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

AEROSPACE MATERIAL SPECIFICATION

AMS 5654B
Superseding AMS 5654A

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UNS S34700

STEEL BARS, FORGINGS, TUBING, AND RINGS, CORROSION AND HEAT RESISTANT
18Cr - 11Ni - 0.60 (Cb + Ta) (SAE 30347)
Consumable Electrode Melted

1. SCOPE:

1.1 Form: This specification covers a corrosion and heat 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 and assemblies requiring corrosion and heat resistance and subject to very rigid inspection standards, especially when such parts are welded during fabrication. Parts and assemblies requiring oxidation resistance up to approximately 1500°F (816°C) but useful at that temperature only when stresses are low.

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) 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 Bars and Wire and 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 2350 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Alloys, Wrought Products Except Forgings
AMS 2375 - Approval and Control of Critical Forgings
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 Stainless Steels
ASTM A370 - Mechanical Testing of Steel Products
ASTM E45 - Determining the Inclusion Content of Steel
ASTM E353 - Chemical Analysis of Stainless, Heat Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

Printed in U.S.A.

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 approved analytical methods:

	min	max
Carbon	--	0.08
Manganese	--	2.00
Silicon	--	1.00
Phosphorus	--	0.020
Sulfur	--	0.020
Chromium	17.00	19.00
Nickel	9.00	13.00
Columbium + Tantalum	10 x C	1.10
Molybdenum	--	0.75
Copper	--	0.50

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, 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 2.750 in. (69.85 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 2.750 in. (69.85 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 or Flash Welded Rings: As ordered by the forging or flash welded ring manufacturer.

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

3.3.1 Tensile Properties: Wire shall have tensile strength not higher than 100,000 psi (690 MPa) or equivalent hardness.

3.3.2 Hardness:

3.3.2.1 Bars: Shall be as follows, or equivalent, determined approximately midway between outer surface and center:

Nominal Diameter or Distance Between Parallel Sides		Brinell Hardness	
Inches	(Millimetres)	min	max
Up to 0.750, incl	(Up to 19.05, incl)	170	255
Over 0.750	(Over 19.05)	140	241

3.3.2.2 Mechanical Tubing: Shall be not higher than 90 HRB or equivalent, determined approximately midway between outer and inner surfaces.

3.3.2.3 Forgings and Flash Welded Rings: Shall be not higher than 187 HB or equivalent.

3.3.3 Embrittlement: The product, after sensitizing treatment, shall pass the copper/copper sulfate/sulfuric acid test performed in accordance with ASTM A262, Practice E, without evidence of intercrystalline Ø surface attack. After exposure, specimens shall not crack when bent 180 deg (3.14 rad) around a diameter equal to the nominal thickness or diameter of the specimen.

3.3.4 Inclusion Rating: Shall be as follows, determined in accordance with ASTM E45, Method D. No inclusion shall have length greater than 0.015 in. (0.38 mm).

Type	A	B	C	D
Thin	2	1-1/2	1-1/2	1-1/2
Heavy	1	1	1	1-1/2

3.4 Quality:

3.4.1 Steel shall be multiple melted using consumable electrode practice in the remelt cycle, unless otherwise permitted.

3.4.2 The product shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.

3.5 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).

3.6 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of the following:

3.6.1 Bars and Wire: AMS 2241.

3.6.2 Mechanical Tubing: AMS 2243.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples 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 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: The following are classified as acceptance or routine control tests:

4.2.1.1 Tests of the product to determine conformance to composition (3.1) and inclusion rating (3.3.4) requirements.

4.2.1.2 Tests of wire to determine conformance to tensile property (3.3.1) requirements.

4.2.1.3 Tests of bars, mechanical tubing, forgings, and flash welded rings to determine conformance to hardness (3.3.2) requirements.

4.2.1.4 Tests of bars, wire, and mechanical tubing to determine conformance to tolerance (3.6) requirements.

4.2.2 Qualification Tests: Tests to determine conformance to embrittlement (3.3.3) requirements are classified as qualification or periodic control tests.

4.2.2.1 For direct U.S. Military procurement, qualification test material and supporting test data shall be submitted to the cognizant qualification agency as directed by the request for procurement, the procuring activity, or the contracting officer.

4.3 Sampling: Shall be in accordance with the following:

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

4.3.2 Forgings and Forging Stock: As agreed upon by purchaser and vendor.

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 three copies of a report showing the results of tests for chemical composition of each heat in the shipment and for tensile properties and hardness of each size from each heat and stating that the product conforms to the other technical requirements of this specification. This report shall include the purchase order number, heat number, material specification number and its revision letter, 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 three copies of a report showing the purchase order number, material specification number and its revision letter, 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 a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

4.6 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the product may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the product represented and no additional testing shall be permitted. Results of all tests shall be reported.