



AEROSPACE MATERIAL SPECIFICATION

AMS5884™**REV. E**

Issued 1992-04
Reaffirmed 2006-04
Revised 2022-09

Superseding AMS5884D

Iron-Nickel Alloy, Bars, Forgings, and Rings
42Fe - 37.5Ni - 14Co - 4.8Cb (Nb) - 1.6Ti
Solution Heat Treated, Precipitation Hardenable
Multiple Melted, High Temperature, Low Expansion
(Composition similar to UNS N19909)

RATIONALE

AMS5884E is the result of a Five-Year review and update of the document. The revision prohibits unauthorized exceptions (3.8, 4.4.3, 5.2.1, 8.4), updates composition and reporting requirements (3.1, 3.1.1), limits hardness testing procedures (3.5.1.1.1, 3.5.1.2.2), adds strain rate control for tensile tests (3.5.1.2.1.1), revises largest allowable grain size (3.5.1.1.2), updates limiting bar sizes (4.4.1), and allows prior revisions (8.5).

1. SCOPE

1.1 Form

This specification covers an iron-nickel alloy in the form of bars, forgings, flash welded rings, and stock for forging, flash welded rings, or heading.

1.2 Application

These products have been used typically for parts requiring a combination of high strength and low expansion properties up to 1200 °F (649 °C), but usage is not limited to such applications.

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.

AMS2261 Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Bars, Rods, and Wire

AMS2269 Chemical Check Analysis Limits, Nickel, Nickel Alloys, and Cobalt Alloys

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Documents
Document Sharing Hub

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, 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
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 E8/E8M	Tension Testing of Metallic Materials
ASTM E10	Brinell Hardness of Metallic Materials
ASTM E21	Elevated Temperature Tension Tests of Metallic Materials
ASTM E112	Determining Average Grain Size
ASTM E139	Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials
ASTM E140	Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness
ASTM E228	Linear Thermal Expansion of Solid Materials with a Push-Rod Dilatometer
ASTM E292	Conducting Time-for-Rupture Notch Tension Tests of Materials
ASTM E354	Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys
ASTM E930	Estimating the Largest Grain Observed in a Metallographic Section (ALA Grain Size)
ASTM E1181	Characterizing Duplex Grain Sizes

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 E354 or by other analytical methods acceptable to purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.06
Manganese	--	1.0
Silicon	0.25	0.50
Phosphorus	--	0.015
Sulfur	--	0.015
Nickel	35.0	40.0
Cobalt	12.0	16.0
Columbium (Niobium)	4.3	5.2
Titanium	1.3	1.8
Chromium	--	1.0
Tantalum	--	0.05
Aluminum	--	0.15
Boron	--	0.012
Copper	--	0.5
Iron	remainder	

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 AMS2269.

3.2 Melting Practice

Alloy shall be multiple melted using consumable electrode practice in the remelt cycle. If consumable electrode remelting is not performed in vacuum, electrodes which have been produced by vacuum induction melting shall be used for remelting.

3.3 Condition

The product shall be supplied in the following condition:

3.3.1 Bars, Forgings, and Flash Welded Rings

Solution heat treated and descaled.

3.3.1.1 Bars shall be hot finished or cold finished; round bars shall be ground or turned.

3.3.1.2 Bar shall not be cut from plate (also see 4.4.1).

3.3.1.3 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.

3.3.2 Stock for Forging, Flash Welded Rings, or Heading

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