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Magnesium and magnesium alloys — Unalloyed magnesium — Chemical composition

Magnésium et alliages de magnésium — Magnésium non allié — Composition chimique

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Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 79, *Light metals and their alloys*, Subcommittee SC 5, *Magnesium and alloys of cast or wrought magnesium*.

This fourth edition cancels and replaces the third edition (ISO 8287:2011), which has been technically revised.

The main changes compared with the previous edition are as follows:

a) in the Introduction and Clause 2, EN 12421:1998 has been replaced by EN 12421:2017;

b) four new grades of cast unalloyed magnesium have been added in Table 1, namely ISO Mg99,95C, ISO Mg99,995A, ISO Mg99,995B and ISO Mg99,995C.

Introduction

This document classifies commercially available cast unalloyed magnesium into a number of grades suitable for the applications for which they might be used. The grades listed in this document are identical to those in EN 12421:2017.

Magnesium and magnesium alloys — Unalloyed magnesium — Chemical composition

1 Scope

This document specifies the chemical composition of cast unalloyed magnesium. It specifies classification, designation, testing rules, marking, packing, transportation, storage, and information subject to agreement between the manufacturer and the purchaser.

This document applies to cast unalloyed magnesium produced by the silicon-thermo process or molten salt electrolysis process.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 80000-1:2009, *Quantities and units — Part 1: General*

EN 12421:2017, *Magnesium and magnesium alloys — Unalloyed magnesium*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
unalloyed magnesium
magnesium with a minimum purity of 99,0 % mass fraction

3.2
cast unalloyed magnesium
unalloyed magnesium (3.1) cast in a variety of shapes

4 Information to be supplied by the purchaser

The enquiry and order shall define the product required and shall contain the following information:

a) material designation;

b) product shape;

c) quantity (for example number, mass, etc.);

d) any requirements for declarations of conformity;

e) any additional requirements agreed between the manufacturer and the purchaser.

5 Designation

The material shall be designated by the appropriate symbols given in Table 1.

Table 1 — Chemical composition of cast unalloyed magnesium

Material designation		Chemical composition/% mass fraction												
In accordance with ISO system	In accordance with EN 12421	Al	Mn	Si	Fe	Cu	Ni	Pb	Sn	Na	Ca	Zn	Others[a] (each)	Mg[b]
		no more than, ≤												no less than, ≥
ISO Mg99,5	EN-MB99,5	0,1	0,1	0,1	0,1	0,1	0,1	—	—	0,01	0,01	—	0,05	99,5
ISO Mg99,80A	EN-MB99,80-A	0,05	0,05	0,05	0,05	0,02	0,001	0,02	0,01	0,003	0,003	0,05	0,05	99,80
ISO Mg99,80B	EN-MB99,80-B	0,05	0,05	0,05	0,05	0,02	0,002	0,02	0,01	—	—	0,05	0,05	99,80
ISO Mg99,80C	EN-MB99,80-C	0,05	0,1	0,02	0,004	0,005	0,001	—	—	—	—	—	0,01	99,80
ISO Mg99,90	EN - MB99,90	0,02	0,03	0,03	0,04	0,004	0,001	—	—	—	—	—	0,01	99,90
ISO Mg99,95A	EN-MB99,95-A	0,01	0,006	0,006	0,003	0,005	0,001	0,005	0,005	0,003	0,003	0,005	0,005	99,95
ISO Mg99,95B	EN-MB99,95-B	0,015	0,015	0,015	0,005	0,005	0,001	0,005	0,005	—	—	0,01	0,005	99,95
ISO Mg99,95C	—	0,005	0,006	0,005	0,03	0,002	0,001	0,005	0,005	—	—	0,005	0,005	99,95
ISO Mg99,98	EN-MB99,98	0,004	0,002	0,003	0,002	0,000 5	0,000 5	0,001	0,004	—	—	0,004	0,005	99,98
ISO Mg99,99	EN-MB99,99	0,002	0,002	0,003	0,002	0,000 3	0,000 3	0,002	0,002	—	—	0,003	0,003	99,99
ISO Mg99,995A	—	0,000 5	0,000 5	0,001	0,001	0,000 3	0,000 2	0,001	0,000 5	—	—	0,002	0,002	99,995
ISO Mg99,995B	—	0,000 5	0,001	0,001	0,001	0,000 3	0,000 2	—	—	0,001	0,002	0,002	0,002	99,995
ISO Mg99,995C	—	0,001	0,001	0,001	0,001	0,000 3	0,000 2	—	—	—	—	0,002	0,002	99,995

[a] The sum of the mass percentages of Cd, Hg, As and Cr should be less than 0,01 %. For products used in the food and medicine fields, these four elements shall be inspected.

[b] By difference.

6 Manufacture

The manufacturing process shall be left to the discretion of the manufacturer unless otherwise agreed at the time of ordering.

NOTE The manufacturing process covers all operations up to the delivery of the product.

7 Chemical composition

The chemical composition of cast unalloyed magnesium shall conform to the requirements for the appropriate material given in Table 1.

Unless otherwise specified in the enquiry and order, the chemical composition of the cast unalloyed magnesium shall relate to that of samples taken from the melt at the time of pouring.

8 General condition of the product

The product shall have a clean surface in accordance with the agreement between the manufacturer and the purchaser, and shall be free from visible and internal defects to a level also agreed between the manufacturer and the purchaser.

9 Testing conditions

9.1 Inspection and acceptance

9.1.1 The product quality certificate should be filled in by the supplier.

9.1.2 The purchaser should retest the products received. If the results of the retest do not conform to this document or the purchase order, the purchaser should inform the supplier within 3 months from the date the products were received, and a solution should be reached between the supplier and the purchaser.

9.2 Batches

Pure magnesium should be submitted to testing in batches; each consignment should be from the same issue of the melting furnace products. No limits exist on the weight of each single consignment.

10 Testing

Analysis to ensure conformity with the chemical composition requirements given in Table 1 shall be carried out on samples taken by the manufacturer and representative of the material delivered. Test method of analysis shall be subject to an agreement between the manufacturer and the purchaser.

11 Rounding of results

In recording the results of the chemical analysis, the result obtained for any property specified in this document shall be expressed to the same number of decimal places as the corresponding value in this document. Rounding shall be carried out as specified in ISO 80000-1:2009, B.2 and B.3. In B.3, it is left to the discretion of the manufacturer as to whether to use Rule A or B, unless the use of one of the rules has been agreed at the time of acceptance of the order.

12 Declaration of conformity and inspection documents

If agreed between the manufacturer and the purchaser or when specified on the order, the manufacturer shall provide a declaration of product conformity or an inspection document listing the results of the analysis of the chemical elements given in Table 1, and of any other element which may have been previously agreed upon.

13 Marking

Unless otherwise agreed, each product, or bundle of products, shall be clearly marked with the following:

a) manufacturer's identification, molten furnace number, and mark of test on each ingot;

b) each bundle should have a bright colour, waterproofing, a label that does not fall off easily and on which is clearly marked the smelting number, bunch of numbers, net weight, number of ingots, designation, manufacturing date, place of origin, and manufacturer's logo.

The method of marking is left to the discretion of the manufacturer. Markings shall be indelible and shall not be a source of contamination.

14 Packing

Unless otherwise agreed by the supplier and the purchaser, the pure magnesium ingot should

a) be packed on a pure magnesium metal plate or a dry wooden plate,

b) be covered and wrapped by a whole plastic film, then enlaced by PVC belts,

c) contain pure magnesium ingots from a maximum of two smelting numbers in each bunch, and

d) contain 1 000 kg ± 50kg or 500 kg ± 20 kg of pure magnesium ingots in each bunch.

15 Transportation

The pure magnesium ingots should use rainproof vehicles or vehicles equipped with rainproof applications or clean containers for the transportation. Special care should be taken when loading and unloading during rain and when the ingots are dripping wet.

16 Storage

The pure magnesium ingots should be stored in a dry, clean, ventilated warehouse which contains no corrosive medium.

17 Quality certificate

Each batch of products should have a quality certificate attached, indicating the following:

a) supplier's name;

b) designation;

c) batch number;

d) net weight and ingot number;

e) the analysis and test results;

f) the reference number of this document, i.e. ISO 8287.

18 Complaints

In the event of any product complaints, the manufacturer shall examine the validity of the complaint within a reasonable time.

Complaints may only be raised against defective products if the defect impairs their processing and use to a more than negligible extent. This shall apply unless otherwise agreed at the time of acceptance of the order.

The purchaser shall give the manufacturer the opportunity to judge whether the complaints are justified.

