

**AEROSPACE
MATERIAL
SPECIFICATION**



AMS-S-22141A

Issued NOV 1998
Cancelled JAN 2003

Superseding AMS-S-22141

Steel, Investment Castings
Alloy and Carbon

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Under Department of Defense policies and procedures, any qualification requirements and associated qualified products lists are mandatory for DOD contracts. Any requirement relating to qualified products lists (QPL's) has not been adopted by SAE and is not part of this technical report.

1. SCOPE:

1.1 Scope:

This specification covers alloy and carbon steel castings made by the investment precision casting process. (See 6.1)

1.2 Classification:

Alloy and carbon steel investment castings shall be of the composition and conditions shown in table I. (See 6.2)

TABLE I. Compositions and conditions

Composition number ¹	Conditions
IC-4130	As annealed, or heattreated
IC-4140	As annealed, or heattreated
IC-4335M	As annealed, or heattreated
IC-4340	As annealed, or heattreated
IC-4620	As annealed, or heattreated
IC-6150	As annealed, or heattreated
IC-8620	As annealed, or heattreated
IC-8630	As cast, annealed, or heattreated
IC-8735	As annealed, or heattreated
IC-8640	As annealed, or heattreated
IC-52100	As annealed, or heattreated
IC-Nitralloy 135	Heattreated
IC-1020	As cast or annealed
IC-1030	As cast, annealed, or heattreated
IC-1040	As cast, annealed, or heattreated
IC-1050	As cast, annealed, or heattreated

¹ Not identical to similar wrought metal designations.

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

2.2 ASTM Publications:

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

ASTM E 8 Tension, Testing of Metallic Materials, Methods of
ASTM E 18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials, Test for
ASTM E 192 Investment Steel Castings for Aerospace Applications, Reference Radiographs of

2.3 ANSI Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ANSI B 46.1 Surface Texture; Surface Roughness, Waviness and Lay

2.4 NAS Publications:

Available from National Standards Association, 1321 14th Street, NW, Washington , D.C. 20005.

NAS 823 Surface Comparison Standard

2.5 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MMM-A-260 Adhesive, Water-resistant, (For Sealing Waterproofed Paper)
PPP-B-566 Box, Folding, Paperboard
PPP-B-585 Box, Wood, Wireboard
PPP-B-601 Box, Wood, Cleated-Plywood
PPP-B-621 Box, Wood, Nailed and Lock-Corner
PPP-B-636 Box, Shipping, Fiberboard
PPP-B-676 Box, Setup
PPP-C-1120 Cushioning Material; Uncompressed Bound Fiber for packaging
PPP-T-76 Tape, Pressure-Sensitive, Adhesive Paper, (For Carton Sealing)

MIL-P-116 Preservation-packaging, Methods of
MIL-B-121 Barrier Material, Greaseproofed, Waterproofed, Flexible
MIL-C-6021 Casting, Classification and Inspection of

FED-STD-151 Metal, Test Methods
FED-STD-356 Commercial Packaging of Supplies and Equipment

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129 Marking for Shipment and Storage
MIL-STD-271 Nondestructive Testing Requirements for Metals

2.6 Uniform Classification Committee Agency:

Available from Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.

Uniform Freight Classification Rules

3. REQUIREMENTS:

3.1 Process:

Castings shall be made by an investment process producing castings complying with this specification (see 4.1.1).

3.1.1 Initial production castings: When specified, castings from initial production shall be forwarded to a testing activity designated in the contract or order (see 4.1.2 and 6.2).

3.2 Chemical composition:

The chemical analysis of castings shall comply with table II for the composition specified (see 6.2).

3.2.1 The contractor shall furnish an analysis of each master heat (not to exceed 10,000 pounds) used to provide molten metal or remelting stock. A production heat results from the remelting of a portion of a master heat. When alloying elements other than required for carburizing or deoxidizing are added to production heats, these heats shall be considered master heats.

3.3 Condition:

3.3.1 Annealed or normalized and tempered: Castings shall be furnished in the annealed or the normalized and tempered condition specified in table III.

3.4 Response to heat treatment:

Tensile specimens cut from sample castings or coupons shall be capable of meeting the mechanical properties of table III after oil quenching and tempering as appropriate for the respective composition. Water quenching is not permissible except for the low carbon compositions, nor tempering at temperatures below 700 °F unless otherwise specified. Mechanical properties of castings required for conditions other than shown in table III shall be as specified in the contract or order (see 6.2) or on the drawing for the castings.

3.5 Surface roughness:

When specified, roughness of surfaces shall not exceed 125 roughness height rating. Surface roughness shall be interpreted in accordance with the provisions of ANSI B 46.1.