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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 7702B

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Superseding AMS 7702A

MAGNETIC ALLOY SHEET AND STRIP
Nickel-Iron Alloy
1/2 Hard

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: Primarily for parts used in magnetic circuits requiring high magnetic permeability at low flux densities after high temperature annealing in hydrogen.

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 molybdenum.

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

2. APPLICABLE DOCUMENT: 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 2262 - Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Sheet, Strip, and Plate
MAM 2262 - Tolerances, Metric, Nickel, Nickel Alloy, and Cobalt Alloy Sheet, Strip, and Plate
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 A596 - Direct-Current Magnetic Properties of Materials Using Ring Test Procedures and the Ballistic Methods
ASTM A773 - D-C Magnetic Properties of Materials Using Ring and Permeameter Procedures with D-C Electronic Hysteresigraphs
ASTM E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

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 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: Cold rolled to half-hard temper, having a surface appearance Ø comparable to a commercial corrosion resistant steel No. 2D finish.

3.3 Properties: The product shall conform to the following requirements:

3.3.1 Hardness: Shall be not lower than 90 HRB, or equivalent, determined in accordance with ASTM E18.

3.3.2 Magnetic Properties: Shall be as follows, determined in accordance with Ø ASTM A596 or ASTM A773 on specimens annealed by heating to 2150°F ± 25 (1177°C ± 14) in a non-contaminating 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 (55°C) per hour to 800°F (427°C) or lower or at a cooling rate recommended by the alloy producer:

3.3.2.1	Maximum permeability, minimum	250,000
3.3.2.2	Permeability at 100 gausses, minimum	70,000
3.3.2.3	Induction at 100 oersteds, gausses, minimum	7,500

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 or Ø MAM 2262.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all Ø 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 product 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 and the following; a lot shall be all product of the same nominal thickness from the same heat of alloy:

4.3.1 Samples for magnetic properties testing shall be selected in accordance with one of the following methods; the sample method used shall be reported with the test results:

4.3.1.1 A pilot sample nominally 0.014 inch (0.36 mm) thick from each heat of alloy.

4.3.1.2 At least one sample selected at random from each lot.
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4.4 Reports:

4.4.1 Ø The vendor of the product shall furnish with each shipment a report showing the results of tests for hardness of each lot and the magnetic properties of each heat. This report shall include the purchase order number, heat number, AMS 7702B, cooling rate if other than 100°F (55°C) per hour, method of test and sampling for magnetic properties, size, and quantity.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 7702B, contractor or other direct supplier of product, part number, and quantity. When product for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of product to determine conformance to the requirements of this specification and shall include in the report either a statement that the product conforms or copies of laboratory reports showing the results of tests to determine conformance.

4.5 Sampling and Retesting: Shall be in accordance with AMS 2371.

5. PREPARATION FOR DELIVERY:

5.1 Identification: The product shall be identified as in 5.1.1 unless purchaser permits a method from 5.1.2.

5.1.1 Each sheet and strip shall be marked on one face, in the respective location indicated below, with AMS 7702B, heat number, manufacturer's identification, and nominal thickness. The characters shall be of such size as to be legible, shall be applied using a suitable marking fluid, and shall be removable in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effect on the product or its performance and shall be sufficiently stable to withstand normal handling.

5.1.1.1 Flat Strip 6 Inches (152 mm) and Under in Width: Shall be marked in one or more lengthwise rows of characters recurring at intervals not greater than 3 feet (914 mm).

5.1.1.2 Flat Sheet and Flat Strip Over 6 Inches (152 mm) in Width: Shall be marked in lengthwise rows of characters recurring at intervals not greater than 3 feet (914 mm), the rows being spaced not more than 6 inches (152 mm) apart and alternately staggered.

5.1.1.3 Coiled Sheet and Strip: Shall be marked near both the outside and inside ends of the coil; the markings shall be applied as in 5.1.1 or shall appear on a durable tag or label attached to the coil and marked with the information of 5.1.1. When the product is wound on cores, the tag or label may be attached to the core.

5.1.2 When purchaser permits, each sheet and strip may be marked near one end, coils being marked near the outside end, with AMS 7702B, heat number, manufacturer's identification, and nominal thickness, using any suitable marking fluid. As an alternate method, individual pieces and bundles shall have attached a durable tag marked with the above information or shall be boxed and the box marked with the same information.