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# AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 7510/1A

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Superseding 7510/1

MAGNETS, RARE-EARTH/COBALT, PERMANENT  
Samarium-Cobalt, 33/67 - 15 (119) 250

## 1. SCOPE:

1.1 Form: This specification covers one type of samarium-cobalt permanent magnets.

1.2 Application: Primarily for components of electrical, electronic, and magnetic devices requiring an energy level of 15 MGOe (119 kT·A/m) for use at service temperatures up to 250°C.

1.3 Classification: Nominal composition of 33% samarium and 67% cobalt with an energy level of 15 MGOe (119 kT·A/m) with 250°C maximum service rating.

2. APPLICABLE DOCUMENTS: See AMS 7510.

## 3. TECHNICAL REQUIREMENTS:

3.1 Basic Specification: The complete requirements for procuring the magnets described herein shall consist of this document and the latest issue of the basic specification, AMS 7510.

3.2 Composition: Shall be nominally 33% samarium and 67% cobalt. Composition variations will be permitted if the magnetic properties are met.

3.3 Condition: Shall be unmagnetized.

REAFFIRMED

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3.4 Magnetic Characteristics: Hysteresis data, determined at  $25^{\circ}\text{C} \pm 5$ , shall be as follows:

|        |                                              |               |                |
|--------|----------------------------------------------|---------------|----------------|
| 3.4.1  | Required magnetizing field, $H_S$ , minimum  | 20 kOe        | 1592 kA/m      |
| 3.4.2  | Energy product level, $(BH)_m$ , nominal     | 15 MGOe       | 119 kT·A/m     |
| 3.4.3. | Residual flux density (induction), $B_r$     | 7.8 - 8.2 kG  | 0.78 - 0.82 T  |
| 3.4.4  | Induction coercive force, $H_c$              | 6.8 - 7.2 kOe | 541 - 573 kA/m |
| 3.4.5  | Intrinsic coercive force, $H_{ci}$ , minimum | 15 kOe        | 1194 kA/m      |

3.5 Permanent Magnet Performance as a Function of Temperature: Shall be as follows:

3.5.1 Reversible coefficient, nominal, when  $B/H = 1.0$ :

|              |                     |
|--------------|---------------------|
| 25° to 100°C | 0.040% per degree C |
| 25° to 250°C | 0.048% per degree C |

3.5.2 Irreversible loss after exposure to temperature noted, nominal:

|                          |       |
|--------------------------|-------|
| 100°C, when $B/H = 1.0$  | 0.8%  |
| 100°C, when $B/H = 0.25$ | 1.8%  |
| 250°C, when $B/H = 1.0$  | 3.0%  |
| 250°C, when $B/H = 0.25$ | 10.0% |

3.6 Individual Magnetic Component Evaluation: Shall be as specified on the applicable drawing or product specification.

3.7 Physical, Thermal, and Electrical Properties: Nominal properties shall be as follows:

|       |                              |                                          |
|-------|------------------------------|------------------------------------------|
| 3.7.1 | Tensile Strength             | 5000 psi<br>(34.5 MPa)                   |
| 3.7.2 | Hardness                     | 500 HV/10/30                             |
| 3.7.3 | Density                      | 8.2 g/cm <sup>3</sup>                    |
| 3.7.4 | Resistivity, at 25°C         | 50μ · cm                                 |
| 3.7.5 | Thermal Conductivity         | 0.025 (cal·cm)/(°C·sec·cm <sup>2</sup> ) |
| 3.7.6 | Thermal Expansion            |                                          |
|       | Parallel to orientation      | $5 \times 10^{-6}$ mm/mm/°C              |
|       | Perpendicular to orientation | $13 \times 10^{-6}$ mm/mm/°C             |

4. QUALITY ASSURANCE PROVISIONS: See AMS 7510.
5. PREPARATION FOR DELIVERY: See AMS 7510.
6. ACKNOWLEDGMENT: See AMS 7510.
7. REJECTIONS: See AMS 7510.
8. NOTES: See AMS 7510.

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