



Designation: B327 – 09a<sup>ε1</sup>

# Standard Specification for Master Alloys Used in Making Zinc Die Casting Alloys<sup>1</sup>

This standard is issued under the fixed designation B327; 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.

<sup>ε1</sup> NOTE—Copper max in Table 2 was editorially corrected in November 2011.

## 1. Scope\*

1.1 This specification covers aluminum–base and zinc–base master alloys used to make zinc die-casting alloys. Alloy compositions specified for aluminum–base master alloys (hardeners) are designated as shown in Table 1. Alloy compositions specified for the zinc-base master alloys are designated as shown in Table 2.

1.2 Aluminum alloy hardeners are added to Special High Grade zinc (per Specification B6) in the proper alloying ratios, as shown in Table 1, to produce zinc alloys for die casting.

1.3 Zinc-base master alloy is added to Special High Grade zinc (per Specification B6) in the proper alloying ratio, as shown in Table 3, to produce zinc alloy for die casting.

1.4 Master alloys may be supplied in the form of shot, bar, ingot or jumbo ingot as specified by the purchaser.

1.5 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.6 *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 date of order acceptance form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards*:<sup>2</sup>

<sup>1</sup> 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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<sup>2</sup> 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.

B6 Specification for Zinc

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

E34 Test Methods for Chemical Analysis of Aluminum and Aluminum-Base Alloys

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

E101 **DESIG ATTRIBUTE E0101 HAD NO TITLE IN SAD TABLES**

E227 Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique<sup>3</sup>

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

E536 Test Methods for Chemical Analysis of Zinc and Zinc Alloys

2.3 *ISO Standards*:<sup>4</sup>

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 *hardener, n*—an aluminum-base master alloy added to Special High Grade Zinc (SHG) to produce a zinc alloy for die casting.

## 4. Ordering Information

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

4.1.1 Quantity,

<sup>3</sup> Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.

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

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

**TABLE 1 Chemical Requirements for Aluminum-Base Master Alloys**

NOTE 1—The following applies to all specified limits in this table: For purposes of determining conformance with this specification, the observed value or calculated value obtained from analysis shall be rounded off “to the nearest unit” in the last right hand place of figures used in expressing the specified limit, in accordance with the rounding method of Practice E29.

ASTM Alloy (UNS) <sup>A</sup>	Composition, percent											Usage	
	Aluminum, min	Copper	Iron, max	Silicon, max	Manganese, max	Magnesium <sup>B</sup>	Zinc	Chromium, max	Nickel, max	Tin, max	Lead, max <sup>B</sup>		Cadmium, max <sup>B</sup>
ZG71A (A07131)	87.0	1.7 max	0.8	0.7	0.50	0.65–1.05	6.5–7.5	0.20	0.20	0.02	0.020	0.010	1 part by weight of ZG71A, 21 parts by weight of Special High Grade zinc <sup>C</sup> to make ASTM zinc Alloy Z33520 (AG40A)

<sup>A</sup> UNS designations were established in accordance with Recommended Practice E527.

<sup>B</sup> Carried to one additional decimal place to ensure proper control in the final alloy.

<sup>C</sup> ASTM Specification B6, for Zinc.

**TABLE 2 Chemical and Color Code Requirements for Zinc-Base Master Alloys<sup>A,B,C</sup>**

Common (UNS)	Color Code <sup>D</sup>	Aluminum	Magnesium	Iron max.	Copper max.	Lead max.	Cadmium max.	Tin max.	Zinc
V12-3 (Z33730)	Pink	11.7–12.6	0.090–0.16	0.070	0.25†	0.005	0.004	0.003	Remainder
V12-5 (Z- - - -)	Pink/Black	11.7–12.6	0.090–0.16	0.070	2.1–3.3	0.005	0.004	0.003	Remainder

†Editorially corrected.

<sup>A</sup> Zinc-base master alloys V12-3 (Z33730) and V12-5 (Z- - - -) used for producing die casting alloys may contain nickel, chromium, silicon, and manganese 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 in die casting alloys and, therefore, analyses are not required for these elements, except that nickel analysis is required when producing die casting alloy Z33522 or Z35530.

<sup>B</sup> The UNS assignments were established in accordance with Practice E527.

<sup>C</sup> For purposes of determining conformance with this specification, the observed value or calculated value obtained from analysis shall be rounded off “to the nearest unit” in the last right hand place of figures used in expressing the specified limit, in accordance with the rounding method of Practice E29.

<sup>D</sup> Refer to Practice B908. (Note: Color Codes indicated are for North American applications.)

**TABLE 3 Weight Requirements for Zinc-Base Master Alloy Jumbo Ingots**

NOTE 1—These requirements are based on the use of nominal 2400 lb or 1200 lb jumbo ingots of V12 (Z33730).

Nominal Weight, lb	Weight Range, lb <sup>A</sup>		Usage
	Minimum	Maximum	
2400	2325	2475	1 part by weight of V12-3 (one 2400 lb jumbo ingot), 2 parts by weight (two 2400 lb jumbo ingots) of Special High Grade zinc to make zinc alloy 3 (Zamak 3, UNS Z33520, AG40A)
			or
1200	1150	1250	1 part by weight of V12-5 (one 2400 lb jumbo ingot), 2 parts by weight (two 2400 lb jumbo ingots) of Special High Grade zinc to make zinc alloy 5 (Zamak 5, UNS Z35531, AC41A)
			or
1200	1150	1250	1 part by weight of V12-3 (one 1200 lb jumbo ingot), 2 parts by weight (one 2400 lb jumbo ingot) of Special High Grade zinc to make zinc alloy 3 (Zamak 3, UNS Z33520, AG40A)
			or
1200	1150	1250	1 part by weight of V12-5 (one 1200 lb jumbo ingot), 2 parts by weight (one 2400 lb jumbo ingot) of Special High Grade zinc to make zinc alloy 5 (Zamak 5, UNS Z35531, AC41A)
			or

<sup>A</sup> Jumbo ingots outside the above weight limits may be acceptable depending upon the chemistry, if mutually agreed upon between the producer and purchaser.

4.1.2 Alloy (Table 1 or Table 2),

4.1.3 Form: that is, shot, bar, ingot or jumbo ingot,

4.1.4 Size: that is, maximum shot size or size of bar, ingot, or jumbo ingot,

4.1.5 Unit weight: that is, nominal weight of shot per bag or nominal weight of each bar, ingot, or jumbo ingot,

4.1.6 Markings on shot bags, bars, ingot or jumbo ingot,

4.1.7 Palletizing, if required: means of palletizing and maximum weight per pallet load,

4.1.8 Place of inspection (Section 8), and

4.1.9 Specification number and date.

## 5. Materials and Manufacture

5.1 The material may be made by any suitable process.

5.2 The material covered by this specification shall be of uniform quality and shall be free of dross, flux, or other

harmful contamination. Also, if the material is in shot form, it shall be sound, uniform in size, and free of a heavily oxidized surface coating, stringers, and moisture.

## 6. Chemical Requirements

6.1 *Limits*—The material shall conform to the requirements as to chemical composition prescribed in Table 1 or Table 2. In addition there are weight limits for zinc-base master alloys when supplied in jumbo ingot form. The weight of jumbo ingots shall conform to the requirements as prescribed in Table 3.

6.2 In case of dispute the following requirements shall apply:

6.2.1 *Number of samples*—Samples for verification of chemical composition shall be taken as follows: