

**LAP SHEAR TEST FOR AUTOMOTIVE-TYPE ADHESIVES FOR FIBER  
REINFORCED PLASTIC (FRP) BONDING**

**Foreword**—This Document has not changed other than to put it into the new SAE Technical Standards Board Format.

**1. Scope**—This SAE Recommended Practice describes a lap shear test method for use in measuring the bonding characteristics of automotive-type adhesives for joining fiber reinforced plastics to themselves and to metals.

**2. References**

**2.1 Applicable Publication**—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 Substrate**

**3.1 Substrates**—Fiber reinforced plastic as specified. Metal composition and roughness as specified.

**3.2 Dimensions**—Fiber reinforced plastic parts shall be cut into flat coupons 25.4 x 100 mm (1.000 x 4.000 in) at a nominal thickness of 2.5 mm (0.100 in). In the case of FRP to metal bonding, metal thickness will be nominally 1.5 mm (0.060 in).

**3.3 Surface Preparation**—Surface preparation of FRP will be in accordance with adhesive suppliers' recommendations. Surface roughening solvent cleaning and surface primers are acceptable provided they do not reduce FRP bulk properties. Any surface preparation must be adaptable to actual production situations. Metals will be machined to eliminate burrs or bevels. They will be clean and dry, or surface treated prior to bonding according to procedures prescribed by the adhesive manufacturer.

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#### 4. Preparation of Test Joints

- 4.1 Application of Adhesive**—Adhesive will be applied in accordance with adhesive suppliers' recommendations. In the case of two-part adhesives, mixing will be in accordance with suppliers' suggested procedures.
- 4.2 Adhesive Cure**—Adhesive will be cured at room temperature or elevated temperature using prescribed conditions determined by adhesive supplier, provided they can be reasonably adapted to production situations.

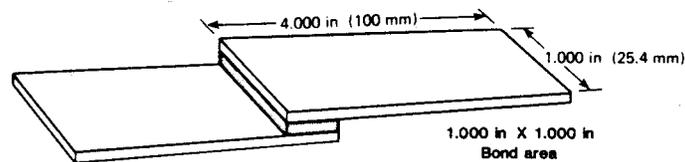


FIGURE 1—

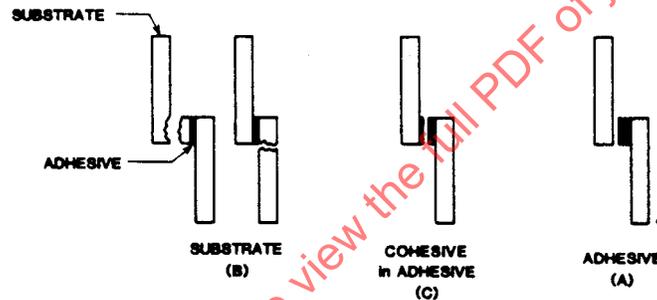


FIGURE 2—

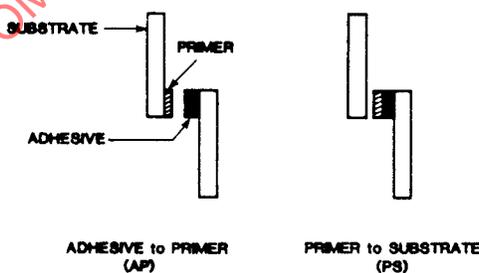


FIGURE 3—

- 4.3 Joint Geometry**—Joint geometry will be as shown in Figure 1. Joint geometry will be controlled by appropriate fixturing using glass beads or other suitable means to control a 0.76 mm (0.030 in) adhesive glueline thickness. The amount of glass beads in the glueline will be the minimum number needed to hold glueline thickness. Fixturing pressure will be allowed.
- 4.4 Excess Adhesive**—Excess adhesive (squeeze out) will be removed from bonded lap shear prior to testing.

**4.5 Conditioning**—Bonded parts will be allowed to return to ambient temperature for at least 1 h if elevated temperature cures are employed. If adhesive is room temperature cured, full cure time plus 10% will be allowed prior to testing.

**5. Testing**

**5.1 Apparatus**—The testing machine shall conform to the requirements of and have the capabilities of the machine prescribed in ASTM D1002.

It shall have a suitable pair of grips to hold test samples without allowing slip. Initial grip separation shall be 100 mm (4.000 in) with 25 mm (1.000 in) minimum of each sample and firmly held.

**5.2 Test Rate**—Fixture loading shall be in a consistent manner with a rate of 13 mm (0.5000)/min preferred.

**5.3 Test Samples**—Five lap shear samples will be prepared in each case and tested.

**6. Report**

**6.1** Complete identification of the adhesive tested, including type and manufacturer's code number.

**6.2** Complete identification of the substrates used and method of surface preparation prior to bonding.

**6.3** Cure schedule, time, and temperature for bonding sample.

**6.4** Individual peak load values (psi or kPa), averages, and failure modes with estimated percentages.

Failure mode will be reported as shown in Figure 2. Close visual observation will be used to determine failure mode.

If primers are employed, the failure modes shown in Figure 3 will be included.

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