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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 6451

Issued 4-1-82
Revised

UNS G92540

STEEL WIRE, SPRING
1.4Si - 0.65Cr (0.51 - 0.59C) (SAE 9254)

1. SCOPE:

1.1 Form: This specification covers a low-alloy steel in the form of wire.

1.2 Application: Primarily for the fabrication of mechanical springs for use up to 450°F (230°C).

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2259 - Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS 2301 - Aircraft Quality Steel Cleanliness, Magnetic Particle Inspection Procedure
AMS 2350 - Standards and Test Methods
AMS 2370 - Quality Assurance Sampling of Carbon and Low-Alloy Steels, Wrought Products Except Forgings and Forging Stock

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM A370 - Mechanical Testing of Steel Products
ASTM E350 - Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 Military Standards:

MIL-STD-163 - Steel Mill Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E350, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser:

	min	max
Carbon	0.51	0.59
Manganese	0.60	0.80
Silicon	1.20	1.60
Phosphorus	--	0.035
Sulfur	--	0.040
Chromium	0.60	0.80

3.1.1 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2259.

3.2 Condition: Oil tempered to meet the requirements of Table I.

3.3 Properties: Wire shall conform to the following requirements:

3.3.1 Tensile Properties: Shall be as specified in Table I, determined in accordance with ASTM A370:

TABLE I

Nominal Diameter Inch	Tensile Strength psi	
	min	max
0.035	300,000	325,000
0.048	295,000	320,000
0.062	290,000	315,000
0.072	288,000	313,000
0.080	285,000	310,000
0.093	280,000	305,000
0.105	275,000	300,000
0.135	270,000	295,000
0.162	265,000	290,000
0.192	260,000	285,000
0.250	250,000	275,000
0.283	248,000	273,000
0.312	245,000	270,000
0.375	240,000	265,000
0.437	235,000	260,000

TABLE I (SI)

Nominal Diameter Millimetres	Tensile Strength MPa	
	min	max
0.88	2070	2240
1.20	2035	2205
1.55	2000	2170
1.80	1985	2160
2.00	1965	2135
2.32	1930	2105
2.62	1895	2070
3.38	1860	2035
4.05	1825	2000
4.80	1795	1965
6.32	1725	1895
7.08	1710	1880
7.80	1690	1860
9.37	1655	1825
10.92	1620	1795

3.3.1.1 For diameters intermediate to those shown in Table I, tensile strength requirements shall be determined by interpolation.

3.3.1.2 Tensile property requirements for wire under 0.035 in. (0.88 mm) or over 0.437 in. (10.92 mm) in nominal diameter shall be as agreed upon by purchaser and vendor.

3.3.2 Wrapping: Wire, bent to form a loop with ends of the specimen crossed at approximately 90 deg, shall not crack when one end of the specimen is wrapped five full closely-spaced turns around the other end. Any cracks are unacceptable but if a crack occurs in the first turn, the test shall be repeated.

3.4 Quality:

3.4.1 Steel shall be aircraft quality, conforming to AMS 2301.

3.4.2 Wire, as received by purchaser, shall be uniform in quality and condition, cylindrical, and free from kinks, twists, rust, excessive decarburization, pits, scale, splits, cold shuts, seams, and other imperfections detrimental to usage of the wire.

3.5 Tolerances: Unless otherwise specified, tolerances shall conform to the following.

3.5.1 Diameter or Thickness: Shall be as specified in Table II.

TABLE II

Nominal Diameter or Thickness Inch	Tolerance, Inch Plus and Minus
Up to 0.075, incl	0.00075
Over 0.075 to 0.148, incl	0.001
Over 0.148 to 0.375, incl	0.0015
Over 0.375 to 0.500, incl	0.002

TABLE II (SI)

Nominal Diameter or Thickness Millimetres	Tolerance, Millimetre Plus and Minus
Up to 1.88, incl	0.0188
Over 1.88 to 3.70, incl	0.02
Over 3.70 to 9.38, incl	0.038
Over 9.38 to 12.50, incl	0.05