SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS5848D

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Superseding AMS5848C

Steel, Corrosion-Resistant, Bars, Wire, Forgings, Extrusions, Tubing, and Rings
Wear and Galling Resistant
8.0Mn – 4.0Si – 17Cr – 8.5Ni – 0.13N
Solution Heat Treated

(Composition similar to UNS S21800)

RATIONALE

AMS5848D revises reporting requirements (4.4.1) 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, extrusions, mechanical tubing, flash welded rings, and stock for forging, extruding, or flash welded rings.

1.2 Application

These products have been used typically for parts requiring wear, galling, and corrosion resistance up to 950 °F (510 °C), but usage is not limited to such applications. Welding, brazing, or other exposure to temperatures over 950 °F (510 °C) during fabrication may impair corrosion resistance.

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 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
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

(Continued)

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

SAE values your input. To provide feedback on this Technical Report, please visit http://www.sae.org/technical/standards/AMS5848D

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

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 A 262 Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
ASTM A 370 Mechanical Testing of Steel Products
ASTM E 353 Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

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 E 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - COMPOSITION

Element	min	max
Carbon	--	0.10
Manganese	7.00	9.00
Silicon	3.50	4.50
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	16.00	18.00
Nickel	8.00	9.00
Nitrogen	0.08	0.18
Molybdenum	--	0.75
Copper	--	0.75

3.1.1 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, Forgings, Extrusions, 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 regardless of size, other bars 2.75 inches (69.8 mm) and under in nominal diameter or least 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 least 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, rings shall be manufactured in accordance with AMS7490.

3.2.2 Stock for Forging, Extruding, or Flash Welded Rings

As ordered by the forging, extrusion, or flash welded ring manufacturer.

3.3 Heat Treatment

Bars, wire, forgings, extrusions, mechanical tubing, and flash welded rings shall be solution heat treated by heating within the range 1925 to 1975 °F (1052 to 1079 °C), holding at heat for a time commensurate with section thickness, and cooling at a rate equivalent to an air cool or faster.

3.4 Properties

The product shall conform to the following requirements; tensile and hardness testing shall be performed in accordance with ASTM A 370.

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

3.4.1.1 Tensile Properties

Shall be as shown in Table 2 and Table 3.

3.4.1.1.1 Product 0.50 Inch (12.7 mm) and Under in Nominal Section Thickness

Shall be as shown in Table 2.

TABLE 2 - MINIMUM TENSILE PROPERTIES

Property	Value
Tensile Strength	105 ksi (724 MPa)
Yield Strength at 0.2% Offset	55 ksi (379 MPa)
Elongation in 4D	35%
Reduction of Area	55%

3.4.1.1.2 Product Over 0.50 Inch (12.7 mm) in Nominal Section Thickness

Shall be as shown in Table 3.

TABLE 3 - MINIMUM TENSILE PROPERTIES

Property	Value
Tensile Strength	95 ksi (655 MPa)
Yield Strength at 0.2% Offset	50 ksi (345 MPa)
Elongation in 4D	35%
Reduction of Area	55%

3.4.1.2 Hardness

Shall be as follows, or equivalent (See 8.2). Product shall not be rejected on the basis of hardness if the tensile properties of 3.4.1.1 are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or from another sample with similar nonconforming hardness.

3.4.1.2.1 Bars

170 to 255 HB, determined at approximate mid-radius or quarter-thickness.

3.4.1.2.2 Forgings, Extrusions, and Flash Welded Rings

Not higher than 240 HB.

3.4.1.2.3 Mechanical Tubing

Not higher than 100 HRB, determined approximately midway between outer and inner surfaces.

3.4.1.3 Susceptibility to Integranular Attack

Specimens from the product shall pass the intergranular corrosion test performed in accordance with ASTM A 262, Practice E.

3.4.2 Forging Stock

When a sample of stock is forged to a test coupon and heat treated as in 3.3, specimens taken from the heat treated coupon shall conform to the requirements of 3.4.1.1.2 and 3.4.1.2. If specimens taken from the stock after heat treatment as in 3.3 conform to the requirements of 3.4.1.1.2 and 3.4.1.2, the tests shall be acceptable as equivalent to tests of a forged coupon.

3.4.3 Stock for Extruding or Flash Welded Rings

Specimens taken from the stock after heat treatment as in 3.3 shall conform to the requirements of 3.4.1.1.2 and 3.4.1.2.

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 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 grain flow.

3.6 Tolerances

Shall conform to all applicable requirements of the following:

3.6.1 Bars and Wire

In accordance with AMS2241.

3.6.2 Mechanical Tubing

In accordance with AMS2243.

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 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 requirements 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 or 3.4.1.1.2) of each lot of bars, wire, forgings, extrusions, mechanical tubing, and flash welded rings.

4.2.1.3 Hardness (3.4.1.2) of each lot of bars, forgings, extrusions, mechanical tubing, and flash welded rings.

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

4.2.2 Periodic Tests

Susceptibility to intergranular attack (3.4.1.3), tests of forging stock (3.4.2) and stock for extruding or flash welded rings (3.4.3) to demonstrate ability to develop required properties, and grain flow of die forgings (3.5.1) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing

Shall be as follows:

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

In accordance with AMS2371.

4.3.2 Forgings

In accordance with AMS2374.

4.4 Reports

4.4.1 The vendor of bars, wire, forgings, extrusions, mechanical tubing, and flash welded rings shall furnish with each shipment a report showing the results of tests for composition of each heat and for tensile properties or hardness of each lot, and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, heat and lot numbers, AMS5848D, product form, size, and quantity. If forgings are supplied, the size and melt source of stock used to make the forgings shall also be included.

4.4.2 The vendor of stock for forging, extruding, or flash welded rings shall furnish with each shipment a report showing the results of tests for composition of each heat. This report shall include the purchase order number, heat number, AMS5848D, size, and quantity.