



Flock Adhesion Test for 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 procedure is used to determine the adhesion characteristics of fiber coated (flocked) parts by measuring the bond strength between the flock and the substrate. Method A is used to determine adhesion characteristics of flock tape. Method B is used to determine the characteristics of electrostatically applied flock. Method C is used to determine the characteristics of electrostatically applied flock in smaller post flocked areas, such as molded corners.

1.2 Applicability. This procedure is applicable to all flocked weatherstrips.

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

2.3 Additional References.

Laboratory Accreditation Requirements

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 Razor knife.

3.2.2 Spring scale capable of measuring 0 N to 10 N.

3.2.3 Clean white cheesecloth.

3.2.4 Varnish Makers and Painters Naphtha solvent.

3.2.5 Humidity chamber.

3.2.6 Hot melt adhesive gun.

3.2.7 Hot melt adhesive, Adchem Number 7301-13 or equivalent.

3.2.8 Hot melt fixture/mold, to create a flow channel 75 mm × 5 mm × 5 mm for Method B. See Appendix A, Figure A1.

3.2.9 Hot melt fixture/mold and clamping device, to create a flow channel for Method C. See Appendix A, Figure A3 and Figure A4.

3.2.10 Force gage or tensile test machine.

3.2.11 Clamps/jaws with serrated faces.

3.2.12 Clamping fixture suitable to securely hold hot melt fixture used in Method C. (See Appendix A, Figure A6).

3.3 Test Vehicle/Test Piece. Test samples shall be cut from finished parts. For Method A, cut three (3) samples approximately 150 mm × 40 mm. For Method B, cut six (6) samples approximately 150 mm × 40 mm. For Method C, cut six (6) samples of sufficient size (minimum width of 15 mm).

3.4 Test Time. Reference the lab test procedure(s) in Section 4 for timing details.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Per laboratory accreditation requirements.

4 Procedure

4.1 Preparation. See Methods listed in 4.3.

4.2 Conditions. Unless otherwise specified, the tests shall be performed at $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

4.2.1 Environmental 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.

4.2.1.1 Moisture Exposure. Test pieces shall be exposed for $24\text{ h} \pm 0.1\text{ h}$ at $+38\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and $95\% \pm 5\%$ relative humidity (RH).

4.2.1.2 Solvent Exposure. Saturate a clean white cheesecloth with naphtha and wring out excess. Fold the solvent-dampened cloth and place it onto the face of the sample. Leave in place for 5 minutes. The cloth shall cover the entire face of the sample.

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.

Note: Any deviation agreement shall be made by the GM engineer or weatherstrip global subsystem leadership team.

4.3 Instructions.

4.3.1 Method A: Knife Peel Test for Flock Tape. This test is to be performed on one (1) sample as received, one (1) sample after moisture exposure, and one (1) sample after solvent exposure.

4.3.1.1 Cut two (2) parallel lines $30\text{ mm} \pm 3\text{ mm}$ in length approximately 6.5 mm apart. Cuts shall be through the flock tape to the substrate.

4.3.1.2 Peel back only enough of the fiber coating/adhesive film (flock tape) to place into the spring scale clip.

4.3.1.3 Peel the strip at a 180 degrees angle at a rate of 250 mm/minute.

4.3.2 Method B: Hot Melt Peel Test for Electrostatically Applied Flock on Extruded Profiles. This test is to be performed on three (3) samples as received and three (3) samples after moisture exposure.

4.3.2.1 Method B: Sample Preparation.

4.3.2.1.1 Mount flocking sample into fixture/mold. Position flock side towards hot melt channel and towards one end of the sample. Clamp tightly to prevent adhesive leakage. Inject hot melt adhesive into mold port, making sure gun tip is held flush with inlet until adhesive exits through port hole.

4.3.2.1.2 Allow hot melt adhesive to cool for $20\text{ minutes} \pm 0.1\text{ minute}$ before cutting excess adhesive from port hole. Release material from mold and trim part tab flush with channel and any excess adhesive from sides of channel. Allow sample to condition for a minimum of 30 minutes at room temperature. Sample must be tested within 8 h of preparation.

4.3.2.2 Method B: Test Procedure.

4.3.2.2.1 Cut or peel substrate from adhesive for jaw clamping. Position metal plate on top of adhesive. Attach clamp or jaws to adhesive and metal plate and secure rubber substrate on same end to a stationary fixture. See Appendix A, Figure A2.

4.3.2.2.2 Pull hot melt adhesive from substrate in a 180 degrees peel at a rate of 305 mm/minute for a minimum of 50 mm separation/peel.

4.3.2.2.3 Repeat on a minimum of three (3) test samples for each exposure.

4.3.3 Method C: Hot Melt Peel Test for Electrostatically Applied Flock on Molded Corners or Extruded Profiles. This test is to be performed on three (3) samples as-received and three (3) samples after moisture exposure.

4.3.3.1 Method C: Sample Preparation.

4.3.3.1.1 Mount flocking sample into fixture/mold (see Appendix A, Figure A5). Position flock side towards hot melt channel and towards one end of the sample. Clamp tight to prevent adhesive leakage. Inject hot melt adhesive into mold port, making sure gun tip is held flush with inlet until adhesive exits through port hole.

4.3.3.1.2 Allow hot melt adhesive to cool for 20 minutes $\pm$ 0.1 minute before cutting excess adhesive from port hole. Release material from mold and trim part tab flush with channel and any excess adhesive from sides of channel. Allow sample to condition for a minimum of 30 minutes at room temperature. Sample must be tested within 8 h of preparation.

4.3.3.2 Method C: Test Procedure.

4.3.3.2.1 Place the prepared sample and fixture into the holding fixture on the testing machine, ensuring that the sample is held securely (see Appendix A, Figure A7).

4.3.3.2.2 Separate fixture/mold from flocked sample at a rate of 50 mm $\pm$ 5 mm/minute (see Appendix A, Figure A8). Record the peak load required to separate the hot melt mold from the flocked sample.

4.3.3.2.3 Repeat on a minimum of three (3) test samples for each exposure.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results.

5.2.1 Knife Peel Results. Report the following results for as-received, after moisture exposure, and after solvent exposure:

5.2.1.1 Force in newtons (N) required for peel.

5.2.1.2 If unable to peel back flock tape, or if peel strength is unavailable due to breakage of the flock tape, report no adhesive failure.

5.2.2 Hot Melt Peel Results. Report the following results for each exposure condition:

5.2.2.1 Force in newtons (N) for average and maximum values for each sample.

5.2.2.2 Peel/tear distance in millimeters (mm).

5.2.2.3 Type of separation.

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, if any.
- Test conditions; temperature, humidity, etc.
- Peel force values.
- Mode of separation.
- Any additional observations.

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.