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.

Designation: A764 – 07 (Reapproved 2017)

Standard Specification for Metallic Coated Carbon Steel Wire, Coated at Size and Drawn to Size for Mechanical Springs[1]

This standard is issued under the fixed designation A764; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification covers two finishes of round, metallic coated, hard-drawn, carbon steel spring wire having properties and quality for the manufacture of mechanical springs and wire forms that are not subject to high stress or require high fatigue properties.

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

1.3 *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 *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

A428/A428M Test Method for Weight [Mass] of Coating on Aluminum-Coated Iron or Steel Articles

A510 Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel

A700 Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment

A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products

B6 Specification for Zinc

B750 Specification for GALFAN

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

2.2 *U.S. Government Standards:*[3]

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)

MIL-STD-129 Marking for Shipment and Storage

2.3 *Automotive Industry Action Group Standard:*[4]

AIAG B-5 02.00 Primary Metals Identification Tag Application Standard

3. Terminology

3.1 *Definitions:*

3.1.1 *coating class (regular, 1, or 3)*—specifies the minimum coating weight per unit area of uncoated wire surface. Aluminum coated wire is only specified in one class.

3.1.2 *coating finish (1 or 2)*—specifies whether a coating is applied prior to or after the final cold drawing operation.

3.1.3 *coating type (A, B, or C)*—specifies the required alloy content of the coating.

3.1.4 *tensile class (I or II)*—specifies the tensile range to which the wire is to conform.

4. Ordering Information

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

4.1.1 Quantity (weight),

4.1.2 Diameter, finish, class of coating if applicable, type of metallic coating, class of tensile strength, name of material,

4.1.3 ASTM designation and date of issue,

4.1.4 Packaging (Section 15),

4.1.5 Cast or heat analysis report, if desired (Section 6), and

4.1.6 Test report, if desired (Section 14).

NOTE 1—A typical ordering description is as follows: 30 000 lb 0.120 in. Finish 2, Class 1, Type B Metallic Coating, Tensile Class II, Steel Mechanical Spring Wire in 400-lb, 22-in. coils to ASTM A764, dated.

[1] This specification is under the jurisdiction of ASTM Committee A05 on Metallic-Coated Iron and Steel Products and is under the direct responsibility of Subcommittee A05.12 on Wire Specifications.

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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.

[3] Available from Standardization Documents Order Desk, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, ATTN: NPODS.

[4] Available from Automotive Industry Action Group, 26200 Lahser Rd., Suite 200, Southfield, MI 48034, www.aiag.org.

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

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5. Materials and Manufacture

5.1 The base metal of the wire shall be of good commercial quality steel. The steel may be either ingot cast or strand cast.

5.2 A sufficient discard shall be made to ensure freedom from injurious piping and undue segregation.

5.3 The wire shall be cold drawn to produce the desired mechanical properties.

5.4 Each coil shall be of one continuous length. Only welds made prior to cold drawing are permitted, unless otherwise agreed upon at the time of the purchase or contract.

5.5 The material shall be metallic coated prior to cold drawing, or at an intermediate stage of cold drawing (Finish 1), or shall be metallic coated after the final cold drawing (Finish 2).

5.6 The wire shall be furnished with one of three types of metallic coating, as specified:

5.6.1 *Type A*—Aluminum coated (aluminized),

5.6.2 *Type B*—Zinc coated (galvanized), or

5.6.3 *Type C*—Zinc-5 % aluminum-mischmetal (Zn-5Al-MM) alloy coated.

5.7 Coating Types A and C shall be produced by a hot-dip process. Coating Type B may be produced by either a hot-dip or an electrolytic process at the option of the producer.

5.8 The slab zinc for Coating Type B shall be any grade of zinc conforming to Specification B6.

5.9 The ingot used for Coating Type C shall conform to Specification B750.

6. Chemical Requirements

6.1 The steel shall conform to the requirements for chemical composition prescribed in Table 1.

6.2 *Cast or Heat Analysis*—Each cast or heat of steel shall be analyzed by the manufacturer to determine compliance with the percentage of elements prescribed in Table 1. This analysis shall be from a test specimen preferably taken during the pouring of the cast or heat. When required, this shall be reported to the purchaser.

6.3 *Product Analysis*—An analysis may be made by the purchaser from finished wire representing each cast or heat of steel. The chemical composition thus determined, as to elements required or restricted, shall conform to the product analysis requirements specified in Table 10 of Specification A510.

TABLE 1 Chemical Requirements

Element	Composition, %
Carbon	0.45–0.85[A]
Manganese	0.30–1.30[B]
Phosphorus, max	0.040
Sulfur, max	0.050
Silicon	0.10–0.35

[A] Carbon in any one lot shall not vary by more than 0.13 %.
[B] Manganese in any one lot shall not vary by more than 0.30 %.

6.4 For referee purposes, Test Methods, Practices, and Terminology A751 shall be used.

7. Mechanical Requirements

7.1 *Tension Test:*

7.1.1 *Requirements*—The material as represented by tension test specimens shall conform to the requirements prescribed in Table 2 or Table 3 for the various sizes and specified class.

7.1.2 *Test Method*—The tension test shall be made in accordance with Test Methods A370, Supplement IV.

7.2 *Wrap Test:*

7.2.1 *Requirement*—Finish 1 (drawn to size metallic coated) wire shall withstand wrapping on a mandrel as shown in Table 4 without the steel base fracturing or the metallic coating peeling or flaking to such an extent that coating metal can be removed by rubbing with the bare fingers. Finish 2 (metallic coated at size) wire shall withstand wrapping on a mandrel as shown in Table 5 without the steel base fracturing or the metallic coating peeling or flaking to such an extent that coating metal can be removed by rubbing with the bare fingers. Loosening or detachment, during the wrap test, of superficial, small particles of coating metal formed by mechanical polishing of the metallic coated wire shall not be considered cause for rejection.

7.2.2 *Test Method*—The wrap test shall be made in accordance with Test Methods A370, Supplement IV.

7.3 *Metallic Coating.*

7.3.1 *Requirement:*

7.3.1.1 For metallic coating Type A, the wire shall conform to the minimum weight of coating prescribed in Table 6.

7.3.1.2 For metallic coating Type B or Type C, the wire shall conform to the minimum weight of coating for Coating Class 1 or 3 prescribed in Table 7. Regular coating has no minimum requirement.

7.3.2 *Test Methods:*

7.3.2.1 The weight of coating test for metallic coating Type A shall be made in accordance with Test Method A428/A428M.

7.3.2.2 The weight of coating test for metallic coating Type B or Type C shall be made in accordance with Test Method A90/A90M.

8. Dimensions and Permissible Variations

8.1 The diameter of the wire shall not vary from that specified by more than the tolerances specified in Table 8 or Table 9.

9. Workmanship, Finish, and Appearance

9.1 The surface of Finish 1, drawn metallic coated wire, shall be smooth and free from defects such as seams, pits, die marks, and other defects tending to impair the use of the wire for springs.

9.2 The surface of Finish 2, metallic coated at wire size, shall be free of slivers, scale, and other defects tending to impair the use of this wire for springs. The metallic coating shall be smooth and continuous. If a sample does not demonstrate a smooth and continuous coating, one sample shall be cut from each end of the coil and examined.

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