

AEROSPACE MATERIAL SPECIFICATION



AMS 5810A

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Reaffirmed APR 2006

Superseding AMS 5810

Steel, Corrosion and Heat Resistant, Flat Wire
15Cr - 25.5Ni - 1.2Mo - 2.1Ti - 0.006B - 0.30V
1800 °F (982 °C) Solution Treated, Cold Drawn or Cold Rolled and Aged,
Consumable Electrode Melted
(Composition similar to UNS S66286)

1. SCOPE:

1.1 Form:

This specification covers a corrosion and heat 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 900 °F (482 °C) and which may 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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or <http://www.sae.org>.

AMS 2248 Chemical Check Analysis Limits, 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

AMS 2750 Pyrometry

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2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

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	--	0.08
Manganese	--	2.00
Silicon	--	1.00
Phosphorus	--	0.025
Sulfur	--	0.025
Chromium	13.50	16.00
Nickel	24.00	27.00
Molybdenum	1.00	1.50
Titanium	1.90	2.30
Boron	0.003	0.010
Vanadium	0.10	0.50
Cobalt	--	1.00
Aluminum	--	0.35
Copper	--	0.50

3.1.1 Check Analysis: Composition variations shall meet the applicable requirements of AMS 2488.

3.2 Melting Practice:

Steel shall be produced by multiple melting using consumable electrode practice in the remelt cycle.

3.3 Condition:

Wire shall be solution heat treated, descaled if necessary, cold drawn or cold rolled to required size, and aged.

3.4 Heat Treatment:

- 3.4.1 Heating Equipment: Furnaces may be of any type. Pyrometry shall conform to AMS 2750. The heating medium or atmosphere shall be dry nitrogen or other atmospheres that will not alter the surface composition.
- 3.4.2 Solution Heat Treatment: Wire shall be solution heat treated by heating to 1800 °F ± 25 (982 °C ± 14), holding at heat for not less than one hour, and quenching in oil.
- 3.4.3 Aging Heat Treatment: Wire, cold drawn or cold rolled to required size, shall be aged by heating to a temperature within the range 1150 to 1325 °F (621 to 718 °C), holding at the selected temperature within ±25 °F (±14 °C) for 4 to 6 hours, and cooling at a rate equivalent to cooling in air.

3.5 Properties After Aging Heat Treatment:

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

- 3.5.1 Tensile Strength: Shall be within the range 185 to 240 ksi (1276 to 1655 MPa).

- 3.5.1.1 The rectangular cross-section area of the wire specimen for the tensile test shall be determined from measurements of thickness and width taken prior to the tensile test. The area on which stress is based shall be determined as shown in Equation 1.

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

where:

- A = area (for this test) of wire cross-section, inch² (mm²)
 T = thickness of wire specimen, inch (mm)
 W = width of wire specimen, inch (mm)

- 3.5.2 Hardness: Shall be as shown in Table 2, or equivalent (See 8.2), but the product shall not be rejected on the basis of hardness if the tensile properties of 3.5.1 are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or from another sample with similar nonconforming hardness.

TABLE 2 - Hardness

Thickness Inch	Thickness Millimeters	Hardness
0.0067 to 0.0142, excl	0.170 to 0.361, excl	81.0 to 85.0 HR15N
0.0142 to 0.0213, excl	0.361 to 0.541, excl	60.5 to 67.5 HR30N
0.0213 to 0.0433, excl	0.541 to 1.100, excl	71.0 to 75.5 HRA
0.0433 and over	1.100 and over	41.0 to 49.0 HRC

3.6 Quality:

- 3.6.1 Wire, as received by purchaser, shall be uniform in quality and condition, sound, and free of pipes, seams, blisters, laminations, inclusions, and surface imperfections detrimental to usage of the wire.
- 3.6.2 Wire shall have a smooth, cold drawn or cold 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, unless otherwise specified.
- 3.6.3 All welds shall be marked and the method of marking shall be specified on the spool, label, or tag.

3.7 Dimensions and Tolerances:

- 3.7.1 Edges: 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).

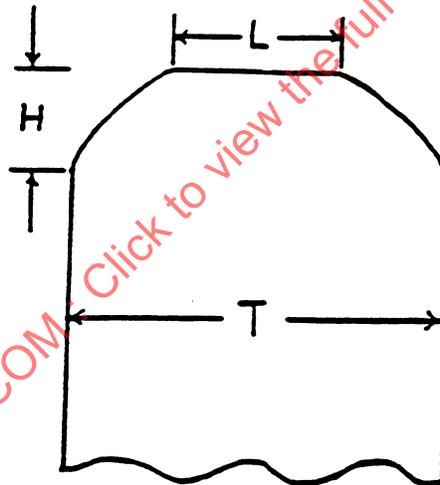


FIGURE 1 - Wire Rounded Edges

- 3.7.1.1 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 the thickness "T".
- 3.7.1.2 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 the thickness "T".
- 3.7.2 Thickness Tolerances: Shall be as specified in Table 3.

TABLE 3A - 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 0.095, incl	0.0015

TABLE 3B - 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 2.41, incl	0.038

3.7.3 Width Tolerance: Shall be as shown in Table 4.

TABLE 4A - Width Tolerance, Inch/Pound Units

Width Inch	Tolerance	Tolerance	Maximum Variation
	Plus Inch	Minus Inch	in 15 Continuous Feet Inch
Up to 0.159, incl	0.002	0.002	0.0015
Over 0.159 to 0.299, incl	0.003	0.003	0.0015
Over 0.299 to 0.499, incl	0.004	0.004	0.002
Over 0.499	0.005	0.005	0.002

TABLE 4B - Width Tolerance, SI Units

Width Millimeters	Tolerance	Tolerance	Maximum Variation
	Plus Millimeter	Minus Millimeter	in 4.6 Continuous Meters Millimeter
Up to 4.04, incl	0.05	0.05	0.038
Over 4.04 to 7.59, incl	0.08	0.08	0.038
Over 7.59 to 12.67, incl	0.10	0.10	0.05
Over 12.67	0.13	0.13	0.05