



Designation: ~~A227/A227M – 06 (Reapproved 2011)~~ A227/A227M – 06 (Reapproved 2017)

Standard Specification for Steel Wire, Cold-Drawn for Mechanical Springs¹

This standard is issued under the fixed designation A227/A227M; 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^{*}Scope

1.1 This specification covers two classes of round cold-drawn steel spring wire having properties and quality for the manufacture of mechanical springs that are not subject to high stress or requiring high fatigue properties and wire forms.

1.2 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.

2. Referenced Documents

2.1 ASTM Standards:²

[A370 Test Methods and Definitions for Mechanical Testing of Steel Products](#)

[A510/A510M Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy 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](#)

[A941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys](#)

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

2.2 American National Standard:

[B 32.4M Preferred Metric Sizes for Round, Square, Rectangle, and Hexagon Metal Products](#)³

2.3 Federal Standard:

[Fed. Std. No. 123 Marking for Shipment \(Civil Agencies\)](#)⁴

2.4 AIAG Standard:

[AIAG B-5 02.00 Primary Metals Identification Tag Application Standard](#)⁵

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 For definition of terms used in this specification, refer to Terminology [A941](#).

4. Ordering Information

4.1 It shall be the responsibility of the purchaser to specify all requirements that are necessary for material under this specification. Such requirement may include, but are not limited to, the following:

4.1.1 Quantity (mass),

4.1.2 Name of material (cold-drawn steel mechanical spring wire) and class ([Table 1](#) or [Table 2](#)),

4.1.3 Wire diameter ([Table 1](#) or [Table 2](#)),

4.1.4 Packaging ([Section 15](#)),

4.1.5 Cast or heat analysis report, if requested ([Section 6](#)),

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.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

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

⁵ Available from Automotive Industry Action Group (AIAG), 26200 Lahser Rd., Suite 200, Southfield, MI 48034.

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

TABLE 1 Tensile Requirements, SI Units^A

Diameter, ^B mm	Class I		Class II	
	Tensile Strength, MPa		Tensile Strength MPa	
	min	max	min	max
0.50	1960	2240	2240	2520
0.55	1940	2220	2220	2500
0.60	1920	2200	2200	2480
0.65	1900	2180	2180	2460
0.70	1870	2140	2140	2410
0.80	1830	2100	2100	2370
0.90	1800	2070	2070	2340
1.00	1770	2040	2040	2310
1.10	1740	2000	2000	2260
1.20	1720	1980	1980	2240
1.40	1670	1930	1930	2180
1.60	1640	1880	1880	2120
1.80	1600	1840	1840	2080
2.00	1580	1810	1810	2040
2.20	1550	1780	1780	2010
2.50	1510	1730	1730	1960
2.80	1480	1700	1700	1920
3.00	1460	1680	1680	1900
3.50	1420	1630	1630	1840
4.00	1380	1590	1590	1800
4.50	1350	1550	1550	1750
5.00	1320	1510	1510	1700
5.50	1300	1490	1490	1670
6.00	1280	1470	1470	1650
6.50	1250	1440	1440	1630
7.00	1220	1410	1410	1600
7.50	1200	1390	1390	1580
8.00	1190	1370	1370	1550
9.00	1160	1340	...	...
10.00	1130	1310	...	...
11.00	1110	1280	...	...
12.00	1090	1260	...	...
14.00	1050	1210	...	...
16.00	1010	1170	...	...

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

^B Preferred sizes. For a complete list, refer to ANSI B32.4M, Preferred Metric Sizes for Round, Square, Rectangle, and Hexagon Metal Products.

[ASTM A227/A227M-06\(2017\)](https://standards.iteh.ai/catalog/standards/sist/08fcfa6-790a-4b42-98f8-564f869c612e/astm-a227-a227m-062017)

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4.1.6 Certification or test report, or both, if specified (Section 14), and

4.1.7 ASTM designation and date of issue.

NOTE 1—A typical ordering description is as follows: 15 000 kg Cold-Drawn Mechanical Spring Wire, Class I, Size 5.00 mm in 700-kg coils to ASTM A227M dated _____, or for non-SI units, 30 000 lb Cold-Drawn Mechanical Spring Wire, Class I, Size 0.207 in. diameter in 500-lb coils to ASTM A227 dated _____.

5. Manufacture

5.1 The steel may be made by any commercially accepted steel-making process. The steel may be either ingot cast or strand cast.

5.2 The finished wire shall be free of detrimental pipe and undue segregation.

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

6. Chemical Composition

6.1 The steel shall conform to the requirements for chemical composition prescribed in Table 3.

6.2 *Cast or Heat Analysis*—Each cast or heat of steel shall be analyzed by the manufacturer to determine the percentage of elements prescribed in Table 3. This analysis shall be made from a test specimen preferably taken during the pouring of the cast or heat. When requested, this shall be reported to the purchaser and shall conform to the requirements of Table 3.

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 3 of Specification A510/A510M.

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