



Standard Specification for Rolled Zinc¹

This standard is issued under the fixed designation B 69; 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 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 I* - Coils or sheets cut from strip (ribbon) rolled zinc and

1.2.2 *Type II* - 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 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 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

B 899 Terminology Relating to Non-ferrous Metals and Alloys

E 8 Test Methods for Tension Testing of Metallic Materials

E 18 Test Methods for Rockwell Hardness of Metallic Materials

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

E 55 Practice for Sampling Wrought Nonferrous Metals and Alloys for Determination of Chemical Composition

E 60 Practice for Analysis of Metals, Ores, and Related Materials by Molecular Absorption Spectrometry

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

E 384 Test Method for Microindentation Hardness of Materials

E 527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

E 536 Test Methods for Chemical Analysis of Zinc and Zinc Alloys

E 634 Practice for Sampling of Zinc and Zinc Alloys for Optical Emission Spectrometric Analysis

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 **B 899**.

3.2 *Definitions of Terms Specific to This Standard*:

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

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

3.2.3 *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.

3.2.4 *ribbon anode, n*—a long, continuous sacrificial anode shape, with a diamond, square, rectangular, oval, or other cross-section, most commonly made of zinc, magnesium or aluminum, having a core wire normally made of steel, that is usually supplied in coils or reels of 100 to 3600 ft depending upon size and cross-section.

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.

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

3.2.6 *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,
- 4.1.5 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 wrought zinc for determination of tensile properties shall be conducted in accordance with Test Methods E 8, 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 E 18, or on a microhardness tester, in accordance with Test Method E 384. Zinc is a time

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 0.040	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
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	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 E 29.

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

^C Zinc: balance by difference.

**TABLE 2 Mechanical Properties of Rolled Zinc Alloys
(Tensile Tested in Longitudinal Direction)**

Alloy (UNS)	Tensile Strength		Elongation %	Hardness HR15T
	ksi	mpa		
Rolled Special High Grade Zinc (Z13004)	9-18	62-124	15-45	24-40
Commercially Pure Rolled Zinc (Z15006)	10-18	69-124	15-60	28-45
Zinc-Low Copper Rolled Zinc Alloy (Z40101)	12-27	83-186	28-60	34-64
Zinc-High Copper Rolled Zinc Alloy (Z40301)	20-34	138-234	30-90	54-72
Zinc-Low Copper-Titanium Rolled Zinc Alloy (Z41121)	14-28	96-193	30-70	35-67
Zinc-High Copper-Titanium Rolled Zinc Alloy (Z41321)	20-34	138-234	30-90	54-72
Zinc-Lead Rolled Zinc Alloy (Z20301)	18-28	124-193	40-65	50-68
Zinc-Lead-Cadmium Rolled Zinc Alloy (Z21721)	14-30	96-207	30-50	52-70
Zinc-Lead-Manganese Rolled Zinc Alloy (Z24311)	14	96-193	45-80	40-70
Zinc-Aluminum Rolled Zinc Alloy	21-80	145-550	3-90	46-84

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

TABLE 3 Permissible Variations in Thickness of Rolled Zinc

Thickness, in. (mm)	Tolerance, in. (mm)
0.009 (0.229) and under	10 % of thickness
0.010–0.030 (0.254 to 0.762)	± 0.001 (0.0254)
0.031–0.060 (0.787 to 1.524)	± 0.002 (0.0508)
0.061–0.090 (1.549 to 2.286)	± 0.003 (0.0762)
0.091–0.125 (2.311 to 3.175)	± 0.004 (0.1016)
0.126 and above (3.200 and above)	± 0.007 (0.1270)

TABLE 4 Permissible Variations in Width

Width Form	Tolerance, in. (mm)
Slit widths	± 0.010 (0.254)
Sheared widths	± 0.062 (1.575) Type I

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.

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 [E 634](#).

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 [E 55](#). 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).

11.2.3 Samples for the analysis of metal in the cast form shall be sampled in accordance with Practice [E 88](#).

11.2.4 Samples for the analysis of metal in the semi-finished or finished product form, shall be taken each 35 000 lbs. (15876 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 [E 536](#), generic optical emission spectrographic methods, [ISO 3815-1](#), or [ISO 3815-2](#), or Practice [E 60](#). Standards for such assay work shall be traceable to NIST standards or other national standards.

11.4 In the event that heat identification or traceability is required the purchaser shall specify the details desired.

12. Inspection

12.1 Inspection of the material shall be agreed upon between the purchaser and the supplier (manufacturer) as part of the purchase agreement.

13. Certification

13.1 When specified on the purchase order, the supplier (manufacturer) shall furnish to the purchaser a certificate stating that each lot has been sampled, tested, and inspected in accordance with this specification and has met the requirements.

14. Packaging and Package Marking

14.1 The material shall be separated by size and composition, and prepared for shipment to ensure acceptance by common carrier for transportation and to afford protection from the normal hazards of transportation.

14.2 Each shipping unit shall be legibly marked with the purchase order number, metal or alloy designation, size, gross and net weight, and name of supplier. The specification number shall be shown when required.

15. Keywords

15.1 rolled zinc; zinc; zinc alloys; zinc plate; zinc sheet

SUMMARY OF CHANGES

Committee B02 has identified the location of selected changes to this standard since the last issue (B 69 - 01a (2005)) that may impact the use of this standard. (Approved November 1, 2008.)

(I) Revisions have been made to Sections 2.3 and 11.3.1 to add analytical spectrochemical methods ISO 3815-1 and ISO 3815-2.

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