AEROSPACE MATERIAL SPECIFICATION

AMS5763™	REV. F

Issued 1972-12
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Revised 2022-07

Superseding AMS5763E

Steel, Corrosion-Resistant Bars, Forgings, Mechanical Tubing, and Rings and Forging Stock 15Cr - 6.5Ni - 0.75Mo - 0.50Cb (Nb) - 1.5Cu Solution Heat Treated

(Composition similar to UNS S45000)

RATIONALE

AMS5763F is the result of a Five-Year Review and update of the specification. The revision updates the title to match the scope, standardizes phrasing for size limits (1.1, 3.4.1) prohibits unauthorized exceptions (3.7, 4.4.3, 5.2.1.1, 8.6), updates composition testing and reporting (3.1, 3.1.1), incorporates strain rate control (3.4.1.3), addresses finish (3.5.4, 8.7), provides for additional forging stock testing (4.4.4, 8.8) and allows the use of prior revisions (8.5).

1. SCOPE

1.1 Form

This specification covers a corrosion-resistant steel in the form of bars, wire, forgings, mechanical tubing, flash welded rings 8.0 inches (200 mm) and under in in thickness, diameter or for hexagons least nominal cross-sectional dimension, and stock of any size for forging or flash welded rings.

1.2 Application

These products have been used typically for parts requiring corrosion resistance approximating that of steels of the 18-8 types and high strength exceeding that of the 12Cr martensitic types up to 700 °F (370 °C), but usage is not limited to such applications.

1.3 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 ksi (1240 MPa), minimum.

1.4 Although this steel is relatively immune to stress-corrosion cracking, reference should be made to ARP1110 for recommended practices to minimize such conditions.

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.

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/AMS5763F/

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

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

AMS2750 Pyrometry

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

AMS2808 Identification, Forgings

AMS7490 Rings, Flash Welded, Corrosion and Heat-Resistant Austenitic Steels, Austenitic-Type Iron, Nickel, or Cobalt Alloys, or Precipitation-Hardenable Alloys

ARP1110 Minimizing Stress Corrosion Cracking in Wrought Forms of Steels and Corrosion-Resistant Steels and Alloys

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

AS7766 Terms Used in Aerospace Metals Specifications

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 A751 Chemical Analysis of Steel Products

ASTM E140 Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness

2.3 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with ASTM A751, or by other analytical methods acceptable to purchaser.

Table 1 - Composition

Element	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
Columbium (Niobium)	8 x C	0.75
Copper	1.25	1.75

3.1.1 Producer may test for any element not listed in Table 1 and include this analysis in the report of 4.4. Reporting of any element not listed in the composition table is not a basis for rejection, unless limits of acceptability are specified by the purchaser.

3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2248.

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

Solution heat treated and centerless ground.

3.2.1.1.2 Squares, Hexagons, and Flats

Hot finished, solution heat treated, and descaled, or solution heat treated cold drawn, and descaled.

3.2.1.1.3 Bar shall not be cut from plate (also see 4.4.2).

3.2.1.2 Wire

Solution heat treated and cold drawn.

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 AMS7490.

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 °F (1040 °C ± 15 °C), holding at heat for not less than 1 hour, and cooling rapidly. Pyrometry shall be in accordance with AMS2750.

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

Shall be as follows on product 8.0 inches (200 mm) and under in nominal thickness, diameter or for hexagons least cross-sectional dimensions.

3.4.1.1 As Solution Treated

3.4.1.1.1 Tensile Properties

Shall meet the requirements shown in Table 2 and 3.4.1.1.1.2:

3.4.1.1.1.1 Bars, Forgings, Tubing, and Flash Welded Rings

Table 2 - Minimum tensile properties

Property	Value
Tensile Strength	125 ksi (860 MPa)
Yield Strength at 0.2% Offset	95 ksi (655 MPa)
Elongation in 4D	10%
Reduction of Area	40%

3.4.1.1.1.2 Wire

Not higher than 165.0 ksi (1135 MPa) or equivalent hardness (see 8.2).

3.4.1.1.2 Hardness

Shall be as follows:

3.4.1.1.2.1 Bars

Not higher than 311 HB, or equivalent (see 8.3), 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 (see 8.3).

3.4.1.2 Response to Precipitation Heat Treatment

Samples from the product shall have the following properties after being precipitation heat treated by heating to 900 °F ± 15 °F (480 °C ± 8 °C), holding at heat for not less than 4 hours, and cooling at a rate equivalent to air cooling:

3.4.1.2.1 Tensile Properties

Shall be as shown in Table 3:

Table 3 - Minimum tensile properties

Property	Value
Tensile Strength	180 ksi (1240 MPa)
Yield Strength at 0.2% Offset	170 ksi (1170 MPa)
Elongation in 4D	10%
Reduction of Area	40%

3.4.1.2.2 Hardness

Shall be not lower than 363 HB, or equivalent (see 8.3), but the product shall not be rejected on the basis of hardness if the tensile properties of 3.4.1.2.1 are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness, or from another sample with similar nonconforming hardness.

3.4.1.3 Unless otherwise specified, the strain rate for all tensile testing shall be set at 0.005 in/in/min (0.005 mm/mm/min) and maintained within a tolerance of ±0.002 in/in/min (0.002 mm/mm/min) through 0.2% offset yield strain. The strain rate after yield may be increased to any value up to 0.5 in/in/min (or 0.5 mm/mm/min) or equivalent crosshead speed as a function of gage length. The requirement for compliance becomes effective for material produced 1 year after the publication date of this document.

3.4.1.4 Property requirements for product outside the range listed in 1.1 shall be agreed upon between purchaser and producer.

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

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 When specified, steel shall conform to AMS2303.

3.5.2 Forgings shall have substantially uniform macrostructure. Standards for acceptance may be agreed upon by purchaser and producer.

3.5.3 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 reentrant flow.

3.5.4 Bars and mechanical tubing shall be free from seams, laps, tears, and cracks after removal of the standard stock removal allowance in accordance with AS1182.

3.6 Tolerances

Shall be as follows:

3.6.1 Bars and Wire

In accordance with AMS2241.

3.6.2 Mechanical Tubing

In accordance with AMS2243.

3.7 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.3.

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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

The following are acceptance tests and shall be performed on each heat or 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.

4.2.1.3 Macrostructure of forgings (3.5.2).

4.2.1.4 Tolerances (3.6) of bars, wire, and mechanical tubing.

4.2.2 Periodic Tests

The following are periodic tests and shall be performed at a frequency selected by the producer 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, and grain flow of die forgings (3.5.3).

4.2.2.2 Ability of forging stock (3.4.2) and stock for flash welded rings (3.4.3) to develop required properties.

4.3 Sampling and Testing

Shall be as follows:

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

In accordance with AMS2371.