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400 Commonwealth Dr., Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 5848

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STEEL BARS, 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: Primarily for parts requiring wear, galling, and corrosion resistance up to 950°F (510°C). 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 Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

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
AMS 2350 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock

AMS 2374 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Forgings and Forging Stock
AMS 2375 - Control of Forgings Requiring First Article Approval
AMS 2806 - Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Heat and Corrosion Resistant Steels and Alloys
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, PA 19103.

ASTM A262 - Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
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 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353 or by spectrographic or other analytical methods approved by purchaser:

	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 in. (70 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 in. (70 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, they 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 rings shall be solution heat treated by heating to 1950°F + 25 (1065°C + 15), 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 A370:

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

3.4.1.1 Tensile Properties: Shall be as follows:

3.4.1.1.1 Product 0.50 In. (12.5 mm) and Under in Nominal Section Thickness:

Tensile Strength, min	105,000 psi (725 MPa)
Yield Strength at 0.2% Offset, min	55,000 psi (380 MPa)
Elongation in 4D, min	35%
Reduction of Area, min	55%

3.4.1.1.2 Product Over 0.50 In. (12.5 mm) in Nominal Section Thickness:

Tensile Strength, min	95,000 psi (655 MPA)
Yield Strength at 0.2% Offset, min	50,000 psi (345 MPa)
Elongation in 4D, min	35%
Reduction of Area, min	55%

3.4.1.2 Hardness: Should 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.

3.4.1.2.1 Bars: 170 - 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 Embrittlement: The product shall pass the embrittlement test in accordance with ASTM A262, 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.

3.6 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 - 20 ft (2 - 6 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 ft (3 m).

3.7 Tolerances: Shall conform to all applicable requirements of the following:

3.7.1 Bars and Wire: AMS 2241 or MAM 2241.

3.7.2 Mechanical Tubing: AMS 2243 or MAM 2243.

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. Results of such tests shall be reported to the purchaser as required by 4.5. 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 to determine conformance to the following requirements are classified as 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) and (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 (3.7) of bars, wire, and mechanical tubing.

4.2.2 Periodic Tests: Tests to detrmine conformance to requirements for embrittlement (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 classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests: Tests of forgings to determine conformance to all applicable technical requirements of this specification when AMS 2375 is specified are classified as preproduction tests and shall be performed prior to or on the first-article shipment of a forging to a purchaser, when a change in material, processing, or both requires reapproval as in 4.4, and when purchaser deems confirmatory testing to be required.

4.2.3.1 For direct U.S. Military procurement of forgings, substantiating test data and, when requested, preproduction forgings shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be in accordance with the following:

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

4.3.2 Forgings and Forging Stock: AMS 2374.

4.4 Approval: When specified, approval and control of forgings shall be in accordance with AMS 2375.

4.5 Reports:

4.5.1 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 tensile properties or hardness of each lot and stating that the product conforms to the other technical requirements of this specification. This report shall include the purchase order number, heat number, AMS 5848, 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.

4.5.2 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, AMS 5848, size, and quantity.