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# Standard Specification for Steel Wire, Carbon and Alloy Specialty Spring Quality[1]

This standard is issued under the fixed designation A1000/A1000M; 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 ~~a quality~~four different grades of round and shaped plain carbon and alloy steel spring wire, uniform in quality and temper, intended for the manufacture of mechanical springs that can withstand moderate fatigue stresses over some relatively low number of cycles. The quality level is between the commercial quality grades of wire such as Specifications A401/A401M, A231/A231M, and A229/A229M and the valve spring quality grades such Specifications as A230/A230M, A232/A232M~~,~~, and A877/A877M~~and A878/A878M~~. It is similar to the grade TD (referenced in EN 10270-2) intended for medium fatigue levels, such as required for clutch springs. This wire shall be either in the annealed and cold-drawn or ~~oil-tempered~~ quenched and tempered condition as specified by purchaser.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. ~~Within the text, the inch-pound units are shown in parentheses.~~ The values stated in each system ~~are~~may not be exact equivalents; therefore, each system ~~must~~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]

A229/A229M Specification for Steel Wire, Oil-Tempered for Mechanical Springs
A230/A230M Specification for Steel Wire, Oil-Tempered Carbon Valve Spring Quality
A231/A231M Specification for Chromium-Vanadium Alloy Steel Spring Wire
A232/A232M Specification for Chromium-Vanadium Alloy Steel Valve Spring Quality Wire
A370 Test Methods and Definitions for Mechanical Testing of Steel Products
A401/A401M Specification for Steel Wire, Chromium-Silicon Alloy
A700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Shipment
A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products
A877/A877M Specification for Steel Wire, Chromium-Silicon Alloy, Chrome-Silicon-Vanadium Alloy Valve Spring Quality
~~A878/A878MSpecification for Steel Wire, Modified Chromium Vanadium Valve Spring Quality~~
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
E45 Test Methods for Determining the Inclusion Content of Steel

2.2 ~~*Federal Standard:*~~
~~Fed. Std. No. 123Marking for Shipment (Civil Agencies)~~
~~2.3 *Military Standard:*~~
~~MIL-STD-163Steel Mill Products, Preparation for Shipment and Storage[3]~~
~~2.4 *AIAG Standard:*~~
~~AIAG B-502.00Primary Metals Identification Tag Application Standard~~
~~2.5~~ *European Standard:*
EN 10270-2 Steel Wire for Mechanical Springs Part 2: Oil-Hardened and Tempered Springsteel Wire of Unalloyed and Alloyed Steels[3]

[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 Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098~~

[3] Available from European Committee for Standardization, rue de Stassart 36,B-1050 Brussels

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

## 3. Terminology

3.1 *Definitions:*

3.1.1 For definition of terms used in this specification, see Terminology A941.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *commercial quality wire*—a grade of wire that is fairly common quality and intended for applications that are primarily static in nature, not involving significant fatigue loading.

## 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~~are permitted to include, but are not limited to the following,

4.1.1 Quantity (mass),

4.1.2 Name of material (chromium-silicon alloy steel specialty spring quality wire),

4.1.3 Dimensions (Table 1 and Section 9~~)~~),

4.1.4 Condition (Section 7),

4.1.5 Packaging (Section 15),

4.1.6 Heat analysis report, if requested (6.2),

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

4.1.8 ASTM designation and year of issue.

NOTE~~1—A typical ordering description is as follows: 20000-kg oil-tempered chromium-silicon alloy steel specialty spring quality wire, size 6.00 mm in 1500-kg coils to ASTM ___ dated ___, or for inch-pound units, 40000-lb. oil-tempered chromium-silicon alloy steel specialty spring quality wire, size 0.250 in. in 3000-lb coils to ASTM___dated ___.~~ 1—A typical ordering description is as follows: 40 000-lb. quenched and tempered chromium-silicon alloy steel specialty spring quality wire, size 0.250 in. in 3000-lb coils to Specification A1000/A1000M dated _____, or for SI units, 20 000-kg quenched and tempered chromium-silicon alloy steel specialty spring quality wire, size 6.00 mm in 1500-kg coils to Specification A1000/A1000M dated _____.

## 5. Materials and 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 from detrimental pipe and undue segregation.

## 6. Chemical Composition

6.1 The steel shall conform to the requirements for chemical composition specified 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. When requested, this shall be reported to the purchaser and shall conform to the requirements of Table 2.

**TABLE 1 Permissible Variations in Wire Dimensions (Round and Shapes)[A]**

| SI Units | | |
|---|---|---|
| Dimension, mm | Permissible Variations, ± mm | Permissible Out-Of-Round, mm |
| 0.5 to 2.0, incl | 0.02 | 0.02 |
| Over 2.0 to 4.0, incl | 0.03 | 0.03 |
| Over 4.0 to 9.5, incl | 0.04 | 0.04 |
| Over 9.5 | 0.05 | 0.05 |
| **Inch-Pound Units** | | |
| Dimension, in. | Permissible Variations, ± in. | Permissible Out-Of-Round, in. |
| 0.020 to 0.075, incl | 0.0008 | 0.0008 |
| Over 0.075 to 0.148, incl | 0.001 | 0.001 |
| Over 0.148 to 0.375, incl | 0.0015 | 0.0015 |
| Over 0.375 | 0.002 | 0.002 |
| **Permissible Variations in Wire Dimensions (Flat Rolled)[A]** | | |
| **SI Units** | | |
| Dimension, mm | Thickness Permissible Variations, ± mm | Width Permissible Variations, mm |
| All | 0.05 | 0.120 |
| **Inch-Pound Units** | | |
| Dimension, in. | Thickness Permissible Variations, ± in. | Width Permissible Variations, in. |
| All | 0.002 | 0.005 |

[A] For purposes of determining conformance with this specification, all specified limits are absolute as defined in Practice E29.