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INTERNATIONAL
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5848A

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Superseding AMS 5848

Submitted for recognition as an American National Standard

STEEL BARS, WIRE, FORGINGS, EXTRUSIONS, TUBING, AND RINGS
Wear, Galling, and Corrosion Resistant
8.0Mn - 4.0Si - 17Cr - 8.5Ni - 0.13N
Solution Heat Treated

UNS S21800

1. SCOPE:

1.1 Form:

This specification covers a corrosion-resistant steel in the form of bars, wire, forgings, extrusions, mechanical tubing, flash welded rings, and stock for forging, extruding, or flash welded rings.

1.2 Application:

These products have been used typically for parts requiring wear, galling, and corrosion resistance up to 950 °F (510 °C), but usage is not limited to such applications. Welding, brazing, or other exposure to temperatures over 950 °F (510 °C) during fabrication may impair corrosion resistance.

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 2243 Tolerances, Corrosion and Heat Resistant Steel Tubing
MAM 2243 Tolerances, Metric, Corrosion and Heat Resistant Steel Tubing
AMS 2248 Chemical Check Analysis Limits, Wrought Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys

2.1 SAE Publications (Continued):

AMS 2371 Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steels and Alloys, Wrought Products and Forging Stock
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
AMS 7490 Rings, Flash Welded, Corrosion and Heat Resistant Austenitic Steels and Austenitic-Type Alloys or Precipitation Hardenable Alloys

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM A 262 Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
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
Manganese	7.00	9.00
Silicon	3.50	4.50
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	16.00	18.00
Nickel	8.00	9.00
Nitrogen	0.08	0.18
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, Forgings, Extrusions, Mechanical Tubing, and Flash Welded Rings: Solution heat treated free from continuous carbide network.

3.2.1.1 Bars and Wire:

3.2.1.1.1 All hexagons, other bars 2.75 inches (69.8 mm) and under in nominal diameter or distance between parallel sides, and wire shall be cold finished.

3.2.1.1.2 Bars, other than hexagons, over 2.75 inches (69.8 mm) in nominal diameter or distance between parallel sides shall be hot finished.

3.2.1.2 Mechanical Tubing: Shall be cold finished.

3.2.1.3 Flash Welded Rings: Shall not be supplied unless specified or permitted on purchaser's part drawing. When supplied, rings shall be manufactured in accordance with AMS 7490.

3.2.2 Stock for Forging, Extruding, or Flash Welded Rings: As ordered by the forging, extrusion, or flash welded ring manufacturer.

3.3 Heat Treatment:

Bars, wire, forgings, extrusions, mechanical tubing, and flash welded rings shall be solution heat treated by heating to 1950 °F ± 25 (1066 °C ± 14), holding at heat for a time commensurate with section thickness, and cooling at a rate equivalent to an air cool.

3.4 Properties:

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

3.4.1 Bars, Wire, Forgings, Extrusions, Mechanical Tubing, and Flash Welded Rings:

3.4.1.1 Tensile Properties: Shall be as shown in Table 2 and Table 3.

3.4.1.1.1 Product 0.50 Inch (12.7 mm) and Under in Nominal Section Thickness:

TABLE 2 - Minimum Tensile Properties

Property	Value
Tensile Strength	105 ksi (724 MPa)
Yield Strength at 0.2% Offset	55.0 ksi (379 MPa)
Elongation in 4D	35%
Reduction of Area	55%

3.4.1.1.2 Product Over 0.50 Inch (12.7 mm) in Nominal Section Thickness:

TABLE 3 - Minimum Tensile Properties

Property	Value
Tensile Strength	95.0 ksi (655 MPa)
Yield Strength at 0.2% Offset	50.0 ksi (345 MPa)
Elongation in 4D	35%
Reduction of Area	55%

3.4.1.2 Hardness: Shall be as follows, or equivalent, but the product shall not be rejected on the basis of hardness if the applicable tensile property requirements are met (See 8.2).

3.4.1.2.1 Bars: 170 to 255 HB, determined at approximate mid-radius or quarter-thickness.

3.4.1.2.2 Forgings, Extrusions, and Flash Welded Rings: Not higher than 187 HB.

3.4.1.2.3 Mechanical Tubing: Not higher than 100 HRB, determined approximately midway between outer and inner surfaces.

3.4.1.3 (R) Susceptibility to Integranular Attack: The product shall pass the intergranular corrosion test using the test method of ASTM A 262, Practice E.

3.4.2 Forging Stock: 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 3.4.1.1.2 and 3.4.1.2. If specimens taken from the stock after heat treatment as in 3.3 conform to the requirements of 3.4.1.1.2 and 3.4.1.2, the tests shall be acceptable as equivalent to tests of a forged coupon.

3.4.3 Stock for Extruding or Flash Welded Rings: Specimens taken from the stock after heat treatment as in 3.3 shall conform to the requirements of 3.4.1.1.2 and 3.4.1.2.

3.5 Quality:

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

3.5.1 (R) 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.

3.6 Tolerances:

Shall conform to all applicable requirements of the following:

3.6.1 Bars and Wire: AMS 2241 or MAM 2241.

3.6.2 Mechanical Tubing: AMS 2243 or MAM 2243.

4. QUALITY ASSURANCE PROVISIONS:

4.1 (R) 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 (3.4.1.1.1 or 3.4.1.1.2) of each lot of bars, wire, forgings, extrusions, mechanical tubing, and flash welded rings.

4.2.1.3 Hardness (3.4.1.2) of each lot of bars, forgings, extrusions, mechanical tubing, and flash welded rings.

4.2.1.4 Tolerances (3.6) of bars, wire, and mechanical tubing.

4.2.2 Periodic Tests: Tests for susceptibility to intergranular attack (3.4.1.3) and tests of forging stock (3.4.2) and stock for extruding or flash welded rings (3.4.3) to demonstrate ability to develop required properties 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:
(R)

Shall be in accordance with the following:

4.3.1 Bars, Wire, Extrusions, Mechanical Tubing, Flash Welded Rings, and Stock for Forging, Extruding, or Flash Welded Rings: AMS 2371.

4.3.2 Forgings: AMS 2374.

4.4 Reports:

4.4.1 The vendor of bars, wire, forgings, extrusions, mechanical tubing, and
(R) flash welded rings shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and for tensile properties or hardness of each lot and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, heat and lot number, AMS 5848A, 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.

4.4.2 The vendor of stock for forging, extruding, or flash welded rings shall furnish with each shipment a report showing the results of tests for chemical composition of each heat. This report shall include the purchase order number, heat number, AMS 5848A, size, and quantity.

4.5 Resampling and Retesting:

Shall be in accordance with the following:

4.5.1 Bars, Wire, Extrusions, Mechanical Tubing, Flash Welded Rings, and Stock for Forging, Extruding, or Flash Welded Rings: AMS 2371.

4.5.2 Forgings: AMS 2374.

5. PREPARATION FOR DELIVERY:

5.1 Sizes:

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