



Static Latching Effort and Front and Rear Closure Strength for Static Latching

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. To evaluate the quasi-static effort to latch a body closure panel.

1.2 Applicability. This standard is for all vehicles having exterior closure panels.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW16048

3 Resources

3.1 Facilities. Test area with level surface.

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 Force gage with the ability to measure compression. (Load cells or dead weight with the associated equipment may also be used). The force gage must be able to display a peak load value and should be able to measure forces up to 500 N.

3.2.2 Force gage accessory to allow load distribution and eliminate denting of the closure panel.

a. A 25 mm diameter flat disk for Hood Strength for Static Latching evaluation.

b. A 100 mm diameter flat disk for all closures Static Latching measurements.

These disks should be made of aluminum or steel, should be 5 mm thick, and should be separate pieces (not physically attached to the force gage) to prevent off-angle loading. Pictures of a typical disk can be seen in Appendix A, Figure A2.

3.2.3 A 50 mm diameter x 7 mm thick (Hood Strength for Static Latching evaluation) and a 100 mm diameter x 7 mm thick (all closures Static Latching measurements) piece of high density Polyvinyl Chloride (PVC). Material and performance properties are:

- Reference GMW16048.
- Shore durometer hardness of HA65.
- Compression set after 22 h at room temperature is 11% and at 70 °C is 60%.

3.3 Test Vehicle/Test Piece. Fully equipped closure mounted on vehicle. All bumpers and seals between the body and the closure must be present. Development testing may be done on fixtures or test bucks as required.

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3.4 Test Time.

Calendar time: 1 d
Test time: 1 h to 2 h

3.5 Test Required Information. Specific Vehicle Technical Specification (VTS) or Subsystem Technical Specification (SSTS) test requirements for the vehicle being tested.

3.6 Personnel/Skills. Familiarization with test equipment required for this test procedure.

4 Procedure

4.1 Preparation. The closure to be tested shall be evaluated in order to ensure that all operational components (seals, latch, striker, gas struts, hinging, etc.) are present and correctly assembled. This test is normally run in the "as received" condition on level ground. Check for cracks, paint chips, dents, mastic separation, etc., and document any variation/deviation in assembly, etc.

4.1.1 Facilities and/or Equipment Preparation. Record the instrumentation calibration information on Data Sheet A1 in Appendix A or an equivalent documentation system.

4.2 Conditions.

4.2.1 Environmental Conditions. Unless otherwise specified by the requesting engineer, the test shall be performed at an ambient temperature of $22\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$.

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 Set-Up Instructions. Cycle the closure system through 5 full open/close cycles.

4.3.2 Functional Testing: Determining Static Latching Loads.

4.3.2.1 Zero the force gage or load cell if being used.

4.3.2.2 Unlatch the closure panel. For latches with a primary and secondary latch position (side doors, hood, and liftgates/hatches), place the closure in the secondary latched position.

4.3.2.3 Using the appropriate disk size described in 3.2.2, position the load normal to the surface of the closure at the position specified in the SSTS.

4.3.2.4 Slowly and steadily (increase at approximately 20 N/s) apply the force in the latching direction and record the minimum force required to fully latch the closure panel on Data Sheet A2 from Appendix A. Typically, an audible "click" indicates latching has occurred. If no audible feedback is provided, incremental loading checks will be required to determine when latching is achieved.

Note: For static latching force on front and rear closures, the maximum load to be applied is 500 N. If the closure does not latch at 500 N, then stop applying the load, and record the static latching force as $> 500\text{ N}$.

4.3.2.5 Repeat the testing three times to ensure that the data is repeatable.

4.3.3 Functional Testing: Hood Strength for Static Latching. This section will test the hood closure assembly and mastic strength during static latching. Refer to the SSTS to understand which load should be used for this evaluation.

4.3.3.1 Visually inspect the entire test panel for any dents or other surface irregularities, and record observations for post-test comparison. Document observations with photos where necessary.

4.3.3.2 Measurement Points.

4.3.3.2.1 Locate and mark the High Usage Zone on the closure along with all of the required measurement points as shown in Appendix A, Figure A1.

The high-usage area on a hood is defined by the SSTS as a 150 mm (fore/aft) x 300 mm (cross-car) zone.

4.3.3.2.2 Subjectively evaluate the entire high usage zone for areas of softness or weakness. Any soft or weak location in the high usage zone must be evaluated in addition to all of the points shown in Appendix A, Figure A1.

4.3.3.2.3 Any weak or soft locations identified by Computer Aided Engineering (CAE) must also be evaluated in addition to all of the points shown in Appendix A, Figure A1 and points identified in 4.3.3.2.2.

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4.3.3.3 Place the closure in the fully latched position. Align the PVC piece (3.2.3) and force gage over the first evaluation point, as identified in 4.3.3.2. The force gage should be perpendicular to the surface of the hood and should use the disk size given in 3.2.2.

4.3.3.4 Slowly increase the force from 0 N to the force given in the SSTS.

4.3.3.5 When the force specified in the SSTS has been reached, remove force gage from the disk surface, remove the PVC piece from the hood, and inspect for any deformation of the outer panel or any mastic separation between the outer, the inner, and any reinforcements. Deformation inspection should be done visually as well as by moving your hand across the outer panel to feel for dents. Document observations with photos where necessary.

4.3.3.6 Record the test observations on Data Sheet A3 from Appendix A.

4.3.3.7 Repeat 4.3.3.3 thru 4.3.3.6 for all locations identified in 4.3.3.2. Locations may be tested in any order unless specified differently by the requesting engineer.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation. Refer to Appendix A for Data Sheets A1 thru A3.

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.

7 Notes

7.1 Glossary. Not applicable.

7.2 Acronyms, Abbreviations, and Symbols.

CAE	Computer Aided Engineering
GSSLT	Global Subsystem Leadership Team
PVC	Polyvinyl Chloride
SSTS	Subsystem Technical Specification
VTs	Vehicle Technical Specification

8 Coding System

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

Test to GMW14830.

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