Designation: B 793 – 03

Standard Specification for Zinc Casting Alloy Ingot for Sheet Metal Forming Dies and Plastic Injection Molds[1]

This standard is issued under the fixed designation B 793; 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 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 *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 899 Terminology Relating to Non-ferrous Metals and Alloys[2]

B 908 Practice for the Use of Color Codes for Zinc Casting Alloy Ingot[2]

TABLE 1 Chemical and North American Color Code Requirements[A,B]

	Composition, %	
	UNS Z35543 Alloy A Kirksite A	UNS Z35542 Alloy B Kirksite B
Color Code[C]	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

[A] 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.

[B] UNS designations were established in accordance with Practice E 527.

[C] Refer to Practice B 908. *(Note: Colors indicated are for North American applications.)*

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications[3]

E 47 Test Methods for Chemical Analysis of Zinc Die-Casting Alloys[4]

E 88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition[5]

E 527 Practice for Numbering Metals and Alloys (UNS)[6]

E 536 Test Methods for Chemical Analysis of Zinc and Zinc Alloys[5]

3. Terminology

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

4. Ordering Information

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

[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] *Annual Book of ASTM Standards*, Vol 02.04.

[3] *Annual Book of ASTM Standards*, Vol 14.02.

[4] Discontinued; see *1998 Annual Book of ASTM Standards*, Vol 03.05.

[5] *Annual Book of ASTM Standards*, Vol 03.05.

[6] *Annual Book of ASTM Standards*, Vol 01.01.

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

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).

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.

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 10 000 lb (4 500 kg) or fraction thereof. When it is deemed necessary, a sample may be taken from each melt of 1 000 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 E 88.

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 suitable chemical (Test Methods E 536 or E 47 for tin), or other methods. In case of dispute, the results secured by Test Method E 536 and Test Method E 47 for tin only shall be the basis of acceptance.

7. Source Inspection

7.1 If the purchaser desires that his representative inspect or witness the inspection and testing of the product prior to shipment, such agreement shall be made by the purchaser and producer or supplier as part of the contract or purchase order.

7.2 When such inspection or witness of inspection and testing is agreed upon, the producer or supplier shall afford the purchaser's representative all reasonable facilities to satisfy him that the product meets the requirements of this specification. Inspection and tests shall be conducted so there is no unnecessary interference with the producer's operations.

8. Rejection and Rehearing

8.1 Material that fails to conform to the requirements of this specification may be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing. If the rehearing establishes that the material does not conform to the requirements of this specification, as much of the rejected original material as possible shall be returned to the producer or supplier.

9. Identification Marking

9.1 All ingots shall be properly marked for identification with the producer's name or brand.

9.2 Each bundle or skid shall be identified with the producer's heat, lot, or other identification mark.

9.3 Each ingot, bundle or skid shall be marked with the appropriate Color Code for the alloy as per North American requirements in Practice B 908.

10. Preparation for Delivery

10.1 *Packaging*—Unless otherwise specified, the ingot shall be packaged to provide adequate protection during normal handling and transportation. Each package shall contain only one alloy unless otherwise agreed upon.

11. Keywords

11.1 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 (B 793 - 01$^{\epsilon 1}$) that may impact the use of this standard.

(1) The traditional names Kirksite, Kirksite A, and Kirksite B were added.