



Designation: A875/A875M – 22

# Standard Specification for Steel Sheet, Zinc-5 % Aluminum Alloy-Coated by the Hot-Dip Process<sup>1</sup>

This standard is issued under the fixed designation A875/A875M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This specification covers steel sheet, metallic-coated with zinc-5 % aluminum alloy via the hot dip process, in coils and cut lengths. The Zn-5Al alloy coating also contains small amounts of elements other than zinc and aluminum that are intended to improve processing and the characteristics of the coated product.

1.2 The coating is produced as two types: zinc-5 % aluminum-mischmetal alloy (Type I) and zinc-5 % aluminum-0.1 % magnesium alloy (Type II), and in two coating structures (classes). The coated sheet is produced in several coating designations (coating weight [mass]) as shown in [Table 1](#).

1.3 The product is intended for applications requiring corrosion resistance, formability, and paintability.

1.4 The product is available in a number of designations, grades, and classes in four general categories that are designed to be compatible with different application requirements.

1.4.1 Steels with mandatory chemical requirements and typical mechanical properties.

1.4.2 Steels with mandatory chemical requirements and mandatory mechanical properties.

1.4.3 Steels with mandatory chemical requirements and mandatory mechanical properties that are achieved through solid-solution or bake hardening.

1.5 The product furnished under this specification shall conform to the applicable requirements of the latest issue of Specification [A924/A924M](#), unless otherwise provided herein.

1.6 The text of this specification references notes and footnotes that provide explanatory material. These notes and footnotes, excluding tables and figures, shall not be considered as requirements of this specification.

1.7 *Units*—This specification is applicable to orders in either inch-pound units (as A875) or metric (SI) units [as A875M]. Values in inch-pound and SI units are not necessarily

equivalent. Within the text, the SI units are shown in brackets. Each system shall be used independently of the other.

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

1.9 *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.*

1.10 *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.*

## 2. Referenced Documents

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

- [A90/A90M Test Method for Weight \[Mass\] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings](#)
- [A370 Test Methods and Definitions for Mechanical Testing of Steel Products](#)
- [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](#)
- [B750 Specification for GALFAN \(Zinc-5 % Aluminum-Mischmetal\) Alloy in Ingot Form for Hot-Dip Coatings](#)
- [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](#)

<sup>1</sup> 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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). 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 Requirements<sup>A,B,C</sup>**

NOTE 1—Use the information provided in 8.1.2 to obtain the approximate coating thickness from the coating weight [mass].

Coating Designation	Minimum Requirement	
	Inch-Pound Units	
	Triple-Spot Test (TST)	Single-Spot Test (SST)
	oz/ft <sup>2</sup>	oz/ft <sup>2</sup>
GF01	0.01	0.01
GF15	0.15	0.12
GF20	0.20	0.16
GF30	0.30	0.25
GF45	0.45	0.35
GF60	0.60	0.50
GF75	0.75	0.65
GF90	0.90	0.80
GF115	1.15	1.00
GF140	1.40	1.20
GF165	1.65	1.40
GF185	1.85	1.60
GF210	2.10	1.80
GF235	2.35	2.00

  

Coating Designation	SI Units	
	Triple-Spot Test (TST)	Single-Spot Test (SST)
	g/m <sup>2</sup>	g/m <sup>2</sup>
ZGF001	3	3
ZGF45	45	35
ZGF60	60	50
ZGF90	90	75
ZGF135	135	113
ZGF180	180	150
ZGF225	225	195
ZGF275	275	235
ZGF350	350	300
ZGF450	450	385
ZGF600	600	510
ZGF700	700	595

<sup>A</sup> The coating designation number is the term by which the minimum triple spot, total both sides coating weight [mass] is specified. Because of the many variables and changing conditions that are characteristic of continuous hot-dip coating lines, the zinc-5 % aluminum alloy coating is not always evenly divided between the two surfaces of a coated sheet; nor is it always evenly distributed from edge to edge. However, minimum single spot coating weight [mass] on any one side is normally not less than 40 % of the single-spot total both sides requirement.

<sup>B</sup> As it is an established fact that the atmospheric corrosion resistance of zinc-5 % aluminum alloy-coated sheet products is a function of coating thickness (weight [mass]), the selection of thinner (lighter) coating designations will result in reduced corrosion performance of the Zn-5Al coating. For example, the heavier zinc-5 % aluminum alloy coatings perform adequately in bold atmospheric exposure, whereas the lighter coatings are often further coated with paint or a similar barrier coating for increased corrosion resistance. Because of this relationship, material carrying the statement “meets ASTM A875/A875M requirements” should also specify the particular coating type and designation.

<sup>C</sup> The corrosion performance of Type I Zn-5Al-MM coated sheet products is nonlinear as the corrosion rate decreases with time, due to the formation of a characteristic passivation layer.

### E1277 Test Method for Analysis of Zinc-5 % Aluminum-Mischmetal Alloys by ICP Emission Spectrometry

#### 2.2 ISO Standard:<sup>3</sup>

#### ISO 14788 Steel Sheet, Zinc-5 % Aluminum Alloy-Coated by the Continuous Hot-Dip Process, of Commercial, Drawing and Structural Qualities

#### 2.3 Other Document:<sup>4</sup>

#### GF-1 Standard Practice for Determination of Cerium and Lanthanum Compositions in Galfan Alloy (5 % Al-0.04 % La-0.04 % Ce-Bal SHG Zn)

### 3. Terminology

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

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

3.2.1 *bake hardenable steel, n*—steel sheet in which a significant increase in yield strength is realized when moderate heat treatment, such as that used for paint baking, follows straining or cold working.

3.2.2 *high strength low alloy steel, n*—a specific group of sheet steels whose strength is achieved through the use of microalloying elements such as columbium (niobium), vanadium, titanium, and molybdenum resulting in improved formability and weldability than is obtained from conventional carbon-manganese steels.

3.2.2.1 *Discussion*—Producers use one or a combination of microalloying elements to achieve the desired properties. The product is available in two designations, HSLAS and HSLAS-F. Both products are strengthened with microalloys, but HSLAS-F is further treated to achieve inclusion control.

3.2.3 *minimized coating structure, n*—a coating characterized by a finer metallurgical coating structure obtained by a treatment designed to restrict the formation of the normal coarse grain structure formed during solidification of the Zn-5Al alloy coating.

<sup>3</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

<sup>4</sup> Available from International Lead Zinc Research Organization, Inc., 2530 Meridian Parkway, Suite 115, Durham, NC 27713.

3.2.4 *regular coating structure, n*—the normal coating structure resulting from unrestricted grain growth during normal solidification of the Zn-5Al alloy coating.

3.2.5 *solid-solution hardened steel or solution hardened steel, n*—steel sheet strengthened through additions of substitutional alloying elements such as Mn, P, or Si.

3.2.5.1 *Discussion*—Substitutional alloying elements such as Mn, P, and Si can occupy the same sites as iron atoms within the crystalline structure of steels. Strengthening arises as a result of the mismatch between the atomic sizes of these elements and that of iron.

### 3.3 Abbreviations:

3.3.1 *MM*—mischmetal.

3.3.2 *Zn-5Al*—zinc-5 % aluminum.

3.3.3 *Zn-5Al-Mg*—zinc-5 % aluminum-0.1 % magnesium.

3.3.4 *Zn-5Al-MM*—zinc-5 % aluminum-mischmetal.

## 4. Classification

4.1 The material is classified in terms of the base metal and in terms of the coating.

### 4.2 Base Metal Classifications:

4.2.1 The material is available in the designations as follows:

4.2.1.1 Commercial Steel (CS Types A, B, and C),

4.2.1.2 Forming Steel (FS Types A and B),

4.2.1.3 Deep Drawing Steel (DDS Types A and C),

4.2.1.4 Extra Deep Drawing Steel (EDDS),

4.2.1.5 Structural Steel (SS),

4.2.1.6 High-Strength Low-Alloy Steel (HSLAS),

4.2.1.7 High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F),

4.2.1.8 Solution Hardened Steel (SHS), and

4.2.1.9 Bake Hardenable Steel (BHS).

4.2.2 Structural Steel, High Strength Low Alloy Steel, Solution Hardened Steel, and Bake Hardenable Steel are available in several grades based on mechanical properties. Structural Steel Grade 50 [340] is available in four classes based on tensile strength. Structural Steel Grade 80 [550] is available in three classes, based on chemistry.

### 4.3 Coating Classifications:

4.3.1 The coating is available in two types, as follows:

4.3.1.1 *Type I*—Zinc-5 % aluminum-mischmetal (Zn-5Al-MM), and

4.3.1.2 *Type II*—Zinc-5 % aluminum-0.1 % magnesium (Zn-5Al-Mg).

4.3.2 The coating is available in two coating classes, or structures, as follows:

4.3.2.1 *Class A*—Minimized coating structure, and

4.3.2.2 *Class B*—Regular coating structure.

4.3.3 The coating is available in several coating designations, or weights [masses] of coating, as shown in [Table 1](#).

## 5. Ordering Information

5.1 Zinc-5 % aluminum alloy-coated 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 both 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, Zn-5Al alloy coated),

5.2.2 Designations of sheet steel [CS (Type A, B, or C), FS (Type A or B), DDS (Type A and C), EDDS, SS, HSLAS, or HSLAS-F, SHS, or BHS].

5.2.2.1 When a CS type is not specified, CS Type B will be furnished.

5.2.2.2 When a FS type is not specified, FS Type B will be furnished.

5.2.2.3 When DDS type is not specified, DDS Type A will be furnished.

5.2.3 When a SS, HSLAS, HSLAS-F, SHS, or BHS designation is specified, state the grade, or class, or combination thereof.

5.2.3.1 When a Class for SS Grade 80 is not specified, Class 1 shall be furnished.

5.2.3.2 When a Class for HSLAS or HSLAS-F Grades is not specified, Class 1 shall be provided.

5.2.4 ASTM designation number and year of issue, as A875-\_\_\_\_ for inch-pound units or A875M-\_\_\_\_ for SI units,

5.2.5 Coating type (I or II) (see [4.3.1](#)),

5.2.6 Coating designation (see [4.3.3](#)),

5.2.7 Class of coating structure (for example, Class A—Minimized, etc.) (see [4.3.2](#)),

5.2.8 Chemically treated or not chemically treated,

5.2.9 Oiled or not oiled,

5.2.10 Extra smooth (if required),

5.2.11 Phosphatized (if required),

5.2.12 Dimensions (show thickness, minimum or nominal, width, flatness requirements and length, if cut lengths).

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

5.2.14 Packaging,

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

5.2.16 Application (part identification and description), and

5.2.17 Special requirements (if any).

5.2.17.1 If required, the product may be ordered to a specified base metal thickness (see Supplementary Requirement S1.)

5.2.17.2 When the purchaser requires thickness tolerances for  $\frac{3}{8}$ -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, Zn-5Al alloy coated to ASTM A875-\_\_\_\_, Commercial Steel—CS Type B, Type I coating, designation GF 115, Class A (minimized coating structure), chemically treated, oiled, 0.040 min by 34 by 117 in., for stock tanks.

Steel sheet, Zn-5Al alloy coated to ASTM A875M-\_\_\_\_, Structural Steel—SS Grade 230, Type II coating, designation ZGF 275, Class B (regular coating structure), chemically treated, not oiled, phosphatized, 1.00 nominal by 900 mm by coil, 1200 mm max OD, 600 mm ID, 9000 kg max, for roof deck.