

**AEROSPACE
MATERIAL
SPECIFICATION**

Submitted for recognition as an American National Standard

AMS 5710D

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Revised 1-1-87

Superseding AMS 5710C

**STEEL BARS AND FORGINGS, CORROSION AND HEAT RESISTANT
20Cr - 2.2Si - 1.3Ni (0.76 - 0.86C)**

UNS S65006

1. SCOPE:

- 1.1 Form: This specification covers a corrosion and heat resistant steel in the form of bars, forgings, and forging stock.
- 1.2 Application: Primarily for parts, such as intake valves and valve seat inserts, requiring strength to 1000°F (540°C), oxidation resistance to 1800°F (980°C), and resistance to attack by lead compounds to 1600°F (870°C).

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

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2.1.1 (Cont'd.):

- 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

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

- ASTM E10 - Brinell Hardness of Metallic Materials
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
Ø	Carbon	0.76 -	0.86
	Manganese	0.20 -	0.60
	Silicon	1.90 -	2.60
	Phosphorus	--	0.030
	Sulfur	--	0.030
	Chromium	19.00 -	21.00
	Nickel	1.00 -	1.60

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: Shall have hardness not higher than 321 HB, or equivalent, determined
in accordance with ASTM E10.3.2.2 Forgings: As ordered.3.2.3 Forging Stock: As ordered by the forging manufacturer.3.3 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.

- 3.3.1 Forgings shall have substantially uniform macrostructure; acceptance standards shall be as agreed upon by purchaser and vendor.
- 3.3.2 Grain flow of die forgings, except in areas which contain flash-line end grain, shall follow the general contour of the forging, showing no evidence of re-entrant flow.
- 3.4 Sizes: Except when exact lengths or multiples of exact lengths are ordered, straight bars 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).
- 3.5 Tolerances: Bars 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 test 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: 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: AMS 2371.
- 4.3.2 Forgings and Forging Stock: AMS 2374.
- 4.4 Reports:
- 4.4.1 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 hardness of each lot of bars. This report shall include the purchase order number, heat number, AMS 5710D, 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.
- 4.4.2 The vendor of forging stock 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, heat number, AMS 5710D, size, and quantity.

4.4.3 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 5710D, 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.

4.5 Resampling and Retesting: Shall be in accordance with the following:

4.5.1 Bars: AMS 2371.

4.5.2 Forgings and Forging Stock: AMS 2374.

5. PREPARATION FOR DELIVERY:

5.1 Identification: The product shall be identified as follows:

5.1.1 Bars: In accordance with AMS 2806.

5.1.2 Forgings: In accordance with AMS 2808.

5.1.3 Forging Stock: As agreed upon by purchaser and vendor.

5.2 Packaging:

5.2.1 The product shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.2.2 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-163, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.2.1 will be acceptable if it meets the requirements of Level C.

6. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS: Material not conforming to this specification or to modifications authorized by purchaser will be subject to rejection.

8. NOTES:

8.1 Marginal Indicia: The phi (ϕ) symbol is used to indicate technical changes from the previous issue of this specification.

8.2 Dimensions in inch/pound units and the Fahrenheit temperatures are primary; dimensions in SI units and the Celsius temperatures are shown as the approximate equivalents of the primary units and are presented only for information.