



AEROSPACE MATERIAL SPECIFICATION

AMS2759™/9**REV. E**Issued 1996-11
Revised 2018-10

Superseding AMS2759/9D

(R) Hydrogen Embrittlement Relief (Baking) of Steel Parts

RATIONALE

AMS2759/9E results from a Five-Year Review and general revision of AMS2759 and its slash specifications.

Ordering information: In addition to that listed in AMS2759, the purchaser shall supply the following information to the plating processor:

- AMS2759/9E
- Final heat treat condition:
 - Minimum tensile strength, as applicable; or
 - Minimum hardness, as applicable; or
 - PH stainless steel temper, as applicable.
- Tempering temperature used for the following types of parts:
 - Carburized or carbonitrided parts.
 - Parts fabricated from music wire, 52100, 440C, or other alloys tempered below 375 °F (191° C).

1. SCOPE

1.1 Purpose

This specification covers the requirements for embrittlement relief (baking) of heat treated steel parts to remove hydrogen infused during plating and certain other chemical processing such as stripping, chemical milling, pickling, and etching.

1.2 Application

This specification is applicable, but not limited to, the following types of parts:

- Carbon, low alloy, and martensitic stainless steel parts heat treated to a minimum strength of 180 ksi (1241 MPa), or a minimum hardness of 40 HRC or equivalent.
- Threaded fasteners made from carbon, low alloy, or martensitic stainless steels heat treated to a minimum strength of 150 ksi (1034 MPa), or a minimum hardness of 34 HRC or equivalent.

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Documents
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- Parts made from high strength precipitation hardening stainless steels other than A-286 (see Table 1 for specific tempers).
- Steel parts which have been case hardened (carburized, nitrided, nitrocarburized, or carbonitrided).
- Other parts that specify AMS2759/9.

1.3 The provisions of this specification revision shall become effective 90 days after publication.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2438	Plating, Chromium, Thin, Hard, Dense Deposit
AMS2649	Etch Inspection of High Strength Steel Parts
AMS2750	Pyrometry
AMS2759	Heat Treatment of Steel Parts, General Requirements

3. TECHNICAL REQUIREMENTS

3.1 Pyrometry

Shall be in accordance with AMS2759.

3.2 Furnace Equipment

Furnaces shall conform to AMS2759 requirements and shall meet Class 5 minimum requirements as specified in AMS2750. Furnace atmosphere shall consist of circulating heated air.

3.3 Auxiliary Equipment

Racks, trays, hangers, supports, and other holding equipment shall be made from mesh, expanded metal, or other construction to allow free circulation of heated air across the parts.

3.4 Cleaning Equipment

Shall be as in accordance with AMS2759.

3.5 Procedure

Parts shall be baked after the completion of the chemical processing or plating designated in Table 1 or 2.

3.5.1 Cleaning shall be in accordance with AMS2759.

3.5.2 Racking

Shall be in accordance with AMS2759, except as follows:

- 3.5.2.1 Small parts may be randomly arranged in trays, provided that layers of parts are not thicker than 2 inches (51 mm) and the distance between the layers is not less than 2 inches (51 mm).
- 3.5.2.2 Thickness of layers of small parts randomly arranged in trays may be greater than 2 inches (51 mm), provided tests have been performed with load thermocouples to confirm that the center of the coldest load will reach the set temperature minus 25 °F (14 °C) within 1 hour of loading.
- 3.5.2.3 Combinations of layer thickness, racks, distance between layers, and part thickness shall be limited so that the maximum time between door closure and temperature recovery to the appropriate baking temperature shall not exceed 4 hours.

3.5.3 Delay Time Limits

The elapsed time between completion of plating and start of heating parts in the baking furnace shall not exceed 4 hours. The following are examples of completion of plating:

- When the current is turned off.
- When parts are removed from the plating bath. This is applicable to electroless processes and those electrolytic processes where current interruption for thickness evaluation is common practice.
- When parts are removed from other chemical processing operations.

When baking is required after etch inspection (see footnote 4 of Tables 1 and 2) to detect abusive grinding or machining, the elapsed time shall not exceed 24 hours.

3.5.4 Bake Set Temperature

Standard bake set temperature shall be 375 °F (191 °C). Non-standard baking set temperatures shall be as specified in Table 2 for carburized or carbonitrided case hardened parts, 52100 steel parts, Type 440C parts, and music wire parts.

3.5.5 Bake Soak Time

Bake soak time shall be as specified in Tables 1 or 2, as applicable.

- 3.5.5.1 Parts which have a minimum section thickness in excess of 1.00 inch (25.4 mm) in thickness shall have additional baking soak time added to the cycles specified in Table 1 and 2 to ensure that the parts have been exposed to the proper temperature for the minimum time required.
- 3.5.5.2 When AMS2759/9 post-plating bakeout is required for parts with a minimum hardness lower than 40 HRC (180 ksi), the applicable time shall be that listed for the lowest strength level in Table 1.

3.5.6 Start of Soak Time

Shall be in accordance with AMS2759.

3.5.7 Soaking Interruptions

If the delay time (see 3.5.3) is less than 2 hours, soaking may be interrupted for the purpose of adding or removing parts. If the delay time (see 3.5.3) is 2 hours or more, at least 1 hour shall have elapsed since the start of soak for the load before adding or removing parts.