



AEROSPACE MATERIAL SPECIFICATION

AMS5338™**REV. H**

Issued 1957-07
Revised 2017-04
Reaffirmed 2022-06

Superseding AMS5338G

Steel, Investment Castings
0.95Cr - 0.20Mo (0.35 - 0.45C) (4140 Mod)
Normalized or Normalized and Tempered
(Composition similar to UNS J14046)

RATIONALE

AMS5338H is a Five-Year Review and update of this specification that adds strain rate control on tensile testing (3.6.1.1), revises reporting (4.5), and outside specification limits notification (4.5.2).

AMS5338H has been reaffirmed to comply with the SAE Five-Year Review policy.

1. SCOPE

1.1 Form

This specification covers a low-alloy steel in the form of investment castings.

1.2 Application

These castings have been used typically for small structural parts of intricate design requiring heat treatment to minimum tensile strengths up to 175 ksi (1207 MPa), but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2175	Castings, Classification and Inspection of
AMS2259	Chemical Check Analysis Limits Wrought Low-Alloy and Carbon Steels
AMS2360	Room Temperature Tensile Properties of Castings
AMS2694	In-Process Welding of Castings

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Full document details: [SAE AMS5338H](http://www.sae.org/standards/content/AMS5338H/)

For more information on this standard, visit
<https://www.sae.org/standards/content/AMS5338H/>

Documents
Document Sharing Hub

- AMS2804 Identification Castings
- AMS-H-6875 Heat Treatment of Steel Raw Materials
- ARP1917 Clarification of Terms Used in Aerospace Metals Specifications

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

- ASTM A370 Mechanical Testing of Steel Products
- ASTM E140 Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness
- ASTM E350 Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron
- ASTM E1417 Liquid Penetrant Testing
- ASTM E1444 Magnetic Particle Testing
- ASTM E1742 Radiographic Examination

3. TECHNICAL REQUIREMENTS

3.1 Composition

Castings shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E350, by spectrochemical methods, or by other analytical methods acceptable to purchaser (see 8.2.1 and 8.2.2).

Table 1 - Composition

Element	Min	Max
Carbon	0.35	0.45
Manganese	0.75	1.00
Silicon	--	1.00
Phosphorus	--	0.04
Sulfur	--	0.04
Chromium	0.80	1.10
Molybdenum	0.15	0.25
Nickel	--	0.25
Copper	--	0.35

3.1.1 Producer may test for any element not listed in Table 1 and include this analysis in the report of 4.5. Limits of acceptability may be specified by purchaser (see 8.2.3).

3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2259. The foundry shall not use the variation allowances to determine conformance of castings or specimens to 3.1.

3.2 Melting Practice

Castings and specimens shall be poured at casting producer's facility either from a melt (see 8.2.4) of a master heat or directly from a master heat (see 3.4.3 and 8.2.5).

- 3.2.1 Revert (gates, sprues, risers, and rejected castings) may be used only in the preparation of master heats; revert shall not be remelted directly without refining for pouring of castings. Melting of revert creates a new master heat.
- 3.2.2 Portions of two or more qualified master heats (see 3.4.2) may be melted together and poured into castings using a procedure authorized by purchaser (see 8.2.6).
- 3.2.3 If modifications, such as alloy additions or replenishments (see 8.2.10), are made by the producer at remelt, producer shall have a written procedure acceptable to purchaser that defines the controls, test, and traceability criteria for both castings and separately-cast specimens. Control factors of 4.4.2.2 shall apply.

3.3 Condition

Castings shall be delivered in the normalized condition, or, when required, in the normalized and tempered condition (see 3.5).

3.4 Test Specimens

Specimens shall be separately-cast, integrally-cast (see 8.2.7) or machined from castings, and shall conform to 3.2.

- 3.4.1 If specimens are separately-cast, producer shall have a written procedure acceptable to purchaser. Control factors of 4.4.2.2 shall apply.
- 3.4.2 Each master heat shall be qualified by evaluation of chemical, hardness, and tensile specimens.
- 3.4.2.1 If alloy additions or replenishments are made at remelt as in 3.2.3, the frequency of sampling and testing used by the producer for qualification to 3.4.2 shall be acceptable to purchaser.
- 3.4.2.2 Tensile tests of 3.4.2 are not required if these tests are conducted using integrally-cast specimens (4.3.3.2) or specimens machined from castings (4.3.3.3).

3.4.3 Chemical Analysis Specimens

Shall be of any convenient size and shape.

3.4.4 Tensile Specimens

Shall be of standard proportions in accordance with ASTM A370 with 0.250 inch (6.35 mm) diameter at the reduced parallel gage section.

- 3.4.4.1 Separately-cast and integrally-cast specimens may be either cast to size or cast oversize and subsequently machined to 0.250 inch (6.35 mm) diameter.
- 3.4.4.2 When integrally-cast specimens and specimens machined from castings are specified, specimen size and location shall be as agreed upon by purchaser and producer (see 8.2.8 and 8.6).

3.4.5 Hardness Specimens for Response to Heat Treatment

May be a representative specimen or a casting.

3.5 Heat Treatment

To produce the condition in castings for delivery, normalize, or when required, normalize and temper, in accordance with AMS-H-6875 except as specified in 3.5.1 to conform to hardness of 3.6.2.1.