



Designation: ~~B793-10~~ Designation: **B793 - 12**

# 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 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>

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](#)

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

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.

<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.

Current edition approved ~~October 1, 2010~~ May 1, 2012. Published ~~October 2010~~ July 2012. Originally approved in 1988. Last previous edition approved in ~~2009~~ 2010 as B793 - 109. DOI: 10.1520/B0793-102.

<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.)

#### 4. Ordering Information

4.1 Orders for ingots 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;

4.1.4 Specification number and date;

4.1.5 Source inspection (Section 7); and

4.1.6 Marking (Section 9).

4.1 Orders for zinc alloy ingot under this specification shall include information as specified in Specification B949, Section 4.

#### 5. Materials and Manufacture

5.1 The alloys may be made by any approved process.

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

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

5.4 Material produced under this specification shall conform with the General Requirements of Specification B949, unless otherwise noted in this specification.

#### 6. Chemical Requirements

6.1 *Limits*—The alloy shall conform to the requirements as to chemical composition prescribed in Table 1. Conformance shall be determined by the producer by analyzing samples taken at the time the ingots are made. If the producer has determined the chemical composition of the metal during the course of manufacture, he shall not be required to sample and analyze the finished product.

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 ingots are shipped in carload lots of the same alloy, not less than five ingots shall be taken at random from the carload for sampling. If the shipment is less than a carload lot, one sample ingot shall be taken for each 10000 lb (4500 kg) or fraction thereof. When it is deemed necessary, a sample may be taken from each melt of 1000 lb (450 kg) or more.

6.3 *Methods of Sampling*—Samples from ingots 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 weight of prepared sample not less than 100 g. Sampling shall be in accordance with Practice E88.

6.3.2 By agreement, an optional method of sampling for analysis may be by melting together representative portions of each ingot selected, and then sampling the liquid composite by casting suitable specimens for either spectrographic or chemical analysis.

6.4 *Method of Analysis*—The determination of chemical composition shall be made in accordance with Test Methods