



Designation: B 6 – 06

American Association of State  
Highway and Transportation  
Officials Standard  
AASHTO No: M120-77

## Standard Specification for Zinc<sup>1</sup>

This standard is issued under the fixed designation B 6; 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 zinc metal made from ore or other material by a process of distillation or by electrolysis in five grades as follows:

- 1.1.1 LME Grade
- 1.1.2 Special High Grade
- 1.1.3 High Grade
- 1.1.4 Intermediate Grade
- 1.1.5 Prime Western Grade

NOTE 1—Certain continuous galvanizing grades are specified in Specification B 852. Other continuous galvanizing and controlled lead grades are not included in this specification but are covered by specific user purchasing specifications.

1.2 This specification does not cover zinc produced by “sweating” or remelting of secondary zinc.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

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 the date of material purchase form a part of this specification to the extent referenced herein.

2.2 *ASTM Standards:*<sup>2</sup>

B 852 Specification for Continuous Galvanizing Grade

(CGG) Zinc Alloys for Hot-Dip Galvanizing of Sheet Steel  
B 899 Terminology Relating to Non-ferrous Metals and Alloys  
B 914 Practice for Color Codes on Zinc and Zinc Alloy Ingot for Use in Hot-Dip Galvanizing of Steel  
E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications  
E 47 Test Methods for Chemical Analysis of Zinc Die-Casting Alloys<sup>3</sup>  
E 88 Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition  
E 527 Practice for Numbering Metals and Alloys (UNS)  
E 536 Test Methods for Chemical Analysis of Zinc and Zinc Alloys

### 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 *LME Grade, n*—a grade of zinc containing a minimum of 99.995 % zinc, with controlled impurity levels, as specified in Table 1.

3.2.2 *Special High Grade, n*—a high purity grade of zinc containing a minimum of 99.990 % zinc, with controlled impurity levels, as specified in Table 1.

3.2.3 *High Grade, n*—a grade of zinc containing a minimum of 99.95 % zinc, with controlled impurity levels, as specified in Table 1.

3.2.4 *Intermediate Grade, n*—a grade of zinc containing a minimum of 99.5 % zinc, with controlled impurity levels, as specified in Table 1.

3.2.5 *Prime Western Grade, n*—a grade of zinc containing 0.5 to 1.4 % lead, a minimum of 98.5 % zinc, with controlled impurity levels, as specified in Table 1.

3.3 *Abbreviations:*

3.3.1 *LME*—LME Grade Zinc

3.3.2 *SHG*—Special High Grade Zinc

3.3.3 *HG*—High Grade Zinc

3.3.4 *IG*—Intermediate Grade Zinc

3.3.5 *PWG*—Prime Western Grade Zinc

<sup>1</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 Dec. 1, 2006. Published January 2007. Originally approved in 1911. Last previous edition approved in 2003 as B 6 – 03.

<sup>2</sup> 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.

<sup>3</sup> Withdrawn.

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

**TABLE 1 Chemical Requirements**

NOTE 1—The following applies to all specified limits in this table: For purposes of determining conformance with this specification, an observed value obtained from analysis shall be rounded off “to the nearest unit” in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding method of Practice E 29.

Grade [UNS] <sup>A</sup>	Color Code <sup>B</sup>	Composition, %							
		Lead	Iron max	Cadmium max	Alumi- num max	Copper max	Tin max	Total Non-Zinc max	Zinc, min by difference
LME Grade (LME) [Z12002]	White	0.003 max	0.002	0.003	0.001	0.001	0.001	0.005	99.995
Special High Grade <sup>C</sup> (SHG) [Z13001]	Yellow	0.003 max	0.003	0.003	0.002	0.002	0.001	0.010	99.990
High Grade (HG) [Z14002]	Green	0.03 max	0.02	0.01	0.01	0.002	0.001	0.05	99.95
Intermediate Grade (IG) [Z16003]	Blue	0.45 max	0.05	0.01	0.01	0.20	...	0.5	99.5
Prime Western Grade (PWG) [Z18004]	Black	0.5–1.4	0.05	0.20	0.01	0.10	...	1.5	98.5

<sup>A</sup> UNS designations were established in accordance with Practice E 527.

<sup>B</sup> Refer to Practice B 914.

<sup>C</sup> For London Metal Exchange (LME) purposes, Special High Grade zinc must be 99.995 % minimum zinc content by difference, corresponding to LME Grade in ASTM Specification B 6.

#### 4. Ordering Information

4.1 Orders for zinc metal 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 (zinc metal),
- 4.1.4 Size (see Section 7), and
- 4.1.5 Grade (see Table 1).

#### 5. Materials and Manufacture

5.1 The manufacturer shall use care to have each lot of zinc metal of as uniform quality as possible.

#### 6. Chemical Composition

6.1 The zinc metal shall conform to the requirements prescribed in Table 1.

#### 7. Sizes and Shapes

7.1 Slabs varying in weight from 40 to 60 lb (18 to 27 kg) are all considered standard slabs.

7.2 Zinc metal may also be ordered in jumbos, blocks, anodes, or other shapes.

#### 8. Appearance

8.1 The zinc metal shall be reasonably free of surface corrosion and adhering foreign matter.

#### 9. Sampling for Chemical Analysis

9.1 The producer may obtain representative samples from the molten metal during casting, and all or part of these samples may be cast into shapes suitable for use in spectrochemical methods.

9.2 If the zinc is in the form of standard slabs at the customer’s plant, the sample for chemical analysis shall be taken in accordance with 9.2.1–9.2.5, inclusive.

9.2.1 *Selection of Portion*—A portion representative of the total shipment or order shall be selected at random for the final sample. The portion preferably shall be taken during loading or unloading. From lots containing at least 60 000 lb (27 300 kg)

of zinc, one slab shall be taken from every 10 000 lb (4530 kg). From smaller lots, five slabs shall be taken.

9.2.2 *Preparation of Sample*—Each slab shall be cleaned thoroughly to rid the surface of extraneous material and drilled or sawed, without lubricant in accordance with 9.2.3 or 9.2.4. The drillings or sawings shall be subjected to the action of a strong magnet to remove any adventitious iron with which the sample may have become contaminated from the drill or saw.

NOTE 2—Sampling by sawing is not recommended for Special High Grade zinc because complete removal of the final traces of adventitious iron from sawings is difficult.

9.2.3 *Drilling*—Two holes shall be drilled, preferably from the bottom or brand side of each slab, at two points located along one diagonal of the slab so that each point is halfway between the center and one extremity of the diagonal. If two holes from each slab do not yield the weight of sample prescribed in 9.2.5, a third hole shall be drilled at the center of each slab. Each hole shall be bored completely through the slab, care being taken to avoid starting the drill in a depression and to adjust the feed to give drillings 0.010 to 0.020 in. (0.25 to 0.51 mm) in thickness. The drill used preferably shall be one twisted from flat stock. The diameter of the drill shall be ½ in. (12.7 mm) for Special High Grade zinc, and shall be ⅝ in. (7.9 mm) for other grades of zinc. The drillings shall be broken or cut with clean shears into pieces not over ½ in. in length and mixed thoroughly.

9.2.4 *Sawing*—Using, preferably, a heat treated high-speed steel saw, make two cuts completely across and through the slab from one long side to the other. Each cut shall be approximately halfway between the center and each end. The width of the saw cut shall be sufficient to give the weight of sample prescribed in 9.2.5, and cuttings from all the slabs shall be mixed thoroughly to form a uniform sample.

9.2.5 *Size of Sample and Storage*—The prepared sample shall weigh at least 1600 g for Special High Grade zinc, and at least 300 g for other grades of zinc. The properly mixed sample shall be split into three equal parts, each of which shall be placed in a sealed package, one for the manufacturer, one for the purchaser, and one for a referee, if necessary. Tight,