SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 7718F

Issued JAN 1981
Revised SEP 2002
Reaffirmed APR 2007

Superseding AMS 7718E

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

(Composition similar to UNS K95000)

RATIONALE

This document has been reaffirmed to comply with the SAE 5-year Review policy.

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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: custsvc@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

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 2243	Tolerances, Corrosion and Heat Resistant Steel Tubing
MAM 2243	Tolerances, Metric, Corrosion and Heat Resistant Steel Tubing
AMS 2371	Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS 2374	Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steel and Alloys Forgings
AMS 2806	Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels Corrosion and Heat Resistant Steels and Alloys
AMS 2808	Identification, Forgings

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or 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 and Rockwell Superficial 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 °F ± 25 (1177 °C ± 14) in a dry hydrogen atmosphere having a dew point of -60 °F (-51 °C) or lower, holding at heat for 4 hours ± 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	6,000	15,000 gauss (1.5T)
5/16 and over	7.9 and over	50,000	4,000	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 AMS 2241 or MAM 2241.

3.5.2 Mechanical Tubing: In accordance with AMS 2243 or MAM 2243.

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:

Shall be as follows:

4.3.1 Bars, Rods, Mechanical Tubing, and Forging Stock: In accordance with AMS 2371.

4.3.2 Forgings: In accordance with AMS 2374.

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, AMS 7718F, cooling rate if other than 100 F (56 C) degrees per hour, test method used for magnetic properties testing, 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:

Shall be as follows.

4.5.1 Bars, Rods, Mechanical Tubing, and Forging Stock: In accordance with AMS 2371.

4.5.2 Forgings: In accordance with AMS 2374.