

Gas Nitriding of Steel Parts

RATIONALE

AMS 2756A has been designated cancelled and superseded because equivalent technical requirements are provided by AMS 2759/6.

CANCELLATION NOTICE

This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of June 2008 and has been superseded by AMS 2759/6, Gas Nitriding and Heat Treatment of Low-Alloy Steel Parts. The requirements of the latest issue of AMS 2759/6 shall be fulfilled whenever reference is made to the cancelled AMS 2756. 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will remain listed in the Numerical Section of the Index of Aerospace Material Specifications, noting that it has been superseded by AMS 2759/6.

Cancelled specifications are available from SAE.

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1. SCOPE:**1.1 Purpose:**

This specification covers a process for surface-hardening parts, made from appropriate low-alloy steels (See 8.4), by the introduction of nitrogen from ammonia.

1.2 Application:

Primarily for parts requiring hard, wear-resistant surfaces.

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 Society of Automotive Engineers, Inc., Two Pennsylvania Plaza, New York, New York 10001.

2.1.1 Aerospace Material Specifications:

AMS 2350 Standards and Test Methods
AMS 2408 Tin Plating

2.2 ASTM Publications:

Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

ASTM E18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E92 Vickers Hardness of Metallic Materials

2.3 Government Publications:

Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

2.3.1 Military Standards:

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes

3. TECHNICAL REQUIREMENTS:

3.1 Equipment:

Shall consist of suitable furnaces equipped with a source of dissociated anhydrous ammonia to supply the nitriding atmosphere. The design and capacity of the furnaces shall be such that the temperature at any point in the working zone shall not vary more than $\pm 15^{\circ}\text{F}$ ($\pm 8.3^{\circ}\text{C}$) from the desired nitriding temperature after the charge has been brought up to temperature and shall provide means for adequate circulation of the furnace atmosphere over the parts at all times.

3.2 Preparation:

3.2.1 Heat Treatment: Parts, before being nitrided, shall be hardened and tempered to meet mechanical properties specified for the core. The tempering temperature should be at least 100°F (56°C) higher than the nitriding temperature to be used.

3.2.2 Masking: If parts are not to be nitrided all over, the surfaces not to be nitrided shall be masked to prevent absorption of nitrogen from the furnace atmosphere. Masking may be accomplished by tin plating in accordance with AMS 2408, by bronze plating, by coating with a suitable paint, or by other methods acceptable to the purchaser. Alternatively, parts may be nitrided all over and the case ground off the surfaces not to be nitrided.

3.2.3 Surface Condition: Parts, before nitriding, shall be clean and free from dirt, grease, oxide, scale, and other injurious foreign matter. Surfaces to be nitrided shall be free from decarburization.

3.3 Procedure:

3.3.1 Loading Parts: Parts shall be suitably placed and supported in the nitriding furnace to prevent distortion at the nitriding temperature and to ensure free circulation of the nitriding gas to all surfaces. Test specimens of comparable material and hardness shall be included with each load of parts as required for process control.

3.3.2 Nitriding: Parts shall be heated in a furnace containing dissociated anhydrous ammonia at a temperature and for a time sufficient to produce the specified depth of case. Before removing parts from the furnace, they shall be cooled to a temperature below 400°F (204°C) in either the nitriding atmosphere or a nonreactive atmosphere.

3.3.2.1 Two-Stage Process: A two-stage nitriding process may be employed to keep the depth of the white layer to a minimum. The first stage produces the brittle white layer and the second stage the remainder of the nitrided case. This process produces the thickest cases and is advantageous for applications where it is impractical to remove the white layer after nitriding.