



AEROSPACE MATERIAL SPECIFICATION

AMS2545™**REV. A**Issued 2017-11
Revised 2021-04

Superseding AMS2545

**Controlled Pneumatic Needle Peening,
Straightening and Forming**

RATIONALE

AMS2545A results from a Five-Year Review and update of this specification with the following changes: peening head movement (3.1.1.4) wording is clarified, peening needles (3.1.2.3) requirements are simplified, peening controller (3.1.3.1) wording is condensed and simplified, test strip holder (3.1.5) adds magnetic holder and reduced peening of test strip, part preparation (3.2.1.2) machining changed to surface preparation, intensity (3.4.1) adds alternate method of measurement, intensity determination test (3.5.1) reworded to current requirements, and Figure 1 was redrawn.

1. SCOPE

1.1 Purpose

This specification covers the requirements for saturation peening, straightening, and forming metal parts using controlled pneumatic activated needles.

1.2 Application

This process is used to perform localized peening, straightening, and reshaping of parts and for cosmetic surface restoration of peened parts but usage is not limited to these applications. Use of controlled pneumatic needle peening may require customer approval.

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.

AMS2590	Rotary Flap Peening of Metal Parts
ARP1917	Clarification of 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 Executive Standards Committee 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."

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2021 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

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
<http://www.sae.org>

SAE WEB ADDRESS:

Full document details: [SAE AMS2545A](http://www.sae.org/standards/content/AMS2545A)

For more information on this standard, visit
<https://www.sae.org/standards/content/AMS2545A>

Documents

Document Sharing Hub

SAE J2277 Shot Peening Coverage Determination

3. TECHNICAL REQUIREMENTS

3.1 Equipment

3.1.1 Peening Head

The pneumatic needle peening head shall be configured as follows:

- 3.1.1.1 Size and configuration shall be such that it allows for proper contact against the metal part to be peened.
- 3.1.1.2 The head shall incorporate a sensor to continuously monitor the movement of each needle to ensure full peening action during the peening process.
- 3.1.1.3 The peening head shall be equipped with a contact cap constructed of a non-metallic, non-marking material, to maintain a fixed distance between the peening head and the part to ensure a consistent peening intensity and to protect the part surface from damage.

3.1.1.4 Peening Head Movement

The peening head shall be capable of being positioned and moved over the part to obtain the coverage required.

3.1.1.4.1 Manual Movement

For manual peening applications, the peening head shall incorporate an on/off switch to start and stop the peening action by the operator.

3.1.1.4.2 Automated Movement

An automated device or robot may be used to perform the peening process. Starting the process shall be done by the peening controller or by another approved method.

3.1.2 Peening Needles

The peening needles shall have the following characteristics:

- 3.1.2.1 Needles shall be selected to achieve the Almen test strip intensity range and coverage required for the part.
- 3.1.2.2 The needle tip shall be made of a material that does not induce ferrous contamination.
- 3.1.2.3 The needles shall be visually inspected at a minimum of 10X magnification as recommended by the equipment manufacturer if not specified by the cognizant engineering organization. The inspection interval and wear limits for the needles shall be as recommended by the equipment manufacturer if not specified by the cognizant engineering organization.

3.1.3 Peening Controller

The controller shall have the following capabilities:

- 3.1.3.1 The controller shall incorporate a closed loop feedback system for measuring and continuously adjusting the air pressure provided to the needle system so as to maintain the required peening intensity. The controller shall stop the process if the required pressure cannot be maintained or goes outside the target limits for 5 or more seconds, or as specified by the cognizant engineering organization.
- 3.1.3.2 When more than 50% of the needles are not in motion, the controller shall stop the process.
- 3.1.3.3 The controller shall provide a means to save process data, username, and user description.

3.1.4 Test Strip and Gage

Test strips and gage shall conform to SAE J442 for saturation peening.

3.1.5 Test Strip Holder

3.1.5.1 A magnetic strip holder with associated arc height conversion shall be used in accordance with AMS2590. Alternatively, the Almen test strip holder shown in Figure 1 may be used. It shall conform to SAE J442, except that the longitudinal spacing of the holding screws are extended to facilitate coverage of the 2.0 inch (50.80 mm) center section of the strip. A groove with the thickness and width of the Almen test strip is added to eliminate possible needle tip damage when peening the edge of the Almen test strip.

3.1.5.2 For both types of holders, peening of the extreme ends of Almen test strips is not necessary and offers a significant time saving when generating saturation curves at low intensity. Uniform coverage of at least the central 2 inches of length is essential to ensure accurate arc height measurement across the Almen gage 1.25 inch support ball distance.

3.2 Part Preparation

3.2.1 The following items are the responsibility of the purchaser and shall have been completed on parts prior to peening.

3.2.1.1 Heat treatment.

3.2.1.2 Any surface preparation required for areas to be peened.

3.2.1.3 Any required nondestructive inspection such as magnetic particle or fluorescent penetrant inspection.

3.2.2 Edge Condition

All part edges and corners in the areas to be peened shall be free of sharp edges and burrs.

3.2.3 Coatings and Damage

Parts shall be free from corrosion, mechanical damage, and corrosion-preventive coatings such as anodic coatings, plating, or paint.

3.2.4 Cleaning

All parts shall be clean and free from contaminants such as grease, dirt, and oil prior to peening. The purchaser shall supply clean parts to the processor or shall specify the cleaning method to be used. If no cleaning method is specified, the processor may clean the parts using a method acceptable to the purchaser. Halogenated solvents shall not be used to clean titanium alloy parts.

3.2.5 Masking

Areas of the part that are designated to be free from any peening shall be suitably masked or protected from needle tip contact.

3.3 Peening

Parts shall be peened to the extent specified.