GM	WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW15379

Freeze Characteristics of Weatherstrips

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 of evaluating the freeze characteristics of coated, uncoated, or flocked weatherstrips.

1.2 Applicability. This procedure is applicable to all weatherstrips (flocked, coated, or uncoated).

2 References

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

2.1 External Standards/Specifications.

ISO 7500-1 ISO 9513

2.2 GM Standards/Specifications.

None

2.3 Additional References.

Advanced Coating Technologies (ACT), 273 Industrial Drive, Hillsdale, MI, 49242

3 Resources

3.1 Facilities. See 3.1.1 and 3.1.2.

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 Method A. - Body Sealing Weatherstrips.

3.2.1.1 Universal testing machine with an environmental chamber capable of -30 °C ± 2 °C. The force measuring device of the test machine shall correspond to ISO 7500-1 Class 1; the deflection measuring device shall correspond to ISO 9513 Class 0.2.

3.2.1.2 Method A - Freeze Test Fixtures. See Appendix A, Figure A1 and Figure A2.

3.2.1.3 Spray bottle capable of a mist spray, containing deionized water.

3.2.1.4 Production representative mating substrate. Substrates may include painted or primed metal, mold-in-color, painted or primed plastic, or glass. Painted mating substrate may be primer, basecoat, or basecoat/clearcoat. Painted substrate can be obtained from the respective vehicle assembly plant or from Advanced Coating Technologies (ACT), 273 Industrial Drive, Hillsdale, MI, 49242. Painted panels must be stored at -30 °C ± 3 °C until usage.

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3.2.2 Method B - Glass Sealing Weatherstrips.

3.2.2.1 Glass Panel. Glass panel according to the glass currently used in production with dimensions 180 mm × 180 mm × 5 mm. An additional mass (e.g., metal plate) is attached (glued) to the glass panel to achieve an overall weight of 1000 g.

3.2.2.2 Metal Plate. Metal plate with a mass of 1000 g. The dimensions shall conform to those of the glass panel.

3.2.2.3 Adhesive. A cold resistant adhesive, with no detrimental effect on the elastomer.

3.2.2.4 Cold Chamber. Cold chamber capable of maintaining the required temperatures within the specified tolerances.

3.2.2.5 Suitable container with deionized water.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Pieces - Method A. Cut test specimens 150 mm ± 1 mm long from weatherstrips of the same part number. The minimum number of test specimens required is six (6).

3.3.2 Test Pieces - Method B. From the profiles, test pieces are cut with approximately 10 mm width and uniform thickness. These test pieces are glued to a metal plate (mass of the metal plate is 1000 g) where several sections with an overall surface of 25 cm^2 will be placed as equally as possible over the metal plate.

For initial sample approval and arbitration purposes, at least three (3) test pieces taken from at least three (3) components shall be tested; for routine quality control purposes, at least one (1) test piece 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.

4.1.1.1 Method A. A section of weatherstrip is compressed against a wetted mating panel at an ambient temperature of 10 °C to 25 °C. The temperature is then lowered to -30 °C ± 3 °C and maintained for 30 minutes ± 1 minute. After 30 minutes ± 1 minute, the weatherstrip sample is pulled from the surface of the mating panel and the peak tensile force for separation is recorded.

4.1.1.2 Method B. Sealing profiles are wetted, and a glass panel of defined weight is put on the sealing. After storage in a cold chamber, the glass panel must release from the profiles when lifted. The freezing on behavior is to determine the hydrophobic properties of flocked elastomeric sealing.

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 °C ± 5 °C and 50% ± 5% relative humidity for at least 24 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.

4.3 Instructions.

4.3.1 Test Procedure - Method A.

4.3.1.1 Mount freeze test fixtures to the universal test machine inside the environmental chamber.

4.3.1.2 Mist panel three (3) times with deionized water to achieve a uniform spray of small droplets, visually similar to the example in Appendix A, Figure A3.

4.3.1.3 Place the cut weatherstrip test specimen in the top test fixture.

4.3.1.4 Place the mating panel (sufficiently large to accommodate the weatherstrip sample) in the bottom test fixture so that it is parallel with the weatherstrip. Use a new panel for each test.

4.3.1.5 Zero the load cell and the distance prior to compressing the test specimen. Compress the test specimen against the mating panel to the design compression line of the weatherstrip at 50 mm/minute ± 5 mm/minute.

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4.3.1.6 Reduce the temperature in the environmental chamber to -30 °C ± 3 °C. Allow the test specimen and painted panel to remain at -30 °C ± 3 °C for 30 minutes ± 1 minute.

4.3.1.7 Pull the weatherstrip from the painted panel at 250 mm/minute ± 10 mm/minute. Record the peak tensile load in Newtons.

4.3.1.8 Warm the environmental chamber and fixture to within the temperature range of 10 °C to 25 °C prior to starting the next freeze test.

4.3.1.9 Repeat 4.3.1.2 thru 4.3.1.8 until all test specimens of the sample set (minimum = 6) have been tested.

4.3.2 Test Procedure - Method B.

4.3.2.1 Completely immerse the metal plate with the glued test pieces for 10 s ± 1 s in deionized water. Remove from water and allow the water to drip for 10 s ± 1 s over the edge.

4.3.2.2 Place the glass panel and the additional mass (entire mass 1000 g) on the test pieces.

4.3.2.3 Place the test setup at -5 °C (-5 °C test piece temperature) into the cold chamber.

4.3.2.4 After 2 h + 0.1 h, lift the glass panel in the center while the test apparatus is still in the cold chamber. The mass of the metal plate must cause the sealing lips to release from the glass panel.

5 Data

5.1 Calculations - Method A. Calculate the mean value and the standard deviation of the peak tensile loads recorded for the test specimens of the sample set.

5.2 Interpretation of Results - Method B. If the sealing lips release when the glass panel is lifted, the test is passed.

5.3 Test Documentation. With reference to this test procedure, the results shall be represented in a test report. The report shall include the following:

- Complete identification of the specimen.
- Conditioning of the test specimen.
- Test conditions.
- Any deviations to the test method.
- Mean value and the standard deviation of the peak tensile loads recorded for the test specimens of the sample set (Method A).
- Pass/fail determination (Method B).

6 Safety

This standard may involve hazardous materials, operations, and equipment. This standard does not propose to address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

7 Notes

7.1 Glossary. Not applicable.

7.2 Acronyms, Abbreviations, and Symbols.

ACT Advanced Coating Technologies

ISO International Organization for Standardization

8 Coding System

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

Test to GMW15379

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