



Determination of Adhesion of Elastomers to Glass, Painted Sheet Metal, or Other Mating Material

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 provides a means for the determination of adhesion, which may occur between an elastomer and glass, painted sheet metal, or other elastomers when in contact. Test pieces of elastomers are held in contact with the respective mating substrate under a specified deflection or pressure force at an elevated temperature for a specified period. The force required to separate the two is then determined. Tests are carried out on test pieces in the "as received" condition, and also when exposed to the effects of specified liquids.

1.2 Applicability. This procedure is applicable to all weatherstrips (body and glass).

2 References

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

2.1 External Standards/Specifications.

ISO 188 ISO 7500-1

2.2 GM Standards/Specifications.

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 Test Piece Mounting Fixtures.

3.2.1.1 Test Piece Mounting Fixtures for Force Determination (Method A). The test piece mounting fixture shall be either a portion cut from the component by which means the elastomeric part is mounted in service or compression fixture as shown in Appendix A, Figure A1. The length of the mounting fixture shall be 100 mm minimum, and it shall be capable of holding the two (2) test pieces opposite and parallel to each other. The fixture must allow for secure attachment to the test machine, which will indicate the force required to separate the test pieces from the glass or painted sheet metal.

3.2.1.2 Test Piece Fixtures for Single Pull-Off Test (Method B). Test pieces shall be positioned on a suitable flat base material and loaded with the respective weight. (See Appendix A, Figure A2).

3.2.2 Glass Plate and Painted Sheet Metal Panel. The glass plate shall be production representative tempered automotive glass. Glass plates must have appropriate size for the fixture used, and a thickness of 3 mm minimum to avoid breakage.

The painted sheet metal panels shall be representative of the mating surface that the elastomer will contact in service. Painted panels may be primer, basecoat, or basecoat/clearcoat. If basecoat or basecoat/clearcoat, the basecoat shall be white. All paint systems shall be representative of the production paint system that the elastomer will contact in service. Panels must have appropriate size for the fixture used.

The paint system and details of paint panel preparation will be defined by the GM Release Engineer or GM Materials Engineer.

Panels may be prepared by the assembly plant or other suitable source, such as Advanced Coating Technologies (ACT), Technical Finishing (TFI) or the respective paint supplier for the assembly plant.

Note: In the case of painted sheet metal panels, panels must be stored at $-30\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ until usage.

3.2.3 Oven. Heating oven capable of maintaining the required temperatures within the specified tolerances (e.g., heat oven to ISO 188 Method B).

3.2.4 Test Machine. The test machine shall be capable of detaching the test piece mounting and test pieces from the plate to which it is adhered, at a velocity of 50 mm/minute $\pm$ 5 mm/minute and indicating the force required. The force measuring device of the test machine shall correspond to ISO 7500-1 Class 1.

3.2.5 Spacers shall be provided in order to secure the test piece holder at a distance, specified in the relevant part drawings, from the glass or painted sheet metal.

3.2.6 Fasteners or clamps suitable to secure the assembly in the required distance.

3.2.7 Test Liquids. Liquids which are to be used shall be unequivocally defined, either by chemical composition or by the use of General Motors Material Specifications. The liquid(s) used shall be specified on the relevant part drawing or performance specification.

3.2.8 Weights (for Testing to Method B). Three (3) weights, each 0.45 kg $\pm$ 0.05 kg.

3.3 Test Vehicle/Test Piece.

3.3.1 Test pieces for Method A shall consist of a length of material from the component, 100 mm long $\pm$ 1 mm long. Test pieces for Method B shall have a total length of 450 mm $\pm$ 5 mm. The test shall be carried out on pairs of test pieces.

3.3.2 For initial sample approval and arbitration purposes, three (3) pairs of test pieces minimum, cut from two (2) components minimum, shall be tested. For routine quality control purposes, one (1) pair of test pieces minimum, preferably from two (2) components, shall be tested.

3.4 Test Time. Not applicable.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Per laboratory accreditation requirements.

4 Procedure

4.1 Preparation.

4.1.1 Summary of Test Method. Samples of elastomers are compressed against glass, painted panels or other elastomers and exposed to a heat cycle. The samples are then separated from the glass, painted panel, or other elastomer. The force required to separate the elastomer from the mating substrate is recorded, and respectively observed whether sticking occurs.

4.2 Conditions. The minimum time period between vulcanization and testing of elastomers shall be 72 h. The test piece shall remain at a temperature of $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ for at least 8 h before testing, and shall be free from strain during this period.

4.2.1 Environmental Conditions.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.