



Designation: B 833 – 01a

Standard Specification for Zinc and Zinc Alloy Wire for Thermal Spraying (Metallizing)¹

This standard is issued under the fixed designation B 833; 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 and zinc alloy wire used in depositing zinc coatings by thermal spraying (metallizing). Zinc and zinc alloy wire provided under this specification is intended for use in oxy-fuel and electric arc thermal protection of iron and steel. Additional zinc alloy compositions used in thermal spraying primarily for electronic applications are found in Specification B 907.

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

1.3 *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 and health practices, and determine the applicability of regulatory limitations prior to use.*

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:

- B 6 Specification for Zinc²
 - B 899 Terminology Relating to Nonferrous Metals and Alloys²
 - B 907 Specification for Zinc, Tin and Cadmium Base Solders²
 - E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications³
 - E 536 Test Methods for Chemical Analysis of Zinc and Zinc Alloys⁴
 - E 527 Practice for Numbering Metals and Alloys (UNS)⁵
- 2.2 *ANSI/AWS Standard:*
ANSI/AWS A5.33 Specification for Solid and Ceramic

Wires and Ceramic Rods for Thermal Spraying⁶

3. Terminology

3.1 Terms shall be defined in accordance with Terminology B 899.

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:

- 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 11),
- 4.1.6 Packaging and packing materials (see Section 12), and
- 4.1.7 Supplementary requirements, if applicable.

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 B 6.

6. Chemical Composition

6.1 The wire shall conform to the requirements prescribed in Table 2.

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.

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 Nov. 10, 2001. Published January 2002. Originally published as B 833 - 93. Last previous edition B 833 - 01^ε.

² Annual Book of ASTM Standards, Vol 02.04.

³ Annual Book of ASTM Standards, Vol 14.02.

⁴ Annual Book of ASTM Standards, Vol 03.05.

⁵ Annual Book of ASTM Standards, Vol 01.01.

⁶ Available from the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

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

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 -0.0762	(+0.0000) (-0.0030)	123.517-126.493	(0.083-0.085)
3.175	(0.125)	+0.0000 -0.0508	(+0.0000) (-0.0020)	55.062-56.550	(0.037-0.038)
2.311	(0.091)	+0.0000 -0.0381	(+0.0000) (-0.0015)	28.275-29.673	(0.019-0.020)
2.000	(0.079)	+0.0000 -0.0381	(+0.0000) (-0.0015)	20.834-22.322	(0.014-0.015)
1.626	(0.064)	+0.0000 -0.0381	(+0.0000) (-0.0015)	13.393-14.882	(0.009-0.010)
1.448	(0.057)	+0.0000 -0.0381	(+0.0000) (-0.0015)	10.417-11.905	(0.007-0.008)

TABLE 2 Chemical Composition Requirements for Zinc and Zinc Alloy Wires

NOTE 1—The following applies to all specified limits in this table. For the purposes of determining conformance with this specification, an observed value obtained from analysis shall be rounded off to the nearest unit in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding method of Practice E 29.

Common Name (UNS) ⁴	Composition, % (Weight percent)													
	Al	Cd	Cu	Fe	Pb	Sn	Sb	Ag	Bi	As	Ni	Mg	Zn	Other
99.99 Zinc (Z13005)	0.002 max	0.003 max	0.005 max	0.003 max	0.003 max	0.001 max	...	...	...	...	...	...	99.99 min	...
99.9 Zinc (Z15005)	0.01 max	0.02 max	0.02 max	0.02 max	0.03 max	...	...	...	...	...	...	...	99.9 min	0.10 total non-Zn
85 Zn/15 Al (Z30700)	14.0- 16.0	0.005 max	0.005 max	0.06 max	0.005 max	0.003 max	0.01 max	0.015 max	0.02 max	0.002 max	0.005 max	0.02 max	remain- der ⁵	0.05 total non Zn+Al

⁴UNS designations were established in accordance with Recommended Practice E 527.

⁵Remainder determined arithmetically by difference.

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.

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.

10.2 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.

10.3 Chemical Composition:

10.3.1 The manufacturer shall perform chemical analyses as directed in Test Methods E 536 or by other methods of at least equal accuracy to confirm that the wire conforms to the requirements of composition. In case of dispute, analysis by Test Methods E 536 shall be accepted. Analysis of alloy wires not covered by Test Methods E 536 shall be agreed upon between the manufacturer and the purchaser.

10.3.2 Analysis may be performed on finished wire, on material selected when the wire is cast, or on samples taken from semi-finished wire.

10.3.3 If analysis is performed on finished wire, the number and selection of samples shall be agreed upon by the buyer and seller.

10.3.4 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.

10.3.5 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.

10.4 The manufacturer shall determine the diameter of the wire at the end and the beginning of each continuous wire in a production pack, coil, or spool of wire. Each determination shall be the result of at least three measurements.

10.5 The buyer reserves the right to reject wire that, during use, is found to be defective.