

AEROSPACE MATERIAL SPECIFICATION

SAE AMS7718

REV. G

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Superseding AMS7718F

Nickel-Iron Alloy, Magnetic, Bars, Rods, Tubing, and Forgings
50Ni - 50Fe

(Composition similar to UNS K95000)

RATIONALE

AMS7718G results from a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers a magnetically soft nickel-iron alloy in the form of bars, rods, forgings, mechanical tubing, and forging stock.

1.2 Application

These products have been used typically for parts in magnetic circuits requiring high magnetic permeability and high saturation induction with the fabricated parts to be annealed in dry hydrogen, 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.

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<http://www.sae.org/technical/standards/AMS7718G>**

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.

AMS2241	Tolerances, Corrosion and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Bars and Wire
AMS2243	Tolerances, Corrosion and Heat-Resistant Steel Tubing
AMS2371	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS2374	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steel and Alloys Forgings
AMS2806	Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels Corrosion and Heat-Resistant Steels and Alloys
AMS2808	Identification, Forgings

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 596/A 596M	Direct-Current Magnetic Properties of Materials Using the Ballistic Method and Ring Specimens
ASTM A 773/A 773M	D-C Magnetic Properties of Materials Using Ring and Permeameter Procedures with dc Electronic Hysteresigraphs.
ASTM E 18	Rockwell Hardness of Metallic Materials

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall be an alloy containing approximately 50% nickel and 50% iron with other alloying elements in such proportions as required to provide a product meeting the requirements of 3.3.

3.2 Condition

The product shall be supplied in the following condition:

3.2.1 Bars, Rods, and Mechanical Tubing

Cold drawn, partially annealed (See 8.2), and centerless ground.

3.2.2 Forgings

As ordered.

3.2.3 Forging Stock

As ordered by the forging manufacturer.

3.3 Properties

The product shall conform to the following requirements:

3.3.1 Hardness

Shall be as follows, determined in accordance with ASTM E 18.

3.3.1.1 Bars and forgings 0.50 inch (12.7 mm) and under in nominal diameter or cross-sectional thickness and mechanical tubing shall have hardness not higher than 100 HRB, or equivalent (See 8.3).

3.3.1.2 Bars and forgings over 0.50 to 2.00 inches (12.7 to 50.8 mm) in nominal diameter or cross-sectional thickness shall have hardness not higher than 90 HRB, or equivalent (See 8.3).

3.3.2 Magnetic Properties

Shall be as shown in Table 1, determined in accordance with ASTM A 596/A 596M or ASTM A 773/A 773M on specimens as in 4.3.3 annealed by heating to $2150^{\circ}\text{F} \pm 25$ ($1177^{\circ}\text{C} \pm 14$) in a dry hydrogen atmosphere having a dew point of 60°F (51°C) or lower, holding at heat for $4 \text{ hours} \pm 0.25$, and cooling in a non-contaminating atmosphere at a rate not greater than 100°F (56°C) degrees per hour to 800°F (427°C) or lower or at a cooling rate recommended by the alloy producer (See 8.2). The annealed maximum coercive force (H_c) from 10 000 Gauss, (1.0 T) shall be 0.070 Oersted (5.57 A/m).

TABLE 1 - ANNEALED MINIMUM MAGNETIC PROPERTIES

Nominal Diameter or Distance Between Parallel Sides Inch		Nominal Diameter or Distance Between Parallel Sides Millimeters		Maximum Permeability	Permeability at B = 100 Gauss (0.01T)	Induction at H = 100 Oersteds (7958 A/m)
Up to	5/16, excl	Up to	7.9, excl	50 000	6000	15 000 gauss (1.5T)
	5/16 and over		7.9 and over	50 000	4000	15 000 gauss (1.5T)

3.4 Quality

The product, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the product.

3.5 Tolerances

Shall be as follows:

3.5.1 Bars and Rods

In accordance with AMS2241.

3.5.2 Mechanical Tubing

In accordance with AMS2243.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests

All technical requirements are acceptance tests and shall be performed on each heat or lot.

4.3 Sampling and Testing

4.3.1 Bars, Rods, Mechanical Tubing, and Forging Stock

In accordance with AMS2371.

4.3.2 Forgings

In accordance with AMS2374.

4.3.3 For magnetic property tests, one or more samples shall be selected at random from each lot.

4.4 Reports

The vendor of the product shall furnish with each shipment a report showing the results of tests for hardness and magnetic properties of each lot, and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, heat and lot numbers, AMS7718G, cooling rate if other than 100 °F (56 °C) degrees per hour, test method used for magnetic properties testing, product form, size, and quantity. If forgings are supplied, the size and melt source of stock used to make the forgings shall also be included.

4.5 Resampling and Retesting

4.5.1 Bars, Rods, Mechanical Tubing, and Forging Stock

In accordance with AMS2371.

4.5.2 Forgings

In accordance with AMS2374.

5. PREPARATION FOR DELIVERY

5.1 Sizes

Except when exact lengths or multiples of exact lengths are ordered, straight bars, rods, and tubing will be acceptable in mill lengths of 6 to 20 feet (1.8 to 6.1 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 feet (3 m).

5.2 Identification

5.2.1 Bars, Rods, and Mechanical Tubing

In accordance with AMS2806.

5.2.2 Forgings

In accordance with AMS2808.

5.2.3 Forging Stock

As agreed upon by purchaser and vendor.