



Standard Specification for Steel Springs, Helical, Heat-Treated¹

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This standard has been approved for use by agencies of the Department of Defense.

^{ε1} NOTE—Table references were editorially corrected in November 2013.

1. Scope

1.1 This specification covers hot-coiled, heat-treated helical compression springs with tapered, closed, squared and ground ends made of hot-wrought round steel bars $\frac{3}{8}$ in. (9.5 mm) and larger in diameter.

1.2 This specification also serves to inform the user of practical manufacturing limits, mechanical tests, and inspection requirements applicable to the type of spring described in 1.1.

1.3 Supplementary Requirements S1 to S8 inclusive of an optional nature are provided. They shall apply only when specified by the purchaser. Details of these supplementary requirements shall be agreed upon by the manufacturer and purchaser.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

2. Referenced Documents

2.1 ASTM Standards:²

A29/A29M Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for

A689 Specification for Carbon and Alloy Steel Bars for Springs

E10 Test Method for Brinell Hardness of Metallic Materials

E112 Test Methods for Determining Average Grain Size

E709 Guide for Magnetic Particle Testing

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 A01.15 on Bars.

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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. Ordering Information

3.1 Orders for springs under this specification shall include the following information:

3.1.1 Quantity,

3.1.2 Name of material,

3.1.3 A drawing or list showing required dimensions and loads, and part number,

3.1.4 Packaging, marking and loading, and

3.1.5 End use.

NOTE 1—A typical ordering description is: 500 springs Drawing 3303 Rev. A. to ASTM A125, 1095 steel, for cyclical machine operation. Palletize, maximum weight 4000 lb.

4. Materials and Manufacture

4.1 Material:

4.1.1 Unless otherwise specified, the springs shall be made of carbon steel bars conforming to the requirements of Specification A689. Due to hardenability limitations of carbon steel, it is suggested that the bar diameter be limited to $1\frac{5}{8}$ in. (41.8 mm) max in order to withstand the maximum test stress requirements of this specification.

4.1.2 If alloy steel is specified, the springs shall be made from alloy steel bars conforming to Specification A689. Any of the alloy steel grades referred to may be used at the option of the spring manufacturer, providing that a minimum as-quenched hardness of Rockwell HRC-50 will be achieved at the center of the bar section representing the spring when quenched in the same media and manner as the spring.

4.1.3 *Springs Made from Bars Over 2 in. (50.8 mm)*—Note that the bias tolerance (reference Specification A29/A29M, Table A1.1 on Permissible Variations in Cross Section for Hot-Wrought Round, Square, and Round-Cornered Square Bars of Steel) of the bar diameter shall be taken into consideration when designing and calculating the solid height, spring rate, solid stress, and solid capacity.

4.2 Hardness:

4.2.1 The springs must be quenched and tempered to a sufficiently high hardness (strength) to withstand the stresses