

Submitted for recognition as an American National Standard

STEEL BARS AND FORGINGS, CORROSION AND HEAT RESISTANT

18Cr - 10.5Ni - 0.60 (Cb + Ta)

Free-Machining, Solution Heat Treated

UNS S34720 (Type 1)

UNS S34723 (Type 2)

1. SCOPE:

1.1 Form: This specification covers two types of free-machining, corrosion and heat resistant steel in the form of bars, wire, forgings, and forging stock.

1.2 Application: Primarily for parts on which the amount of machining warrants the use of a free-machining grade of steel, requiring corrosion resistance similar to the 18-8 type of steel, and which will be subjected to high temperatures during fabrication or in service, except that it is not intended for parts to be brazed at temperatures higher than 1350°F (732°C) or to be fusion welded.

1.3 Classification: The steels covered by this specification are classified as follows:

Type 1 - 18Cr - 10.5Ni - 0.26S - (Cb + Ta).

Type 2 - 18Cr - 10.5Ni - 0.14P - 0.25Se - (Cb + Ta).

1.3.1 Unless a specific type is specified, either Type 1 or Type 2 may be supplied.

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.

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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
- AMS 2374 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Forgings and Forging Stock
- 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

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, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

	Type I		Type 2	
	min	max	min	max
Carbon	--	0.08	--	0.08
Manganese	--	2.00	--	2.00
Silicon	--	1.00	--	1.00
Phosphorus	--	0.040	0.11	0.17
Sulfur	0.18	0.35	--	0.030
Chromium	17.00	19.00	17.00	19.00
Nickel	9.00	12.00	9.00	12.00
Columbium + Tantalum	10 x C	1.10	10 x C	1.10
Selenium	--	--	0.15	0.35
Molybdenum	--	0.75	--	0.75
Copper	--	0.75	--	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, and Forgings: Solution heat treated free from continuous carbide network and descaled.

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.

3.2.2 Forging Stock: As ordered by the forging manufacturer.

3.3 Properties: Bars, wire, and forgings shall conform to the following requirements; hardness and tensile testing shall be performed in accordance with ASTM A370. Properties of forging stock shall be as agreed upon by purchaser and vendor.

3.3.1 Tensile Properties: Wire shall have tensile strength not higher than 125,000 psi (862 MPa).

3.3.2 Hardness:

3.3.2.1 Bars: Shall be as follows, or equivalent, determined approximately at midradius.

Nominal Diameter or Distance Between Parallel Sides		Hardness
Inches	Millimetres	
Up to 0.75, incl	Up to 19.0, incl	170 - 255 HB
Over 0.75	Over 19.0	140 - 241 HB

3.3.2.2 Forgings: Shall be not higher than 187 HB, or equivalent.

3.3.3 Susceptibility to Intergranular Attack: The product, after sensitizing treatment, shall pass the intergranular corrosion acid test performed in accordance with ASTM A262, Practice E.

3.4 Quality: The product, as received by purchaser, shall be uniform in quality and condition, clean, sound, and, consistent with the type of steel involved, free from foreign materials and from imperfections detrimental to usage of the product.

3.4.1 Forgings shall have substantially uniform macrostructure. Standards for acceptance shall be as agreed upon by purchaser and vendor.

3.4.2 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.

3.5 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 feet (1.8 - 6.1 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 feet (3 m).

3.6 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 4.4. 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 all technical requirements of this specification are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling: Shall be in accordance with the following:

4.3.1 Bars and Wire: AMS 2371.