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# **Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products**

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**AASHTO Designation: M 111M/M 111-19**

**Technical Subcommittee: 4f, Metals**

**Release: Group 2 (June)**

**ASTM Designation: A123/A123M-17**



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### 1. SCOPE

- 1.1. This specification covers the requirements for zinc coating (galvanizing) by the hot-dip process on iron and steel products made from rolled, pressed and forged shapes, castings, plates, bars, and strips.
- 1.2. This specification covers both unfabricated products and fabricated products, for example, assembled steel products, structural steel fabrications, large tubes already bent or welded before galvanizing, and wire work fabricated from uncoated steel wire. This specification also covers steel forgings and iron castings incorporated into pieces fabricated before galvanizing or which are too large to be centrifuged (or otherwise handled to remove excess galvanizing bath metal).  
**Note 1**—This specification covers those products previously addressed in M 111-80, ASTM A123-78, and ASTM A386-78.
- 1.3. This specification does not apply to wire, pipe, tube, or steel sheet that is galvanized on specialized or continuous lines, or to steel less than 0.76 mm [22 gauge (0.0299 in.)] thick.
- 1.4. The galvanizing of hardware items that are to be centrifuged or otherwise handled to remove excess zinc (such as bolts and similar threaded fasteners; castings; and rolled, pressed, and forged items) shall be in accordance with M 232M/M 232.
- 1.5. Fabricated reinforcing steel bar assemblies are covered by the present specification. The batch galvanizing of separate reinforcing steel bars shall be in accordance with ASTM A767/A767M and the continuous galvanizing of reinforcing bars shall be in accordance with ASTM A1094/A1094M.
- 1.6. This specification is applicable to orders in either SI units (as M 111M) or inch-pound units (as M 111). SI units and inch-pound units are not necessarily exact equivalents. Within the text of this specification and where appropriate, inch-pound units are shown in brackets. Each system shall be used independently of the other without combining values in any way. In the case of orders in SI units, all testing and inspection shall be done using the metric equivalent of the test or inspection method as appropriate. In the case of orders in SI units, such shall be stated to the galvanizer when the order is placed.

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## 2. REFERENCED DOCUMENTS

### 2.1. *AASHTO Standards:*

- M 232M/M 232, Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- T 65M/T 65, Mass [Weight] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings

### 2.2. *ASTM Standards:*

- A47/A47M, Standard Specification for Ferritic Malleable Iron Castings
- A143/A143M, Standard Practice for Safeguarding against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
- A384/A384M, Standard Practice for Safeguarding against Warpage and Distortion during Hot-Dip Galvanizing of Steel Assemblies
- A385/A385M, Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
- A767/A767M, Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement
- A780/A780M, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- A902, Standard Terminology Relating to Metallic Coated Steel Products
- A1094/A1094M, Standard Specification for Continuous Hot-Dip Galvanized Steel Bars for Concrete Reinforcement
- B6, Standard Specification for Zinc
- B487, Standard Test Method for Measurement of Metal and Oxide Coating Thickness by Microscopical Examination of Cross Section
- B602, Standard Test Method for Attribute Sampling of Metallic and Inorganic Coatings
- B960, Standard Specification for Prime Western Grade-Recycled (PWG-R) Zinc
- E376, Standard Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Testing Methods

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## 3. TERMINOLOGY

### 3.1. *Definitions:*

- 3.1.1. The following terms and definitions are specific to this specification. ASTM A902 contains other terms and definitions relating to metallic-coated steel products.

### 3.2. *Definitions of Terms Specific to This Standard:*

- 3.2.1. *average coating thickness, n*—the average of three specimen coating thicknesses.
- 3.2.2. *black, adj*—denotes the condition of not galvanized or otherwise coated. For purposes of this specification, the word “black” does not refer to the color or condition of surface, or to a surface deposit or contamination.
- 3.2.3. *coating thickness grade, n*—the numerical value from Table 1 at the intersection of a material category and a thickness range.