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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5744D

Issued FEB 1965
Revised APR 1993
Reaffirmed SEP 2000

Superseding AMS 5744C

Steel, Corrosion and Heat Resistant, Bars and Forgings
15.5Cr - 4.5Ni - 2.9Mo - 0.10N
Heat Treated, 170 ksi (1172 MPa) Tensile Strength

UNS S35500

1. SCOPE:

1.1 Form:

This specification covers a corrosion and heat resistant steel in the form of bars, forgings, and forging stock.

1.2 Application:

These products have been used typically for parts requiring oxidation resistance and high strength up to 800 °F (427 °C) and where such parts can be machined from fully heat-treated product, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

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 2371	Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steels and Alloys, Wrought Products and Forging Stock

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7161 FAX: (724) 776-0243
TO PLACE A DOCUMENT ORDER: (724) 776-4970 FAX: (724) 776-0790
SAE WEB ADDRESS: http://www.sae.org

2.1 (Continued):

AMS 2374	Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steel and Alloy Forgings
AMS 2750	Pyrometry
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, 1916 Race Street, Philadelphia, PA 19103-1187.

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

2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	min	max
Carbon	0.10	0.15
Manganese	0.50	1.25
Silicon	--	0.50
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	15.00	16.00
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 Melting Practice:

Steel shall be multiple melted using consumable electrode practice in the remelt cycle.

3.3 Condition:

The product shall be supplied in the following condition:

3.3.1 Bars and Forgings: Solution heat treated, sub-zero cooled, austenite conditioned, sub-zero cooled, tempered, and descaled.

3.3.2 Forging Stock: As ordered by the forging manufacturer.

3.4 Heat Treatment:

Bars and forgings shall be solution heat treated by heating to 1900 °F ± 25 (1038 °C ± 14), holding at heat for 1 to 3 hours, and cooling as rapidly as possible to room temperature; cooling to -100 °F (-73 °C) or colder, holding at that temperature for not less than three hours, and warming in air to room temperature; austenite conditioned by heating to 1750 °F ± 25 (954 °C ± 14), holding at heat for 10 to 60 minutes, and cooling as rapidly as possible to room temperature; cooling to -100 °F (-73 °C) or colder, holding at that temperature for not less than three hours, and warming in air to room temperature; and tempered by heating to 1000 °F ± 25 (538 °C ± 14), holding at heat for not less than three hours, and cooling in air. Pyrometry shall be in accordance with AMS 2750.

3.5 Properties:

The product shall conform to the following requirements; hardness and tensile testing shall be performed in accordance with ASTM A 370:

3.5.1 Bars and Forgings:

3.5.1.1 Tensile Properties: Shall be as shown in Table 2.

TABLE 2 - Minimum Tensile Properties

Property	Value
Tensile Strength	170 ksi (1172 MPa)
Yield Strength at 0.2% Offset	155 ksi (1069 MPa)
Elongation in 4D	12%
Reduction of Area	25%

3.5.1.2 Hardness: Shall be 37 to 44 HRC, or equivalent (See 8.2).

3.5.2 Forging Stock: When a sample of stock is forged to a test coupon and heat treated as in 3.4, specimens taken from the heat treated coupon shall conform to the requirements of 3.5.1.1 and 3.5.1.2. If specimens taken from the stock after heat treatment as in 3.4 conform to the requirements of 3.5.1.1 and 3.5.1.2, the tests shall be accepted as equivalent to tests of a forged coupon.

3.6 Quality:

The product, as received by purchaser, shall be uniform in quality and condition, essentially free of grain boundary carbides, sound, and free from foreign materials and from imperfections detrimental to usage of the product.

3.6.1 Grain flow of die forgings, except in areas having flash-line end grain, shall follow the general contour of the forgings showing no evidence of re-entrant grain flow.

3.7 Tolerances:

Bars 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. 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:

4.2.1 Acceptance Tests: Tests for the following requirements are acceptance tests and shall be performed on each heat or lot as applicable:

4.2.1.1 Composition (3.1) of each heat.

4.2.1.2 Tensile properties (3.5.1.1) and hardness (3.5.1.2) of each lot of bars and forgings.

4.2.1.3 Tolerances (3.7) of bars.

4.2.2 Periodic Tests: Tests of forging stock (3.5.2) to demonstrate ability to develop required properties and tests for grain flow of die forgings (3.6.1) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:

Shall be in accordance with the following: