AERONAUTICAL MATERIAL SPECIFICATION

Society of Automotive Engineers, Inc.
29 West 39th Street
New York City

AMS 5115A

Issued 3-1-42
Revised 10-1-43

CARBON STEEL SPRING WIRE

Valve Spring Quality

1. ACKNOWLEDGMENT: A vendor must 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:

		Individual Coil Check Analysis Over or Under
Carbon	0.65 - 0.75	0.01
Manganese	0.60 - 0.90	0.03
Phosphorus	0.035 max	0.005
Sulphur	0.035 max	0.005
Phosphorus + Sulphur	0.065 max	---

4. CONDITION: (a) Hardened and tempered without further cold finishing to produce the following physical properties on round wire:

Nominal Diameter, inch	Tensile Strength lb per sq in. min	Tensile Strength lb per sq in. max	Elongation, % in 10 in. min	Reduction of Area % min
0.093 to 0.128, incl.	210,000	230,000	4.5	45
0.129 to 0.162, incl.	205,000	225,000	4.5	45
0.163 to 0.192, incl.	200,000	220,000	4.5	45
0.193 to 0.250, incl.	195,000	215,000	4.5	45

(b) Square wire shall have a tensile strength within the limits specified above, but it may have an elongation of 50% of the minimum value given. The reduction of area requirement does not apply.

(c) Test specimens from round wire taken from any part of bundles of wire shall withstand twisting, without tension, over a 10-inch length, for diameters from 0.093 to 0.177 inch, inclusive, and over 15-inch length for larger diameters, in accordance with the following requirements:

For 10-inch Length Specimen

Diameter, inch	Turns Forward	Turns Reverse*
0.093	7	21
0.098	7	20
0.105	7	19
0.114	7	17
0.120	7	16
0.125	7	15
0.135	7	14
0.148	7	13
0.156	7	12
0.162	7	11
0.172	7	10
0.177	7	10

For 15-inch Length Specimen

Diameter, inch	Turns Forward	Turns Reverse*
0.187	7	16
0.192	7	15
0.207	7	14
0.218	7	13
0.225	7	12
0.244	7	11
0.250	7	11

*The reverse twists shall be continued until failure and must show a clean square break normal to the axis of the wire with no splits or cracks.

5. QUALITY: (a) The wire shall be uniform in quality and temper, cylindrical or square, clean, and free from kinks, twists, scrapes, splits, seams and other injurious defects.

(b) Etching.- A sample from each end of each coil of the wire shall be etched in a solution of equal parts of concentrated hydrochloric acid and water at a temperature of 160-175°F for a sufficient length of time to reveal maximum defects. The surface shall be examined at 10 diameters magnification and shall show no evidence of rust spots, pits, cracks, laps, injurious die marks, torn surface or any other defects which may be detrimental to springs.

(c) 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 100 diameters.

6. TOLERANCES: (a) The following variations in wire diameter are permissible; all dimensions are in inches:

Nominal Diameter	Tolerance, plus or minus
0.093 to 0.148, incl.	0.001
0.149 to 0.177, incl.	0.0015
0.178 to 0.250, incl.	0.002

(b) The wire shall not be out-of-round more than one-half the total permissible variations specified above.

(c) For square wire the tolerance may be 0.001 inch greater than that for round wire.

7. FINISHED SPRINGS: (a) It is the responsibility of the spring manufacturer to supply springs to the drawing, material specification and to the satisfaction of the purchaser.

(b) After coiling, the springs shall be stress relieved by heating to 725-750°F, holding at heat one hour and then allowing to cool in air. With permission of the purchaser this treatment may be changed.