



Seat Operation Durability Test for Rear Occupant Entry

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. This test procedure evaluates the operating performance and durability characteristics of seat systems that incorporate features to allow for rear occupant entry.

1.2 Applicability. This procedure applies to the front and second row for all GM passenger cars and light duty trucks that have seats with adjuster features designed to allow for rear occupant ingress and egress.

1.3 Remarks. There are four primary types of adjuster features to allow for rear occupant ingress and egress, or sometimes referred to as Easy Entry (EZ) – Pitch Slide, Tip Slide, Fold and Tumble, and Stadium Slide. The EZ Entry seat maneuver is utilized by front and rear seats in car and truck products to gain access to the rear seating areas of the passenger compartment.

1.3.1 Tip Slide Maneuver. The maneuver includes folding the seat or the seat back forward, sliding the seat to the forward-most position (If slide is included in the operation), returning the seat rearward to the specified lock position, and returning the seat back to the upright first lock position.

1.3.2 Pitch Slide Maneuver. The Pitch Slide maneuver includes sliding the seat forward, pitching or rotating the seat forward to gain access to the third row seating area of the passenger compartment, rotating the seat back down and rearward to its seating position.

1.3.3 Fold and Tumble Maneuver. The Fold and Tumble seat maneuver is utilized by rear seats in truck products to gain access to the third row seating area of the passenger compartment. The Fold and Tumble maneuver includes folding the seat back onto the cushion, raising the cushion and seat back forward about the front anchorages, returning the cushion and seat back to the locked position on the floor, and returning the seat back to the upright first lock position.

1.3.4 Stadium Slide Maneuver. The Stadium Slide seat maneuver is utilized by rear seats in truck products to gain access to the third row seating area of the passenger compartment. The Stadium Slide maneuver includes folding the seat back forward to an upright position, moving the entire seat forward while the seat cushion simultaneously folds vertically, and returning the seat cushion to its seated position and seat back to the upright first lock position.

2 References

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

2.1 External Standards/Specifications.

SAE J826

2.2 GM Standards/Specifications.

None

2.3 Additional References.

- Subsystem Technical Specifications (SSTS).

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3 Resources

3.1 Facilities. An approved GM certified test lab with an adequate bed plate or equivalent work surface necessary for mounting the test sample and associated test fixtures appropriate for the procedure to be run.

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 Test Device. Programmable robot, hydraulic actuator, or air actuator capable of inputting seat inputs consecutively.

This input source may will require a long throw (typically > 92 cm) during the easy entry portion of the test and must be capable of stopping at the appropriate position without exceeding the maximum force.

3.2.2 Mounting Fixture. Rigid mounting blocks to simulate the floor attachment points to mount the seat system in design position on a bedplate or other equivalent work surface.

3.2.3 Seat Back Force Application Device. A device that can be held firmly in place on the seat back at the force application position of the seat back. This device will be used for applying force to the seat back during the test. A load bar that sandwiches the seat back is often used for this purpose. When connecting this device to the robot/actuator, the attachment should have cross-seat and vertical degrees of freedom (e.g., a ball-in-socket).

3.2.4 Seat Cushion Force Application Device. A device that can be held firmly in place on the seat back at the force application position of the seat cushion. This device will be used for applying force to the seat cushion during the test. A load bar that sandwiches the seat cushion is often used for this purpose. When connecting the device to the robot/actuator, the attachment should have cross-seat and vertical degrees of freedom (i.e., a ball-in-socket).

Note. If the load application can be applied directly to the seat back or the seat cushion sufficiently with the actuator without the use of the force application device, it is not necessary to attach the additional hardware of the device to the seat.

3.2.5 Load Cell. A uniaxial load cell, of the appropriate size, at the end of the seat input ram (or robot) used to measure the load input to the seat during the test.

3.2.6 Force Gage. A force gage, of the appropriate size, capable of measuring the actuation force for each mechanism.

3.2.7 Seat handle refers to the handle that releases the seat lock and allows back/forth movement.

3.3 Test Vehicle/Test Piece. Complete trimmed seat subsystem. An appropriate seat subsystem consisting of all components necessary to qualify as complete for the model and trim level specified by the Design Release Engineer (DRE). Use the heaviest fully trimmed seat back option.

3.4 Test Time.

Calendar time: 5 days

Test hours: 96 h

Coordination hours: 8 h

3.5 Test Required Information. Obtain from the seating arrangement drawing or from the DRE, the design position of the seat (seat back angle, cushion frame angle, H-Point location, and location of upper structure of the seat back). In addition, obtain the maximum operating force for each adjustment.

3.6 Personnel/Skills. The following individuals are necessary to complete this test procedure.

- General Motors Design Release Engineer.
- General Motors Validation Engineer.
- Testing Organization's Test Engineer.
- Testing Organization's Test Technician.

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4 Procedure

4.1 Preparation.

4.1.1 Connect the seat to the bedplate or fixture by attaching it at the mounting points of the seat system. Utilize the mounting fixture to mount the seat in body position. Tighten the fasteners to the minimum specified torque.

4.1.2 Locate and mark the seat back force application position or positions to be used. Prior to testing, the force application position should be agreed upon by the GM DRE and Validation Engineer. This location should be based on customer usage expectation and approved by the GM Human Vehicle Integration (HVI) Engineer.

4.1.3 Locate and mark the seat cushion force application position or positions to be used. Prior to testing, the force application position should be agreed upon by the GM DRE and Validation Engineer. This location should be based on customer usage expectation and approved by the GM HVI Engineer.

4.1.4 Move the seat to the design position with the head restraint in the full up position. This will be the position of origin, and should be confirmed with the DRE or GM Validation Engineer.

4.1.4.1 Align the device used for pushing/pulling the seat back, and align the device used for pushing/pulling/tumbling the seat cushion.

4.1.4.2 Align the device used to unlock the seat back lock (if equipped with such a feature). Align the device used to unlock the seat cushion for tumble or forward slide (if equipped with such a feature).

4.1.4.3 Damage to the seat as a result of the pushing/pulling/tumbling feature should be mitigated as much as possible, and reviewed with the GM DRE and GM Validation Engineer for approval.

4.1.5 Mark the heads of the recliner bolts in order to observe any rotational movement.

4.2 Conditions.

4.2.1 Environmental Conditions. Unless otherwise specified in the Subsystem Technical Specifications (SSTS), conduct the test in a room temperature environment. If temperatures are defined for climatic chamber, 10% of the cycles have to be performed in a very cold environment and 30% in a very hot environment.

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 Tip Slide EZ Entry Operation Durability Cycle.

4.3.1.1 Initiate EZ Entry Cycle. Release the seat back easy entry lock mechanism to rotate the seat back forward as shown in Figure 1, Step 1. Lift the seat handle and keep it in this position, if needed by applying a force, not to exceed the specified seat back release force in the SSTS.

4.3.1.2 Forward Motion. Using the robot/actuator, move the seat in the forward direction by applying a force to the agreed upon seat back load application location until the seat stops at the full forward position (See Figure 1, Step 2). If the EZ Entry feature includes a slide motion of the entire seat forward, ensure that the seat is pushed to the maximum forward position.

4.3.1.3 Load Application. With the seat in its full forward slide and easy entry position, apply a 450 N load to the agreed upon force application point at an angle of 45 degrees from the horizontal line. Hold for 5 s and release (see Figure 1, Step 3 and Figure 2).

4.3.1.4 Rearward Motion. If the EZ Entry feature includes a slide motion, the seat must first return rearward to its original starting slide position. Using the robot/actuator, move the seat in the rearward direction by applying a force to the agreed upon seat cushion load application location until the seat is relocked in the specified slide lock position (see Figure 1, Step 4). Using the robot/actuator, move the seat back in the rearward direction by applying a force to the seat back load application location until the seat back is relocked in the specified recliner lock position. Generally, this is the first lock (see Figure 1, Step 5). This completes one full cycle.

4.3.1.5 Repeat steps 4.3.1.1 thru 4.3.1.4 until all cycles as specified in the SSTS are complete at a rate of (10 ± 3) cycles per minute (cpm). Locking or latching speed is not to exceed 2 m/s.

Note. The exact sequence will depend on the design and seat requirements, but should simulate customer use as closely as possible. Additionally, input forces are to begin at a level orientation. Throughout the maneuver, the actuation may vary from its initial level position due to the geometry of the seat back as well as the location of the force application position.

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