



# Standard Specification for Zinc Casting Alloy Ingot for Sheet Metal Forming Dies and Plastic Injection Molds<sup>1</sup>

This standard is issued under the fixed designation B793; 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.

## 1. Scope\*

1.1 This specification covers commercial zinc alloys in ingot form for remelting for the manufacture of dies and molds from the alloys as shown in **Table 1**.

1.2 This specification presents requirements for zinc alloys suitable for the production of sand cast or plaster cast forming dies for sheet metal stamping operations and plastic injection molding. Alloy A is intended for use in the fabrication of dies for sheet metal stamping under drop hammer and hydraulic pressure. Alloy B is a special purpose alloy of closely controlled composition and is primarily used in the manufacture of plastic injection molds.

1.3 This specification covers two zinc alloys which are specified and designated as follows:

UNS	ASTM	Traditional
Z35543	Alloy A	Kirksite A
Z35542	Alloy B	Kirksite B

1.4 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.

1.5 *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 Safety Data Sheet (SDS) 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>

- 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
- 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

### 2.3 ISO Standards:<sup>3</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 *Kirksite, n*—a common trade name for aluminum-copper-magnesium alloys, Kirksite A and Kirksite B, used to produce, among other things, sheet metal forming dies.

3.2.2 *plastic injection molds, n*—molds used for the production of plastic parts by pressure injection of molten or semi-molten plastic.

3.2.3 *sheet metal forming die, n*—a die or pattern used to form sheet metal into a finished or semi-finished shape using

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</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 and North American Color Code Requirements<sup>A,B</sup>**

Color Code <sup>C</sup>	Composition, %	
	UNS Z35543 Alloy A Kirksite A	UNS Z35542 Alloy B Kirksite B
	Green/Red	Green/Black
Element		
Aluminum	3.5–4.5	3.9–4.3
Cadmium	0.005 max	0.003 max
Copper	2.5–3.5	2.5–2.9
Iron	0.100 max	0.075 max
Lead	0.007 max	0.003 max
Magnesium	0.02–0.10	0.02–0.05
Tin	0.005 max	0.001 max
Zinc	Remainder	Remainder

<sup>A</sup> 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.

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

<sup>C</sup> Refer to Practice B908. (Note: Colors indicated are for North American applications.)

mechanical force to make the sheet metal conform to the shape of the die, often a pair of dies with a positive and negative face between which sheet metal is shaped under high pressure.

#### 4. Ordering Information

4.1 Orders for zinc alloy ingot under this specification shall include information as specified in Specification B949.

#### 5. Chemical Requirements

5.1 *Limits*—The alloy shall conform to the requirements as to chemical composition prescribed in Table 1.

5.2 Chemical requirement procedures shall be in compliance with the provisions of Specification B949.

#### 6. Sampling for Chemical Analysis

6.1 Sampling procedures shall be in compliance with the provisions of Specification B949.

#### 7. Method of Chemical Analysis

7.1 The determination of chemical composition shall be made in accordance with Test Methods E536, or ISO 3815-1, or ISO 3815-2 or other methods. In case of dispute, the results

secured by Test Methods E536, or ISO 3815-1, or ISO 3815-2 shall be the basis of acceptance.

NOTE 1—Test Methods E536 is not directly applicable to the alloys in Specification B793. ISO 3815-1 and ISO 3815-2 are generic methods applied to zinc and zinc alloys. Each of the methods may be modified and formatted for the alloy to be assayed. An experienced chemist, using suitable and/or traceable standards along with valid quality assurance techniques, will be able to perform and validate the methods and demonstrate acceptable precision and accuracy.

#### 8. Materials and Manufacture

8.1 The alloys may be made by any approved process.

8.2 The material covered by this specification shall be of uniform quality and shall be free from dross, slag, or other harmful contamination.

8.3 Jumbo or block ingots shall conform to configuration shown in Specification B897, or to a shape and size previously agreed upon.

#### 9. Physical Properties – NA

#### 10. Mechanical Properties – NA

#### 11. Dimensions, Mass, and Permissible Variation, and Shapes and Sizes – NA

#### 12. Workmanship, Finish, and Appearance – NA

#### 13. Inspection

13.1 Source inspection shall be in compliance with the provisions of Specification B949.

#### 14. Rejection and Rehearing

14.1 See appropriate requirements in Specification B949.

#### 15. Certification

15.1 See appropriate requirements in Specification B949.

#### 16. Product Identification Marking and Packaging

16.1 Each slab, block, jumbo or ingot shall be marked for identification in accordance with the provisions of Specification B949.

#### 17. Keywords

17.1 blanking dies; casting; casting alloys; forming dies; gravity casting; Kirksite; Kirksite A; Kirksite B; sheet metal dies; zinc

**SUMMARY OF CHANGES**

Committee B02 has identified the location of selected changes to this standard since the last issue (B793–15) that may impact the use of this standard. (Approved May 1, 2016.)

- (1) The references to specific sections in Specification B949 were removed.      (2) Several sections added to conform to a standard template and reference Specification B949.

Committee B02 has identified the location of selected changes to this standard since the last issue (B793–13) that may impact the use of this standard. (Approved June 1, 2015.)

- (1) The definitions for Kirksite, plastic injection molds, and sheet metal forming die were added to Terminology Section 3.

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