



AEROSPACE MATERIAL SPECIFICATION

AMS5361

REV. F

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Superseding AMS5361E

Steel Castings, Sand and Centrifugal, Corrosion and Heat-Resistant
18.5Cr - 13.5Ni - 2.1Mo
Solution Heat Treated
(Composition similar to UNS J93072)

RATIONALE

AMS5361F results from a Five Year Review of this specification to incorporate editorial updates.

1. SCOPE

1.1 Form

This specification covers a corrosion and heat-resistant steel in the form of sand or centrifugal castings.

1.2 Application

These products have been used typically for parts requiring corrosion and heat resistance up to 1600 °F (870 °C). At elevated temperatures, strength of this steel is slightly higher than, and oxidation resistance is similar to, 18Cr - 8Ni type steels, 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.

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2.1 SAE Publications

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

AMS2360	Room Temperature Tensile Properties of Castings
AMS2635	Radiographic Inspection
AMS2645	Fluorescent Penetrant Inspection
AMS2694	In-Processr Welding of Castings
AMS2804	Identification, Castings
AMS-H-6875	Heat Treatment of Steel Raw Materials

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 A 370	Mechanical Testing of Steel Products
ASTM E 353	Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys
ASTM E 446	Reference Radiographs for Steel Castings up to 2 Inches (51 mm) in Thickness

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the following percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 353, or by spectrographic or other analytical methods approved by purchaser:

TABLE 1 - COMPOSITION

Element	min	max
Carbon	0.15	0.25
Manganese	--	2.00
Silicon	--	1.00
Phosphorus	--	0.04
Sulfur	--	0.04
Chromium	17.00	20.00
Nickel	12.00	15.00
Molybdenum	1.75	2.50
Copper	--	0.75

3.2 Condition

Solution heat treated.

3.3 Casting

A melt shall be the metal poured from a single furnace charge of 15 000 pounds (6800 kg) or less. A lot shall be all castings of the same part number poured from a single melt in not more than eight consecutive hours and solution heat treated together as a batch.

3.4 Test Specimens

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.

3.5 Heat Treatment

Castings shall be solution heat treated by heating to $1950\text{ }^{\circ}\text{F} \pm 50$ ($1065\text{ }^{\circ}\text{C} \pm 30$), holding at heat for not less than 60 minutes, and cooling in air. Furnace surveys and calibration of temperature controllers and recorders shall be in accordance with AMS-H-6875.

3.6 Properties

Castings shall conform to the following requirements; hardness and tensile testing shall be performed in accordance with ASTM A 370:

3.6.1 Hardness

Shall be not higher than 212 HB or equivalent.

3.6.2 Tensile Properties

When specified on the drawing or when agreed upon by purchaser and vendor, tensile specimens as in 4.3.3 conforming to ASTM A 370 shall be machined from locations indicated on the drawing from a casting or castings selected at random from each lot. 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 AMS2360.

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 AMS2635 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 AMS2645.

3.7.4 Radiographic, fluorescent penetrant, and other quality standards shall be as agreed upon by purchaser and vendor. ASTM E 446 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.

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 AMS2694.

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

All technical requirements of this specification are acceptance tests and are 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:

4.3.1 Two chemical analysis specimens in accordance with 3.4 from each melt or a casting from each lot.

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 lot 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 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 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, sample castings, test specimens, 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

Furnace atmosphere

Fluxing or deoxidation procedure

Gating and risering practices (sand castings only)

Mold setup and rotational speed (for centrifugal castings)

Metal pouring temperature (variation of ± 50 °F (± 30 °C) from the established limit is permissible)

Solidification and cooling procedures

Solution heat treatment cycle

Cleaning operations

Methods of inspection