



400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION



AMS 5693C

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| Noncurrent | APR 1994 |
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| Superseding | AMS 5693B |

Steel, Corrosion Resistant, Wire
 18Cr - 9.0Ni
 Cryogenically Produced, High Tensile Strength
 (Composition similar to UNS S30200)

CANCELLATION NOTICE

This specification has been "CANCELLED" by the Aerospace Materials Division, SAE, as of May 2001. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications.

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1. SCOPE:**1.1 Form:**

This specification covers a corrosion resistant steel in the form of round, square, and rectangular wire.

1.2 Application:

Primarily for springs requiring corrosion and heat resistance up to 500°F (260°C).

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications 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 2241 | Tolerances, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire |
| MAM 2241 | Tolerances, Metric, Corrosion and Heat Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire |
| AMS 2248 | Chemical Check Analysis Limits, Wrought Corrosion and Heat Resistant Steels and Alloys, Maraging and Other Highly-Alloyed Steels, and Iron Alloys |
| AMS 2350 | Standards and Test Methods |
| AMS 2371 | Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, 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 E8 | Tension Testing of Metallic Materials |
| ASTM E353 | Chemical Analysis of Stainless, Heat-Resisting, Maraging, and Other Similar Chromium-Nickel-Iron Alloys |

2.3 U.S. Government Publications:

Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E353, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

| | 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 requirements of AMS 2248.

3.2 Condition:

Spring temper, cryogenically cold drawn to required size.

3.2.1 Wire shall be supplied in coils or as ordered.

3.3 Properties:

Wire shall conform to the following requirements:

3.3.1 As Cryogenically Cold Drawn:

3.3.1.1 Tensile Properties: Shall be as follows for rectangular wire having nominal width not more than four times the nominal thickness and for round wire and square wire 0.050 - 0.148 inch (1.27 - 3.76 mm) in nominal diameter or thickness, determined in accordance with ASTM E8:

| Form | Tensile Strength |
|------------------------|--|
| Rounds | 275,000 - 310,000 psi (1895 - 2135 MPa) |
| Square and Rectangular | 245,000 - 280,000 psi (1690 - 1930 MPa) |

3.3.1.1.1 When straightened or flattened cut lengths are ordered, tensile strength requirements shall be as agreed upon by purchaser and vendor.

3.3.1.2 Wrapping: Round wire shall withstand, without cracking, wrapping at room temperature five full, closely-spaced turns around a diameter equal to the nominal diameter of the wire.

3.3.1.3 Coiling: Round wire 0.050 - 0.148 inch (1.27 - 3.76 mm) in nominal diameter shall show a uniform pitch with no splits or fractures when wound into a tightly closed coil on an arbor of the size specified in Table I and the resultant coil stretched to a permanent set of four times its as-wound length.

TABLE I

| Nominal Wire Diameter Inch | Arbor Diameter Inch |
|-------------------------------|------------------------|
| Over 0.050 to 0.055, incl | 0.21 |
| Over 0.055 to 0.125, incl | 0.25 |
| Over 0.125 to 0.148, incl | 0.38 |

TABLE I (SI)

| Nominal Wire Diameter Millimetres | Arbor Diameter Millimetres |
|--------------------------------------|-------------------------------|
| Over 1.27 to 1.40, incl | 5.33 |
| Over 1.40 to 3.18, incl | 6.35 |
| Over 3.18 to 3.76, incl | 9.65 |

3.3.2 As Stress Relieved: Wire shall have the following properties after being stress relieved by heating to 800° - 850°F (425° - 455°C), holding at heat for 30 minutes \pm 5, and cooling in air:

3.3.2.1 Tensile Properties: Shall be as follows for rectangular wire having nominal width not more than four times the nominal thickness, and for round wire and square wire 0.050 - 0.148 inch (1.27 - 3.76 mm) in nominal diameter or thickness, determined in accordance with ASTM E8:

| Form | Tensile Strength |
|------------------------|--|
| Rounds | 290,000 - 340,000 psi (2000 - 2345 MPa) |
| Square and Rectangular | 260,000 - 310,000 psi (1795 - 2135 MPa) |

3.3.3 Wire under 0.050 inch (1.27 mm) or over 0.148 inch (3.76 mm) in nominal diameter or thickness shall have properties as agreed upon by purchaser and vendor.

3.4 Quality:

Wire, as received by purchaser, shall be uniform in quality and condition, sound, and free from kinks, twists, scrapes, splits, cold shuts, and other imperfections detrimental to its use.

3.5 Tolerances:

Shall conform to all applicable requirements of AMS 2241 or MAM 2241.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of wire shall supply all samples for vendor's tests and shall be responsible for performing all 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 wire conforms to the requirements of this specification.

4.2 Classification of Tests:

Tests to determine conformance to all technical 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 2371.

4.4 Reports:

4.4.1 The vendor of wire shall furnish with each shipment 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 5693C, size, and quantity.