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**Magnesium and magnesium alloys —  
Magnesium alloys for cast anodes**

*Magnésium et alliages de magnésium — Alliages de magnésium pour  
anodes coulées*

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## Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 26202 was prepared by the European Committee for Standardization (CEN) (as EN 12438) and was adopted, under a special "fast-track procedure", by Technical Committee ISO/TC 79, *Light metals and their alloys*, Subcommittee SC 5, *Magnesium and alloys of cast or wrought magnesium*, in parallel with its approval by the ISO member bodies.

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 190 "Foundry technology", the secretariat of which is held by DIN.

Within its programme of work, Technical Committee CEN/TC 190 requested CEN/TC 190/WG 3.10 " Cast magnesium" to prepare the following standard :

EN 12438

Magnesium and magnesium alloys - Magnesium alloys for cast anodes

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of an identical text or by endorsement, at the latest by October 1998, and conflicting national standards shall be withdrawn at the latest by October 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

This European Standard classifies the commercially available magnesium anode alloys into a number of grades suitable for the applications to which they might be put. The annexes A and B describe methods for electrochemical tests with corresponding recommended values. Annex C gives a list of corresponding international designations and former national designations.

## 1 Scope

This European Standard specifies the chemical composition of magnesium alloy ingots for anodes and chemical composition of magnesium alloy anode castings.

## 2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 1559-1  
Founding – Technical conditions of delivery – Part 1: General

EN 1559-5  
Founding – Technical conditions of delivery – Part 5: Additional requirements for magnesium alloy castings

ISO 31-0 : 1992  
Quantities and units – Part 0: General principles

NOTE: Informative references to documents used in the preparation of this standard, and cited at the appropriate places in the text, are listed in a bibliography, see annex D.

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## 3 Designations

### 3.1 Material

The material shall be designated either by symbol or by number (see tables 1 and 2).

### 3.2 Casting process

The following symbols shall be used for the different casting processes:

- S Sand casting;
- K Permanent mould casting (gravity);
- C Continuous casting.

## 4 Requirements

### 4.1 General

The requirements for technical delivery conditions given in EN 1559-1 and EN 1559-5 shall apply.

### 4.2 Chemical composition

The chemical composition of magnesium based alloy ingots for anodes shall conform to the requirements for the appropriate material given in table 1. The chemical composition of magnesium based alloy anode castings shall conform to the requirements for the appropriate material given in table 2.

Table 1: Chemical composition of magnesium alloy ingots for anode castings

Alloy group	Material designation		Composition in percent (mass fraction)													
	Symbol	Number	Mg	Al	Zn	Mn	Si	Fe	Cu	Ni	Others each					
MgAlZn	EN-MBMgAl3Zn1	EN-MB21130	Rem.	2,6	0,7	0,20	—	—	—	—	—	—	—	—	—	—
	EN-MBMgAl6Zn1	EN-MB21140	—	3,5	1,4	1,0	0,30	0,01	0,05	0,001	—	—	—	—	—	0,05
	EN-MBMgAl6Zn3	EN-MB21150	Rem.	5,6	0,7	0,20	—	—	—	—	—	—	—	—	—	—
MgMn	EN-MBMgAl6Zn3	EN-MB21150	—	6,5	1,4	1,0	0,30	0,01	0,05	0,001	—	—	—	—	—	—
	EN-MBMgMn1	EN-MB40010	Rem.	5,1	2,1	0,20	—	—	—	—	—	—	—	—	—	—
	EN-MBMgMn2	EN-MB40020	—	7,0	4,0	1,0	0,30	0,01	0,05	0,001	—	—	—	—	—	—
			Rem.	—	—	0,50	—	—	—	—	—	—	—	—	—	—
			—	0,01	0,05	1,3	0,05	0,02	0,02	0,001	—	—	—	—	—	—
			Rem.	—	—	1,20	—	—	—	—	—	—	—	—	—	—
			—	0,01	0,05	2,5	0,05	0,02	0,02	0,001	—	—	—	—	—	—

NOTE: The material designation is in accordance with EN 1754.

Table 2: Chemical composition of magnesium alloy anode castings

Alloy group	Material designation		Casting process <sup>1)</sup>	Composition in percent (mass fraction)												
	Symbol	Number		Element	Mg	Al	Zn	Mn	Si	Fe	Cu	Ni	Others each	As+Sb+Pb+Cr+Ni <sup>2)</sup>	Cd+Hg+Se <sup>2)</sup>	
MgAlZn	EN-MAMgAl3Zn1	EN-MA21130	S, K, C	Rem.	2,5	0,6	0,2	—	—	—	—	—	—	—	—	—
	EN-MAMgAl6Zn1	EN-MA21140	S, K, C	—	3,5	1,4	1,0	0,3	0,02	0,05	0,002	0,05	0,1	—	—	—
	EN-MAMgAl6Zn3	EN-MA21150	S, K, C	Rem.	5,5	0,6	0,2	—	—	—	—	—	—	—	—	—
MgMn	EN-MAMgMn1	EN-MA40010	S, K, C	—	6,5	1,4	1,0	0,3	0,02	0,05	0,002	0,05	0,1	—	—	—
	EN-MAMgMn2	EN-MA40020	S, K, C	Rem.	5,0	2,0	0,2	—	—	—	—	—	—	—	—	—
				—	7,0	4,0	1,0	0,3	0,02	0,05	0,002	0,05	0,1	—	—	—
			Rem.	—	—	0,5	—	—	—	—	—	—	—	—	—	—
			—	0,01	0,05	1,3	0,05	0,03	0,02	0,02	0,002	0,05	0,1	—	—	—
			Rem.	—	—	1,2	—	—	—	—	—	—	—	—	—	—
			—	0,01	0,05	2,5	0,05	0,03	0,02	0,02	0,002	0,05	0,1	—	—	—

<sup>1)</sup> S = Sand casting; K = Permanent mould casting (gravity); C = Continuous casting

<sup>2)</sup> Only for anodes used in potable water (tap water)

NOTE: The material designation is in accordance with EN 1754.



## 5 Testing

### 5.1 Analysis of chemical composition

Sufficient samples shall be taken by the manufacturer to assure conformance to the chemical composition requirements of the alloys in tables 1 and 2. Samples shall be taken from the molten metal at the time of casting. Samples shall be representative of the material delivered.

### 5.2 Electrochemical testing

If applicable, electrochemical testing shall be carried out in accordance with annexes A and B.

## 6 Rounding of numbers

In recording chemical analysis, the number representing the result for any value specified in this standard shall be expressed to the same number of decimal places as the corresponding number in this standard. The rounding of numbers shall meet the requirements of ISO 31-0 : 1992, annex B, clause B.3, rule A or B. The choice shall be left to the discretion of the manufacturer, unless the use of one of the rules is agreed by the time of acceptance of the order.

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