AEROSPACE MATERIAL SPECIFICATION

AMS5718™	REV. E

Issued	1970-11
Cancelled	2007-04
Revised	2016-05
Reaffirmed	2021-05

Superseding AMS5718D

Steel, Bars, Forgings, Tubing, and Rings, Corrosion Resistant
11.8Cr - 2.5Ni - 1.8Mo - 0.33V (0.08 - 0.15C)
Annealed

(Composition similar to UNS S64152)

RATIONALE

AMS5718E revises the grain size requirement (3.4.2), Quality (3.5), and Reports (4.5), and is a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

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

1.2 Application

Primarily for parts, such as compressor wheels and structural members, requiring high strength and oxidation resistance up to 800 °F (425 °C).

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2241 Tolerances, Corrosion and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire

AMS2243 Tolerances, Corrosion and Heat-Resistant Steel Tubing

AMS2248 Chemical Check Analysis Limits, Corrosion and Heat-Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS5718E/

AMS2303 Steel Cleanliness, Aircraft Quality, Martensitic Corrosion-Resistant Steels, Magnetic Particle Inspection Procedure

AMS2371 Quality Assurance Sampling and Testing Corrosion and Heat-Resistant Steels and Alloys Wrought Products and Forging Stock

AMS2374 Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steel and Alloy Forgings

AMS2375 Control of Forgings Requiring First Article Approval

AMS2806 Identification Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat-Resistant Steels and Alloys

AMS2808 Identification Forgings

AMS7493 Rings, Flash Welded, Ferritic and Martensitic Corrosion-Resistant Steels

ARP1917 Clarification of Terms Used in Aerospace Metals Specifications

AS1182 Standard Stock Removal Allowance Aircraft-Quality and Premium Aircraft-Quality Steel Bars and Mechanical Tubing

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM A370 Mechanical Testing of Steel Products

ASTM E112 Determining Average Grain Size

ASTM E353 Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

ASTM E381 Macroetch Testing Steel Bars, Billets, Blooms, and Forgings

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E353 or by spectrographic or other analytical methods approved by purchaser.

Table 1 - Composition

	min	max
Carbon	0.08	0.15
Manganese	0.50	0.90
Silicon	--	0.35
Phosphorus	--	0.025
Sulfur	--	0.025
Chromium	11.00	12.50
Nickel	2.00	3.00
Molybdenum	1.50	2.00
Vanadium	0.25	0.40
Nitrogen	0.01	0.05
Copper	--	0.50

3.1.1 Check Analysis

Composition variations shall meet the requirements of AMS2248.

3.2 Condition

The product shall be supplied in the following condition:

3.2.1 Bars

3.2.1.1 Rounds

Annealed and centerless ground, turned, or polished.

3.2.1.2 Hexagons

Annealed and cold finished.

3.2.1.3 Bars Other than Rounds or Hexagons

Annealed and descaled.

3.2.2 Wire

Annealed and cold finished.

3.2.3 Forgings, Flash Welded Rings, and Extrusions

Annealed 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 AMS7493.

3.2.4 Mechanical Tubing

Cold finished and annealed.

3.2.5 Stock for Forging or Flash Welded Rings

As ordered by the forging or flash welded ring manufacturer.

3.3 Heat Treatment

Bars, wire, forgings, flash welded rings, extrusions, and mechanical tubing shall be annealed by heating to 1275 °F ± 20 °F (690 °C ± 11 °C), holding at heat for not less than 6 hours, and cooling in air.

3.4 Properties

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

3.4.1 Macrostructure

Visual examination of transverse sections as in 4.3.2.1 from bars, billets, tube rounds or tubes, and stock for forging or flash welded rings, etched in accordance with ASTM E381 in hot hydrochloric acid at 160 to 180 °F (70 to 80 °C) for sufficient time to develop a well-defined macrostructure, shall show no pipe or cracks. Except as specified in 3.4.1.1, porosity, segregation, inclusions, and other imperfections shall be no worse than standards agreed upon by purchaser and producer.

3.4.1.1 If tubes are produced directly from ingots or large blooms, transverse sections may be taken from tubes rather than tube rounds. Macrostructure standards for such tubes shall be as agreed upon by purchaser and producer.

3.4.2 Average Grain Size of Bars, Forgings, Tubing and Rings

Shall be ASTM No. 5 or finer, determined in accordance with ASTM E112.

3.4.3 Bars, Wire, Forgings, Flash Welded Rings, Extrusions, and Mechanical Tubing

3.4.3.1 As Annealed

3.4.3.1.1 Bars, Forgings, Flash Welded Rings, Extrusions and Mechanical Tubing

Shall have hardness not higher than 311 HB, or equivalent.

3.4.3.1.2 Wire

Shall have tensile strength not higher than 155 ksi (1070 MPa).

3.4.3.2 After Hardening and Tempering

Specimens taken from bars, wire, extrusions, and tubing, from forgings with axis in the longitudinal direction, and from parent metal of flash welded rings shall have the following properties after being hardened by heating to 1925 °F ± 25 °F (1050 °C ± 15 °C), holding at heat for not less than 30 minutes, and cooling as required to room temperature and tempered by heating to 1200 °F ± 25 °F (650 °C ± 15 °C), holding at heat for not less than 2 hours, and cooling in air to room temperature:

3.4.3.2.1 Tensile Properties

Shall be as shown in Table 2.

Table 2 - Minimum tensile properties

Tensile Strength, min	135 ksi (930 MPa)
Yield Strength at 0.2% Offset, min	110 ksi (760 MPa)
Elongation in 4D, min	17%
Reduction of Area, min	30%

3.4.3.2.2 Hardness

Should be 286 to 331 HB, or equivalent, but the product shall not be rejected on the basis of hardness if the tensile property requirements of 3.4.3.2.1 are met.

3.4.4 Forging Stock

When a sample of stock is forged to a test coupon and heat treated as in 3.3 and 3.4.3.2, specimens taken from the heat treated coupon shall conform to the requirements of 3.4.3.2.1 and 3.4.3.2.2. If specimens taken from the stock after heat treatment as in 3.3 and 3.4.3.2 conform to the requirements of 3.4.3.1 and 3.4.3.2.2, the tests shall be accepted as equivalent to tests of the forged coupon.

3.4.5 Stock for Flash Welded Rings

Specimens taken from the stock after heat treatment as in 3.3 and 3.4.3.2 shall conform to the requirements of 3.4.3.2.1 and 3.4.3.2.2.

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 Steel shall be aircraft quality conforming to AMS2303.

3.5.2 Bars and mechanical tubing ordered hot rolled or cold drawn, or machined, ground, turned or polished, shall, after removal of the standard stock removal allowance in accordance with AS1182, be free from seams, laps, tears, and cracks open to the machined, ground, turned, or polished surface.

3.5.3 Grain flow of die forgings, except in areas that contain flash-line end grain, shall follow the general contour of the forgings, showing no evidence of re-entrant grain flow.

3.6 Sizes

Except when exact lengths or multiples of exact lengths are ordered, straight bars, wire, and mechanical tubing will be acceptable in mill lengths of 6 to 20 feet (2 to 6 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 feet (3 m).

3.7 Tolerances

Shall conform to all applicable requirements of the following:

3.7.1 Bars and Wire

AMS2241.

3.7.2 Mechanical Tubing

AMS2243.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of the product shall supply all samples for producer'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

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), macrostructure (3.4.1) of each heat, and grain size (3.4.2) of each lot.

4.2.1.2 Tensile properties (3.4.3.2.1) and hardness (3.4.3.2.2) of each lot of bars, wire, forgings, mechanical tubing, extrusions, and flash welded rings after hardening and tempering.

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

4.2.2 Periodic Tests

The ability of forging stock (3.4.4) and of stock for flash welded rings (3.4.5) to develop required properties are classified as periodic tests and shall be performed at a frequency selected by the producer unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests

When AMS2375 is specified (see 4.4), all applicable technical requirements of this specification are 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.

4.3 Sampling

Shall be in accordance with the following:

4.3.1 Bars, Wire, Mechanical Tubing, Extrusions, Flash Welded Rings, and Stock for Flash Welded Rings

AMS2371.