

**SLOVENSKI STANDARD**  
**oSIST prEN 1753:2018**  
**01-september-2018**

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**Magnezij in magnezijeve zlitine - Ingoti in ulitki iz magnezijevih zlitin**

Magnesium and magnesium alloys - Magnesium alloy ingots and castings

Magnesium und Magnesiumlegierungen - Blockmetalle und Gussstücke aus Magnesiumlegierungen

Magnésium et alliages de magnésium - Lingots et pièces moulées en alliages de magnésium

**Ta slovenski standard je istoveten z: prEN 1753**

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**ICS:**

77.150.20	Magnezijevi izdelki	Magnesium products
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**oSIST prEN 1753:2018**

**en,fr,de**



EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 1753**

June 2018

ICS 77.150.20

Will supersede EN 1753:1997

English Version

**Magnesium and magnesium alloys - Magnesium alloy  
ingots and castings**

Magnésium et alliages de magnésium - Lingots et  
pièces moulées en alliages de magnésium

Magnesium und Magnesiumlegierungen - Blockmetalle  
und Gussstücke aus Magnesiumlegierungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 190.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## European foreword

This document (prEN 1753:2018) has been prepared by Technical Committee CEN/TC 190 “Foundry technology”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1753:1997.

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

EN 1753:1997, *Magnesium and magnesium alloys — Magnesium alloy ingots and castings*

Annex D provides details of significant technical changes between this European standard and the previous edition.

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## Introduction

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

Sixteen new grades as specified in National [1] [2] [3] or International Standards [4] have been added.

In this standard a new designation system by number, as established in EN 1754 [5], is given.

NOTE This designation system by number is based on the structure and rules of EN 10027-2 [6] and so corresponds with the European numbering system for steel and other materials.

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## 1 Scope

This document defines the grades and the corresponding requirements for cast alloyed magnesium materials.

This document specifies 2 groups of magnesium alloy grades by a classification based on the chemical composition. The first group deals with grades for magnesium alloy ingots. The second group deals with grades for magnesium alloy castings.

This document also specifies mechanical properties measured on test pieces machined from cast samples.

This document does not cover technical delivery conditions for magnesium alloy castings (see EN 1559-1 [7] and EN 1559-5 [8]).

## 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.

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

EN ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method (ISO 6506-1)*

EN ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature (ISO 6892-1)*

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.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

### 3.1

#### **cast sample**

quantity of material cast to represent the cast material

Note 1 to entry: This includes separately cast sample, side by side cast sample and cast-on sample.

[Source: FprEN 1563:2018, definition 3.5]

### 3.2

#### **separately cast sample**

sample cast in a separate mould under representative manufacturing conditions and material grade

[Source: FprEN 1563:2018, definition 3.6]

### 3.3

#### **side-by-side cast sample**

sample cast in the mould alongside the casting, with a joint running system



[Source: FprEN 1563:2018, definition 3.7]

### 3.4

#### **cast-on sample**

sample attached directly to the casting

[Source: FprEN 1563:2018, definition 3.8]

### 3.5

#### **test piece**

part of the sample, with specified dimensions, machined or unmachined, brought to a required condition for submission to a given test

[Source: EN 1559-1:2011, definition 3.15]

## 4 Designation

### 4.1 Material

The material shall be designated either by symbol or by number as given in Tables 1, 2, 3, 4 or 5.

NOTE 1 The material symbol designation and the material number designation are in accordance with EN 1754 [5].

NOTE 2 The comparison of EN 1753 grade designations with the designations from the ISO standard for magnesium alloy ingots and castings, ISO 16220 [4], is given in Annex A, Table A.1 and Table A.2.

NOTE 3 The materials for aerospace applications referred to in European Standards prepared by AECMA (Association Européenne des Constructeurs de Matériel Aérospatial) have different designations.

### 4.2 Casting process

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

- S sand casting;
- K permanent mould casting;
- D pressure die casting;
- L investment casting.

NOTE Examples of the use of these designations are given in EN 1559-5 [8].

### 4.3 Temper

The following symbols for temper designation shall be used:

- F as cast;
- T4 solution heat-treated and naturally aged;
- T5 as cast and artificially aged;
- T6 solution heat-treated and artificially aged.

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NOTE Examples of the use of these designations are given in EN 1559-5 [8].

**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) any special requirements.

All requirements shall be agreed between the manufacturer and the purchaser by the time of acceptance of the order, e.g. technical delivery conditions according to EN 1559-1 [7] and EN 1559-5 [8].

**6 Manufacture**

The method of producing magnesium alloy ingots and castings shall be left to the discretion of the manufacturer who shall ensure that the requirements of this European standard are met for the material grade specified in the order.

All agreements between the manufacturer and the purchaser shall be made by the time of the acceptance of the order.

**7 Requirements****7.1 Chemical composition**

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

The chemical composition of magnesium alloy castings shall conform to the requirements for the appropriate material given in Table 2.

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

NOTE 1 For additional information regarding the manganese and iron contents see Annex B.

NOTE 2 For additional information regarding maximum content of alloying elements and impurities in ingots and castings see Annex C.

**7.2 Tensile properties of castings****7.2.1 Test pieces machined from cast samples or as cast test pieces**

The mechanical properties obtained from test pieces prepared from cast samples for sand castings and permanent mould castings shall meet the requirements given in Tables 3 and 4. As appropriate, the tests shall be carried out in accordance with Clause 9.

NOTE 1 Mechanical properties obtained from test pieces prepared from cast samples for investment castings are not specified as experience is limited. As a general rule they are similar to those for permanent mould castings.

NOTE 2 The mechanical properties obtained from test pieces prepared from separately cast samples for pressure die castings are very dependent upon injection parameters. Therefore, the properties given in Table 5 are for guidance only.

NOTE 3 Tensile testing requires sound test pieces in order to guarantee pure uni-axial stress during the test.

### 7.2.2 Test pieces machined from cast samples cut from a casting

If applicable, the manufacturer and the purchaser shall agree on:

- the location(s) on a casting where the cast sample(s) shall be taken;
- the mechanical properties that shall be measured;
- the minimum values, or allowable range of values, for these mechanical properties (for information, see Table 3 and 4, NOTE 1).

NOTE 1 The properties of castings may not be uniform, depending on the complexity of the castings and variation in their section thickness.

NOTE 2 Mechanical properties for test pieces cut from a casting are affected not only by material properties (subject of this standard) but also by the local casting soundness (not subject of this standard).

### 7.3 Hardness of castings

Guidance values for Brinell hardness are given in Tables 3, 4 and 5.

The Brinell hardness test shall be carried out on porosity free areas of castings or on a test piece which has not been stressed.

### 7.4 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 (see EN 1559-5 [8]).

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Table 1 — Chemical composition of magnesium alloy ingots

Alloy group	Material designation		Composition in % (mass fraction)																
	Symbol	Number	Min. or max	Mg	Al	Zn	Mn a	RE b	Zr	Ag	Y	Gd	Li	Th	Si	Fe	Cu	Ni	Others each
MgAl	EN-MBMgAl6	3.5210	min. max.	Rem. -	5,5 6,5	- 0,20	0,1 0,4	- -	- -	- -	- -	- -	- -	- -	- 0,20	- 0,05	- 0,20	- 0,01	- 0,05
MgAlZn	EN-MBMgAl2Zn	3.5211	min. max.	Rem. -	2,0 2,5	0,2 0,8	0,1 0,4	- -	- -	- -	- -	- -	- -	- -	- 0,30	- 0,05	- 0,20	- 0,01	- 0,05
	EN-MBMgAl3Zn1	3.5212	min. max.	Rem. -	2,6 3,5	0,7 1,4	0,1 0,4	- -	- -	- -	- -	- -	- -	- -	- 0,30	- 0,05	- 0,20	- 0,01	- 0,05
	EN-MBMgAl6Zn1	3.5213	min. max.	Rem. -	5,5 6,5	0,7 1,4	0,1 0,4	- -	- -	- -	- -	- -	- -	- -	- 0,30	- 0,05	- 0,20	- 0,01	- 0,05
	EN-MBMgAl6Zn3	3.5214	min. max.	Rem. -	5,0 7,0	2,0 3,5	0,1 -	- -	- -	- -	- -	- -	- -	- -	- 0,30	- 0,05	- 0,20	- 0,01	- 0,05
	EN-MBMgAl8Zn1	3.5215	min. max.	Rem. -	7,2 8,5	0,45 0,9	0,17 -	- -	- -	- -	- -	- -	- -	- -	- 0,05	- 0,004	- 0,025	- 0,001	- 0,01
	EN-MBMgAl9Zn1(A)	3.5216	min. max.	Rem. -	8,5 9,5	0,45 0,9	0,17 -	- -	- -	- -	- -	- -	- -	- -	- 0,05	- 0,004	- 0,025	- 0,001	- 0,01
	EN-MBMgAl9Zn1(B)	3.5217	min. max.	Rem. -	8,0 10,0	0,3 1,0	- -	- -	- -	- -	- -	- -	- -	- -	- 0,3	- 0,03	- 0,20	- 0,01	- 0,05
MgAlMn	EN-MBMgAl2Mn	3.5220	min. max.	Rem. -	1,7 2,5	- 0,2	0,35 -	- -	- -	- -	- -	- -	- -	- -	- 0,05	- 0,004	- 0,008	- 0,001	- 0,01
	EN-MBMgAl5Mn	3.5221	min. max.	Rem. -	4,5 5,3	- 0,2	0,27 -	- -	- -	- -	- -	- -	- -	- -	- 0,05	- 0,004	- 0,008	- 0,001	- 0,01
	EN-MBMgAl6Mn	3.5222	min. max.	Rem. -	5,6 6,4	- 0,2	0,23 -	- -	- -	- -	- -	- -	- -	- -	- 0,05	- 0,004	- 0,008	- 0,001	- 0,01
	EN-MBMgAl7Mn	3.5223	min. max.	Rem. -	6,6 7,4	- 0,2	0,20 -	- -	- -	- -	- -	- -	- -	- -	- 0,05	- 0,004	- 0,008	- 0,001	- 0,01