GM	WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW15329

Determination of the Modulus of Rigidity in Shear for Adhesives Used in Glass Bonding Applications

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. To determine the modulus of rigidity in shear of polyurethane adhesives used for bonding stationary glass and encapsulating glass.

1.2 Applicability. Adhesives used in glass bonding applications.

1.3 Remarks. Not applicable.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3221

2.3 Additional References.

Test Petrol B 040 0007

3 Resources

3.1 Facilities. Not applicable.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Varnish Makers and Painters (VM&P) Naphtha, Test Petrol B 040 0007 or equivalent cleaning solvent.

3.2.2 Razor knife.

3.2.3 Air operated or electric adhesive cartridge dispense gun.

3.2.4 Air regulator.

3.2.5 Tensile tester capable of pulling 2000 N with a crosshead speed of 100 mm/minute at 10% strain.

3.2.6 Coupon holding racks capable of maintaining a 6 mm ± 2.0 mm bond height between upper and lower bonded test coupons. The racks are to be used in conjunction with specified substrate thickness.

3.2.7 Test Substrate.

3.2.7.1 Test substrates are to be Electrocoat (E-coat) coupons with dimensions per Table 1.

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Table 1: Test Substrate Dimensions

Width	25 mm
Thickness	0.8 mm to 1.0 mm
Length	100 mm

3.3 Test Vehicle/Test Piece.

3.3.1 Test Material. Fixed glass bonding adhesive.

3.4 Test Time.

Calendar time: Not applicable

Test hours: 30 minutes

Coordination hours: Not applicable

3.5 Test Required Information. See 5.3.1.

3.6 Personnel/Skills. Test Technician.

4 Procedure

Summary of Test Procedure. This test procedure is used to determine the modulus of rigidity in shear of fixed glass bonding adhesives when uniformly applied between two (2) sample substrates and pulled in shear to failure.

Standard Conditions. All testing in standard conditions to this specification shall be performed in accordance with GMW3221 Code A, Procedure for Standard Conditions of Organic Materials.

4.1 Preparation.

4.1.1 Test Sample Preparation.

4.1.1.1 Prepare the appropriate number of shear test specimens for each test condition as dictated by the material specification. If not specified prepare five shear test specimens for each test condition.

4.1.1.2 Clean all substrates with VM&P Naphtha or test petrol B 040 0007 unless otherwise specified.

4.1.1.3 In order to prevent squeeze-out from bonding to the substrate outside of the bond area, mask each coupon with masking tape leaving the bond area exposed.

4.1.1.4 Place one coupon of each set on the coupon holding rack with 1 mm spacing minimum between samples. Bonding area of coupons must be on the inner edge of the coupon rack. Secure the opposite end of coupons to the holding rack with tape.

4.1.1.5 Apply a bead of the adhesive at the end of the coupon. The finished bead dimensions of the cured assembly are 10 mm × 6 mm × 25 mm^3 (dimension tolerances of ± 2.0 mm at each dimension).

4.1.1.6 Within 5 minutes of applying cold applied and 1 minute of warm applied adhesive, position the coupons of the remaining substrate over the racked coupons so as to sandwich the adhesive between the appropriate portions of the coupons. Secure the rear end of the upper test coupons to the holding rack with tape. See Figure 1 for shear adhesion assembly.

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