The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
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# SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1523

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Submitted for recognition as an American National Standard

## METAL TO METAL OVERLAP SHEAR STRENGTH TEST FOR AUTOMOTIVE TYPE ADHESIVES

***Foreword***—This Reaffirmed Document has been changed only to reflect the new SAE Technical Standards Board format.

***1. Scope***—This SAE Recommended Practice defines a procedure for determining shear strengths of adhesives used for bonding automotive oil metal substrates.

***2. References***

**2.1 Applicable Publications**—The following publication forms a part of this specification to the extent specified herein.

2.1.1 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 1002—Test Method for Strength Properties of Adhesives in Shear by Tension Loading (Metal-to-Metal)

***3. Test Substrates***

**3.1 Substrates**—Metal composition and roughness as specified.

**3.2 Dimensions**—Metal substrates shall be cut into flat coupons 25.4 mm (1.000 in) x 100 mm (4.000 in) at 0.8 mm (0.030 in) nominal thickness unless otherwise specified. Coupons shall be free from burrs or other surface imperfections.

**3.3 Surface Preparation**—Remove contaminant from test coupon surface using a neutral solvent such as acetone or methyl ethyl ketone. Apply a uniform 0.025 mm (0.001 in) wet thickness coating of light mineral oil over test coupons unless otherwise specified. Condition coupons at 23 °C ± 2 °C and 50% ± 5% humidity for 1 h minimum before bonding.

***4. Preparation of Test Joints***

**4.1 Joint Geometry**—Joint geometry will be as shown in Figure 1. A 3.2 $cm^2$ (0.5 $in^2$) overlap is recommended.

**4.2 Adhesive Bondline Thickness**—Evaluate adhesive bondline thickness at 0.13 mm (0.005 in) and 0.8 mm (0.030 in). Bondline thickness can be controlled by inserting wire or glass bead spacers into the adhesive. The spacer volume shall not exceed 1% of the total adhesive volume.





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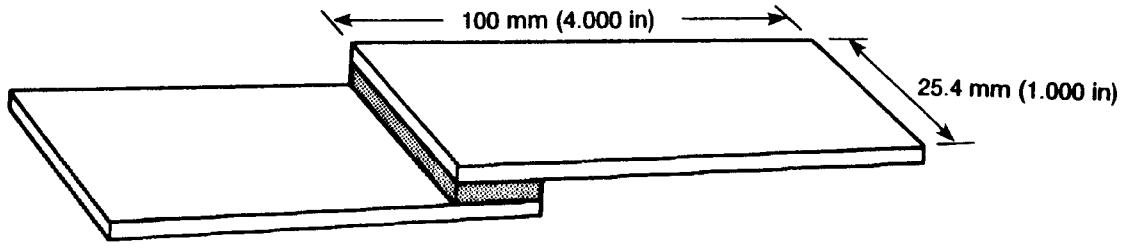


FIGURE 1—JOINT GEOMETRY

**4.3** **Adhesive Application—**The quantity of adhesive used to prepare the bond should be regulated to avoid excess squeeze-out. Squeeze-out at the edges of the bond shall be removed prior to curing.

**4.4** **Clamping and Fixturing—**Bonding surfaces shall be firmly fixed and retained through cure cycle.

**4.5** **Adhesive Cure—**Adhesive shall be cured in accordance with the adhesive suppliers or automotive engineer's recommendation.

**4.6** **Conditioning—**Bonded specimens shall be allowed to return to ambient temperatures for 1 h minimum prior to testing.

## *5. Testing*

**5.1** **Apparatus—**Test apparatus as described in ASTM D 1002.

**5.2** **Sample Clamping—**The distance between clamping jaws shall be 100 mm (4.000 in) with each jaw grasping 25 mm (1.000 in) minimum of test specimens.

**5.3** **Test Rate—**Specimens shall be tested at a pull rate of 13 mm (0.500 in)/min.

**5.4** **Test Quantity—**A minimum of five sample lap shears shall be prepared for each test condition.

## *6. Report Results*

**6.1** Report individual peak load values, sample average, and standard deviation. Bond values shall be reported as the value obtained for 3.2 $cm^2$ (0.500 $in^2$) bond. Do not interpolate to 6.5 $cm^2$ (1.000 $in^2$).

**6.2** Report composition, roughness, and thickness of substrate.

**6.3** Report value for 0.13 mm (0.005 in) and 0.8 mm (0.003 in) bonds.

**6.4** Report metal preparation materials and thickness applied.

**6.5** Report mode of failure (adhesive, cohesive, or substrate failure).

**6.6** Report adhesive cure schedule, time, and temperature.



PREPARED BY THE SAE MATERIALS JOINING COMMITTEE