



Designation: A767/A767M – 16

Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement¹

This standard is issued under the fixed designation A767/A767M; 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 steel reinforcing bars with protective zinc coatings applied by immersing the properly prepared reinforcing bars into a molten bath of zinc.

NOTE 1—The galvanizer is identified throughout this specification as the manufacturer.

1.2 Guidelines for construction practices at the job-site are presented in [Appendix X1](#).

1.3 Guidelines for use of zinc-coated (galvanized) reinforcing bars with non-galvanized steel forms are presented in [Appendix X2](#).

1.4 The text of this specification references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables) shall not be considered as requirements of the specification.

1.5 This specification is applicable for orders in either inch-pound units (as Specification A767) or SI units (as Specification A767M).

1.6 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system may not be exact equivalents. Therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with this specification.

1.7 *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.*

¹ This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.05 on Steel Reinforcement.

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2. Referenced Documents

2.1 ASTM Standards:²

A90/A90M Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
A615/A615M Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

A706/A706M Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement

A780/A780M Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

A996/A996M Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement

B6 Specification for Zinc

B487 Test Method for Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of Cross Section

E376 Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Testing Methods

2.2 ACI Standard:³

ACI 301 Specifications for Structural Concrete

2.3 AWS Standard:⁴

AWS D1.4/D1.4M Structural Welding Code—Reinforcing Steel

3. Terminology

3.1 Definition of Term Specific to This Specification:

3.1.1 *lot, n*—all bars of one size furnished to the same steel reinforcing bar specification that have been coated within a single production shift.

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 Concrete Institute (ACI), P.O. Box 9094, Farmington Hills, MI 48333-9094, <http://www.concrete.org>.

⁴ Available from American Welding Society (AWS), 8669 NW 36 St., #130, Miami, FL 33166-6672, <http://www.aws.org>.

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

4. Ordering Information

4.1 Orders for zinc-coated (galvanized) bars for concrete reinforcement under this specification shall include the following information:

- 4.1.1 Specification for reinforcing bars to be coated (ASTM designation and year of issue) (5.1),
- 4.1.2 Quantity of bars,
- 4.1.3 Size and grade of bars,
- 4.1.4 Class of coating (Class 1 or Class 2) (6.5),
- 4.1.5 Galvanizing before or after fabrication for Class 1 coating (7.3),
- 4.1.6 ASTM designation A767 [A767M] and year of issue.

4.2 The purchaser shall have the option to specify additional requirements, including but not limited to, the following:

- 4.2.1 Requirements for inspection (8.1),
- 4.2.2 Manufacturer certification (10.1), and
- 4.2.3 Other special requirements, if any.

5. Materials

5.1 Steel reinforcing bars to be zinc-coated (galvanized) shall conform to one of the following Specifications: A615, A706, or A996 [A615M, A706M, or A996M], as specified by the purchaser.

5.2 The zinc used for coating shall be any grade that conforms to Specification B6.

6. Zinc Coating Process

6.1 Reinforcing bars shall be prepared for galvanizing using any surface cleaning process that allows the zinc to bond with the steel, such that the galvanized bar coating appearance and continuity requirements in Section 7 of this specification are satisfied.

6.2 The reinforcing bars shall be coated by immersing the reinforcing bars into a molten bath of zinc until the zinc reacts with the steel surface to form zinc-iron inter-metallic alloys.

6.3 After solidification of the zinc coating, the coated reinforcing bars shall meet the minimum coating thickness or equivalent weight [mass] requirements in Table 1.

NOTE 2—Excess liquid zinc can be removed from freshly coated bars either by allowing liquid zinc to drain off the surface by gravity, or by subjecting the bars to an air or wiping process, where in the case of the latter method, care should be taken to maintain a uniformly thick coating around the perimeter of the bar.

6.4 It shall be the responsibility of the galvanizer to maintain identity of the reinforcing bars throughout the galvanizing process and to the point of shipment.

6.5 *Class of Coating Thickness and Equivalent Weight [Mass]:*

6.5.1 This specification includes two classes of zinc coating thickness and corresponding equivalent weight [mass]. The equivalent weight [mass] of zinc coating on the bar shall conform to the requirements in Table 1.

6.6 *Coating Thickness Tests:*

6.6.1 Coating thickness tests shall be performed in accordance with one of the following test methods:

6.6.1.1 *Magnetic Thickness Gauge Measurements*—The thickness of the coating shall be determined by magnetic thickness gauge measurements in accordance with Practice E376. Use Table 1 to determine the equivalent weight [mass] of the coating. One or more of the following methods shall be permitted to be used to referee the results obtained by magnetic thickness gauge measurements.

6.6.1.2 *Stripping Method*—The weight [mass] shall be determined by stripping the coating from the steel reinforcing bar section in accordance with Test Method A90/A90M. This test method shall not be used for deformed reinforcing bars.

6.6.1.3 *Weighing Before and After Galvanizing*—The weight [mass] shall be determined by weighing steel reinforcing bars before and after galvanizing. The difference between the two measurements divided by the surface area of the bars provides the weight [mass]/unit area. The original weighing shall occur after pickling and drying. The second weighing shall occur after cooling to ambient temperature. This test method shall not be used for deformed reinforcing bars.

NOTE 3—Due to variations in the surface areas of deformed bars as a function of deformation pattern and bar size, the methods in 6.6.1.2 and 6.6.1.3 to measure coating thickness are not appropriate for deformed bars. These are destructive tests appropriate for small samples of a minimum of 3 in.² [2000 mm²] of surface area. These tests do not include the weight [mass] of iron reacted with the zinc coating and may overestimate coating weight [mass] by up to 10 %.

6.6.1.4 *Microscopy*—The equivalent weight [mass] shall be determined by cross-sectional and optical measurement in accordance with Test Method B487. A cross-section sample of the steel shall be polished and examined with an optical microscope to determine the coating thickness. Measurements of thickness shall not be taken on points located on longitudinal ribs or transverse deformations. Use Table 1 to determine the equivalent weight [mass] of the coating.

6.6.2 *Number of Tests*—The following number of coated steel samples and measurements shall be made to determine coating thickness:

6.6.2.1 For determination of the coating weight [mass] using magnetic thickness gauge measurements, three random

TABLE 1 Zinc Coating Thickness and Equivalent Weight [Mass]

NOTE 1—The key value in this table is micrometres (µm) and is based on a zinc density of 7140 kg/m³. The other values are based on conventions using the following formulae: mils = µm × 0.03937; oz/ft² = µm × 0.0232; g/m² = µm × 7.14; and mg/cm² = µm × 0.714.

Classification	Zinc Thickness		Weight [Mass]/Unit Area	
	mils	µm	oz/ft ²	mg/cm ²
Class 1				
Bar Designation No. 3 [10]	5.1	129	3.0	92
Bar Designation No. 4 [13] and Larger	5.9	150	3.5	107
Class 2				
Bar Designation No. 3 [10] and Larger	3.4	86	2.0	62