AEROSPACE MATERIAL SPECIFICATION

AMS5755™	REV. H

Issued 1957-01
Reaffirmed 2019-07
Revised 2024-11

Superseding AMS5755G

Nickel Alloy, Corrosion and Heat-Resistant, Bars, Forgings, Rings and Forging and Flash-Welded Ring Stock
64Ni - 5.0Cr - 24.5Mo - 5.5Fe (Alloy W)
Solution Heat Treated
(Composition similar to UNS N10004)

RATIONALE

AMS5755H is the result of a Five-Year Review and update of the specification. The revision updates the Title to match the Scope and adds the common name, adds a new composition specification and updates wording and requirements related to testing and reporting (see 3.1, 3.1.1, and Table 1; deleting 3.1.1 revision G), adds bar condition for larger bar product (see 3.2.1.1), updates bar cutting information (see 4.4.2), adds option for additional forging properties (see 4.4.3 and 8.6), allows the use of prior revisions (see 8.4), and prohibits unauthorized exceptions (see 3.7, 4.4.4, 5.2.1, and 8.5).

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

These products have been used typically for parts requiring oxidation resistance up to 1600 °F (871 °C), good strength up to 1200 °F (649 °C), and low coefficient of expansion, 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

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/AMS5755H/

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

AMS2283 Composition Testing Methods for Nickel- and Cobalt-Based 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

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

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 E10 Brinell Hardness of Metallic Materials

ASTM E21 Elevated Temperature Tension 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

2.3 Definitions

Terms used in AMS are defined in AS776.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Composition shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS2283 or by other analytical methods acceptable to the purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.12
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	4.00	6.00
Molybdenum	23.00	26.00
Iron	4.00	7.00
Vanadium	--	0.60
Cobalt	--	2.50
Nickel + Cobalt	remainder	

3.1.1 The 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 Condition

The product shall be supplied in the following condition:

3.2.1 Bars

Bars shall be hot rolled, solution heat treated, and descaled. Rounds 0.75 inch (19.0 mm) and over in nominal diameter shall be ground.

3.2.1.1 Bars, other than hexagons, over 2.75 inches (69.8 mm) in nominal diameter or least distance between parallel sides shall be hot finished or cold finished.

3.2.1.2 Bars shall not be cut from plate (see 4.4.2).

3.2.2 Forgings

Forgings shall be solution heat treated and descaled.

3.2.3 Flash-Welded Rings

Flash-welded rings shall be solution heat treated.

3.2.3.1 Flash-welded rings shall not be supplied unless specified or permitted on the purchaser's part drawing. When supplied, rings shall be manufactured in accordance with AMS7490.

3.2.4 Stock for Forging or Flash-Welded Rings

Stock for forging or flash-welded rings shall be as ordered by the forging or flash-welded ring manufacturer.

3.3 Heat Treatment

Bars, forgings, and flash-welded rings shall be solution heat treated by heating to 2150 °F ± 25 °F (1177 °C ± 14 °C), holding at heat for a time commensurate with section thickness but not less than 20 minutes, and cooling at a rate equivalent to a rapid air cool or faster. Pyrometry shall be in accordance with AMS2750.

3.4 Properties

The product shall conform to the following requirements:

3.4.1 Bars, Forgings, and Flash-Welded Rings

3.4.1.1 Tensile properties for bars, forgings, and flash-welded rings shall be as shown in Table 2, determined in accordance with ASTM E21 on specimens heated to 1500 °F ± 5 °F (816 °C ± 3 °C), held at heat for 20 to 30 minutes before testing, and tested at 1500 °F ± 5 °F (816 °C ± 3 °C).

Table 2 - Minimum elevated temperature tensile properties

Property	Value
Tensile Strength	55 ksi (379 MPa)
Elongation in 4D or 2 inches (50 mm)	10%

3.4.1.2 Hardness

Hardness shall be 170 to 241 HBW, or equivalent (see 8.2), determined in accordance with ASTM E10.

3.4.2 Stock for Forging or Flash-Welded Rings

Stock for forging or flash-welded rings shall be as agreed upon by the purchaser and producer.

3.5 Quality

The product, as received by the 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 that contain flash-line end grain, shall follow the general contour of the forgings showing no evidence of reentrant grain flow.

3.6 Tolerances

Bar tolerances shall conform to all applicable requirements of AMS2261.

3.7 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.4.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of the product shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The 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

Tests for the following requirements are acceptance tests and shall be performed on each heat or lot as applicable:

- Composition (see 3.1) of each heat.
- Elevated temperature tensile properties (see 3.4.1.1) and hardness (see 3.4.1.2) of each lot of bars, forgings, and flash-welded rings.
- Tolerances (see 3.6) of bars.

4.2.2 Periodic Tests

Tests to determine ability of stock for forging or flash-welded rings to develop required properties (see 3.4.2) and tests for grain flow of die forgings (see 3.5.1) are periodic tests and shall be performed at a frequency selected by the producer unless frequency of testing is specified by the purchaser.

4.3 Sampling and Testing

4.3.1 Sampling and testing of bars, flash-welded rings, and stock for forging or flash-welded rings shall be in accordance with AMS2371.

4.3.2 Sampling and testing of forgings shall be in accordance with AMS2374.