

AEROSPACE MATERIAL SPECIFICATION

Issued APR 1980
Revised OCT 1988
Cancelled JUL 2002
Superseded by AMS 2269

Chemical Check Analysis Limits Cast Nickel and Nickel Alloys

CANCELLATION NOTICE

This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of July, 2002 and has been superseded by AMS 2269. The requirements of the latest issue of AMS 2269 shall be fulfilled whenever reference is made to the cancelled AMS 2268. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications, noting that it has been superseded by AMS 2269.

Cancelled specifications are available from SAE.

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1. SCOPE:

This specification covers chemical check (product or verification) analysis limits as established by AMS usage. The chemical check analysis limits shown herein shall apply when this specification is referenced in material specifications for cast nickel and nickel alloys. Check analysis limits for elements or for ranges of elements not listed herein shall be as specified in the applicable material specification or as agreed upon by purchaser.

2. APPLICABLE DOCUMENTS:

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

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 Standards and Test Methods

2.2 ASTM Publications:

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

ASTM E88 Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition

3. TECHNICAL REQUIREMENTS:

3.1 Analytical Procedures:

Referee methods of analysis shall be by any method acceptable to purchaser and vendor.

3.2 Definitions:

3.2.1 Check (Product or Verification) Analysis: Analysis made by the purchaser after the nickel or alloy has been cast into semi-finished or finished shapes or fabricated into parts, and is either for the purpose of verifying the composition of a heat or lot or to determine variations in the composition within a heat. Acceptance or rejection of a heat or lot of castings or batch of parts may be made by the purchaser on the basis of this check analysis. In the analysis of finished parts, these values do not apply to elements whose percentage can be varied by fabricating techniques employed unless the sample is taken in such a manner as to exclude such changes.

- 3.2.2 Variation Limit, Under Minimum or Over Maximum: Given in 3.3 is the amount an individual determination for a specified element may vary under or over the specified composition limit. In no case shall the several determinations of any element in a heat, using the same analytical procedure, vary both above and below the specified range. These variations are not permitted for ladle analyses made by the producer.
- 3.2.3 Remainder: Shows the basis element from which the alloy is made and is assumed to be present in an amount approximately equal to the difference between 100% and the sum percentage of the alloying elements and listed impurities. Analysis for this element need not be made nor need a percentage figure be reported.
- 3.2.4 Residual Elements, Each, Maximum: The maximum amount of an individual element not mentioned specifically in the tabulated composition, that may be present. Producer normally will analyze only for elements which are possible to be present because of raw materials or manufacturing processes and which may affect the product significantly. Others will analyze for impurities as they deem necessary.
- 3.2.5 Residual Elements, Total, Maximum: The sum percentage of the residual elements (See 3.2.4) found. It is not inferred by the statement that an analysis need be made for each element of the periodic table not mentioned specifically in the tabulated composition.
- 3.3 Check Analysis Limits: Shall be as follows:

Element	Upper Limit or Maximum of Specified Range, %	Variation	
		Under Min	Over Max
Carbon	Up to 0.02, incl	--	0.005
	Over 0.02 to 0.02, incl	0.01	0.01
	Over 0.20 to 0.60, incl	0.02	0.02
	Over 0.60 to 1.00, incl	0.03	0.03
Manganese	Up to 1.00, incl	--	0.03
	Over 1.00 to 3.00, incl	0.04	0.04
	Over 3.00 to 6.00, incl	0.07	0.07
Silicon	Up to 0.005, incl	--	0.01
	Over 0.05 to 0.25, incl	0.02	0.02
	Over 0.25 to 0.50, incl	0.03	0.03
	Over 0.50 to 1.00, incl	0.05	0.05
	Over 1.00 to 4.50, incl	0.10	0.10
Phosphorus	All	0.005	0.005
Sulfur	Up to 0.02, incl	--	0.003
	Over 0.02 to 0.060, incl	0.005	0.005

Element	Upper Limit or Maximum of Specified Range, %	Variation	
		Under Min	Over Max
Chromium	Over 3.00 to 5.00, incl	0.10	0.10
	Over 5.00 to 15.00, incl	0.15	0.15
	Over 15.00 to 25.00, incl	0.25	0.25
	Over 25.00 to 35.00, incl	0.30	0.30
	Over 35.00 to 45.00, incl	0.40	0.40
	Over 45.00 to 50.00, incl	0.50	0.50
Nickel	Over 20.00 to 30.00, incl	0.25	0.25
	Over 30.00 to 40.00, incl	0.30	0.30
	Over 40.00 to 60.00, incl	0.35	0.35
	Over 60.00 to 80.00, incl	0.45	0.45
	Over 80.00 to 99.00, incl	0.60	0.60
Cobalt	Up to 0.10, incl	--	0.01
	Over 0.10 to 0.20, incl	0.02	0.02
	Over 0.20 to 1.00, incl	0.03	0.03
	Over 1.00 to 5.00, incl	0.05	0.05
	Over 5.00 to 10.00, incl	0.10	0.10
	Over 10.00 to 15.00, incl	0.15	0.15
	Over 15.00 to 20.00, incl	0.20	0.20
	Over 20.00 to 25.00, incl	0.25	0.25
	Over 25.00 to 30.00, incl	0.30	0.30
	Over 30.00 to 35.00, incl	0.35	0.35
Molybdenum	Over 0.20 to 1.00, incl	0.03	0.03
	Over 1.00 to 3.00, incl	0.05	0.05
	Over 3.00 to 5.00, incl	0.10	0.10
	Over 5.00 to 20.00, incl	0.15	0.15
Tungsten	Up to 1.00, incl	--	0.04
	Over 1.00 to 3.00, incl	0.10	0.10
	Over 3.00 to 5.00, incl	0.15	0.15
	Over 5.00 to 10.00, incl	0.20	0.20
	Over 10.00 to 15.00, incl	0.25	0.25
Hafnium	Up to 0.10, incl	--	0.01
	Over 0.10 to 0.20, incl	0.02	0.02
	Over 0.20 to 1.00, incl	0.03	0.03
	Over 1.00 to 2.50, incl	0.05	0.05
Columbium + Tantalum	Over 0.50 to 1.50, incl	0.05	0.05
	Over 1.50 to 3.00, incl	0.10	0.10
	Over 3.00 to 5.00, incl	0.15	0.15
	Over 5.00 to 7.00, incl	0.20	0.20
	Over 7.00 to 10.00, incl	0.25	0.25
	Over 10.00 to 13.00, incl	0.30	0.30