



Designation: ~~B327–16~~ **B327 – 21**

Standard Specification for Master Alloys Used in Making Zinc Die Casting Alloys¹

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 (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification covers ~~aluminum-base~~aluminum-base and ~~zinc-base~~zinc-base master alloys used to make zinc die-casting alloys. Alloy compositions specified for ~~aluminum-base~~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. Specification **B897** covers configuration of jumbo, block, half block, and slab ingot.

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 Safety Data Sheet (SDS) for this product/material as provided by the manufacturer, to establish appropriate ~~safety~~safety, health, and ~~health~~environmental practices, and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

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:*²

B6 Specification for Zinc

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 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	Composition, percent											Usage	
	Aluminum, min	Copper	Iron, max	Silicon, max	Manganese, max	Magnesium ^A	Zinc	Chromium, max	Nickel, max	Tin, max	Lead, max ^A		Cadmium, max ^A
ZG71A ^B	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, ^B 21 parts by weight of Special High Grade zinc ^C to make ASTM zinc alloy Z33524 (AG40A ^B)

^A Carried to one additional decimal place to ensure proper control in the final alloy.

^B ASTM alloy designations were established in accordance with Practice B275.

^C ASTM Specification B6, for Zinc.

TABLE 2 Chemical and Color Code Requirements for Zinc-Base Master Alloys^{A,B,C}

Common (UNS)	Color Code ^D	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 (Z35740)	Pink/Black	11.7–12.6	0.090–0.16	0.070	2.1–3.3	0.005	0.004	0.003	Remainder

^A Zinc-base master alloys V12-3 (Z33730) and V12-5 (Z35740) 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 detrimental effects on alloy performance 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 Z33526.

^B The UNS assignments were established in accordance with Practice E527.

^C 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.

^D 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 ^A		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 Z33524, AG40A ^B)
			or 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 Z35532, AC41A ^B)
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 Z33524, AG40A ^B)
			or 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 Z35532, AC41A ^B)

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

^B ASTM alloy designations were established in accordance with Practice B275.

[B275 Practice for Codification of Certain Zinc, Tin and Lead Die Castings \(Withdrawn 2020\)³](#)

[B897 Specification for Configuration of Zinc and Zinc Alloy Jumbo, Block, Half Block, and Slab Ingot](#)

[B899 Terminology Relating to Non-ferrous Metals and Alloys](#)

[B908 Practice for the Use of Color Codes for Zinc Casting Alloy Ingot](#)

[B949 Specification for General Requirements for Zinc and Zinc Alloy Products](#)

[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 \(Withdrawn 2017\)³](#)

[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](#)

[E1251 Test Method for Analysis of Aluminum and Aluminum Alloys by Spark Atomic Emission Spectrometry](#)

³ The last approved version of this historical standard is referenced on www.astm.org.

2.3 *ISO Standards*:⁴

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 Alloy (**Table 1** or **Table 2**),

4.1.2 Form: that is, shot, bar, ingot₂ or jumbo ingot,

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

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

4.1.5 Markings on shot bags, bars, ingot₂ or jumbo ingot,

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

4.1.7 Place of inspection (Section **8**), and

4.1.8 For additional information see Specification **B949**.

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

6.2.2 If the master alloys are shipped in carload lots of the same alloy, not less than five samples shall be taken at random from the carload for sampling. If the shipment is in less than carload lots, the following shall apply:

6.2.2.1 *Aluminum-base master alloys—Master Alloys*—One sample shall be taken for each 6000 lb (2722 kg) or fraction thereof. When it is deemed necessary, a sample may be taken from each melt of 500 lb (227 kg) or more of the alloy.

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