



Child Restraint Anchorage Configuration and Strength

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 if the child restraint anchorage system and its associated hardware of motor vehicles meet the configuration and strength requirements of:

- Federal Motor Vehicle Safety Standard (FMVSS) 225.
- Canadian Motor Vehicle Safety Standard (CMVSS) 210.1 and CMVSS 210.2.
- United Nations Regulation UN R14.

Note: This procedure addresses the configuration and strength test requirements of FMVSS 225, UN R14, ADR 03, ADR 34, CMVSS 210.1 and CMVSS 210.2, the child restraint fixture fit and the line of sight requirement only. This procedure does not address the design criteria of FMVSS 225, UN R14, CMVSS 210.1 or CMVSS 210.2. For information concerning this, see the FMVSS 225, UN R14, CMVSS 210.1 or CMVSS 210.2 standard.

1.2 Applicability. This standard applies to passenger cars; to trucks and multipurpose passenger vehicles with a Gross Vehicle Weight Rating (GVWR) of 3855 kg (8500 lb) or less; and to buses (including school buses) with a GVWR of 4536 kg (10 000 lb) or less. This standard does not apply to walk-in van-type vehicles, vehicles manufactured to be sold exclusively to the United States (U.S.) Postal Service, shuttle buses, and funeral coaches.

This procedure is for the Lower Anchor and Tethers for Children for all systems as defined in FMVSS 225, UN R14, CMVSS 210.1 and CMVSS 210.2.

2 References

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

2.1 External Standards/Specifications.

ADR 03	CMVSS 210.1	FMVSS 210
ADR 34	CMVSS 210.2	UN R14
CMVSS 210	FMVSS 225	UN R16

2.2 GM Standards/Specifications.

GMW14366	GMW14413
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2.3 Additional References.

- FMVSS 225 UN R14 Control Drawing.
- GM Best Practices Seats 97.
- Statement of Requirements Appendix G2.
- Subsystem Technical Specification (SSTS).

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3 Resources

3.1 Facilities. The child restraint anchorage system test requires facilities having the test equipment described in 3.2 appropriate for the test(s) being run. The Body Test Lab at the Warren Technical Center is an example of such a facility.

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 Servo-hydraulic loading apparatus capable of applying, maintaining and proportioning the required loads to the child restraint anchorage system, described in 4.3.3, for any seating position.

3.2.2 Suitable load cells and instrumentation for measuring and recording loads applied to each Static Force Application Device (SFAD) 1 or SFAD 2 test fixture.

3.2.3 Suitable string potentiometer and instrumentation for measuring and recording the displacements of each SFAD 1 or SFAD 2 test fixture.

3.3 Test Vehicle/Test Piece.

3.3.1 A vehicle body or suitable partial body may be used for a child restraint anchorage system test. When using a partial body for pull testing, be certain it is of sufficient size to contain all areas of potential loading. The test body should represent production intent tether anchorages, tether anchorage locations, welding, and hardware. The test body should include appropriate components where they could have an effect on the test outcome (i.e., trim, rear glass, speakers, etc.) The vehicle body or partial body will include production intent seats for this test.

3.3.2 For component level testing, a fixture representative of the body form and/or attachments along with the production intent seats should be used to determine the strength and displacement of the Child Restraint Anchorage System (LATCH) prior to the vehicle level test.

3.4 Test Time.

Calendar time: (2 to 3) days

Test hours: 1 h

Coordination hours: (8 to 12) h

3.5 Test Required Information. Confirm with the GM Seat Design Release Engineer (DRE) or GM Seat Validation Engineer the intent of the anchorage system design: Latch position, Universal position, ISOFIX position, or i-Size position. In addition, the nominal design riding position of the seat back and the FMVSS 225 UN R14 Control Drawing will be required to conduct the tests outlined in this procedure.

3.6 Personnel/Skills. Following are the required personnel to perform the testing in this standard: Test Lab Technician, Test Lab Engineer, GM Responsible Engineer (vehicle level testing).

4 Procedure

4.1 Preparation. Attach the test body or partial body to its frame (if applicable) by the design mounting provisions. Securely mount the body or body frame assembly to a suitable holding fixture in such a manner so as to not influence or restrict local body distortion under test loads. Install the seats with the proper attachment hardware.

4.2 Conditions. There are no additional conditions required for this test.

4.2.1 Environmental Conditions. None required for this specification.

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 Configurations of the Lower Anchors. For compliance reporting, all position, dimension, attitude, and marking compliance of the lower anchorages shall be confirmed according to the FMVSS 225 UN R14 Control

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Drawing available from the GM Seat DRE. Critical configuration information requiring additional data is described in the remainder of 4.3.1.

4.3.1.1 Attitude Angles of the Lower Anchorages. Adjustable seats shall be adjusted as follows.

- Place adjustable seat backs in the nominal design riding positions and
- Place adjustable seats in the full rearward and full downward position.

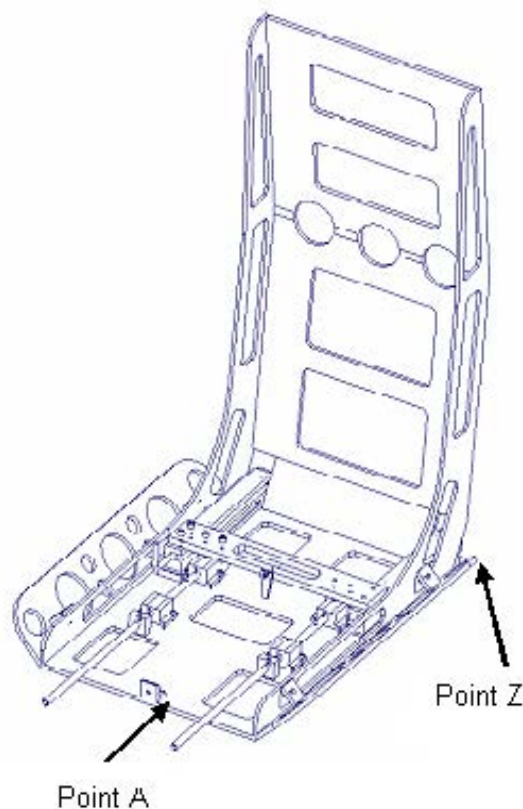
The anchorage bars are located at the vehicle seating position by using the CRF rearward extensions (Figure 1), with the CRF placed against or near the vehicle seat back. With the CRF attached to the anchorages and resting on the seat cushion, the bottom surface shall have attitude angles within the limits in Table 1, angles measured relative to the vehicle horizontal, longitudinal and transverse reference planes (Figure 2).

Table 1: Attitude Angles

Attitude	Angle (degree)
Pitch	15 ± 10
Roll	0 ± 5
Yaw	0 ± 10

Note: A graphic of the attitude angles is given in Figure 2.

Figure 1: Child Restraint Fixture (CRF)



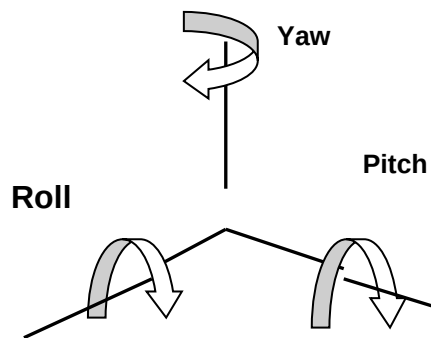
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Figure 2: Pitch/Roll/Yaw Angles



4.3.1.2 Lower Anchorage Location. Each lower anchorage bar shall be located so that a vertical transverse plane tangent to the front surface of the bar is not > 70 mm from the CRF point Z (Figure 1) measured parallel to the bottom of the CRF and not < 120 mm behind the vehicle seating reference point, measured horizontally and in a vertical longitudinal plane. Measured as follows:

4.3.1.2.1 Place the Child Restraint Fixture (CRF) onto seat cushion.

4.3.1.2.2 Slide the fixture rearward towards seat back, ensuring that the rearward extensions from the fixture fully engage the anchorage bars.

4.3.1.2.3 Once the anchorage bars are fully engaged in the fixture, lock down the CRF extensions.

4.3.1.2.4 Apply a horizontal force of 100 N at point A on the fixture (Figure 1). While the CRF is pressed against the seat back by the force, turn down knobs on fixture in order to secure the CRF.

4.3.1.2.5 Read measurement from the front of scale and record.

4.3.1.3 Size of the Lower Anchorage Wires. Each lower anchorage wire shall be (6 ± 0.1) mm in diameter.

4.3.1.3.1 Using a micrometer gage, measure and record the diameter of each lower anchorage wire.

4.3.1.4 Rigidity of Lower Anchorage Wire and Its Attachment. When subjected to a 100 N force in any direction, each lower anchorage wire attached to the vehicle or seating system shall not deform more than the amount specified in the Subsystem Technical Specification (SSTS).

4.3.1.4.1 Attach a string pot or other means of measuring displacement to the anchorage wire in the direction opposing the intended load.

4.3.1.4.2 Using a push/pull gage, apply 100 N vertically downward to the center of each anchorage wire, and record the maximum displacement of the wire.

4.3.1.4.3 Repeat the load applied in 4.3.1.4.1 in the vertical upward direction, longitudinal forward direction, and longitudinal rearward direction.

Note: If it can be determined through analysis that the wire will meet the displacement requirements as stated in the SSTS in any direction when a 100 N load is applied, a physical test is not necessary.

4.3.1.5 Confirm Marking or Conspicuity of the Lower Anchorages. Lower anchorages shall comply with either the 30° line of sight requirement per 4.3.2.1, or the marking requirement per 4.3.2.2.

4.3.1.5.1 Confirmation using Thirty Degree (30°) Line of Sight.

4.3.1.5.1.1 Requirement. The vehicle should be configured such that either the bars or the permanently attached guide for the bar is visible. The bar or guide device must be visible without the compression of the seat cushion or seat back when the bar or device is viewed in a vertical longitudinal plane passing through the center of the bar or guide device along a line making an upward 30° angle with a horizontal plane. Seat backs are in the nominal design riding position.

4.3.1.5.1.2 Instruction for Confirmation. Attach a string to the center of the lower anchor bar for each bar of each seating position. Angle the string to 30° up from horizontal in the forward longitudinal plane (toward the front of the vehicle). View the lower anchor bars from anywhere along this 30° line. If the lower anchor bar is visible along this 30° line, no additional markings are required on the seat back or cushion. Record if the bar is visible along the 30° line of sight, and take a photo from this aspect for documentation.

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Note: This must be checked for each lower anchor bar of each seating position. See Figure 3 and Figure 4 for a pictorial of the 30° line of sight.

4.3.1.5.2 Confirmation using Marking Location.

4.3.1.5.2.1 Requirement. Above each anchorage bar shall be a permanently marked 13 mm diameter circle with the child seat anchorage symbol, or, if the intent is to accommodate i-Size, a 13 mm minimum by 13 mm minimum square. The marking may be on a tag or a resin button, and within the area specified by the SSTs. If not otherwise specified, this area is defined as (50 to 100) mm above the anchorage wire and ± 25 mm from the center of anchorage wire.

4.3.1.5.2.2 Instructions for Confirmation. Using calipers, measure from the center of the anchorage wire vertically upward to the marking and record the distance. If the marking is not along the same vertical plane as the center of the anchorage wire, measure and record the horizontal distance of this difference. Take a photograph of the marking to be included in the test report.

Figure 3: Thirty Degree (30°) Line of Sight, Side View

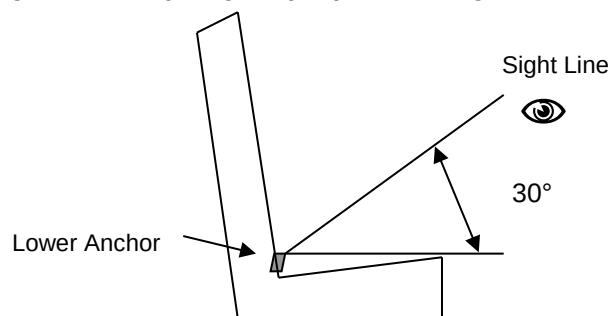
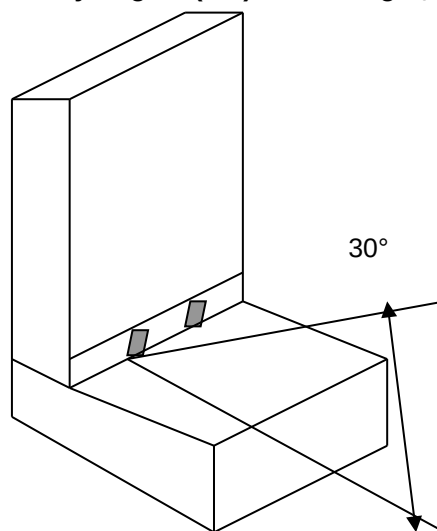


Figure 4: Thirty Degree (30°) Line of Sight, Front View



4.3.2 Configurations of the Top Tether Anchors. For compliance reporting, all position, dimension, attitude, and marking compliance of the top tether anchors shall be confirmed according to the FMVSS 225 UN R14 Control Drawing available from the GM Seat DRE.

Note: In the case of a vehicle that has a flexible or rigid user-ready tether routing device, a physical measurement using a Coordinate Measuring Machine (CMM) as described in 4.3.2.1 is required.

4.3.2.1 Measurement of the User-Ready Tether Routing Device. Install the SFAD 2 to the lower anchorages and top tether as described in 4.3.3.1.2.1. If the seating position does not have lower anchorages, center the SFAD 2 on the seat and replace the adjustable lower anchors of the SFAD 2 with spacers that end flush with

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