AEROSPACE MATERIAL SPECIFICATION

AMS2175™	REV. B

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Superseding AMS2175A

Castings, Classification and Inspection of

RATIONALE

AMS2175B results from a Five-Year Review and update of this specification with replacement of ARP1917 with AS7766 (see 2.5), new definitions (see 2.5.5 and 2.5.15), changes to Surface Characteristics (see 3.4.1.1), changes to Gate Riser and Parting Line Projections (see 3.4.1.3), and changes to Surface Pits and Raised Metal (see 3.4.1.4.1 and 3.4.1.4.2).

1. SCOPE

1.1 Purpose

This specification establishes nondestructive testing methods, sampling frequency, and acceptance criteria for the inspection of metal castings.

1.2 Application

This specification has been used typically for structural castings, but usage is not limited to such applications.

1.2.1 Casting Methods

This specification is intended to apply to all casting methods except high pressure die castings (see 8.2).

1.2.2 Casting Alloys

This specification is intended to apply to all casting alloys covered in Tables 7 through 15. Other alloys may be inspected to this standard as described in 3.4.3.2 using criteria specified by the cognizant engineering organization.

1.3 Classification

Castings that are inspected in accordance with this specification are designated by classes and applicable grades. The “Casting Class” governs the frequency of inspection (see 3.1 and 4.3), while the “Casting Grade” controls the acceptance criteria (see 3.1 and 3.4).

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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For more information on this standard, visit
https://www.sae.org/standards/content/AMS2175B

1.3.1 Classes

Class 1 - A casting, the single failure of which would endanger the lives of operating personnel, or cause the loss of a missile, aircraft, or other vehicle.

Class 2 - A casting, the single failure of which would result in a significant operational penalty. In the case of missiles, aircraft, and other vehicles, this includes loss of major components, unintentional release, or inability to release armament stores, or failure of weapon installation components.

Class 3 - Castings not included in Class 1 or Class 2 and having a margin of safety of 200% or less.

Class 4 - Castings not included in Class 1 or Class 2 and having a margin of safety greater than 200%.

1.3.2 Grades

Castings, or sections of a casting, shall be of the following grades:

Grade A - The highest quality grade of casting, or area of a casting, with minimum allowable discontinuities and very difficult to produce except in local areas.

Grade B - The second highest quality grade of casting, or area of a casting, which allows slightly more discontinuities than Grade A, and difficult to produce, except in local areas.

Grade C - A high quality grade of casting, or area of a casting, that can be consistently produced.

Grade D - The lowest quality grade of a casting, or area of a casting, that is easily produced and is used primarily for low stress or noncritical areas adjacent to the higher graded areas.

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.

AS7766 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 A802 Steel Acceptance Standards, Visual Examination

ASTM E155 Reference Radiographs for Inspection of Aluminum and Magnesium Castings

ASTM E186 Reference Radiographs for Heavy-Walled (2 to 4 1/2-in. (50.8 to 114-mm)) Steel Castings

ASTM E192 Reference Radiographs of Investment Steel Castings for Aerospace Applications

ASTM E272 Reference Radiographs of High-Strength Copper-Base and Nickel-Copper Alloy Castings

ASTM E280 Reference Radiographs for Heavy-Walled (4 1/2 to 12 -in. (114 to 305-mm)) Steel Castings

ASTM E310 Reference Radiographs for Tin Bronze Castings

ASTM E446 Reference Radiographs for Steel Castings up to 2 in. (50.8 mm) in Thickness

ASTM E1255 Radioscopy

ASTM E1320 Reference Radiographs for Titanium Castings

ASTM E1417 Liquid Penetrant Testing

ASTM E1444 Magnetic Particle Testing

ASTM E1742 Radiographic Examination

ASTM E2033 Radiographic Examination Using Computed Radiology (Photostimulable Luminescence Method)

ASTM E2104 Radiographic Examination of Advanced Aero and Turbine Materials and Components

ASTM E2422 Digital Reference Images for Inspection of Aluminum Castings

2.3 NAS Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NAS 410 Certification & Qualification of Nondestructive Test Personnel

2.4 ANSI Accredited Publications

Copies of these documents are available online at https://webstore.ansi.org/.

ANSI/MSS SP-55 Quality Standard for Steel Castings for Valves, Flanges, Fittings, and Other Piping Components – Visual Method for Evaluation of Surface Irregularities

2.5 DEFINITIONS

Terms used in AMS are defined in AS7766 and as follows:

2.5.1 CHAPLET

Metal core support that is used in the mold cavity and fuses into the casting.

2.5.2 COLD SHUT

An imperfect junction between two flows of metal in a mold caused by the surface of the streams of molten metal chilling too rapidly such that complete fusion does not occur. This discontinuity may have the appearance of a crack or lap with smooth or rounded edges.

2.5.3 CORE SHIFT

Movement of a casting core such that a change in position can be discerned. Cores are portions of the mold that may create internal passageways or other casting features.

2.5.4 CRACK

A separation (rupture or fracture) of metal that was once joined in the solid state and produces a linear indication observed during nondestructive testing. See “cold shut” and “hot tear” for examples of other discontinuities that also produce linear indications.