

	SURFACE VEHICLE RECOMMENDED PRACTICE	
	SAE	J442 FEB2013
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Superseding J442 NOV2008		
(R) Test Strip, Holder, and Gage for Shot Peening		

RATIONALE

Entire document revised and reformatted to extract information relative to use of these articles and pass them to SAE J443, Procedures for Using Standard Shot Peening Almen Strip.

1. SCOPE

This SAE standard defines requirements for equipment and supplies to be used in measuring shot peening arc height and other surface enhancement processes. Guidelines for use of these items can be found in SAE J443 and SAE J2597.

2. REFERENCES

2.1 Applicable Documents

2.1.1 SAE Publications

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

SAE J403 Chemical Compositions of SAE Carbon Steels

SAE J443 Procedures for Using Standard Shot Peening Almen Strip

SAE J2597 Computer Generated Shot Peening Saturation Curves

2.1.2 ASTM Publication

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org

ASTM E 18 Standard Test Method for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

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3. EQUIPMENT

3.1 Test Strip

3.1.1 The test strip is a flat rectangular piece of SAE 1070 cold rolled steel conforming to the description in Figure 1. Test strips exist in three standard thicknesses for low, medium and high intensity applications.

3.1.2 Sub-size strips may be used for intensity measurements in small locations such as holes or slots. These strips shall conform to requirements of Figure 1 except for length and width. The rolling direction shall be along the length of the test strip. See SAE J443 for additional requirements.

3.2 Holder

A hardened steel holding fixture conforming to the requirements of Figure 2 shall be used when exposing the test strip to a shot stream. Flatness in the contact zone (cross hatched area shown in Figure 2.) shall be maintained to 0.1mm. (0.0039 inch)

3.3 Gage

The gage shall conform to the requirements shown in Figure 3 and shall have a capability resolution of 0.001 mm. It shall have an accuracy of ± 0.005 mm (± 0.0002 inch). It shall be calibrated in its range of operation which is -0.050 mm to + 0.600 mm. The gage shall be calibrated on an annual basis. Calibration shall consist of reporting at least 5 points of extension (i.e., 0.2, 0.3, 0.4, 0.5 and 0.6 mm) for the indicator device. Balls and indicator tip shall be inspected and replaced if there are flat spots greater than 1.0mm. Positioning posts shall be replaced or rotated if grooves would interfere with proper seating of the strip onto the gage.

3.4 Zero Block

A zero block with a certified flat surface (0.005 mm) shall be used to set the zero datum of the gage. The block shall be shaped such that it rests upon the surface of the four support balls.

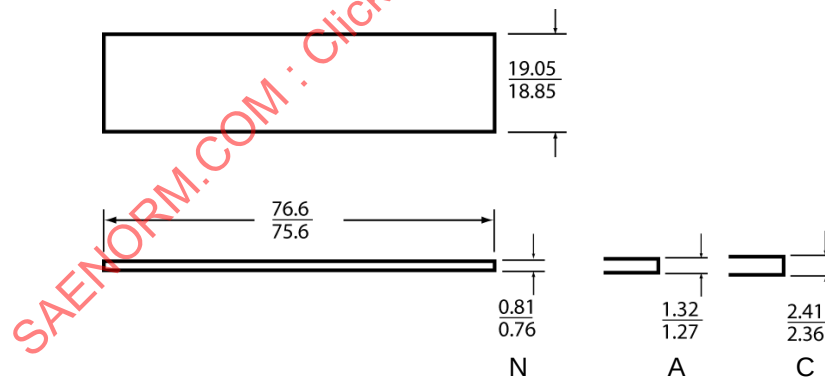


FIGURE 1 - TEST STRIP

1. Material: SAE 1070 cold rolled spring steel per SAE J403.

Heat Treatment: All strips shall be uniformly hardened and tempered to produce tempered martensite having a hardness, as measured on the surface, of HRC (44-50) for the A and C strips and HRA (72.5-76.0) for the "N" strips. Hardness shall be measured in accordance with ASTM E 18 at approximately 13 mm from either end of the strip on the longitudinal center line of a flat side. Sampling for hardness testing of the strips shall be used. Hardness determination precludes other use of the strip.

Surface Carbon: Strips shall be free from alteration of surface carbon level to the degree that any difference in average hardness between the surface and subsurface material shall not exceed two points as measured on the Rockwell 30-N scale. The average of at least four readings in each should be used to make the comparison. Any such determination must be made on strips which have not been shot peened; hardness determination will preclude other use of the strip. Surface hardness readings that are less than subsurface readings indicate evidence of decarburization. Surface readings which are higher than the corresponding subsurface values indicate carburization. For example: If the average surface hardness is 62.5 on the Rockwell 30-N scale and, after careful grinding, a region below the surface is found to be 64.0 on the Rockwell 30-N scale – the strip is acceptable. If the subsurface reading had been 65.0 on the Rockwell 30-N scale, the difference (2.5 points) being over two points would constitute grounds for rejection.

1. Edge Type: Number 1 (does not apply to ends of strip)
2. Finish: Free of any deformed metal (burrs) that projects above the plane of the test strip top and bottom surfaces.
3. Pre-Bow: The maximum allowed pre-bow for either side of each strip: N ± 0.025 mm (0.001 inch), A ± 0.025 mm (0.001 inch), and C ± 0.038 mm. (0.0015 inch) Post tempering treatments to achieve pre-bow flatness are not permitted.

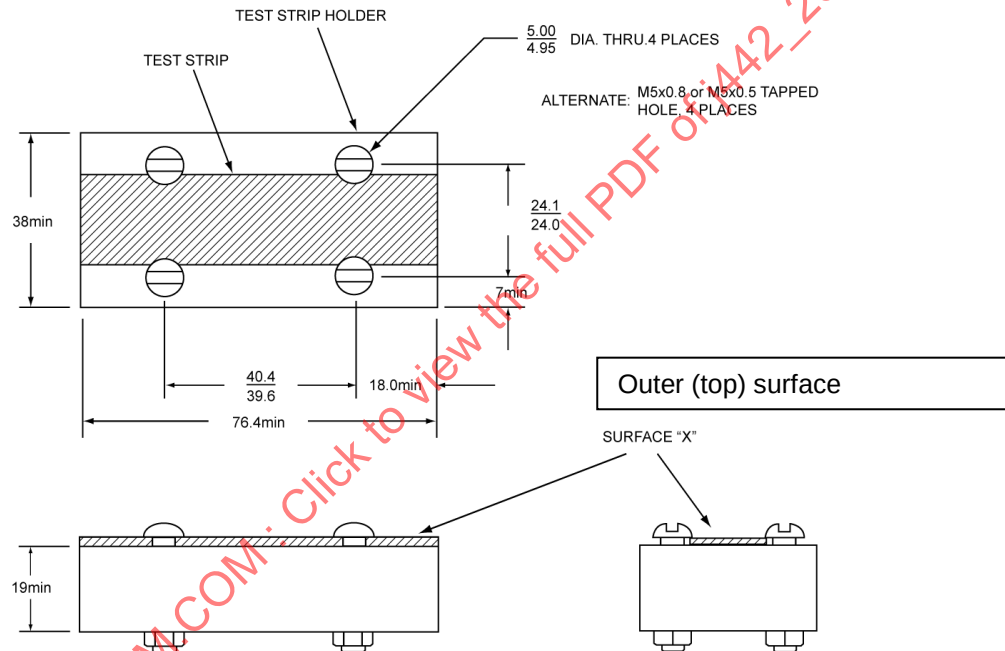


FIGURE 2 - ASSEMBLED TEST STRIP AND HOLDER

1. Material: The recommended material for the test strip holder is any alloy or carbon steel with minimum 57 HRC to a depth of 0.7 mm or greater. Alternate materials (and hardness) and exterior dimensions may be used when their wear and deformation characteristics do not adversely affect the performance of the test strip.
2. Attachment holes: One or two additional holes, each with a maximum diameter of 18 mm, may be added to facilitate mounting the holder to a fixture. The holes may be threaded or plain and may extend into the strip contact surface of the holder.
3. Screws: Use pan head (or smaller head diameter) style screw of size M5. No washers are allowed under the screw head to clamp the test strip to the holder.

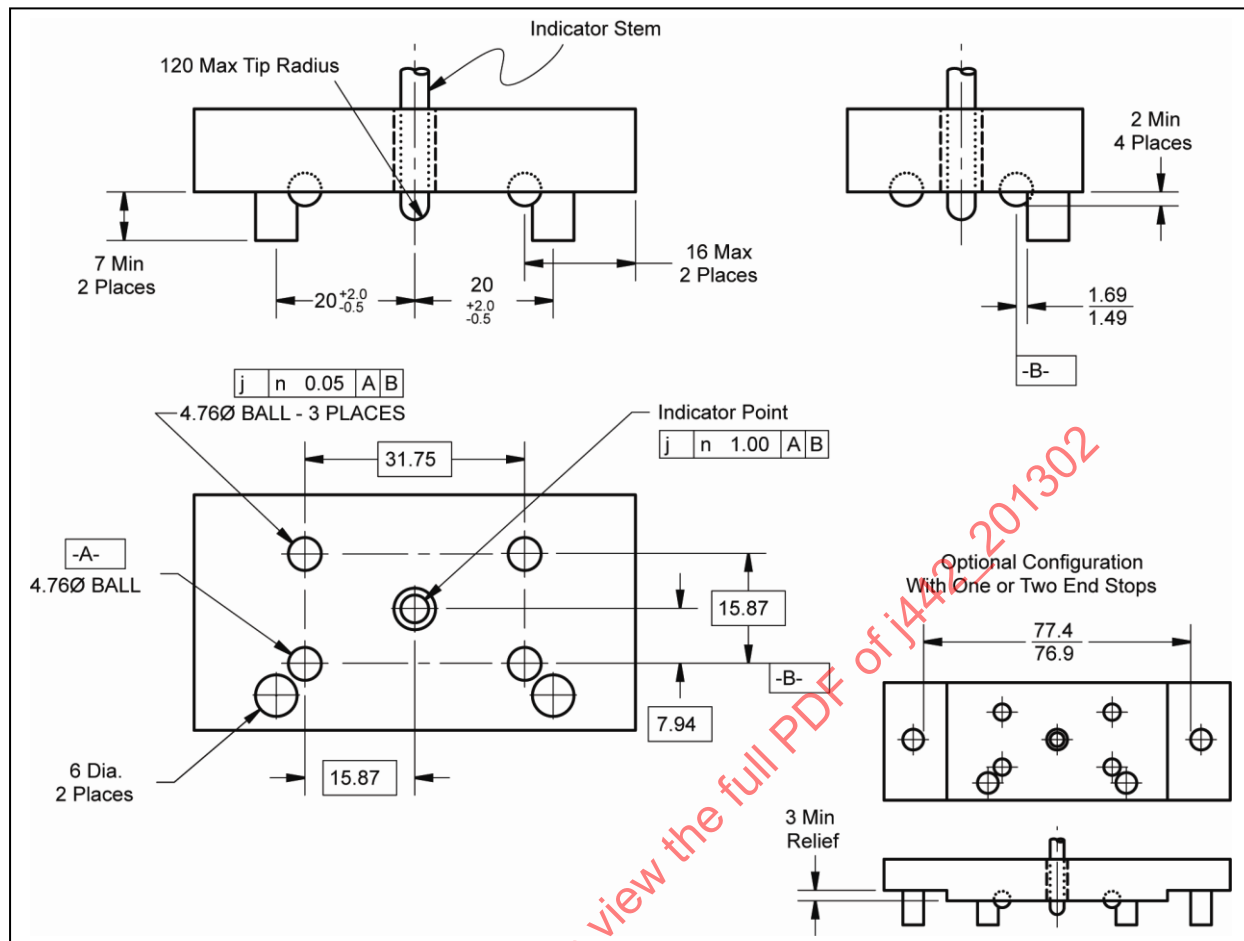


FIGURE 3 - TEST STRIP GAGE

1. Dimensional Tolerances: ± 0.5 mm unless otherwise specified
2. Four, 4.76 mm diameter, precision balls are installed in the test strip locating base. Balls shall be in the same plane (perpendicular to the indicator stem) within ± 0.05 mm.
3. Digital indicator shall have 0.001 mm (0.0001 in) resolution (minimum).
4. The optional configuration with one or two end stops (posts) is preferred because the stops promote uniformity of testing by ensuring consistent strip placement upon the gage.

4. NOTES

4.1 Superseded Gage Designation

Two types of gages were formerly used to measure the arc height of test strips. The number 1 gage, which is obsolete, employed two knife edges to support the test strip; the number 2 gage (developed in 1943) uses four balls to locate the test strip in relation to the indicator stem. Some engineering criteria may continue to show the numeral "2" after the test strip letter, designating the use of a number 2 gage. This designation (such as A2) is neither required nor recommended. The gage defined by this SAE Standard uses the same locating scheme as the number 2 gage, and therefore will yield an equivalent reading.