



Overlap Shear Adhesion Test for Stationary Glass Bonding Materials

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. This standard describes a test procedure to determine the shear adhesion strength of polyurethane adhesives used for bonding stationary glass and encapsulating glass.

1.2 Applicability. Polyurethane adhesives used for bonding stationary glass and encapsulating glass.

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. None.

3 Resources

3.1 Facilities.

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 (VM) and Painters (P) Naphtha, Test Petrol or approved cleaning solvent.

3.2.2 Razor knife.

3.2.3 Primer applicator.

3.2.4 Air operated or electric adhesive cartridge dispense gun.

3.2.5 Air regulator.

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

3.2.7 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).

3.2.8 Test Substrate.

3.2.8.1 Test substrates are determined by the material to be tested or the appropriate material specification.

3.2.8.2 Substrate coupons are to have dimensions of 25 mm × 100 mm with the following recommended nominal thicknesses. Variations with size and coatings may be used as described by a related GM specification or when approved by the appropriate GM engineering group.

- Glass: 5.0 mm
- Metal: 0.8 mm
- Fiber Reinforcing Plastic: 2.5 mm
- Encapsulating Material: 3.2 mm

Note: Flexible substrates are to be maintained in a shear position during testing by reinforcing the coupon with a metal backing or other equivalent method.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Material.

3.3.1.1 Approved or development substrate primers (if required) as dictated by the material specification or recommended by the adhesive supplier.

3.3.1.2 Fixed glass bonding adhesive.

3.4 Test Time. Typical timing to run adhesion testing.

3.5 Test Required Information. See 5.3.

3.6 Personnel/Skills. Test technician capable of running test.

4 Procedure

Summary of Test Procedure. This test procedure is used to determine the material strengths 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 (5) shear test specimens for each test condition.

4.1.1.2 Clean all substrates with Varnish Makers and Painters (VM and P) Naphtha or Test Petrol unless otherwise specified.

4.1.1.3 Apply appropriate primers to the coupons in the area to be bonded. Unless otherwise specified, a nominal dry film thickness per the manufactures specification is required.

4.1.1.4 Air dry primed coupons for 30 minutes to 60 minutes at 22 °C ± 3 °C and 50% ± 5% Relative Humidity (RH). Record the actual temperature and relative humidity.

4.1.1.5 Place one (1) set of coupons on the coupon holding rack with 1 mm spacing 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.

4.1.1.6 Apply a bead of the adhesive approximately 6 mm to 8 mm inboard from the end of the coupon. Bead dimensions of the cured assembly are 6 mm x 10 mm x 25 mm (dimension tolerances of +2/-0 mm).

4.1.1.7 Within five (5) minutes of applying the 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.