SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

AMS 5392M

Issued	MAR 1949
Revised	OCT 1985
Noncurrent	NOV 1994
Reaf. Noncur.	NOV 2000
Cancelled	APR 2007

Superseding AMS 5392L

Alloy Iron Castings, Sand, Moderate Corrosion and Heat Resistant 2.1Cr - 15Ni - 6.5Cu (2.4 - 2.8C) As Cast

(Composition similar to UNS F47004)

RATIONALE

AMS 5392L has been cancelled and superseded because equivalent requirements are contained in ASTM A 439.

CANCELLATION NOTICE

This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of April, 2007, and has been superseded by ASTM A 439. The requirements of the latest issue of ASTM A 439 shall be fulfilled whenever reference is made to the cancelled AMS 5392L. 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will remain listed in the Numerical Section of the Index of Aerospace Material Specifications, noting that it has been superseded by ASTM A 439.

Cancelled specifications are available from SAE.

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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5392L

Issued	MAR 1949
Revised	OCT 1985
Noncurrent	NOV 1994
Reaf. Noncur.	NOV 2000
Superseding	AMS 5392K

Alloy Iron Castings, Sand, Moderate Corrosion and Heat Resistant 2.1Cr - 15Ni - 6.5Cu (2.4 - 2.8C) As Cast

UNS F47004

NONCURRENT NOTICE

This specification has been declared “NONCURRENT” by the Aerospace Materials Division, SAE, as of November 1994. 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 from SAE.

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1. SCOPE:

1.1 Form:

This specification covers a moderate corrosion and heat resistant alloy iron in the form of sand castings.

1.2 Application:

Primarily for parts requiring moderate corrosion and heat resistance up to 800°F (425°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 2350	Standards and Test Methods
AMS 2635	Radiographic Inspection
AMS 2645	Fluorescent 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 A370	Mechanical Testing of Steel Products
ASTM E351	Chemical Analysis of Cast Iron - All Types
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 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 E351 or by spectrographic or other analytical methods approved by purchaser:

	min	max
Carbon (3.1.1)	2.40	2.80
Manganese	1.00	1.50
Silicon (3.1.1)	1.50	2.50
Phosphorus	--	0.30
Sulfur	--	0.12
Chromium	1.80	2.40
Nickel	14.00	16.00
Copper	6.00	7.00
Lead	--	0.003

3.1.1 If castings have section thicknesses under 3/4 in. (19 mm), carbon and silicon may each be as high as 3.00.

3.2 Condition:

As cast.

3.3 Casting:

A melt shall be the metal poured from a single ladle of 10,000 lb (4540 kg) or less. A lot shall consist of all castings poured consecutively from a single melt.

3.4 Test Specimens:

3.4.1 Chemical Analysis Specimens: Shall be of any convenient size, shape, and form.

3.4.2 Tensile Coupons: Shall be standard keel blocks conforming to ASTM A370 unless purchaser permits use of “Y” blocks as shown in Fig. 1. Coupons shall be cast with each melt of metal for castings, shall be cast in open molds made of suitable core sand, shall be poured directly after pouring the castings, and shall be kept in the mold until black. Metal for coupons shall be part of the melt which is used for the castings. Molding practice and the coupon size, when use of “Y” blocks is permitted, shall, insofar as practicable, be such that cooling rates of castings and coupons are substantially the same. Standard tensile specimens in accordance with ASTM A370 shall be machined from the as-cast coupons.

3.5 Properties:

Castings and representative tensile coupons produced in accordance with 3.4.2 shall conform to the following requirements; hardness and tensile testing shall be performed in accordance with ASTM A370:

3.5.1 Separately-Cast Coupons:

3.5.1.1 Tensile Strength: Shall be not lower than 30,000 psi (205 MPa).

3.5.1.2 Hardness: Shall be 75 - 90 HRB or equivalent.

3.5.2 Castings:

3.5.2.1 Microstructure: Shall consist of an austenite matrix with uniformly distributed graphite flakes.

3.5.2.2 Tensile Strength: Shall be not lower than 30,000 psi (205 MPa).

3.5.2.2.1 Specimens cut from castings are not required for acceptance testing; however, properties obtained from such specimens may be the basis for acceptance of castings.

3.5.2.3 Hardness: Should be 75 - 90 HRB, or equivalent, but castings shall not be rejected on the basis of hardness if the tensile strength requirements of 3.5.2.2 are met.

3.5.2.4 Effect of Sub-Zero Cooling: Castings shall withstand, without the austenite transforming to martensite, being cooled to -75°F ± 5 (-60°C ± 3), holding at -75°F ± 5 (-60°C ± 3) for sufficient time to equalize, and warming to room temperature. Castings so treated shall be sufficiently nonmagnetic to prevent a small steel magnet from adhering to the casting.

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 well cleaned. 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 AMS 2635 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 When specified, castings shall be subjected to fluorescent penetrant inspection in accordance with AMS 2645.

3.6.4 Radiographic, fluorescent penetrant, and other quality standards shall be as agreed upon by purchaser and vendor. ASTM E446 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 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:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), tensile properties (3.5.1.1) and hardness (3.5.1.2) of separately-cast coupons and, when specified, tensile properties of specimens cut from castings (3.5.2.2) are classified as acceptance tests and shall be performed on each melt or lot as applicable.

4.2.1.1 Tensile properties of separately-cast specimens need not be determined when specimens cut from castings are determined.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for microstructure (3.5.2.1), hardness (3.5.2.3), and effect of sub-zero cooling (3.5.2.4) of castings are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

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

4.2.3.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling:

Shall be in accordance with the following:

4.3.1 Two chemical analysis specimens in accordance with 3.4.1 from each melt or a casting from each lot.

4.3.2 Three tensile coupons in accordance with 3.4.2 representing each lot.

4.3.3 Two preproduction castings in accordance with 4.4.1 of each part number.

4.3.4 One or more castings from each lot when properties of specimens machined from castings are required. Size, location, and number of specimens machined from castings shall be as specified or as agreed upon by purchaser and vendor. When size, location, and number of specimens are not specified, not less than two tensile specimens, one from the thickest section and one from the thinnest section, shall be cut from a casting or castings from each lot.

4.4 Approval:

4.4.1 Sample castings from new or reworked patterns 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 coupons, sample castings, or both. 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 (±30°C) from the established limit is permissible
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:

4.5.1 The vendor of castings shall furnish with each shipment a report showing the results of tests for chemical composition of at least one casting, or of specimens as in 3.4.1 from each melt represented and the results of tests on separately-cast coupons or on castings to determine conformance to the other acceptance test requirements of this specification. This report shall include the purchase order number, melt number, AMS 5392L, part number, and quantity from each melt.