SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS7701	REV. F

Issued 1956-07
Revised 2006-02
Cancelled 2010-10

Superseded by ASTM A 753

Nickel-Iron Alloy, Magnetic, Sheet and Strip Annealed

RATIONALE

AMS7701F has been designated cancelled based on results of a survey to aerospace users and producers.

CANCELLATION NOTICE

This specification has been declared “CANCELLED” by the Aerospace Materials Division, SAE, as of October 2010 and has been superseded by ASTM A 753 as shown below. The requirements of the latest issue of ASTM A 753 shall be fulfilled whenever reference is made to the cancelled AMS7701. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications, noting that it has been superseded by ASTM A 753.

Cancelled specifications are available from SAE.

AMS7701 Type 1 superseded by ASTM A753, Alloy 3 Annealed Sheet or Strip "Wrought Nickel-Iron Soft Magnetic Alloys (UNS K94490, K94840, N14076, N14080)"

AMS7701 Type 2 superseded by ASTM A753, Alloy 4 Annealed Sheet or Strip "Wrought Nickel-Iron Soft Magnetic Alloys (UNS K94490, K94840, N14076, N14080)"

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS7701F

1. SCOPE

1.1 Form

This specification covers two types of magnetic nickel-iron alloy in the form of sheet and strip.

1.2 Application

These products have been used typically for magnetic circuit parts that require high magnetic permeability at low flux densities with the fabricated parts to be annealed in dry hydrogen, but usage is not limited to such applications.

1.3 Classification

The magnetic alloys covered by this specification are classified as follows:

Type 1 - Nickel plus iron and other alloying elements, usually copper and chromium. Type 1 may be required for applications involving severe forming.

Type 2 - Nickel plus iron and other alloying elements, usually copper and/or molybdenum.

1.3.1 Unless a specific type is specified, either type may be supplied.

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 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 2262	Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Sheet, Strip, and Plate
AMS 2371	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS 2807	Identification, Carbon and Low-Alloy Steels, Corrosion and Heat-Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing
AS4194	Sheet and Strip Surface Finish Nomenclature

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 480	Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM A 596	Direct-Current Magnetic Properties of Materials Using Ballistic Method and Ring Specimens
ASTM A 773	D-C Magnetic Properties of Materials Using Ring and Permeameter Procedures with D-C 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 80% nickel plus iron and other alloying elements (See 1.3) in such proportions as required to provide a product meeting the requirements of 3.3.

3.2 Condition

Hot rolled with or without subsequent cold reduction, annealed (See 8.3), and descaled, having a surface appearance comparable to 3.2.1 or 3.2.2, as applicable, in accordance with ASTM A 480/A 480M and AS4194.

3.2.1 Sheet

No. 2D finish.

3.2.2 Strip

No. 1 strip finish.

3.3 Properties

The product shall conform to the following requirements:

3.3.1 Hardness

Shall be not higher than 75 HRB, or equivalent (See 8. 2), determined in accordance with ASTM E 18.

3.3.2 Magnetic Properties

Shall be as shown in Table 1, determined in accordance with ASTM A 596 or ASTM A 773 on specimens as in 4.3.1 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. 3).

TABLE 1 - Minimum Magnetic Properties

Property	Value
Maximum permeability	250,000
Permeability at 100 gauss (0.01T)	70,000
Induction at 100 Oersteds (7958 A/m), gauss	7,500 (0.75T)

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 conform to all applicable requirements of AMS 2262.

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 as applicable.

4.3 Sampling and Testing

Shall be in accordance with AMS 2371 and the following:

4.3.1 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 for the three Table 1 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 7701E, cooling rate if other than 100 F (56 C) degrees per hour, size, and quantity.

4.5 Resampling and Retesting

Shall be in accordance with AMS 2371.

5. PREPARATION FOR DELIVERY

5.1 Identification

Shall be in accordance with AMS 2807.

5.2 Packaging

The product shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery.