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Standard Specification for High-Strength Zinc-Coated (Galvanized) Steel Core Wire for Aluminum and Aluminum-Alloy Conductors, Steel Reinforced¹

This standard is issued under the fixed designation B606/B606M; 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-coated (galvanized), steel core wire with Class A zinc coating (GA3) for use in overhead electrical conductors.

1.2 This specification covers wire of diameter from 0.0500 to 0.1900 in. inclusive or 1.27 to 4.82 mm inclusive.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.4 *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 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:*²

[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](#)

[A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products](#)

[B6 Specification for Zinc](#)

[B193 Test Method for Resistivity of Electrical Conductor Materials](#)

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

3. Terminology

3.1 *Definitions:*

3.1.1 *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.

3.1.2 *Product Code*—Defines product coating type, coating class and strength grade. This specification covers only High Strength Class A Zinc Coated products and identified as product code GA3.

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 or millimeters (Section 13),

4.1.3 Certification, if required (Section 18),

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

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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.



- 4.1.4 Test report, if required (Section 18), and
- 4.1.5 Package size (Section 19).
- 4.1.6 Order Example: Five multiple lengths of 12 000 ft. each, 0.1327 in. GA3 wire, packaged onto wooden non-returnable reels, with certified test report.
- 4.1.7 Product Code (see paragraph 3.1.2).

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 zinc to produce the desired properties.
- 5.3 The slab zinc used for coating shall be high grade or better, conforming to Specification B6.

6. Chemical Composition

- 6.1 The steel shall conform to the requirements prescribed in Table 1.
- 6.2 Chemical analysis shall be conducted in accordance with Test Methods, Practices, and Terminology A751.

7. Tensile Test

7.1 The zinc-coated steel core wire shall conform to the tensile and elongation requirements prescribed in Table 2 or Table 3 and a minimum breaking strength (lbs [N]) calculated from the minimum required tensile and nominal wire diameter. The wire tensile strength used to determine compliance to Table 2 or Table 3 shall be calculated using the actual wire breaking strength and the nominal finished diameter of the wire.

7.2 Tensile tests shall be conducted in accordance with Test Methods and Definitions A370, using the initial settings for determining stress at 1 % extension given in Table 4 or Table 5 of this specification.

7.3 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.

8. Wrap Test

8.1 The material, as represented by the test specimens, shall not fracture when the galvanized 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 %.

9. Coating Test

- 9.1 The zinc-coated wire shall conform to the coating requirements prescribed in Table 6 or Table 7.
- 9.2 The coating test shall be conducted in accordance with Test Method A90/A90M.

10. Adherence of Coating Test

10.1 The zinc-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 8 or Table 9, without cracking or flaking the zinc coating to such an extent that any zinc can be removed by rubbing with the bare fingers.

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

11. Joints

- 11.1 No joints shall be made in the finished wire.
- 11.2 Joints may be made at any stage of processing prior to final cold drawing, by the electric butt-weld or flash-welding process.

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



TABLE 2 Tensile Requirements

Specified Diameter in.	Stress at 1 % Extension, min kpsi	Ultimate Tensile Strength, min kpsi	Elongation in 10 in., min %
0.0500 to 0.0899, incl	210	235	3.0
0.0900 to 0.1199, incl	205	230	3.0
0.1200 to 0.1399, incl	200	225	3.5
0.1400 to 0.1900, incl	195	220	3.5

TABLE 3 Tensile Requirements [Metric]

Specified Diameter mm	Stress at 1 % Extension, min MPa	Ultimate Tensile Strength, min MPa	Elongation in 250 mm, min %
1.27 to 2.28, incl	1450	1620	3.0
2.29 to 3.04, incl	1410	1590	3.0
3.05 to 3.55, incl	1380	1550	3.5
3.56 to 4.82, incl	1340	1520	3.5

TABLE 4 Initial Settings for Determining Stress at 1 % Extension

Specified Diameter in.	Initial Stress kpsi	Initial Setting of Extensometer in./in.
0.0500 to 0.0899, incl	15	0.0005 (0.05 % extension)
0.0900 to 0.1199, incl	30	0.0010 (0.10 % extension)
0.1200 to 0.1900, incl	46	0.0015 (0.15 % extension)

TABLE 5 Initial Settings for Determining Stress at 1 % Extension
[Metric]

Specified Diameter mm	Initial Stress MPa	Initial Setting of Extensometer mm/mm
1.27 to 2.28, incl	110	0.0005 (0.05 % extension)
2.29 to 3.04, incl	210	0.0010 (0.10 % extension)
3.05 to 4.82, incl	320	0.0015 (0.15 % extension)

TABLE 6 Zinc Coating

Specified Diameter of Coated Wire, in.	Area Density of Coating, min, of Uncoated Wire Surface, oz/ ft ²
	Class A
0.0500 to 0.0599, incl	0.60
0.0600 to 0.0749, incl	0.65
0.0750 to 0.0899, incl	0.70
0.0900 to 0.1039, incl	0.75
0.1040 to 0.1199, incl	0.80
0.1200 to 0.1399, incl	0.85
0.1400 to 0.1799, incl	0.90
0.1800 to 0.1900, incl	1.00

11.3 Welding equipment and procedure shall be such that it can be demonstrated that the ultimate tensile strength of a finished wire specimen containing the welded section shall be not less than 96 % of the specified minimum stress at 1 % extension.

11.4 A welded section shall not be required to meet the stress at 1 % extension, elongation, and wrap tests.

12. Density and Resistivity

12.1 For the purpose of calculating mass per unit length, cross sections, and so forth, the density of galvanized steel wire at 20°C shall be taken as 0.281 lb/in.³ [7780 kg/m³].