AEROSPACE MATERIAL SPECIFICATION

AMS2590™ REV. C

Issued 2010-12
Revised 2022-04

Superseding AMS2590B

Rotary Flap Peening of Metal Parts

RATIONALE

AMS2590C results from a Five-Year Review and update of this specification with the deletion of test strips being specified by the purchaser as these are stated in SAE J442 (3.1.3), addition of instructions regarding test strip holder and magnets to ensure there is no movement of the test strip (3.1.4), addition of new calibration requirement for measuring equipment (3.1.5), addition of general requirement that parts be peened to the extent specified (3.3), rewording of intensity to include CEO approval for alternate methods (3.4.1), addition of CEO approval of alternate arc height conversion methods (3.4.2), reworded used flap examination requirements for flap replacement to percent of missing shot (3.4.7), and added calibration requirement for rpm controller (3.5.1.1).

1. SCOPE

1.1 Purpose

This specification covers procedures and requirements for peening of metal parts with portable, bonded-shot, rotary flap assemblies in accordance with AS2592. The principles of rotary flap peening are similar to conventional shot peening, except conversion of arc height values using the magnetic test strip holder is required for intensity determination.

1.2 Application

This process is normally used for peening or local repeening of blemished areas, straightening and reshaping of parts, for plating adhesion testing, and for cosmetic surface restoration of peened parts, but usage is not restricted to these applications. Use of rotary flap peening requires customer approval when used to replace manual or automated shot peening. Conformance with AMS2430 is required to the extent specified herein.

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.

AMS2430 Shot Peening

AS2592 Flap Assemblies, Rotary Flap Peening

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS2590C/

AS7766 Terms Used in Aerospace Metals Specifications

SAE J442 Test Strip, Holder, and Gage for Shot Peening

SAE J443 Procedures for Using Standard Shot Peening Almen Test Strip

SAE J2277 Shot Peening Coverage Determination

3. TECHNICAL REQUIREMENTS

3.1 Equipment

3.1.1 Rotary Tools

Pneumatic or electrically powered rotary tools shall be used which can accommodate mandrels described in AS2592. The rotary tool shall be capable of operating at speeds that will produce the required intensity. Actual operational speed of the rotary tool is dependent on the desired intensity and is established in 3.4.1. Once the operational speed is established the rotary tool shall be capable of maintaining a constant speed within ±100 revolutions per minute (rpm) while the flap is in contact with a work piece or test strip.

3.1.2 Flaps and Mandrels

Flaps and mandrels shall conform to AS2592.

3.1.3 Test Strips and Gage

Test strips and gage shall conform to SAE J442.

3.1.4 Test Strip Holder

A magnetic strip holder conforming to Figure 1 shall be used. It shall consist of a nonmagnetic material block with three permanent magnets loosely recessed into the top side for the purpose of positioning a test strip. The holder and magnets shall be constructed to ensure that the magnets maintain contact with the test strip as it arcs. The design should minimize test strip movement during peening. The magnets and their fasteners shall be adjusted to allow the strip to lie flat on the holder. The magnets shall be allowed to move while maintaining contact with the test strip while peening. A backstop shall be located as shown in Figure 1 to prevent the test strip from moving out of position. An optional backstop may be added at the opposite end of the test strip to provide a level approach surface to the test strip. This will prevent the shot on the flaps from hitting the exposed end of the test strip which may dislodge them from the flap. The form of the back stops are not restricted as long as they function as outlined above. The height of the backstops may vary to suit the use of the different Almen test strip thicknesses. The bottom surface of the holder shall be faced with non-skid material.

3.1.5 Calibration

The processor’s equipment used for measuring and controlling the shot peening process such as gages, tachometers, stroboscopes, or closed loop rpm controllers shall be calibrated as recommended by the manufacturer. Calibration shall be made against instruments whose calibration is traceable to National Institute of Standards and Technology or other industry standards, unless waived by the cognizant engineering organization.

3.2 Part Preparation

3.2.1 Customer Responsibility

The customer shall provide all parts to the supplier meeting the following criteria: areas of parts to be peened shall be within dimensional requirements and surface finish requirements, all fillets shall be properly formed, all burrs shall be removed, all heat treatments shall be completed, all non-destructive testing shall be completed, all edges and corners to be peened shall be radiused or chamfered, and all coatings removed.

3.2.2 Cleaning and Stripping

Unless otherwise specified, all areas shall be cleaned by methods that are not physically or chemically damaging. Procedures for stripping coatings shall be as specified or approved by the cognizant engineering organization. All parts shall be clean and dry prior to peening.

3.2.3 Masking

Areas of the part where peening is prohibited shall be suitably masked or protected if within area of possible flap contact.

3.3 Peening

Parts shall be peened to the extent specified.

3.4 Properties

3.4.1 Intensity

3.4.1.1 The intensity shall be determined in conjunction with process setup and prior to peening parts unless alternative control/verification methods such as a specific rotation speed (rpm) is specified by the cognizant engineering organization.

3.4.1.2 Intensity shall be determined from a saturation curve in accordance with 3.4.3. The saturation curve developed intensity is limited to each individual operator and specific equipment, flapper size, and test strip type

3.4.1.3 When approved by the cognizant engineering organization, alternative methods for intensity measurement may be employed. It is the responsibility of the peening processor to substantiate the use of alternative methods for approval.

3.4.2 Arc Height Conversion

Strip arc height measurements obtained using the magnetic strip holder shall be converted to the values equivalent to those that would be obtained using the SAE J442 strip holder using Figures 2A, 2B, 2C, or 2D. The figures have conversion graphs and tables for A and N strips. Only the converted arc heights shall be used for data points on saturation curves. Any conversions for C test strips shall be provided by the cognizant engineering organization prior to use. Alternative arc height conversion methods may be used as permitted by the cognizant engineering organization

3.4.3 Intensity Determination Methods

Intensity shall be determined by either of the two methods below. The SAE J443 10% rule method is preferred, but the test strip coverage method is permitted.

3.4.3.1 SAE J443 10% Rule Method

Intensity is determined from a saturation curve with the converted arc height at the first point whose time when doubled produces an arc height increase of 10% per SAE J443.

3.4.3.2 Test Strip Coverage Method

For this method, a saturation curve is developed by plotting converted arc heights and strip coverage versus time. Intensity is determined as the converted arc height of the saturation curve test strip at the time when it reaches full coverage as determined by the methods in SAE J2277.

3.4.4 Number of Test Strips

Regardless of which intensity method is used, only one test strip is required for the entire saturation curve.