FINAL REPORT NUMBER 225-MGA-10-004

SAFETY COMPLIANCE TESTING FOR FMVSS 225
"Child Restraint Anchorage Systems"

GENERAL MOTORS LLC
2010 BUICK LACROSSE
NHTSA No. CA0108

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083

Test Date: July 30, 2010
Report Date: August 23, 2010

FINAL REPORT

Prepared For:

U.S DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance (Rm W45-304)
1200 New Jersey Avenue, SE
Washington, DC 20590

Prepared By: _____
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Approval Date: 9/9/2010

FINAL REPORT ACCEPTANCE BY OVSC:

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Date: 2010.09.22 10:04:57 -04'00'

Acceptance Date: _____

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. 225-MGA-10-004	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Final Report of FMVSS 225 Compliance Testing of a 2010 Buick Lacrosse, NHTSA No. CA0108		5. Report Date August 23, 2010 6. Performing Organization Code MGA	
7. Author(s) Helen A. Kaleto, Laboratory Manager Fern Gatilao, Project Engineer Brad Reaume, Test Personnel		8. Performing Organization Report No. 225-MGA-10-004	
9. Performing Organization Name and Address MGA Research Corporation 446 Executive Drive Troy, Michigan 48083		10. Work Unit No. 11. Contract or Grant No. DTNH22-02-D-11043	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance (NVS-220) 400 Seventh Street, SW Room 6111 Washington, DC 20590		13. Type of Report and Period Covered Final Test Report 14. Sponsoring Agency Code NVS-220	
15. Supplementary Notes			
16. Abstract A compliance test was conducted on the subject 2010 Buick Lacrosse, NHTSA No. CA0108, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-225-01 for the determination of FMVSS 225 compliance. The test was conducted at MGA Research Corporation in Troy, Michigan on July 30, 2010. Test failures identified were as follows: NONE The data recorded indicates that the 2010 Buick Lacrosse tested appears to meet the requirements of FMVSS 225.			
17. Key Words Compliance Testing Safety Engineering FMVSS 225 2010 Buick Lacrosse		18. Distribution Statement Copies of this report are available From: NHTSA Technical Reference Technical Information Services Division, NPO-411 1200 New Jersey Avenue, SE (Rm E12-100) Washington, D.C. 20590 Telephone No. (202) 366-4946	
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Form DOT F 1700.7 (8-70)

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1.0 PURPOSE AND PROCEDURE

PURPOSE

The child restraint anchorage testing results presented in this report are part of the Federal Motor Vehicle Safety Standard (FMVSS) No. 225 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by MGA Research Corporation (MGA) under Contract No. DTNH22-02-D-11043. The purpose of the testing was to determine if the subject vehicle, a 2010 Buick Lacrosse, NHTSA No. CA0108 meets the performance requirements of FMVSS No. 225, "Child Restraint Anchorage Systems."

PROCEDURE

This testing was conducted in accordance with NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure TP-225-01 (4/11/05) and MGA's Laboratory Test Procedure, MGATP225GOV (6/23/06).

The rear occupant compartment consisted of a 2nd row three-passenger 60/40 split-back-bench seat. The 2nd row outboard left and right seating positions and center seating positions were equipped with a child restraint anchorage system (one tether and two lower anchorages). The center-to-center spacing between the 2nd row outboard lower anchorages was approximately 718 mm. The 2nd row right outboard and center seating positions were tested with the SFADII.

2.0 COMPLIANCE TEST AND DATA SUMMARY

TEST SUMMARY

The testing was conducted at MGA in Troy, Michigan on July 30, 2010.

Based on the test results, the 2010 Buick Lacrosse appears to meet the requirements of FMVSS No. 225 for this testing.

The SFADII at the 2nd row center seating position sustained a maximum force of 11,129 N and held the required load for 3 seconds and the total displacement was 56 mm. The SFADII at the 2nd row right seating position sustained a maximum force of 15,061 N and held the required load for 3 seconds.

DATA SUMMARY

Strength and displacement summary data are provided below. Data for the configuration and the location of each child restraint anchorage system are provided in Section 5.0. Photographs are found in Section 6.0 and test plots are found in Section 7.0.

Table 1. Summary Data for Strength and Displacement

MGA Test #	Fixture Type	Test Configuration	Seating Position	Max. Load (N)	Displacement (mm)
A10240	SFADII	Forward	2nd Row Center	11,129	56
		Forward w/ Top Tether	2nd Row Right	15,061	--

3.0 TEST VEHICLE INFORMATION

Table 2. General Test and Vehicle Parameter Data

VEH. MOD YR/MAKE/MODEL/BODY	2010 Buick Lacrosse
VEH. NHTSA NO.	CA0108
VIN	1G4GB5EG3AF184744
COLOR	White
VEH. BUILD DATE	12/09
TEST DATE	July 30, 2010
TEST LABORATORY	MGA Research Corporation
OBSERVERS	Fern Gatilao , Brad Reaume, Kenney Godfrey

GENERAL INFORMATION:

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: General Motors, LLC

Date of Manufacture: 12/09; VIN: 1G4GB5EG3AF184744

GVWR: 4,878 lbs GAWR FRONT: 2,539 lbs

GAWR REAR: 2,339 lbs

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 33 psi REAR: 33 psi

Recommended Tire Size: P245/50R17

Recommended Cold Tire Pressure:

FRONT: 33 psi REAR: 33 psi

Size of Tire on Test Vehicle: P245/50R17

Size of Spare Tire: T125/70R17

VEHICLE CAPACITY DATA:

Type of Front Seats: Bench ____; Bucket X; Split Bench___

Number of Occupants: Front __2__; Middle__0___; Rear;_3__ TOTAL __5__.

4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

MGA Research Corporation 446 Executive Drive Troy, Michigan 48083	
Test Equipment Used for Testing	**Calibration Due Date**
MGA Hydraulic Test Frame	N/A
Two (2) Load Cell 10,000 lb Capability	S/N 251 & 663 (12/1/2010)
String Potentiometer	L1608952A (9/30/2010)
Hydraulic Pump	N/A
MGA CRF Fixture	N/A
MGA SFADI	N/A
MGA SFADII	N/A
MGA 2-Dimensional Template	N/A
Linear Scale	TPM928 (5/26/2011)
MGA Data Acquisition System	N/A
Digital Calipers	MGA00684 (1/16/2011)
Force Gauge	MGA00015 (6/1/2011)
Inclinometer (Digital)	MGA00822 (1/27/2011)

5.0 DATA

Table 3. Child Restraint Tether Anchorage Configuration

Seating Position		Permit the attachment of a tether hook	Accessible without the need for any tool other than a screwdriver or coin	Ready for use without the need for any tools	Sealed to prevent the entry of exhaust fumes
Front Row		N/A	N/A	N/A	N/A
Second Row	LH	Yes	Yes	Yes	Yes
	Ctr.	Yes	Yes	Yes	Yes
	RH	Yes	Yes	Yes	Yes
Third Row		N/A	N/A	N/A	N/A

Note: AS DETERMINED USING THE PROCEDURES SPECIFIED IN TP-225-01.

REMARKS: NONE.

Table 4. Child Restraint Lower Anchorage Configuration

OBSERVED LOWER ANCHORAGE CONFIGURATION	SEAT POSITION				
		FRONT ROW	SECOND ROW		THIRD ROW
			I/B	O/B	
Above anchorage, permanently marked with a circle not less than 13 mm in Dia.; and whose color contrasts with its background; and its center is not less than 50 mm and not more than 100 mm above the bar, and in the vertical longitudinal plane that passes through the center of the bar.	LH	N/A	Yes		N/A
	Ctr		Yes		
	RH		Yes		
Each of the bars is visible, without the compression of the seat cushion or seat back, when the bar is viewed, in a vertical longitudinal plane passing through the center of the bar, along a line marking an upward 30 degree angle with a horizontal plane.	LH	N/A	N/A		N/A
	Ctr		N/A		
	RH		N/A		
Diameter of the bar (mm)	LH	N/A	6.1	6.2	N/A
	Ctr		6.1	6.1	
	RH		6.0	6.0	
Inspect if the bars are straight, horizontal and transverse	LH	N/A	Yes		N/A
	Ctr		Yes		
	RH		Yes		
Optional Marking: At least one anchorage bar (when deployed for use, if storable anchorages), one guidance fixture, or one seat marking is visible.	LH	N/A	N/A		N/A
	Ctr				
	RH				
Optional Marking: If guidance fixtures are used, the fixture(s) must be installed.	LH	N/A	N/A		N/A
	Ctr				
	RH				
Measure the distance between Point "Z" of the CRF and the front surface of the anchorage bar (mm)	LH	N/A	56		N/A
	Ctr		59		
	RH		55		
Measure the distance between the SRP to the front of the anchorage bar (mm)	LH	N/A	175	175	N/A
	Ctr		N/A		
	RH		175	175	

Table 4. Child Restraint Lower Anchorage Configuration (continued)

OBSERVED LOWER ANCHORAGE CONFIGURATION	SEAT POSITION					
			FRONT ROW	SECOND ROW I/B	SECOND ROW O/B	THIRD ROW
Inspect if the centroidal longitudinal axes are collinear within 5 degrees	LH		N/A	Yes		N/A
	Ctr			Yes		
	RH			Yes		
Inspect if the inside surface of the bar that is straight and horizontal section of the bars, and determine they are not less than 25 mm, but not more than 60 mm in length (mm).	LH	Req't>25	N/A	52.5	38.4	N/A
		Req't<60		57.3	43.4	
	Ctr	Req't>25		46.8	52.5	
		Req't<60		50.7	57.3	
	RH	Req't>25		44.7	38.3	
		Req't<60		49.0	43.4	
Inspect if the bars can be connected to, over their entire inside length by the connectors of child restraint system.	LH		N/A	Yes		N/A
	Ctr			Yes		
	RH			Yes		
Inspect if the bars are an integral and permanent part of the vehicle.	LH		N/A	Yes		N/A
	Ctr			Yes		
	RH			Yes		
Inspect if the bars are rigidly attached to the vehicle. If feasible, hold the bar firmly with two fingers and gently pull.	LH		N/A	Yes		N/A
	Ctr			Yes		
	RH			Yes		

PITCH, YAW, & ROLL INFORMATION

SEAT POSITION	PITCH (deg)	YAW (deg)	ROLL (deg)
2nd Row Left	13	N/A	1
2nd Row Center	13	N/A	0
2nd Row Right	13	N/A	0

N/A indicates that there were no lower anchorages in the 2nd row center seating position.

Note: AS DETERMINED USING THE PROCEDURES SPECIFIED IN TP-225-01.

REMARKS: NONE

Table 5. Tether Location and Dimensional Measurements

SEAT POSITION FOR TETHER		TETHER ANCHORAGE LOCATION Located in the required zone?
Front Row		N/A
Second Row	LH	Yes
	Ctr.	Yes
	RH	Yes
Third Row		N/A

Note: AS DETERMINED USING THE PROCEDURES SPECIFIED IN TP-225-01.

REMARKS: NONE

Table 6. Tether Anchorage Static Loading and Displacement

SEAT POSITION		Seat, Seat Back, & Head Restraint Positions			Type of SFAD Used	Angle (deg)	Initial Location (mm)	Onset Rate (N/sec.)	Force Applied (kN)	Max. Load (N)	Final Location (mm)	Horiz. Displ. (mm)
		Seat	Seat Back	Is There a H/R?								
Front Row		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Second Row	LH	N/A	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ctr.	Fixed	Fixed	No	II	10.2	14	389	11,000	11,129	70	56
	RH	Fixed	Fixed	Yes	II	10.4	--	537	15,000	15,061	--	--
Third Row		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: AS DETERMINED USING THE PROCEDURES SPECIFIED IN TP-225-01.

6.0 PHOTOGRAPHS

6.1 Front view

6.2 Rear view

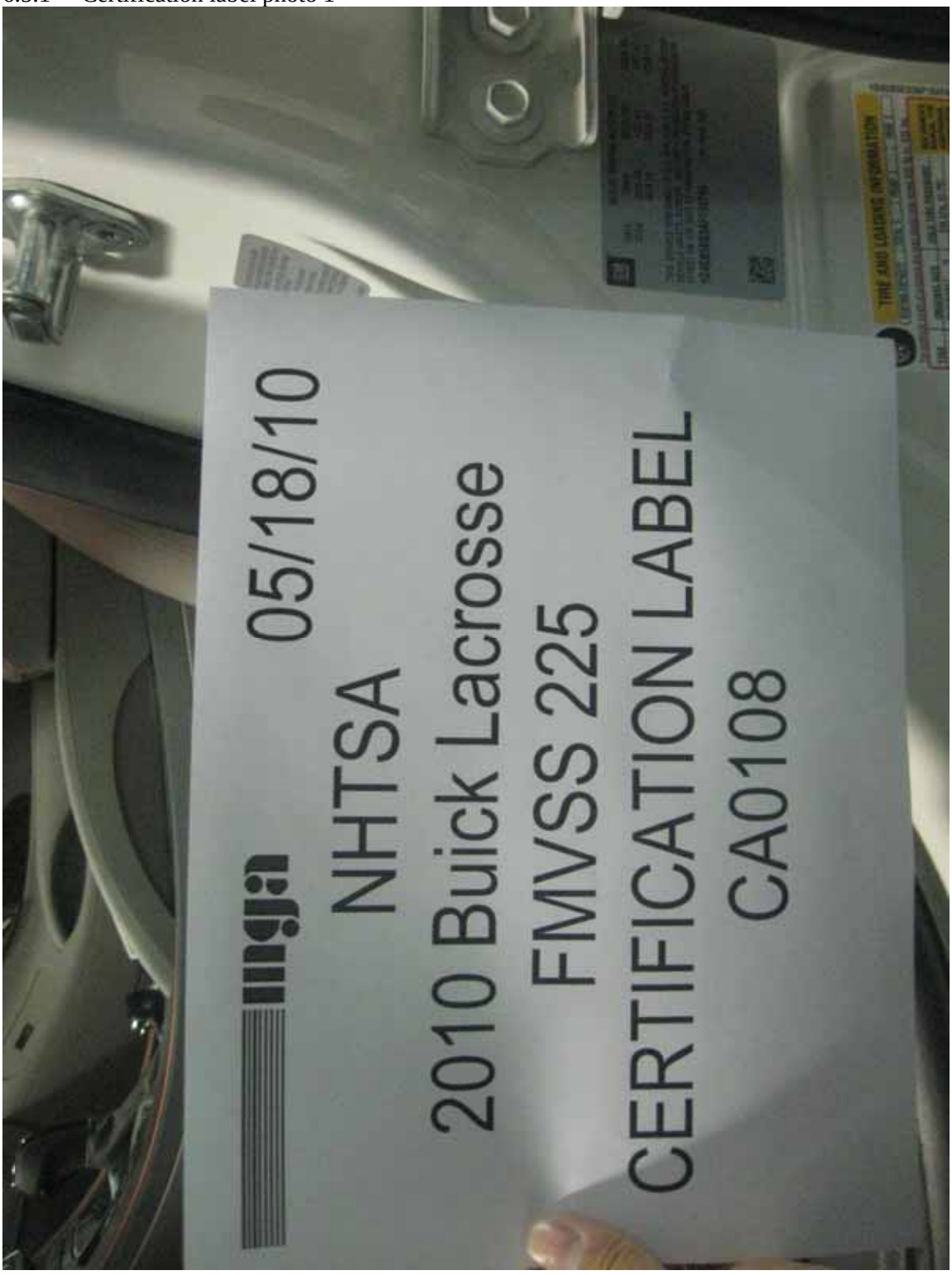

05/19/10
NHTSA
2010 Buick Lacrosse
FMVSS 225
REAR VIEW
CA0108
BUICK

6.3 Front left view

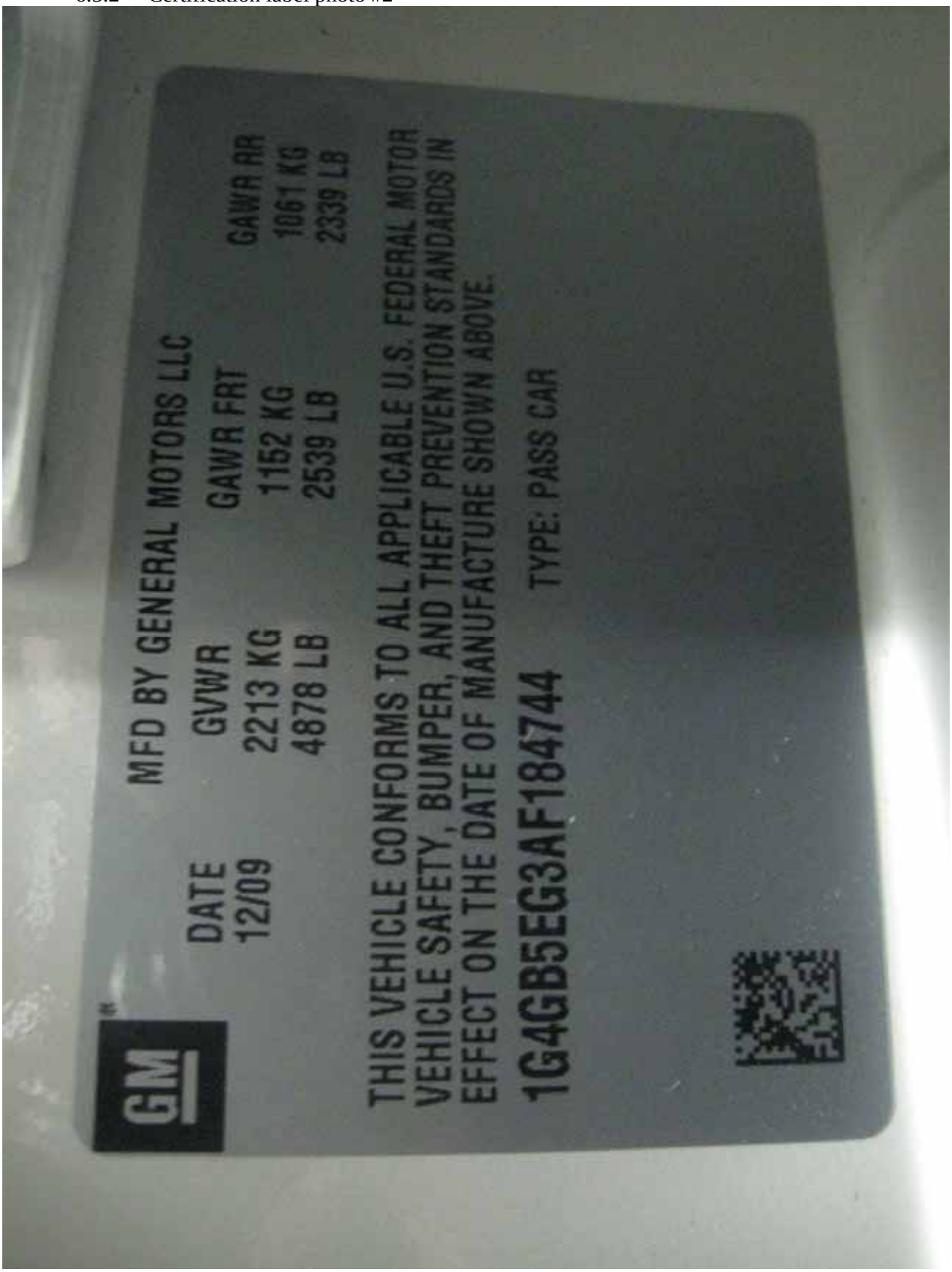
6.4 Front right view

6.5 Test vehicle's certification label

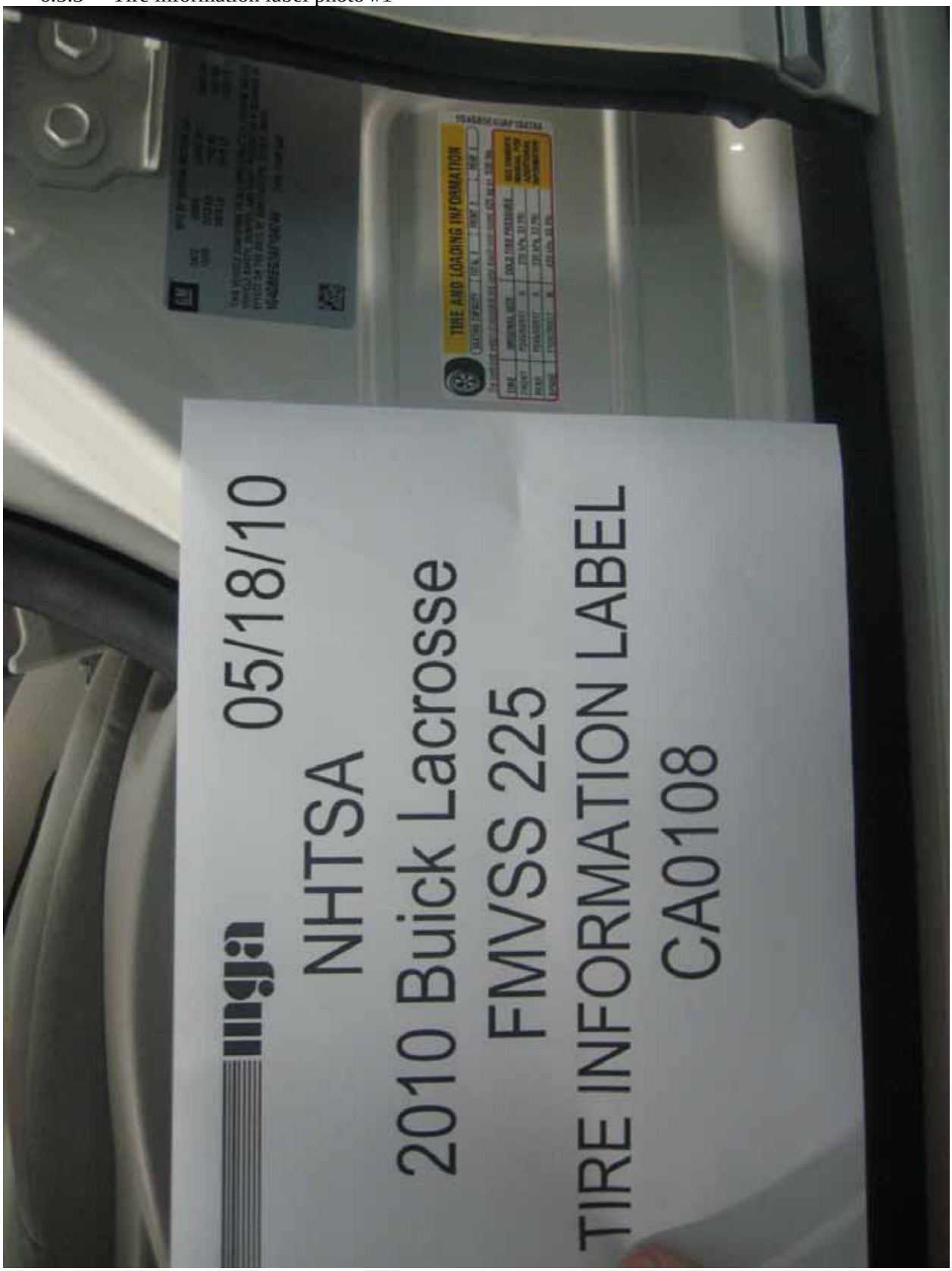
6.5.1 Certification label photo 1



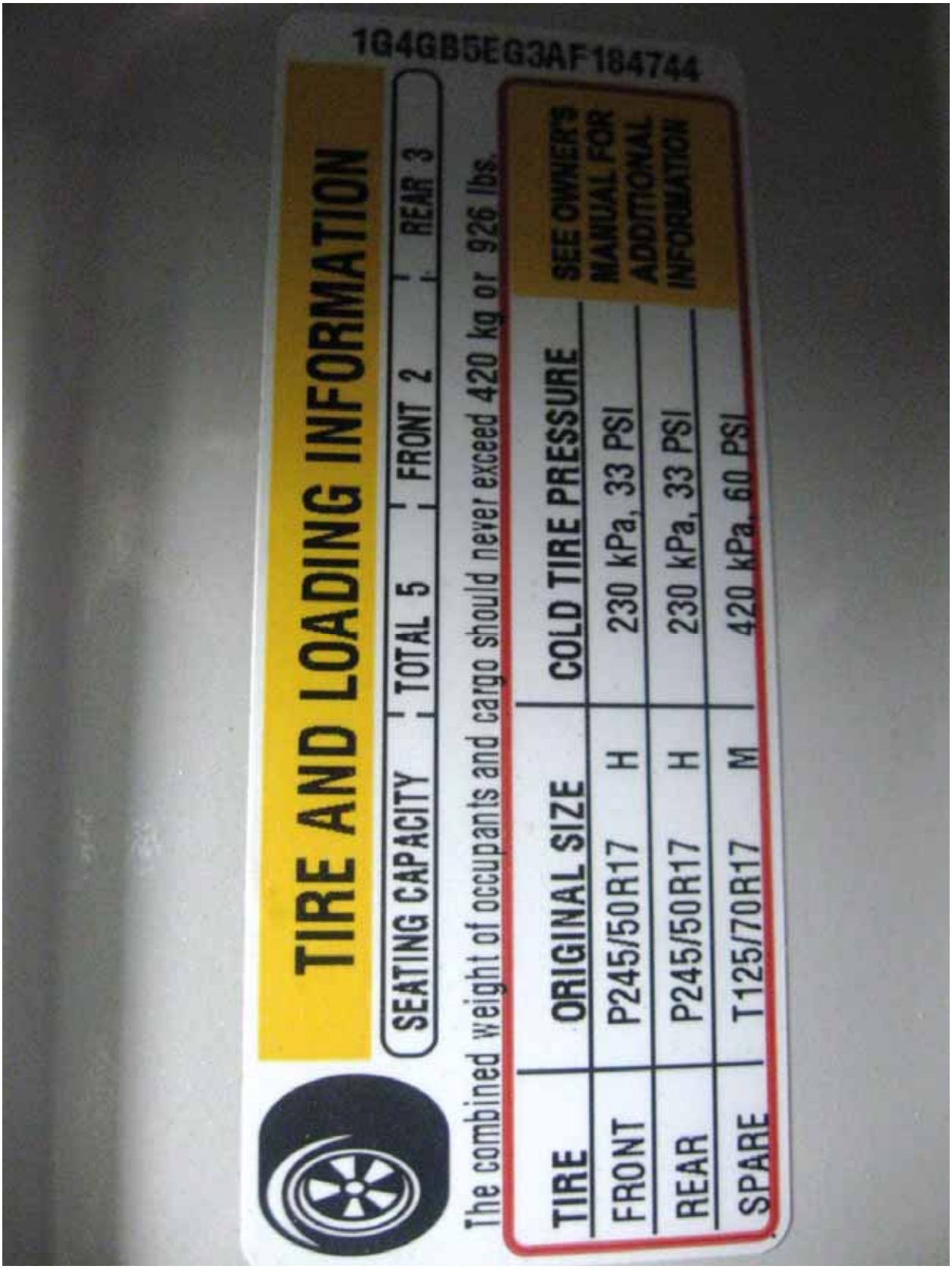
6.5.2 Certification label photo #2



6.5.3 Tire information label photo #1



6.5.4 Tire information label photo #2



6.6 Vehicle tie down at each tie down location

6.6.1 Front under vehicle

6.6.2 Rear under vehicle

6.6.3 Left front

6.6.4 Left rear

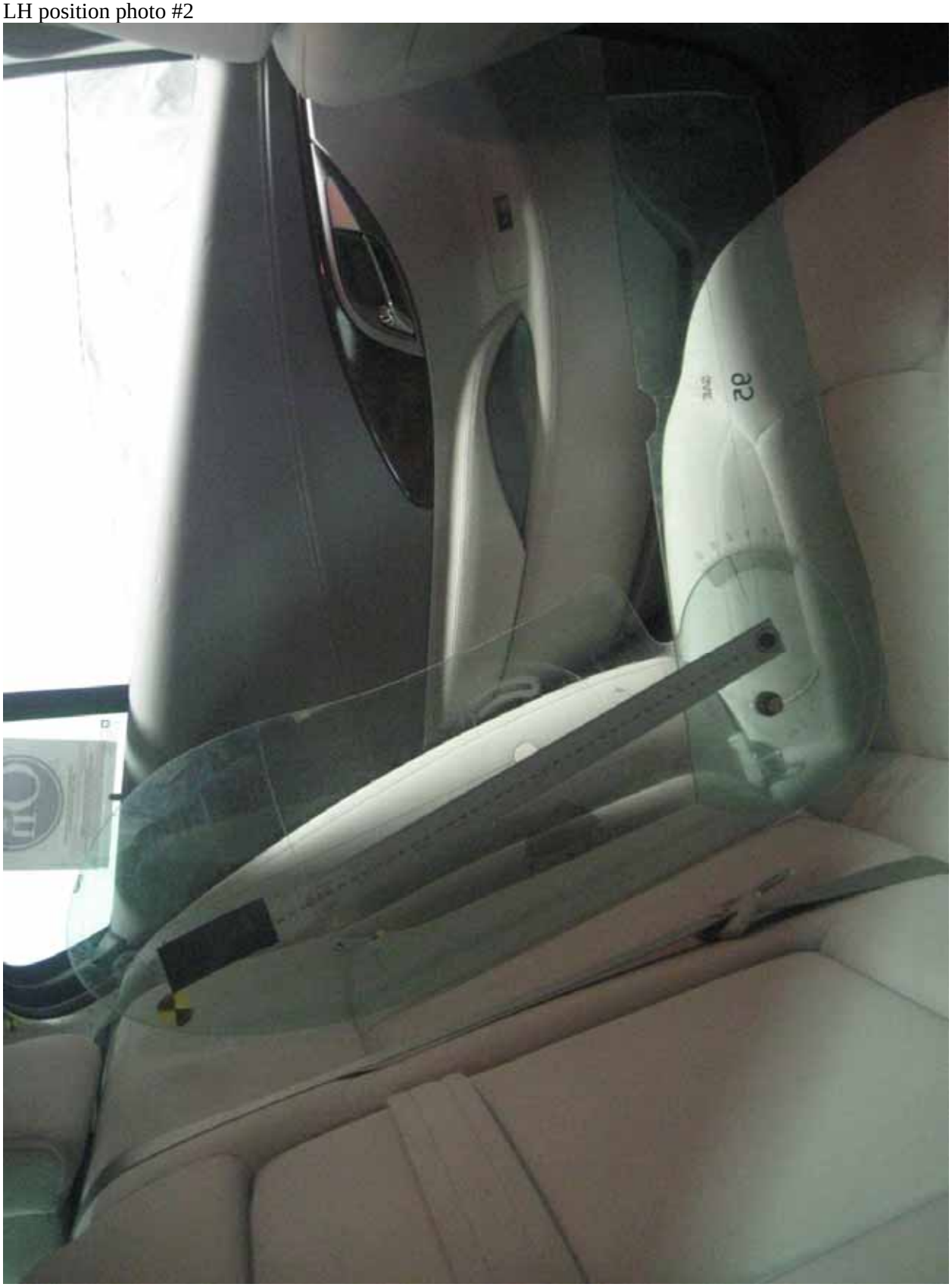
6.6.5 Right front

6.6.6 Right rear

6.7 2-dimensional template

6.7.1 LH position photo #1

6.7.2 LH position photo #2

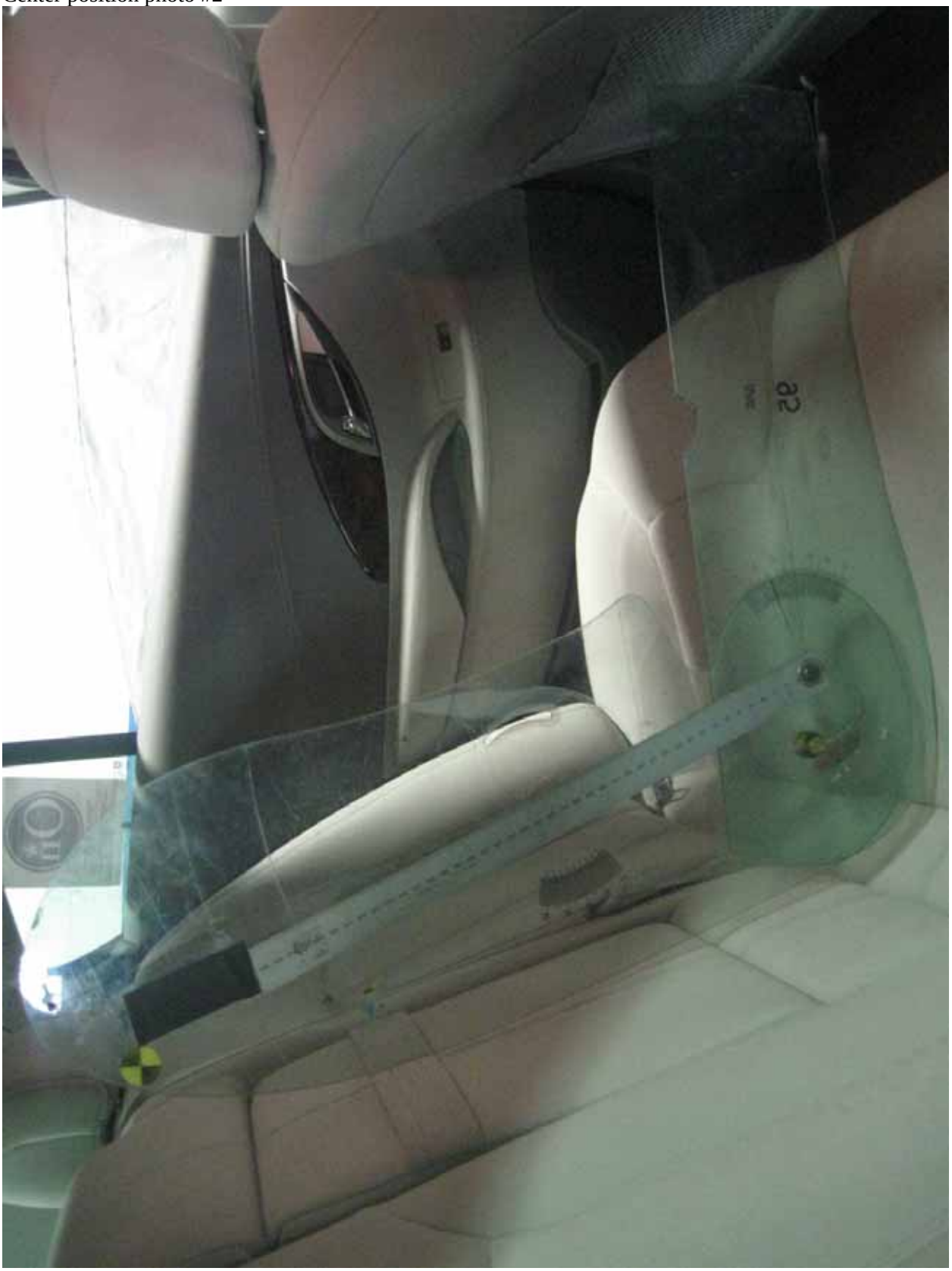


6.7.3 RH position photo #1

6.7.4 RH position photo #2

6.7.5 Center position photo #1

6.7.6 Center position photo #2

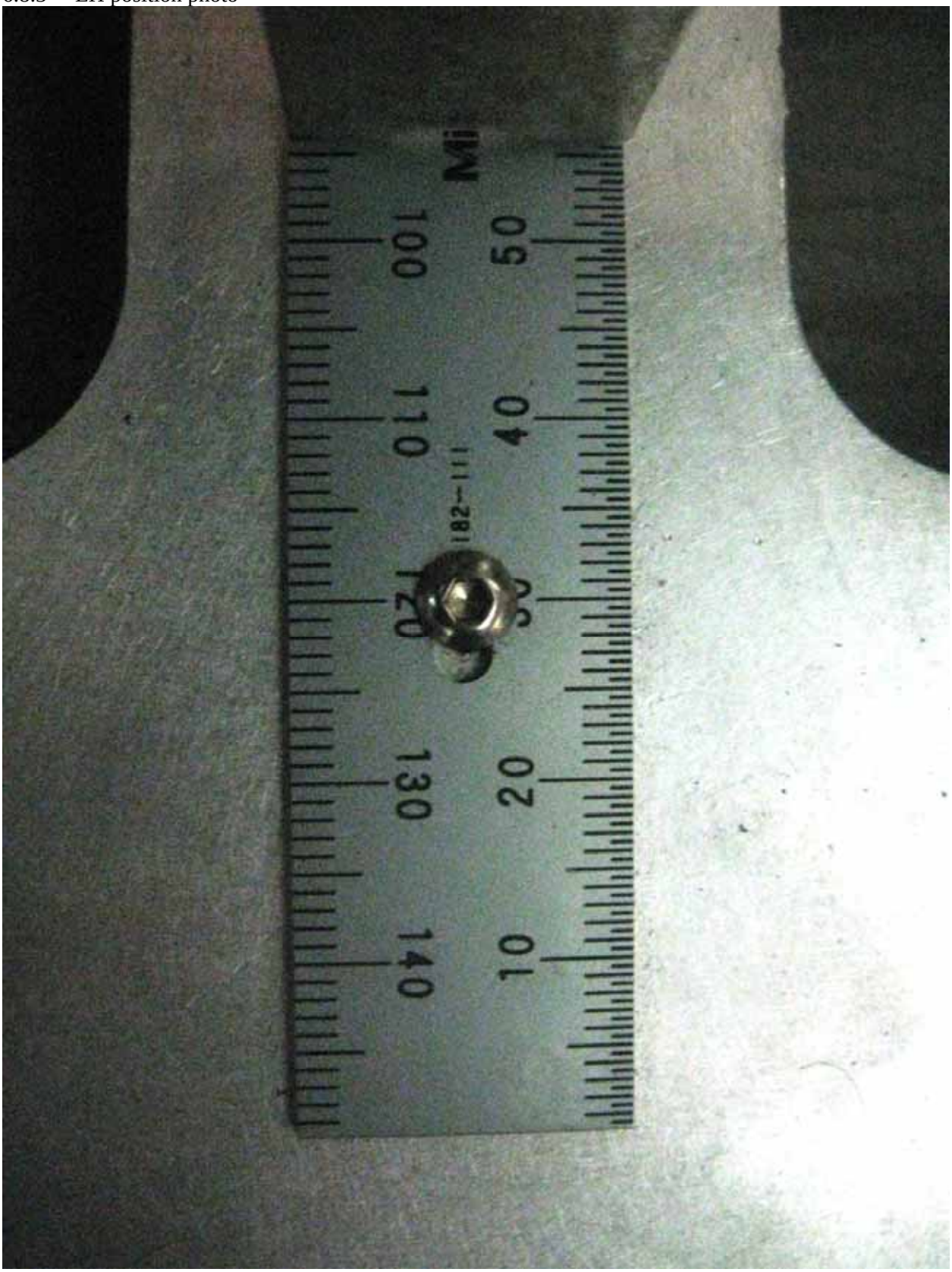


6.8 CRF verification

6.8.1 LH position photo

6.8.2 LH position photo

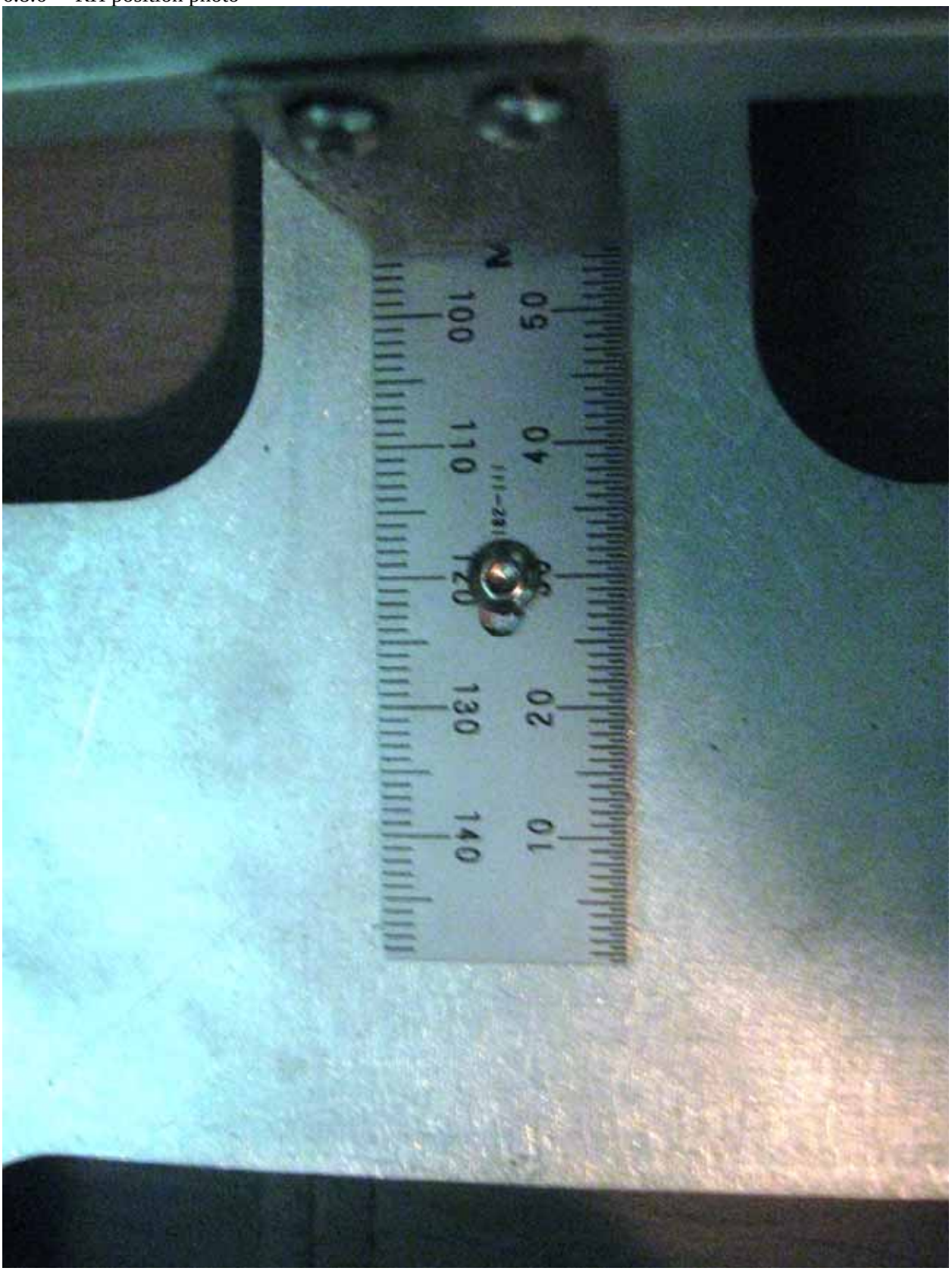
6.8.3 LH position photo



6.8.4 RH position photo

6.8.5 RH position photo

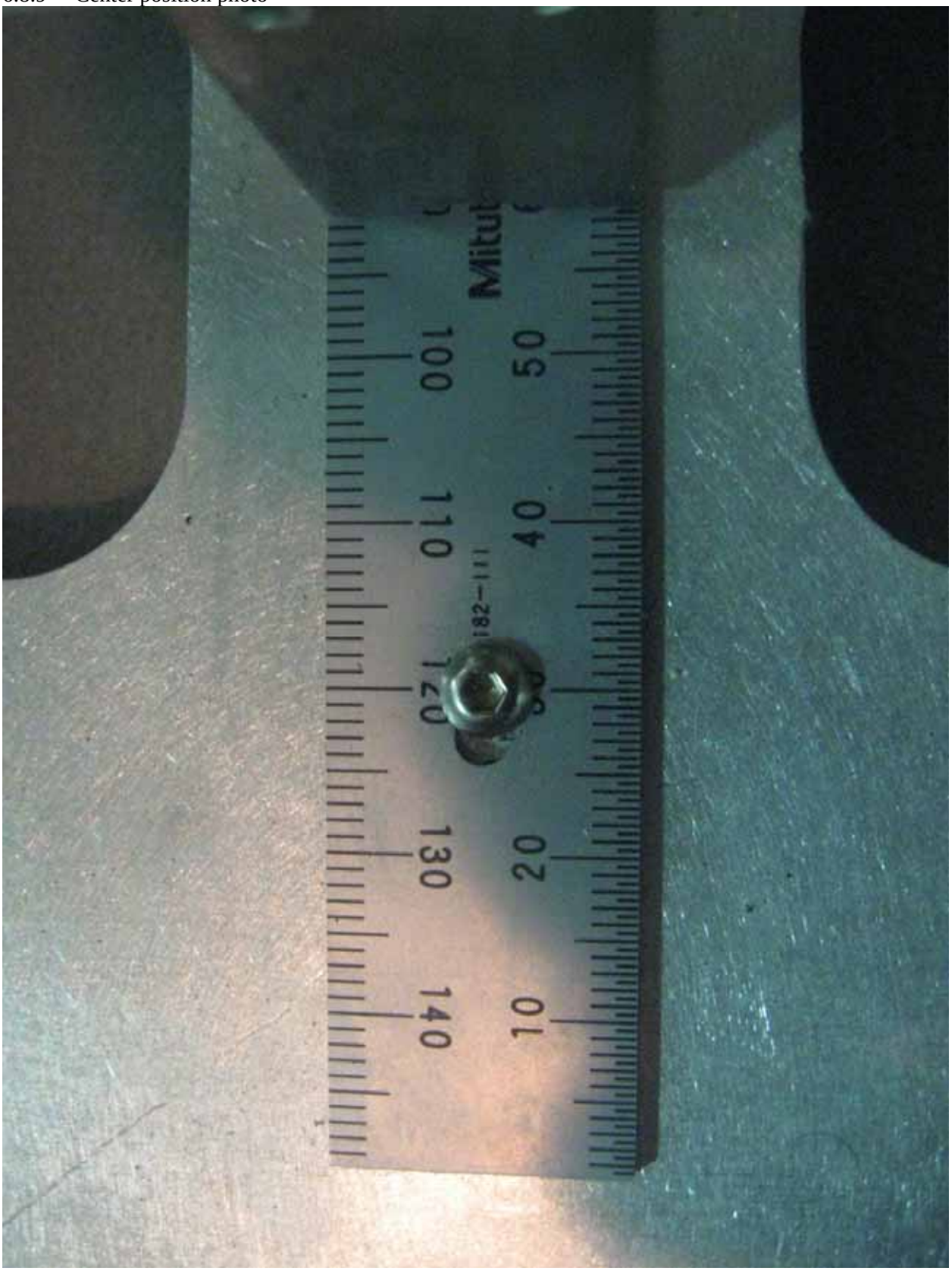
6.8.6 RH position photo



6.8.7 Center position photo

6.8.8 Center position photo

6.8.9 Center position photo



6.9 Front view of test vehicle with test apparatus in place

6.9.1 SFAD II LH & RH Photo # 1

6.9.2 SFAD II LH & RH Photo #2

6.10 Pre-test views of each child restraint anchorage system installed in the vehicle

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6.10.2 Pre-test photo

6.10.3 Pre-test photo

6.10.4 Pre-test photo

6.10.5 Pre-test photo

6.11 Post-test condition of each child restraint anchorage system

6.11.1 Post-test photo

6.11.2 Post-test photo

6.11.3 Post-test photo

6.11.4 Post-test photo

6.11.5 Post-test photo

6.11.6 Post-test photo

6.11.7 Post-test photo

6.11.8 Post-test photo

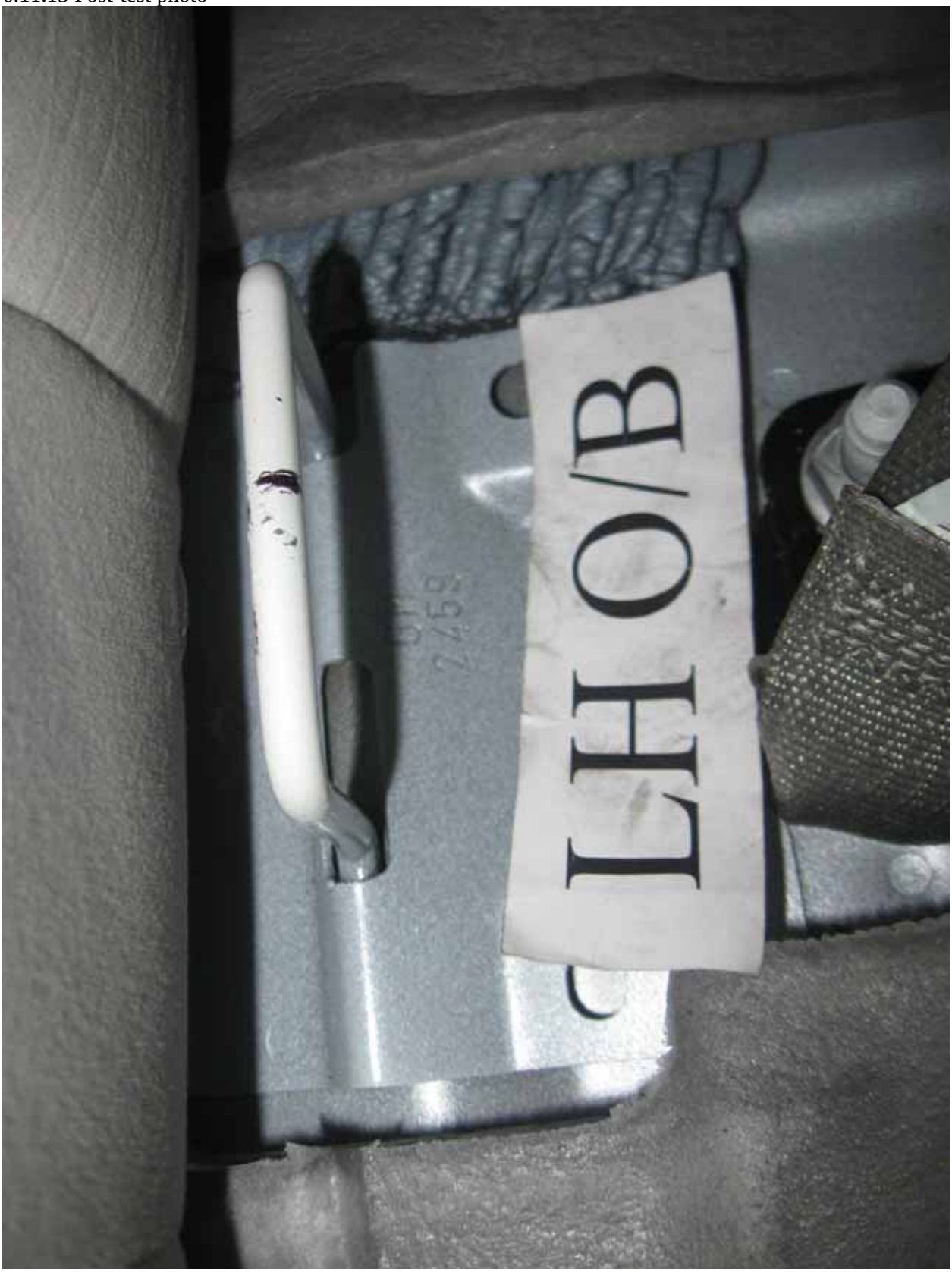
6.11.9 Post-test photo

6.11.10 Post-test photo

6.11.11 Post-test photo

6.11.12 Post-test photo

6.11.13 Post-test photo



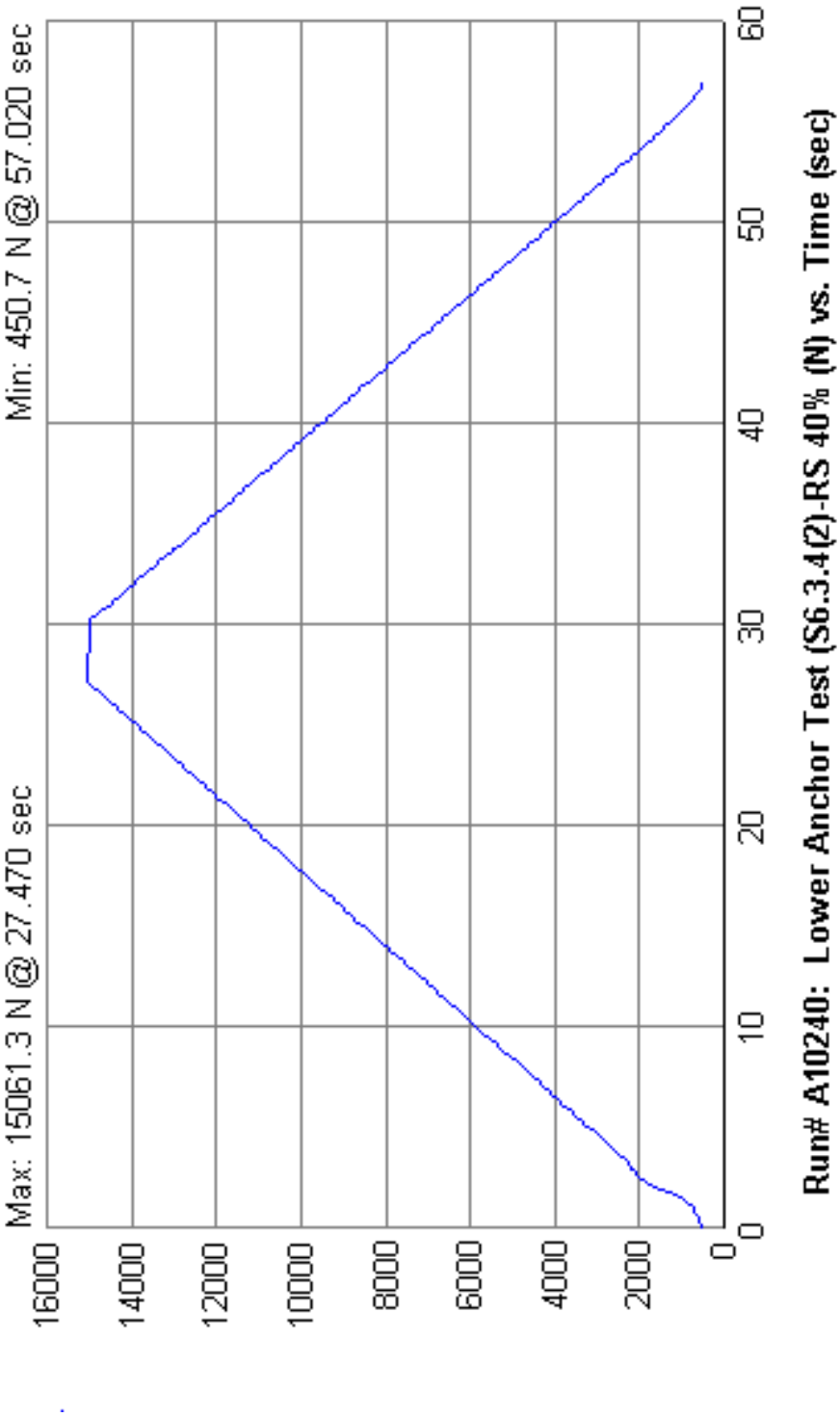
6.11.14 Post-test photo

6.11.15 Post-test photo

6.11.16 Post-test photo

6.11.17 Post-test photo

7.0 Plots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Min: 450.7 N @ 57.020 sec
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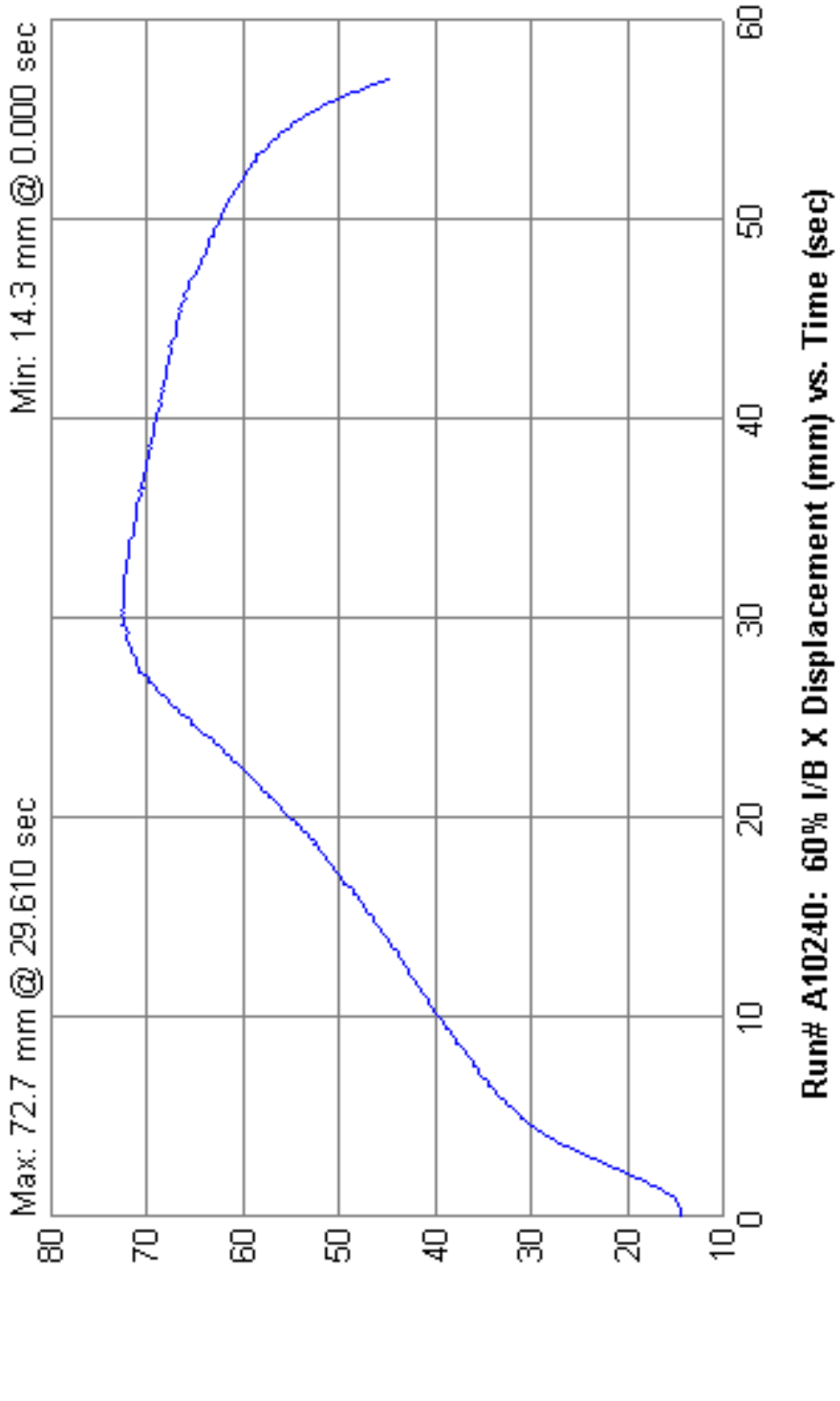
14000
12000
10000
8000
6000
4000
2000
0
0
10
20
30
40
50
60


Max: 72.7 mm @ 29.610 sec
Min: 14.3 mm @ 0.000 sec
Run# A10240: 60% I/B X Displacement (mm) vs. Time (sec)
80
70
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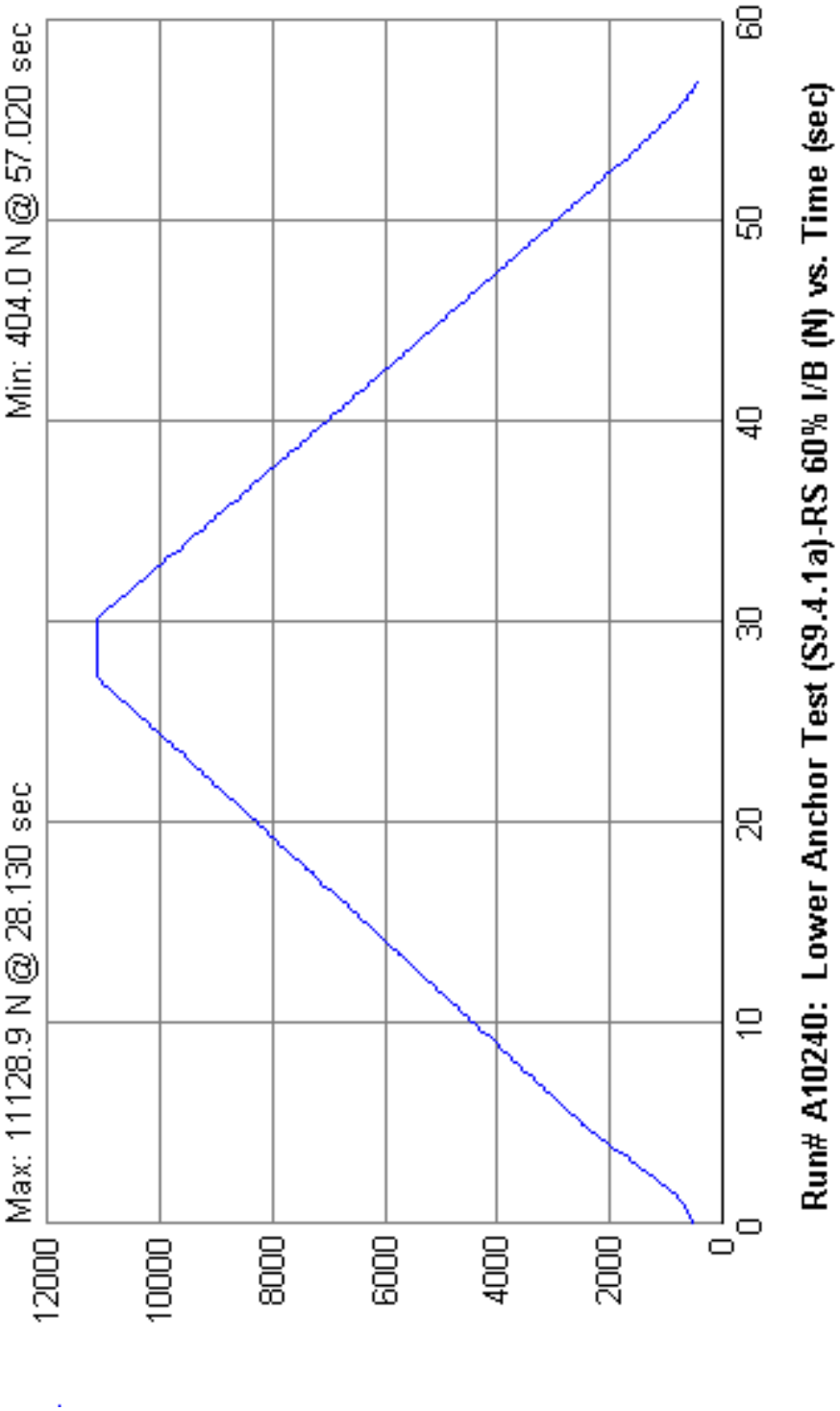
30
20
10
0
10
20
30
40
50
60


Max: 11128.9 N @ 28.130 sec
Min: 404.0 N @ 57.020 sec
12000
10000
8000
6000
4000
2000
0
0
10
20
30
40
50
60
Run# A10240: Lower Anchor Test (S9.4.1a)-RS 60% I/B (N) vs. Time (sec)

8.0 REPORT OF VEHICLE CONDITION

REPORT OF VEHICLE CONDITION AT THE COMPLETION OF TESTING

CONTRACT No.: DTNH22-02-D-11043 DATE: July 30, 2010

From: MGA Research Corporation, 446 Executive Drive, Troy, MI 48083

To: NHTSA, OVSC, NVS-220

The following vehicle has been subjected to compliance testing for FMVSS No. 225 & 201U

The vehicle was inspected upon arrival at the laboratory for the test and found to contain all of the equipment listed below. All variances have been reported within 2 working days of vehicle arrival, by letter, to the NHTSA Industrial Property Manager (NAD0-30), with a copy to the OVSC COTR. The vehicle is again inspected, after the above test has been conducted, and all changes are noted below. The final condition of the vehicle is also noted in detail.

VEH. MOD YR/MAKE/MODEL/BODY: 2010 Buick Lacrosse

VEH. NHTSA NO.: CA0108 VIN: 1G4GB5EG3AF184744

COLOR: White

ODOMETER READINGS: ARRIVAL 3 miles Date: 5/18/2010

COMPLETION 4 miles Date: 7/30/2010

PURCHASE PRICE: $28,730

ENGINE DATA: 6 Cylinders 3.0 Liters ___ Cubic Inches

TRANSMISSION DATA: X Automatic ___ Manual ___ No. of Speeds

FINAL DRIVE DATA: ___Rear Drive X Front Drive ___4 Wheel Drive

CHECK APPROPRIATE BOXES FOR VEHICLE EQUIPMENT:

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Fern Gatilao, Brad Reaume, Kenney Godfrey

X	Air Conditioning	X	Traction Control	X	Clock
	Tinted Glass		All Wheel Drive		Roof Rack
X	Power Steering	X	Speed Control	X	Console
X	Power Windows	X	Rear Window Defroster	X	Driver Air Bag
X	Power Door Locks		Sun Roof or T-Top	X	Passenger Air Bag
X	Power Seat(s)	X	Tachometer	X	Front Disc Brakes
X	Power Brakes	X	Tilt Steering Wheel	X	Rear Disc Brakes
X	Antilock Brake System	X	AM/FM/Compact Disc		Other

REMARKS:

Salvage only.

Equipment that is no longer on the test vehicle as noted on previous pages:

All equipment inventoried and placed in vehicle.

Explanation for equipment removal:

Test Vehicle Condition:

Winshield was removed for testing.

Salvage only.

RECORDED BY: Fern Gatilao, Kenney Godfrey DATE: July 30, 2010

APPROVED BY: Brad Reaume

APPENDIX A
OWNERS MANUAL CHILD RESTRAINT SYSTEMS

Child Restraints

Older Children

Older children who have outgrown booster seats should wear the vehicle's safety belts.

The manufacturer's instructions that come with the booster seat, state the weight and height limitations for that booster. Use a booster seat with a lap-shoulder belt until the child passes the below fit test:

- Sit all the way back on the seat. Do the knees bend at the seat edge? If yes, continue. If no, return to the booster seat.
- Buckle the lap-shoulder belt. Does the shoulder belt rest on the shoulder? If yes, continue. If no, then return to the booster seat.
- Does the lap belt fit low and snug on the hips, touching the thighs? If yes, continue. If no, return to the booster seat.
- Can proper safety belt fit be maintained for the length of the trip? If yes, continue. If no, return to the booster seat.

Q: What is the proper way to wear safety belts?

A: An older child should wear a lap-shoulder belt and get the additional restraint a shoulder belt can provide. The shoulder belt should not cross the face or neck. The lap belt should fit snugly below the hips, just touching the top of the thighs. This applies belt force to the child's pelvic bones in a crash. It should never be worn over the abdomen, which could cause severe or even fatal internal injuries in a crash.

According to accident statistics, children and infants are safer when properly restrained in a child restraint system or infant restraint system secured in a rear seating position.

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In a crash, children who are not buckled up can strike other people who are buckled up, or can be thrown out of the vehicle. Older children need to use safety belts properly.

⚠ WARNING

Never do this.

Never allow two children to wear the same safety belt. The safety belt can not properly spread the impact forces. In a crash, the two children can be crushed together and seriously injured. A safety belt must be used by only one person at a time.

⚠ WARNING

Never do this.

Never allow a child to wear the safety belt with the shoulder belt behind their back. A child can be seriously injured by not wearing the lap-shoulder belt properly. In a crash, the child would not be restrained by the shoulder belt. The child could move too far forward increasing the chance of head and neck injury. The child

(Continued)

WARNING (Continued)

might also slide under the lap belt. The belt force would then be applied right on the abdomen. That could cause serious or fatal injuries. The shoulder belt should go over the shoulder and across the chest.

2-42 Seats and Restraints

Infants and Young Children

Everyone in a vehicle needs protection! This includes infants and all other children. Neither the distance traveled nor the age and size of the traveler changes the need, for everyone, to use safety restraints. In fact, the law in every state in the United States and in every Canadian province says children up to some age must be restrained while in a vehicle.

⚠ WARNING

Children can be seriously injured or strangled if a shoulder belt is wrapped around their neck and the safety belt continues to tighten. Never leave children unattended in a vehicle and never allow children to play with the safety belts.

Airbags plus lap-shoulder belts offer protection for adults and older children, but not for young children and infants. Neither the vehicle's safety belt system nor its airbag system is designed for them. Every time infants and young children ride in vehicles, they should have the protection provided by appropriate child restraints.

Children who are not restrained properly can strike other people, or can be thrown out of the vehicle.

⚠ WARNING

Never do this.

Never hold an infant or a child while riding in a vehicle. Due to crash forces, an infant or a child will become so heavy it is not possible to hold it during a crash. For example, in a crash at only 40 km/h (25 mph), a 5.5 kg (12 lb) infant will suddenly become a 110 kg (240 lb) force on a person's arms. An infant should be secured in an appropriate restraint.

Seats and Restraints 2-43

⚠ WARNING

Never do this.

Children who are up against, or very close to, any airbag when it inflates can be seriously injured or killed. Never put a rear-facing child restraint in the right front seat. Secure a rear-facing child restraint in a rear seat. It is also better to secure a forward-facing child restraint in a rear seat. If you must secure a forward-facing child restraint in the right front seat, always move the front passenger seat as far back as it will go.

2-44 Seats and Restraints

Q: What are the different types of add-on child restraints?

A: Add-on child restraints, which are purchased by the vehicle's owner, are available in four basic types. Selection of a particular restraint should take into consideration not only the child's weight, height, and age but also whether or not the restraint will be compatible with the motor vehicle in which it will be used.

For most basic types of child restraints, there are many different models available. When purchasing a child restraint, be sure it is designed to be used in a motor vehicle. If it is, the restraint will have a label saying that it meets federal motor vehicle safety standards.

The restraint manufacturer's instructions that come with the restraint state the weight and height limitations for a particular child restraint. In addition, there are many kinds of restraints available for children with special needs.

⚠ WARNING

To reduce the risk of neck and head injury during a crash, infants need complete support. This is because an infant's neck is not fully developed and its head weighs so much compared with the rest of its body. In a crash, an infant in a rear-facing child restraint settles into the restraint, so the crash forces can be distributed across the strongest part of an infant's body, the back and shoulders. Infants should always be secured in rear-facing child restraints.

⚠ WARNING

A young child's hip bones are still so small that the vehicle's regular safety belt may not remain low on the hip bones, as it should. Instead, it may settle up around the child's abdomen. In a crash, the belt would apply force on a body area that is unprotected by any bony structure. This alone could cause serious or fatal injuries. To reduce the risk of serious or fatal injuries during a crash, young children should always be secured in appropriate child restraints.

Seats and Restraints 2-45

Child Restraint Systems

(A) Rear-Facing Infant Seat

A rear-facing infant seat (A) provides restraint with the seating surface against the back of the infant.

The harness system holds the infant in place and, in a crash, acts to keep the infant positioned in the restraint.

(B) Forward-Facing Child Seat

A forward-facing child seat (B) provides restraint for the child's body with the harness.

(C) Booster Seats

A booster seat (C) is a child restraint designed to improve the fit of the vehicle's safety belt system. A booster seat can also help a child to see out the window.

Securing an Add-On Child Restraint in the Vehicle

⚠ WARNING

A child can be seriously injured or killed in a crash if the child restraint is not properly secured in the vehicle. Secure the child restraint properly in the vehicle using the vehicle's safety belt or LATCH system, following the instructions that came with that child restraint and the instructions in this manual.

To help reduce the chance of injury, the child restraint must be secured in the vehicle. Child restraint systems must be secured in vehicle seats by lap belts or the lap belt portion of a lap-shoulder belt, or by the LATCH system. See *Lower Anchors and Tethers for Children (LATCH System) on page 2-48* for more information. Children can be endangered in a crash if the child restraint is not properly secured in the vehicle.

When securing an add-on child restraint, refer to the instructions that come with the restraint which may be on the restraint itself or in a booklet, or both, and to this manual. The child restraint instructions are important, so if they are not available, obtain a replacement copy from the manufacturer.

Keep in mind that an unsecured child restraint can move around in a collision or sudden stop and injure people in the vehicle. Be sure to properly secure any child restraint in the vehicle — even when no child is in it.

Securing the Child Within the Child Restraint

⚠ WARNING

A child can be seriously injured or killed in a crash if the child is not properly secured in the child restraint. Secure the child properly following the instructions that came with that child restraint.

Where to Put the Restraint

According to accident statistics, children and infants are safer when properly restrained in a child restraint system or infant restraint system secured in a rear seating position.

We recommend that children and child restraints be secured in a rear seat, including: an infant or a child riding in a rear-facing child restraint; a child riding in a forward-facing

child seat; an older child riding in a booster seat; and children, who are large enough, using safety belts.

A label on your sun visor says, "Never put a rear-facing child seat in the front." This is because the risk to the rear-facing child is so great, if the airbag deploys.

⚠ WARNING

A child in a rear-facing child restraint can be seriously injured or killed if the right front passenger airbag inflates. This is because the back of the rear-facing child restraint would be very close to the inflating airbag. A child in a forward-facing child restraint can be seriously injured or killed if the right front passenger airbag inflates and the passenger seat is in a forward position.

(Continued)

WARNING (Continued)

Even if the passenger sensing system has turned off the right front passenger frontal airbag, no system is fail-safe. No one can guarantee that an airbag will not deploy under some unusual circumstance, even though it is turned off.

Secure rear-facing child restraints in a rear seat, even if the airbag is off. If you secure a forward-facing child restraint in the right front seat, always move the front passenger seat as far back as it will go. It is better to secure the child restraint in a rear seat.

See *Passenger Sensing System on page 2-32* for additional information.

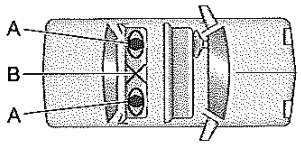
When securing a child restraint in a rear seating position, study the instructions that came with your child restraint to make sure it is compatible with this vehicle.

If a child restraint is secured in the center rear seating position, the safety belts and the child restraint LATCH anchors for the rear outside seating positions will not be accessible. Child restraints or passengers will not be able to ride in the rear outside seating positions. If two child restraints are secured in the rear outside seating positions, the safety belt for the center rear seat position will not be accessible. Child restraints or passengers will not be able to ride in the center rear seating position.

Wherever you install a child restraint, be sure to secure the child restraint properly.

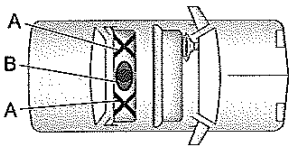
Keep in mind that an unsecured child restraint can move around in a collision or sudden stop and injure people in the vehicle. Be sure to properly secure any child restraint in your vehicle — even when no child is in it.

Configurations for Use of Child Restraints



A. Child restraint using LATCH

B. Child restraint or occupant prohibited



A. Child restraint or occupant prohibited

B. Child restraint using LATCH

Lower Anchors and Tethers for Children (LATCH System)

The LATCH system holds a child restraint during driving or in a crash. This system is designed to make installation of a child restraint easier. The LATCH system uses anchors in the vehicle and attachments on the child restraint that are made for use with the LATCH system.

Make sure that a LATCH-compatible child restraint is properly installed using the anchors, or use the vehicle's safety belts to secure the restraint, following the instructions that came with that restraint, and also the instructions in this manual. When installing a child restraint with a top tether, you must also use either the lower anchors or the safety belts to properly secure the child restraint. A child restraint must never be installed using only the top tether and anchor.

In order to use the LATCH system in the vehicle, you need a child restraint that has LATCH attachments. The child restraint manufacturer will provide you with instructions on how to use the child restraint and its attachments. The following explains how to attach a child restraint with these attachments in the vehicle.

Not all vehicle seating positions or child restraints have lower anchors and attachments or top tether anchors and attachments.

Seats and Restraints 2-49

Lower Anchors

Lower anchors (A) are metal bars built into the vehicle. There are two lower anchors for each LATCH seating position that will accommodate a child restraint with lower attachments (B).

Top Tether Anchor

A top tether (A, C) anchors the top of the child restraint to the vehicle. A top tether anchor is built into the vehicle. The top tether attachment (B) on the child restraint connects to the top tether anchor in the vehicle in order to reduce the forward movement and rotation of the child restraint during driving or in a crash.

The child restraint may have a single tether (A) or a dual tether (C). Either will have a single attachment (B) to secure the top tether to the anchor.

Some child restraints that have a top tether are designed for use with or without the top tether being attached. Others require the top tether always to be attached. In Canada, the law requires that forward-facing child restraints have a top tether, and that the tether be attached. Be sure to read and follow the instructions for the child restraint.

2-50 Seats and Restraints

Lower Anchor and Top Tether Anchor Locations

Rear Seat

(Top Tether Anchor): Seating positions with top tether anchors.

(Lower Anchor): Seating positions with two lower anchors.

To assist you in locating the lower anchors, each rear anchor position has a label, near the crease between the seatback and the seat cushion.

To assist you in locating the top tether anchors, the top tether anchor symbol is located on the cover.

The top tether anchors are located under the covers, behind the rear seat, on the filler panel. Be sure to use an anchor located on the same side of the vehicle as the seating position where the child restraint will be placed.

Seats and Restraints 2-51

Do not secure a child restraint in a position without a top tether anchor if a national or local law requires that the top tether be attached, or if the instructions that come with the child restraint say that the top tether must be attached.

Accident statistics show that children are safer if they are restrained in the rear rather than the front seat. See *Where to Put the Restraint on page 2-46* for additional information.

Securing a Child Restraint Designed for the LATCH System

⚠ WARNING

If a LATCH-type child restraint is not attached to anchors, the child restraint will not be able to protect the child correctly. In a crash, the child could be seriously injured or killed. Install a LATCH-type child restraint properly using the anchors, or use the vehicle's safety belts to secure the restraint, following the instructions that came with the child restraint and the instructions in this manual.

⚠ WARNING

Do not attach more than one child restraint to a single anchor. Attaching more than one child restraint to a single anchor could cause the anchor or attachment to come loose or even break during a crash. A child or others could be injured. To reduce the risk of serious or fatal injuries during a crash, attach only one child restraint per anchor.

⚠ WARNING

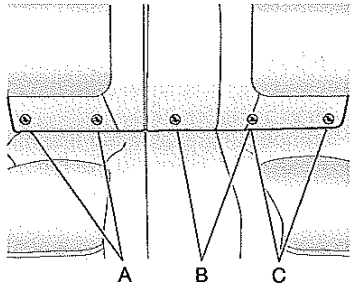
Children can be seriously injured or strangled if a shoulder belt is wrapped around their neck and the safety belt continues to tighten. Buckle any unused safety belts behind the child restraint so children cannot reach them. Pull the shoulder belt all the way out of the retractor to set the lock, if your vehicle has one, after the child restraint has been installed.

Notice: **Do not let the LATCH attachments rub against the vehicle's safety belts. This may damage these parts. If necessary, move buckled safety belts to avoid rubbing the LATCH attachments.**

Do not fold the empty rear seat with a safety belt buckled. This could damage the safety belt or the seat. Unbuckle and return the safety belt to its stowed position, before folding the seat.

If you need to secure more than one child restraint in the rear seat, see *Where to Put the Restraint on page 2-46*. Depending on where you place the child restraint, you may not be able to access certain safety belt assemblies or LATCH anchors for additional passengers or child restraints.

You cannot secure three child restraints using the LATCH anchors in the rear seat at the same time, but you can install two of them. If you want to do this, install one LATCH child restraint in the passenger-side position, and install the other one either in the driver-side position or in the center position. Refer to the following illustration to learn which anchors to use.



A. Passenger Side Rear Seat Lower Anchors

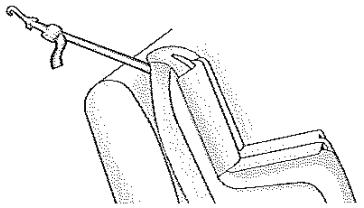
B. Center Rear Seat Lower Anchors

C. Driver Side Rear Seat Lower Anchors

Make sure to attach the child restraint at the proper anchor location.

This system is designed to make installation of child restraints easier. When using lower anchors, do not use the vehicle's safety belts. Instead use the vehicle's anchors and child restraint attachments to secure the restraints. Some restraints also use another vehicle anchor to secure a top tether.

1. Attach and tighten the lower attachments to the lower anchors. If the child restraint does not have lower attachments or the desired seating position does not have lower anchors, secure the child restraint with the top tether and the safety belts. Refer to the child restraint manufacturer instructions and the instructions in this manual.
   1.1. Find the lower anchors for the desired seating position.
   1.2. Put the child restraint on the seat.
   1.3. Attach and tighten the lower attachments on the child restraint to the lower anchors.
2. If the child restraint manufacturer recommends that the top tether be attached, attach and tighten the top tether to the top tether anchor, if equipped. Refer to the child restraint instructions and the following steps:
   2.1. Find the top tether anchor.
   Open the cover to expose the anchor.
   2.2. Route, attach, and tighten the top tether according to the child restraint instructions and the following instructions:



If the position you are using does not have a headrest or head restraint and you are using a single tether, route the tether over the seatback.

2-54 Seats and Restraints

If the position you are using does not have a headrest or head restraint and you are using a dual tether, route the tether over the seatback.

If the position you are using has an adjustable headrest or head restraint and you are using a single tether, route the tether under the headrest or head restraint and in between the headrest or head restraint posts. See *Head Restraints on page 2-2.*

If the position you are using has an adjustable headrest or head restraint and you are using a dual tether route the tether around the headrest or head restraint.

3. Push and pull the child restraint in different directions to be sure it is secure.

Replacing LATCH System Parts After a Crash

⚠ WARNING

A crash can damage the LATCH system in the vehicle. A damaged LATCH system may not properly secure the child restraint, resulting in serious injury or even death in a crash. To help make sure the LATCH system is working properly after a crash, see your dealer/retailer to have the system inspected and any necessary replacements made as soon as possible.

If the vehicle has the LATCH system and it was being used during a crash, new LATCH system parts may be needed.

New parts and repairs may be necessary even if the LATCH system was not being used at the time of the crash.

Securing Child Restraints (Rear Seat)

When securing a child restraint in a rear seating position, study the instructions that came with the child restraint to make sure it is compatible with this vehicle.

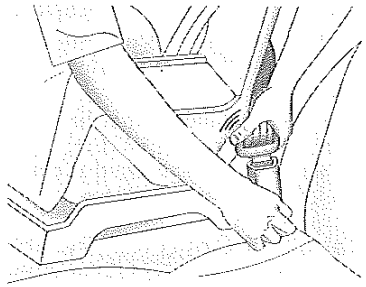
If the child restraint has the LATCH system, see *Lower Anchors and Tethers for Children (LATCH System) on page 2-48* for how and where to install the child restraint using LATCH. If a child restraint is secured in the vehicle using a safety belt and it uses a top tether, see *Lower Anchors and Tethers for Children (LATCH System) on page 2-48* for top tether anchor locations.

Do not secure a child seat in a position without a top tether anchor if a national or local law requires that the top tether be anchored, or if the instructions that come with the child restraint say that the top strap must be anchored.

If the child restraint does not have the LATCH system, you will be using the safety belt to secure the child restraint in this position. Be sure to follow the instructions that came with the child restraint. Secure the child in the child restraint when and as the instructions say.

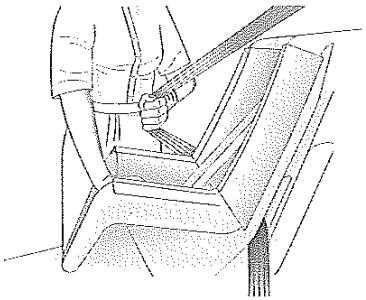
If more than one child restraint needs to be installed in the rear seat, be sure to read *Where to Put the Restraint on page 2-46.*

1. Put the child restraint on the seat.
2. Pick up the latch plate, and run the lap and shoulder portions of the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.



3. Push the latch plate into the buckle until it clicks.

   Position the release button on the buckle so that the safety belt could be quickly unbuckled if necessary.



4. Pull the rest of the shoulder belt all the way out of the retractor to set the lock.

5. To tighten the belt, push down on the child restraint, pull the shoulder portion of the belt to tighten the lap portion of the belt and feed the shoulder belt back into the retractor. When installing a forward-facing child restraint, it may be helpful to use your knee to push down on the child restraint as you tighten the belt.

6. If the child restraint has a top tether, follow the child restraint manufacturer's instructions regarding the use of the top tether. See *Lower Anchors and Tethers for Children (LATCH System) on page 2-48* for more information.
7. Push and pull the child restraint in different directions to be sure it is secure.

To remove the child restraint, unbuckle the vehicle safety belt and let it return to the stowed position. If the top tether is attached to a top tether anchor, disconnect it.

Securing Child Restraints (Front Seat)

This vehicle has airbags. A rear seat is a safer place to secure a forward-facing child restraint. See *Where to Put the Restraint on page 2-46*.

In addition, the vehicle has a passenger sensing system which is designed to turn off the right front passenger frontal airbag under certain conditions. See *Passenger Sensing System on page 2-32* and *Passenger Airbag Status Indicator on page 4-16* for more information, including important safety information.

2-58 Seats and Restraints

A label on the sun visor says, "Never put a rear-facing child seat in the front." This is because the risk to the rear-facing child is so great, if the airbag deploys.

⚠ WARNING

A child in a rear-facing child restraint can be seriously injured or killed if the right front passenger airbag inflates. This is because the back of the rear-facing child restraint would be very close to the inflating airbag. A child in a forward-facing child restraint can be seriously injured or killed if the right front passenger airbag inflates and the passenger seat is in a forward position.

(Continued)

WARNING (Continued)

Even if the passenger sensing system has turned off the right front passenger frontal airbag, no system is fail-safe. No one can guarantee that an airbag will not deploy under some unusual circumstance, even though it is turned off.

Secure rear-facing child restraints in a rear seat, even if the airbag is off. If you secure a forward-facing child restraint in the right front seat, always move the front passenger seat as far back as it will go. It is better to secure the child restraint in a rear seat.

See *Passenger Sensing System on page 2-32* for additional information.

If the child restraint has the LATCH system, see *Lower Anchors and Tethers for Children (LATCH System) on page 2-48* for how and where to install the child restraint using LATCH. If a child restraint is secured using a safety belt and it uses a top tether, see *Lower Anchors and Tethers for Children (LATCH System) on page 2-48* for top tether anchor locations.

Do not secure a child seat in a position without a top tether anchor if a national or local law requires that the top tether be anchored, or if the instructions that come with the child restraint say that the top strap must be anchored.

In Canada, the law requires that forward-facing child restraints have a top tether, and that the tether be attached.

You will be using the lap-shoulder belt to secure the child restraint in this position. Follow the instructions that came with the child restraint.

1. Move the seat as far back as it will go before securing the forward-facing child restraint.

   When the passenger sensing system has turned off the right front passenger frontal airbag, the off indicator on the passenger airbag status indicator should light and stay lit when you start the vehicle. See *Passenger Airbag Status Indicator on page 4-16*.

2. Put the child restraint on the seat.

3. Pick up the latch plate, and run the lap and shoulder portions of the vehicle's safety belt through or around the restraint. The child restraint instructions will show you how.

4. Push the latch plate into the buckle until it clicks.

   Position the release button on the buckle so that the safety belt could be quickly unbuckled if necessary.

5. Pull the rest of the shoulder belt all the way out of the retractor to set the lock.

6. To tighten the belt, push down on the child restraint, pull the shoulder portion of the belt to tighten the lap portion of the belt and feed the shoulder belt back into the retractor. When installing a forward-facing child restraint, it may be helpful to use your knee to push down on the child restraint as you tighten the belt.
7. Push and pull the child restraint in different directions to be sure it is secure.

If the airbags are off, the off indicator in the passenger airbag status indicator will come on and stay on when the vehicle is started.

If a child restraint has been installed and the on indicator is lit, see "If the On Indicator is Lit for a Child Restraint" under *Passenger Sensing System on page 2-32* for more information.

To remove the child restraint, unbuckle the vehicle safety belt and let it return to the stowed position.

APPENDIX B
MANUFACTURER'S DATA (OVSC FORM 225)

2

FORM – 225
Rev. 10/10/08

SEAT REFERENCE POINT (SRP) AND TORSO ANGLE DATA

FMVSS No. 225
(All dimensions in mm[1])

MODEL YEAR: 2010 / MAKE: CHEVY / MODEL: EQUINOX / BODY STYLE: SUV

SEAT STYLE: FRONT ROW: Free Standing Buckets / SECOND ROW: Full Bench W/Split Seat Back / THIRD ROW: N/A

LEFT SIDE VIEW OF TEST VEHICLE

FORM – 225

Table 1. Seating Positions[1] and Torso Angles

		Left (Driver Side)	Center (if any)	Right
A1		268.15 (Driver)	N/A	268.15 (Front Passenger)
A2		265.77	285.77	265.77
A3		N/A	N/A	N/A
B		304.8	N/A	304.8
C		1187.0	1167.0	1187.0
D		N/A	N/A	N/A
Torso Angle (degree)	Front Row	20	N/A	20
	Second Row	22	22	22
	Third Row	N/A	N/A	N/A

Note: All dimensions are in mm. If not, provide the unit used.

FORM – 225

4

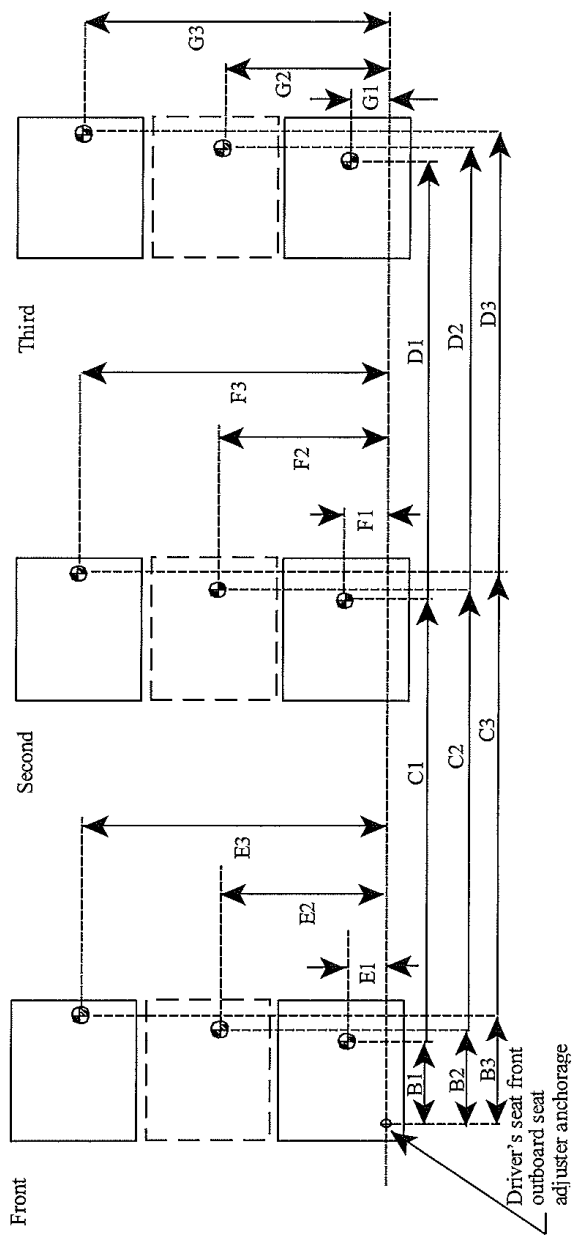
SEATING REFERENCE POINT

FMVSS No. 225

(All dimensions in mm)

MODEL YEAR: 2010 / MAKE: CHEVY / MODEL: EQUINOX / BODY STYLE: SUV

SEAT STYLE: FRONT ROW: Free Standing Buckets / SECOND ROW: Full Bench W/Split Seat Back / THIRD ROW: N/A



FORM – 225

Point selected for the 2nd row "Vehicle Floor-pan" reference point.

Point selected as the "Driver's seat front outboard seat adjuster anchorage" reference point.

FORM – 225

6

Table 2. Seating Reference Point and Tether Anchorage Locations

Seating Reference Point (SRP)		Distance from Driver's front outboard seat adjuster anchorage[1]
Front Row	B1	300.51
	E1	222.75
	B2	N/A
	E2	N/A
	B3	300.51
	E3	962.75
Second Row	C1	1182.71
	F1	232.75
	C2	1162.71
	F2	592.75
	C3	1182.71
	F3	952.75
Third Row	D1	N/A
	G1	N/A
	D2	N/A
	G2	N/A
	D3	N/A
	G3	N/A

Note: Use the center of anchorage.

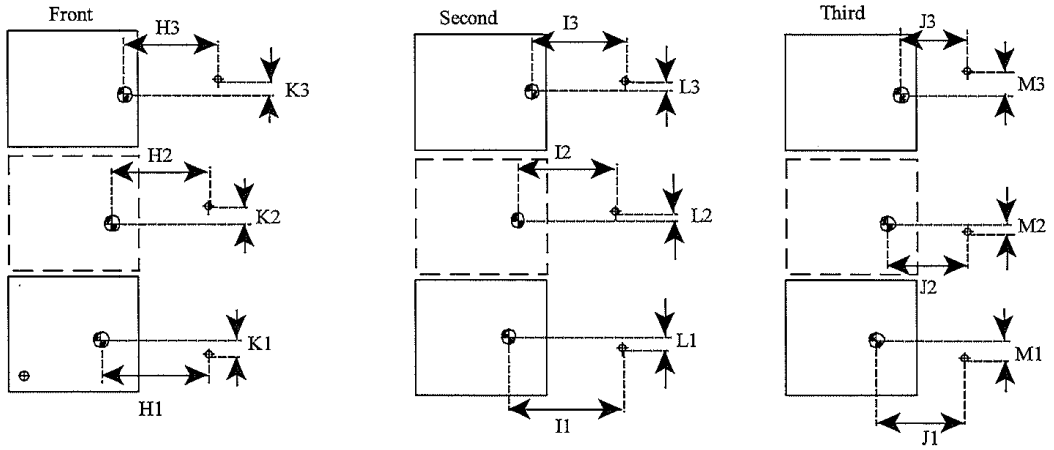
FORM – 225

TETHER ANCHORAGE LOCATIONS

FMVSS No. 225
(All dimensions in mm)

MODEL YEAR: 2010 / MAKE: CHEVY / MODEL: EQUINOX / BODY STYLE: SUV

SEAT STYLE: FRONT ROW: Free Standing Buckets / SECOND ROW: Full Bench W/Split Seat Back / THIRD ROW: N/A



⊕: SRP
⊕: Tether anchorage

Note: The location shall be measured at the center of anchorage.

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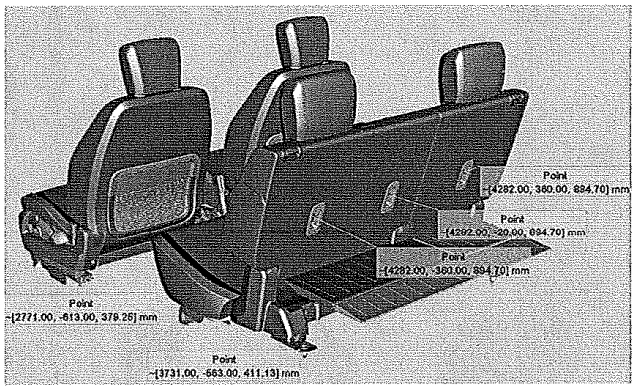
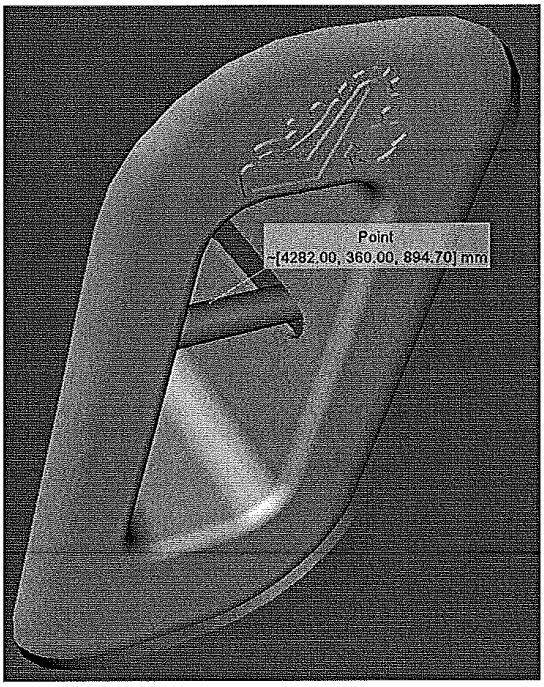
Table 3. Seating Reference Point and Tether Anchorage Locations

Seating Reference Point (SRP)	Distance from SRP	
Front Row	H1	N/A
	K1	N/A
	H2	N/A
	K2	N/A
	H3	N/A
	K3	N/A
Second Row	I1	324.0
	L1	0.0
	I2	344.0
	L2	20.0
	I3	324.0
	L3	0.0
Third Row	J1	N/A
	M1	N/A
	J2	N/A
	M2	N/A
	J3	N/A
	M3	N/A

Note: Use the center of anchorage.

9





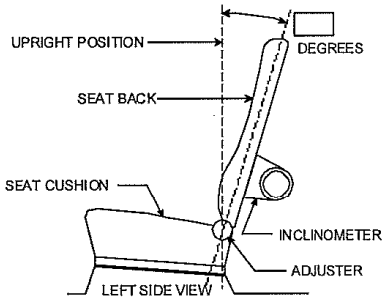
Point measured is on the top and centered on the anchor

FORM – 225

10

NOMINAL DESIGN RIDING POSITION

For adjustable driver, passenger, 2nd row and 3rd row seat backs, describe how to position the inclinometer to measure the seat back angle. Include a description of the location of the seat back adjustment latch detent if applicable. Indicate if applicable, how the detents are numbered (Is the first detent "0"or "1"?). Indicate if the seat back angle is measured with the dummy in the seat.



Seat back angle for driver's seat = 20 degrees.

Measurement Instructions:

To get to the 20 degree back angle move the head restraint to the highest position and fit an electronic inclinometer against the back of the head restraint post and recline the seat back until it reads 2.8 degrees. The driver torso angle is 20 degrees.

Seat back angle for passenger's seat = 20 degrees.

Measurement Instructions:

Measurement instructions same as driver seat. The passenger torso same as driver.

Seat back angle for 2nd row seat = 18.3 SIDES_18.3 MIDDLE_degrees.

Measurement Instructions:

To get to the 18.3 degree back angle measure 18.3 degrees off the hard back panel. This is the first locking position you get to when you rotate the seat up from fold flat position. It has two recline positions. Each position is 3.5 degrees rearward. The torso angle is 22 degrees for sides and middle.

Seat back angle for 3rd row seat = __N/A__ degrees.

Measurement Instructions:

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TETHER ANCHORAGE LOCATIONS - VERTICAL

FMVSS No. 225
(All dimensions in mm)

MODEL YEAR: 2010 / MAKE: CHEVY / MODEL: EQUINOX / BODY STYLE: SUV

SEAT STYLE: FRONT ROW: Free Standing Buckets / SECOND ROW: Full Bench W/Split Seat Back / THIRD ROW: N/A

LEFT SIDE VIEW OF TEST VEHICLE

FORM – 225

Table 4. Vertical Dimension For The Tether Anchorage

Seating Row	Vertical Distance from Seating Reference Point	
Front Row	N1 (Driver)	N/A
	N2 (Center)	N/A
	N3 (Right)	N/A
Second Row	O1 (Left)	217.8
	O2 (Center)	197.8
	O3 (Right)	217.8
Third Row	P1 (Left)	N/A
	P2 (Center)	N/A
	P3 (Right)	N/A

Note: All dimensions are in mm. If not, provide the unit anchorage.

For each vehicle, provide the following information:

1. How many designated seating positions exist in the vehicle? 5

2. How many designated seating positions are equipped with lower anchorages and tether anchorages? Specify which position(s). 3 positions: 2nd row, LH, Ctr and RH. Only 2 Child Seats can be used in the 2nd row at one time. Options are: 1) The two outboard positions or 2) Ctr position.

3. How many designated seating positions are equipped with tether anchorages? Specify which positions(s).
   3 positions; 2nd row, LH, Ctr and RH

4. Lower Anchorages Marking and Conspicuity: Whether the anchorages are certified to S9.5(a) or S9.5(b) of FMVSS No. 225. Vehicle rear seats have exposed latch wires, S9.5(b).

SgRP's:

	LH	RH
Front Seat:	X = 2771.0	X = 2771.0
	Y = -613.0	Y = 613.0
	Z = 379.25	Z = 379.25

	LH	CTR	RH
2nd Row Seat:	X = 3958.0	X = 3938.0	X = 3958.0
	Y = -360.0	Y = 0.0	Y = 360.0
	Z = 676.9	Z = 696.9	Z = 676.9