



AEROSPACE MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 1000

AMS 5115C

Superseding AMS 5115B

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STEEL WIRE
0.60 - 0.75C
Valve Spring Quality

1. **ACKNOWLEDGMENT:** A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.
2. **FORM:** Cold-drawn, hardened and tempered wire supplied as coils of wire or as finished springs.
3. **COMPOSITION:**

	min	max
Carbon	0.60 - 0.75	
Manganese	0.50 - 0.90	
Silicon	0.12 - 0.30	
Phosphorus	--	0.025
Sulfur	--	0.030

- 3.1 **Check Analysis:** Composition variations shall meet the requirements of the latest issue of AMS 2259, paragraph titled, "Carbon Steels, Wire other than Flat".

4. **CONDITION:** Cold drawn, hardened, and tempered.

5. **TECHNICAL REQUIREMENTS:**

- 5.1 **Wire:**

- 5.1.1 **Tensile Properties:**

Nominal Diameter Inch	Tensile Strength, psi		Reduction of Area % min
	min	max	
0.093 to 0.120, incl	210,000	230,000	45
Over 0.120 to 0.148, incl	205,000	225,000	45
Over 0.148 to 0.192, incl	200,000	220,000	45
Over 0.192 to 0.250, incl	195,000	215,000	45

- 5.1.1.1 Square wire shall have a tensile strength within the limits specified above except reduction of area requirement does not apply.

- 5.1.1.2 Tensile properties of wire under 0.093 in. or over 0.250 in. in nominal diameter shall be as agreed upon by purchaser and vendor.

- 5.1.2 **Twist:** A 10-in. specimen twisted 7 turns forward and then reversed until failure shall show a square break normal to the axis of the wire without splits or cracks.

- 5.1.3 **Decarburization:** The surface of the wire shall exhibit no ferritic area when transverse sections of the wire are mounted, micro-etched, and examined at a magnification of 100X.

- 5.1.4 Etching: Specimens taken from each end of each coil shall be subjected to the following test. The samples shall be etched in hydrochloric acid solution (1 volume of HCl (sp gr 1.19) to 1 volume of water) at 165 - 175 F (73.9 - 79.4 C) for a sufficient length of time to remove approximately 1% of the diameter or thickness of the wire. The etched surfaces shall show no evidence of pits, cracks, laps, injurious die marks, torn surfaces, or any other imperfections which may be detrimental to springs. Coils from which defective samples are taken shall be subject to rejection; if 25% or more of the coils from a lot are rejected, the entire lot shall be rejected.

5.2 Finished Springs:

- 5.2.1 After coiling, unless otherwise specified, springs shall be stress relieved by heating to 725 - 750 F (385 - 398.9 C), holding at heat for 1 hr, and cooling in air.

- 5.2.2 Magnetic Particle Inspection: Each spring shall be subjected to magnetic particle inspection. The inspection procedure and standards for acceptance shall be as agreed upon by purchaser and vendor.

- 5.2.3 Shot Peening: When specified, springs shall be peened to obtain uniform coverage of the entire surface of each spring. Shot size and peening intensity shall be as agreed upon by purchaser and vendor.

- 5.2.4 Surface Condition: The surface of the finished springs shall be uniform and free from defects such as pits, nicks, scratches, and marks due to grinding, drawing, or coiling, and from imperfections detrimental to the action of the springs.

6. QUALITY: Wire shall be uniform in quality and condition, smooth, and free from defects such as seams, pits, nicks, scratches, marks due to grinding or drawing, and from imperfections detrimental to fabrication or performance of parts.

7. TOLERANCES: Unless otherwise specified, tolerances shall conform to the following:

7.1 Diameter:

Nominal Diameter Inch.	Tolerance, Inch plus and minus
0.093 to 0.148, incl	0.001
Over 0.148 to 0.177, incl	0.0015
Over 0.177 to 0.250, incl	0.002

- 7.2 Round wire shall not be out-of-round by more than one-half the total tolerance specified in 7.1.

8. REPORTS:

- 8.1 Unless otherwise specified, the vendor of wire shall furnish with each shipment three copies of a report of the results of tests for chemical composition of each heat in the shipment and for tensile properties of each size from each heat. This report shall include the purchase order number, heat number, material specification number and its revision letter, size, and quantity from each heat.

- 8.2 Unless otherwise specified, the vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.