Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 5678

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Revised

UNS S17700

STEEL WIRE, CORROSION RESISTANT
17Cr - 7.1Ni - 1.1Al
Precipitation-Hardenable, Cold-Drawn, Spring Temper

1. SCOPE:

1.1 Form: This specification covers a corrosion-resistant steel in the form of spring-temper wire.

1.2 Application: Primarily for springs requiring corrosion resistance and resistance to permanent set at temperatures up to 600°F (316°C). Where parts require welding during fabrication, strength of this wire will be impaired.

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 Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, Pennsylvania 15096.

2.1.1 Aerospace Material Specifications:

AMS 2248 - Chemical Check Analysis Limits, Wrought Heat and Corrosion Resistant Steels and Alloys
AMS 2350 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Alloys, Wrought Products Except Forgings

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

ASTM A370 - Mechanical Testing of Steel Products
ASTM E353 - Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

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

2.3.1 Federal Standards:

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

3.1 (Continued)

	min	max
Carbon	--	0.09
Manganese	--	1.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	16.00	18.00
Nickel	6.50	7.75
Aluminum	0.75	1.50
Molybdenum	--	0.75
Copper	--	0.50

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2248.

3.2 Condition: Spring temper, cold drawn to required size.

3.2.1 Wire ordered for coiling on automatic spring-winding machines shall be coated with a suitable lubricant.

3.3 Properties: Wire shall conform to the following requirements; tensile and wrapping testing shall be performed in accordance with ASTM A370:

3.3.1 Tensile Properties: Wire, as cold-drawn, shall have the tensile properties specified in Table I, Column A. Wire shall have the tensile properties specified in Table I, Column B after being precipitation heat treated by heating to 900° F ± 10 (482.2°C ± 5.6), holding at heat for 60 min. ± 5, and cooling in air.

TABLE I

Nominal Diameter Inch	Column A As Cold-Drawn Tensile Strength, psi min	Column A As Cold-Drawn Tensile Strength, psi max	Column B Precipitation-Hardened Tensile Strength, psi min	Column B Precipitation-Hardened Tensile Strength, psi max
0.016 to 0.020, incl	248,000	305,000	335,000	365,000
Over 0.020 to 0.025, incl	243,000	300,000	330,000	360,000
Over 0.025 to 0.029, incl	239,000	295,000	325,000	355,000
Over 0.029 to 0.041, incl	234,000	290,000	320,000	350,000
Over 0.041 to 0.051, incl	230,000	285,000	310,000	340,000
Over 0.051 to 0.061, incl	225,000	280,000	305,000	335,000
Over 0.061 to 0.071, incl	218,000	272,000	297,000	327,000
Over 0.071 to 0.086, incl	216,000	270,000	292,000	322,000
Over 0.086 to 0.090, incl	207,000	260,000	282,000	312,000
Over 0.090 to 0.100, incl	204,000	257,000	279,000	309,000
Over 0.100 to 0.106, incl	201,000	253,000	274,000	304,000
Over 0.106 to 0.130, incl	199,000	251,000	272,000	302,000
Over 0.130 to 0.138, incl	194,000	245,000	260,000	290,000
Over 0.138 to 0.146, incl	192,000	243,000	258,000	288,000
Over 0.146 to 0.162, incl	190,000	241,000	256,000	286,000
Over 0.162 to 0.180, incl	188,000	239,000	254,000	284,000
Over 0.180 to 0.207, incl	186,000	237,000	252,000	282,000
Over 0.207 to 0.225, incl	183,000	233,000	248,000	278,000
Over 0.225 to 0.306, incl	178,000	228,000	242,000	272,000
Over 0.306 to 0.440, incl	173,000	222,000	235,000	265,000

3.3.1 (Continued)

TABLE I (SI)

Nominal Diameter Millimetres	Column A As Cold-Drawn Tensile Strength, MPa min	Column A As Cold-Drawn Tensile Strength, MPa max	Column B Precipitation-Hardened Tensile Strength, MPa min	Column B Precipitation-Hardened Tensile Strength, MPa max
0.41 to 0.51, incl	1710	2103	2310	2517
Over 0.51 to 0.64, incl	1675	2068	2275	2482
Over 0.64 to 0.74, incl	1648	2034	2241	2448
Over 0.74 to 1.04, incl	1613	2000	2206	2413
Over 1.04 to 1.30, incl	1586	1965	2137	2344
Over 1.30 to 1.55, incl	1551	1931	2103	2310
Over 1.55 to 1.80, incl	1503	1875	2048	2255
Over 1.80 to 2.18, incl	1489	1862	2013	2220
Over 2.18 to 2.29, incl	1427	1793	1944	2151
Over 2.29 to 2.54, incl	1407	1772	1924	2131
Over 2.54 to 2.69, incl	1386	1744	1889	2096
Over 2.69 to 3.30, incl	1372	1731	1875	2082
Over 3.30 to 3.51, incl	1338	1689	1793	2000
Over 3.51 to 3.71, incl	1324	1675	1779	1986
Over 3.71 to 4.11, incl	1310	1662	1765	1972
Over 4.11 to 4.57, incl	1296	1648	1751	1958
Over 4.57 to 5.26, incl	1282	1634	1738	1944
Over 5.26 to 5.72, incl	1262	1607	1710	1917
Over 5.72 to 7.77, incl	1227	1572	1669	1875
Over 7.77 to 11.18, incl	1193	1531	1620	1827

3.3.2 Wrapping: As-cold-drawn wire shall withstand, without cracking, wrapping at room temperature one full turn around a diameter equal to the nominal diameter of the wire.

3.3.3 Coiling: The as-cold-drawn wire shall show a uniform pitch with no splits or fractures when wound in a tightly closed coil on an arbor of size shown in Table II and the resultant coil stretched to a permanent set of 4 times its as-wound length. This requirement shall apply only to wire having a diameter of 0.125 in. (3.18 mm) and under.

TABLE II

Nominal Diameter Inch	Arbor Diameter Inch
0.016 to 0.024, incl	0.067
Over 0.024 to 0.034, incl	0.102
Over 0.034 to 0.045, incl	0.145
Over 0.045 to 0.055, incl	0.212
Over 0.055 to 0.078, incl	0.250
Over 0.078 to 0.125, incl	0.328

3.3.3 (Continued)

TABLE II (SI)

Nominal Diameter Millimetres	Arbor Diameter Millimetres
0.41 to 0.61, incl	1.70
Over 0.61 to 0.86, incl	2.59
Over 0.86 to 1.14, incl	3.68
Over 1.14 to 1.40, incl	5.38
Over 1.40 to 1.98, incl	6.35
Over 1.98 to 3.18, incl	8.33

3.4 Quality:

3.4.1 Wire shall be uniform in quality and condition, cylindrical, clean, and free from kinks, twists, scrapes, splits, and other imperfections.

3.4.2 The surface of the wire shall have a smooth, cold-drawn finish free from pits, abrasions, and other surface imperfections.

3.5 Tolerances: Unless otherwise specified, tolerances shall be in accordance with Table III.

TABLE III

Nominal Diameter Inch	Tolerance, Inch Minus Only
0.016 to 0.024, incl	0.0008
Over 0.024 to 0.032, incl	0.0010
Over 0.032 to 0.042, incl	0.0015
Over 0.042 to 0.312, incl	0.0020
Over 0.312 to 0.440, incl	0.0030

TABLE III (SI)

Nominal Diameter Millimetres	Tolerance, Millimetre Minus Only
0.41 to 0.61, incl	0.020
Over 0.61 to 0.81, incl	0.025
Over 0.81 to 1.07, incl	0.038
Over 1.07 to 7.92, incl	0.051
Over 7.92 to 11.18, incl	0.076

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of wire shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to assure that the wire conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance or routine control tests.

4.3 Sampling: Shall be in accordance with AMS 2371.