SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 5110F

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Superseding AMS 5110E

CARBON STEEL WIRE
0.75 - 0.88C (SAE 1080)
Spring Temper, Cold Drawn

UNS G10800

1. SCOPE:

1.1 Form: This specification covers a carbon steel in the form of wire supplied as coils of wire or as finished springs.

1.2 Application: Primarily for springs and other applications where spring temper is required.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications 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 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 ASTM, 1916 Race Street, Philadelphia, PA 19103.

ASTM A 370 - Mechanical Testing of Steel Products
ASTM E 350 - 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 Military Standards:

MIL-STD-163 - Steel Mill Products, Preparation for Shipment and Storage
MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, Ø determined by wet chemical methods in accordance with ASTM E 350, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

	min	max
Carbon	0.75	0.88
Manganese	0.60	0.90
Silicon	0.10	0.30
Phosphorus	--	0.040
Sulfur	--	0.050

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

3.2 Condition: The product shall be supplied in the following condition:

3.2.1 Wire: Cold drawn.

3.2.2 Finished Springs: Stress relieved.

3.3 Heat Treatment: Finished springs, after coiling, shall be stress relieved by heating in oil to 550°F ± 10 (288°C ± 6), holding at heat for not less than 1 hour, and cooling in air.

3.4 Properties: The product shall conform to the following requirements:

3.4.1 Tensile Properties at Room Temperature: Tensile properties of wire shall be as specified in Table I, determined in accordance with ASTM A 370.

TABLE I

Nominal Diameter Inch	Tensile Strength, psi min	Tensile Strength, psi max
Up to 0.062, incl	300,000	--
Over 0.062 to 0.091, incl	285,000	335,000
Over 0.091 to 0.124, incl	265,000	315,000
Over 0.124 to 0.149, incl	255,000	295,000
Over 0.149 to 0.174, incl	240,000	280,000
Over 0.174 to 0.191, incl	225,000	265,000
Over 0.191 to 0.250, incl	200,000	250,000

TABLE I (SI)

Nominal Diameter Millimetres	Tensile Strength, MPa min	max
Up to 1.57, incl	2068	--
Over 1.57 to 2.31, incl	1965	2310
Over 2.31 to 3.15, incl	1827	2172
Over 3.15 to 3.78, incl	1758	2034
Over 3.78 to 4.42, incl	1655	1931
Over 4.42 to 4.85, incl	1551	1827
Over 4.85 to 6.35, incl	1379	1724

3.5 Quality: Wire, before forming into springs, shall have a bright, smooth, cold-drawn finish and shall be free from imperfections such as seams, pits, nicks, scratches, and other imperfections detrimental to usage of the wire. A dull surface resulting from the use of a phosphate coating during drawing is acceptable.

3.6 Tolerances: Wire shall be supplied to the tolerances shown in Table II and 3.6.1.

TABLE II

Nominal Diameter Inch	Tolerance, Inch plus and minus
Up to 0.026, incl	0.0003
Over 0.026 to 0.063, incl	0.0005
Over 0.063 to 0.150, incl	0.0010
Over 0.150	0.0015

TABLE II (SI)

Nominal Diameter Millimetres	Tolerance, Millimetre plus and minus
Up to 0.66, incl	0.008
Over 0.66 to 1.60, incl	0.013
Over 1.60 to 3.81, incl	0.025
Over 3.81	0.038

3.6.1 Wire shall not be out-of-round by more than one-half the total permissible variation shown in Table II.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples for vendor's tests 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 sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests for all technical requirements are acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling and Testing: Shall be in accordance with AMS 2370; the number of specimens to be sampled shall be the minimum number of specimens tested.

4.4 Reports: The vendor of wire shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and for tensile properties of each lot. This report shall include the purchase order number, lot number, AMS 5110F, size, and quantity.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2370.

5. PREPARATION FOR DELIVERY:

5.1 Identification:

5.1.1 Wire: Coiled wire shall be securely bundled and identified by a durable tag marked with not less than the purchase order number, AMS 5110F, lot number, nominal size, and manufacturer's identification and attached to each coil or shall be boxed and the box marked with the same information.

5.1.2 Finished Springs: Springs of different part numbers shall be shipped in separate containers, each marked with the part number.

5.2 Protective Treatment: Finished springs shall be protected, during shipment and storage, by coating with a suitable corrosion-preventive compound which is readily removable by washing in hydrocarbon solvent.

5.3 Packaging:

5.3.1 Packaging shall be accomplished in such a manner as to ensure that the wire and finished springs, during shipment and storage, will be protected against mechanical injury and exposure to moisture.

5.3.2 Wire and containers of springs shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the wire and finished springs to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.3.3 For direct U.S. Military procurement, packaging of wire shall be in accordance with MIL-STD-163, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.3.1 and 5.3.2 will be acceptable if it meets the requirements of Level C.

5.3.4 For direct U.S. Military procurement, packaging of springs shall be in accordance with MIL-STD-794, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.3.1 and 5.3.2 will be acceptable if it meets the requirements of Level C.