



Performance Requirements of Bonded Exterior Trim

1 Scope

1.1 Material Description. This specification defines the adhesion requirements of exterior trim that is tape attached to painted or non-painted substrates. These requirements also include weatherstrips and seals that are tape attached, and flexible or metallic inserts tape attached, and used as a decorative component of a molding, applique, fascia, or sill plate assembly. The adhesive system is typically a double-coated foam, or elastomeric tape.

1.1.1 This specification covers the laboratory test requirements for Production Part Approval Process (PPAP) (Table A1, Appendix A), and Routine Quality Control (Table A2, Appendix A).

1.1.2 In addition to the tape/substrate combinations, approvals are also specific to the facility that laminates the tape to the part.

1.2 Symbols. Not applicable.

1.3 Typical Applications. This specification applies only to substrates, paint, adhesion promoters, and tape materials that have been qualified and approved to the appropriate GM specifications.

1.3.1 Double-coated foam or elastomeric tapes shall meet the requirements of GMW15201 for the appropriate tape type. Tape approvals to GMW15201 include adhesion testing to exterior topcoats.

1.3.2 The process and requirements for obtaining GM Approval for Approved Adhesive Applications (AAA) has been removed from this specification. If it is required, GMW15625 will be added to the part drawing, or math data.

2 References

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

2.1 External Standards/Specifications.

ISO 8510-1	ISO/IEC 17025	SAE J2215	TS 16949
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2.2 GM Standards/Specifications.

9985568	GMW3116	GMW14729	GMW16830
9985630	GMW3221	GMW15201	
9986084	GMW14124	GMW15625	
GMW3059	GMW14333	GMW16766	

2.3 Additional References.

- GM General Procedure GP-10
- TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com)

3 Requirements

3.1 Requirements on Test Specimens. All tests shall be performed at conditions per GMW3221 Code A unless otherwise specified.

3.1.1 Sample Preparation. The bonded part must be conditioned for 72 h per GMW3221 Code A prior to environmental exposure unless otherwise stated. Flexible, or metallic tape attached inserts must be bonded using production intent, or representative locating and wet-out techniques. Production intent adhesion promoters must be used. Wet-out target is 80% minimum. Samples shall be conditioned 1 h per GMW3221 Code A following environmental exposure prior to testing unless otherwise specified.

3.2 Test Preparation and Evaluation.

3.2.1 Facilities.

3.2.1.1 For PPAP Testing, if tests are performed outside of GM, use a laboratory from an organization that is either third (3rd) party registered to TS 16949 or has laboratory accreditations to ISO/IEC 17025 or to GM General Procedure GP-10.

3.2.1.2 All testing is the responsibility of the GM supplier who laminates tape to the parts in question.

3.2.2 Component Testing.

3.2.2.1 For parts that are directly tape attached to the vehicle exterior, on either painted, or non-painted substrates, test using the aluminum foil 90 degree peel strength test procedure detailed in GMW16830. Test after the environments listed in 3.3. Tape to part bond performance is evaluated using the aluminum foil peel 90°degree peel strength test.

3.2.2.2 For flexible or metallic inserts tape attached to a molding, appliqué, fascia, or sill plate, run the 90°degree peel strength test per ISO 8510-1, and use a rate of grip separation of 300 mm per minute. Record the average 90 degree peel strength and the failure mode (i.e., adhesive failure, cohesive failure, or adherend failure) after the environments listed in 3.3. Tape to insert, and tape to component bond performance is evaluated using the 90 degree peel test.

3.2.2.3 All specimens for testing must be obtained from parts that have been molded, painted and processed using the same equipment, tools, materials, processing conditions and manufacturing locations that will be used to manufacture production parts for vehicle assembly. If regrind is allowed, all specimens for testing must be obtained from production parts that are made from the maximum allowable regrind as stated on the drawing.

3.2.2.4 Each test must be completed on a minimum of three (3) samples, each obtained from separate parts.

3.3 Ninety Degree (90°) Peel Strength. The minimum average 90°degree peel strength test value can be found in GMW15201, Performance Requirements Tables, in the column for the appropriate tape type after the following environmental exposures:

- 20 minutes at 23 °C ± 2 °C and 50% ± 5% Relative Humidity (RH) GMW15201, Performance Requirements Tables, row "20 Minute Peel".
- 72 h at 23 °C ± 2 °C and 50% ± 5% RH per GMW15201, Performance Requirements Tables, row "72 h Peel".
- 168 h in an air circulating oven at 70 °C per GMW15201, Performance Requirements Tables, row "Accelerated Age".
- 168 h in a condensing humidity chamber per GMW14729 and GMW15201, Performance Requirements Tables, row "Humidity".
- 2 cycles of GMW14124 Cycle C per GMW15201, Performance Requirements Tables, row "Cycle Test". An optional cycle test is the adhesive/sealant humidity/high temperature cycle per GMW14124 Test Cycle "W", five (5) cycles, if specified on the drawing.

For example, the minimum average 90 degree peel strength test for Type IXA tape would be:

- 20 minute peel – 32 N
- 72 h peel – 50 N
- Accelerated Age – 48 N
- Humidity – 38 N
- Cycle Test – 46 N

3.3.1 The typical failure mode observed during the 90 degree peel strength test after accelerated aging, and the environmental cycle test is cohesive failure (foam split). Mixed failure modes are frequently observed (cohesive failure and adhesive failure). Certain substrates, and tapes will not exhibit cohesive failure, and not all applications will require cohesive failure. The Release Engineer and the Material Engineer should specify requirements for the application.

3.3.2 Test the actual part or sections cut from the part. The length of the test specimen shall be 150 mm minimum. Disregard the first and last inch of peel. Report the average peel strength, and the failure mode. All minimum peel values in GMW15201 are based on a 12.7 mm tape width. For tape widths other than 12.7 mm,

the peel strength requirement is directly proportional to the width. For moldings with ribs, do not count the voids between the ribs when determining the actual tape width.

3.3.3 Adhesion promoter selection for lift gate, and Center High Mounted Stop Lamp (CHMSL) appliques made from Acrylonitrile Butadiene Styrene (ABS) or Acrylonitrile Butadiene Styrene/Polycarbonate (ABS/PC) plastics.

3.3.3.1 Clean plastic test strip with 1:1 distilled water/isopropyl alcohol. Wipe dry using a lint free clean cloth.

3.3.3.2 Apply adhesion promoter (9985568 or 9985630). Allow to air dry, approximately 60 s.

3.3.3.3 Laminate production intent double-coated foam tape (non-liner side) to test strip.

3.3.3.4 Roll one (1) time with a 6.8 kg roller at a rate of approximately 30 cm/minute.

3.3.3.5 Clean production intent substrate test plaque (painted steel or glass) with 1:1 distilled water/isopropyl alcohol. Wipe dry using a lint free clean cloth.

3.3.3.6 Apply adhesion promoter to glass (9986084 or equivalent). Allow to air dry, approximately 60 s.

3.3.3.7 Remove tape liner and apply plastic test strip with tape to substrate.

3.3.3.8 Roll two (2) times, back and forth, with a 6.8 kg roller at a rate of approximately 30 cm/minute.

3.3.3.9 Dwell for 4 h at room temperature.

3.3.3.10 Heat sample in an air circulating oven for 1 h at 80 °C.

3.3.3.11 Remove sample from oven, and immediately run a 90 degree peel strength test at 300 mm/minute jaw separation, measuring breakaway and continuous peel strength.

3.3.3.12 The failure mode during the peel strength test must be cohesive (foam split). If the failure mode is adhesive (clean separation between the tape and the plastic), then try the other adhesion promoter.

3.4 Fuel Resistance (only applicable for trim located below the fuel filler). Use one of the reference fuels in GMW14333. Immerse samples 25 times, 10 s immersion with a 20 s dry-off in between. During dry-off, drain all fuel from panel. Allow sample to dwell 24 h at ambient prior to running the 90 degree free peel strength test, 30 N minimum average peel strength requirements for 12.7 mm tape width.

3.5 Free State (unbonded) part check at temperature for tape attached components. Expose entire part, by placing on a flat surface with release liner on, at room temperature, and after the following conditions:

- 4 h at 80 °C. Check at temperature for excessive shrinkage, warping, curling, etc.
- 4 h at -30 °C. Check at temperature for excessive shrinkage, warping, curling, etc.

3.5.1 Record any change from nominal in millimeters (mm). Production parts should have <1 mm gap between part and sheet metal in free state. If the ends of the part curl up, or warp, and require more than 13 N (3 lbf) to net the part end to sheet metal (at room temperature, and at temperature), notify the design release engineer, and the materials engineer. This may indicate a potential build issue. For parts that are not flat, place on a section of the body panel with the mating surface, or on a splash off the surface (clear surface tool made per SAE J2215 can be used), or on the dimensional check fixture. Locate the clear cast tool, or check fixture near the oven, or freezer, so the part can be quickly removed from the chamber, and placed on the mating surface.

3.6 Test Conditions. Tests shall be conducted using the latest issue of the test methods indicated. Suitable precautions should be taken to ensure that applicable safe limits are not exceeded when conducting test procedures, processes and/or handling the materials required by this specification.

Unless otherwise specified, painted samples shall be subjected to the testing after a minimum aging period of 72 h following the baking or drying cycle.

3.7 Documentation. Samples of components or material released to this specification shall be tested for conformity with the requirements of this specification and approved by the responsible GM Department prior to the start of delivery of production level components or materials.

3.8 Changes in Processing. Unless otherwise agreed to, the entire verification test shall be repeated and documented by the supplier prior to start of delivery of the modified or changed product. In some cases, a shorter test can be agreed to between the responsible GM Department and the supplier.

3.9 Test Results. Test reports shall be written per the Requirements for Test Report in ISO/IEC 17025.

3.10 Deviations from Test Procedure. Deviations from the requirements of the test procedures shall have been agreed upon with GM. Such requirements shall be specified on component drawings, test certificates, reports, etc.