Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 5763A
Superseding AMS 5763
Issued 11-15-72
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UNS S45000

STEEL BARS, FORGINGS, TUBING, AND RINGS, CORROSION RESISTANT
15Cr - 6.5Ni - 0.75Mo - 0.30 (Cb & Ta) 1.5Cu
Solution Heat Treated

1. SCOPE:

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

1.2 Application: Primarily for parts requiring corrosion resistance approximating that of steels of the 18-8 types and high strength exceeding that of the 12 Cr martensitic types up to 700°F (370°C). This steel can be used in the solution heat treated condition and is capable of being precipitation heat treated to tensile strengths as high as 180,000 psi (1241 MPa). Although this steel is relatively immune to stress-corrosion cracking, reference should be made to ARP 1110 for recommended practices to minimize such conditions.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) and Aerospace Recommended Practices (ARP) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 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
AMS 2243 - Tolerances, Corrosion and Heat Resistant Steel Tubing
AMS 2248 - Chemical Check Analysis Limits, Wrought Heat and Corrosion Resistant Steels and Alloys
AMS 2303 - Aircraft Quality Steel Cleanliness, Martensitic Corrosion Resistant Steels, Magnetic Particle Inspection Procedure
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

2.1.2 Aerospace Recommended Practices:

ARP 1110 - Minimizing Stress Corrosion Cracking in Heat Treatable Wrought Low Alloy and Martensitic Corrosion Resistant Steels

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2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

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 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 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, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser:

	min	max
Carbon	--	0.05
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.030
Sulfur	--	0.030
Chromium	14.00	16.00
Nickel	6.00	7.00
Molybdenum	0.50	1.00
Columblum + Tantalum	8 x C	--
Copper	1.25	1.75

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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, Mechanical Tubing, Forgings, and Flash Welded Rings: Solution heat treated.

3.2.1.1 Bars:

3.2.1.1.1 Rounds: Centerless ground after solution heat treatment.

3.2.1.1.2 Squares, Hexagons, and Flats: Hot finished, solution heat treated, and descaled or cold drawn after solution heat treatment and descaling, as ordered.

3.2.1.2 Wire: Cold drawn after solution heat treatment.

3.2.1.3 Mechanical Tubing: Cold finished and solution heat treated.

3.2.1 4 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 or Flash Welded Rings: As ordered by the forging or flash welded ring manufacturer.

3.3 Heat Treatment: Bars, wire, forgings, mechanical tubing, and flash welded rings shall be solution heat treated by heating to 1900°F ± 25 (1040°C ± 15), holding at heat for not less than 1 hr, and cooling rapidly.

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

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

3.4.1.1 As Solution Treated:

3.4.1.1.1 Ø Tensile Properties: Shall be as follows on product 8.0 in. (200 mm) and under in least nominal cross-sectional dimension; tensile property requirements for product over 8.0 in. (200 mm) in nominal least cross-sectional dimension shall be as agreed upon by purchaser and vendor:

3.4.1.1.1.1 Bars, Forgings, Tubing, and Flash Welded Rings:

Tensile Strength, min	125,000 psi (862 MPa)
Yeld Strength at 0.2% Offset, min	95,000 psi (655 MPa)
Elongation in 4D, min	10%
Reduction of Area, min	40%

3.4.1.1.1.2 Wire: Not higher than 165,000 psi (1133 MPa) or equivalent hardness.

3.4.1.1.2 Hardness: Shall be as follows:

3.4.1.1.2.1 Bars: Not higher than 311 HB or equivalent, determined midway between surface and center.

3.4.1.1.2.2 Tubing, Flash Welded Rings, and Forgings: Not higher than 311 HB or equivalent.

3.4.1.2 After Precipitation Heat Treatment: The product shall have the following properties after being precipitation heat treated by heating to 900°F ± 15 (482°C ± 5), holding at heat for not less than 4 hr, and cooling in air:

3.4.1.2.1 Ø Tensile Properties: Shall be as follows on product 8.0 in. (200 mm) and under in least nominal cross-sectional dimension; tensile property requirements for product over 8.0 in. (200 mm) in least nominal cross-sectional dimension shall be as agreed upon by purchaser and vendor:

Tensile Strength, min	180,000 psi (1241 MPa)
Yield Strength at 0.2% Offset, min	170,000 psi (1172 MPa)
Elongation in 4D, min	10%
Reduction of Area, min	40%

3.4.1.2.2 Hardness: Should be not lower than 363 HB or equivalent but the product shall not be rejected on the basis of hardness if the tensile property requirements of 3.4.1.2.1 are met.

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3.4.2 Forging Stock: When a sample of stock is forged to a test coupon and heat treated as in 3.3 and 3.4.1.2, specimens taken from the heat treated coupon shall conform to the requirements of 3.4.1.2.1 and 3.4.1.2.2. If specimens taken from the stock after heat treatment as in 3.3 and 3.4.1.2, conform to the requirements of 3.4.1.2.1 and 3.4.1.2.2, the tests shall be accepted as equivalent to tests of a forged coupon.

3.4.3 Stock for Flash Welded Rings: Specimens taken from the stock after heat treatment as in 3.3 and 3.4.1.2 shall conform to the requirements of 3.4.1.2.1 and 3.4.1.2.2.

3.5 Quality:

3.5.1 When specified, steel shall conform to AMS 2303.

3.5.2 The product, as received by purchaser, shall be uniform in quality and condition, sound, and Ø free from foreign materials and from internal and external 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 (1.8 - 6.1 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 ft (3 m).

3.7 Tolerances: Unless otherwise specified, tolerance shall conform to all applicable requirements of the following:

3.7.1 Bars and Wire: AMS 2241.

3.7.2 Mechanical Tubing: AMS 2243.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples for vendor's Ø 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 such confirmatory testing as he deems 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 requirements for the following are Ø classified as acceptance tests and shall be performed on heat or each 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 hardness (3.4.1.1.2) of each lot of bars, wire, forgings, mechanical tubing, and flash welded rings as solution heat treated.

Ø 4.2.1.3 Tolerances (3.7) of bars, wire, and mechanical tubing.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for the following are classi- Ø fied as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser:

4.2.2.1 Tensile properties (3.4.1.2.1) and hardness (3.4.1.2.2) of each lot of bars, wire, forgings, mechanical tubing, and flash welded rings after precipitation heat treatment.

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