

**AEROSPACE
MATERIAL
SPECIFICATION**

AMS 7712B
Superseding AMS 7711A

Issued 9-15-57
Revised 4-1-84

STEEL SHEET AND STRIP, FLAT-ROLLED, ELECTRICAL, NON-ORIENTED

3.0 (Si+Al)

Type 47S178 or Type 64S194, Semi-Processed

1. SCOPE:

- 1.1 Form:** This specification covers two types of semi-processed silicon steel in the form of sheet and strip supplied in coils or cut lengths.
- 1.2 Application:** Primarily for 50 to 60 Hz power frequency applications in magnetic devices such as motors and generators, and similar apparatus where medium core losses are desired; where purchaser anneals the product to develop the desired core loss and permeability characteristics.
- 1.3 Classification:** The steels covered by this specification are classified as follows:

Type 47S178 - Product 0.0185 in. (0.47 mm) thick
Type 64S194 - Product 0.025 in. (0.64 mm) thick

- 2. APPLICABLE DOCUMENTS:** The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) 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 2350 - Standards and Test Methods
AMS 2370 - Quality Assurance Sampling of Carbon and Low-Alloy Steels,
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 A343 - Alternating-Current Magnetic Properties of Materials at Power Frequencies Using the Wattmeter-Ammeter-Voltmeter Method and 25-cm Epstein Test Frame

SAE Technical Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

AMS documents are protected under United States and international copyright laws. Reproduction of these documents by any means is strictly prohibited without the written consent of the publisher.

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 a low-carbon steel containing approximately 3% silicon and other alloying elements, usually aluminum, in such proportions as required to provide a product meeting the requirements of 3.3.

3.2 Condition: Semi-processed (See 8.3) and, unless otherwise specified, uncoated.

3.3 Magnetic Properties: The product shall conform to the following requirements (density of 7.65 g/cm³ is assumed):

3.3.1 Core Loss: Shall be not greater than the following, determined in accordance with ASTM A343 on 50/50 Epstein specimens as in 4.3.1, annealed by heating in a non-carburizing atmosphere to not lower than 1450°F (790°C) and furnace cooling:

Type	Maximum		
	W/lb 60 Hz	W/kg 60 Hz	W/kg 50 Hz
47Sl78	1.78	3.92	3.10
64Sl94	1.94	4.28	3.38

3.3.2 Permeability: Typical permeability shall be as high as possible consistent with the required core loss limits (See 3.3.1) that govern the grade. Typical permeability (μ P) shall be as follows, calculated from measurements of peak exciting current at an induction of 15 kilogausses (1.5 T) in accordance with ASTM A343 on annealed 50/50 grain Epstein specimens:

Type	Typical μ P
47Sl78	1000
64Sl94	1300

3.3.3 Exciting Current: The root-mean-square (rms) exciting current required to produce a given flux density in terms of rms ampere-turns per centimetre (At/cm) of magnetic path length (A-C exciting force) equivalent to the permeability values (See 3.3.2) are approximately:

Type	Typical At/cm
47Sl78	6.5
64Sl94	5.5