SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS5866 | REV. D

Issued 1989-07
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Reaffirmed 2012-04

Superseding AMS5866C

Steel, Corrosion-Resistant, Flat Wire 18Cr - 9.0Ni (SAE 30302) Spring Temper

(Composition similar to UNS S30200)

RATIONALE

AMS5866D has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

1.1 Form

This specification covers a corrosion-resistant steel in the form of flat wire.

1.2 Application

This wire has been used typically for retaining rings requiring corrosion and heat-resistance up to 400 °F (204 °C) and which require moderate to severe forming and bending, 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 cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS 2248	Chemical Check Analysis Limits, Wrought Corrosion and Heat-Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys
AMS 2371	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock

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http://www.sae.org/technical/standards/AMS5866D

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM A 370	Mechanical Testing of Steel Products
ASTM E 353	Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys

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 353, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - COMPOSITION

Element	min	max
Carbon	--	0.15
Manganese	--	2.00
Silicon	--	1.00
Phosphorus	--	0.040
Sulfur	--	0.030
Chromium	17.00	19.00
Nickel	8.00	10.00
Molybdenum	--	0.75
Copper	--	0.75

3.1.1 Check Analysis

Composition variations shall meet the applicable requirements of AMS 2248.

3.2 Condition

Spring temper; cold drawn or rolled, descaled, and rerolled to required size.

3.3 Properties

Wire shall conform to the following requirements, determined in accordance with ASTM A 370:

3.3.1 Tensile Properties

Square wire, and rectangular wire having nominal width not greater than ten times the nominal thickness, shall have tensile properties as shown in Table 2.

TABLE 2A - TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Thickness Inch	Tensile Strength ksi	Elongation in 2 Inches %, min
0.008 to 0.022, incl	210 to 250	--
Over 0.022 to 0.047, incl	200 to 240	3
Over 0.047 to 0.062, incl	185 to 235	3
Over 0.062 to 0.074, incl	175 to 225	3
Over 0.074 to 0.089, incl	165 to 215	3
Over 0.089 to 0.095, incl	155 to 205	3

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TABLE 2B - TENSILE PROPERTIES, SI UNITS

Nominal Thickness Millimeters	Tensile Strength MPa	Elongation in 50.8 mm % min
0.20 to 0.56, incl	1448 to 1724	--
Over 0.56 to 1.19, incl	1379 to 1655	3
Over 1.19 to 1.57, incl	1276 to 1620	3
Over 1.57 to 1.88, incl	1207 to 1551	3
Over 1.88 to 2.26, incl	1138 to 1482	3
Over 2.26 to 2.41, incl	1069 to 1413	3

The cross-sectional area of the wire shall be determined from measurements of thickness and width taken prior to the tensile test. The area on which stress is based, adjusted for rounded edges, shall be determined as shown in Equation 1.

$$A = T \times W - 0.12(T)^2 \quad \text{(Eq. 1)}$$

where:

A = area (for this test) or wire cross-section, square inches, (mm^2)
T = thickness of wire specimen, inch, (mm)
W = width of wire specimen, inch, (mm)

3.3.2 Hardness

Shall be as shown in Table 3, or equivalent (See 8.2). Product shall not be rejected on the basis of hardness if the tensile properties of 3.3.1 are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or from another sample with similar nonconforming hardness.

TABLE 3 - HARDNESS

Nominal Thickness Inch	Nominal Thickness Millimeters	Hardness
0.008 to 0.015, incl	0.20 to 0.38, incl	83.0 to 86.0 HR15N
Over 0.015 to 0.022, incl	Over 0.38 to 0.56, incl	64.0 to 69.5 HR30N
Over 0.022 to 0.047, incl	Over 0.56 to 1.19, incl	72.0 to 74.9 HRA
Over 0.047 to 0.062, incl	Over 1.19 to 1.57, incl	39.8 to 48.5 HRC
Over 0.062 to 0.074, incl	Over 1.57 to 1.88, incl	38.0 to 47.0 HRC
Over 0.074 to 0.089, incl	Over 1.88 to 2.26, incl	36.5 to 45.0 HRC
Over 0.089 to 0.095, incl	Over 2.26 to 2.41, incl	34.5 to 44.0 HRC

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3.4 Quality

Wire, as received by purchaser, shall be uniform in quality and condition, sound, and free from pipes, seams, blisters, laminations, inclusions, and surface imperfections detrimental to usage of the wire.

3.4.1 Wire shall have a bright, smooth, cold drawn or rolled surface free from pits, abrasions, and other surface imperfections. Wire for coiling on automatic spring winding machines shall be furnished with a lubricating coating suitable for such purpose.

3.4.2 All welds made on coiled or spooled wire shall be marked and the method of marking shall be specified on the spool, label, or tag. Straightened or flattened cut lengths shall have no welds.

3.5 Dimensions and Tolerances

3.5.1 Edges

3.5.2 Wire shall have commercial round edges as shown in Figure 1 and maximum camber shall be 0.5-inch in 8 feet (12.7-mm in 2.4 m).

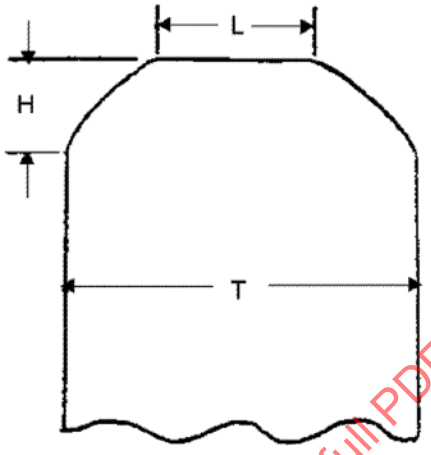

FIGURE 1 - WIRE ROUNDED EDGES

3.5.2.1 For wire thickness "T" 0.021-inch (0.53-mm) and under, the crown dimension "H" shall be 0.005-inch (0.13-mm) minimum and the maximum dimension "L" shall be 0.010-inch (0.25-mm) less than thickness "T".

3.5.2.2 For wire thickness "T" over 0.021-inch (0.53-mm), the crown dimension "H" shall be 0.0075-inch (0.190-mm) minimum and the maximum dimension of "L" shall be 0.020-inch (0.51-mm) less than thickness "T".

3.5.3 Thickness Tolerance

3.5.4 Shall be as shown in Table 4.

TABLE 4A - THICKNESS TOLERANCE, INCH/POUND UNITS

Thickness Inch	Tolerance, Inch Plus and Minus
Up to 0.010, incl	0.00035
Over 0.010 to 0.021, incl	0.0005
Over 0.021 to 0.045, incl	0.00075
Over 0.045 to 0.060, incl	0.0010
Over 0.060 to 0.089, incl	0.0015
Over 0.089	0.0020

TABLE 4B - THICKNESS TOLERANCE, SI UNITS

Thickness Millimeters	Tolerance Millimeter Plus and Minus
Up to 0.25, incl	0.0089
Over 0.25 to 0.53, incl	0.013
Over 0.53 to 1.14, incl	0.0190
Over 1.14 to 1.52, incl	0.025
Over 1.52 to 2.26, incl	0.038
Over 2.26	0.051

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