



Designation: B833 – 20

Standard Specification for Zinc and Zinc Alloy Wire for Thermal Spraying (Metallizing) for the Corrosion Protection of Steel¹

This standard is issued under the fixed designation B833; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope*

1.1 This specification covers zinc and zinc alloy wire used to deposit zinc coatings by thermal spraying (metallizing) for the corrosion protection of steel and iron. Zinc and zinc alloy wire provided under this specification is intended for use in oxy-fuel and electric arc thermal spraying equipment. Additional zinc alloy compositions used in thermal spraying primarily for electronic applications are found in Specification B943.

1.2 Zinc alloy wire compositions used in thermal spraying primarily for electronic applications are found in Specification B943.

1.3 Zinc alloy wire compositions used as solders are found in Specification B907.

1.4 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information only.

1.5 *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 become familiar with all hazards including those identified in the appropriate Material Safety Data Sheet (MSDS) for this product/material as provided by the manufacturer; to establish appropriate safety, health, and environmental practices, and determine the applicability of regulatory limitations prior to use.*

1.6 *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 The following ASTM documents of the issue in effect on the date of material purchase form a part of this specification to the extent referenced herein:

¹ This specification is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.04 on Zinc and Cadmium.

Current edition approved April 1, 2020. Published April 2020. Originally approved in 1993. Last previous edition approved in 2013 as B833 – 13. DOI: 10.1520/B0833-20.

2.2 ASTM Standards:²

B6 Specification for Zinc

B899 Terminology Relating to Non-ferrous Metals and Alloys

B907 Specification for Zinc, Tin and Cadmium Base Alloys Used as Solders

B943 Specification for Zinc and Tin Alloy Wire Used in Thermal Spraying for Electronic Applications

B949 Specification for General Requirements for Zinc and Zinc Alloy Products

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

E536 Test Methods for Chemical Analysis of Zinc and Zinc Alloys

2.3 ANSI/AWS Standard:³

ANSI/AWS A5.33 Specification for Solid and Ceramic Wires and Ceramic Rods for Thermal Spraying

2.4 ISO Standards:⁴

ISO 3815-1 Zinc and zinc alloys — Part 1: Analysis of solid samples by optical emission spectrometry

ISO 3815-2 Zinc and zinc alloys — Part 2: Analysis by inductively coupled plasma optical emission spectrometry

3. Terminology

3.1 Terms shall be defined in accordance with Terminology B899.

4. Ordering Information

4.1 In order to make the application of this specification complete, the purchaser shall supply the following information to the seller in the purchase order or other governing documents:

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.

³ Available from American Welding Society (AWS), 550 NW LeJeune Rd., Miami, FL 33126, <http://www.aws.org>.

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

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

- 4.1.1 Name, designation, and date of issue of this specification,
 - 4.1.2 Quantity (mass(weight) in kilograms (pounds)),
 - 4.1.3 Diameter (see [Table 1](#)),
 - 4.1.4 Acceptance tests if other than specified (see Section 10),
 - 4.1.5 Certification (see Section 14),
 - 4.1.6 Packaging and packing materials (see Section 15), and
 - 4.1.7 Supplementary requirements, if applicable.
- 4.2 See Specification [B949](#).

5. Materials and Manufacture

- 5.1 The zinc used to manufacture the wire shall conform to the requirements for High Grade Zinc (Z15001) or Special High Grade Zinc (Z13001) as specified in Specification [B6](#).
- 5.2 See Specification [B949](#).

6. Chemical Composition

- 6.1 The wire shall conform to the requirements prescribed in [Table 2](#).
- 6.2 The manufacturer shall perform chemical analyses as directed by Test Methods [E536](#), ISO 3815-1, ISO 3815-2 or by other methods of at least equal accuracy to confirm that the wire conforms to the requirements of composition. In case of dispute, Test Method [E536](#) shall be accepted. Analysis of alloy wires not covered by Test Method [E536](#) shall be agreed upon between the manufacturer and the purchaser.

NOTE 1—Test Method [E536](#) is not directly applicable, in an unmodified form, to alloys 85Zn/15Al or 87Zn/13Al.

NOTE 2—By mutual agreement between supplier and purchaser, analysis may be required and limits established for elements or compounds not specified in [Table 2](#).

- 6.2.1 Analysis may be performed on finished wire, on material selected when the wire is cast, or on samples taken from semi-finished wire.
- 6.2.2 If analysis is performed on finished wire, the number and selection of samples shall be agreed upon by the buyer and seller.
- 6.2.3 If the analysis is performed on material selected while the wire is being cast, at least one sample shall be selected for each source of molten metal.
- 6.2.4 If the analysis is performed on samples taken from semi-finished product, at least one sample shall be analyzed for each 4500 kg (10 000 lbs) or fraction thereof.

7. Physical Properties and Mechanical Properties

- 7.1 [Appendix X1](#) shows typical physical properties for zinc and zinc alloy wire and does not constitute a part of this specification but is provided for informational purposes only.
- 7.2 [Appendix X2](#) shows typical mechanical properties for zinc and zinc alloy wire and does not constitute a part of this specification but is provided for informational purposes only.
- 7.2.1 Mechanical properties are important so the wire can be fed into a thermal spray gun without breaking or jamming.
- 7.2.2 Mechanical properties of zinc and zinc alloy wire will vary depending upon the wire diameter and processing factors.

8. Dimensions, Weights, and Permissible Variations

- 8.1 The wire shall conform to the sizes, tolerances, and weights per unit length listed in [Table 1](#).

9. Workmanship, Finish, and Appearance

- 9.1 The wire shall be clean and free of corrosion, adhering foreign material, scale, seams, nicks, burrs, and other defects which would interfere with the operation of thermal spraying equipment. The wire shall uncoil readily and be free of bends or kinks that would prevent its passage through the thermal spray gun.
- 9.2 The wire shall be a continuous length per spool, coil, or drum. Splices or welds are permitted, provided that they do not interfere with the thermal spray equipment or coating process.
- 9.3 The starting end of each coil shall be tagged to indicate winding direction and to be readily identifiable with ASTM designation.
- 9.4 See Specification [B949](#).

10. Acceptance Tests

- 10.1 The seller shall provide, at the buyer's option, either a certification or a manufacturer's declaration that the raw material used to manufacture the wire met the requirements of composition specified in [5.1](#).

11. Sampling

- 11.1 Selection of samples of wire shall be agreed upon between the purchaser and the supplier. Agreement may also include requirements of the number of tests and retests.
- 11.2 The manufacturer shall determine the diameter of the wire at the end and the beginning of each continuous wire in a

TABLE 1 Dimensions, Weights, and Permissible Variations

Nominal Wire Diameter		Permissible Variation		Nominal Weight Per Unit Length	
mm	(in.)	mm	(in.)	g/m	(lb/ft)
4.763	(0.1875)	+0.0000	(+0.0000)	123.517-126.493	(0.083-0.085)
		-0.0762	(-0.0030)		
3.175	(0.125)	+0.0000	(+0.0000)	55.062-56.550	(0.037-0.038)
		-0.0508	(-0.0020)		
2.311	(0.091)	+0.0000	(+0.0000)	28.275-29.673	(0.019-0.020)
		-0.0381	(-0.0015)		
2.000	(0.079)	+0.0000	(+0.0000)	20.834-22.322	(0.014-0.015)
		-0.0381	(-0.0015)		
1.626	(0.064)	+0.0000	(+0.0000)	13.393-14.882	(0.009-0.010)
		-0.0381	(-0.0015)		
1.448	(0.057)	+0.0000	(+0.0000)	10.417-11.905	(0.007-0.008)
		-0.0381	(-0.0015)		