



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AMS 5715A

Superseding AMS 5715

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ALLOY BARS, FORGINGS, AND RINGS, CORROSION AND HEAT RESISTANT
60.5Ni - 23Cr - 14Fe - 1.4Al

1. SCOPE:

1.1 Form: This specification covers a corrosion and heat resistant nickel alloy in the form of bars, forgings, flash welded rings, and stock for forging or flash welded rings.

1.2 Application: Primarily for parts requiring corrosion and oxidation resistance up to 2200°F (1205°C) and where such parts may require welding during fabrication.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2261 - Tolerances, Nickel, Nickel Base, and Cobalt Base Alloy Bars and Forging Stock

AMS 2269 - Chemical Check Analysis Limits, Wrought Nickel Alloys and Cobalt 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 2375 - Control of Forgings Requiring First Article Approval

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

AMS 7490 - Rings, Flash Welded, Corrosion and Heat Resistant Austenitic Steels and Austenitic-Type Alloys

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

ASTM E8 - Tension Testing of Metallic Materials

ASTM E354 - Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt 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 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

SAE Technical Board rules provide that: "All technical reports, including standards approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade or their use by governmental agencies is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

2.3.2 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 E354, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser:

	min	max
Carbon	--	0.10
Manganese	--	1.00
Silicon	--	0.50
Sulfur	--	0.015
Chromium	21.00 - 25.00	
Nickel	58.00 - 63.00	
Aluminum	1.00 - 1.70	
Titanium	--	0.60
Boron	--	0.006
Copper	--	1.00
Iron	remainder	

- 3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2269.

- 3.2 Condition: The product shall be supplied in the following condition:

- 3.2.1 Bars: Hot finished and annealed; round bars shall be ground or turned.

- 3.2.2 Forgings and Flash Welded Rings: Annealed. Surface finish shall be as agreed upon by purchaser and the forging or flash welded ring manufacturer.

- 3.2.2.1 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 AMS 7490.

- 3.2.3 Stock for Forging or Flash Welded Rings: As ordered by the forging or flash welded ring manufacturer.

- 3.3 Properties: Tensile properties of bars, forgings, and flash welded ring 4.00 in. (100 mm) and under in least nominal cross-sectional dimension shall be as follows, determined in accordance with ASTM E8; tensile property requirements for bars, forgings, and flash welded rings over 4.00 in. (100 mm) in least nominal cross-sectional dimension shall be as agreed upon by purchaser and vendor:

Tensile Strength, min	80,000 psi (552 MPa)
Yield Strength at 0.2% Offset, min	30,000 psi (207 MPa)
Elongation in 4D, min	35%

- 3.4 Quality: The product, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external imperfections detrimental to usage of the product.

- 3.4.1 Forgings shall have substantially uniform macrostructure and grain flow.

- 3.5 Sizes: Except when exact lengths or multiples of exact lengths are ordered, straight bars will be acceptable in mill lengths of 6 - 24 ft (1.8 - 7.3 m) but not more than 25% of any shipment shall be supplied in lengths of 6 - 9 ft (1.8 - 2.7 m) except that for bars weighing over 25 lb per ft (37 kg/m), short lengths down to 2 ft (600 mm) may be supplied.

- 3.6 Tolerances: Unless otherwise specified, tolerances for bars and forging stock shall conform to all applicable requirements of AMS 2261.

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 4.5. Purchaser reserves the right to sample and to perform such confirmatory testing as he deems 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 requirements for the following are classified as 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 (3.3) of each lot of bars, forgings, and flash welded rings.

4.2.1.3 Tolerances (3.6) of bars and forging stock.

- 4.2.2 Preproduction Tests: Tests of forgings to determine conformance to all technical requirements of this specification when AMS 2375 is specified are classified as preproduction tests and shall be performed on the first-article shipment of a forging to a purchaser, when a change in material or processing requires reapproval as in 4.4, and when purchaser deems confirmatory testing to be required.

4.2.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, pre-production forgings shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be in accordance with the following:

4.3.1 Bars, Flash Welded Rings, and Stock for Flash Welded Rings: AMS 2371.

4.3.2 Forgings and Forging Stock: AMS 2374.

4.4 Approval: When specified, approval and control of forgings shall be in accordance with AMS 2375.

4.5 Reports:

4.5.1 The vendor of the product shall furnish with each shipment three copies of a report showing the results of tests for chemical composition of each heat and for tensile properties of each lot. This report shall include the purchase order number, AMS 5715A, heat number, annealing temperature used, size, and quantity from each heat. If forgings are supplied, the part number and the size and melt source of stock used to make the forgings shall also be included.

4.5.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, AMS 5715A, 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 a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.