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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4892B

Issued JAN 1959
Revised JAN 1999

Superseding AMS 4892A

Submitted for recognition as an American National Standard

Alloy Castings, Corrosion and Heat Resistant
66Ni - 29Cu - 4.0Si
As Cast

UNS N04019

1. SCOPE:

1.1 Form:

This specification covers a nickel-copper alloy in the form of castings.

1.2 Application:

These castings have been used typically for parts requiring resistance to wear and galling under light-to-medium loads against dissimilar materials of higher hardness, and retention of hot hardness up to 1000 °F (538 °C), but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2694 Repair Welding of Aerospace Castings
AMS 2804 Identification, Castings

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7154 FAX: (724) 776-0243
TO PLACE A DOCUMENT ORDER: (724) 776-4970 FAX: (724) 776-0790

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 10	Brinell Hardness of Metallic Materials
ASTM E 76	Chemical Analysis of Nickel-Copper Alloys
ASTM E 272	Reference Radiographs for High-Strength Copper-Base and Nickel-Copper Alloy Castings
ASTM E 1417	Liquid Penetrant Inspection
ASTM E 1742	Radiographic Examination

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 76, by spectrochemical methods or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	min	max
Nickel	60.0	--
Copper	27.0	31.0
Silicon	3.5	4.5
Iron	--	2.5
Manganese	--	1.5
Cobalt	--	1.0
Carbon	--	0.25
Sulfur	--	0.015

3.2 Condition:

As cast.

3.2.1 Centrifugal Castings: Shall be rough turned and bored.

3.2.2 Sand Castings: Solid round bars shall be rough turned.

3.3 Casting:

Castings shall be produced in lots from metal conforming to 3.1. A lot shall be all castings produced from one furnace melt or crucible melt. When two or more furnace melts or crucible melts or combination thereof are used to charge a ladle for pouring, the castings therefrom shall constitute a lot. A lot shall be not more than 2000 pounds (907 kg) of castings.

3.4 Chemical Analysis Specimens:

Shall be cast from each melt and shall be of any convenient size, shape, and form. When chemical analysis specimens are required by purchaser, specimens shall be cast to a size, shape, and form agreed upon by purchaser and vendor.

3.5 Properties:

Castings shall conform to the following requirements:

3.5.1 Hardness: Shall be as follows, determined in accordance with ASTM E 10:

3.5.1.1 Castings over 0.25 inch (6.25 mm) in nominal cross-section shall have hardness not lower than 277 HB or equivalent (See 8.2).

3.5.1.2 Response to Heat Treatment: Castings 0.25 inch (6.35 mm) and under in nominal cross-section shall meet the requirements of 3.5.1.1 after being precipitation heat treated by heating to 1100 °F ± 25 (593 °C ± 14), holding at heat for 4 to 6 hours and air or furnace cooling.

3.6 Quality:

3.6.1 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.

3.6.1.1 Castings shall have smooth surfaces and shall be sufficiently cleaned to permit fluorescent penetrant inspection. Metallic shot or grit shall not be used for final cleaning.

3.6.2 Castings shall be produced under radiographic control. This control shall consist of radiographic examination of castings in accordance with ASTM E 1742 until proper foundry technique, which will produce castings free from harmful internal imperfections, is established for each part number and of production castings as necessary to ensure maintenance of satisfactory quality.

3.6.3 Castings, when specified, shall be subjected to fluorescent penetrant inspection in accordance with ASTM E 1417.

3.6.4 Radiographic, fluorescent penetrant, and other quality standards shall be as agreed upon by purchaser and vendor. ASTM E 272 may be used to define radiographic acceptance standards.

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

3.6.5.1 When permitted in writing by purchaser, defects in castings may be 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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the castings conform to specified requirements.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Composition (3.1.1) and hardness of castings over 0.25 inch (6.35 mm) in nominal cross-section (3.5.1.1) are acceptance tests and shall be performed on each heat or lot as applicable.

4.2.2 Periodic Tests: Hardness of castings 0.25 inch (6.35 mm) and under in nominal cross-section after precipitation heat treatment (3.5.1.2) is a periodic test and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.2.3 Preproduction Tests: All technical requirements are preproduction tests and shall be performed on sample castings (4.3.2), when a change in control factors occurs (4.4.2.1), and when purchaser deems confirmatory testing to be required.

4.3 Sampling and Testing:

The minimum testing performed by vendor shall be in accordance with the following:

4.3.1 One chemical analysis specimen in accordance with 3.4 from each melt or a casting from each lot.

4.3.2 One preproduction casting in accordance with 4.4 shall be tested to the requirements of the casting drawing and to all technical requirements.

4.4 Approval:

4.4.1 Sample castings from new or reworked patterns or molds and the casting procedure 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 procedure 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, test specimens and/or sample castings. Production castings incorporating the revised operations shall not be shipped prior to receipt of reapproval.

4.4.2.1 Control factors for producing castings include, but are not limited to, the following:

Type of furnace
Furnace atmosphere
Fluxing or deoxidation procedure
Gating and risering practices
Metal pouring temperature; variation of ±50 °F (±10 °C) from the established limit is permissible
Mold setup, parting agent and rotational speed for centrifugal castings
Solidification and cooling procedures
Cleaning operations
Methods of inspection

4.4.2.1.1 Any of the above process control factors for which parameters are considered proprietary by the vendor may be assigned a code designation. Each variation in such parameters shall be assigned a modified code designation.

4.5 Reports:

The vendor of the product shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements. This report shall include the purchase order number, master heat identification, heat treat/lot identification, AMS 4892B, part number, and quantity.

4.6 Resampling and Retesting:

If any specimen used in the above tests fails to meet the specified requirements, disposition of the castings may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the castings represented. Results of all tests shall be reported.