



Designation: B 803 – 98

Standard Specification for High-Strength Zinc–5 % Aluminum-Mischmetal Alloy-Coated Steel Core Wire for Aluminum and Aluminum-Alloy Conductors, Steel Reinforced¹

This standard is issued under the fixed designation B 803; 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 round, high strength, zinc–5 % aluminum-mischmetal (Zn–5Al–MM) alloy-coated, steel core wire with Class A Zn–5Al–MM alloy coating used for mechanical reinforcement in the manufacture of special aluminum and aluminum-alloy conductors, steel reinforced.

1.2 This specification covers wire of diameter from 0.0500 to 0.1900 in. inclusive.

1.3 The SI values for resistivity are regarded as standard. For all other properties the inch-pound units are regarded as standard and the SI units may be approximate.

2. Referenced Documents

2.1 The following documents of the issue in effect on date of material purchase form a part of this specification to the extent referenced herein.

2.2 *ASTM Standards:*

[A 90/A90M Test Method for Weight \[Mass\] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings²](#)

[A 370 Test Methods and Definitions for Mechanical Testing of Steel Products³](#)

[A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products³](#)

[B 193 Test Method for Resistivity of Electrical Conductor Materials⁴](#)

[B 750 Specification for Zinc–5 % Aluminum-Mischmetal Alloy \(UNS Z38510\) in Ingot Form for Hot-Dip Coatings⁵](#)

[E 47 Test Methods for Chemical Analysis of Zinc Die-Casting Alloys⁶](#)

[E 1277 Test Method for Chemical Analysis of Zinc-5](#)

[Aluminum-Mischmetal Alloys by ICP Emission Spectrometry⁷](#)

2.3 *Other Standard:*

[GF-1 Standard Practice for Determination of Cerium and Lanthanum Compositions in Galfan Alloy \(5 % Al-0.04 % La-0.04 % Ce-Bal SHG Zn\)⁸](#)

3. Terminology

3.1 *Abbreviations: Abbreviations:*

3.1.1 *MM*—mischmetal

3.1.2 *Zn–5Al–MM*—zinc–5 % aluminum mischmetal

3.2 *Definitions:*

3.2.1 *lot*—unless otherwise specified in the contract or order, a lot shall consist of all coils of wire of the same diameter and unit lengths submitted for inspection at the same time.

4. Ordering Information

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

4.1.1 Quantity of each size,

4.1.2 Wire diameter in inches (Section 7),

4.1.3 Certification, if required (Section 18),

4.1.4 Test report, if required (Section 18), and

4.1.5 Package Size (Section 19).

5. Materials and Manufacture

5.1 The base metal shall be steel produced by the open-hearth, electric furnace, or basic oxygen process.

5.2 The wire shall be cold drawn and coated with Zn–5Al–MM alloy to produce the desired properties.

6. Chemical Composition

6.1 The steel shall conform to the requirements prescribed in [Table 1](#).

6.2 Chemical analysis of the steel shall be conducted in accordance with Test Methods [A 751A 751](#).

¹ This specification is under the jurisdiction of ASTM Committee B-01 on Electrical Conductors and is the direct responsibility of Subcommittee B01.05 on Conductors of Ferrous Metals.

Current edition approved Sept. 10, 1998. Published November 1998. Originally published as B 803 – 89. Last previous edition B 803 – 94.

² *Annual Book of ASTM Standards*, Vol 01.06.

³ *Annual Book of ASTM Standards*, Vol 01.03.

⁴ *Annual Book of ASTM Standards*, Vol 02.03.

⁵ *Annual Book of ASTM Standards*, Vol 02.04.

⁶ *Annual Book of ASTM Standards*, Vol 03.05.

⁷ *Annual Book of ASTM Standards*, Vol 03.06.

⁸ Available from International Lead Zinc Research Organization, 2525 Meridian Parkway, P.O. Box 12036, Research Triangle Park, NC 27709-2036

TABLE 1 Chemical Requirements

Element	Composition, %
Carbon	0.50 to 0.88
Manganese	0.50 to 1.30
Phosphorus, max	0.035
Sulfur, max	0.045
Silicon	0.10 to 0.35

6.3 The ingot form of zinc-5 % aluminum-mischmetal alloy shall conform to Specification B 750B 750.

6.3.1 For a two-step coating operation where the first coating is zinc (hot-dip galvanized or electrogalvanized), the final bath may have an aluminum content of up to 7.2 %, to prevent depletion of the aluminum content of the bath.

6.3.2 *Method of Analysis*—The determination of chemical composition shall be made in accordance with suitable chemical (Test Methods E 47E 47 for Tin), ICP Argon Plasma Spectrometric (Test Method E 1277E 1277), or other methods. In case of dispute, the results secured by Test Method E 1277E 1277 shall be the basis of acceptance.

6.3.3 A standard practice of X-ray fluorescence spectrometry for determination of cerium and lanthanum in a Zn-5Al-MM alloy has been established by the International Lead Zinc Research Organization (Standard Practice GF-1). In case of dispute, the results secured by Test Method E 1277E 1277 shall be the basis of acceptance.

7. Dimensions and Permissible Variations

7.1 The specified diameter of the Zn-5Al-MM alloy-coated wire shall be expressed in decimal fractions of an inch to four decimal places, or in millimetres to three decimal places.

7.2 For diameter measurements and diameter tolerance, specified diameters shall be rounded to the closest 0.0005 in. (0.013 mm).

7.3 The average of the largest and smallest diameter readings, each to the nearest 0.001 in. (0.025 mm) taken at the same cross section, shall not differ from the specified diameter by more than the tolerances shown in Table 2.

8. Workmanship, Finish, and Appearance

8.1 The Zn-5Al-MM alloy coating shall be reasonably smooth, continuous, of reasonably uniform thickness and free of imperfections not consistent with good commercial practice.

9. Tensile Test

9.1 The Zn-5Al-MM-coated steel core wire shall conform to the tensile and elongation requirements prescribed in Table 3.

9.2 Tensile tests shall be conducted in accordance with Test Methods A 370A 370, using the initial settings for determining stress at 1 % extension given in Table 4 of this specification.

9.3 *Test Specimens*—The test specimens shall be free of bends or kinks other than the curvature resulting from the usual coiling operations. Any hand straightening necessary to permit insertion of the specimen in the jaws of the testing machine shall be performed by drawing between wood blocks or by some other equally satisfactory means.

10. Wrap Test

10.1 The material, as represented by the test specimens, shall not fracture when the Zn-5Al-MM alloy-coated wire is wrapped at a rate not exceeding 15 turns/min in a close helix of at least eight turns around a cylindrical mandrel with a diameter equal to three times the specified diameter of the wire under test, ± 5 %.

11. Coating Test

11.1 The Zn-5Al-MM alloy-coated wire shall conform to the coating requirements prescribed in Table 5.

11.2 The coating test shall be conducted in accordance with Test Method A 90A 90/A90M/A 90M.

12. Adherence of Coating Test

12.1 The Zn-5Al-MM alloy-coated wire shall be capable of being wrapped in a close helix at a rate not exceeding 15 turns/min around a cylindrical mandrel having a diameter as prescribed in Table 6, without cracking or flaking the coating to such an extent that any Zn-5Al-MM alloy can be removed by rubbing with the bare fingers.

NOTE 1—Loosening or detachment during the adhesion test of superficial, small particles of Zn-5Al-MM alloy formed by mechanical polishing of the surface of the coated wire shall not be considered cause for rejection.

13. Joints

13.1 No joints shall be made in the finished wire.

13.2 Joints may be made at any stage of processing prior to final cold drawing by the electric butt-weld or flash or flash-welding process.

TABLE 2 Permissible Variations in Diameter of Zn-5Al-MM Alloy-Coated Steel Wire

NOTE 1— It is recognized that the surface of coatings, particularly those produced by the hot-dip method of coating, are not perfectly smooth and devoid of irregularities. If the tolerances shown in the table are rigidly applied to such irregularities that are inherent to the product, unjustified rejections of wire that would actually be satisfactory for use could occur. It is intended that these tolerances be used in gaging the wires where there is a minimum of such diameter irregularities due to hot dip coating.

Specified Diameter		Permissible Variation			
in.	mm	in.		mm	
		Plus	Minus	Plus	Minus
0.0500 to 0.0749, incl	1.270 to 1.902, incl	0.0015	0.001	0.038	0.025
0.0750 to 0.1199, incl	1.905 to 3.045, incl	0.002	0.002	0.051	0.051
0.1200 to 0.1399, incl	3.048 to 3.553, incl	0.003	0.002	0.076	0.051
0.1400 to 0.1900, incl	3.556 to 4.823, incl	0.004	0.003	0.102	0.076