



Determination of Outer Belt Position and Lip Interface to Glass

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 document and measure the sealing lip to glass interface and position of outer belt on the flange at multiple lip compressions for comparison to design, analytical and actual.

1.2 Applicability. This test procedure is applicable to all outer belt seals.

2 References

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

2.1 External Standards/Specifications.

None

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 Digital Camera. Ten (10) megapixels minimum.

3.2.2 Camera Slide. See Figure A1. When camera is attached to slide fixture, the camera must be square to the base of the fixture. Use a level to verify.

3.2.3 Glass Plate. Clear, tint-free, flat glass panel, 4 mm thick, and of adequate height so that panel extends a minimum of 25 mm above the top of the test sample when assembled in the fixture. (**Note:** Glass panel shall have no curvature and shall be automotive or plate glass; laminated glass is not acceptable). Length of glass panel shall be longer than the test specimen, but shorter than the fixture base. See Figure A2.

3.2.4 Fixture. Wire burn fixture representative of door environment (door outer with outer belt reinforcement). Any retention features in the center of the belt, (i.e., pumpkin teeth) shall be represented in the wire burn at the end of the fixture (where the picture is taken). Fixtures shall be made of aluminum. The length of the Electric Discharge Machining (EDM) wire burn shall be at 100 mm $\pm$ 5 mm in length.

The fixture base shall be square to allow for perpendicular positioning relative to the camera. The fixture base must allow for secure perpendicular positioning (horizontally and vertically) below the camera. Fixture must include locking grooves to ensure that test pieces are securely held at the specified compression positions. (Maximum gap, Nominal, Minimum gap). See Figure A3.

3.2.5 Flat bottom glass dish of sufficient size to hold one (1) sample.

3.2.6 Deionized water.

3.2.7 Scales. 0.5 mm increments.

3.2.8 Light. High intensity lighting (i.e., microscope lighting), sufficient to remove all background shadows.

3.2.9 Box to reflect light.

3.3 Test Vehicle/Test Piece.

3.3.1 Four (4) 100 mm $\pm$ 5 mm test pieces shall be cut from one (1) straight length extrusion prior to any finishing operations (i.e., stretch bending). End cuts must be clean, square, and free from burrs. Samples must be cut with no distortion to test piece.

3.4 Test Time. Not applicable.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation.

4.2 Conditions.

4.2.1 Environmental Conditions. The minimum time between vulcanization and testing of elastomers shall be 72 h. The test pieces shall be maintained at a temperature of $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ and $50\% \pm 5\%$ relative humidity for at least 8 h prior to test and shall be free from strain during this period.

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.

Any deviations from the requirements of this standard shall have prior approval from the Weatherstrip Global Subsystem Leadership Team (GSSLT) and shall be documented on the GSSLT Deviation Form, found in Global Document Management (GDM).

4.3 Instructions.

4.3.1 Method A - Lip Interface. Three (3) test pieces are needed for this method. Test shall be run in maximum gap, nominal, then minimum gap order. Glass shall be inserted into fixture base prior to test. Wire burn fixture is not mounted to base at the beginning of the test.

4.3.1.1 Place test sample (flocked lips face down) into the glass dish containing enough deionized water to cover the lips. Leave sample in water for one (1) minute.

4.3.1.2 Insert one test piece onto wire burn fixture.

4.3.1.3 Mount and secure wire burn fixture to the fixture base at maximum gap position.

4.3.1.4 Position fixture base horizontally under camera lens. Place scale on glass plate, perpendicular to the sample. See Figure A4 and Figure A5.

4.3.1.5 Photograph the sample. Save picture to file.

4.3.1.6 Remove test piece and wire burn from the fixture. (Do not remove test piece from wire burn fixture).

4.3.1.7 Dry glass. Rewet test piece by placing sample back into glass dish as in 4.3.1.1. Repeat 4.3.1.2 through 4.3.1.6 two (2) more times at the same condition using the same sample.

4.3.1.8 Place wire burn with sample onto fixture base at nominal position. Repeat 4.3.1.2 to 4.3.1.7 for nominal and minimum gap positions for each of the test pieces.

4.3.1.9 From pictures, measure and record the lip interface area for each position, to the nearest 0.5 mm. See Figure A10.

4.3.1.10 Compare results with Finite Element Analysis (FEA) results.

4.3.2 Method B – Outer Belt Position. One (1) test piece is needed for this method. Test shall be run in maximum gap, nominal and minimum gap order. Glass shall be inserted into fixture base prior to test.

4.3.2.1 Attach and secure wire burn fixture to base in the maximum gap position.

4.3.2.2 Insert test piece onto wire burn fixture.

4.3.2.3 Align edge of glass with edge of sample. See Figure A6.

4.3.2.4 Attach scales to fixture as shown in Figure A7.

4.3.2.5 Position fixture vertically under camera lens. See Figure A8.

4.3.2.6 Photograph sample. Photograph must encompass total end view including wire burn fixture. See Figure A9. Save picture to file.

4.3.2.7 Do not remove sample from wire burn fixture. Move the wire burn fixture to nominal gap position. Repeat 4.3.2.2 to 4.3.2.6 for nominal and minimum gap positions.

4.3.2.8 From pictures, measure and record the V-Gap to the nearest 0.5 mm. See Figure A9.

4.3.2.9 Compare results with FEA results.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation.

5.3.1 Photo files for both methods.

5.3.2 Lip interface measurements.

6 Safety

This Engineering Standard may involve safety requirements for hazardous materials, the method of operations and equipment. This standard does not propose to address all the safety issues associated with its use. It is the responsibility of the user of this standard to ensure compliance with all appropriate safety and health practices. This would include any specific training that may be required. The safety and health standards include site specific rules and procedures, company rules and procedures, and Government Standards. Contact shall be made with the appropriate site Safety and Health personnel for further direction and guidance in these matters.

7 Notes

7.1 Glossary. Not applicable.

7.2 Acronyms, Abbreviations, and Symbols.

EDM Electric Discharge Machining

FEA Finite Element Analysis

GDM Global Document Management

GSSLT Global Subsystem Leadership Team

8 Coding System

This standard shall be referenced in other documents, drawings, etc., as follows:

Test to GMW16608

9 Release and Revisions

This standard was originated in May 2011. It was first approved by the Weatherstrip GSSLT in June 2011. It was first published in June 2011.

Issue	Publication Date	Description (Organization)
1	JUN 2011	Initial publication.
2	JUL 2016	Updated section 4.2.2, added photo to Appendix 9; added $\pm$ to all temperature callouts. (Body – Weatherstrip GSSLT)

Appendix A



Figure A1: Camera Slide

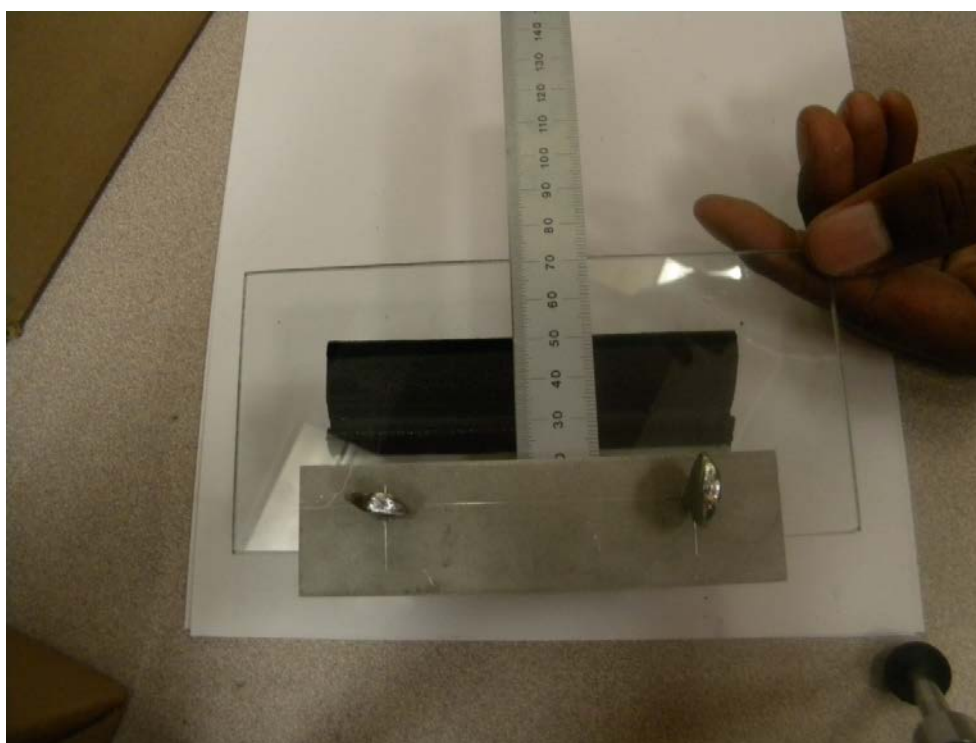


Figure A2: Glass in Fixture