



Designation: B 327 – 01<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 B 327; 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—Paragraph 10.3 was corrected editorially and a Summary of Changes section was added in July 2001.

### 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 composition specified for the zinc-base master alloy is designated as shown in Table 2.

1.2 Aluminum alloy hardeners are added to Special High Grade zinc (per Specification B 6) 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 B 6) 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 standard. The SI equivalents of inch-pound units are for information only.

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 Data Sheet 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:*

B 6 Specification for Zinc<sup>2</sup>

B 899 Terminology Relating to Non-ferrous Metals and Alloys<sup>2</sup>

B 908 Practice for the Use of Color Codes for Zinc Casting Alloy Ingot<sup>2</sup>

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications<sup>3</sup>

E 34 Test Methods for Chemical Analysis of Aluminum and Aluminum–Base Alloys<sup>4</sup>

E 88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition<sup>4</sup>

E 101 Test Method for Spectrographic Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique<sup>5</sup>

E 227 Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique<sup>4</sup>

E 527 Practice for Numbering Metals and Alloys (UNS)<sup>6</sup>

E 536 Test Method for Chemical Analysis of Zinc and Zinc Alloys<sup>7</sup>

### 3. Terminology

3.1 Terms shall be defined in accordance with Terminology B 899.

### 4. Ordering Information

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

4.1.1 Quantity,

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

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

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 14.02.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 03.05.

<sup>5</sup> Discontinued; see *1995 Annual Book of ASTM Standards*, Vol 03.05.

<sup>6</sup> *Annual Book of ASTM Standards*, Vol 01.01.

<sup>7</sup> *Annual Book of ASTM Standards*, Vol 03.06.

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

**TABLE 1 Chemical and North American Color Code Requirements**

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 E 29.

ASTM Alloy (UNS) <sup>A</sup>	Color Code <sup>B</sup>	Composition, percent											Usage	
		Aluminum, min	Copper	Iron, max	Silicon, max	Manganese, max	Magnesium <sup>C</sup>	Zinc	Chromium, max	Nickel, max	Tin, max	Lead, max <sup>C</sup>		Cadmium, max <sup>C</sup>
ZG71A (A07131)	Pink	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>D</sup> to make ASTM zinc Alloy Z33520 (AG40A)

<sup>A</sup>UNS designations were established in accordance with Recommended Practice E 527.

<sup>B</sup>Refer to Practice B 908. (Note: Colors indicated are for North American applications.)

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

<sup>D</sup>ASTM Specification B 6, for Zinc.

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

Common Alloy (UNS)	Composition, percent							
	Aluminum	Magnesium	Iron, max	Copper, max	Lead, max	Cadmium, max	Tin, max	Zinc remainder
V12 (Z33730)	11.7–12.6	0.075–0.12	0.070	0.25	0.005	0.004	0.003	remainder

<sup>A</sup>Zinc-base master alloy Z33730 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.

<sup>B</sup>The UNS designations were established in accordance with Practice E 527.

<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 E 29.

**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 (one 2400 lb jumbo ingot), 2 parts by weight (two 2400 lb jumbo ingots) of Special High Grade zinc to make ASTM zinc alloy Z33520 (AG40A).
1200	1150	1250	1 part by weight of V12 (one 1200 lb jumbo ingot), 2 parts by weight (one 2400 lb jumbo ingot) of Special High Grade zinc to make ASTM zinc alloy Z33520 (AG40A).

<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.

4.1.9 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:

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*—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.

6.2.2.2 *Zinc-base master alloys*—One sample shall be taken for each 10 000 lb (4536 kg) or fraction thereof. When necessary, a sample may be taken from each melt of 1000 lb (454 kg) or more.

6.2.3 A sample may consist of an ingot or bar. In the case of metal in shot form, a small representative lot of the shot may be melted and poured to form a thin chill-cast bar approximately ¼ in. (6.4 mm) thick or a suitable spectrographic mold sample. In the case of a jumbo ingot, the sample may be a cast spectrographic specimen taken from the same pour used to cast the jumbo ingots.

6.3 *Methods of Sampling*—Samples for determination of chemical composition shall be taken in accordance with one of the following methods:

6.3.1 Samples for chemical analysis shall be taken from the material by drilling, sawing, milling, turning, or clipping a representative piece or pieces to obtain a weight of prepared sample not less than 100 g. Sampling shall be in accordance with Practice E 88.

6.3.2 By agreement between the producer and the purchaser, other methods of sampling cast products for spectrochemical and other methods of analysis may be used. Such methods shall be suitable for the form of material being analyzed and the type of analytical method used.

6.3.2.1 An optional method of sampling for analysis may be to melt together representative portions of each ingot selected, and then sample the liquid composite by casting suitable specimens for spectrographic and/or chemical analysis.