

AEROSPACE MATERIAL SPECIFICATION

SAE AMS5341

REV. C

Issued 1969-05
Revised 1985-10
Noncurrent 1995-01
Reaf Noncur 2012-04

Superseding AMS5341B

Steel Castings, Investment, Corrosion Resistant
19.5Cr - 10.5Ni - 0.25S (Type 303)
Solution Heat Treated

UNS J92711

RATIONALE

AMS5341C has been reaffirmed to comply with the SAE five-year review policy.

NONCURRENT NOTICE

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of January 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 from SAE upon request.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2012 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

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
http://www.sae.org

SAE WEB ADDRESS:

**SAE values your input. To provide feedback
on this Technical Report, please visit
<http://www.sae.org/technical/standards/AMS5341C>**

1. SCOPE:

1.1 Form:

This specification covers a corrosion-resistant steel in the form of investment castings.

1.2 Application:

Primarily for small parts not subjected to welding, brazing, or soldering during assembly and not subjected to temperatures exceeding 700°F (370°C) during fabrication or in service. Corrosion resistance is lower than that of AMS 5358 but machinability is better.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Materials 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 2360	Room Temperature Tensile Properties of Castings
AMS 2635	Radiographic Inspection
AMS 2645	Fluorescent Penetrant Inspection
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 E192	Reference Radiographs of Investment Steel Castings for Aerospace Applications
ASTM E353	Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

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, 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 E353 or by spectrographic or other analytical methods approved by purchaser:

	min	max
Carbon	--	0.16
Manganese	--	2.00
Silicon	--	2.00
Phosphorus	--	0.04
Sulfur	0.15	0.35
Chromium	18.00 -	21.00
Nickel	9.00 -	12.00
Molybdenum	--	0.75
Copper	--	0.75

3.2 Condition:

Solution heat treated free from continuous carbide network.

3.3 Casting:

Castings shall be poured either from remelted metal from a master heat or directly from a master heat. In either case, metal for casting shall be qualified as in 3.4.

3.3.1 A master heat is refined metal of a single furnace charge or is metal blended as in 3.3.2. Gates, sprues, risers, and rejected castings shall be used only in preparation of master heats; they shall not be remelted directly, without refining, for pouring of castings.

3.3.2 Unless prohibited by purchaser, metal from two or more master heats may be blended provided that the composition of each master heat to be blended is within the limits of 3.1 and that the total weight of metal blended does not exceed 15,000 lb (6800 kg). When two or more master heats are blended, the resultant blend shall be considered a master heat.

3.4 Master Heat Qualification:

Each master heat shall be qualified by evaluation of chemical analysis specimens conforming to

3.4.1. A master heat may be considered conditionally qualified if vendor's test results show conformance to all applicable requirements of this specification. However, except when purchaser waives confirmatory testing, final qualification shall be based on purchaser's test results. Conditional qualifications of a master heat shall not be construed as a guarantee of acceptance of castings poured therefrom.

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

3.5 Heat Treatment:

Castings, and representative tensile specimens when specified, shall be solution heat treated by heating in a suitable protective atmosphere to $1950^{\circ}\text{F} \pm 25$ ($1065^{\circ}\text{C} \pm 15$), holding at heat for not less than 3 hr, and suitably quenching. Furnace surveys and calibration of temperature controllers and recorders shall be in accordance with MIL-H-6875.

3.6 Properties:

Castings shall conform to the following requirements; hardness and tensile treating shall be performed in accordance with ASTM A370:

- 3.6.1 Hardness: Shall be not higher than 180 HB or equivalent.

- 3.6.2 Tensile Properties: When specified on the drawing or when agreed upon by purchaser and vendor, tensile specimens conforming to ASTM A370 shall be machined from castings selected at random from each master heat. Property requirements for such specimens shall be as shown on the drawing or as agreed upon by purchaser and vendor and may be defined as specified in AMS 2360.

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 imperfection 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.

- 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 internal 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.
- 3.7.4 Radiographic, fluorescent penetrant, and other quality standards shall be as agreed upon by purchaser and vendor. ASTM E192 may be used to define radiographic acceptance standards.
- 3.7.5 Castings shall not be repaired by peening, plugging, welding, or other methods without written permission from purchaser.

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 heat 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.

- 4.2.1 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 or a casting from each master heat.
- 4.3.2 Two preproduction castings in accordance with 4.4.1 of each part number.
- 4.3.3 One or more castings from each master heat when properties of specimens machined from castings are required. Size, location, and number of specimens machined from castings shall be as specified on the drawing or as agreed upon by purchaser and vendor. When size, location, and number of specimens are not specified, not less than two tensile test specimens, one from the thickest section and one from the thinnest section, shall be cut from a casting or castings from each master heat.

4.4 Approval:

- 4.4.1 Sample castings from new or reworked master 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, sample test specimens, 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 and its capacity
Type and size of furnace charge
Time molten metal is in furnace
Furnace atmosphere
Fluxing or deoxidation procedure
Number of ladles used in pour
Mold refractory formulation
Mold back-up material
Gating practices
Mold preheat and metal pouring temperatures; variations of $\pm 25^{\circ}\text{F}$ ($\pm 15^{\circ}\text{C}$) from established limits are 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 cast in a mold with parts, from each master heat represented and the results of tests on each master heat to determine conformance to the other acceptance test requirements and stating that the castings conform to the other technical requirements of this specification. When properties of specimens cut from castings are specified, the report shall include the results of tests to determine conformance to such requirements. This report shall include the purchase order number, master heat number or code symbol, AMS 5341C, part number, and quantity from each master heat.