SAE Aerospace
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AEROSPACE STANDARD

SAE AS586 | REV. B

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Wheel and Brake (Sand and Permanent Mold) Castings - Minimum Requirements for Aircraft Applications

NONCURRENT NOTICE

This specification has been declared "NONCURRENT" as of January 2005. It is recommended, therefore, that this document not be specified for new designs.

Each of these "NONCURRENT" documents is available from SAE.

AS586 is inactive for use in new designs. This document will be retained for historical record only. For the inspection and classification of castings used in aircraft wheel and braking systems, refer to AMS 2175 - Castings, Classification and Inspection of. The design authority shall specify the class and grade of casting in accordance with AMS 2175.

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FOREWORD

Changes in this reaffirm are format/editorial only.

1. SCOPE:

This SAE Aerospace Standard (AS) sets forth the minimum quality required for aircraft wheel and brake castings. Its use will establish minimum acceptable requirements for internal structure and surface conditions and is predicated on the use of a casting factor for the ultimate load of more than 1.51 through 2.00. When casting factors of 1.25 through 1.50 are used, visual, penetrant, and radiographic or other approved equivalent nondestructive inspection methods shall all be required on each production casting. Where specific parts, or areas of parts, require a quality level exceeding that described by this document, the requirements shall be established by negotiation between the purchaser and vendor.

1.1 Purpose:

To establish minimum quality and inspection requirements for magnesium and aluminum wheel and brake (sand and permanent mold) castings for use on aircraft.

2. APPLICABLE DOCUMENT:

The following publication forms a part of this specification to the extent specified herein. The applicable issue shall be the issue in effect on the date of the purchase order.

2.1 ASTM Publication:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM E 155 Radiographic Standards

3. QUALIFICATION CASTINGS:

Castings used during the qualification test shall meet the minimum requirements set forth in this document.

4. PRODUCTION CASTINGS:

Castings produced after qualification shall meet the minimum requirements set forth in this standard and, in addition, shall meet the limiting requirements agreed upon between the purchaser and the vendor for designated areas.

5. CASTING RECORDS:

5.1 Castings shall be identified by melt and heat treat batch numbers. When steel stamping is used, it shall be in specified locations.

5.2 Reports showing conformance to applicable material specifications (SAE, Federal, Air Force, Navy, or manufacturer) shall be submitted to the purchaser of the castings. Tensile properties shall be determined from standard separately cast test bars or from specimens removed from production castings as agreed upon between the purchaser and vendor. The report shall include:

a. Chemical analysis of sample from each melt
b. Ultimate tensile strength
c. Tensile yield strength
d. Elongation

6. QUALITY STANDARD:

6.1 The following discontinuities in the finished part shall be cause for rejection:

a. Cracks
b. Shrinkage cavities
c. Misruns
d. Cold shuts

6.2 The following discontinuities in the finished part shall be cause for rejection if they exceed the indicated limits using ASTM E 155 as a basis for the degree of defect.

6.2.1 Aluminum Castings:

a. Gas Porosity: Film 2
b. Shrinkage Cavity: Film 3
c. Shrinkage Sponge: Film 3
d. Gas Holes: Film 3
e. Foreign Material (Less Dense): Film 2
f. Foreign Material (More Dense): Film 2
g. Segregations: Film 2

6.2.2 Magnesium Castings:

a. Gas Holes: Film 4
b. Micro Shrinkage (Feathery): Film 3
c. Micro Shrinkage (Sponge): Film 2
d. Inclusions (Less Dense): Film 4
e. Inclusions (More Dense): Film 2
f. Segregations: Film 2

6.2.3 Additional Requirements for Rare Earth Magnesium Alloys:

a. Eutectic Segregation (Microshrinkage type): Vol. II Film 6
b. Gravity Segregation: Vol. II Film 4
c. Reacted Sand Inclusions: Vol. II Film 4
d. Flow Line: Not to exceed Vol. II film
e. Hot Tear: Not to exceed Vol. II film
f. Pipe: Not to exceed Vol. II film

7. ESTABLISHING MINIMUM QUALITY OF CASTINGS:

7.1 Radiographic examination of initial castings shall be performed to develop foundry techniques that are capable of producing castings which will meet the requirements of the standard. For magnesium castings fracture examinations may be substituted based on standards established in Section 6.

7.2 Production techniques in foundry practice, gating, etc., shall not be significantly changed after a suitable casting technique has been established, except when authorized by the purchaser, and after sample castings made with the change(s) of techniques have been checked and approved in accordance with 7.1.

8. MINIMUM INSPECTION FOR QUALITY CONTROL OF PRODUCTION CASTINGS:

8.1 Visual Inspection:

Each casting shall be inspected visually.

8.2 Penetrant Inspection:

8.2.1 When penetrant inspection is used as the quality control method, it shall be performed on finish machined castings.

8.2.2 When penetrant inspection is used as the quality control method, it shall be performed in accordance with AMS 2645 or another specification as agreed upon between the purchaser and the vendor.

8.2.3 After quality history is established by using Section 7, a valid penetrant sampling plan no less critical than described in Section 10 shall be applied when the penetrant method is used as a quality control method.

8.3 Radiographic Inspection:

8.3.1 Radiographic inspection may be used instead of the penetrant inspection method and may be accomplished before machining.

8.3.2 When radiographic inspection is used as the quality control method, it shall be performed in accordance with AMS 2635 or another radiographic specification as agreed upon between the purchaser and the vendor.

8.3.3 After quality control history has been established by using Section 7, a valid radiographic sampling plan no less critical than described in Section 10 shall be applied when the radiographic method is used as a quality control method.

8.4 Fracture Inspection:

Where fracture examination has been used to establish minimum quality, per Section 7, its use should be continued to supplement the above inspection techniques. Machine scrap or foundry rejects with incidental defects may be used for this purpose.

8.5 Repair of Castings:

The foundry shall perform only those repairs approved by the purchaser. Repair in critical areas shall be marked and radiographic evidence submitted to show acceptability of the repaired area.