temperature; and temper by heating to 1000° F ± 25 (537.8° C ± 14), holding at heat for not less than 3 hr, and cooling in air.

3.4.2.1 Tensile Properties:

Tensile Strength, min	165,000 psi	(1138 MPa)
Yield Strength at 0.2% Offset, min	140,000 psi	(965 MPa)
Elongation in 2 in. (50.8 mm) or 4D, min	10%	
Reduction of Area, min	20%	

3.4.2.2 Hardness: 38 - 48 HRC or equivalent.

3.5 Quality:

3.5.1 Steel shall be multiple melted using consumable electrode process in the remelt cycle, unless otherwise permitted.

3.5.2 The product shall be uniform in quality and condition, essentially free of grain boundary carbides, 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 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 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 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; a heat shall be the consumable electrode ingots produced from steel originally melted as a single furnace charge.

4.3.1 Bars: AMS 2371.

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.

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.

4.6 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the product may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the product represented and no additional testing shall be permitted. Results of all tests shall be reported.