



Designation: B894 – 17

## Standard Specification for ACuZinc5<sup>1</sup> (Zinc-Copper-Aluminum) Alloy Die Castings<sup>2</sup>

This standard is issued under the fixed designation B894; 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 ACuZinc5, zinc-copper-aluminum alloy die castings. (UNS Z46541).<sup>3</sup>

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *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, health and environmental practices, and determine the applicability of regulatory limitations prior to use.*

1.4 *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 acceptable form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*<sup>4</sup>

[B892 Specification for ACuZinc5 \(Zinc-Copper-Aluminum\) Alloy in Ingot Form for Die Castings](#)

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

<sup>1</sup> ACuZinc and ACuZinc5 are registered trade names of the General Motors Corporation.

<sup>2</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 June 1, 2017. Published September 2017. Originally approved in 1999. Last previous edition approved in 2015 as B894 – 10 (2015). DOI: 10.1520/B0894-17.

<sup>3</sup> See Footnote B in [Table 1](#).

<sup>4</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.

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

[E10 Test Method for Brinell Hardness of Metallic Materials](#)  
[E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications](#)

[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 *Federal Standards:*<sup>5</sup>

[Fed. Std. No. 123 Marking for Shipment \(Civil Agencies\)](#)

2.4 *ISO Standards:*<sup>6</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](#)

2.5 *Military Standard:*<sup>7</sup>

[MIL-P-116 Methods of Preservation](#)

[MIL-STD-129 Marking for Shipment and Storage](#)

2.6 *NADCA Standard:*<sup>8</sup>

[NADCA Product Specification Standards for Die Castings](#)

### 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 *die casting, n*—a casting process in which molten metal is injected under high velocity and pressure into a metal die and solidified, also a product produced by such a process. Alternately known as pressure die casting.

### 4. Ordering Information

4.1 Orders for die castings shall include the following basic information in addition to the information specified in Specification B949:

<sup>5</sup> Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov>.

<sup>6</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

<sup>7</sup> Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

<sup>8</sup> Available from North American Die Casting Association (NADCA), 3250 Arlington Heights Rd., Suite 101, Arlington Heights, IL 60004, <http://www.diecasting.org>.

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

4.1.1 Part name and number,

4.1.2 Alloy (**Table 1**), and

4.1.3 Drawing of die casting, when required, giving all necessary dimensions and showing latest revisions and allowances for machining, if any. Location of ejector pin marks or parting lines shall be at the option of the producer, unless specifically designated on the drawing.

4.2 Additional tests, options and special inspection requirements as provided below should be justified only on the basis of need. These shall be specified in the contract or purchase order, as additional procedures and extended delivery time may be involved.

4.2.1 Chemical analysis (Section 7),

4.2.2 Quality assurance (Section 6),

4.2.3 Special proof tests or mechanical properties (Section 8),

4.2.4 General quality options for internal soundness or for finish (Section 10),

4.2.5 Source inspection (Section 11),

4.2.6 Certification (Section 13),

4.2.7 Marking for identification (Section 14), and

4.2.8 Special packaging (Section 15).

## 5. Materials and Manufacture

5.1 The metal used in the manufacture of die castings shall be zinc alloy of a specified chemical composition conforming to the requirements of Specification **B892**.

5.2 See Specification **B949**.

## 6. Quality Assurance — See Specification **B949**

## 7. Chemical Requirements

7.1 *Limits*—The die casting shall conform to the requirements as to chemical composition in **Table 1**. Conformance shall be determined by the producer by analyzing samples taken at the time castings are made. If the producer has determined the chemical composition of the metal during the

**TABLE 1 ACuZinc5 Chemical Requirements, Composition, Zinc-Copper-Aluminum Die Castings<sup>A</sup>**

Elements	Composition, % (Z46541) <sup>B</sup>
Copper	5.0 to 6.0
Aluminum	2.5 to 3.3
Magnesium	0.025 - 0.05
Iron	0.075 max
Lead	0.005 max
Cadmium	0.004 max
Tin	0.003 max
Zinc	Remainder <sup>C</sup>

<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> Determined arithmetically by difference.

course of manufacture, he shall not be required to sample and analyze the finished product.

7.2 *Number of Samples*—See Specification **B949**.

7.3 *Methods of Sampling*—See Specification **B949**.

7.4 *Method of Analysis*—See Specification **B949**.

## 8. Mechanical Properties and Tests

8.1 Unless specified in the contract or purchase order, or specified on the detail drawing, acceptance of die castings under this specification shall not depend on mechanical properties determined by tension or impact tests.

8.1.1 Tensile strength, yield strength and elongation values shown in **Table 1**. They are Weibull analysis values to be used for design guidance. They are  $B_{50}$  and  $B_1$  values with 50 % confidence and were obtained from tests on 5.3 mm diameter separately cast test bars which had a 25.4 mm gage length. The bars were tested in the as-cast condition.

NOTE 1—The property values of test bars cut from castings will vary depending on the solidification rate of the individual casting. Solidification and cooling rate are significantly influenced by casting section size. Also due to cooling rate and section size variation, the properties of bars machined from castings may vary from those of separately cast test bars. For these reasons, acceptance or rejection of the casting shall be based on chemistry. Hardness and mechanical properties may be used when agreed by the purchaser and supplier, and specified on the engineering drawing.

8.1.2 *Hardness (Test Method **E10**)*—The hardness shall be determined on the casting unless otherwise specified on the part drawing. A Brinell hardness test will be performed using a 500 kg load and a 10 mm ball unless otherwise specified and agreed to by supplier and user. If the part is too small for a Brinell test, a Rockwell F or K hardness test is suggested.

## 9. Permissible Variations in Dimensions

9.1 Permissible variations in dimensions shall be within the limits specified on the drawings or in the contract or purchase order.

9.1.1 Any dimensions for which a tolerance is not specified shall be in accordance with NADCA Product Specification Standards for Die Castings.

9.2 Dimensional tolerance deviations waived by the purchaser shall be confirmed in writing to the producer or supplier.

## 10. General Quality — See Specification **B949**

## 11. Source Inspection — See Specification **B949**

## 12. Rejection and Retest — See Specification **B949**

## 13. Certification — See Specification **B949**

## 14. Identification Marking — See Specification **B949**

## 15. Preparation for Delivery — See Specification **B949**

## 16. Keywords

16.1 ACuZinc; ACuZinc5; castings; die castings; pressure die castings; zinc; zinc alloy die castings; zinc metal; zinc-copper-aluminum alloys