GM	WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW14601

Anchorage of Seats

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. The purpose of this test procedure is to determine if the seat anchorages, seat frames, seat/seat back adjusters, and seat/seat back locking devices of motor vehicles meet the requirements of:

- Federal Motor Vehicle Safety Standard (FMVSS), FMVSS 207.
- Canada Motor Vehicle Safety Standard (CMVSS), CMVSS 207.
- Korean Motor Vehicle Safety Standard (KMVSS), KMVSS 97.

1.2 Applicability. This procedure applies to all passenger cars, light/medium duty trucks, and category M_1 motor vehicles.

This procedure does not apply to side-facing seats or passenger seats on a bus.

This test can be modified to be conducted on a seat structure and/or a trimmed seat on a rigid fixture for evaluation any time throughout the seat system development process.

1.3 Remarks. Determination of compliance with FMVSS 207 and CMVSS 207 is established by two methods:

a. **Seat Subsystem Tests**. Testing individual seat subsystems on rigid mounting blocks simulating the vehicle floor attachment provisions provides a simulation of the subsystem's performance in a vehicle.

   Note: These tests are typically conducted by the seat supplier.

b. **Vehicle System Tests**. The structural performance of any seat subsystem (i.e., seat frame, adjuster and body structure or, in the case of non-adjustable seats, seat frame and body structure) is evaluated as a complete system.

   Note: These tests are typically conducted at GM.

1.3.1 Seat Subsystem with Attached Seat Belt Assemblies. Seating systems which have all or some portion of the seat belt assemblies attached to the seat back or seat bottom, or where the belts and seats attach to a common structure, shall be tested simultaneously with the seat belt anchorage loads in accordance with GMW14413, FMVSS 210/CMVSS 210 and KMVSS 97.

Note: These tests are typically conducted at GM.

2 References

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

2.1 External Standards/Specifications.

CMVSS 207	FMVSS 207	KMVSS 97
CMVSS 210	FMVSS 210	

2.2 GM Standards/Specifications.

GMW14366	GMW14413

2.3 Additional References.

- Subsystem Technical Specification (SSTS).

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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.

3.1.3 The seat anchorage pull test outlined in 4.3.2 requires facilities having the test equipment described in 3.2 appropriate for the test(s) being conducted. The Body Test Lab at the Warren Technical Center (Warren, Michigan) is an example of such a facility.

3.1.4 Sled Facility. Capable of 20G acceleration.

3.2 Equipment.

3.2.1 Mounting Fixture. A means to support the seat subsystem including rigid mounting blocks, or equivalent, simulating the floor attachment points to mount the seat subsystem in body position on a bed plate.

3.2.2 Load Application Device. A device consisting of hydraulic actuators with the required load and/or stroke capacity specified in FMVSS 207/CMVSS 207 and the Subsystem Technical Specification (SSTS), suitable load cells and instrumentation for measuring and recording loads applied to each body block, electronic programming unit, and any other necessary controls.

3.2.3 Instrumentation. All equipment must be calibrated as required and the information must be preserved in the laboratory records.

3.3 Test Vehicle/Test Piece.

3.3.1 Complete Structural Seat Subsystem. An appropriate structural seat subsystem consisting of a back frame, bottom frame (pan), adjuster and recliner, as specified by the Design Engineer/Design Release Engineer (DE/DRE) for testing the seat structure only.

3.3.2 Body-in-White (BIW) (for Vehicle System Tests). An appropriate BIW for testing the floor structure.

3.4 Test Time.

Calendar time:	2 days
Test hours:	8 h
Coordination hours:	8 h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. The following individuals may be necessary to complete this test procedure:

- Test Engineer.
- Test Technician.
- GM Safety Belt Design Release Engineer.
- GM Seat Design Release Engineer.
- GM Validation Engineer.

4 Procedure

4.1 Preparation.

4.1.1 Seats with Seat Back and Seat Bottom Attached to the Vehicle Through the Same Attachments.

4.1.1.1 Weight. Determine the weight of the heaviest applicable fully-trimmed seat subsystem and seat back (including all portions of the seat back that move when the seat back pivots or reclines).

4.1.1.2 Center of Gravity. Determine the center of gravity of the seat subsystem and seat back weighed in 4.1.1.1 using GMW14366.

4.1.2 Seats with Seat Back and Seat Bottom Attached to the Vehicle Through Different Attachments.

4.1.2.1 Weight. Determine the weight of the heaviest applicable fully-trimmed seat back and seat bottom (including all portions of the seat back and seat bottom that move when the seat back or seat bottom pivots or reclines).

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4.1.2.2 Center of Gravity. Determine the center of gravity of the seat back and seat bottom weighed in 4.1.2.1 using GMW14366.

4.1.3 Body-in-White (BIW) (for Vehicle System Tests). Cut the BIW so that no portion of the BIW interferes with the cables that transfer test loads.

Note: Care should be taken to avoid cutting away too much of the BIW, particularly in the area of the seat subsystem load floor.

4.2 Conditions.

4.2.1 Environmental Conditions. Unless otherwise specified in the SSTS, conduct test in a room temperature 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 Seat Subsystem Tests.

4.3.1.1 Seat Back Restraining Device Load for Seats with Seat Back and Seat Bottom Attached to the Vehicle through the Same Attachments.

4.3.1.1.1 Mount the seat subsystem to its appropriate rigid mounting provisions. Include the seat back lock in the locked position, where applicable. If the seat back lock or striker is mounted independently of the seat assembly, then the appropriate panel subassembly or simulated mounting point must also be rigidly mounted and included in the test.

4.3.1.1.2 Positioning Seat.

4.3.1.1.2.1 Set the slide adjuster in the rearmost position, if applicable.

4.3.1.1.2.2 Set the height adjuster in the downmost position, if applicable.

4.3.1.1.2.3 Set the seat back in design position.

4.3.1.1.3 Center of Gravity Bar. Attach the center of gravity bar to the seat frame at the center of gravity of the mass of the hinged or folded portion as determined in 4.1.2.2. If the frame construction is a wire frame, then weld a rigid structure to the seat back frame that will distribute the applied load throughout the seat back frame. The loading structure should be constructed so the load application point is as near as possible to the center of gravity of the seat back, and has a width at least as wide as the seat frame structure.

Note: Care should be taken to avoid welding the loading structure to any point that will reinforce the seat back frame mounting provisions. A tack weld is preferred.

4.3.1.1.4 Load Application. For a forward-facing seat, apply a horizontal forward load to the seat back through the seat back center of gravity (see 4.3.1.1.3) equal to 20 times the weight of the hinged or folding portion as determined in 4.1.2.1. For a rearward-facing seat, apply a horizontal rearward load to the seat back through the seat back center of gravity equal to eight times the weight of the hinged or folding portion as determined in 4.1.2.1.

4.3.1.1.4.1 Inspect the seat for breakage and adjuster loss of position.

4.3.1.2 Seat Back Restraining Device Load for Seats with Seat Back and Seat Bottom Attached to the Vehicle Through Different Attachments.

4.3.1.2.1 Mount the seat back subsystem in design position to its appropriate rigid mounting provisions. Include the seat back lock in the locked position, where applicable. If the seat back lock or striker is mounted independently of the seat assembly then the appropriate panel subassembly or simulated mounting point must also be rigidly mounted and included in the test.

4.3.1.2.2 Center of Gravity Bar. Attach the center of gravity bar to the center of gravity of the hinged or folded portion of the seat back as described in 4.3.1.1.3.

4.3.1.2.3 Load Application. Apply the forward or rearward load as described in 4.3.1.1.4.

4.3.1.3 Seat Bottom Restraining Device Load for Seats with Seat Bottom and Seat Back Attached to the Vehicle Through Different Attachments.

4.3.1.3.1 Mount the seat bottom subsystem in design position to its appropriate mounting provisions. Include the seat bottom lock in locked position, if applicable. If the seat bottom lock or striker is mounted independently of the seat assembly then the appropriate panel subassembly or simulated mounting point must also be rigidly mounted and included in the test.

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