International Standard 3115

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Castings in magnesium alloys containing zirconium — Chemical composition and mechanical properties

Pièces moulées en alliages de magnésium contenant du zirconium — Composition chimique et caractéristiques mécaniques

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

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International Standard ISO 3115 was developed by Technical Committee ISO/TC 79, *Light metals and their alloys*, and was circulated to the member bodies in April 1980.

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It has been approved by the member bodies of the following countries :

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France	Korea, Dem. P. Rep. of	Sweden
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India	Norway	USSR

The member body of the following country expressed disapproval of the document on technical grounds :

USA

This second edition cancels and replaces the first edition (i.e. ISO 3115-1974) and International Standard ISO 2119-1972.

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Castings in magnesium alloys containing zirconium — Chemical composition and mechanical properties

1 Scope and field of application

This International Standard specifies

a) the chemical composition and the minimum mechanical properties of castings in magnesium-zirconium-silver-rare earth alloy;

b) the chemical composition and the minimum mechanical properties of castings in a series of magnesium-zinc-zirconium alloys.

The values may be checked on test pieces made in accordance with ISO 2377.

2 References

ISO/R 190, *Tensile testing of light metals and their alloys.*[1)]

ISO/R 2107, *Light metals and their alloys — Temper designations.*

ISO 2092, *Light metals and their alloys — Code of designation based on chemical symbols.*

ISO 2377, *Magnesium alloy sand castings — Reference test bar.*

3 Requirements

3.1 Chemical composition

3.1.1 The chemical composition of castings in magnesium-zirconium-silver-rare earth alloy shall be as given in table 1.

3.1.2 The chemical composition of castings in magnesium-zinc-zirconium alloys shall be as given in table 2.

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Table 1

Alloy	Chemical composition, %							
	Ag	Zn max.	RE[1)]	Zr	Th	Cu max.	Ni max.	Total other impurities max.
Mg-Ag3RE2Zr	2,0 to 3,0	0,2	1,8 to 2,8	0,40 to 1,0	—	0,10	0,01	0,30

1) Didymium-rich rare earths (RE)

Table 2

Alloy	Chemical composition, %						
	Zn	Zr	Rare earths (RE)[1)]	Th	Cu max.	Ni max.	Total other impurities max.
Mg-RE3Zn2Zr	0,8 to 3,0	0,40 to 1,0	2,5 to 4,0	—	0,10	0,01	0,30
Mg-Zn5Zr	3,5 to 5,5	0,40 to 1,0	—	—	0,10	0,01	0,30
Mg-Zn4REZr	3,5 to 5,0	0,40 to 1,0	0,75 to 1,75	—	0,10	0,01	0,30
Mg-Zn6Th2Zr	5,0 to 6,2	0,40 to 1,0	—	1,5 to 2,3	0,10	0,01	0,30
Mg-Th3Zn2Zr	1,7 to 2,5	0,40 to 1,0	0,10 max.[2)]	2,5 to 4,0	0,10	0,01	0,30
Mg-Zn6Zr	5,5 to 6,5	0,60 to 1,0	—	—	0,10	0,01	0,30

1) In french, TR is used to indicate rare earths (RE).

2) Analysis is not usually carried out, but, if required, the result shall be less than the maximum indicated value.

1) The revision of ISO/R 190 will be incorporated in ISO 6892.

3.2 Mechanical properties

Before comparison with the limiting values given in tables 3 and 4, the measured or calculated values of 0,2 % yield strength, or of tensile strength, shall be rounded to the nearest 1 N/mm^2, and those of the percentage elongation rounded to the nearest 1 %.

3.2.1 Table 3 gives the minimum values of the mechanical properties of magnesium-zirconium-silver-rare earth alloy in the temper condition TF as defined in ISO/R 2107, obtained from sand cast reference test bars.

3.2.2 Table 4 gives the minimum values of the mechanical properties of magnesium-zinc-zirconium alloys, obtained from sand cast reference test bars.

4 Methods of test

4.1 Chemical composition

The methods used for the determination of the alloying elements given in tables 1 and 2 shall be those described in existing International Standards.

Other methods may be used, but, in case of dispute, the International Standard methods shall be adopted.

4.2 Tensile test

The tensile test shall be carried out by the method described in ISO/R 190.

Table 3

Alloy	Temper	Tensile strength R_m N/mm^2	0,2 % yield strength $R_{p0,2}$ N/mm^2	Elongation A $5,65\sqrt{S_0}$ %
Mg-Ag3RE2Zr	TF	240	175	2

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Table 4

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Alloy	Temper	Tensile strength R_m N/mm^2	0,2 % yield strength $R_{p0,2}$ N/mm^2	Elongation A $5,65\sqrt{S_0}$ %
Mg-RE3Zn2Zr	TE	140	95	2
Mg-Th3Zn2Zr	TE	185	90	3
Mg-Zn4REZr	TE	200	135	2
Mg-Zn6Th2Zr	TE	240	150	4
Mg-Zn5Zr	TE	235	140	4
Mg-Zn6Zr	TF	275	180	4