



Adhesion Requirements for Bonded Interior Parts

1 Scope

1.1 Material Description. This specification describes the adhesion requirements for bonded parts subjected to interior environments. The various types of adhesives used are:

- Vacuum form adhesives
- Liquid adhesives, water based adhesives, or solvent based adhesives.
- Hot melt adhesives.
- Pressure sensitive adhesives.
- Film/web adhesives.
- Powder adhesives.

In addition to the requirements in this specification, all bonded interior parts must meet the applicable requirements of GMW14444.

1.2 Applicability. This specification applies to all interior adhesively bonded materials and components.

1.3 Remarks. Supplier is responsible for evaluating adhesive bonds to make sure that they conform to the requirements of this specification.

2 References

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

2.1 External Standards/Specifications.

ISO 8510-2 ISO/IEC 17025

2.2 GM Standards/Specifications.

GMW3059	GMW14093	GMW14444	GMW15625
GMW3221	GMW14124	GMW14729	

2.3 Additional Requirements.

Statement of Requirements

3 Test Preparation and Evaluation

3.1 Resources.

3.1.1 Facilities. All testing shall be performed in an accredited laboratory. Laboratory accreditations to ISO/IEC 17025 are acceptable.

3.1.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.1.2 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.

3.1.2 Equipment.

3.1.2.1 Universal tensile test machine.

3.1.2.2 Impact test machine per GMW14093.

3.1.2.3 Oven capable of maintaining 105 °C.

3.1.2.4 Freezer capable of maintaining -30 °C.

3.1.2.5 Chamber capable of maintaining > 95% relative humidity (RH) at 40 °C.

3.1.3 Test Vehicle/Test Piece. Laboratory prepared bonded adherents using production intent materials or bonded adherends prepared from manufactured bonded assemblies. In all of the following tests (peel adhesion, edge adhesion, impact test and dead load test) a minimum of three (3) samples must be investigated.

3.1.4 Test Time. Not applicable.

3.1.5 Test Required Information. A minimum of three (3) specimens shall be tested for each adhesion test. Each test specimen shall be at least 25 mm in width and 100 mm in length.

3.1.5.1 Peel Adhesion (ISO 8510-2). Perform peel adhesion tests when one (1) or both adherends are flexible. (If both adherends are rigid substrates, see Impact Test in 3.1.5.3). Test samples shall be peel tested at an angle of 180 degrees at a constant rate of 300 mm/minute jaw separation. Peel adhesion tests must be completed at temperature of test specimens, as specified after removal from environmental exposures. Peel strengths of the bonded assemblies must meet the minimum average peel strength of 525 N/m, or show cohesive failure of one (1) or both of the adherends. See 3.1.5.1.4.

Perform peel adhesion tests on as-received and after each of the following environmental exposures in 3.1.5.1.1, 3.1.5.1.2, and 3.1.5.1.3. (See Appendix A, Table A1).

Note: If it is not possible to conduct 180 degrees peel adhesion tests on samples from parts because of geometry, affix Mylar strips to ends of adherends by staples or some other fastening mechanism in order to allow the adherends to be tested at 180 degrees. If circumstances are such that the peel adhesion tests are not feasible, consult with GM Materials Engineering for approval of adhesion tests.

3.1.5.1.1 Humidity, GMW14729, Option A or Option B for 144 h. Tests to be completed at least 1 h after removal from humidity and stabilizing per GMW3221 Code A.

3.1.5.1.2 Oven Age for 24 h.

- Use 105 °C for Code 1 parts as identified per Table 1 of GMW14444.
- Use 95 °C for Code 2 parts as identified per Table 1 of GMW14444.
- Use 85 °C for Code 3 parts as identified per Table 1 of GMW14444.

Tests must be completed at specified temperatures within 60 s of removal from the oven.

3.1.5.1.3 Two (2) Cycles, GMW14124 Cycle M, or if Cycle W is called out on part drawing, then three (3) cycles of Cycle W.

- Use 105 °C for Code 1 parts as identified per Table 1 of GMW14444.
- Use 95 °C for Code 2 parts as identified per Table 1 of GMW14444.
- Use 85 °C for Code 3 parts as identified per Table 1 of GMW14444.

Tests to be completed at least 1 h after setting at room temperature per GMW3221 Code A.

3.1.5.1.4 Adhesive Failure versus Cohesive Failure for Peel Testing.

3.1.5.1.4.1 Adhesive failure is identified by absence of adhesive on one (1) of the two (2) adherents after the peel adhesion test.

3.1.5.1.4.2 Cohesive failure is identified by either:

- The presence of adhesive on both adherents
- The presence of adherent material on one (1) side of the bond line area; or
- Stock-break failure of an adherent

3.1.5.1.4.3 If adhesive is left on one (1) or both adherends resulting in an adhesive or cohesive failure of the adhesive, the minimum required peel strength shall be 525 N/m.

3.1.5.2 Edge Adhesion. Parts shall be fixtured to represent in-car position. There shall be no visual adhesion loss such as peeling, lifting, bubbling, bridging across concave areas, unwrapping of edge wraps, etc., after being submitted to one (1) of the specified environmental exposures in 3.1.5.1.3. (See Appendix A, Table A2).