



Sliding Door Operating Force and Velocity

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 determine the forces and velocity required for moving a sliding side door from the ajar position to the full open position and from the full open position to the closed position.

1.2 Applicability. This procedure applies to all passenger cars, light duty trucks, and medium duty trucks having a manual or power sliding side door system.

1.3 Remarks. Within this procedure, the following efforts are measured.

- Hold-open Engagement Effort
- Hold-open Release Effort
- Opening Effort
- Closing Effort
- Closing Velocity

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

2.3 Additional References.

- Subsystem Technical Specification (SSTS) 55.01.03 Side Sliding Door Closure.
- Vehicle Technical Specification (VTS) paragraph 3.2.5.8.c External Closure Actuation.

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 Hardware. Floor jack and jack stands with enough travel to raise the vehicle to a specified incline and/or decline angle.

3.2.2 Instrumentation.

3.2.2.1 Force gage with a capacity approximately 1.5 times the specified load(s) required (refer to 3.5). The force gage should have peak hold capability.

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3.2.2.2 Appropriate force gage accessories such as a hook, protective tip, or other type of adapter, to measure the operating efforts.

3.2.2.3 Linear velocity meter.

3.3 Test Vehicle/Test Piece. A full vehicle or body with a complete assembled and mounted sliding side door system with all necessary components installed (i.e., roller brackets, latches, inside/outside handles).

3.4 Test Time.

Calendar time: 1 d

Engineer time: 1 h

Technician time: 2 h

3.5 Test Required Information. The requesting engineer is responsible for providing specifications appropriate to the particular vehicle line being tested (reference VTS/SSTS paragraph numbers if applicable. See 2.3).

The following specifications or information are required to run this test:

3.5.1 Level change requirements (i.e., incline or decline).

Note: The angle of incline or decline may greatly affect the operating efforts of the sliding side door. Testing in the inclined and declined condition simulates customer use when parked on a driveway with a slope or when parked on a hill.

3.5.2 The time required for the door's seal to undergo a compressive set – Green Seal or Aged Seal.

3.6 Personnel/Skills. Prior experience in setting up and running similar tests and experience in the use of the force and velocity tools.

4 Procedure

4.1 Preparation.

4.1.1 Vehicle Setup.

4.1.1.1 Test Door. Ensure that the door components are present and properly assembled.

4.1.1.2 Allow the vehicle to acclimate to the environmental conditions in test area for an appropriate time to allow the vehicle systems to reach test room temperature before the test.

4.1.1.3 Close windows, moveable roofs, trunk, hatch, mid-gate and any other closure.

4.1.1.4 Power vehicle and place HVAC in Recirculation mode. After HVAC has achieved desired mode turn the vehicle off.

4.1.1.5 This test is normally run on the test subject in an "as received" condition. If it is requested to be run in a specifically adjusted condition, follow the applicable procedure(s).

4.2 Conditions.

4.2.1 Environmental Conditions. Unless otherwise specified in this document's text or 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. Position vehicle on level test surface. Other incline angles may be tested if specified in 3.5.1. If required, the vehicle angle needs to be adjusted using the jacks such that the vehicle incline is within 1 degree of the desired test condition.

4.3.2 Effort Instructions.

Note: The door should be opened with the minimum required force to move the door. The force should also be applied in a smooth manner. This ensures that the force that is measured is due to the rolling friction of the door and not due to trying to accelerate the door. All forces shall be applied normal to the hem of the door at the height of the exterior handle. When testing a power operated door these measurements are made with the door in the manual mode.

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4.3.2.1 Door Opening Effort.

4.3.2.1.1 Unlatch the door and move the door to the ajar position.

4.3.2.1.2 Determine the force required to open the door. Using a force gage with an appropriate attachment, open the door from the ajar position until just before the door reaches the hold-open mechanism. The force should be applied to the forward hem of the door (see Figure 1).

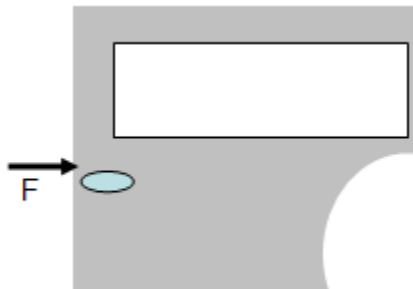


Figure 1: Opening Force Location

4.3.2.1.3 Record the forces required to open the door along the full path of motion as shown in Figure 2. Forces should be taken along the curved and straight path of motion. At a minimum, the peak force in the curved section as well as the straight path are recorded.

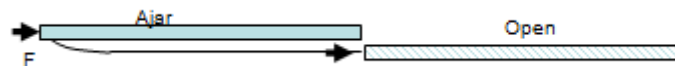


Figure 2: Slider Path of Motion – Opening

4.3.2.2 Hold Open Engagement Effort. Continue the procedure 4.3.2.1.2 until the door engages the hold-open mechanism. Record the peak force required to engage the hold open mechanism.

4.3.2.3 Hold Open Release Effort. Friction type hold open mechanisms only.

4.3.2.3.1 Move the door to the full opened position so the door is engaged in the hold-open mechanism.

4.3.2.3.2 Determine the peak force required to disengage the door from the hold-open mechanism. Using a force gage with appropriate attachment, move the door in the closing direction until the hold-open mechanism is fully disengaged. The force should be applied to the rear hem of the sliding door (see Figure 3).

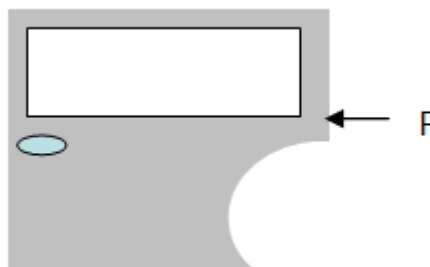


Figure 3: Closing Force Location

4.3.2.3.3 Record the peak force required to release the door from the hold open mechanism.

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