Designation: B989 – 14

Standard Specification for High Fluidity (HF) Zinc-Aluminum Alloy in Ingot Form for Thin Wall Die Castings[1]

This standard is issued under the fixed designation B989; 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 a commercial zinc-aluminum alloy in ingot form for remelting for the manufacture of thin wall pressure die castings as designated and specified in Table 1.

1.2 Systems of nomenclature used to designate zinc and zinc-aluminum (ZA) alloys used for casting are described in Appendix X1.

1.3 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.

1.4 *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 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:*[2]

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

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:*[3]

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 *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.

3.2.2 *high fluidity alloy, n*—a zinc alloy by nature of its composition is capable of producing die castings with thinner wall sections compared to typical die cast alloys; often less than 0.012 in. (0.30 mm) in thickness.

3.2.3 *thin wall die casting, n*—a die casting with wall sections that can be less than 0.012 in. (0.30 mm) in thickness.

4. Ordering Information (See Specification B949)

5. Chemical Requirements

5.1 The ingots shall conform to the requirements as to chemical composition as prescribed in Table 1. Conformance shall be determined in accordance with Specification B949, Sections 5.2 and 5.2.1.

[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] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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

TABLE 1 Chemical and North American Color Code Requirements

Common Name UNS	HF Alloy[A,B,C] to be assigned
Color Code[D]	Red/Brown
Element	
Aluminum	4.3–4.7
Magnesium	0.005–0.012
Copper, max	0.035
Iron, max	0.03
Lead, max	0.003
Cadmium, max	0.002
Tin, max	0.001
Zinc[E]	Remainder

[A] Zinc alloy ingots for die casting may contain nickel, chromium, silicon, and manganese in amounts of up to 0.01, 0.01, 0.01, and 0.01 %, respectively. No harmful effects have ever been noted due to the presence of these elements in up to these concentrations and, therefore, analyses are not required for these elements.
[B] The last digit of a UNS number differentiates between alloys of similar composition. UNS designations for ingot and casting versions of an alloy were not assigned in the same sequence for alloys.
[C] For purposes of acceptance and rejection, the observed value or calculated value obtained from analysis should be rounded to the nearest unit in the last right-hand place of figures, used in expressing the specified limit, in accordance with the rounding procedure prescribed in Practice E29.
[D] Refer to Practice B908 (Note: Colors indicated are for North American applications.)
[E] Determined arithmetically by difference.

6. Sampling for Determination of Chemical Composition (See Specification B949)

7. Methods for Chemical Analysis

7.1 The determination of chemical composition shall be made in accordance with Specification B949, Section 5.2.2.

7.2 In case of dispute, the results secured by an approved method (or combination of approved methods), or by a method agreed upon by both parties, shall be the basis of acceptance.

7.2.1 Approved methods include: Test Methods E536, ISO 3815–1, or ISO 3815–2.

7.2.1.1 Test Methods E536 is generally applicable, but must be slightly modified to cover the higher Al range. 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.

7.3 For purposes of determining compliance with specified composition limits as given in Table 1, an observed or calculated value shall be rounded to the nearest unit in the last right-hand place of figures shown in Table 1, in accordance with the rounding method of Practice E29.

8. Materials and Manufacturer (See Specification B949)

9. Physical Properties – NA

10. Mechanical Properties – NA

11. Dimensions, Mass, and Permissible Variation, and Shapes and Sizes

11.1 Zinc casting alloy ingots are typically supplied in ingot bundles weighing 1700 to 2400 lb (770 to 1090 kg).

11.2 Ingots and bundles vary in size and weight depending on the alloy and supplier.

11.2.1 Standard ingots have a nominal weight in the range of 17 to 24 lb (8 to 11 kg) and are generally 24 to 26 in. (61 to 66 mm) long.

11.3 Margash bars or ingots come in two sizes with a nominal weight in the range of either 12 to 14 lb (5 to 6 kg) or 20 to 24 lb (9 to 11 kg).

11.4 Zinc casting alloy ingot may be ordered in jumbos or blocks, as specified in Specification B897.

11.5 Zinc casting alloy ingot may also be ordered in other shapes.

12. Workmanship, Finish, Appearance – NA

13. Inspection (See Specification B949)

14. Rejection and Rehearing (See Specification B949)

15. Certification (See Specification B949)

16. Product and Package Marking, Packaging and Preparation for Delivery (See Specification B949)

17. Keywords

17.1 castings; die castings; high fluidity; high fluidity alloy; pressure die castings; thin wall die casting; zinc; zinc-aluminum alloy; zinc metal

APPENDIX

(Nonmandatory Information)

X1. NOMENCLATURE SYSTEMS FOR ZINC AND ZINC-ALUMINUM (ZA) ALLOYS

X1.1 The information in this appendix does not constitute a part of this specification but is provided for informational purposes only. The nomenclature covers a commercial zinc-aluminum alloy in ingot form for remelting for the manufacture of pressure die castings as designated and specified in Table 1.

X1.2 Several different systems of nomenclature have evolved over the years to designate the zinc alloys used for casting as listed in Table X1.1.

TABLE X1.1 Nomenclature Systems for Zinc-Aluminum Alloys

Common	UNS
HF alloy	to be assigned

X1.2.1 Common names refer to the established and common reference to the zinc casting alloy.

X1.2.2 UNS numbers are established in Practice E527 (SAE J1086) as part of a Unified Numbering System to provide unique designations for each metal grade and alloy in use worldwide. Zinc alloys start with the prefix "Z" followed by five numbers. The first digit is based on the major alloying element, the second digit provides a further sub-classification based on secondary and tertiary alloying elements, the third digit designates the nominal composition of the major alloying element, the fourth digit designates the nominal concentration of the second most important alloying element, and the fifth digit allows a unique number to be established to differentiate between similar compositions.