SURFACE VEHICLE STANDARD

J443™	DEC2025

Issued 1952-01
Revised 2025-12

Superseding J443 NOV2024

Procedures for Determining and Verifying Peening Intensity

RATIONALE

Text of paragraph 6.5 moved from a draft of AMS2430 as it was determined to be within the scope of SAE J443.

1. SCOPE

This SAE Standard defines the method for deriving and verifying the peening intensity exerted onto a part surface during shot peening or other surface enhancement processes.

1.1 Application

1.1.1 Almen test strips are used to generate saturation curves in order to determine intensity and as a means of verifying the repeatability of a peening process.

1.1.2 The process of shot peening or other peening processes cannot, at present, be adequately controlled by nondestructive inspection of the peened parts; therefore, it is necessary to control the process itself to achieve consistent, reliable results. The use of Almen test strips with this standard is a method of measuring and verifying the peening process.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

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

AMS2590 Rotary Flap Peening of Metal Parts

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

SAE J2277 Shot Peening Coverage Determination

SAE J2597 Computer Generated Shot Peening Saturation Curves

SAE HS-84 SAE Manual on Shot Peening

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3. DEFINITIONS

3.1 ARC HEIGHT

A measurement of the curvature of an Almen test strip is the “arc height,” not the “intensity.” Exposing a single Almen test strip does not reveal intensity. Intensity can only be determined from a saturation curve developed by the procedure described in Section 4.

3.2 PRE-BOW

The measurement, either positive or negative, of the arc height of an Almen test strip prior to peening.

3.2.1 PRE-BOW COMPENSATION

Subtraction of the measured pre-bow from the measured arc height, after peening, to obtain the net change in the arc height from the peening process.

4. TECHNICAL REQUIREMENTS

4.1 Peening Intensity

Intensity is a function of the mass, the hardness, the velocity, and the impingement angle of the shot and the distance traveled by the shot stream to the peened surface of an Almen test strip. For each set of peening parameters with a given media, an intensity value can be derived and documented.

4.2 Saturation Curve

A saturation curve, which is a plot of Almen test strip arc heights versus the duration of the exposure to the shot stream, is used to derive the peening intensity for a set of peening parameters. The saturation curve is developed from data points obtained by peening a series of Almen test strips while varying only the exposure. The exposure may be time based (minutes, seconds, or inverse feed rate) or increment based (number of passes, rotations, or cycles). In general, these points define a typical curve with a shape as exemplified in Figure 1 (Type 1). In some cases, saturation curves can appear as exemplified in Figure 2 (Type 2) and occur only when process variables do not permit the attainment of earlier data points.

The arc height value on the curve that increases by 10% when the exposure time is doubled is declared to be the intensity. The exposure time associated with the intensity value is designated as “T.” The exposure time at which the arc height increases by 10% is designated as “2T.” See 6.6 for recommended documentation of peening intensity. The use of computer-generated saturation curves that comply with SAE J2597 is recommended.

In cases where it appears that a data point is erroneous, it is permissible to repeat that test. If the same erroneous value is achieved, then the machine parameters shall be evaluated and adjusted as needed and a new saturation curve shall be generated.

Almen test strips exposed for extended periods can exhibit arc heights significantly greater than the “intensity” value. This does not imply that extensively long duration peening treatments are in violation of intensity requirements. Intensity is a value derived from a saturation curve and is constant for a given set of machine parameters, regardless of peening time.

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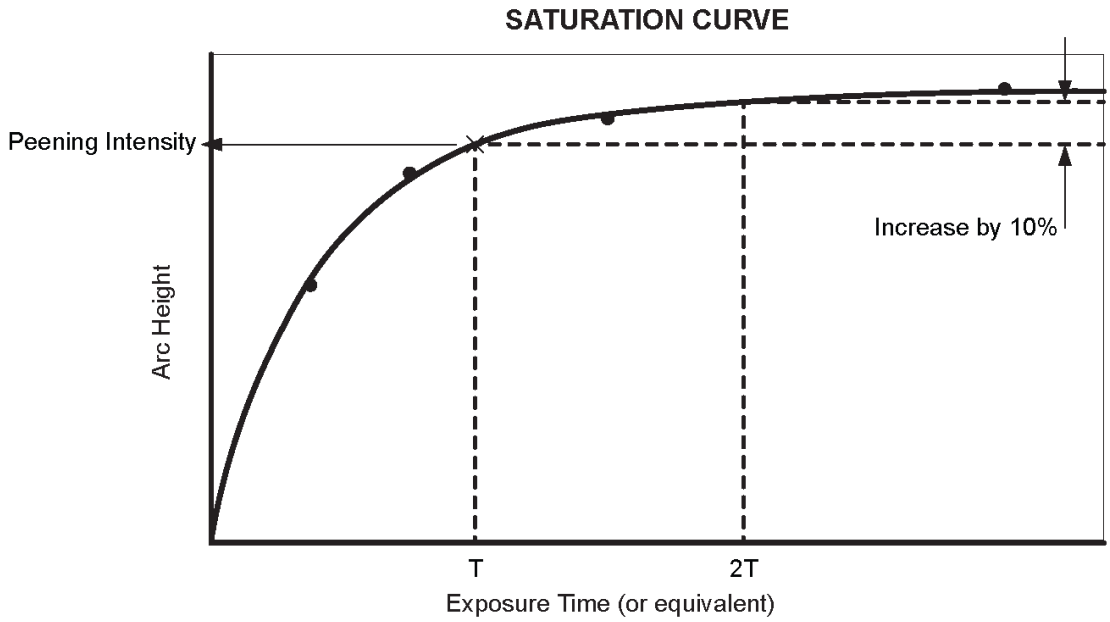

Figure 1 - Time based saturation curve (Type 1)

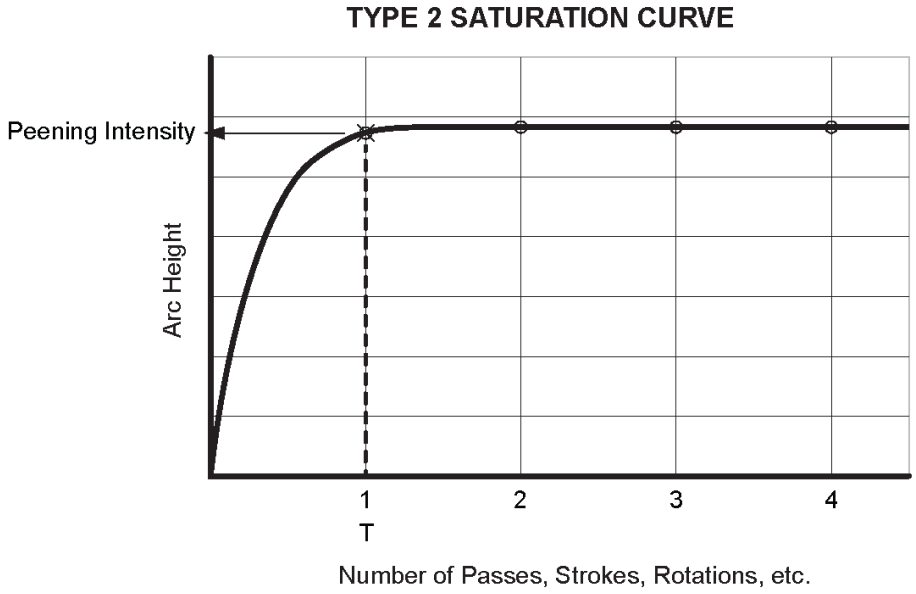

Figure 2 - Incremental based saturation curve (Type 2)

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