GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW14276

Closure Panel Release Handle Release Force Measurement

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 measure the force required to operate a closure panel's remote release mechanism.

1.2 Applicability. All passenger vehicles equipped with a release handle for Hoods, Decklids, Liftgates, Midgates, Endgates, and Fuel Doors.

1.3 Remarks. In order to determine standardized measurements of release forces for different vehicles and handles, it is necessary to specify a measurement procedure, which can be performed properly, easily and accurately.

This test procedure is intended to simulate the method that a customer would use to operate a remote release handle. The quasi-static force is applied in the direction that the handle is designed to be used by the customer.

2 References

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

2.1 External Standards/Specifications.

CMVSS 401 FMVSS 401

2.2 GM Standards/Specifications.

None

2.3 Additional References. Use the following program specific documents.

- Decklid Subsystem Technical Specifications (SSTS)
- Endgate SSTS
- Front End Sheet Metal (FESM) SSTS
- Liftgate SSTS
- Midgate SSTS

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 Handheld tensile/compression force gage with hook and a measuring range of 1.5 times the relevant SSTS specification.

3.2.2 Adaptation for Release Lever. The adaptation should be designed such that the force gage hook can engage it without binding or otherwise causing unintended moments.

3.2.3 Angle measuring device (level gage).

3.2.4 Any other instrumentation deemed necessary.

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3.3 Test Vehicle/Test Piece. An appropriate buck, body or vehicle, with a design intent closure panel system is required to perform this test.

Note that all hardware and system components should be present due to the possible effects of seals, overslam bumpers, counterbalance mechanisms, etc.

3.4 Test Time. Times shown represent the conditions indicative of having facilities, resources and parts available, as well as the testing of one sample.

Calendar time:	1 d
Test time:	2 h
Coordination time:	5 h

3.5 Test Required Information. The requesting engineer is responsible for providing specifications appropriate to the particular vehicle line being tested (reference Vehicle Technical Specifications (VTS)/SSTS paragraph numbers if applicable).

3.5.1 Location of force application on handle assembly.

3.5.2 Direction/arc of force application.

3.5.3 Minimum and/or maximum allowable operating effort requirement(s).

3.5.4 Environmental conditions.

3.6 Personnel/Skills. It is emphasized that the performance of measurements always requires a certain degree of technical knowledge in order to produce consistent results. Prior experience in setting up and running similar tests and experience in the use of the referenced test equipment are critical to achieving the estimated times shown in 3.4.

4 Procedure

4.1 Preparation.

4.1.1 Sample Inspection. The actual condition of the closure release and the corresponding latching system (if purely mechanical system) shall be checked and corrected to nominal condition or drawing condition, if necessary.

For mechanical systems, the closure shall be latched in the primary engagement position.

The closure bumpers/buffers shall be adjusted to the correct height, in accordance with the drawing.

If present, in the vehicle to be measured, the release cable shall be checked for proper condition as well as proper position and function.

It is recommended that the test parts/assembly be dimensionally certified before testing is started.

4.1.2 Sample Preparation. Operate the system five (5) times (unlatch with handle, open the closures, shut the closure and then ensure that the latch has re-engaged the primary).

Verify that all weatherstrips, seals, bumpers etc., lose their green strength by allowing the system to remain closed and latch for approximately 12 h.

4.1.3 Equipment Preparation. Record the instrumentation calibration information on Data Sheet B1 in Appendix B.

4.1.4 Testing. The function of the closure release lever shall be tested by means of repeated unlatching, by pulling the release lever in the vehicle accompanied by subsequent re-latching of the closure.

4.2 Conditions.

4.2.1 Environmental Conditions. The measurements typically are performed under the following ambient conditions:

- Temperature +23 °C ± 5 °C
- Relative Humidity of 40% +20%
- Atmospheric pressure equivalent to the local barometric pressure (which is variable during any given day and from day to day).
- The ambient conditions shall not change significantly during the measurement: ($\Delta T < 5$ °C).
- Measurements shall be performed on the stationary vehicle.

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Note: This procedure can also be tested at any other environmental condition as required by the relevant SSTS (see 2.3). If tests are conducted at non-ambient conditions, indicate so on the data sheet.

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.

All deviations must be recorded on Data Sheet A1 in Appendix A, Data Sheet B1 in Appendix B and Data Sheet C1 in Appendix C.

4.3 Instructions. There are two (2) typical types of release handles: Rotational Levers and Linear Handles.

4.3.1 Install the Adaptation and Connect Force Gage. The orientation of the tensile/compression force gage shall be such that it simulates the direction of force application that the customer must use to actuate the handle. This is typically tangential to swing or parallel to travel and perpendicular to the surface which the customer grasps the handle. The load should be applied (through an adaptation if necessary) such that the leverage arm of the force gage originates through a point that is centered on the finger grip area of the release handle.

4.3.1.1 Rotational Lever Adaptations and Connections. In order to standardize the measurements, the adaptation, which may be provided with an eyelet or similar interface, shall be attached to the release lever before testing. The hook of the tensile/compression gage shall be inserted into this eyelet (Figure 1) or directly to the finger/handle position (Figure 2) if feasible.

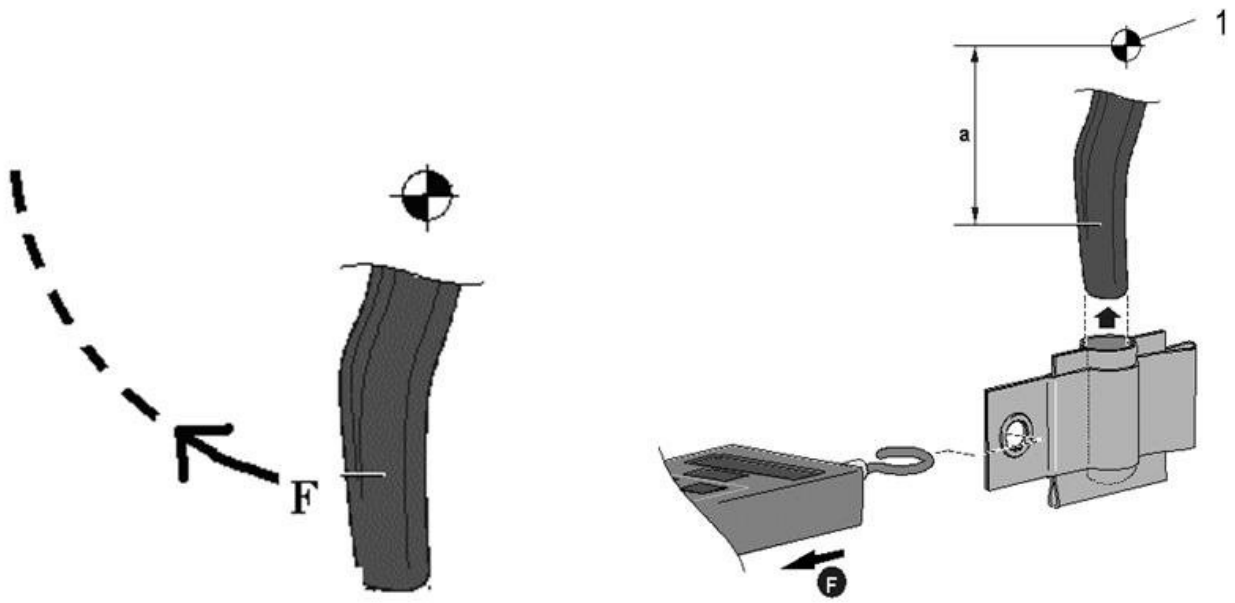

Figure 1: Adaptation Orientation and Release Force Measurement with a Rotational Release Lever

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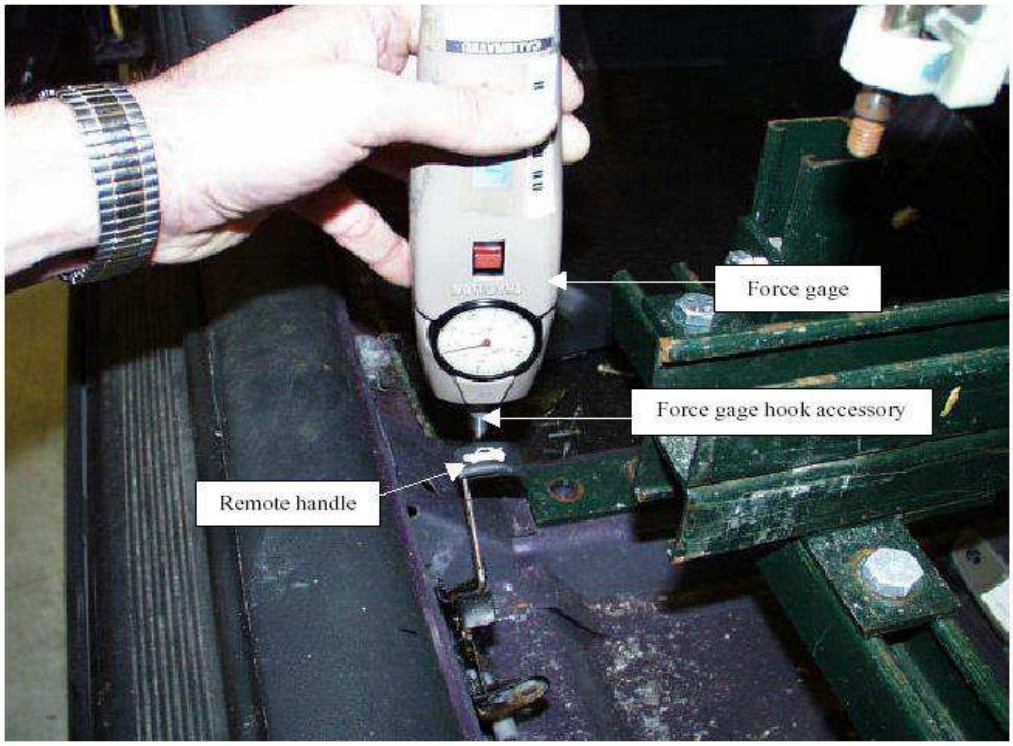

Figure 2: Direct Attachment with a Rotational Release Lever

4.3.1.2 Linear Handle Adaptations and Connections. In order to standardize the measurements, the adaptation, which may be provided with an eyelet or similar interface, shall be attached to the release lever before testing. The hook of the tensile/compression gage shall be inserted into this interface (Figure 3) or directly to the finger/handle position (Figure 4) if feasible.

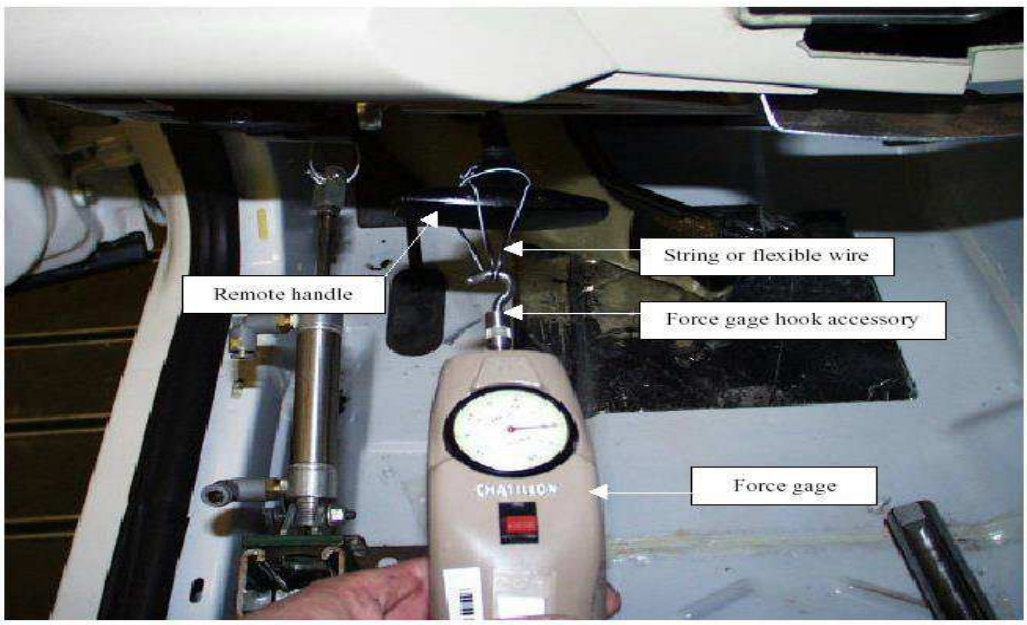

Figure 3: Adaptation Orientation and Release Force Measurement with a Linear Pull Handle

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