



Adhesion Performance Requirements for Adhesive Backed Light Trim and Foam

1 Scope

This specification covers the adhesion performance requirements of light adhesive backed trim or foam which is bonded to painted or unpainted metal, plastic or glass. Primary applications are used on the exterior of the vehicle.

1.1 Material Description. Foams can be open or closed cell of varying polymer technologies. The adhesives of these pressure sensitive applications will carry a release liner or be provided on release liner sheets, (e.g., adhesive backed foam strips). The construction can be applied to component and shipped Part of Assembly (POA) or delivered as a separate part for installation at a GM Assembly Center.

1.2 Symbols. Not applicable.

1.3 Applicability. Typical applications include spacers, door water shields, foam gaskets (e.g., fasteners), under hood muckets, foam dams (windshields/Air Inlet Panels (AIP)), and general air, dust, and water seals such as seals and close-outs in lighting.

Note: This specification does not address interior adhesion performance. Those requirements are specified within GMW14444 and GMW14892.

1.3.1 Type Performance.

1.3.1.1 Type I. An adhesive backed application that is entrapped and/or mechanically retained for the life of the vehicle. The adhesive application of this type is functional prior to and during installation or until such time when it is entrapped and/or mechanically retained down line from the installed location.

1.3.1.2 Type II. An adhesive-backed foam composite that is retained by the adhesive for the life of the vehicle.

2 References

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

2.1 External Standards/Specifications.

ISO 188	ISO 8510-2	SAE J2412
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2.2 GM Standards/Specifications.

GMW3059	GMW14162	GMW14892	GMW16853
GMW3221	GMW14444	GMW15735	
GMW14124	GMW14729	GMW15851	

2.3 Additional References.

Safety and Industrial Hygiene (S&IH) Technical Standard (TS), S&IH TS 3.4-160-02

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

3.2 Emissions Testing of Interior Materials and Parts. For all Code E designated parts per GMW14444, reference GMW16853 for emissions testing of interior materials and parts.

3.3 Standard Requirements. The specific proposed trim/foam/adhesive combination must be tested with on production intent parts. Refer to Appendix A, Table A1, and Table A2 for test report data forms.

3.3.1 Parts may be cut/sectioned to enable exposure in cabinets or chambers that cannot accommodate a full production sample. Cutting production parts for this purpose requires agreement from GM Engineering prior to the onset of testing.

3.3.2 Include the test report in the Production Part Approval Process (PPAP) package. The test report shall clearly indicate that all of the requirements of the specification have been met.

3.3.3 Edge Adhesive. The test samples must be exposed in an inverted position where the adhesive attached trim/foam is underneath/below the application substrate and retained by the adhesive only. During and after the required environmental exposures of this specification, the edges of the bonded trim/foam shall show no signs of lift or separation from the substrate. During heat exposure, the adhesive must not flow from the bond joint.

3.4 Peel Adhesion 180 Degree (ISO 8510-2). When peeled at an angle of 180 degrees and a rate of 300 mm/minute, the adhesive backed foam must demonstrate a minimum 525 Nm width and foam tear. Allow 24 h recovery at 23 °C and 50% Relative Humidity (RH) after environmental exposures prior to peel adhesion.

3.4.1 If a backing layer (i.e., aluminum foil or polyester) is used, test each adhesive backed layer separately. Refer to Appendix B, Figure B1 for sample setup.

3.5 Environmental Exposure.

3.5.1 Type I Applications. Perform edge adhesion only with the environmental exposures of 3.5.3 through 3.5.5.

3.5.2 Type II Applications. Perform edge adhesion and 180 degree peel with the environmental exposures of 3.5.3 through 3.5.8.

Note: Expose to accelerated weathering for exterior exposed applications only.

3.5.3 As-Received. As-received refers to the production parts/test samples in the "As-Received" state at the intended GM vehicle assembly center. This includes full cure conditions of the adhesive systems based upon the manufacturer's recommended requirements. Unless otherwise specified, age test sample 24 h prior to testing.

3.5.4 Heat Age, ISO 188. Samples shall be exposed for 168 h at 80 °C ± 2 °C in an air circulating oven per ISO 188.

3.5.5 Humidity, GMW14729. Samples shall be exposed for 168 h in a condensing humidity chamber.

- Use Option B for Type I performance.
- Use Option A for Type II performance.

3.5.6 Cycle Exposure, GMW14124. Samples shall be exposed per GMW14124.

a. **Exterior:** Two (2) cycles, GMW14124 Cycle C. Optional cycle test, adhesive/sealant humidity/high temperature cycle per GMW14124 Test Cycle "W", five (5) cycles, if specified on the drawing.

3.5.7 Accelerated Weathering Resistance. If exterior is exposed, test samples must be subjected to 2500 kJ/m² per SAE J2412, or 38 MJ/m² per GMW14162 Cycle C and 115 °C. Test samples or parts may be used for exposure at the discretion and approval of GM Engineering.

3.5.8 Cold Shock. Per discretion of validation and materials engineering only. Following 72 h at 54 °C ± 2 °C, condition the samples for 4 h at -30 °C ± 2 °C. With no recovery, the samples must withstand two (2) free impacts when dropped for a height of 0.6 m onto cement floor. After impact and 24 h recovery at 23 °C and 50% RH, the samples must meet the "peel adhesion" of this requirement. No other exposures are required.

3.6 Tape Wet Out, GMW15851. Bonded assemblies must demonstrate a minimum 85% tape Wet Out when tested per GMW15851.

3.7 Liner Contact. The release liner must contact the adhesive 100% at all times prior to the adhesive backed foam being installed on the vehicle/component. Perform a visual inspection after the required exposures per GMW15735 section "Humidity Stability."

3.7.1 Liner Removal. The release liner must be readily removed with a force not to exceed 65 Nm width when peeled at an angle of 180 degrees at 300 mm/minute. Any tear or distortion of the liner shall constitute a failure.

3.8 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to obtain a GM-approved International Material Data System (IMDS) submission.

4 Manufacturing Process

The production intent process must be used for hardware attachment under this requirement and must be declared in the completed test report.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations valid in the country of usage.

5.2 Language. In the event of conflict between the English and domestic language, the English language shall take precedence.

5.3 Inspection and Rejection. Samples of components or materials released to a GM material specification shall be tested for conformity with the requirements of this material specification and approved by the responsible Engineering department prior to commencement of delivery of bulk supplies.

A new approval must be received for any changes, e.g., properties, manufacturing process, location of manufacture, etc. If not otherwise agreed, all testing and documentation normally required for initial release must be completed.

It is the responsibility of the supplier to inform the customer in a timely manner, without solicitation, and to include documentation of all modifications of materials and/or processes and to apply for a new release.

5.4 Material Safety Data Sheets/Safety Data Sheets (MSDS/SDS). For new product submissions, or when a change in chemical composition of an existing product has occurred, a complete copy of the Material Safety Data Sheet/Safety Data Sheet must be submitted in compliance with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) requirements or other country-specific MSDS/SDS requirements. In addition, product MSDS/SDS submissions must be in compliance with specific country General Motors S&IH TS 3.4-160-02 where available.

6 Approved Sources

Materials supplied to this specification must be approved by General Motors.

The appropriate GM Materials Engineering department(s) must confirm material as meeting the requirements of this specification. Any test data sheets of material submitted to General Motors for such confirmation (e.g., during Production Part Approval Process (PPAP)) under this material specification must list all properties and must apply corresponding test methods of this material specification.

7 Notes

7.1 Glossary. Not applicable.

7.2 Acronyms, Abbreviations, and Symbols.

AF-B	Adhesion from Back
AF-P	Adhesion from Part
AIP	Air Inlet Panel
CF	Cohesive Foam
GHS	Globally Harmonized System of Classification and Labeling of Chemicals
GSSLT	Global Subsystem Leadership Team
IMDS	International Material Data System
MSDS	Material Safety Data Sheet
POA	Part of Assembly
PPAP	Production Part Approval Process
RH	Relative Humidity
SDS	Safety Data Sheet

8 Coding System

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

Adhesive Performance per GMW16443 Type X, where X indicates type per 1.3.1