Designation: B951 – 11

Standard Practice for Codification of Unalloyed Magnesium and Magnesium-Alloys, Cast and Wrought[1]

This standard is issued under the fixed designation B951; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This practice provides a system for designating unalloyed magnesium and magnesium-alloys that have been used commercially since 1952, and thus is intended to be the registration source for unalloyed magnesium and magnesium-alloys. A record of designations along with the established compositions is given in Table 2.

1.2 The equivalent Unified Numbering System (UNS) alloy designations shown in the appendixes are in accordance with Practice E527.

2. Referenced Documents

2.1 The following documents form a part of this practice to the extent referenced herein:

2.2 *ASTM Standards:*[2]

B80 Specification for Magnesium-Alloy Sand Castings

B90/B90M Specification for Magnesium-Alloy Sheet and Plate

B91 Specification for Magnesium-Alloy Forgings

B92/B92M Specification for Unalloyed Magnesium Ingot and Stick For Remelting

B93/B93M Specification for Magnesium Alloys in Ingot Form for Sand Castings, Permanent Mold Castings, and Die Castings

B94 Specification for Magnesium-Alloy Die Castings

B107/B107M Specification for Magnesium-Alloy Extruded Bars, Rods, Profiles, Tubes, and Wire

B199 Specification for Magnesium-Alloy Permanent Mold Castings

B403 Specification for Magnesium-Alloy Investment Castings

B843 Specification for Magnesium Alloy Anodes for Cathodic Protection

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

3. Basis of Codification

3.1 The designations for alloys and unalloyed metals are based on their chemical composition limits.

NOTE 1—For unalloyed magnesium, magnesium-alloys, cast and wrought, standard limits for alloying elements and impurities are expressed to the following places:

Less than 0.0001 % (used only for magnesium alloys)	0.0000X
0.0001 to 0.001 %	0.000X
0.001 to 0.01 %	0.00X
0.01 to 0.10 %	
Unalloyed aluminum made by a refining process	0.0XX
Alloys and unalloyed aluminum or magnesium not made by a refining process	0.0X
0.10 through 0.55 %	0.XX
Over 0.55 %	0.X,X.X,XX.X

3.2 Designations shall be assigned, revised, and cancelled by Subcommittee B07.04 of ASTM Committee B07 on Light Metals and Alloys on written requests to its chairman. Complete chemical composition limits shall be submitted with request for assignment or revision of designations. Arbitrary assignments by other subcommittees or committees will not be recognized.

4. Alloys

4.1 Designation for alloys shall consist of not more than two letters representing the alloying elements (Note 2) specified in the greatest amount, arranged in order of decreasing percentages, or in alphabetical order if of equal percentages, followed by the respective percentages rounded off to whole numbers and a serial letter (Note 3). The full name of the base metal precedes the designation, but it is omitted for brevity when the base metal being referred to is obvious.

NOTE 2—For codification, an alloying element is defined as an element (other than the base metal) having a minimum content greater than zero either directly specified or computed in accordance with the percentages specified.

[1] This practice is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.04 on Magnesium Alloy Cast and Wrought Products.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard**

NOTE 3—The serial letter is arbitrarily assigned in alphabetical sequence starting with "A" (omitting "I" and "O") and serves to differentiate otherwise identical designations. A serial letter is necessary to complete each designation.

4.2 The letters used to represent the two greatest amounts of the alloying elements shall be those in Table 1.

4.3 In rounding percentages, the nearest whole number shall be used. If two choices are possible as when the decimal is followed by a 5 only, or a 5 followed only by zeros, the nearest even whole number shall be used.

4.4 When a range is specified for the alloying element, the rounded mean shall be used in the designation.

4.5 When only a minimum percentage is specified for the alloying element, the rounded minimum percentage shall be used in the designation.

TABLE 1 Letters Representing Alloying Elements

A—Aluminum	Q—Silver
C—Copper	S—Silicon
E—Rare earths	T—Tin*
H–Thorium*	V—Gadolinium
J—Strontium	W—Yttrium
K—Zirconium	Z—Zinc
L—Lithium*	*For historical reference
M—Manganese	

5. Unalloyed Metals

5.1 Designations for unalloyed metals consist of the specified minimum purity, all digits retained but dropping the decimal point, followed by a serial letter (Note 3). The full name of the base metal precedes the designation, but it is omitted for brevity when the base metal being referred to is obvious.

6. Keywords

6.1 magnesium; UNS designations

TABLE 2 Unalloyed Magnesium and Magnesium-Alloy Registration
(A Registration Record of Magnesium Alloys with Established Designations and Chemical Composition)

NOTE 1—Cast or wrought product compositions may differ from casting ingot compositions.

Designation			Chemical Composition, % max unless shown as a range or as a min																		
Practice	UNS	See ASTM	Magnesium	Aluminum	Calcium	Copper	Gadolinium	Iron	Lithium	Manganese	Neodymium	Nickel	Rare Earths	Silicon	Silver	Strontium	Yttrium	Zinc	Zirconium	Other Elements		
																				Specific	Each	Total
9980A	M19980	B92/ B92M	99.80 min			0.02				0.10		0.001								0.01 Sn 0.01 Pb 0.006 Na	0.05	
9980B	M19991	B92/ B92M	99.80 min			0.02				0.10		0.005								0.01 Sn 0.01 Pb	0.05	
9990A[A]	M19990	B92/ B92M	99.90 min	0.003				0.04		0.004		0.001		0.005							0.01	
9995A[A]	M19995	B92/ B92M	99.95 min	0.01				0.003		0.004		0.001		0.005						0.01 Ti	0.005	
9998A[A]	M19998	B92/ B92M	99.98 min	0.004		0.0005		0.002		0.002		0.0005		0.003						0.001 Ti 0.001 Pb	0.005	
AJ52A[B]	M17520	B94	[C]	4.5-5.5		0.010		0.004[D]		0.24-0.6[D]		0.001		0.10		1.7-2.3		0.22			0.01	
AJ52A[BE]	M17521	B93/ B93M	[C]	4.6-5.5		0.008		0.004		0.26 - 0.5		0.001		0.08		1.8-2.3		0.20			0.01	
AJ62A[B]	M17620	B94	[C]	5.5-6.6		0.010		0.004[D]		0.24-0.6[D]		0.001		0.10		2.0-2.8		0.22			0.01	
AJ62A[BE]	M17621	B93/ B93M	[C]	5.6-6.6		0.008		0.004		0.26-0.05		0.001		0.08		2.1-2.8		0.20			0.01	
AM50A	M10500	B94	[C]	4.4-5.4		0.010		0.004[D]		0.26-0.6[D]		0.002		0.10				0.22			0.02	
AM50A[E]	M10501	B93/ B93M	[C]	4.5-5.3		0.008		0.004		0.28-0.50		0.001		0.08				0.20†			0.01	
AM60A	M10600	B94	[C]	5.5-6.5		0.35				0.13-0.6		0.03		0.50				0.22				
AM60A	M10601	B93/ B93M	[C]	5.6-6.4		0.25				0.15-0.50		0.01		0.20				0.20				0.30
AM60B	M10602	B94	[C]	5.5-6.5		0.010		0.005[D]		0.24-0.6[D]		0.002		0.10				0.22			0.02	
AM60B[E]	M10603	B93/ B93M	[C]	5.6-6.4		0.008		0.004		0.26-0.50		0.001		0.08†				0.20			0.01	
AM100A	M10100	B80 B199 B403	[C]	9.3-10.7		0.10				0.10-0.35		0.01		0.30				0.30				0.30
AM100A	M10101	B93/ B93M	[C]	9.4-10.6		0.08				0.13-0.35		0.010		0.20				0.2				0.30
AS21A	M10210	B94	[C]	1.8-2.5		0.01		0.005		0.18-0.7		0.001		0.7-1.2				0.20			0.01	
AS21A[E]	M10211	B93/ B93M	[C]	1.9-2.5		0.008		0.004		0.2-0.6		0.001		0.7-1.2				0.20			0.01	
AS21B[B]	M10212	B94	[C]	1.8-2.5		0.008		0.0035		0.05-0.15		0.001	0.06-0.25	0.7-1.2				0.25			0.01	
AS21B[BE]	M10213	B93/ B93M	[C]	1.9-2.5		0.008		0.0035		0.05-0.15		0.001	0.06-0.25	0.7-1.2				0.25			0.01	
AS41A	M10410	B94	[C]	3.5-5.0		0.06				0.20-0.50		0.03		0.50-1.5				0.12				
AS41A	M10411	B93/ B93M	[C]	3.7-4.8		0.04				0.22-0.48		0.01		0.60-1.4				0.10				0.30
AS41B	M10412	B94	[C]	3.5-0.7[D]		0.02		0.0035[D]		0.35-0.7		0.002		0.50-1.5				0.12			0.02	
AS41B[E]	M10413	B93/ B93M	[C]	3.7-4.8		0.015		0.0035		0.35-0.6		0.001		0.60-1.4				0.10			0.01	
AZ31B	M11311	B90/ B90M B91 B107/ B107M B843	[C]	2.5-3.5	0.04	0.05		0.005		0.20-1.0		0.005		0.10				0.6-1.4				0.30