



# Standard Practice for Codification of Certain Nonferrous Metals and Alloys, Cast and Wrought<sup>1</sup>

This standard is issued under the fixed designation B 275; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

<sup>ε1</sup> NOTE—Summary of Changes was added editorially in November 2003.

## 1. Scope\*

1.1 This practice covers a system originally adopted for designating light metals and alloys, cast and wrought, and later extended to certain heavier, base-metal die-casting alloys. Those designations which are currently being used in specifications under the jurisdiction of Committees B02 on Nonferrous Metals and Alloys and B07 on Light Metals and Alloys are listed in Table X2.1.

1.1.1 The alloy designations now being used in Committee B07 specifications for aluminum and aluminum-alloy wrought and cast products conform to ANSI H35.1. Alloys formerly codified by this practice and the corresponding ANSI designations are shown in Tables X3.1 and X3.2.

1.2 This practice also provides a system for designating magnesium alloys that has been used commercially since 1952, and thus is intended to be the registration source for new magnesium alloys. A record of designations along with the established compositions is given in Table X4.1.

1.3 The equivalent Unified Numbering System alloy designations shown in the appendixes are in accordance with Practice E 527.

## 2. Referenced Documents

2.1 The following documents of the issue in effect on date of material purchase form a part of this practice to the extent referenced herein:

### 2.2 ASTM Standards:

- B 37 Specification for Aluminum for Use in Iron and Steel Manufacture<sup>2</sup>
- B 80 Specification for Magnesium-Alloy Sand Castings<sup>2</sup>
- B 86 Specification for Zinc-Alloy Die Castings<sup>3</sup>
- B 93/B93M Specification for Magnesium Alloys in Ingot

Form for Sand Castings, Permanent Mold Castings, and Die Castings<sup>2</sup>

B 94 Specification for Magnesium-Alloy Die Castings<sup>2</sup>

B 102 Specification for Lead and Tin Alloy Die Castings<sup>3</sup>

B 240 Specification for Zinc Alloys in Ingot Form for Die Castings<sup>3</sup>

B 327 Specification for Aluminum-Alloy Hardeners Used in Making Zinc Die-Casting Alloys<sup>3</sup>

E 527 Practice for Numbering Metals and Alloys (UNS)<sup>4</sup>

### 2.3 ANSI Standard:

H35.1 Alloy and Temper Designation Systems for Aluminum<sup>5</sup>

## 3. Basis of Codification

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

NOTE 1—For aluminum and 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 B07.07 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.

3.3 The temper designation, which is used for all metal forms except ingot, follows the alloy designation and is separated therefrom by a dash.

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee B07 on Light Metals and Alloys and is the direct responsibility of Subcommittee B07.03 on Aluminum Alloy Wrought Products.

Current edition approved Apr. 10, 2002. Published June 2002. Originally published as B 275 – 62 T. Last previous edition B 275 – 96.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 02.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 02.04.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 01.01.

<sup>5</sup> Available in the Related Materials section (gray pages) of the *Annual Book of ASTM Standards*, Vol 02.02.

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

#### 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 (Notes 3 and 4). 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.

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.

NOTE 4—The designation of a casting alloy in ingot form is derived from the composition specified for the corresponding alloy in the form of castings. Thus, a casting ingot designation may consist of an alloy designation having one or more serial letters, one for each product composition, or it may consist of one or more alloy designations.

4.2 The letters used to represent 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.

**TABLE 1 Letters Representing Alloying Elements**

A—Aluminum	M—Manganese
B—Bismuth	N—Nickel
C—Copper	P—Lead
D—Cadmium	Q—Silver
E—Rare earths	R—Chromium
F—Iron	S—Silicon
G—Magnesium	T—Tin
H—Thorium	W—Yttrium
J—Strontium	X—Calcium
K—Zirconium	Y—Antimony
L—Lithium	Z—Zinc

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.

#### 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 aluminum; lead; magnesium; tin; UNS designations; zinc

### APPENDIXES

#### (Nonmandatory Information)

#### X1. EXAMPLES OF CODIFICATION

X1.1 *Example 1*—For Alloy CG181A in Specification B 327, “C” represents copper, the alloying element specified in the greatest amount; “G” represents magnesium, the alloying element specified in the second greatest amount; 18 indicates that the rounded mean copper percentage lies between 17 and 19; 1 signifies the nearest whole number for magnesium percentage; and “A” as the final letter indicates that this is the first alloy qualified and assigned under the designation CG181.

X1.2 *Example 2*—For Alloys AZ91A, B, and C, in Specification B 93/B 93M, “A” represents aluminum, the alloying

element specified in the greatest amount; “Z” represents zinc, the alloying element specified in the second greatest amount; “9” indicates that the rounded mean aluminum percentage lies between 8.6 and 9.4; “1” signifies that the rounded mean of the zinc lies between 0.6 and 1.4; and “A” as the final letter indicates that this is the first alloy whose composition qualified assignment of the designation AZ91. The final serial letters B and C signify alloys subsequently developed whose specified compositions differ slightly from the first and from one another but do not differ sufficiently to effect a change in the basic designation.

#### X2. DESIGNATIONS FOR METALS AND ALLOYS ASSIGNED IN CONFORMANCE WITH PRACTICE B 275, FOR CODIFICATION OF CERTAIN NONFERROUS METALS AND ALLOYS

X2.1 Designations for metals and alloys assigned in conformance with Practice B 275, and the ASTM specifications in

which they are used, are shown in Table X2.1.

**TABLE X2.1 Designations Assigned for Nonferrous Metals and Alloys in Conformance with Practice B 275**

Designation		ASTM Specifications				
ASTM B 275	UNS	B 37	B 102	B 86	B 240	B 327
Aluminum Alloy						
850A		*	...	...	...	...
900A		*	...	...	...	...
920A		*	...	...	...	...
950A		*	...	...	...	...
980A		*	...	...	...	...
990A		*	...	...	...	...
CG181A		...	...	...	...	*
G1C		...	...	...	...	*
ZG71A		...	...	...	...	*
Lead Alloy						
Y10A		...	*	...	...	...
YT155A		...	*	...	...	...
Tin Alloy						
CY44A		...	*	...	...	...
PY1815A		...	*	...	...	...
YC135A		...	*	...	...	...
Zinc Alloy						
AC41A	Z35531	...	...	*	...	...
AG40A	Z35520	...	...	*	...	...
AC41A	Z35530	...	...	...	*	...
AG40A	Z33521	...	...	...	*	...
AC43A	Z35541	...	...	*	...	...
AG40B	Z33523	...	...	*	...	...
AC43A	Z35540	...	...	...	*	...
AG40B	Z33522	...	...	...	*	...

\* Alloys appear in applicable specifications which are found in the *Annual Book of ASTM Standards*, Vol 02.02.

**X3. DESIGNATIONS FOR METALS AND ALLOYS FORMERLY ASSIGNED IN CONFORMANCE WITH B 275**

X3.1 Designations assigned in conformance with this practice were used for wrought aluminum and wrought aluminum alloys in ASTM specifications prior to 1960 and for cast aluminum and aluminum alloys and ingot prior to 1974 but now designations conforming to the American National Standard Alloys and Temper Designation Systems for Aluminum

(ANSI H35.1) are standard with the Unified Numbering System, E 527 for information only. The former ASTM designations and the corresponding ANSI and UNS designations for wrought alloys are as shown in Table X3.1. Cast alloys and ingot are as shown in Table X3.2.

**TABLE X3.1 Wrought Aluminum Alloys**

Designations			Designations		
ANSI H35.1	Former B 275 – 63	UNS	ANSI H35.1	Former B 275 – 63	UNS
1060	996A	A91060	5056	GM50A	A95056
1100	990A	A91100	5083	GM41A	A95083
2011	CB60A	A92011	5086	GM40A	A95086
2014	CS41A	A92014	5154	GR40A	A95154
2017	CM41A	A92017	5254	GR40B	A95254
2018	CN42C	A92018	5454	GM31A	A95454
2024	CG42A	A92024	5456	GM51A	A95456
2117	CG30A	A92117	5652	GR20B	A95652
3003	M1A	A93003	6053	GS11B	A96053
3004	MG11A	A93004	6061	GS11A	A96061
4032	SG121A	A94032	6063	GS10A	A96063
5005	G1B	A95005	6101	GS10B	A96101
5050	G1A	A95050	7075	ZG62A	A97075
5052	GR20A	A95052			