SLOVENSKI STANDARD
oSIST prEN 1559-5:2015

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Livarstvo - Tehnični dobavni pogoji - 5. del: Dodatne zahteve za ulitke iz magnezijevih zlitin

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

Gießereiwesen - Technische Lieferbedingungen - Teil 5: Zusätzliche Anforderungen an Gussstücke aus Magnesiumlegierungen

Fonderie - Conditions techniques de fourniture - Partie 5 : Spécifications complémentaires pour les pièces moulées en alliage de magnésium

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English Version

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

Fonderie - Conditions techniques de fourniture - Partie 5 : Spécifications complémentaires pour les pièces moulées en alliage de magnésium

Gießereiwesen - Technische Lieferbedingungen - Teil 5: Zusätzliche Anforderungen an 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.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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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
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 1559-5:2015) 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 1559-5:1997.

Within its programme of work, Technical Committee CEN/TC 190 requested CEN/TC 190/WG 9 "Cast Magnesium” to revise the following standard:

EN 1559-5:1997, *Founding — Technical conditions of delivery — Part 5: Additional requirements for magnesium alloy castings*

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

This standard is one of a series of European Standards for technical delivery conditions for castings. The other standards in this series are:

— EN 1559-1, *Founding — Technical conditions of delivery — Part 1: General*

— EN 1559-2, *Founding — Technical conditions of delivery — Part 2: Additional requirements for steel castings*

— EN 1559-3, *Founding — Technical conditions of delivery — Part 3: Additional requirements for iron castings*

— EN 1559-4, *Founding — Technical conditions of delivery — Part 4: Additional requirements for aluminium alloy castings*

— EN 1559-6, *Founding — Technical conditions of delivery — Part 6: Additional requirements for zinc alloy castings*

Introduction

CEN/TC 190 "Foundry Technology" has prepared material standards covering magnesium alloy castings.

In order to assist manufacturers and purchasers to prepare proper contractual arrangements and prevent misunderstanding, CEN/TC 190 approved the preparation of a series of standards covering technical delivery conditions. These have been prepared as separate parts.

This part of EN 1559 covers the additional technical delivery conditions for magnesium alloy castings, e.g. optional information, manufacturing process, additional requirements regarding the condition of the casting and test methods.

This part of EN 1559 cannot be used alone for compiling a specification for ordering and supplying magnesium alloy castings, but as a complement to EN 1559-1.

The clauses marked with a single dot ● indicate that the requirements of the same clauses of EN 1559-1 have to be met.

1 Scope

This part of EN 1559 specifies the additional technical delivery conditions for castings, see EN 1753 and cast anodes, see EN 12438 made from magnesium alloys.

This part of EN 1559 applies to magnesium alloy castings produced in sand or permanent moulds or by pressure die casting, centrifugal casting, continuous casting or investment casting.

This part of EN 1559 does not apply to ingots, bars, billets (or other shapes) for further reprocessing, such as re-melting or extrusion.

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 1370, *Founding - Examination of surface condition*

EN 1371-1, *Founding - Liquid penetrant testing- Part 1: Sand, gravity die and low pressure die castings*

EN 1371-2, *Founding - Liquid penetrant testing - Part 2: Investment castings*

EN 1559-1:2011, *Founding - Technical conditions of delivery - Part 1: General*

EN 1753, *Magnesium and magnesium alloys - Magnesium alloy ingots and castings*

EN 1754, *Magnesium and magnesium alloys – Designation system for anodes, ingots and castings – Material symbols and material numbers*

EN 12438, *Magnesium and magnesium alloys - Magnesium alloys for cast anodes*

prEN 12681-1, *Founding - Radiographic testing - Part 1: Film techniques*[1)]

prEN 12681-2, *Founding - Radiographic testing - Part 2: Techniques with digital detectors*[1)]

EN ISO 3452-1, *Non-destructive testing - Penetrant testing - Part 1: General principles (ISO 3452-1)*

EN ISO 5579, *Non-destructive testing - Radiographic testing of metallic materials using film and X- or gamma rays - Basic rules (ISO 5579)*

3 ● Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1559-1 and in the applicable material standard apply.

1) In development.

4 Information to be supplied by the purchaser

4.1 ● Mandatory information

4.2 Optional information

Where applicable, the enquiry and order shall include other details, such as requirements for:

a) an as-cast condition;

b) special or subsequent heat treatment if required (together with the heat-treatment conditions);

c) formation of test units (unless already defined by material specifications, it shall be in accordance with 8.3.1).

4.3 ● Drawings, patterns and tools

4.4 ● Information on the mass

4.5 ● Preliminary sample

4.6 ● Initial sample

5 Designations

The designation of cast magnesium alloys by material number or material symbol shall be in accordance with EN 1754. Both designations describe the magnesium alloys according to their chemical composition.

The designation shall be used on the drawings and in the order.

To identify the temper (heat treatment condition) and/or the casting process, the designation shall be supplemented with symbols preceded and separated from each other by a hyphen (-):

— for tempers as given in EN 1753;

— for casting processes as given in EN 1753 and EN 12438.

For examples of the use of these symbols in conjunction with either the material symbol or material number see Table 1.

Table 1 — Examples for the designation

Designation by		**Explanation for the supplement**
material number	material symbol	
3.5316	EN-MCMgAl9Zn1(A)	without supplement
3.5316-T4	EN-MCMgAl9Zn1(A)-T4	"-T4" specifies the temper (heat treatment condition)
3.5316-F-D	EN-MCMgAl9Zn1(A)-F-D	"-F-D" specifies the temper and the casting process
3.5130	EN-MAMgMn1	without supplement
3.5130-S	EN-MAMgMn1-S	"-S" specifies the casting process

6 Manufacture

6.1 ● Manufacturing process

7 Requirements

7.1 ● General

7.2 Material

7.2.1 ● Chemical composition

EN 1559-1 shall apply with the following addition:

Determination of elements not specified in the applicable material standard shall be carried out when agreed between the manufacturer and the purchaser by the time of acceptance of the order.

7.2.2 ● Mechanical properties

7.2.3 ● Other properties

7.3 Casting

7.3.1 ● Chemical composition

7.3.2 ● Mechanical properties

7.3.3 ● Outer and inner conditions (non-destructive testing)

7.3.3.1 The testing shall be performed according to the applicable European Standards as listed in Table 2. Other methods may be agreed between purchaser and manufacturer.

Table 2 — Test methods

Test method	Symbol	General principles	Test conditions
Liquid penetrant	PT	EN ISO 3452-1	EN 1371-1 EN 1371-2
Radiographic	RT	EN ISO 5579	prEN 12681-1 prEN 12681-2

7.3.3.2 ●

7.3.3.3 The selection of a non-destructive testing method is dependent on the thickness and material of the casting and the position, orientation and size of possible discontinuities in the areas to be tested.

Different acceptance criteria can be specified for different areas of the same casting. Moreover, for the same area of the casting different acceptance criteria can be specified according to the non-destructive methods selected.

For all non-destructive testing methods, the acceptance criteria (discontinuity levels) can be graded with increasing number and/or extent of indications.

Unless specifically agreed, discontinuities revealed on cast surfaces which are to be machined, are not to be regarded as discontinuities, when these discontinuities are totally removed by machining.

7.3.3.4 If applicable, the roughness of the cast or grinded surface shall be specified in accordance with EN 1370 and shall be subject of an agreement between the manufacturer and the purchaser by the time of acceptance of the order.

7.3.4 ● Condition of the casting

7.3.5 ● Mass of the casting

7.3.6 ● Additional requirements regarding the condition of the casting

7.3.6.1 In order to eliminate leaks in castings, impregnation procedures may be used after the approval of the purchaser. The impregnation medium and method, maximum permitted size of discontinuities and retest procedures shall be agreed between the manufacturer and the purchaser.

7.3.6.2 Where appropriate, a macroscopic examination of a suitably prepared section shall be carried out to assess the grain structure and/or structural inadequacy of a casting to agreed criteria.

NOTE Assessment is usually carried out with naked eyes or with an agreed magnification.

7.3.6.3 Where appropriate, a microscopic examination of a suitably prepared section shall be carried out to determine the metallurgical structure of a casting to agreed criteria.

NOTE 1 Assessment is usually carried out with an agreed magnification and can include the nature, shape and distribution of the structural constituents.

NOTE 2 A cooling curve/thermal analysis carried out on a sample of liquid alloy before casting can help to predict the metallurgical structure of the casting.

7.3.6.4 If applicable, density evaluation by weighting in air and water to agreed criteria shall be used to estimate the soundness of the casting.

8 Inspection

8.1 ● General

8.2 ● Type of inspection documents and type of inspection

The requirements given in the applicable material standard shall also apply.

8.3 Test unit

8.3.1 ● Formation of test units

8.3.2 ● Size of test units

The requirements given in the applicable material standard shall also apply.

8.3.3 ● Inspection frequency

When tests are required, unless otherwise agreed, one test per unit shall be carried out. For hardness testing, the frequency of testing shall be subject to an agreement between the manufacturer and the purchaser.

8.4 ● Samples

The requirements given in the applicable material standard shall also apply.