



Standard Specification for Steel Wire, Cold-Drawn, for Coiled-Type Springs¹

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1. Scope

1.1 This specification covers round, cold-drawn, steel spring wire having properties and quality intended for the manufacture of the following types of upholstery springs:

- 1.1.1 *Type A*—Coiled (Marshall pack),
- 1.1.2 *Type B*—Coiled and knotted,
- 1.1.3 *Type C*—Coiled and knotted (offset style),
- 1.1.4 *Type D*—Coiled and hooked (single and cross helicals),
- 1.1.5 *Type E*—Coiled and hooked (short tension—regular tensile strength),
- 1.1.6 *Type F*—Coiled and hooked (short tension—high tensile strength),
- 1.1.7 *Type G*—Regular lacing,
- 1.1.8 *Type H*—Automatic lacing,
- 1.1.9 *Type I*—Zig-zag (U-formed),
- 1.1.10 *Type J*—Square-formed, and
- 1.1.11 *Type K*—Sinuous for furniture spring units.

1.2 These types of upholstery springs are used in the manufacture of automotive seat springs, furniture springs, bed spring units, mattresses, furniture cushions, and automobile seats. This wire is not intended for the manufacture of mechanical springs.

2. Referenced Documents

2.1 ASTM Standards:²

- A370 Test Methods and Definitions for Mechanical Testing of Steel Products
- A700 Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment
- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

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

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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.

2.2 AIAG Standard:

AIAGB-5 02.00 Primary Metals Identification Tag Application Standard³

3. Ordering Information

3.1 Orders for material under this specification should include the following information for each ordered item:

- 3.1.1 Quantity (weight),
- 3.1.2 Name of material (name of specific type required) (Section 1 and Table 1),
- 3.1.3 Diameter (Table 2),
- 3.1.4 Packaging, marking, and loading (Section 12),
- 3.1.5 ASTM designation and date of issue, and
- 3.1.6 Heat (cast) analysis (if desired).

NOTE 1—A typical ordering description is as follows: 50 000 lb [15 000 kg], cold-drawn upholstery spring wire Type B for coiling and knotting, size 0.080 in. [2.0 mm], 1500-lb [700 kg] coils on tubular carriers to ASTM A407 dated.

4. Manufacture

4.1 The steel shall be made by any of the following processes: open-hearth, basic-oxygen, or electric-furnace.

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

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

5. Chemical Composition

5.1 Upholstery spring wire for coiled-type springs is customarily produced within the chemical ranges shown below. Chemical composition and processing may vary depending on the gage of wire and specific use.

Carbon, %	0.45 to 0.70 ⁴
Manganese, %	0.60 to 1.20 ⁴
Phosphorus, max, %	0.040
Sulfur, max, %	0.050

⁴ In any lot in which all the wire is of the same size and type, and submitted for inspection at the same time, the carbon content shall not vary more than 0.20 %, and the manganese content shall not vary more than 0.30 %.

5.2 An analysis of each heat (cast) shall be made by the producer to determine the percentage of elements specified

³ Available from Automotive Industry Action Group (AIAG), 26200 Lahser Rd., Suite 200, Southfield, MI 48033-7100, www.aiag.org.

TABLE 1 Tensile Strength Requirements^A

Diameter, in. [mm]	Wire Gage	Tensile Strength, ksi [MPa]	
		min	max
Type A, Marshall Pack			
0.048 [1.2]	18	255 [1800]	295 [2060]
0.054 [1.4]		250 [1760]	290 [2010]
0.062 [1.6]	17	250 [1710]	290 [1950]
0.072 [1.8]	16	240 [1680]	280 [1920]
0.080 [2.0]	15	230 [1650]	270 [1890]
0.092 [2.4]	14	225 [1610]	265 [1830]
0.106 [2.8]	13	220 [1560]	260 [1780]
	12		
Type B, Coiled and Knotted			
0.062 [1.6]	16	235 [1550]	270 [1790]
0.072 [1.8]		230 [1530]	265 [1770]
0.080 [2.0]	15	225 [1500]	260 [1740]
0.092 [2.4]	14	215 [1460]	250 [1680]
0.106 [2.6]	13	205 [1420]	235 [1640]
0.120 [3.0]	12	195 [1380]	225 [1600]
0.135 [3.5]	11	190 [1350]	220 [1560]
0.148 [3.8]	10	185 [1300]	215 [1530]
0.162 [4.2]	9	180 [1300]	210 [1500]
	8		
Type C, Coiled and Knotted (Offset Type)			
0.072 [1.8]	15	215 [1450]	245 [1690]
0.080 [2.0]		210 [1430]	240 [1670]
0.092 [2.4]	14	200 [1390]	230 [1610]
0.106 [2.6]	13	195 [1360]	225 [1580]
	12		
Type D, Coiled and Hooked (Cross Helicals)			
0.048 [1.2]	18	215 [1490]	255 [1750]
0.054 [1.4]		210 [1440]	250 [1700]
0.062 [1.6]	17	210 [1410]	250 [1650]
	16		
Type E, Coiled and Hooked (Short Tension, Regular Tensile Strength)			
0.080 [2.0]	14	200 [1410]	240 [1650]
0.092 [2.4]		200 [1360]	240 [1580]
0.106 [2.6]	13	195 [1330]	235 [1550]
	12		
Type F, Coiled and Hooked (Short Tension, High Tensile Strength)			
0.080 [2.0]	14	225 [1550]	260 [1790]
0.092 [2.4]		220 [1520]	255 [1740]
0.106 [2.6]	13	215 [1490]	250 [1710]
	12		
Type G, Regular Lacing Wire			
0.041 [1.0]	19	235 [1640]	275 [1910]
0.048 [1.2]		230 [1600]	270 [1860]
0.054 [1.4]	18	225 [1560]	265 [1810]
0.062 [1.6]	17	225 [1520]	265 [1760]
	16		
Type H, Automatic Lacing Wire			

TABLE 1 Continued

Diameter, in. [mm]	Wire Gage	Tensile Strength, ksi [MPa]			
		min		max	
0.041 [1.0]	19	250 [1740]		290 [2020]	
0.048 [1.2]		245 [1700]		285 [1960]	
0.054 [1.4]	18	240 [1660]		280 [1910]	
0.062 [1.6]	17	235 [1620]		275 [1860]	
	16				
Type I, Zig-Zag Type Automobile Seat and Back Spring Units					
		Class I		Class II	
0.092 [2.4]	13	220 [1520]	250 [1720]	230 [1590]	260 [1800]
0.106 [2.6]	12	215 [1480]	245 [1690]	225 [1550]	255 [1760]
0.120 [3.0]	11	210 [1450]	240 [1660]	215 [1480]	245 [1690]
0.135 [3.5]	10	205 [1410]	235 [1620]	210 [1450]	240 [1660]
0.148 [3.8]	9	200 [1380]	230 [1590]	205 [1410]	235 [1620]
0.162 [4.2]	8	190 [1310]	220 [1520]	200 [1380]	230 [1590]
Type J, Square-Formed Type Automobile Seat and Back Spring Units					
		Class I		Class II	
0.092 [2.4]	13	215 [1480]	245 [1690]	225 [1550]	255 [1760]
0.106 [2.6]	12	210 [1450]	240 [1660]	220 [1520]	250 [1720]
0.120 [3.0]	11	205 [1410]	235 [1620]	215 [1480]	245 [1690]
0.135 [3.5]	10	200 [1380]	230 [1590]	210 [1450]	240 [1660]
0.148 [3.8]	9	190 [1310]	220 [1520]	200 [1380]	230 [1590]
0.162 [4.2]	8	180 [1240]	210 [1450]	190 [1310]	220 [1520]
Type K, Sinuous Type Furniture Spring Units					
0.092 [2.4]	13	235 [1660]		270 [1860]	
0.106 [2.6]	12	235 [1620]		265 [1830]	
0.120 [3.0]	11	230 [1590]		260 [1800]	
0.135 [3.5]	10	225 [1550]		255 [1760]	
0.148 [3.8]	9	220 [1520]		250 [1720]	
0.162 [4.2]	8	215 [1480]		245 [1690]	
0.177 [4.5]	7	210 [1450]		240 [1660]	
0.192 [5.0]	6	207 [1430]		237 [1630]	

^A Tensile strength values for diameters not shown in this table shall conform to that shown for the next larger diameter (for example, for diameter 0.128 in. [3.25 mm] the value shall be the same as for 0.135 in. [3.42 mm]).

TABLE 2 Permissible Variations in Wire Diameter

NOTE 1—For purposes of determining conformance with this specification, all specified limits are absolute as defined in Practice E29.

Diameter, in. [mm]	Variations, plus and minus, in. [mm]	Permissible Out-of-Round, in. [mm]
Sizes finer than 0.076 [2.0]	0.001 [0.02]	0.001 [0.02]
Sizes 0.076 [2.0] to 0.162 [4.2], incl	0.002 [0.05]	0.002 [0.05]
Sizes 0.092 [2.2] to 0.192 [5.2]	0.002 [0.05]	0.002 [0.05]

above. The analysis shall be made from a test sample preferably taken during the pouring of the heat (cast). The chemical composition thus determined shall be reported to the purchaser or his representative upon request.

6. Mechanical Properties

6.1 Tension Test:

6.1.1 *Requirements*—The material as represented by tension test specimens shall conform to the requirements prescribed in Table 1 for the various sizes and specified types.

6.1.2 *Number of Tests*—One test specimen shall be taken for each ten coils, or fraction thereof, in a lot. Each heat in a given lot shall be tested.

6.1.3 *Location of Tests*—Test specimens shall be taken from either end of the coil.

