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EUROPEAN STANDARD  
 NORME EUROPÉENNE  
 EUROPÄISCHE NORM

**EN 2076**

Part 1

November 1989

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Key words : Aircraft industry, castings, ingots, aluminium alloys, magnesium alloys, manufacturing, specifications, tests, inspection

**English version**

**Aerospace series  
 Aluminium and magnesium alloy  
 ingots and castings  
 Technical specification  
 Part 1 : General requirements**

**Série aérospatiale  
 Lingots et pièces moulées  
 en alliages d'aluminium et de magnésium  
 Spécification technique  
 Partie 1 : Exigences générales**

**Luft- und Raumfahrt  
 Blöcke und Gußstücke aus  
 Aluminium- und Magnesiumlegierungen  
 Technische Lieferbedingungen  
 Teil 1 : Allgemeine Anforderungen**

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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, Luxembourg, 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).

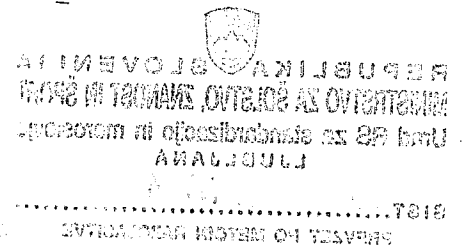
After inquiries and votes carried out in accordance with the rules of this Association, this Standard has successively received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

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.

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## 1 Scope

This standard defines the general requirements for the manufacture, inspection and testing of aluminium and magnesium alloy ingots and castings.

Particular requirements applicable to ingots and castings are defined in EN 2076-2 and EN 2076-3 respectively.

Unless otherwise specified on the drawing, order or inspection schedule the reference to EN 2076 only defines one quality level which is quality level 3 in table 1 of EN 2076-3.

## 2 Field of application

Unless otherwise specified on the drawing, order or inspection schedule this standard shall be applied when referenced in the relevant EN material standard.

By agreement between the purchaser and manufacturer it may also be applied to other materials or delivery conditions not covered by EN standards. The agreements shall be formalized by reference to this standard on the drawing, order or inspection schedule.

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## 3 References

- EN 2076-2, Aerospace series - Aluminium and magnesium alloy ingots and castings - Technical specification - Part 2 - Ingots for remelting
- EN 2076-3, Aerospace series - Aluminium and magnesium alloy ingots and castings - Technical specification - Part 3 - Pre-production and production castings
- EN 2078, Manufacturing schedule, inspection schedule and inspection report - General definitions - Aerospace series.

## 4 Definitions

### 4.1 Ingot

Semi-finished product intended for melting, obtained by solidification of liquid metal from a cast.

### 4.2 Cast (term used for ingots)

4.2.1 Metal taken from the same furnace or from the same ladle or from several furnaces and mixed in the same furnace or in the same ladle before pouring.

4.2.2 Where a continuous melting process is used, a cast may be defined as metal taken from the furnace before the next following charge.

### 4.3 Melt (term used for castings)

Metal taken from the same furnace or from the same ladle, or from several furnaces and mixed in the same furnace or in the same ladle before pouring.

### 4.4 Batch

A batch consists of ingots for remelting or castings:

- of the same form and of the same nominal dimensions or of the same drawing number, and
- from the same cast for ingots or from the same melt for castings, and
- from the same heat treatment charge.

### 4.5 Approved scrap

Approved scrap is defined as that scrap which arises from the casting manufacturer's own production from material which is segregated and identified with certainty. It may include headers, runners and heavy fettling scrap, but shall exclude all small particles.

### 4.6 Precision castings

Castings produced by an investment process or any similar process.

Investment process castings : castings obtained by means of a process using moulds obtained from models in waste wax.

#### 4.7 Sand castings

Castings made by a process involving the moulding of a pattern with a suitably bonded sand.

#### 4.8 Chill castings

Castings made by introducing molten metal by gravity or low pressure into a metal mould.

#### 4.9 Pre-production castings

Castings produced to a particular design which qualify the method of manufacture and mould configuration and demonstrate that the requirements of the purchaser can be met.

#### 4.10 Inspection schedule

See EN 2078.

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#### 4.11 Manufacturing schedule (standards.iteh.ai)

See EN 2078.

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#### 4.12 Inspection and testing report

See EN 2078.

#### 4.13 "Capability clause"

Certain test requirements can be met on the basis of the "capability clause".

Reference to "capability clause" signifies that sufficient evidence of a statistical nature with respect to the properties under consideration can be submitted to show that the requirements of the relevant standard will be met on the basis of a reduced amount of testing. Such action in no way reduces the obligations of the manufacturer to fulfil all requirements. If subsequent testing indicates that a product does not comply with the requirements the batch shall be rejected.

## 5 Manufacture

5.1 Castings shall be made from ingots complying with the relevant material standard and EN 2076-2.

5.2 Unless otherwise specified, the manufacturing technique shall be at the discretion of the manufacturer.

5.3 Conformance with the requirements of the purchaser shall be demonstrated by the manufacture and inspection and testing of pre-production castings as required by EN 2076-3.

5.4 The products shall be supplied in the heat treatment condition specified in the material standard. If otherwise agreed or if there is more than one heat treatment condition in the material standard, the condition of supply shall be specified on the order or drawing.

If a specific heat treatment temperature (value and tolerance) is stated, that temperature shall be mandatory.

If a heat treatment temperature range is stated, a temperature within that range reduced by the furnace tolerances shall be selected to give the required properties.

Unless otherwise specified, the charge shall be maintained at the temperature subject to the tolerances of  $\pm 5^\circ\text{C}$  for the period stated.

## 6 Traceability

Each product shall be identifiable as to its cast and melt and if appropriate, heat treatment batch at all stages of manufacture and delivery.

## 7 Freedom from defects

The products shall be free from harmful defects to subsequent use and not withstanding previous acceptance of products complying with this standard; any product that is found, at a later stage, to contain such defects may be rejected.



## 8 Testing

The tests required by the material standard, the order, or inspection schedule, shall be made in accordance with the requirements of the appropriate test standard. If a test standard does not exist the method to be used shall be agreed between manufacturer and purchaser.

Unless otherwise specified on the order, drawing or inspection schedule, the frequency of sampling shall be as given in EN 2076-2 or EN 2076-3.

The location of test samples shall be as indicated on the drawing or inspection schedule.

The test samples and associated test pieces shall be marked in such a manner as to ensure that their identity and location with respect to the product and the batch is maintained.

### 8.1 Chemical analysis

8.1.1 The chemical composition of the delivered product shall comply with the requirements of the relevant material standard.

8.1.2 The chemical composition of each cast and melt shall be determined. The samples taken for analysis shall be representative of the cast or the melt. The method of analysis shall be selected by the manufacturer but in case of dispute, the method set out in the relevant ISO standard shall be used. If no ISO standard exists, a fundamental method of chemical analysis shall be used.

8.1.3 Elements not quoted in the material standard shall not be intentionally added to the alloy without the agreement of the purchaser except for the purpose of fluxing or degassing. Precautions shall be taken to prevent their inclusion during manufacture and to avoid contamination. For special applications, such as modification, the purchaser, by agreement with the manufacturer, may set a limit to the amount of one or more such elements and may require the amount to be stated on the Certificate of Conformance.

8.1.4 No further additions shall be made to a cast or melt after the final analytical sample has been taken.