



Designation: A679/A679M – 17

Standard Specification for Steel Wire, High Tensile Strength, Cold Drawn¹

This standard is issued under the fixed designation A679/A679M; 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 round, uncoated, high tensile strength, cold drawn steel spring wire, having properties and quality suitable for the manufacture of mechanical springs and wire forms subject to high static stresses or infrequent dynamic load, or both.

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 are not 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.

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

- [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](#)

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.

[Determine Conformance with Specifications](#)

2.2 *ANSI Standard:*³

[B32.100 Preferred Metric Sizes for Round, Square, Rectangle, and Hexagon Metal Products](#)

2.3 *Federal Standard:*⁴

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

3. Terminology

3.1 *Definitions*—For definitions 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 requirements may include, but are not limited to, the following:

4.1.1 Quantity (mass),

4.1.2 Name of material (steel wire, high tensile strength, cold drawn),

4.1.3 Dimensions ([Table 1](#) and [Section 9](#)),

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

4.1.5 ASTM designation and year of issue.

4.2 The purchaser shall have the option to specify additional requirements, including but not limited to:

4.2.1 Requirements for certifications, heat analysis or test reports (see [Sections 6.2](#) and [14](#)),

4.2.2 Special packing, marking, and loading requirements (see [Section 15](#)), and

4.2.3 Other special requirements, if any.

4.2.4 For wire diameters over 5.00 mm [0.207 in.] or smaller than 0.50 mm [0.020 in.], mechanical properties and permissible variations in wire diameter shall be negotiated between purchaser and supplier and shall be included on the order information.

NOTE 1—A typical ordering description is as follows: 20 Mg high tensile strength, cold drawn steel mechanical spring wire, 5.00-mm diameter, 500-kg coils to ASTM A679/A679M dated _____, or for inch-pound units, 40 000-lb high tensile strength, cold drawn steel mechanical spring wire, 0.192-in. diameter, in 1000-lb coils to ASTM

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, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.

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

TABLE 1 Tensile Requirements

Diameter, mm ^{A,B}	SI Units		Inch-Pound Units		
	Tensile Strength, MPa		Diameter, in. ^A	Tensile Strength, ksi	
	min	max		min	max
0.50	2400	2650	0.020	350	387
0.55	2380	2620	0.023	343	380
0.60	2350	2600	0.026	337	373
0.65	2320	2580	0.029	331	366
0.70	2300	2550	0.032	327	361
0.80	2250	2500	0.035	322	356
0.90	2200	2450	0.041	314	347
1.00	2150	2400	0.048	306	339
1.10	2120	2380	0.054	300	331
1.20	2100	2350	0.062	293	324
1.40	2050	2300	0.072	287	317
1.60	2000	2250	0.080	282	312
1.80	1980	2220	0.092	275	304
2.00	1950	2200	0.106	268	296
2.20	1900	2150	0.120	263	290
2.50	1850	2100	0.135	258	285
2.80	1820	2050	0.148	253	279
3.00	1800	2000	0.162	249	275
3.50	1750	1950	0.177	245	270
4.00	1700	1900	0.192	241	267
4.50	1680	1880	0.207	238	264
5.00	1650	1850			

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

^B Preferred sizes. For a complete list, refer to ANSI B32.100.

A679/A679M dated ____ .

5. Materials and Manufacture

5.1 The steel may be made by any commercially accepted steel-making process. The rod to be used in the manufacture of wire furnished to this specification shall be in accordance with Specification **A510/A510M**.

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

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

5.4 The wire finish shall be suitable for forming or coiling. It is not intended that this material be furnished with a metallic coating.

6. Chemical Composition

6.1 The steel shall conform to the requirements for chemical composition prescribed in **Table 2**.

6.2 *Heat Analysis*—Each heat of steel shall be analyzed by the manufacturer to determine the percentage of elements prescribed in **Table 2**. This analysis shall be made from a test specimen preferably taken during the pouring of the heat.

TABLE 2 Chemical Requirements

Element	Composition, %
Carbon	0.65–1.00 ^A
Manganese	0.20–1.30 ^B
Phosphorus, max	0.040
Sulfur, max	0.050
Silicon	0.15–0.35

^A Carbon in any one lot shall not vary more than 0.13 %.

^B Manganese in any one lot shall not vary more than 0.30 %.

When requested, in the purchase order, the heat analysis shall be reported to the purchaser.

6.3 *Product Analysis*—An analysis may be made by the purchaser from finished wire representing each heat of steel. The chemical composition thus determined, as to elements required or restricted, shall conform to the product analysis requirements specified in **Table 7** of Specification **A510/A510M**.

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

7. Mechanical Properties

7.1 Tension Test:

7.1.1 *Requirements*—The material as represented by tension test specimens shall conform to the requirements prescribed in **Table 1**.

7.1.2 *Number of Tests*—One test specimen shall be taken for each 10 coils or fraction thereof, in a lot. Each heat in a given lot shall be tested.

7.1.3 *Test Method*—The tension test shall be made in accordance with Test Methods and Definitions **A370**.

7.1.4 *Location of Test*—It shall be permissible to take specimens from either end of the coil.

7.2 Wrap Test:

7.2.1 *Requirements*—The material as represented by the wrap test specimens shall conform to the requirements specified in **Table 3**.

7.2.2 *Number of Tests*—One test specimen shall be taken for each 10 coils, or fraction thereof, in a lot. Each heat in a given lot shall be tested.

7.2.3 *Location of Test*—It shall be permissible to take test specimens from either end of the coil.

7.2.4 *Test Method*—The wrap test shall be made in accordance with Test Methods and Definitions **A370**.

8. Metallurgical Requirements

8.1 *Microstructure*—The wire shall be cold drawn with a fine pearlite structure.

8.2 *Surface Conditions*—The wire surface shall not exhibit imperfections that exceed 3.5 % of the wire diameter or 0.25 mm (0.010 in.) in depth, whichever is smaller.

TABLE 3 Wrap Test Requirements^A

SI Units	
Diameter, mm	Mandrel Size
0.50 to 4.00, incl	2x
Over 4.00 to 5.00, incl	4x
Inch-Pound Units	
Diameter, in.	Mandrel Size
0.020 to 0.162, incl	2x
Over 0.162 to 0.207, incl	4x

^A The symbol "X" represents the diameter of the wire tested.