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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 6451B

Issued APR 1982
Revised SEP 2000

Superseding AMS 6451A

Steel, Spring Wire
1.4Si - 0.65Cr (0.51 - 0.59C) (SAE 9254)
Oil Tempered

UNS G92540

1. SCOPE:

1.1 Form:

This specification covers a low-alloy steel in the form of wire supplied as coils or straight lengths.

1.2 Application:

This wire has been used typically for the fabrication of mechanical springs for use up to 450 °F (230 °C), but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS:

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been canceled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2259	Chemical Check Analysis Limits, Wrought Low-Alloy and Carbon Steels
AMS 2301	Cleanliness, Aircraft Quality Steel Magnetic Particle Inspection Procedure
MAM 2301	Cleanliness, Aircraft Quality Steel Magnetic Particle Inspection Procedure, Metric (SI) Measurement
AMS 2370	Quality Assurance Sampling and Testing, Carbon and Low-Alloy Steel Wrought Products and Forging Stock

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7161 FAX: (724) 776-0243
TO PLACE A DOCUMENT ORDER: (724) 776-4970 FAX: (724) 776-0790

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM A 370 Mechanical Testing of Steel Products
ASTM E 290 Semi-Guided Bend Test for Ductility of Metallic Metals
ASTM E 350 Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 350, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - Composition

Element	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 2.

3.3 Properties:

Wire shall conform to the following requirements:

3.3.1 Tensile Properties: Shall conform to the requirements shown in Table 2, determined in accordance with ASTM A 370.

TABLE 2A - Tensile Properties, Inch/Pound Units

Nominal Diameter Inch	Tensile Strength ksi min	Tensile Strength ksi max
0.035	300.0	325.0
0.048	295.0	320.0
0.062	290.0	315.0
0.072	288.0	313.0
0.080	285.0	310.0
0.093	280.0	305.0
0.105	275.0	300.0
0.135	270.0	295.0
0.162	265.0	290.0
0.192	260.0	285.0
0.250	250.0	275.0
0.283	248.0	273.0
0.312	245.0	270.0
0.375	240.0	265.0
0.437	235.0	260.0

TABLE 2B - Tensile Properties, SI Units

Nominal Diameter Millimeters	Tensile Strength MPa min	Tensile Strength MPa max
0.89	2070	2240
1.22	2035	2205
1.57	2000	2170
1.83	1985	2160
2.03	1965	2135
2.36	1930	2100
2.67	1895	2070
3.43	1860	2035
4.11	1825	2000
4.88	1795	1965
6.35	1725	1895
7.19	1710	1880
7.92	1690	1860
9.53	1655	1825
11.10	1620	1795

3.3.1.1 For diameters intermediate to those shown in Table 2 tensile strength requirements shall be determined by interpolation.

3.3.2 Wrapping: Wire, bent to form a loop with ends of the specimen crossed at approximately 90 degrees, 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:

Wire, as received by purchaser, shall be uniform in condition, sound, and free from foreign materials and from imperfections detrimental to usage of the wire for springs.

3.4.1 Steel shall be aircraft quality conforming to AMS 2301 or MAM 2301.

3.5 Tolerances:

Wire shall conform to the following:

3.5.1 Diameter or Thickness: Shall be as specified in Table 3.

TABLE 3A - Diameter or Thickness Tolerances, Inch/Pound Units

Nominal Diameter or Thickness Inch	Tolerance Inch plus	Tolerance Inch minus
Up to 0.075, incl	0.00075	0.00075
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 to 0.500, incl	0.002	0.002

TABLE 3B - Diameter or Thickness Tolerances, SI Units

Nominal Diameter or Thickness Millimeters	Tolerance Millimeter plus	Tolerance Millimeter minus
Up to 1.91, incl	0.0191	0.0191
Over 1.91 to 3.76, incl	0.02	0.02
Over 3.76 to 9.53, incl	0.038	0.038
Over 9.53 to 12.70, incl	0.05	0.05