



Designation: A1046/A1046M – 25a

Standard Specification for Steel Sheet, Zinc-Aluminum-Magnesium Alloy-Coated by the Hot-Dip Process¹

This standard is issued under the fixed designation A1046/A1046M; 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.

1. Scope*

1.1 This specification covers zinc-aluminum-magnesium alloy-coated steel sheet in coils and cut lengths.

1.2 This product is intended for applications requiring corrosion resistance and paintability.

1.3 The steel sheet is produced in a number of designations, types, grades, and classes designed to be compatible with differing application requirements.

1.4 Product furnished under this specification shall conform to the applicable requirements of the latest issue of Specification A924/A924M, unless otherwise provided herein.

1.5 The text of this specification references notes and footnotes which provide explanatory material. These notes and footnotes, excluding those in tables and figures, shall not be considered as requirements of the standard.

1.6 *Units*—This specification is applicable to orders in either inch-pound units (as A1046) or SI units (as A1046M). Values in inch-pound and SI units are not necessarily equivalent. Within the text, SI units are shown in brackets. Each system shall be used independently of the other.

1.7 Unless the order specifies the “M” designation (SI units), the product shall be furnished to inch-pound units.

1.8 *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 establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.9 *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 A05 on Metallic-Coated Iron and Steel Products and is the direct responsibility of Subcommittee A05.11 on Sheet Specifications.

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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
- A568/A568M Specification for Steel, Sheet, Carbon, Structural, and High-Strength Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
- A902 Terminology Relating to Metallic Coated Steel Products
- A924/A924M Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
- A1122/A1122M Test Method for Bend Testing of Metallic-Coated Steel Sheet to Evaluate Coating Adhesion
- E517 Test Method for Plastic Strain Ratio r for Sheet Metal
- E646 Test Method for Tensile Strain-Hardening Exponents (n -Values) of Metallic Sheet Materials

3. Terminology

3.1 *Definitions*—See Terminology A902 for definitions of general terminology relating to metallic-coated hot-dip products.

4. Classification

4.1 The material is available in several designations as follows:

- 4.1.1 Commercial Steel—CS Types A, B, and C,
- 4.1.2 Deep Drawing Steel—DDS,
- 4.1.3 Extra Deep Drawing Steel—EDDS,
- 4.1.4 Forming Steel—FS Types A and B,
- 4.1.5 High Strength Low Alloy Steel—HSLAS,
- 4.1.6 High Strength Low Alloy Steel with Improved Formability—HSLAS-F, and
- 4.1.7 Structural Steel—SS.

4.2 Structural steel and high strength low alloy steel are available in several grades based on mechanical properties. Structural Steel Grade 50 [340] is available in four classes based on tensile strength.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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

TABLE 1 Weight [Mass] of Coating Requirement^A

Coating Designation	Inch-Pound Units	
	Minimum Requirement	
	Triple-Spot Test Total Both Sides, oz/ft ²	Single-Spot Test Total Both Sides, oz/ft ²
ZM20	0.20	0.16
ZM30	0.30	0.25
ZM40	0.40	0.30
ZM50	0.50	0.40
ZM60	0.60	0.50
ZM70	0.70	0.60
ZM75	0.75	0.65
ZM90	0.90	0.80
ZM100	1.00	0.90
ZM115	1.15	1.00
ZM140	1.40	1.20
ZM165	1.65	1.40
ZM210	2.10	1.80

Coating Designation	SI Units	
	Minimum Requirement	
	Triple-Spot Test Total Both Sides, g/m ²	Single-Spot Test Total Both Sides, g/m ²
ZMM60	60	50
ZMM90	90	75
ZMM120	120	90
ZMM150	150	120
ZMM180	180	150
ZMM210	210	180
ZMM220	220	190
ZMM275	275	235
ZMM300	300	270
ZMM350	350	300
ZMM450	450	385
ZMM500	500	425
ZMM600	600	510

^A The coating designation number is the term by which this product is specified. Because of the many variables and changing conditions that are characteristic of continuous hot-dip coating lines, the weight [mass] of the coating is not always evenly divided between the two surfaces of a sheet, nor is the coating evenly distributed from edge to edge. However, it can normally be expected that not less than 40 % of the single-spot test limit will be found on either surface.

4.3 The product is available in several coating weights [masses] with the coating designation in accordance with **Table 1**.

5. Ordering Information

5.1 Zinc-aluminum-magnesium alloy-coated steel sheet in coils and cut lengths is produced to thickness requirements expressed to 0.001 in. [0.01 mm]. The thickness of the sheet includes the base metal and the coating.

5.2 Orders for product to this specification shall include the following information, as necessary, to adequately describe the desired product:

5.2.1 Name of product (steel sheet, zinc-aluminum-magnesium alloy-coated),

5.2.2 Designation of sheet steel {CS (Type A, B, or C), FS (Type A or B), DDS, EDDS, SS, HSLAS or HSLAS-F},

5.2.2.1 When a CS type is not specified, CS Type B shall be furnished. When an FS type is not specified, FS Type B shall be furnished.

5.2.2.2 When a SS or HSLAS designation is specified, state the grade or class, or combination thereof.

5.2.2.3 When a class for HSLAS or HSLAS-F is not specified, Class 1 shall be furnished,

5.2.2.4 When a SS Grade contains more than one class, and a class is not specified, Class 1 shall be furnished.

5.2.3 ASTM designation number and year of issue, such as A1046 - ____ for inch-pound units or A1046M - ____ for SI units,

5.2.4 Coating designation,

5.2.5 Coating bath composition type (see section 6.2),

5.2.6 Chemically treated or not chemically treated,

5.2.7 Oiled or not oiled,

5.2.8 Dimensions (show thickness, minimum or nominal, width, flatness requirements (if appropriate), and length (if cut length)),

5.2.9 Coil size requirements (specify maximum outside diameter (OD), acceptable inside diameter (ID), and maximum weight [mass]),

5.2.10 Packaging,

5.2.11 Certification, if required, and heat analysis and mechanical property report,

5.2.12 Application (show part identification and description), and

5.2.13 Special requirements (if any).

5.2.13.1 When the purchaser requires thickness tolerances for 3/8-in. [10-mm] minimum edge distance (see Supplementary Requirement in Specification **A924/A924M**), this requirement shall be specified in the purchase order or contract.

NOTE 1—Typical ordering descriptions are as follows:
Steel sheet, zinc-aluminum-magnesium alloy coated, Forming Steel Type B, ASTM A1046 - ____, coating designation ZM90, chemical treatment, no oil, minimum 0.034 by 48 in. by coil, 60-in. maximum OD, 24-in. ID, 10,000-lb maximum, for inner door panel, or steel sheet, zinc-aluminum-magnesium alloy coated, Commercial Steel Type B, ASTM A1046M - ____, coating designation ZMM275, not chemically treated, oiled, minimum 0.85 by 900 mm by coil, 1200-mm maximum OD, 610-mm ID,