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Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloys in Ingot Form for Foundry and Die Castings[1]

This standard is issued under the fixed designation B240; 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.

~~ε[1] NOTE—Summary of Changes was corrected editorially in March 2009.~~

1. Scope*

1.1 This specification covers commercial zinc and zinc-aluminum (ZA) alloys in ingot form for remelting for the manufacture of pressure die castings, foundry castings and continuous cast bar stock as designated and specified in Table 1. Seven alloy compositions are specified, designated as follows:

Common	Traditional	ASTM[A]	UNS[A]
Alloy 3	Zamak 3	AG 40A	Z33521
Alloy 7	Zamak 7	AG 40B	Z33522
Alloy 5	Zamak 5	AC 41A	Z35530
Alloy 2	Zamak 2	AC 43A	Z35540
ZA-8	ZA-8	...	Z35635
ZA-12	ZA-12	...	Z35630
ZA-27	ZA-27	...	Z35840

[A] See Table 1, footnote B.

1.2 Zinc alloys Z33521, Z33522, Z35530, and Z35540 are used primarily for remelting in the manufacture of pressure die castings. Zinc-aluminum alloys Z35635, Z35630, and Z35840 are used for remelting in the manufacture of both foundry and pressure die castings. Castings made from these ingots are specified in Specification B86, Standard Specification for Zinc and Zinc-Aluminum Alloys for Foundry and Die Castings.

1.3 The values stated in inch-pound units are to be regarded as standard.

1.4 Systems of nomenclature used to designate zinc and zinc-aluminum (ZA) alloys used for casting are described in Appendix X1.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to become familiar with all hazards including those identified in the appropriate Material Safety Data Sheet (MSDS) for this product/material as provided by the manufacturer, to establish appropriate safety and health practices, and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 The following documents of the issue in effect on data of order acceptance form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*[2]

B86 Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings

B275 Practice for Codification of Certain Nonferrous Metals and Alloys, Cast and Wrought

B897 Specification for Configuration of Zinc and Zinc Alloy Jumbo Block and Half Block Ingot

B899 Terminology Relating to Non-ferrous Metals and Alloys

B908 Practice for the Use of Color Codes for Zinc Casting Alloy Ingot

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications ~~E47Test Methods for~~

[1] This specification is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.04 on Zinc and Cadmium.

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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.**

TABLE 1 Chemical and North American Color Code Requirements

	Alloy 3[A,B,C,D] Zamak 3 (AG40A) Z33521	Alloy 7[A,B,C,D] Zamak 7 (AG40B) Z33522	Alloy 5[A,B,C,D] Zamak 5 (AC41A) Z35530	Alloy 2[A,B,C,D] Zamak 2 (AC43A) Z35540	ZA-8[B,C,E] ZA-8 Z35635	ZA-12[B,C,E] ZA-12 Z35630	ZA-27[B,C,E] ZA-27 Z35840
Color Code[F]	None	Brown	Black	Green	Blue	Orange	Purple
Element							
Aluminum	3.9-4.3	3.9-4.3	3.9-4.3	3.9-4.3	8.2-8.8	10.8-11.5	25.5-28.0
Magnesium	0.03-0.06	0.010-0.020	0.03-0.06	0.025-0.05	0.02-0.03	0.02-0.03	0.012-0.020
Copper	0.10 max	0.10 max	0.7-1.1	2.7-3.3	0.9-1.3	0.5-1.2	2.0-2.5
Iron, Max	0.035	0.075	0.035	0.035	0.035	0.05	0.07
Lead, Max	0.0040	0.0030	0.0040	0.0040	0.005	0.005	0.005
Cadmium, Max	0.0030	0.0020	0.0030	0.0030	0.005	0.005	0.005
Tin, Max	0.0015	0.0010	0.0015	0.0015	0.002	0.002	0.002
Nickel	- - -	0.005-0.020	- - -	- - -	- - -	- - -	- - -
Zinc[G]	Remainder	Remainder	Remainder	Remainder	Remainder	Remainder	Remainder

[A] Zinc alloy ingot for die casting may contain nickel, chromium, silicon, and manganese in amounts of up to 0.02, 0.02, 0.035 and 0.05 %, respectively. No harmful effects have ever been noted due to the presence of these elements in up to these concentrations and, therefore, analyses are not required for these elements, except that nickel analysis is required for Z33522.

[B] ASTM alloy designations were established in accordance with Practice B275. UNS assignations were established in accordance with Practice E527. The last digit of a UNS number differentiates between alloys of similar composition. UNS designations for ingot and casting versions of an alloy were not assigned in the same sequence for all alloys.

[C] For purposes of acceptance and rejection, the observed value or calculated value obtained from analysis should be rounded to the nearest unit in the last right-hand place of figures, used in expressing the specified limit, in accordance with the rounding procedure prescribed in Practice E29.

[D] When this material is required to conform to ISO Standard 301, the chemical limits for thallium and indium each shall not exceed 0.001 %.

[E] Zinc-aluminum ingot for foundry and pressure die casting may contain nickel, chromium, and manganese in amounts of up to 0.01 % each or 0.03 % total. No harmful effects have ever been noted due to the presence of these elements in up to these concentrations and, therefore, analyses are not required for these elements.

[F] Refer to Practice B908. *(Note: Colors indicated are for North American applications.)*

[G] Determined arithmetically by difference.

~~Chemical Analysis of Zinc Die-Casting Alloys~~

E88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition

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

E536 Test Methods for Chemical Analysis of Zinc and Zinc Alloys

E634 Practice for Sampling of Zinc and Zinc Alloys for Optical Emission Spectrometric Analysis

2.3 *Other ASTM Document:*

Methods for Emission Spectrochemical Analysis[3]

2.4 ~~*ISO Standard*~~ *ISO Standards:* [4]

ISO 301 Zinc Alloy Ingots Intended for Casting

ISO 3815–1 Zinc and zinc alloys — Part 1: Analysis of solid samples by optical emission spectrometry.

ISO 3815–2 Zinc and zinc alloys — Part 2: Analysis by inductively coupled plasma optical emission spectrometry.

3. Terminology

3.1 Terms shall be defined in accordance with Terminology B899.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *continuous casting*, *n*—a casting technique in which a cast is continuously withdrawn through the bottom of the mold as it solidifies, so that its length is not determined by mold dimensions; used chiefly to produce semifinished mill products such as billets, blooms, ingots, slabs and tubes; also known as concast.

3.2.2 *die casting*, *n*—a casting process in which molten metal is injected under high velocity and pressure into a metal die and solidified, also a product produced by such a process. Alternately known as pressure die casting.

4. Ordering Information

4.1 Orders for ingot under this specification shall include the following information:

4.1.1 Quantity in pounds,

4.1.2 Alloy (Table 1),

4.1.3 Size, if not manufacturer's standard (see Section 7),

[3] *Methods for Emission Spectrochemical Analysis: General Practices, Nomenclature, Standard Methods, Proposed Methods, Suggested Methods*, ASTM International, 1982.

~~Methods for Emission Spectrochemical Analysis: General Practices, Nomenclature, Standard Methods, Proposed Methods, Suggested Methods, ASTM International, 1982~~.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.