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400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5743H

Issued SEP 1957
Revised JAN 1999

Superseding AMS 5743G

Submitted for recognition as an American National Standard

Steel, Corrosion and Heat Resistant, Bars and Forgings
15.5Cr - 4.5Ni - 2.9Mo - 0.10N
Solution Heat Treated, Sub-Zero Cooled, Equalized, and Over-Tempered

UNS S35500

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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 may require welding during fabrication, 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, 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

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2.1 (Continued):

AMS 2374 Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steel and Alloy Forgings
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, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

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

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.

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3.3 Condition:

The product shall be supplied in the following condition:

3.3.1 Bars: Solution heat treated, sub-zero cooled, equalized, over-tempered, and descaled.

3.3.1.1 Rounds: Ground, turned, or polished after heat treatment.

3.3.1.2 Shapes: Cold finished prior to heat treatment.

3.3.1.3 Flats: Hot finished prior to heat treatment.

3.3.2 Forgings: Solution heat treated, sub-zero cooled, equalized, and over-tempered.

3.3.3 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; cooled to -100 °F (-73 °C) or colder, held at that temperature for not less than three hours, and warmed in air to room temperature; equalized by heating to 1425 °F ± 50 (774 °C ± 28), holding at heat for not less than three hours, and cooling in air to not higher than 80 °F (27 °C); and over-tempered by heating to 1075 °F ± 25 (579 °C ± 14), holding at heat for not less than three hours, and cooling in air.

3.5 Property:

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

3.5.1 Bars and Forgings:

3.5.1.1 As Solution Heat Treated, Sub-Zero Cooled, Equalized, and Over-Tempered:

3.5.1.1.1 Hardness: Shall be not higher than 363 HB, or equivalent, except that bars 0.625 inch (15.88 mm) and under in nominal diameter may have hardness as high as 375 HB, or equivalent (See 8.2).

3.5.1.2 Response to Heat Treatment: The product shall have the properties shown in Table 2, after being austenite conditioned by heating to 1750 °F ± 25 (954 °C ± 14), holding at heat for 10 to 60 minutes, and quenching in water; cooling to not higher than -100 °F (-73 °C), 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.

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3.5.1.2.1 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%

3.5.1.2.2 Hardness: Shall be 37 to 44 HRC, or equivalent (See 8.2). Product shall not be rejected on the basis of hardness if the tensile properties of 3.5.1.2.1 are acceptable determined on specimens taken from the same sample as that with nonconforming hardness or from another sample with similar nonconforming hardness.

3.5.2 Forging Stock: When a sample of stock is forged to a test coupon and heat treated as in 3.4 and 3.5.1.2, specimens taken from the heat treated coupon shall conform to the requirements of 3.5.1.2.1 and 3.5.1.2.2. If specimens taken from the stock after heat treatment as in 3.4 and 3.5.1.2 conform to the requirements of 3.5.1.2.1 and 3.5.1.2.2, 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 which contain 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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

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4.2 Classification of Tests:

4.2.1 Acceptance Tests: 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 Hardness (3.5.1.1.1) of each lot of bars and forgings as solution heat treated, sub-zero cooled, equalized, and over-tempered.

4.2.1.3 Tensile properties (3.5.1.2.1) and hardness (3.5.1.2.2) of each lot of bars and forgings after austenite conditioning, sub-zero cooling, and tempering.

4.2.1.4 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 grain flow of die forgings 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:

4.3.1 Bars, and Forging Stock: AMS 2371.

4.3.2 Forgings: AMS 2374.

4.4 Reports:

The vendor of the product shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and for hardness of each lot as received (3.5.1.1.1) and tensile properties (3.5.1.2.1) and hardness (3.5.1.2.2) of each lot after austenite conditioning, sub-zero cooling, and tempering, and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, heat and lot numbers, AMS 5743H, 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.

4.5 Resampling and Retesting:

Shall be in accordance with the following:

4.5.1 Bars and Forging Stock: AMS 2371.

4.5.2 Forgings: AMS 2374.

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