SLOVENSKI STANDARD
SIST EN 2076-3:2001

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Aerospace series - Aluminium and magnesium alloy ingots and castings - Technical specification - Part 3: Pre-production and production castings

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Luft- und Raumfahrt - Blöcke und Gußstücke aus Aluminium- und Magnesiumlegierungen - Technische Lieferbedingungen - Teil 3: Ausfallmuster und Seriengußstücke

Série aérospatiale - Lingots et pieces moulées en alliages d'aluminium et de magnésium - Spécification technique - Partie 3: Pieces types et pieces de série

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English version

Aerospace series
Aluminium and magnesium alloy ingots and castings
Technical specification
Part 3 : Pre-production and production castings

Série aérospatiale
Lingots et pièces moulées en alliages d'aluminium et de magnésium
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This European Standard was accepted by CEN on 1988-07-20. CEN members are bound to comply with the requirements of CEN Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to CEN Central Secretariat has the same status as the official versions.

CEN members are the national standards organizations of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat : Rue Bréderode 2, B—1000 Bruxelles

Brief history

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After inquiries and votes carried out in accordance with the rules of this Association, this Standard has successively received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

According to the Common CEN/CENELEC Rules, the following countries are bound to implement this European Standard : Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Contents

1 Scope and field of application

This standard specifies the particular requirements for castings in aluminium and magnesium alloys produced from material complying with EN 2076-2.

This standard also applies to pre-production castings intended for the qualification of the method of manufacture and inspection.

This standard shall be used in conjunction with EN 2076-1.

2 References

EN 2002-1, Aerospace series - Test methods for metallic materials - Part 1 - Tensile testing at ambient temperature [1)]

EN 2002-7, Aerospace series - Test methods for metallic materials - Part 7 - Hardness tests [1)]

EN 2002-16, Aerospace series - Test methods for metallic materials - Part 16 - Dye penetrant testing [1)]

EN 2002-21, Aerospace series - Test methods for metallic materials - Part 21 - Radiographic testing of cast components [1)]

EN 2004-4, Aerospace series - Test methods for aluminium and aluminium alloys - Part 4 - Stress corrosion test method for high strength aluminium alloy wrought products. Alternate immersion [1)]

EN 2076-1, Aerospace series - Aluminium and magnesium alloy ingots and castings - Technical specification - Part 1 - General requirements

EN 2076-2, Aerospace series - Aluminium and magnesium alloy ingots and castings - Technical specification - Part 2 - Ingots for remelting

1) In preparation

3 Casting development

It is strongly recommended that the technical representative of the manufacturer be given the opportunity to examine the casting drawing at the initial stages of design and to advise on the optimum design which will facilitate consistent production of acceptable castings.

The dimensional tolerances of the castings shall be as agreed between the purchaser and manufacturer and indicated on the drawing or the inspection schedule.

4 Pre-production castings

4.1 General

4.1.1 The following requirements shall be specified on the order, drawing and/or inspection schedule in addition to those specified in EN 2076-1 :

- Number of castings to be examined
- Who shall perform the examination
- Heat treatment condition
- Type and frequency of inspection and testing necessary to evaluate and qualify the manufacturing process (dimensions, mechanical and metallurgical properties, etc.).

4.1.2 The inspection and testing of pre-production castings shall be carried out and the inspection and testing conditions shall be recorded to allow the definition of the optimum techniques to be used for production castings.

4.1.3 The inspection and tests carried out on pre-production castings shall include those which will be carried out on production castings.

4.2 Inspection and testing report

In addition to the information required by EN 2076-1, the inspection and testing report on the pre-production castings shall provide all technical information to allow evaluation of the quality of these parts, e.g., radiographs, results of dimensional measurements ...

4.3 Acceptance of pre-production castings

When all inspection and test results relative to pre-production castings have been reported and considereded as satisfactory by the purchaser and manufacturer, the purchaser shall give his written agreement or order for series production.

The inspection schedule and if required the manufacturing schedule shall be agreed between the manufacturer and purchaser.

5 Manufacture of production castings

5.1 At the start of production (particularly at the start of series production), the manufacturing schedule may be completed to allow the manufacturer to guarantee the reproducibility of the product with more certainty.

All information, no matter how minor, shall be recorded in the manufacturing schedule.

5.2 When a manufacturing schedule has been agreed, no change in manufacturing method shall be made without the written approval of the purchaser.

When such changes are necessary in the case of, for example :

a) Alterations of pattern, mould material or position of runners and risers,

b) Alteration of the casting process,

c) Alterations of the heat treatment process,

the purchaser shall decide if new pre-production castings shall be manufactured and tested.

The manufacturing schedule and the inspection schedule shall be modified if necessary.

5.3 Any change of the casting requiring a revised drawing may require at the purchaser's or manufacturer's request :

- manufacturing of new pre-production castings, or
- modification of the manufacturing schedule and/or the inspection schedule.

5.4 Manufacturing schedules and inspection schedules, which are modified during production shall be subjected to the same approval process as the original documents.

5.5 Approved scrap may be added to the melt at the discretion of the manufacturer up to the maximum amount specified on the manufacturing schedule.

5.6 Correction of distortion shall be carried out only by agreement between the manufacturer and the purchaser. The manufacturer shall be responsible for specifying the conditions under which such correction is to be carried out, subject to any provisions made by the purchaser. The method agreed shall be incorporated in the manufacturing schedule.

After correction of distortion the castings shall be examined by penetrant flaw detection as per clause 6.3.

6 Inspection and testing of production castings

Inspection and testing shall be carried out on production castings under the same conditions as applied to pre-production castings.

6.1 Dimensions and tolerances

The dimensions specially indicated by the purchaser shall be checked on every casting.

For other dimensions the frequency of examination adopted by the manufacturer shall be sufficient to permit him to certify compliance with the requirements.

6.2 Chemical analysis

In addition to EN 2076-1, the manufacturer shall perform sufficient analysis throughout the casting cycle to ensure that the composition of all the castings will conform to the requirements of the material standard.

6.3 External defects

6.3.1 . Castings shall be suitably fettled and cleaned to enable inspection to be carried out in a satisfactory manner.

6.3.2 Each casting shall be examined for surface defects by visual inspection and by penetrant flaw detection after all specified heat treatment and pressure testing is completed. Penetrant testing shall be carried out in accordance with the requirements of EN 2002-16.

Castings shall be free from cracks and cracklike indications. For other indications the acceptance level is detailed on the inspection schedule, if necessary.

6.3.3 Surface defects may be removed by local dressing provided the castings are subsequently within the dimensional tolerances. Dressing shall be followed by penetrant flaw detection in accordance with clause 6.3.2.

6.4 Internal defects

Castings shall be radiographically examined in accordance with EN 2002-21. The technique and frequency to be used shall be agreed and specified on the drawing or inspection schedule. The radiographic standard of acceptance shall conform to grade B of table 2 (Al-alloys) and table 3 (Mg-alloys), unless otherwise specified on the drawing or inspection schedule, by reference to a quality level of table 1, or to alternative general or localised levels agreed and defined on the drawing or in the inspection schedule.

Unless otherwise agreed, all radiographs shall be forwarded to the purchaser, suitably identified to the castings they represent.

6.5 Tensile testing

6.5.1 Number, selection and preparation of test samples for tests and re-tests

6.5.1.1 Test samples for tests required by the drawing or inspection schedule, shall be obtained by one or more of the following methods as agreed between the manufacturer and the purchaser and indicated on the drawing or inspection schedule referring to a quality level of table 1 :