SAE The Engineering Resource For Advancing Mobility
400 COMMONWEALTH DRIVE WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 5110E
Superseding AMS 5110D

Issued 12-4-39
Revised 7-1-83

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 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 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
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, 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	0.75 -	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 (290°C ± 5), holding at heat for not less than 1 hr, and cooling in air.

3.4 Properties:

3.4.1 Tensile Properties at Room Temperature: Tensile properties of wire shall Ø be as specified in Table I, determined in accordance with ASTM A370.

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	Tensile Strength, MPa max
Up to 1.55, incl	2070	--
Over 1.55 to 2.28, incl	1965	2310
Over 2.28 to 3.12, incl	1825	2170
Over 3.12 to 3.75, incl	1760	2035
Over 3.75 to 4.35, incl	1655	1930
Over 4.35 to 4.78, incl	1550	1825
Over 4.78 to 6.25, incl	1380	1725

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: Unless otherwise specified, 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 0.65, incl	0.008
Over 0.65 to 1.60, incl	0.012
Over 1.60 to 3.80, incl	0.025
Over 3.80	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 Ø 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 to determine conformance to all technical Ø requirements of this specification are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling: Shall be in accordance with AMS 2370.

4.4 Reports:

4.4.1 The vendor of wire shall furnish with each shipment three copies of 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, heat number, AMS 5110E, size, and quantity from each heat.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, AMS 5110E, contractor or other direct supplier of wire, part number, and quantity. When wire for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of wire to determine conformance to the requirements of this specification and shall include in the report either a statement that the wire conforms or copies of laboratory reports showing the results of tests to determine conformance.

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

5. PREPARATION FOR DELIVERY:

5.1 Identification: