



Designation: A 764 – 95 (Reapproved 2001)

Standard Specification for Metallic Coated Carbon Steel Wire, Coated at Size and Drawn to Size for Mechanical Springs¹

This standard is issued under the fixed designation A 764; 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 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. Tables 1-9

2. Referenced Documents

2.1 ASTM Standards:

A 90 Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles²

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products³

A 428 Test Method for Weight of Coating on Aluminum-Coated Iron or Steel Articles²

A 510 Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel³

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment⁴

A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products³

B 6 Specification for Zinc (Slab Zinc)⁵

B 750 Specification for Zinc-5 % Aluminum-Mischmetal Alloy (UNS Z 38510) in Ingot Form for Hot-Dip Coatings⁵

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications⁶

2.2 U.S. Government Standards:⁷

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

¹ This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel, and Related Alloys and is under the direct responsibility of Subcommittee A01.03 on Steel Rod and Wire.

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² Annual Book of ASTM Standards, Vol 01.06.

³ Annual Book of ASTM Standards, Vol 01.03.

⁴ Annual Book of ASTM Standards, Vol 01.05.

⁵ Annual Book of ASTM Standards, Vol 02.04.

⁶ Annual Book of ASTM Standards, Vol 14.02.

⁷ Available from Standardization Documents Order Desk, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, ATTN: NPODS.

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 %.

MIL-STD-129 Marking for Shipment and Storage

MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage

2.3 Automotive Industry Action Group Standard:

AIAG B-5 02.00 Primary Metals Identification Tag Application Standard⁸

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).

⁸ Available from Automotive Industry Action Group, 26200 Lahser, Suite 200, Southfield, MI 48034.



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TABLE 2 Tensile Requirements^A—Finish 1 (Drawn to Size Metallic Coated), Regular or Class 1 Coating (One Class on Coating Type A)

Wire Diameter, ^B in. (mm)	Tensile Class I		Tensile Class II	
	Tensile Strength, ksi (MPa)		Tensile Strength, ksi (MPa)	
	min	max	min	max
0.032 (0.81) ^C	253 (1740)	306 (2110)	292 (2010)	347 (2390)
0.035 (0.89) ^C	248 (1710)	301 (2080)	287 (1980)	342 (2360)
0.041 (1.04) ^C	242 (1670)	293 (2020)	279 (1920)	332 (2290)
0.048 (1.22) ^C	236 (1630)	286 (1970)	273 (1880)	325 (2240)
0.054 (1.37)	231 (1590)	279 (1920)	266 (1830)	316 (2180)
0.062 (1.57)	225 (1550)	272 (1880)	259 (1790)	308 (2120)
0.072 (1.83)	220 (1520)	266 (1830)	254 (1750)	301 (2080)
0.080 (2.03)	216 (1490)	261 (1800)	249 (1720)	296 (2040)
0.092 (2.34)	209 (1440)	253 (1740)	241 (1660)	287 (1980)
0.106 (2.69)	205 (1410)	248 (1710)	237 (1630)	281 (1940)
0.120 (3.05)	200 (1380)	241 (1660)	230 (1590)	273 (1880)
0.135 (3.43)	196 (1350)	237 (1630)	226 (1560)	269 (1850)
0.148 (3.76)	193 (1330)	234 (1610)	223 (1540)	266 (1830)

^A Tensile strength values for intermediate diameters may be interpolated.

^B Decimal size is rounded to three significant places in accordance with Practice E 29.

^C These sizes are not produced with metallic coating Type A.

TABLE 3 Tensile Requirements^A—Finish 2 (Metallic Coated at Size) Regular, Class 1 or Class 3 Coating (One Class on Coating Type A)

Wire Diameter, ^B in. (mm)	Class I		Class II	
	Tensile Strength, ksi (MPa)		Tensile Strength, ksi (MPa)	
	min	max	min	max
0.062 (1.57) ^C	213 (1470)	272 (1880)	232 (1600)	291 (2010)
0.072 (1.83) ^C	209 (1440)	266 (1830)	227 (1570)	284 (1960)
0.080 (2.03)	204 (1410)	261 (1800)	223 (1540)	280 (1930)
0.092 (2.34)	198 (1370)	253 (1740)	216 (1490)	271 (1870)
0.106 (2.69)	194 (1340)	248 (1710)	212 (1460)	266 (1830)
0.120 (3.05)	189 (1300)	241 (1660)	206 (1420)	258 (1780)
0.135 (3.43)	185 (1280)	237 (1630)	202 (1390)	254 (1750)
0.148 (3.76)	183 (1260)	234 (1610)	200 (1380)	251 (1730)
0.162 (4.11)	180 (1240)	230 (1590)	196 (1350)	246 (1700)
0.177 (4.50)	176 (1210)	225 (1550)	192 (1320)	241 (1660)
0.192 (4.88)	173 (1190)	221 (1520)	189 (1300)	237 (1630)
0.207 (5.26)	171 (1180)	218 (1500)	186 (1280)	233 (1610)
0.225 (5.72) ^C	167 (1150)	214 (1480)	183 (1260)	230 (1590)
0.250 (6.35) ^C	164 (1130)	210 (1450)	179 (1230)	225 (1550)

^A Tensile strength values for intermediate diameters may be interpolated.

^B Decimal size is rounded to three significant places in accordance with Practice E 29.

^C These sizes are not produced with metallic coating Type A.

TABLE 4 Mandrel Diameters for Steel Ductility and Adherence of Metallic Coating Test for Finish 1 Wire (Drawn to Size Metallic Coated)

Wire Diameter		Mandrel Diameter	
in.	mm	Class I Tensile	Class II Tensile
0.032 to 0.148 incl	0.81 to 3.76 incl	1D ^A	2D

^AD equals nominal wire diameter being tested. For 1D mandrel, wire may be wound on itself.

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 A 764, dated .

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 B 6.



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