



Designation: A856/A856M – 03 (Reapproved 2020)

Standard Specification for Zinc-5 % Aluminum-Mischmetal Alloy-Coated Carbon Steel Wire¹

This standard is issued under the fixed designation A856/A856M; 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 soft, medium, and hard temper zinc-5 % aluminum-mischmetal (Zn-5 Al-MM) alloy-coated carbon steel wire in coils for general use. The product is intended for applications requiring corrosion resistance, drawability, and formability.

1.2 This specification is applicable to orders in either inch-pound units (as A856) or acceptable SI units [as A856M]. Inch-pound units and SI units are not necessarily equivalent; therefore, each system shall be used independently of the other, without combining values in any way.

1.3 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 this specification.

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

1.5 *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:²

[A90/A90M Test Method for Weight \[Mass\] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings](#)

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 A05.12 on Wire Specifications.

Current edition approved Sept. 1, 2020. Published September 2020. Originally approved in 1986. Last previous edition approved in 2014 as A856/A856M – 03(2014). DOI: 10.1520/A0856_A0856M-03R20.

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.

[A700 Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment](#)

[A902 Terminology Relating to Metallic Coated Steel Products](#)

[B117 Practice for Operating Salt Spray \(Fog\) Apparatus](#)

[B750 Specification for GALFAN \(Zinc-5 % Aluminum-Mischmetal\) Alloy in Ingot Form for Hot-Dip Coatings](#)

[E8 Test Methods for Tension Testing of Metallic Materials \[Metric\] E0008_E0008M](#)

[E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications](#)

[E47 Test Methods for Chemical Analysis of Zinc Die-Casting Alloys \(Withdrawn 1997\)³](#)

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

2.2 *Military Standards:*⁴

[MIL-STD-129 Marking for Shipment and Storage](#)

[MIL-STD-163 Steel Mill Products Preparation](#)

2.3 *Federal Standards:*⁴

[Fed Std. No. 123 Marking for Shipment \(Civil Agencies\)](#)

2.4 *Other Standards:*⁵

[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.

4. Classification

4.1 *Temper*—The wire is classified with regard to mechanical properties by temper, which is related to tensile strength and stiffness. The temper designations are soft, medium, and hard.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111–5094, Attn: NPODS

⁵ Available from International Lead Zinc Research Organization 2525 Meridian Parkway, P.O. Box 12036, Research Triangle Park, NC 27709-2036.

4.2 *Coating Classes*—Zn-5AL-MM alloy coating on the wire is classified in a number of classes (1, 3 or A, 60, B, 100, and C) (see [Table 1](#)).

5. Ordering Information

5.1 Orders for material under this specification shall include the following information:

- 5.1.1 Quantity (weight),
- 5.1.2 Coated wire diameter,
- 5.1.3 Class of coating (see [4.2](#))
- 5.1.4 Temper (soft, medium, or hard) (see [Table 2](#)),
- 5.1.5 Packaging requirements, and
- 5.1.6 ASTM designation and year of issue, as A856-____ for inch-pound units or A856M-____ for SI units.

NOTE 1—A typical ordering description is as follows: 50 000 lb, 0.120-in. diameter Zn-5 Al-MM alloy-coated wire, Coating Class 60, Soft Temper in 600-lb coils on tubular carriers to ASTM A856-____ or [50 000 kg, 3.00-mm diameter Zn-5 Al-MM alloy-coated wire, Coating Class 1, Soft Temper in 1000-kg coils on tubular carriers to ASTM A856M-____].

6. Materials and Manufacture

6.1 The steel from which the wire is produced shall be made by any commercially accepted steelmaking process.

6.2 *Coating Bath Analysis*—The bath metal used in continuous hot-dip Zn-5 Al-MM alloy-coated wire shall meet the chemical composition limits specified in Specification [B750](#).

6.2.1 For a two-step coating operation where the first coating is zinc (hot-dip galvanizing or electrogalvanizing) the final bath shall be permitted to have an aluminum content of up to 7.2 % to prevent depletion of the aluminum content of the bath.

6.2.2 *Method of Analysis*—The determination of chemical composition shall be made in accordance with suitable chemical (see Test Method [E47](#) for tin), ICP Argon Plasma Spectrometric (see Test Methods [E1277](#)), or other methods. In case of dispute, the results secured by Test Methods [E1277](#) shall be the basis of acceptance.

6.2.3 A standard practice for X-ray fluorescence spectrometry for determination of cerium and lanthanum in a zinc-5 % aluminum-mischmetal alloy has been established by the International Lead Zinc Research Organization (Standard Practice [GF-1](#)). In case of dispute, the results secured by Test Methods [E1277](#) shall be the basis of acceptance.

7. Mechanical Properties

7.1 The Zn-5 Al-MM alloy coated wire as represented by the test specimens tested in accordance with Test Methods [E8](#) shall conform to the tensile strength requirements prescribed in [Table 2](#).

7.2 Test specimens found to contain a weld or obvious imperfections shall be discarded and another test specimen obtained to verify conformance to the tensile strength requirements.

8. Coating Tests:

8.1 *Weight of Coating*—The Zn-5 Al-MM alloy-coated wire when tested in accordance with Test Method [A90/A90M](#) shall conform to the requirements of [Table 1](#) for minimum weight of coating for the class required.

NOTE 2—A typical ratio of 0.20 oz/ft² [61 g/m²] equals 200 to 240 h as salt spray test in accordance with Test Method [B117](#) may be used.

8.2 *Adherence of Coating*—The Zn-5 Al-MM alloy-coated wire as represented by the test specimens shall be capable of being wrapped in a close helix at a rate not exceeding 15 turns/min around a cylindrical steel mandrel having a diameter as prescribed in [Table 3](#) without cracking or delaminating the coating to such an extent that any coating is removed when rubbed with the bare fingers. Loosening or detachment during the adhesion test of superficial, small particles of Zn-5 Al-MM alloy formed by mechanical polishing of the surface of the coated wire shall not be considered cause for rejection.

TABLE 1 Minimum Weight of Zn-5 AL-MM Alloy Coating per Unit Area of Uncoated Wire Surface, oz/ft² [g/m²]

Wire Diameter in. [mm] ^A	Class 1 oz/ft ² [g/m ²]	Class 3 or A Coating, oz/ft ² [g/m ²]	Class 60 Coating, oz/ft ² [g/m ²]	Class B Coating, oz/ft ² [g/m ²]	Class 100 Coating, oz/ft ² [g/m ²]	Class C Coating, oz/ft ² [g/m ²]
0.035 [0.89]	0.15 [46]	0.45 [137]	n/a	0.90 [275]	n/a	1.35 [412]
0.041 [1.04]	0.15 [46]	0.50 [153]	n/a	1.00 [305]	n/a	1.50 [458]
0.048 [1.22]	0.15 [46]	0.55 [168]	n/a	1.10 [335]	n/a	1.65 [503]
0.054 [1.37]	0.20 [61]	0.60 [183]	n/a	1.20 [366]	n/a	1.80 [549]
0.062 [1.57]	0.20 [61]	0.65 [198]	n/a	1.20 [366]	n/a	1.80 [549]
0.072 [1.83]	0.20 [61]	0.65 [198]	n/a	1.20 [366]	n/a	1.80 [549]
0.076 [1.93]	0.25 [76]	0.70 [214]	.60 [183]	1.40 [427]	1.00 [305]	2.10 [641]
0.080 [2.03]	0.25 [76]	0.70 [214]	.60 [183]	1.40 [427]	1.00 [305]	2.10 [641]
0.092 [2.34]	0.28 [85]	0.75 [229]	.60 [183]	1.50 [458]	1.00 [305]	2.25 [686]
0.099 [2.51]	0.28 [85]	0.80 [244]	.60 [183]	1.60 [488]	1.00 [305]	2.40 [732]
0.106 [2.69]	0.30 [92]	0.80 [244]	.60 [183]	1.60 [488]	1.00 [305]	2.40 [732]
0.120 [3.05]	0.30 [92]	0.85 [259]	.60 [183]	1.70 [519]	1.00 [305]	2.55 [778]
0.135 [3.43]	0.30 [92]	0.85 [259]	.60 [183]	1.70 [519]	1.00 [305]	2.55 [778]
0.148 [3.76]	0.35 [107]	0.90 [275]	.60 [183]	1.80 [549]	1.00 [305]	2.70 [824]
0.162 [4.11]	0.35 [107]	0.90 [275]	.60 [183]	1.80 [549]	1.00 [305]	2.70 [824]
0.177 [4.50]	0.44 [134]	0.90 [275]	.60 [183]	1.80 [549]	1.00 [305]	2.70 [824]
0.192 [4.88]	0.50 [153]	1.00 [305]	.60 [183]	2.00 [610]	1.00 [305]	3.00 [915]
0.207 [5.26]	0.53 [162]	1.00 [305]	.60 [183]	2.00 [610]	1.00 [305]	3.00 [915]

^A Coating weights [mass] for diameters other than those shown in Table 1 are the coating weights [mass] for the next smaller diameter.