Designation: A 363 – 03

# Standard Specification for Zinc-Coated (Galvanized) Steel Overhead Ground Wire Strand[1]

This standard is issued under the fixed designation A 363; 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 high-strength, extra-high-strength, and utilities grades of concentric lay steel wire strand composed of three wires or seven wires with Class A, Class B, or Class C zinc coatings specifically intended for use as overhead ground wires or static wires for electric power transmission lines.

1.2 The values stated in inch-pound units are to be regarded as the standard. The SI units given in brackets are for information only.

## 2. Referenced Documents

2.1 *ASTM Standards:*

A 90/A 90M Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings

A 902 Terminology Relating to Metallic-Coated Steel Products

B 6 Specification for Zinc

## 3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology A 902.

## 4. Ordering Information

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

4.1.1 Quantity of each size,

4.1.2 Size and grade of strand (Table 1), and

4.1.3 Class of zinc coating (Section 11 and Table 2).

4.1.4 ASTM designation and year of issue.

## 5. Materials and Manufacture

5.1 The base metal shall be steel produced by any commercially accepted steel making process and shall be of such quality and purity that when drawn to the size of wire specified and coated with zinc, the finished strand will have the properties and characteristics prescribed in this specification.

5.2 The slab zinc when used for the coating shall be any grade of zinc conforming to Specification B 6.

## 6. Stranding

6.1 The strand shall have a left lay with a uniform pitch of not more than 16 times the nominal diameter of the strand. A left lay is defined as a counter-clockwise twist away from the observer. Stranding shall be sufficiently close to ensure no significant reduction in diameter when stressed to 10 % of the minimum breaking strength.

## 7. Preforming Strand

7.1 Preformed strand shall be supplied when so specified by the purchaser. Strand is preformed when the component wires are set to the helical form which they assume in the product by any means of process other than by merely laying them about the strand core.

## 8. Breaking Strength and Weight

8.1 The approximate weight per unit length of strand and the minimum breaking strength of the finished strand shall be as specified in Table 1.

8.2 A test in which the breaking strength is below the minimum specified and which may have been caused by the slipping of the specimen in the jaws of the testing machine, by breaking within the jaws or within 1 in. [25.4 mm] of the jaws, or by the improper socketing of a specimen shall be disregarded and another sample from the same coil or reel shall be tested.

## 9. Elongation

9.1 The elongation of the strand in 24 in. [610 mm], determined as specified in 9.2, shall be not less than 5 % for the high-strength and for the 5⁄16-in. [7.94-mm], 3-wire utilities grades, and 4 % for the extra-high-strength and for the 3⁄8-in. [9.52-mm], 7-wire Utilities grades.

9.2 The elongation shall be measured as the percentage increase in separation between the jaws of the testing machine from the position after application of the initial load, to the position at initial failure in the test specimen. The separation of

[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 October 1, 2003. Published December 2003. Originally approved in 1952. Last previous edition approved in 1998 as A 363 – 98.

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

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**TABLE 1 Physical Properties of Zinc-Coated Steel Overhead Ground Wire Strand**

| Nominal Diameter of Strand, in. [mm] | Number of Wires in Strand | Nominal Diameter of Coated Wire in Strand, in. [mm][A] | Approximate Weight of Strand, lb/1000 ft [kg/km] | Minimum Breaking Strength of Strand, lbf [kN] | | |
|---|---|---|---|---|---|---|
| | | | | High-Strength Grade | Extra-High-Strength Grade | Utilities Grade |
| 5/16 [7.94] | 3 | 0.145 [3.68] | 171 [255] | . . . | . . . | 6500 [28.9] |
| 5/16 [7.94] | 7 | 0.104 [2.64] | 205 [305] | 8000 [35.6] | 11 200 [49.8] | . . . |
| 3/8 [9.52] | 7 | 0.120 [3.05] | 273 [407] | 10 800 [48.0] | 15 400 [68.4] | 11 500 [51.2] |
| 7/16 [11.11] | 7 | 0.145 [3.68] | 399 [595] | 14 500 [64.5] | 20 800 [92.5] | . . . |
| 1/2 [12.7] | 7 | 0.165 [4.19] | 517 [770] | 18 800 [83.6] | 26 900 [119.6] | . . . |

[A] It is recognized that the surfaces of heavy zinc coating, particularly those produced by hot galvanizing, are not perfectly smooth and devoid of irregularities. If the tolerances shown above 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. Therefore, it is intended that these tolerances be used in gaging the uniform areas of the galvanized wire.

**TABLE 2 Minimum Weights of Coating**

| Nominal Diameter of Coated Wire, in. [mm] | Minimum Weight of Coating, oz/ft$^2$[kg/m$^2$] of Uncoated Wire Surface | | |
|---|---|---|---|
| | Class A | Class B | Class C |
| 0.104 [2.64] | 0.80 [0.24] | 1.60 [0.49] | 2.40 [0.73] |
| 0.120 [3.05] | 0.85 [0.26] | 1.70 [0.52] | 2.55 [0.78] |
| 0.145 [3.68] | 0.90 [0.27] | 1.80 [0.55] | 2.70 [0.82] |
| 0.165 [4.19] | 0.90 [0.27] | 1.80 [0.55] | 2.70 [0.82] |

the jaws of the testing machine shall be approximately 2 ft [0.61 m] when under an initial load equal to 10 % of the required minimum breaking strength of the strand. The elongation values shall be recorded only for specimens that break over 1 in. [25.4 mm] from jaws of the testing machine.

## 10. Ductility of Steel

10.1 The individual wires of the completed strand shall not fracture when wrapped at a rate not exceeding 15 turns per minute in a close helix of at least two turns around a cylindrical mandrel equal to three times the nominal diameter of the wire under test.

## 11. Weight of Coating

11.1 The weight of zinc coating shall not be less than that specified in Table 2.

11.2 *Weight of Coating Test*—The zinc coating shall be tested for weight by a stripping test in accordance with Test Method A 90/A 90M.

## 12. Adherence of Coating

12.1 The zinc coating shall adhere to the wire without delaminating and without being removable by rubbing with the bare fingers after the individual wires have been wrapped at a rate not exceeding 15 turns per minute, in a close helix of at least two turns around a cylindrical mandrel equal to three times the nominal diameter of the wire under test. Loosening or detachment during the adhesion tests of superficial, small particles of zinc formed by mechanical polishing of the surface of zinc-coated wire shall not be considered cause for rejection.

## 13. Joints and Splices

13.1 There shall be no joints of any kind made in the finished wire entering into the construction of the strand.

13.2 Electric-welded butt joints made prior to the start of cold drawing of the wire are permitted; however, no electric-welded butt joints of the wire shall be made during the cold drawing application.

13.3 There shall be no strand joints or strand splices in any length of the completed strand.

## 14. Permissible Variations in Wire Size

14.1 The diameter of the zinc-coated wire forming the strand shall conform to the nominal diameter shown in Table 1 within a tolerance of ±0.004 in. [0.102 mm] for Wire Sizes 0.104 in. [2.642 mm] and 0.120 in. [3.048 mm] and ±0.005 in. [0.127 mm] for Wire Sizes 0.145 in. [3.683 mm] and 0.165 in. [4.191 mm].

## 15. Workmanship, Finish, and Appearance

15.1 The zinc-coated wire shall be uniform in diameter and shall be free from splints, scales, inequalities, flaws, and other imperfections not consistent with good commercial practice. The coating shall be continuous and reasonably uniform.

## 16. Sampling

16.1 The number of samples to be taken shall be determined by lot size as follows:

| Lot Size | Number of Samples |
|---|---|
| 1 to 3 reels | 1 from each reel |
| 4 to 30 reels | 3 min |
| 31 reels or greater | 4 min |

16.2 Each sample taken shall be subjected to all tests prescribed in Sections 6, 8, and 9.

16.3 In addition to the strand testing in 16.2 the individual wires from the strand samples shall be tested for compliance with Sections 10, 11, 12, and 14. Select all three wires in three-wire strand, and four of the wires in seven-wire strand. Individual wire samples selected for compliance to Section 14 shall be discarded if any distortion of the wire occurred during the stranding operation.

16.4 Instead of testing the wires from the completed strand in accordance with 16.3, the producer may elect to establish compliance with Sections 10, 11, 12, and 14 of this specification by tests made on the wires prior to stranding, unless otherwise stipulated by the purchaser. However, if the producer makes this election, the purchaser shall still reserve the right to test wires from the completed strand for compliance.



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## 17. Inspection

17.1 The manufacturer shall afford the inspector representing the purchaser all reasonable facilities to satisfy him that the material is being furnished in accordance with this specification. All tests and inspection shall be made on the finished strand at the place of manufacture prior to shipment and shall be so conducted as not to interfere unnecessarily with the operation of the works.

## 18. Rejection

18.1 In case there is a reasonable doubt in the first trial as to the failure of the wire or strand to meet any requirement of this specification, two additional tests shall be made on samples of wire or strand from the same coil or reel, and if failure occurs in either of these tests, the strand shall be rejected.

## 19. Packaging and Package Marking

19.1 The completed strand shall be furnished on reels sufficiently sturdy to withstand normal service incident to shipping, hauling, and field erection.

19.2 The completed strand shall be furnished in random lengths. At least 95 % of the lengths shall be within the minimum and maximum limits shown in Table 3. Not more than 5 % of a total length ordered may be furnished in lengths which are below the minimum limits shown in Table 3 but which are not less than 1500 ft [457 m] long. Each reel shall be clearly marked to show the length of the strand contained thereon.

**TABLE 3 Range of Strand Lengths per Reel for at Least 95 % of the Completed Strand**

| Nominal Diameter of Strand, in. [mm] | Number of Wires in Strand | Length in Feet [metres] of Strand Per Reel for at Least 95 % of the Order | |
|---|---|---|---|
| | | Min | Max |
| 5/16 [7.94] | 3 | 4700 [1430] | 7900 [2410] |
| 5/16 [7.94] | 7 | 4800 [1460] | 7700 [2350][A] |
| 3/8 [9.52] | 7 | 3600 [1100] | 5800 [1770][A] |
| 7/16 [11.11] | 7 | 4700 [1430] | 7900 [2410] |
| 1/2 [12.7] | 7 | 3600 [1100] | 6100 [1860] |

[A] Purchasers may procure maximum lengths up to 12 000 ft [3660 m] for 5/16-in. [7.94-mm] diameter strand and up to 9400 ft [2860 m] for 3/8-in. [9.52-mm] diameter strand.

19.3 Each reel shall have a strong tag securely fastened to it showing the name of the material "ground wire strand," the length, size, grade of the strand, class of coating, ASTM Specification A 363, and the name or mark of the manufacturer.

## 20. Keywords

20.1 coated overhead strand; steel wire strand; zinc-coated overhead strand

## SUMMARY OF CHANGES

Committee A05 has identified the location of selected changes to this standard since the last issue (A 363 - 98) that may impact the use of this standard.

*A 363 - 03:*

(*1*) Renumbered sections to meet Form & Style requirements.
(*2*) Deleted "Size of Strand" section.
(*3*) Added paragraph 4.1.4.
(*4*) Changed base metal in 5.1 to any commercially accepted steel making process.
(*5*) Combined old "Physical Properties" section into new Section 8 (Breaking Strength and Weight).
(*6*) Editorial changes in sections 11.1-12.1-18.
(*7*) Made Note 1 part of 12.1.
(*8*) Made Note 2 part of 16.3.
(*9*) Changed kg/m to kg/km in Table 1.
(*10*) Added Summary of Changes section.

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