

**AEROSPACE
MATERIAL
SPECIFICATION**

AMS 7716C
Superseding AMS 7716B

Issued 3-15-66
Revised 4-1-84

**STEEL SHEET AND STRIP, FLAT-ROLLED, ELECTRICAL, GRAIN-ORIENTED
3.15Si**

Type 27G053, Type 30G058, or Type 35G066, Fully-Processed

1. SCOPE:

- 1.1 Form:** This specification covers three types of fully-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 applications in small transformers and similar apparatus requiring a low core loss and high permeability in the direction of rolling, which has been obtained by appropriate metallurgical processing. The product is usually used in the form of thin laminations with only moderate surface insulation requirements.
- 1.3 Classification:** The steels covered by this specification are classified as follows:

Type 27G053 - Product 0.011 in. (0.27 mm) thick

Type 30G058 - Product 0.012 in. (0.30 mm) thick

Type 35G066 - Product 0.014 in. (0.35 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 specifications 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

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.

- 2.2 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

- 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 3.15% silicon as required to provide a product meeting the requirements of 3.3.

- 3.2 Condition: The product shall be in the PQ (C-5 coated) condition, fully processed to metallurgically produce a product meeting the technical requirements of this specification and thermally flattened with the inherent AISI Type C-2 (See 8.3.2) coating removed and AISI Type C-5 (See 8.3.3) coating applied for insulating purposes.

- 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: At 15 kilogausses (1.5 T) shall be not greater than the following, determined in accordance with ASTM A343 on specimens as in 4.3.1, stress relief annealed (after shearing) at 1450°F (790°C) in an atmosphere of pure dry nitrogen with 2 to 15% pure dry hydrogen added and having a dew point within the annealing chamber not higher than 0°F (-18°C). Provision shall be made for obtaining essentially perfect flatness of the magnetic test specimens in the stress-relief anneal.

Type	Maximum			
	60 Hz		50 Hz	
	W/lb	W/kg	W/lb	W/kg
27G053	0.53	1.17	0.40	0.89
30G058	0.58	1.28	0.44	0.97
35G066	0.66	1.46	0.50	1.11

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 greater than 1780 calculated from measurements of peak exciting current at a magnetizing force (H_R) of 10 Oersteds (795 A/m) in accordance with ASTM A343 on annealed, with-grain, Epstein specimens.

3.3.3 Lamination Factor: Shall be as high as practicable consistent with the surface type and material thickness desired. Typical (not minimum) values for lamination factors for C-5 coated surfaces, measured at 100 psi (6.90 kPa), are:

Type	Factor
27G053	96. min
30G058	96. min
35G066	96.5 min

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

3.5 Tolerances:

3.5.1 Thickness:

TABLE I

Type	Thickness Limits			
	Inch		Millimetre	
	min	max	min	max
27G053	0.0095	0.0120	0.24	0.305
30G058	0.0105	0.0130	0.265	0.33
35G066	0.0125	0.0150	0.32	0.38

3.5.2 Width:

TABLE II

Specified Width Inches	Width Tolerance Inch plus and minus
Up to 4, incl	0.005
Over 4 to 9, incl	0.007
Over 9 to 15, incl	0.010
Over 15	0.016