

BS EN 12421:2017



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Magnesium and magnesium alloys — Unalloyed magnesium

National foreword

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European foreword

This document (EN 12421:2017) has been prepared by Technical Committee CEN/TC 190 “Foundry Technology”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2017, and conflicting national standards shall be withdrawn at the latest by September 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12421:1998.

Within its programme of work, Technical Committee CEN/TC 190 requested CEN/TC 190/WG 9 “Cast magnesium” to revise:

EN 12421:1998, *Magnesium and magnesium alloys — Unalloyed magnesium*

Annex B provides details of significant technical changes between this European Standard and the previous edition.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard classifies cast unalloyed magnesium into a number of grades suitable for the applications for which they might be used.

Four new grades of cast unalloyed magnesium, as specified in ISO 8287:2011 [3], has been added.

In this European Standard a new designation system by number, as established in EN 1754 [1], is given.

NOTE This designation system by number is based on the structure and rules of EN 10027-2 [2] and so corresponds with the European numbering system for steel and other materials.

1 Scope

This European Standard specifies the grades and corresponding requirements for cast unalloyed magnesium.

This European Standard specifies the chemical composition, designation, testing, marking and inspection documentation.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 10204, *Metallic products - Types of inspection documents*

EN ISO 80000-1:2013, *Quantities and units - Part 1: General (ISO 80000-1:2009 + Cor 1:2011)*

3 Terms and definitions

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

3.1

unalloyed magnesium

material where the minimum magnesium content is 99,0 % (mass fraction)

3.2

cast unalloyed magnesium

unalloyed magnesium processed in various moulds

4 Designations

The material shall be designated either by symbol or by number, as given in Table 1.

NOTE The comparison of EN 12421 grade designations with the designations from the ISO standard for unalloyed magnesium, ISO 8287 [3], is given in Annex A.

5 Order information

The following information shall be supplied by the purchaser:

- a) the number of this European Standard;
- b) the designation of the material;
- c) product shape;
- d) quantity (e.g. number, mass, etc.);
- e) any special requirements.

All requirements shall be agreed between the manufacturer and the purchaser by the time of acceptance of the order.

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 Requirements

7.1 Chemical composition

The chemical composition of cast unalloyed magnesium shall be in accordance with the requirements as given in Table 1.

If not otherwise specified in the enquiry and order, the chemical composition of the cast unalloyed magnesium shall relate to that of the samples taken from the melt at the time of pouring.

7.2 General condition of the product

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

8 Sampling

8.1 General

Samples for chemical analysis shall be made from the same material as that used to produce the material which they represent.

All samples shall be adequately marked to guarantee full traceability to the material which they represent.

The samples for the determination of the chemical composition shall be cast in a manner which ensures accurate results.

8.2 Frequency and number of tests

Samples, representative of the material, shall be produced at a frequency in accordance with the process quality assurance procedures adopted by the manufacturer or as agreed with the purchaser.

The quality assurance procedures for sampling should be based on appropriate and recognized statistical principles.

9 Testing

9.1 Determination of the chemical composition

The methods used to determine the chemical composition of the material shall be in accordance with standardized methods or validated procedures.

9.2 Rounding of results of chemical analysis

In recording the result obtained for any value specified in this European Standard, it shall be expressed to the same number of decimal places as the corresponding value in this European Standard. Rounding shall be carried out as specified in EN ISO 80000-1:2013, 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.

Table 1 — Chemical composition of cast unalloyed magnesium

Material designation		Chemical composition % (mass fraction)													
Symbol	Number	Element	Al	Mn	Si	Fe	Cu	Ni	Pb	Sn	Na	Ca	Zn	Others each	Mg ^a
EN-MB99,5	3.5201	min.	—	—	—	—	—	—	—	—	—	—	—	—	99,5
		max.	0,1	0,1	0,1	0,1	0,1	0,01	—	—	0,01	0,01	—	0,05	—
EN-MB99,80-A	3.5202	min.	—	—	—	—	—	—	—	—	—	—	—	—	99,80
		max.	0,05	0,05	0,05	0,05	0,02	0,001	0,01	—	0,003	0,003	0,05	0,05	—
EN-MB99,80-B	3.5203	min.	—	—	—	—	—	—	—	—	—	—	—	—	99,80
		max.	0,05	0,05	0,05	0,05	0,02	0,002	0,01	—	—	—	0,05	0,05	—
EN-MB99,80-C	3.5204	min.	—	—	—	—	—	—	—	—	—	—	—	—	99,80
		max.	0,05	0,1	0,02	0,004	0,005	0,001	—	—	—	—	—	0,01	—
EN-MB99,90	3.5205	min.	—	—	—	—	—	—	—	—	—	—	—	—	99,90
		max.	0,02	0,03	0,03	0,004	0,004	0,001	—	—	—	—	—	0,01	—
EN-MB99,95-A	3.5206	min.	—	—	—	—	—	—	—	—	—	—	—	—	99,95
		max.	0,01	0,006	0,006	0,003	0,005	0,001	0,005	0,005	0,003	0,003	0,005	0,005	—
EN-MB99,95-B	3.5207	min.	—	—	—	—	—	—	—	—	—	—	—	—	99,95
		max.	0,01	0,01	0,01	0,005	0,005	0,001	0,005	0,005	—	—	0,01	0,005	—
EN-MB99,98	3.5208	min.	—	—	—	—	—	—	—	—	—	—	—	—	99,98
		max.	0,004	0,002	0,003	0,002	0,000 5	0,000 5	0,001	0,001	0,004	—	0,004	0,005	—
EN-MB99,99	3.5209	min.	—	—	—	—	—	—	—	—	—	—	—	—	99,99
		max.	0,002	0,002	0,003	0,002	0,000 3	0,000 3	0,002	0,002	0,002	—	0,003	0,003	—

NOTE The material designation is in accordance with EN 1754 [1].

^a Balance

10 Inspection documentation

When requested by the purchaser and agreed with the manufacturer, the manufacturer shall issue for the products the appropriate inspection documentation according to EN 10204.

The material manufacturer is responsible for affirming conformity with the specification for the material ordered.

11 Marking

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

- manufacturer's identification;
- material designation;
- melt identification;
- unit weight (mass).

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

12 Packaging and surface protection

Packaging and/or surface protection, if any, for the transport or storage of the products, shall be at the discretion of the manufacturer unless a specific agreement has been made by the time of acceptance of the order.

The packaging method should ensure the full protection of the products until their final destination.

13 Complaints

In case of any complaint, the manufacturer shall be able to examine the validity of the complaint within a reasonable time.

If applicable, the sampling conditions and the test methods used to evaluate the disputed characteristic shall be in accordance with the requirements given in Clause 8 and Clause 9.

Unless otherwise agreed, complaints on technical matters may only be made when the specified requirements are not met.

Annex A
(informative)

Comparison of cast unalloyed magnesium material designations according to EN 12421 and ISO 8287 [3]

This informative annex compares the material designation of the standardized grades of cast unalloyed magnesium based on the EN and ISO designations, see Table A.1.

Table A.1 — Material designations of cast unalloyed magnesium

EN 12421:2017		EN 12421:1998		ISO 8287:2011
symbol	number	symbol	number	
EN-MB99,5	3.5201	EN-MB99,5	EN-MB10010	ISO Mg 99,5
EN-MB99,80-A	3.5202	EN-MB99,80-A	EN-MB10020	ISO Mg 99,80A
EN-MB99,80-B	3.5203	EN-MB99,80-B	EN-MB10021	ISO Mg 99,80B
EN-MB99,80-C	3.5204	— ^a	— ^a	ISO Mg 99,80C
EN-MB99,90	3.5205	— ^a	— ^a	ISO Mg 99,90
EN-MB99,95-A	3.5206	EN-MB99,95-A	EN-MB10030	ISO Mg 99,95A
EN-MB99,95-B	3.5207	EN-MB99,95-B	EN-MB10031	ISO Mg 99,95B
EN-MB99,98	3.5208	— ^a	— ^a	ISO Mg 99,98
EN-MB99,99	3.5209	— ^a	— ^a	ISO Mg 99,99
^a Not included in EN 12421:1998.				

Annex B
(informative)

Significant technical changes between this European Standard and the previous edition

Table B.1 — Significant technical changes between this European Standard and the previous edition

Clause/Paragraph/Table/Figure	Change
Clause 8	Requirements regarding sampling added.
Clause 12	Requirements regarding packaging and surface protection added.
Table 1	Addition of 4 new grades of cast unalloyed magnesium. Structure of designation by numbers has been changed.
Annex A	Informative Annex A for the comparison of cast unalloyed magnesium material designations according to EN 12421 and ISO designation added.

NOTE The technical changes referred include the significant technical changes from the EN revised but is not an exhaustive list of all modifications from the previous version.

Bibliography

- [1] EN 1754, *Magnesium and magnesium alloys - Designation system for anodes, ingots and castings - Material symbols and material numbers*
- [2] EN 10027-2, *Designation systems for steels - Part 2: Numerical system*
- [3] ISO 8287:2011, *Magnesium and magnesium alloys — Unalloyed magnesium — Chemical composition*

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