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400 Commonwealth Dr., Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS 5764B

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Superseding AMS 5764A

STEEL BARS, FORGINGS, EXTRUSIONS, AND RINGS, CORROSION RESISTANT
5Mn - 22Cr - 12.5Ni - 2.2Mo - 0.20Cb - 0.30N - 0.20V
Solution Heat Treated

UNS S20910

1. SCOPE:

- 1.1 Form: This specification covers a corrosion resistant steel in the form of bars, wire, forgings, extrusions, flash welded rings, and stock for forging, extruding, or flash welded rings.
- 1.2 Application: Primarily for parts requiring excellent corrosion resistance and high strength from -423° to +1100°F (-255° to +595°C). Can also be used for welded parts without subsequent heat treatment.

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 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

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2.1.1 (Continued)

- 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 Steel 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	--	0.06
Manganese	4.00 -	6.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	20.50 -	23.50
Nickel	11.50 -	13.50
Molybdenum	1.50 -	3.00
Columbium	0.10 -	0.30
Nitrogen	0.20 -	0.40
Vanadium	0.10 -	0.30
Titanium (3.1.1)	--	0.02
Aluminum (3.1.1)	--	0.02
Zirconium (3.1.1)	--	0.02

3.1.1 Determination not required for routine acceptance.

3.1.2 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: Centerless ground or turned after solution heat treatment.

3.2.1.2 Hexagons: Cold drawn after solution heat treating and descaling.

3.2.1.3 Squares and Flats: Hot finished and solution heat treated.

3.2.2 Wire: Cold drawn or centerless ground after solution heat treatment.

3.2.3 Forgings and Flash Welded Rings: Solution heat treated and descaled.

3.2.3.1 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.

3.2.4 Extrusions: Solution heat treated, straightened, and descaled.

3.2.5 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, and flash welded rings shall be solution heat treated by heating to $1950^{\circ}\text{F} \pm 25$ ($1065^{\circ}\text{C} \pm 15$), holding at heat for a time commensurate with section thickness, and cooling at a rate equivalent to air cool or faster.

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

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

3.4.1.1 Tensile Properties: Shall be as follows:

Tensile Strength, min	100,000 psi (690 MPa)
Yield Strength at 0.2% Offset, min	55,000 psi (380 MPa)
Elongation in 4D, min	35%
Reduction of Area, min	55%

3.4.1.2 Hardness: Should be not lower than 20 HRC, or equivalent, but the product shall not be rejected on the basis of hardness if the tensile properties are met.

3.4.1.3 Embrittlement: The product, after sensitizing treatment, shall pass the copper/copper sulfate/sulfuric acid test performed 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, specimen taken from the heat treated coupon shall conform to the requirements of 3.4.1.1 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 and 3.4.1.2, the tests shall be accepted as equivalent to tests of the 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 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 Forgings shall have substantially uniform macrostructure. Standards for acceptance shall be as agreed upon by purchaser and vendor.
- 3.5.2 Grain flow, except in areas of die forgings which contain flash line end grain, shall follow the general contour of the forgings, showing no evidence of re-entrant flow.
- 3.6 Sizes: Except when exact lengths or multiples of exact lengths are ordered, straight bars and wire 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: Bars and wire 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. 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) and hardness (3.4.1.2) of each lot of bars, wire, forgings, extrusions, and flash welded rings.
- 4.2.1.3 Tolerances (3.7) of bars and wire.

- 4.2.2 Periodic Tests: Tests of bars, wire, forgings, extrusions, and flash welded rings to determine conformance to embrittlement (3.4.1.3) and tests of forging stock (3.4.2) and of 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, 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 and hardness of each lot. This report shall include the purchase order number, heat number, AMS 5764B, 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 a report showing the purchase order number, AMS 5764B, 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 either a statement that the material conforms or copies of laboratory reports showing the results of tests to determine conformance.
- 4.6 Resampling and Retesting: Shall be in accordance with the following:
- 4.6.1 Bars, Wire, Extrusions, Flash Welded Rings, and Stock for Extruding or Flash Welded Rings: AMS 2371.