

**AEROSPACE  
MATERIAL  
SPECIFICATION**

**AMS 5408B**

Issued APR 1985  
Noncurrent NOV 1995  
Reaf. Noncur. MAR 2001  
Cancelled APR 2007

Superseding AMS 5408A

Alloy Castings, Centrifugal, Corrosion and Heat Resistant  
64Ni - 16Cr - 15Mo - 0.30Al - 0.05La  
Solution Heat Treated

RATIONALE

AMS 5408A has been designated cancelled because survey of aerospace users and producers determined that this product is not produced to this specification.

CANCELLATION NOTICE

This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of April, 2007. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications, indicating that it has been "CANCELLED".

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# AEROSPACE MATERIAL SPECIFICATION



AMS 5408A

Issued APR 1985  
Noncurrent NOV 1995  
Reaf. Noncur. MAR 2001

Superseding AMS 5408

Alloy Castings, Centrifugal, Corrosion and Heat Resistant  
64Ni - 16Cr - 15Mo - 0.30Al - 0.05La  
Solution Heat Treated

## NONCURRENT NOTICE

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of November 1995. It is recommended, therefore, that this specification not be specified for new designs.

"NONCURRENT" refers to those materials which have previously been widely used and which may be required on some existing designs in the future. The Aerospace Materials Division, however, does not recommend these as standard materials for future use in new designs. Each of these "NONCURRENT" specifications is available.

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**1. SCOPE:****1.1 Form:**

This specification covers a corrosion and heat resistant nickel alloy in the form of centrifugal castings.

**1.2 Application:**

Primarily for parts such as turbine cases requiring relatively high strength up to 1800°F (980°C) and oxidation resistance up to 2000°F (1095°C).

**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 2268	Chemical Check Analysis Limits, Cast Nickel and Nickel Alloys
AMS 2350	Standards and Test Methods
AMS 2635	Radiographic Inspection
AMS 2645	Fluorescent Penetrant Inspection
AMS 2646	Contrast Dye Penetrant Inspection
AMS 2694	Repair Welding of Aerospace Castings
AMS 2804	Identification, Castings

**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 E10	Brinell Hardness of Metallic Materials
ASTM E21	Elevated Temperature Tension Tests of Metallic Materials
ASTM E354	Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt Alloys
ASTM E446	Reference Radiographs for Steel Castings up to 2 in. (51 mm) in Thickness

## 2.3 U.S. Government Publications:

Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

## 2.3.1 Military Specifications:

MIL-H-6875 Heat Treatment of Steels (Aircraft Practice), Process for

## 2.3.2 Military Standards:

MIL-STD-794 Parts and Equipment, Procedures for Packaging and Packing of

## 3. TECHNICAL REQUIREMENTS:

## 3.1 Composition:

Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E354 or by spectrographic or other analytical methods approved by purchaser:

	min	max
Carbon	--	0.02
Manganese	0.30	1.00
Silicon	0.20	0.75
Phosphorus	--	0.020
Sulfur	--	0.015
Chromium	14.50	17.00
Molybdenum	14.00	16.50
Aluminum	0.10	0.50
Cobalt	--	2.00
Tungsten	--	1.00
Boron	--	0.015
Iron	--	3.00
Lanthanum	--	0.10
Copper	--	0.35
Nickel	remainder	

## 3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2268.

## 3.2 Condition:

Solution heat treated.

## 3.3 Casting:

A melt shall be the metal poured from a single furnace charge into rotating molds.

## 3.4 Test Specimens:

3.4.1 Chemical Analysis Specimens: Shall be of any convenient size, shape, and form for vendor's tests. When chemical analysis specimens are required by purchaser, specimens shall be cast to a size, shape, and form agreed upon by purchaser and vendor.

3.4.2 Tensile Specimens: Shall be machined from castings, if practicable, or from standard keel blocks or shall be cast to size; specimens shall conform to ASTM E8. Specimens shall be cast with each melt of metal and, when requested, shall be supplied with the castings. Standard keel blocks and cast-to-size specimens shall be poured from the same ladle as the castings, and shall be kept in the mold until black.

## 3.5 Solution Heat Treatment:

Castings and representative tensile specimens shall be solution heat treated by heating to a temperature not lower than 1925°F (1050°C), holding at the selected temperature within  $\pm 25^\circ\text{F}$  ( $\pm 15^\circ\text{C}$ ) for 1 hr per inch (25 mm) of section thickness but not less than 30 min., and cooling at a rate equivalent to air cool or faster. Furnace surveys and calibration of temperature controllers and recorders shall be in accordance with MIL-H-6875.

## 3.6 Properties:

Castings and representative tensile specimens produced in accordance with 3.4.2 shall conform to the following requirements:

## 3.6.1 Tensile Properties:

3.6.1.1 At Room Temperature: Shall be as follows, determined in accordance with ASTM E8:

Tensile Strength, min	72,000 psi (495 MPa)
Yield Strength at 0.2% Offset, min	35,000 psi (240 MPa)
Elongation in 4D, min	28%

3.6.1.2 At 1200°F (650°C): Shall be as follows, determined in accordance with ASTM E21 on specimens heated to 1200°F ± 5 (650°C ± 3), held at heat for 20 - 30 min. before testing, and tested at 1200°F ± 5 (650°C ± 3):

Tensile Strength, min	45,000 psi (310 MPa)
Yield Strength at 0.2% Offset, min	18,000 psi (125 Mpa)
Elongation in 4D, min	30%

3.6.2 Hardness: Castings should have hardness not higher than 241 HB, or equivalent, determined in accordance with ASTM E10, but shall not be rejected on the basis of hardness if the tensile property requirements of 3.6.1.1 are met.

### 3.7 Quality:

3.7.1 Castings, 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 castings.

3.7.1.1 Castings shall have smooth surfaces and shall be well cleaned. Metallic shot or grit shall not be used for final cleaning, unless otherwise permitted by purchaser.

3.7.2 Castings shall be produced under radiographic control. This control shall consist of radiographic examination of castings in accordance with AMS 2635 until proper foundry technique, which will produce castings free from harmful imperfections, is established for each part number and of production castings as necessary to ensure maintenance of satisfactory quality.

3.7.3 When specified, castings shall be subjected to fluorescent penetrant inspection in accordance with AMS 2645, or to contrast dye penetrant inspection in accordance with AMS 2646.

3.7.4 Radiographic, fluorescent penetrant, contrast dye penetrant, and other quality standards shall be as agreed upon by purchaser and vendor. ASTM E446 may be used to define radiographic inspection standards.

3.7.5 Castings shall not be repaired by peening, plugging, welding, or other methods without written permission from purchaser.

3.7.5.1 When permitted in writing by purchaser, defects in castings may be removed and the castings repaired by welding in accordance with AMS 2694.

### 4. QUALITY ASSURANCE PROVISIONS:

#### 4.1 Responsibility for Inspection:

The vendor of castings 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 any confirmatory testing deemed necessary to ensure that the castings conform to the requirements of this specification.

#### 4.2 Classification of Tests:

Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and as preproduction tests and shall be performed prior to or on the first-article shipment of a casting to a purchaser, on each melt or lot as applicable, when a change in material, processing, or both requires reapproval as in 4.4.2 and when purchaser deems confirmatory testing to be required.

#### 4.3 Sampling:

Shall be in accordance with the following; a lot shall be all castings of a specific design, produced from a single melt, solution heat treated in a single batch, and presented for vendor's inspection at one time:

- 4.3.1 One chemical analysis specimen in accordance with 3.4.1 from each melt or a casting from each lot.
- 4.3.2 Two tensile specimens in accordance with 3.4.2 from each lot.
- 4.3.3 Each casting from each lot.
- 4.3.4 Two preproduction castings in accordance with 4.4.1 of each part number.

#### 4.4 Approval:

- 4.4.1 Sample castings from new or reworked molds, the casting procedure, and substantiating test data shall be approved by purchaser before castings for production use are supplied, unless such approval be waived by purchaser.
- 4.4.2 Vendor shall establish for production of sample castings of each part number parameters for the process control factors which will produce acceptable castings; these shall constitute the approved casting procedures and shall be used for producing production castings. If necessary to make any change in parameters for the process control factors, vendor shall submit for reapproval a statement of the proposed changes in processing and, when requested, sample castings, test specimens, or both. Production castings incorporating the revised operations shall not be shipped prior to receipt of reapproval.