Designation: B69 – 20

Standard Specification for Rolled Zinc[1]

This standard is issued under the fixed designation B69; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers two types of commercial rolled zinc as described in 1.2. It should be understood that the specification is general. Any closer limitations on permissible variations shall be a matter of agreement between the supplier (manufacturer) and the purchaser.

1.2 Rolled zinc is furnished in two types as follows:

1.2.1 *Type A*—Coils or sheets cut from strip (ribbon) rolled zinc and

1.2.2 *Type B*—Zinc plates such as boiler and hull plates produced by any rolling method.

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 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.*

1.5 *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 issue of each of the following reference documents shall be that which is current on the date the purchase order is accepted by the supplier (manufacturer).

2.2 *ASTM Standards:*[2]

B899 Terminology Relating to Non-ferrous Metals and Alloys

E8 Test Methods for Tension Testing of Metallic Materials [Metric] E0008_E0008M

E18 Test Methods for Rockwell Hardness of Metallic Materials

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E55 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition

E60 Practice for Analysis of Metals, Ores, and Related Materials by Spectrophotometry

E88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition

E384 Test Method for Microindentation Hardness of Materials

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

E536 Test Methods for Chemical Analysis of Zinc and Zinc Alloys

E634 Practice for Sampling of Zinc and Zinc Alloys for Analysis by Spark Atomic Emission Spectrometry

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 *architectural rolled zinc, Type 1, n*—a lower copper composition architectural zinc that exhibits different properties than Type 2.

[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.

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

3.2.2 *architectural rolled zinc, Type 2, n*—a higher copper composition architectural zinc that exhibits different properties than Type 1.

3.2.3 *coiled sheet, n*—sheet coils with either slit or unslit edges.

3.2.4 *flat sheet, n*—sheet with sheared, slit, or sawed edges that has been flattened or leveled.

3.2.5 *plate, n*—rolled product, rectangular in cross section and form, or thickness of more than 0.125 in. (3.175 mm) with either untrimmed, sheared or sawed edges.

3.2.6 *rolled zinc, n*—wrought zinc or zinc alloy sheet, strip, or plate produced by hot and/or cold rolling.

3.2.7 *sheet, n*—rolled product, rectangular in cross section and form of thickness of 0.003 in. (0.076 mm) through 0.125 in. (3.175 mm) with sheared, slit, untrimmed or sawed edges.

4. Ordering Information

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

4.1.1 ASTM designation and year of issue,

4.1.2 Quantity (weight),

4.1.3 Name of material (rolled zinc),

4.1.4 Type of rolled zinc:

4.1.4.1 Form designated as Type A or Type B,

4.1.4.2 and if an architectural grade identified as Type 1 or Type 2,

4.1.5 Dimensions (thickness, width, length, or coil),

4.1.6 Chemical composition/alloy, and

4.1.7 Others as agreed upon between the purchaser and the supplier.

5. Materials and Manufacture

5.1 The supplier (manufacturer) shall ensure that each rolled zinc product:

(a) conforms to the chemical composition specified in the purchase order,

(b) is free of deleterious inclusions, and

(c) is of satisfactory appearance.

The products covered by this specification shall be produced by casting, rolling, and other processes found in a mill product plant.

6. Chemical Composition

6.1 *Alloys*—The material shall conform to the chemical requirements prescribed in Table 1.

7. Mechanical Properties

7.1 The material shall conform to the mechanical property requirements in the longitudinal rolling direction in Table 2.

7.1.1 The testing of wrought zinc for determination of tensile properties shall be conducted in accordance with Test Methods E8, with the additional recommendation that the rate of separation of the heads during a test be maintained between 0.115 to 0.135 in./in./min (0.115 to 0.135 mm/mm/min) at room temperature (68 to 75°F (20 to 24°C) suggested).

7.1.2 The testing of zinc for hardness shall be made on a Rockwell superficial hardness tester set up for the 15T scale, in accordance with Test Methods E18, or on a microhardness tester, in accordance with Test Method E384. Zinc is a time dependent material; therefore, the dwell time of the major load shall be specified between supplier and customer, for example, 4 to 15 s.

8. Dimensions and Permissible Variations

8.1 *Thickness*—The permissible variations in thickness of rolled zinc shall be as specified in Table 3, along the length of the coil shall be made within 12 in. (305 mm) of each other, nor shall measurement in any one line across the width of the coil be used as a basis of rejection.

8.2 *Width*—The permissible variations in width of all types of rolled zinc shall be as specified in Table 4.

8.3 *Length*—The permissible variations in length in all types of rolled zinc shall be as follows: sheets, strips, and plates may be ordered to exact lengths with the following variations in length permitted, ±0.125 in. (3.2 mm), or to a tolerance range agreed to by buyer and seller. For Architectural Rolled Zinc (ZXXXXX), the permissible variation in length is ±0.2 in. (±5 mm).

8.4 *Sidewise Bend and Curvature (Camber)*—Type I rolled zinc in lengths over 10 ft (3048 mm) shall not exhibit sidewise bend or curvature in excess of 1 in. (25.4 mm) in any length of 10 ft, or to a tolerance range agreed to by buyer and seller.

9. Workmanship, Finish, and Appearance

9.1 The material shall be uniform in quality and finish, commercially straight or flat, and free of injurious imperfections.

10. Sampling

10.1 The sampling plan for zinc for purposes of chemical analysis or mechanical property testing shall be designed such that any lot of finished product may be adequately described by the results of the tests performed on the samples. Lot or portion size shall be as agreed upon between purchaser and supplier.

11. Chemical Analysis

11.1 Samples for chemical analysis shall be taken in accordance with 10.1 and 11.2, 11.2.1 or 11.2.3 according to the form of zinc and zinc alloy to be analyzed and the analysis method to be used.

11.2 Samples from molten metal, cast, semi-finished or finished product for optical emission spectrochemical analysis shall be sampled in accordance with Practice E634.

11.2.1 Samples for the analysis of metal from incoming material in the ingot or slab form shall be taken in accordance with Practice E55. Drillings or millings shall be taken in approximately equal weight from each of the samples pieces selected in accordance with 10.1 and combined into one composite sample.

11.2.2 Samples for the analysis of metal in the molten form taken in the process of pouring of castings shall be taken in an adequate number and spacing such that the casting, simultaneously poured castings, may be described by the analysis of the sample(s).

TABLE 1 Chemical Composition of Rolled Zinc Alloys[A]

Alloy (UNS)[B]	Cu	Pb	Fe	Cd	Ti	Al	Sn	Mn	Mg	Zn
Rolled Special High Grade Zinc (Z13004)	0.003 max	0.003 max	0.003 max	0.003 max	. . .	0.002 max	0.001 max	. . .	. . .	[C]
Commercially Pure Rolled Zinc (Z15006)	0.08 max	0.03 max	0.02 max	0.01 max	0.02 max	0.01 max	0.003 max	. . .	. . .	[C]
Zinc-Low Copper Rolled Zinc Alloy (Z40101)	0.08 to 0.40	0.01 max	0.01 max	0.005 max	0.02 max	0.01 max	0.003 max	. . .	. . .	[C]
Zinc-High Copper Rolled Zinc Alloy (Z40301)	0.50 to 1.0	0.01 max	0.01 max	0.005 max	0.04 max	0.01 max	0.003 max	. . .	. . .	[C]
Architectural Rolled Zinc Type 1[D] (Z41110)	0.08 to 0.20	...	...	...	0.07 to 0.12	0.001 to 0.015	...	...	...	[C]
Architectural Rolled Zinc Type 2[D] (Z41310)	0.80 to 1.00	...	...	...	0.07 to 0.12	0.001 to 0.015	...	...	...	[C]
Zinc-Low Copper-Titanium Rolled Zinc Alloy (Z41121)	0.08 to 0.49	0.01 max	0.01 max	0.005 max	0.05 to 0.18	0.01 max	0.003 max	. . .	. . .	[C]
Zinc-High Copper-Titanium Rolled Zinc Alloy (Z41321)	0.50 to 1.00	0.01 max	0.01 max	0.005 max	0.08 to 0.18	0.01 max	0.003 max	. . .	. . .	[C]
Zinc-Lead Rolled Zinc Alloy (Z20301)	0.005 max	0.10 max	0.01 max	0.01 max	0.02 max	0.002 max	. . .	. . .	. . .	[C]
Zinc-Lead-Cadmium Rolled Zinc Alloy (Z21721)	0.005 max	1.0 max	0.01 max	0.07 max	0.02 max	0.002 max	. . .	. . .	. . .	[C]
Zinc-Lead-Manganese Rolled Zinc Alloy (Z24311)	0.005 max	0.03-0.08	0.01 max	0.005 max	0.02 max	0.002 max	. . .	0.015 max	0.0015 max	[C]
Zinc-Aluminum Rolled Zinc Alloy (Z30900)	5.0 max	0.05 max	0.1 max	0.15 max	0.2 max	1.4 to 34.0	.003 max	. . .	0.10 max	[C]

[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 E29.
[B] UNS designations were established in accordance with Practice E527.
[C] Zinc: balance by difference.
[D] For Architectural Rolled Zinc, Type 1 and Type 2, the total of Pb, Fe, Cd, Sn, Mn, and Mg must not exceed 0.005 % max.

11.2.3 Samples for the analysis of metal in the cast form shall be sampled in accordance with Practice E88.

11.2.4 Samples for the analysis of metal in the semi-finished or finished product form, shall be taken each 35 000 lb (15 876 kg) or fraction thereof.

11.3 *Analysis Method to Be Used:*

11.3.1 The determination of chemical composition shall preferably be made in accordance with one or more of the following: an appropriate chemical method, Test Methods E536, generic optical emission spectrographic methods, ISO 3815-1, or ISO 3815-2, or Practice E60. Standards for such assay work shall be traceable to NIST standards or other national standards.

NOTE 1—Test Methods E536 is not directly applicable to rolled zinc alloys. 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.