FINAL REPORT NUMBER: SPNCAP-TRC-19-002

NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST

GENERAL MOTORS LLC
2019 Cadillac XT4 SUV
NHTSA NUMBER: M20190101

PREPARED BY:
Transportation Research Center Inc.
10820 State Route 347
P. O. Box B-67
East Liberty, OH 43319

Report Date: May 10, 2019

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NRM-110
1200 New Jersey Ave, SE
Room W43-410
Washington, D.C. 20590

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Report Prepared By: ILO Project Operations Group

Report Approved By: 

John Shultz

Approval Date: May 10, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

Division Chief, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards

Date: _____

FINAL REPORT ACCEPTANCE BY OCWS:

COTR, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards

Date: _____

Technical Report Documentation Page

1. Report No. SPNCAP-TRC-19-002	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing of 2019 Cadillac XT4 SUV NHTSA No.: M20190101		5. Report Date May 10, 2019 6. Performing Organization Code TRC Inc.
7. Author(s) John Shultz, Project Manager		8. Performing Organization Report No. 190220
9. Performing Organization Name and Address Transportation Research Center Inc. 10820 State Route 347 East Liberty, OH 43319		10. Work Unit No. 11. Contract or Grant No. DTNH22-14-D-00354
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards Mail Code NRM-110 1200 New Jersey Ave, SE, Room W43-410 Washington, DC 20590		13. Type of Report and Period Covered Final Test Report February 20, 2019 – May 10, 2019 14. Sponsoring Agency Code NRM-110
15. Supplemental Notes		

16. Abstract

A 32.2 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject vehicle, a 2019 Cadillac XT4 SUV, in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. This test was conducted by Transportation Research Center Inc. in East Liberty, Ohio, on February 20, 2019.

The impact velocity was 32.32 km/h, and the ambient temperature at the struck (left) side of the target vehicle at the time of impact was 21.3° C. The test vehicle's post-test maximum crush was 330 mm at Level 3.

The test or target vehicle's performance is given below:

	Unit	Threshold	Front SID-IIs
Head Injury Criteria (HIC_{36}):	NA	1000	204
Resultant Lower Spine Acceleration:	g's	82	34.8
Total Pelvic Force: (sum of acetabular and iliac forces)	N	5525	2322.7
Maximum Thoracic Rib Deflection	mm	38*	19.7
Maximum Abdomen Rib Deflection	mm	45*	16.8

* Proposed IARV

The doors on the struck side did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.

17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs	18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833

19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. Number of Pages 123	22. Price

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TEST PURPOSE AND PROCEDURE

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 19 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00354. The purpose of this test is to generate comparative side impact performance in a 2019 Cadillac XT4 SUV manufactured by GENERAL MOTORS LLC. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated October 2015.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a model year 2019 Cadillac XT4 SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.32 km/h. The side impact test was conducted by Transportation Research Center Inc. in East Liberty, OH, on February 20, 2019. Pre-test and post-test photographs of the test vehicle and the side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated October 2015. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) dummy was instrumented accordingly:

Primary and Redundant Head CG Trisxial Accelerometers
Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
Abdomen Upper and Lower Rib Displacement Potentiometers
Lower Spine (T12) Triaxial Accelerometers
Iliac Load Cell
Acetabulum Load Cell

Appendix B contains the vehicle and dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report. Appendix D contains the test equipment and instrumentation calibration data.

Injury readings for the SID-IIs dummy were recorded as follows:

Measurement Description	Driver ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})	NA	1000	204
Lower Spine Acceleration Resultant	G	82	34.8
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2322.7
Maximum Thoracic Rib Deflection	mm	38*	19.7
Maximum Abdominal Rib Deflection	mm	45*	16.8

* Proposed IARV

Supplemental restraint information is given below:

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes		
Knee Airbag	Yes	Yes		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	N/A
Side Torso Airbag	No	N/A	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Unknown	No	N/A
Other Safety Restraint	No	N/A	No	N/A

GENERAL COMMENTS

Driver Head VX; No valid data throughout

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20190101
Model Year	2019
Make	Cadillac
Model	XT4
Body Style	MPV
VIN	1GYAZAR4XKF128410
Body Color	Radiant Silver Metallic
Odometer Reading (km/mi)	91 mi
Engine Displacement (L)	2.0
Type/No. Cylinders	Gas/4
Engine Placement	Front Transverse
Transmission Type	Automatic
Transmission Speeds	9
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	No
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	No

Does owner's manual provide instructions to turn off automatic door locks? No

DATA FROM CERTIFICATION LABEL

Manufactured By	GENERAL MOTORS LLC
Date of Manufacturer	11/18
Vehicle Type	MPV

GVWR (kg)	2250
GAWR Front (kg)	1220
GAWR Rear (kg)	1200

VEHICLE SEATING AND WEIGHT CAPACITY DATA

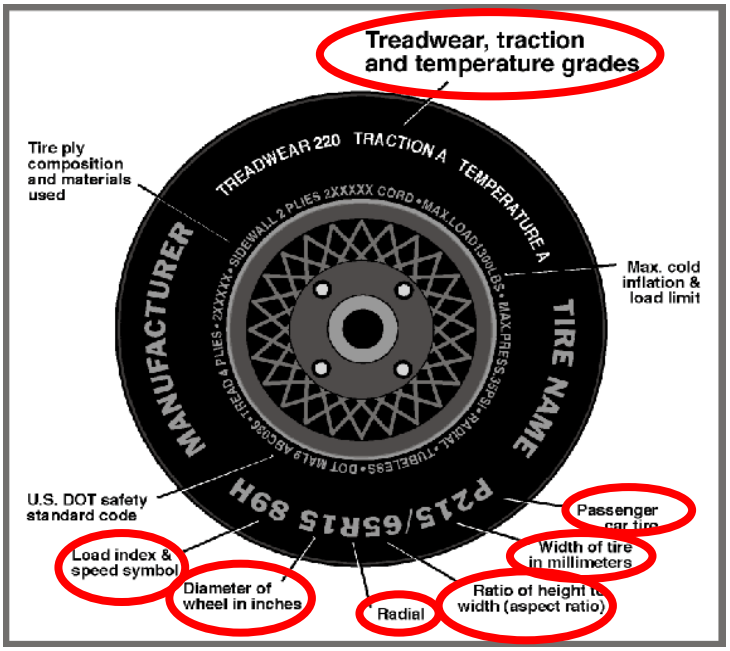
	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	N/A	5
Vehicle Capacity Weight (VCW) (kg)				510
DSC X 68.04 kg				340.2
Rated Cargo and Luggage Weight (RCLW) (kg)				169.8

VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	Yes	N/A	N/A		N/A	N/A	Yes
Rear or Second Row Seat	N/A	N/A	Yes	Yes	Yes	N/A	N/A
Third row seat	N/A	N/A	N/A	N/A	N/A	N/A	N/A

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	235/60R18 H	235/60R18 H
Tire Size on Vehicle	235/60R18 H	235/60R18 H
Tire Manufacturer	Continental	Continental
Tire Model	Pro Contact TX	Pro Contact TX
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	5	5
Load Index/Speed Symbol	103 H	103 H
Tire Material	Polyester/Steel/Polyamide	Polyester/Steel/Polyamide
DOT Safety Code Left	A345 WD77 4318	A345 WD77 4218
DOT Safety Code Right	A345 WD77 4318	A345 WD77 4218

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	262	262	269	262
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	240	240

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	496.4	347.4		530.0	406.6		517.4	431.2	
Right	kg	491.8	317.8		507.8	387.2		495.2	394.6	
Ratio	%	59.8	40.2		56.7	43.3		55.1	44.9	
Totals	kg	988.2	665.2	1653.4	1037.8	793.8	1831.6	1012.6	825.8	1838.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1653.4	(A)
Actual Weight of 1 P572V ATD (SID-IIs) Dummy Used	kg	49.0	(B)
Rated Cargo/Luggage Weight (RCLW)[1]	kg	136.0	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1838.4	(A+B+C)

Does the measured As Tested Vehicle Weight lie within the required weight range (i.e. Calculated Test Vehicle Target Weight – 4.5 kg to 9 kg)? ☒ YES ☐ NO

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	Deg.	-0.4	-0.3	0.2	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg.	-0.5	-0.2	0.0	Yes
Front Bumper-Line Angle (left-to-right)**	Deg.	-0.4	-0.4	-0.4	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg.	-0.3	-0.2	-0.2	Yes
Vehicle CG (Aft of Front Axle)	mm	1116	1203	1247	
Vehicle CG (Left (+) / Right (-) from longitudinal Centerline)	mm	+17	+18	+26	

*ND=Nose Down (-), NU=Nose Up (+) **LD=Left Down (-), LU=Left Up (+)
*** The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements. Indicate "Yes" or "No" for "Meets Requirements".

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Ballast: Steel plate mounted in cargo area	88.4
Components Removed: None	0.0

Test height adjustable suspension setting, if applicable: N/A

[1] Rated cargo and luggage weight limited to 136.0 kg or 300.0 lbs.

DATA SHEET NO. 2

SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101

Test Program: SPNCAP Side Impact Test Date: 2/20/2019

SEAT POSITIONING

The driver seat, front center seat (if applicable), and right front passenger's seat should be set to the forward-most, mid-height, mid-angle position. The struck-side rear passenger's seat, rear center seat, and non-struck side rear passenger's seats should be set to the rear-most, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL(°)		
	Max.	Min.	Mid
Driver Seat	18.9	10.5	14.7
Front Passenger Seat	16.3	11.9	14.1
Front Center Seat*	N/A	N/A	N/A
Struck Side Rear Seat	Fixed	N/A	12.1
Non-Struck Side Rear Seat	Fixed	N/A	12.3
Rear Center Seat*	Fixed	N/A	10.0

* If applicable.

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore/Aft	Forward-Most
Driver Seat	14.7	203	Max	234	232	230
			Mid	207	206	203
			Min	179	177	175
Front Passenger Seat	14.1	184	Max	N/A	N/A	N/A
			Mid	188	186	184
			Min	N/A	N/A	N/A
Front Center Seat*	N/A	N/A	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Struck Side Rear Seat	12.1	Fixed	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Non-Struck Side Rear Seat	12.3	Fixed	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Rear Center Seat*	10.0	Fixed	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A

* If applicable.

DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019

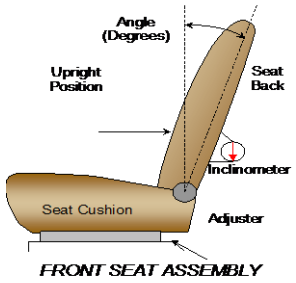
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	240	N/A	0	N/A
Front Passenger Seat	240	N/A	0	N/A
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	N/A	Fixed	N/A	N/A
Non-Struck Side Rear Seat	N/A	Fixed	N/A	N/A
Rear Center Seat*	N/A	Fixed	N/A	N/A

* If applicable.

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned such that the dummy's head is level. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck-side rear passenger seat back is positioned in accordance with the information provided by the manufacturer on Form No. 1. For the 5th percentile female dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back is set to match the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detent*
Driver Seat w/ Seated Dummy	65.8	N/A	24.6	N/A
Front Passenger Seat	66.0	N/A	24.6	N/A
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	21.3	N/A	N/A	N/A
Non-Struck Side Rear Seat	21.3	N/A	N/A	N/A
Rear Center Seat*	21.3	N/A	N/A	N/A

* If applicable.

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted with the information provided by the manufacturer on Form No. 1

	Total # of Positions	Placed in Position #
Driver Seat	4	1, Uppermost

HEAD RESTRAINT ADJUSTMENT

Head restraints are adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	9	9, Lowermost

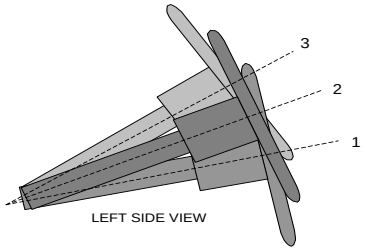
DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel geometric locus it describes when moved through its full range of motion.

	Degrees	Fore/Aft Position, mm
Lowermost, Position No. 1	22.0	0
Geometric Center, Position No. 2	24.2	30
Uppermost, Position No. 3	26.4	60
Telescoping Steering Wheel Travel		60
Test Position	24.2	30

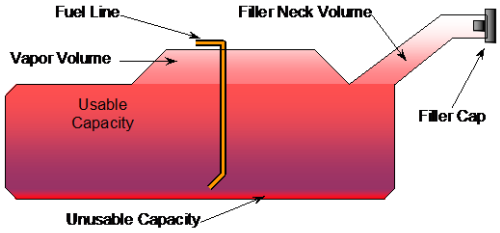


STEERING COLUMN ASSEMBLY

FUEL PUMP

Describe the fuel pump type, details about how it operates and the location of the fuel filler neck:

With the key on (run mode) the pump will keep the lines pressurized.



VEHICLE FUEL TANK ASSEMBLY

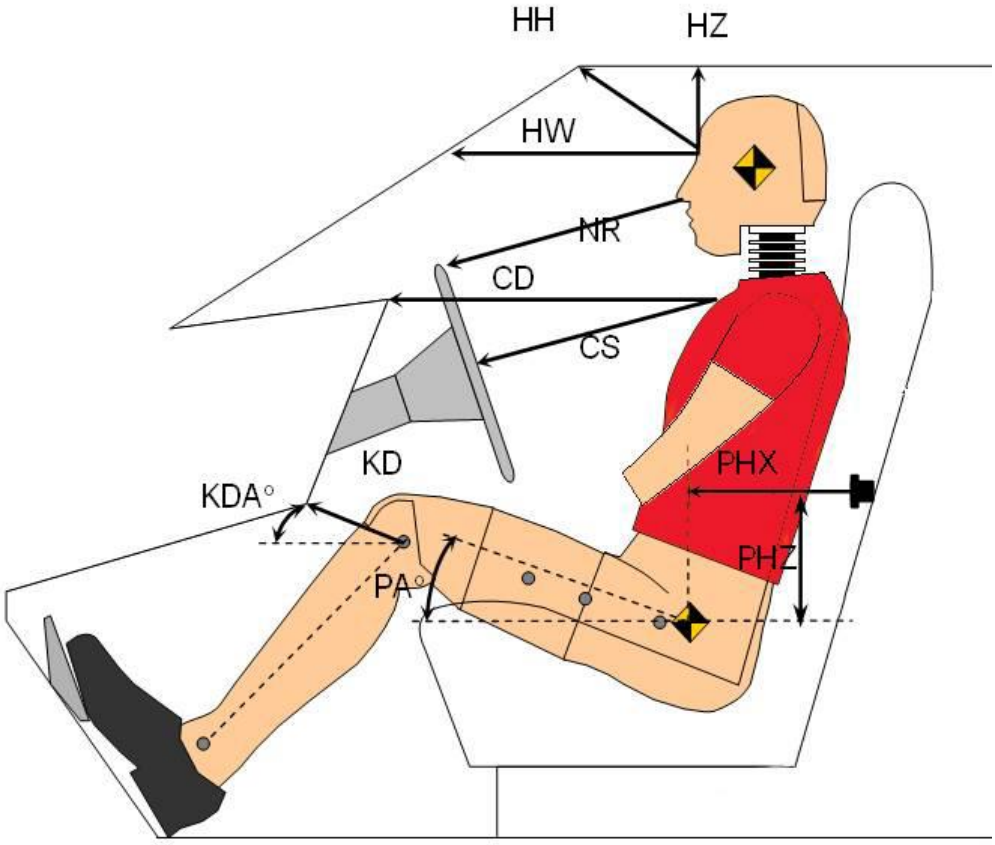
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	60.2
Usable Capacity of "Optional" Tank (see Form No. 1)	61.7
Usable Capacity of Standard Tank (see Owner's Manual)	60.2
Usable Capacity of Optional Tank (see Owner's Manual)	61.7
93% of Usable Capacity	56.0
Actual Amount of Solvent Used in Test	56.0
1/3 of Usable Capacity	20.1

Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in on Form No. 1? ☒ YES ☐ NO

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

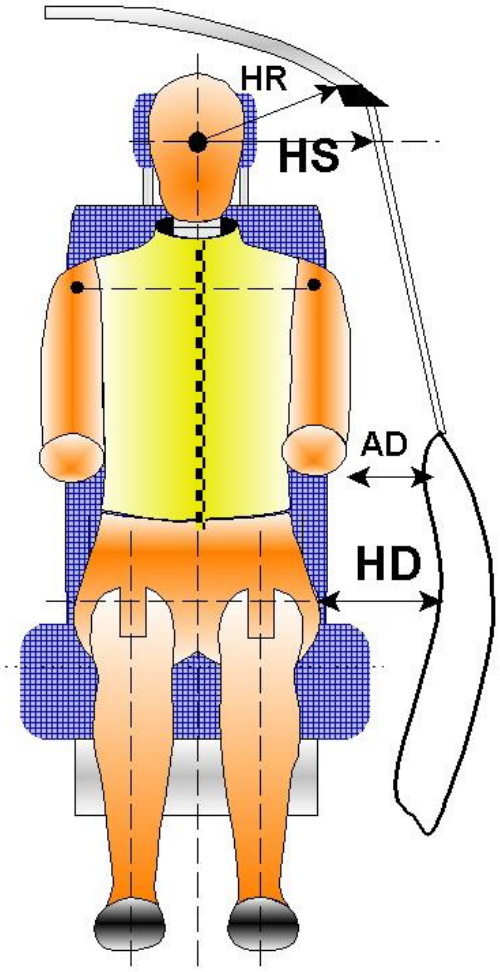
Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019



Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	344	
HW	Head to Windshield	663	
HZ	Head to Visor	228	
NR	Nose to Rim	305	
CD	Chest to Dashboard	463	
CS	Chest to Steering Wheel	220	
KDL/KDLA°	Left Knee to Dash	162	36.3
KDR/KDRA°	Right Knee to Dash	148	36.1
PAX°	Pelvic Tilt Angle (X-axis)		0.3
PAY°	Pelvic Tilt Angle (Y-axis)		19.8
PHX	Hip Point to Striker (X-Axis)	279	
PHZ	Hip Point to Striker (Z-Axis)	134	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

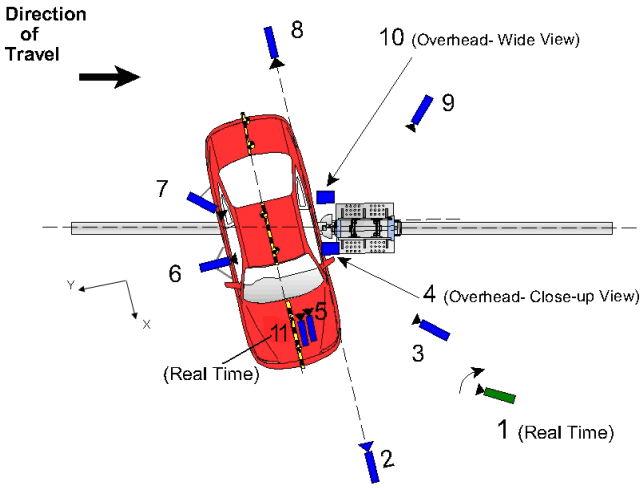
Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019



Code	Measurement Description	Length (mm)
HR	Head to Side Header	299
HS	Head to Side Window	394
AD	Arm to Door	147
HD	Hip Point to Door	168

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019



REFERENCE: (from point of impact for X and Y; from ground for Z)
+ X = Forward of vehicle, + Y = Right of vehicle, + Z = Down

Camera No.	View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real time (24-30 fps) pan view of impact				Zoom	30
2	Front ground level – impact view	0	5257	-1290	20	1000
3	Impact side 45° – forward pole view	1163	4367	-1382	20	1000
4	Overhead Close-up view of impact	0	0	-5650	28	1000
5	Onboard – dummy front view				25	1000
6	Onboard – dummy side view				12.5	1000
7	Onboard – dummy rear oblique view				12.5	1000
8	Rear ground level – impact view	0	-5851	-1233	20	1000
9	Impact side 45° – rearward pole view	3554	-5109	-1232	20	1000
10	Overhead wide view of impact	221	0	-5650	18	1000
11	Real time dummy front view				Zoom	30

All measurements accurate to +/- 6 mm.

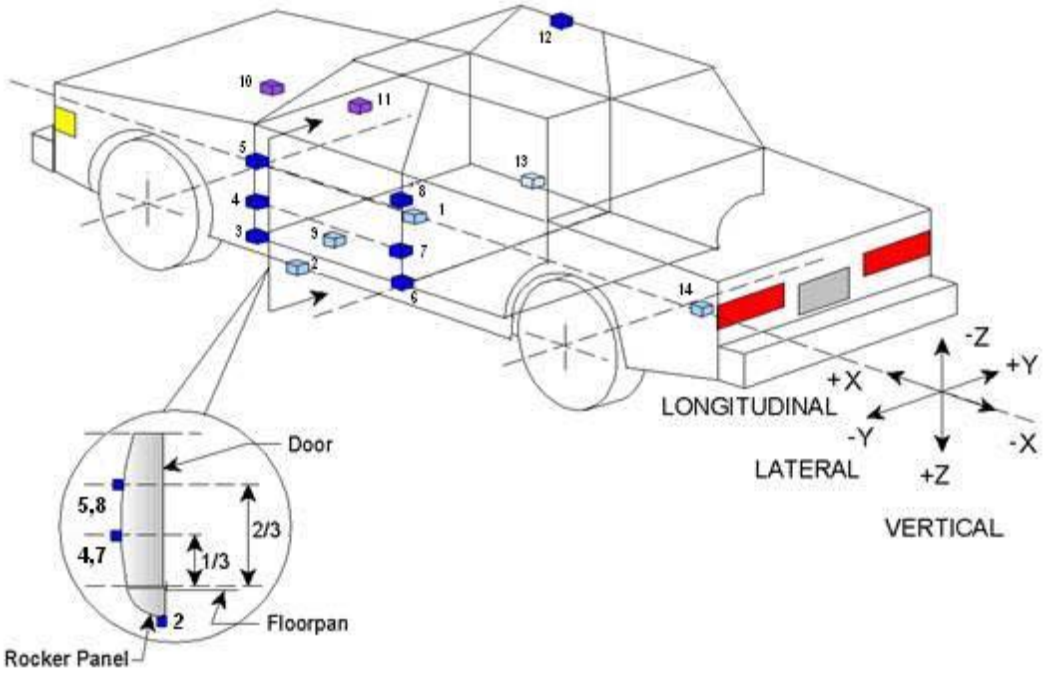
NOTE: Vehicle was at a 75° angle to the rigid pole.
If applicable, explain why camera(s) did not run: N/A

INSTRUMENTATION

	Number of Channels
Driver Dummy	16
Vehicle Structure	18
Pole Load Cells	8
TOTAL	42

DATA SHEET NO. 6
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019



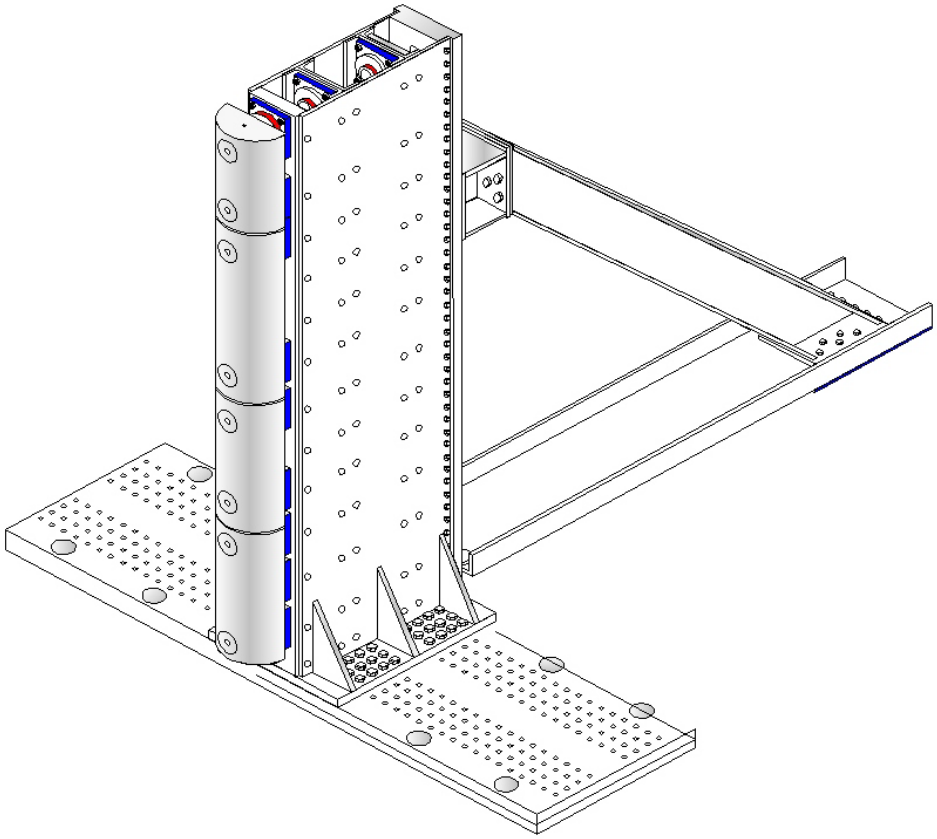
	Accelerometer/Sensor Location			
	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2795	140	-329
2	Left Floor Sill	2690	-745	-380
3	A-Pillar Sill	3067	-715	-452
4	A-Pillar Low	3140	-855	-558
5	A-Pillar Mid	3160	-865	-952
6	B-Pillar Sill	2000	-760	-434
7	B-Pillar Low	2045	-830	-575
8	B-Pillar Mid	2020	-810	-990
9	Driver Seat Track	2270	-562	-425
10	Engine Top	3850	0	-835
11	Firewall	3610	-10	-980
12	Right Roof	2095	625	-1575
13	Right Floor Sill	2670	745	-384
14	Rear Floorpan	640	10	-446

Reference: *X - Test Vehicle Rear Bumper (+ forward)*
Y - Test Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019

FOIL 300K RIGID POLE



Load Cell Locations	
ID	**Height From Top of Carrier (mm)**
1	87
2	468
3	648
4	978
5	1168
6	1651
7	1816
8	2057

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver SID-IIs Dummy
Face	SCAB, Frontal Airbag
Top of Head	SCAB, Frontal Airbag
Left Side of Head	SCAB
Back of Head	SCAB, Headrest, Seatback
Left Shoulder	Seatback bolster, SAB
Upper Torso	Seatback bolster
Lower Torso	Seatback bolster
Left Hip	Seat cushion bolster, SAB
Left Knee	None

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/ Other Door
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Record Width of Opening at Striker (mm)	N/A	N/A	N/A	N/A	N/A

* Indicate “Yes”, “No”, or “NA”.

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	No	N/A	No	N/A
Seat Disengagement from Floor pan	No	N/A	No	N/A
Seat Back Movement from Initial Position	No	No	No	No
Seat Back Collapse	No	No	No	No

* Indicate “Yes”, “No”, or “NA”.

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Good
Sill Separation	None
Windshield Damage	Completely shattered
Side Window Damage	Driver window broken but intact
Other Notable Effects	Good

DATA SHEET NO. 8 (CONTINUED)
POST-TEST OBSERVATIONS

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

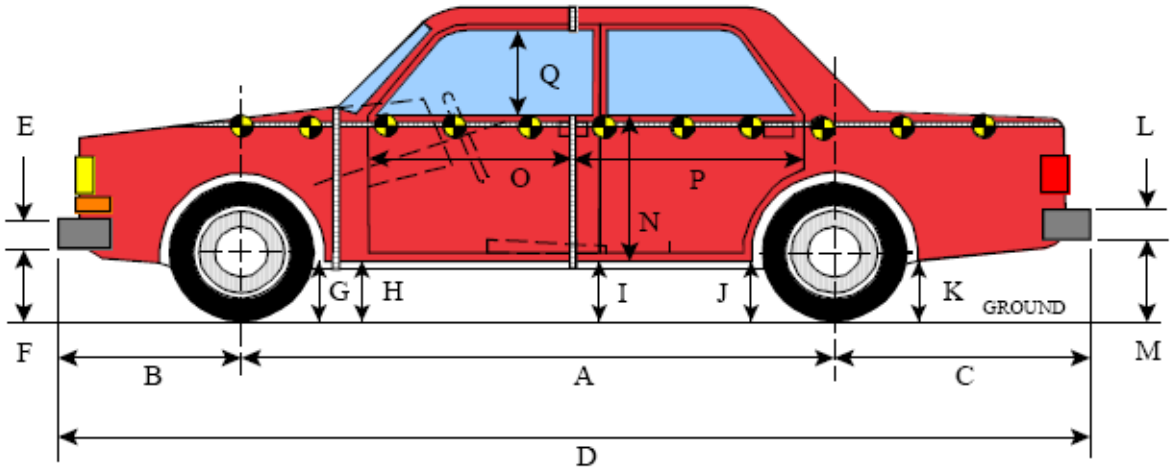
Restraint Type	Struck Side (Driver)		Struck Side (Rear Passenger)	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	Yes		
Knee Airbag	Yes	Yes		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	N/A
Side Torso Airbag	No	N/A	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Unknown	No	N/A
Other	No	N/A	No	N/A

VEHICLE SPEED, VEHICLE ANGLE AT IMPACT AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1185
Actual Impact Point (Aft of Front Axle)	mm		1185
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 of Intended Impact point	0
Angle Between Vehicle's Longitudinal Centerline and Line of Motion	degrees	75 +/- 3	75
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.32
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.34

DATA SHEET NO. 9
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019



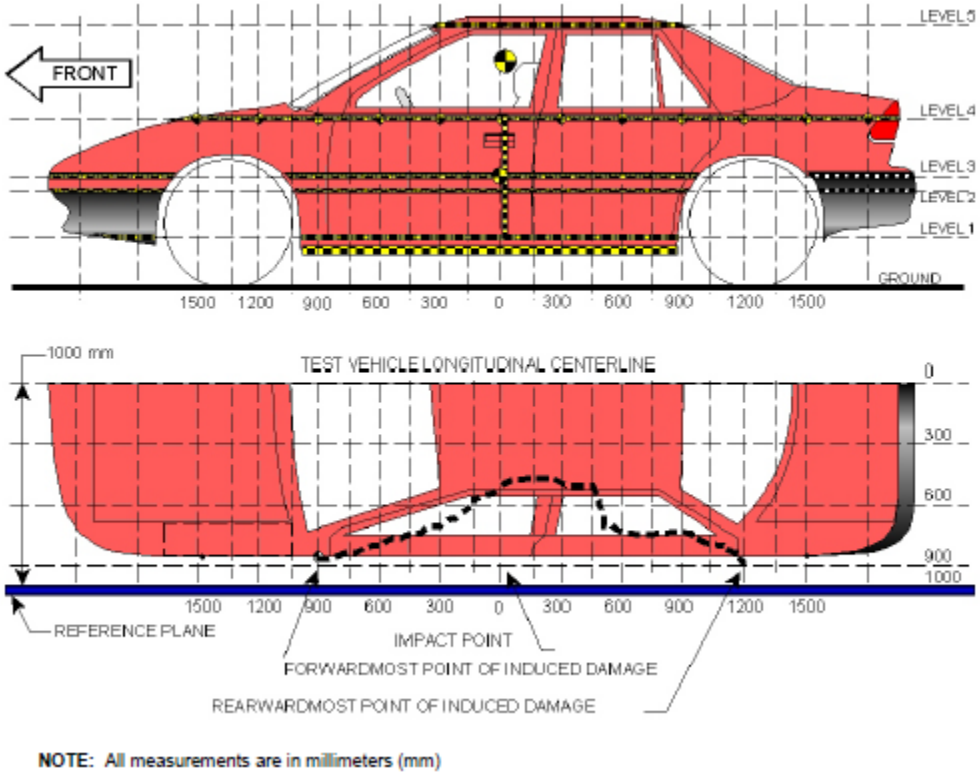
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2775	2712	63
B	Front Axle to Front Surface of Vehicle	910	910	0
C	Rear Axle to Rear Surface of Vehicle	965	965	0
D	Total Length at Centerline	4650	4581	69
E	Front Bumper Thickness	90	90	0
F	Front Bumper Bottom to Ground	480	494	-14
G	Sill Height at Front Wheel Well	335	330	5
H	Sill Height at Front Door Leading Edge	350	340	10
I	Sill Height at B-Pillar	365	383	-18
J1	Sill Height at Rear Wheel Well	325	371	-46
J2	Pinch Weld Height at Rear Wheel Well	230	277	-47
K	Sill Height Aft of Rear Wheel Well	480	522	-42
L	Rear Bumper Thickness	65	65	0
M	Rear Bumper Bottom to Ground	512	555	-43
N	Sill Height to Bottom of Front Window Sill	910	920	-10
O	Front Door Leading Edge to Impact CL	711	628	83
P	Rear Door Trailing Edge to Impact CL	1487	1375	112
Q	Front Window Opening	405	391	14
R	Right Side Length	4210	4130	80
S	Left Side Length	4200	4209	-9
T	Vehicle Width at B-Pillars	1865	1785	80

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019



NOTE: All measurements are in millimeters (mm)

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	443	260	0
2	Occupant H-Point	775	322	150
3	Mid-Door	801	330	150
4	Window Sill	1091	311	150
5	Window Top	1694	129	150

NOTE: The above measurements should be taken along the vertical impact reference line. Vehicle measurements forward of the vertical impact reference line are negative.

DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

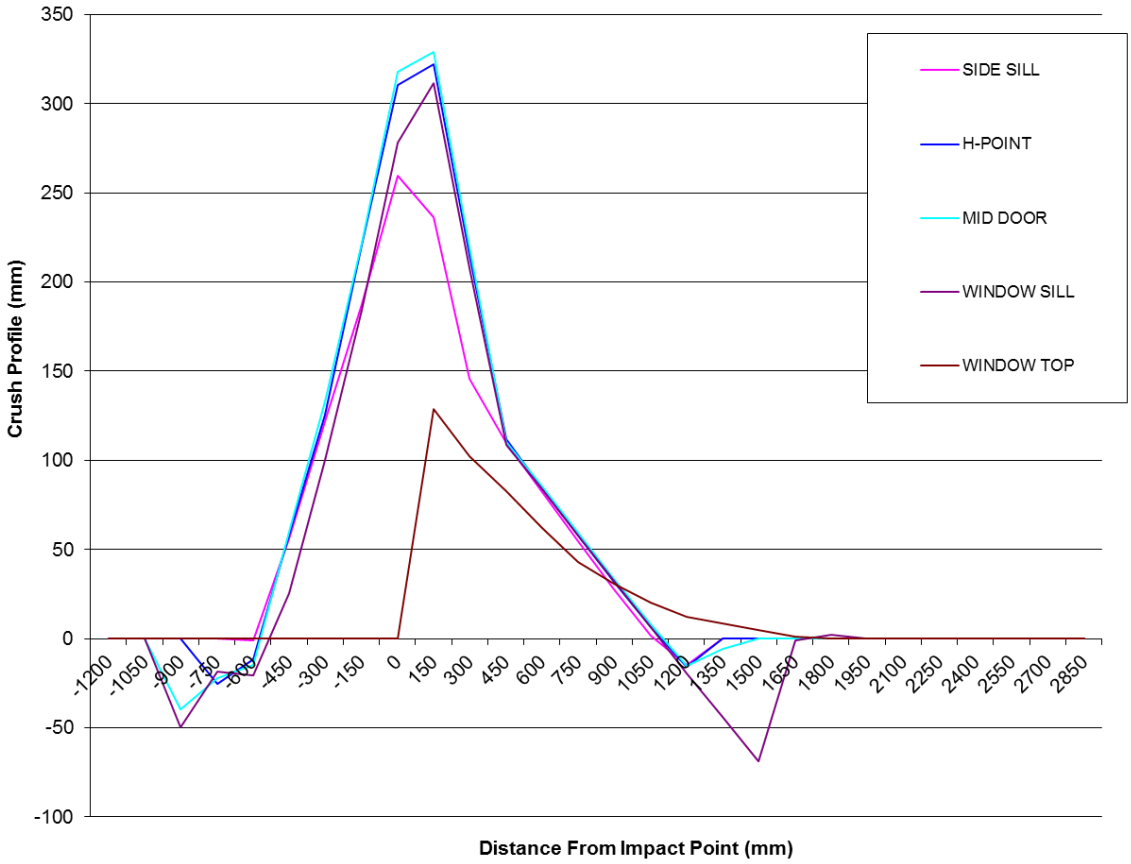
Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900	0	0	941	808	0	0	0	981	858	0	0	0	-40	-50	0
-750	0	936	929	820	0	0	961	952	838	0	0	-25	-23	-18	0
-600	915	918	918	829	0	916	930	933	849	0	-1	-12	-15	-20	0
-450	907	913	916	836	0	850	855	856	811	0	57	58	60	25	0
-300	906	913	916	847	0	784	787	783	747	0	122	126	133	100	0
-150	904	913	916	856	0	716	692	695	672	0	188	221	221	184	0
0	904	913	916	865	0	644	602	598	586	0	260	311	318	279	0
150	903	913	916	871	621	666	591	586	560	492	237	322	330	311	129
300	901	913	915	877	626	755	698	695	669	524	146	215	220	208	102
450	897	912	912	878	628	787	801	802	769	545	110	111	110	109	83
600	895	913	912	877	627	813	829	826	793	566	82	84	86	84	61
750	893	914	911	875	627	839	856	852	817	584	54	58	59	58	43
900	894	916	913	872	623	866	884	880	840	592	28	32	33	32	31
1050	902	921	919	870	616	901	914	911	864	595	1	7	8	6	21
1200	905	934	933	866	610	920	950	949	886	597	-15	-16	-16	-20	13
1350	0	0	938	863	600	0	0	944	907	591	0	0	-6	-44	9
1500	0	0	0	860	590	0	0	0	929	585	0	0	0	-69	5
1650	0	0	0	855	577	0	0	0	856	575	0	0	0	-1	2
1800	0	0	0	847	0	0	0	0	845	0	0	0	0	2	0

NOTE: Pre-test measurements are taken when the vehicle is in the “As Tested” weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point. The final distance from impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy’s head.

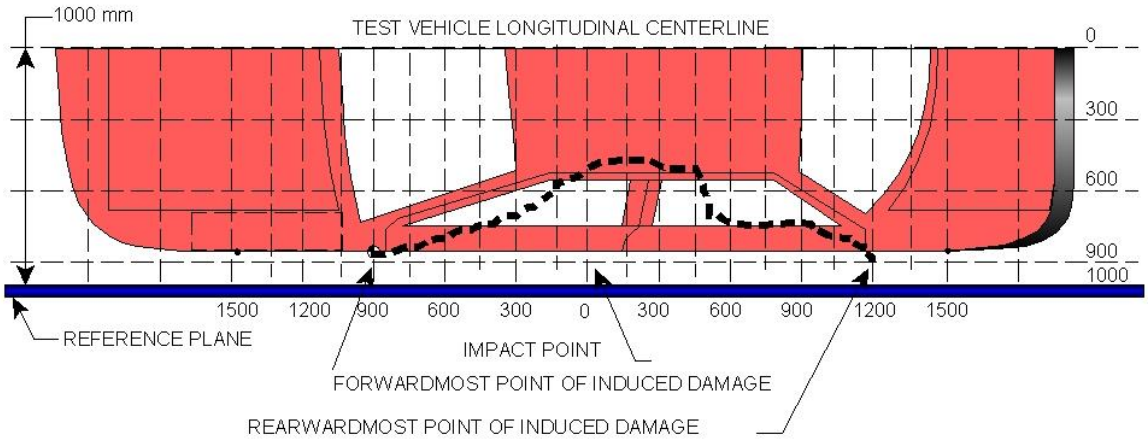
DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019



DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	1800	4	845	847	2
2	1350	5	591	600	9
3	900	3	880	913	33
4	450	2	801	912	111
5	0	3	598	916	318
6[1]	-450	3	856	916	0

[1] DPD 6 is defined as zero crush since the crush does not extend to the end of the vehicle.

DATA SHEET NO. 12

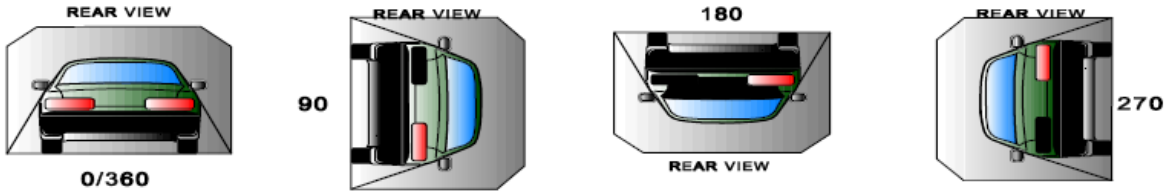
FMVSS NO. 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019

Test Time: 16:19 **Temperature:** 21.5ºC

A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable is 1 ounce)
B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable is 5 ounces)
C. For the following 25 minutes: 0 oz.
(Maximum allowable is 1 ounce/minute)
D. Spillage Details: None

FMVSS 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0 to 90	90	330	420
90 to 180	90	330	840
180 to 270	90	330	1260
270 to 360	90	330	1680

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

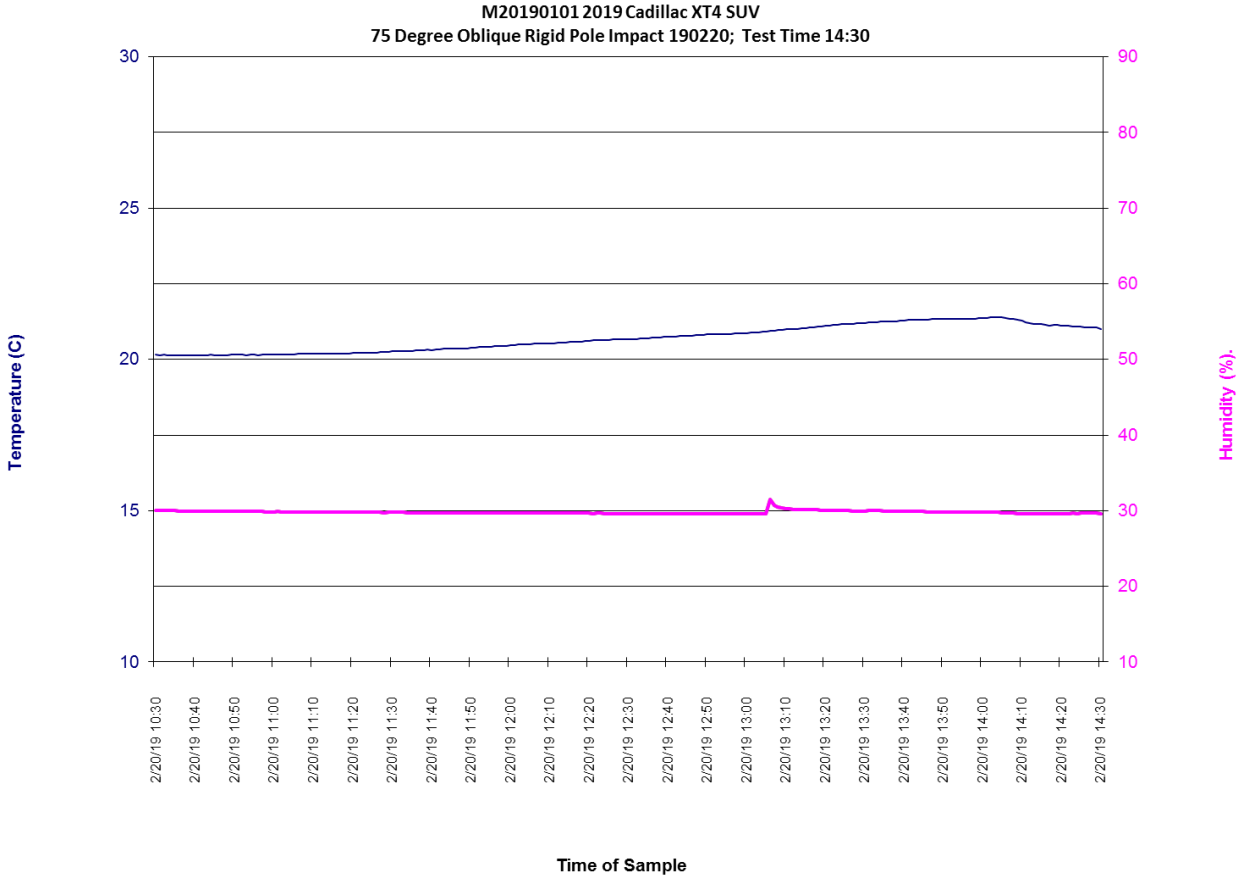
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0 to 90	0	0	0	0
90 to 180	0	0	0	0
180 to 270	0	0	0	0
270 to 360	0	0	0	0

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0 to 90	None
90 to 180	None
180 to 270	None
270 to 360	None

DATA SHEET NO. 13
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2019 Cadillac XT4 SUV NHTSA No.: M20190101
Test Program: SPNCAP Side Impact Test Date: 2/20/2019



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (CONTINUED)

No. 001 As Delivered Right Front ¾ View of Test Vehicle

No. 002 As Delivered Left Rear ¾ View of Test Vehicle

No. 003 Pre-Test Frontal View of Test Vehicle

No. 004 Post-Test Frontal View of Test Vehicle

No. 005 Pre-Test Left Front ¾ View of Test Vehicle

No. 006 Post-Test Left Front ¾ View of Test Vehicle

No. 007 Pre-Test Left Side View of Test Vehicle

No. 008 Post-Test Left Side View of Test Vehicle

No. 009 Pre-Test Left Rear ¾ View of Test Vehicle

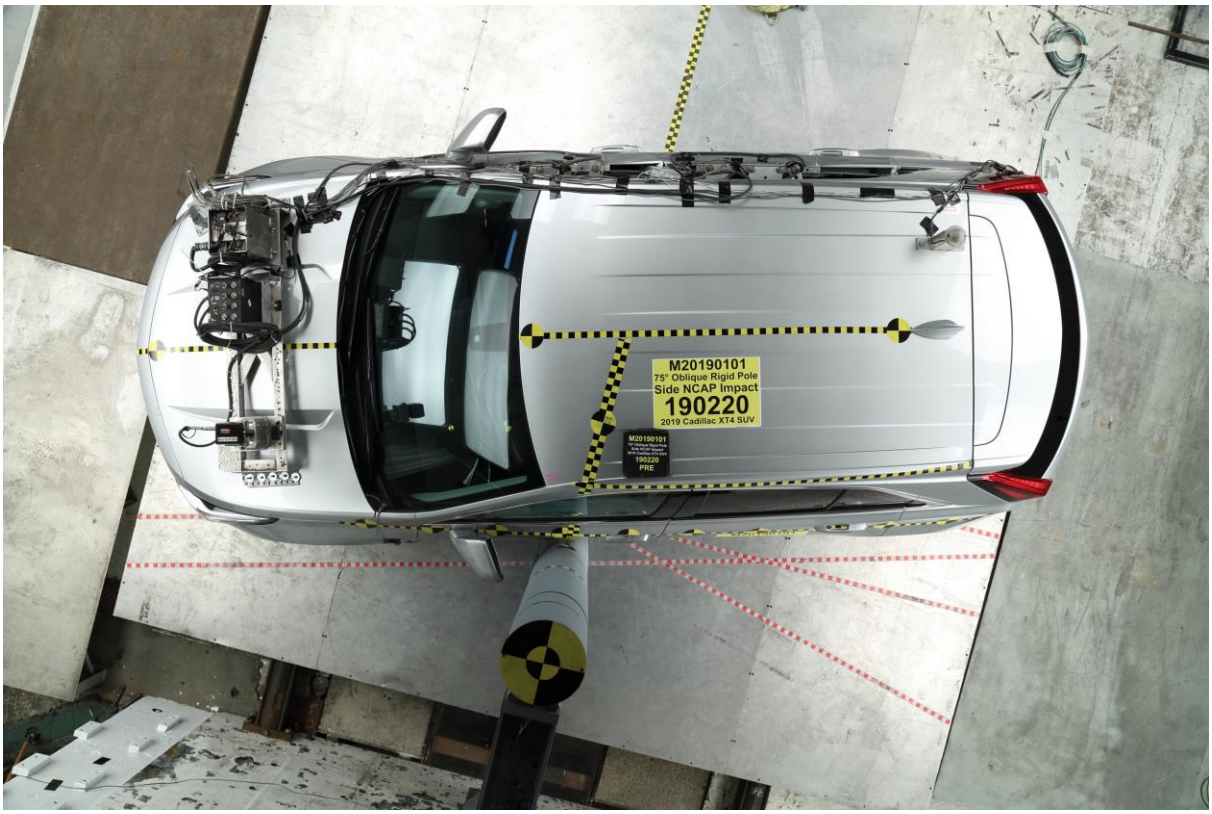
No. 010 Post-Test Left Rear ¾ View of Test Vehicle

No. 011 Pre-Test Rear View of Test Vehicle

No. 012 Post-Test Rear View of Test Vehicle

No. 013 Pre-Test Right Side View of Test Vehicle

No. 014 Post-Test Right Side View of Test Vehicle



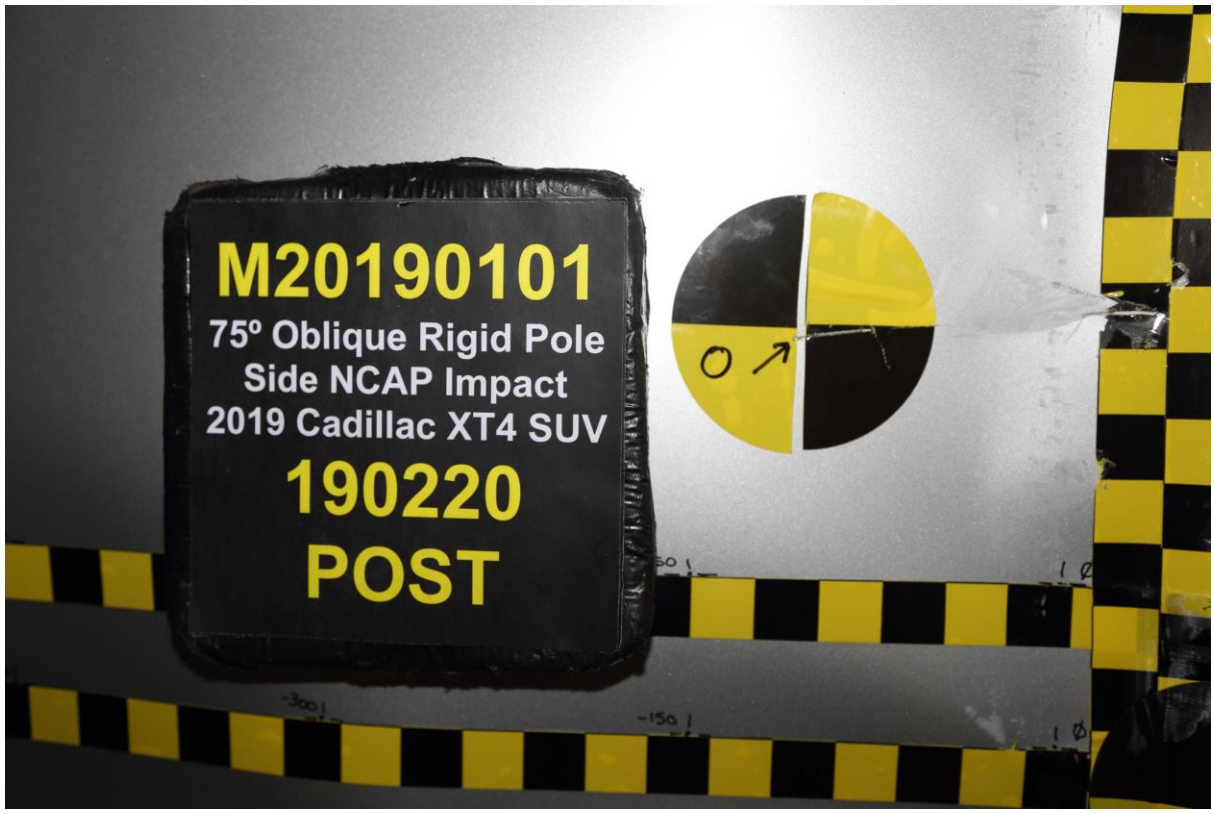
No. 015 Pre-Test Overhead View of Test Area

No. 016 Post-Test Overhead View of Test Area

No. 017 Pre-Test Left Side View of Pole Positioned Against Side of Vehicle

No. 018 Pre-Test Right Side View of Pole Positioned Against Side of Vehicle

No. 019 Pre-Test Close-Up View of Impact Point Target



No. 020 Post-Test Close-Up View of Impact Point Target Showing Impact Location

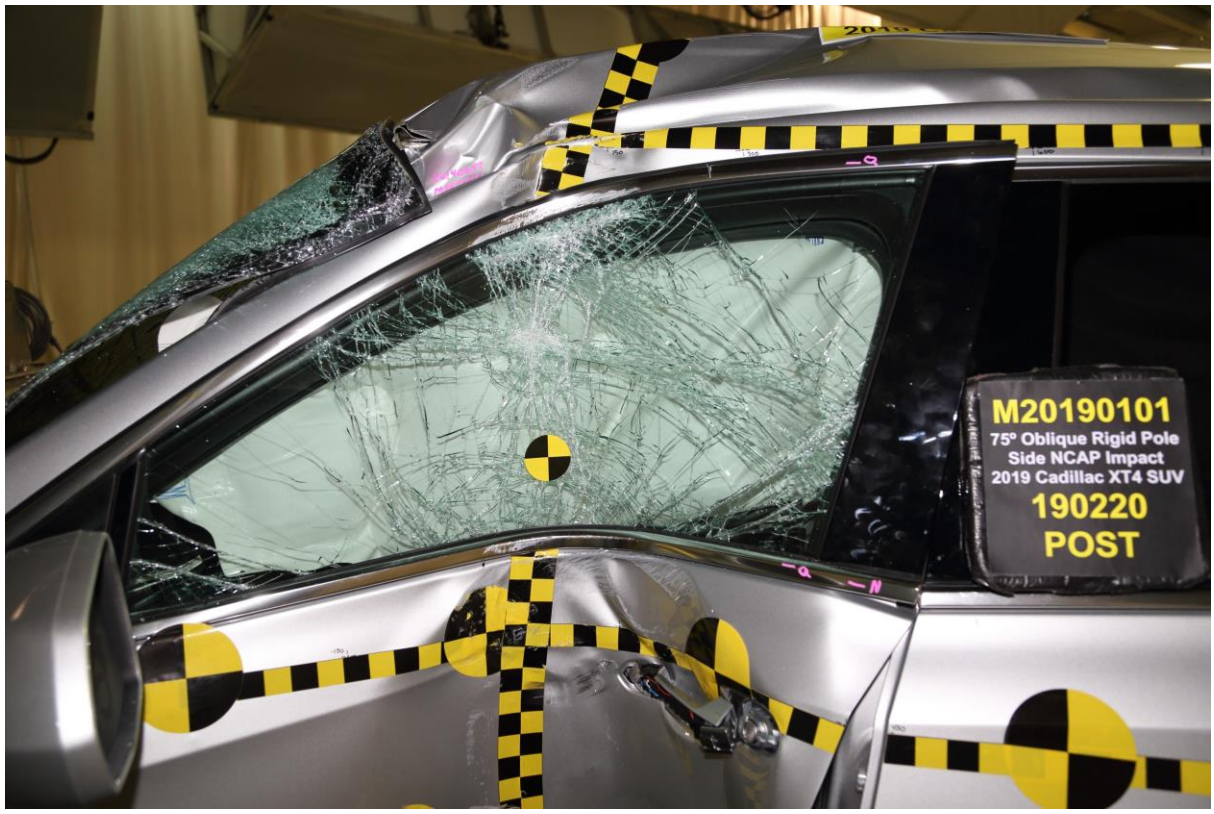
No. 021 Pre-Test Front Close-Up View of Dummy Head and Chest

No. 022 Post-Test Front Close-Up View of Dummy

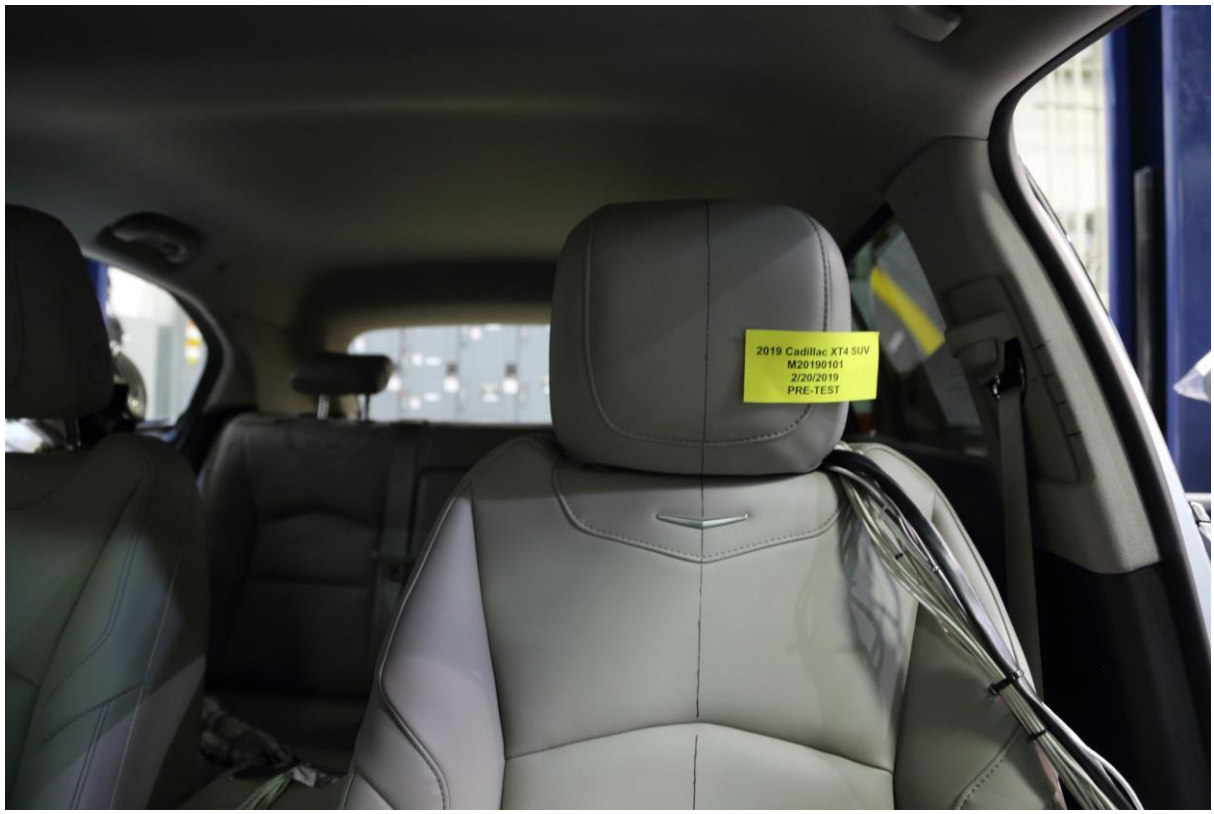
No. 023 Pre-Test Left Side View of Dummy Showing Belt and Chalking

Intentionally Left Blank

No. 024 Pre-Test Left Side View of Dummy Shoulder and Door Top View



No. 025 Post-Test Left Side View of Dummy Shoulder and Door Top View

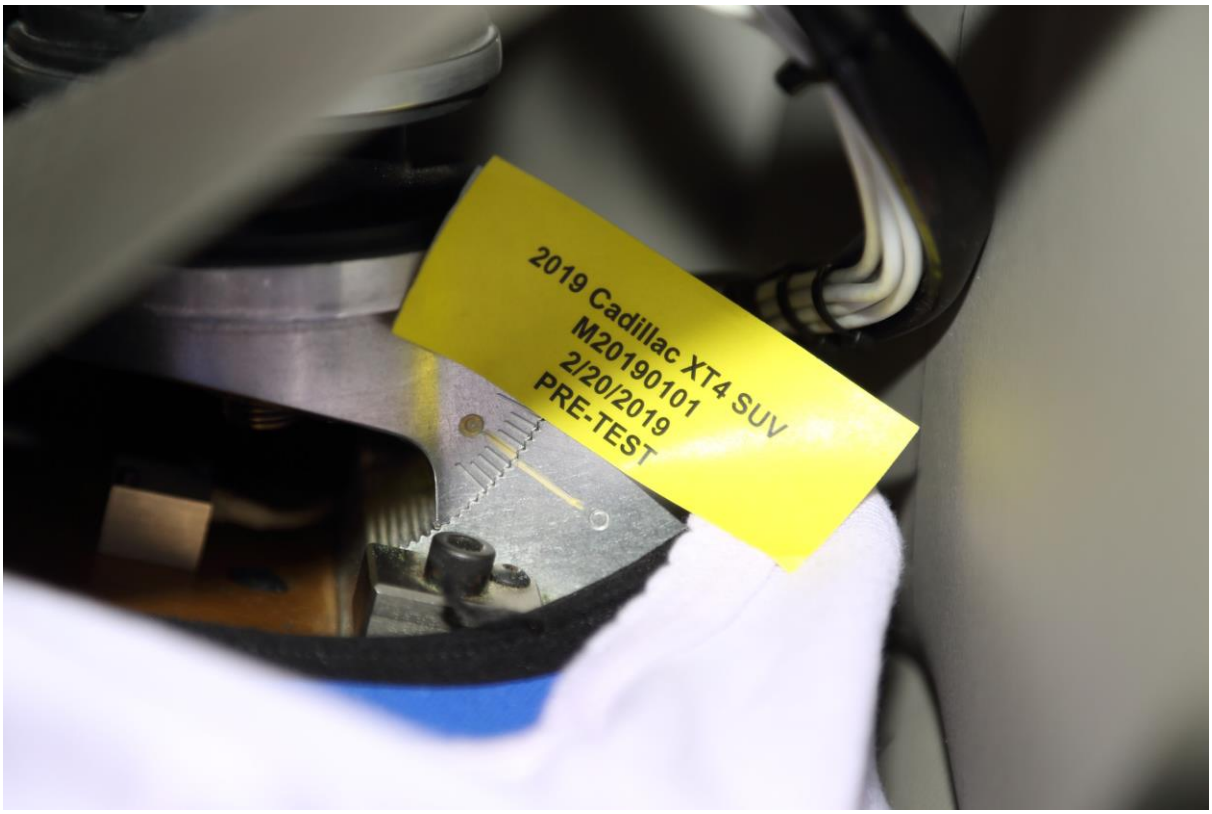


No. 026 Pre-Test Front View of Seat Back Prior to Dummy Positioning

No. 027 Pre-Test Front Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint

No. 028 Pre-Test Front View of Seat Pan Prior to Dummy Positioning

No. 029 Pre-Test Overhead View of Dummy Thighs on Seat Pan

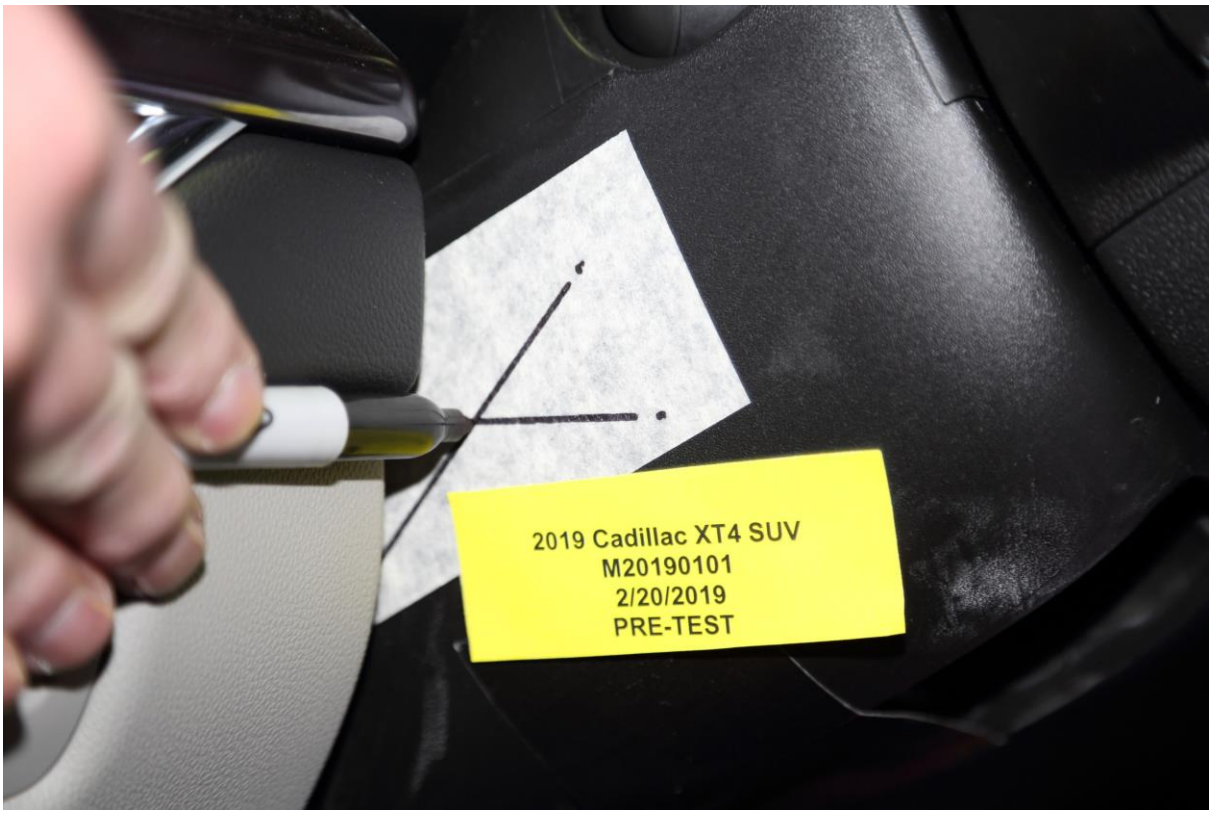


No. 030 Pre-Test Left Side View of Dummy Neck Showing Position of Adjustable Neck Bracket

No. 031 Pre-Test Left Side View of Dummy Head Showing Dummy Head is Level

No. 032 Pre-Test Placement of Dummy Feet

No. 033 Pre-Test View of Belt Anchorage for Dummy



No. 034 Pre-Test Left Side View of Steering Wheel

No. 035 Pre-Test View of Disengaged Parking Brake

No. 036 Pre-Test View of Parking Brake

No. 037 Pre-Test Close-Up Left Side View of Driver Seat Track

No. 038 Pre-Test Close-Up Left Side View of Driver Seat Back

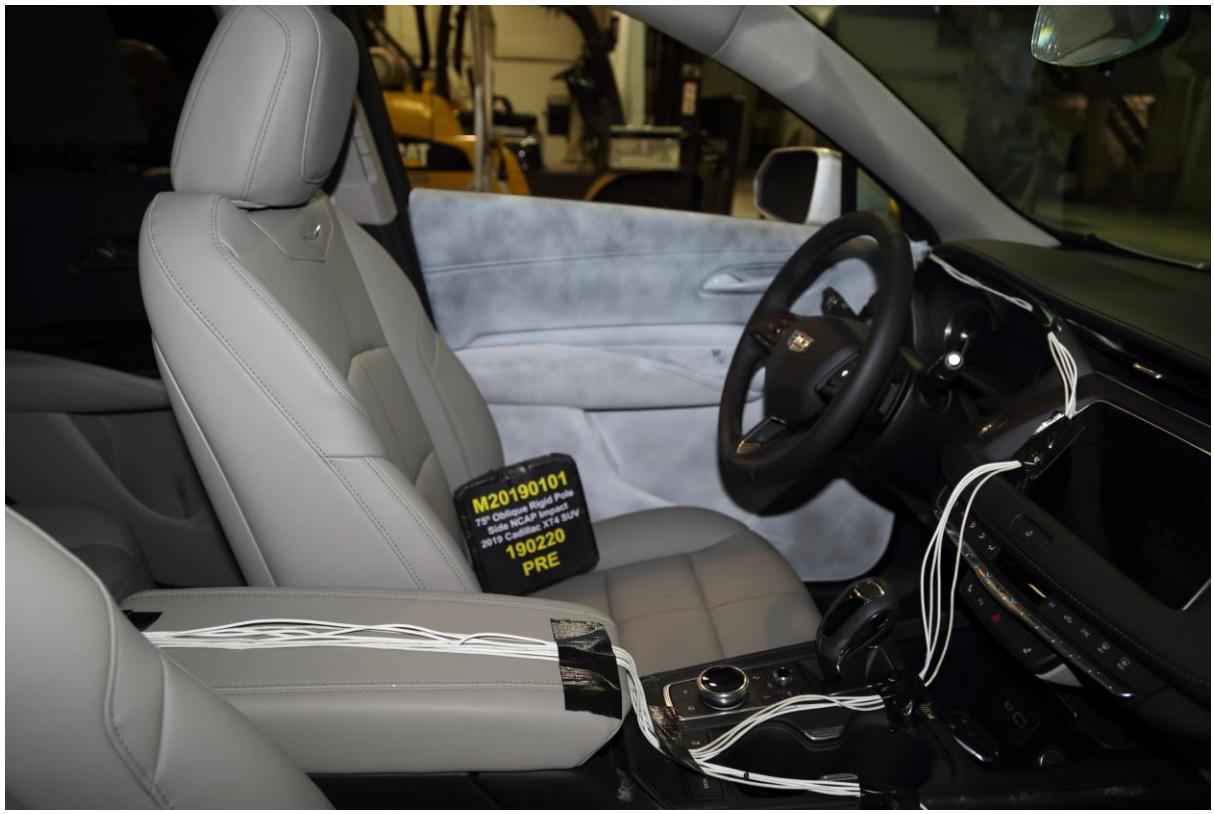
No. 039 Pre-Test Close-Up View of Driver Seat Back or Head Restraint

No. 040 Pre-Test Dummy and Door Clearance View

No. 041 Post-Test Dummy and Door Clearance View

No. 042 Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment

No. 043 Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment



No. 044 Pre-Test Inner Door Panel View

No. 045 Post-Test Inner Door Panel View Showing Dummy Contact Location

No. 046 Post-Test Dummy Close-Up Head Contact with Vehicle Interior View

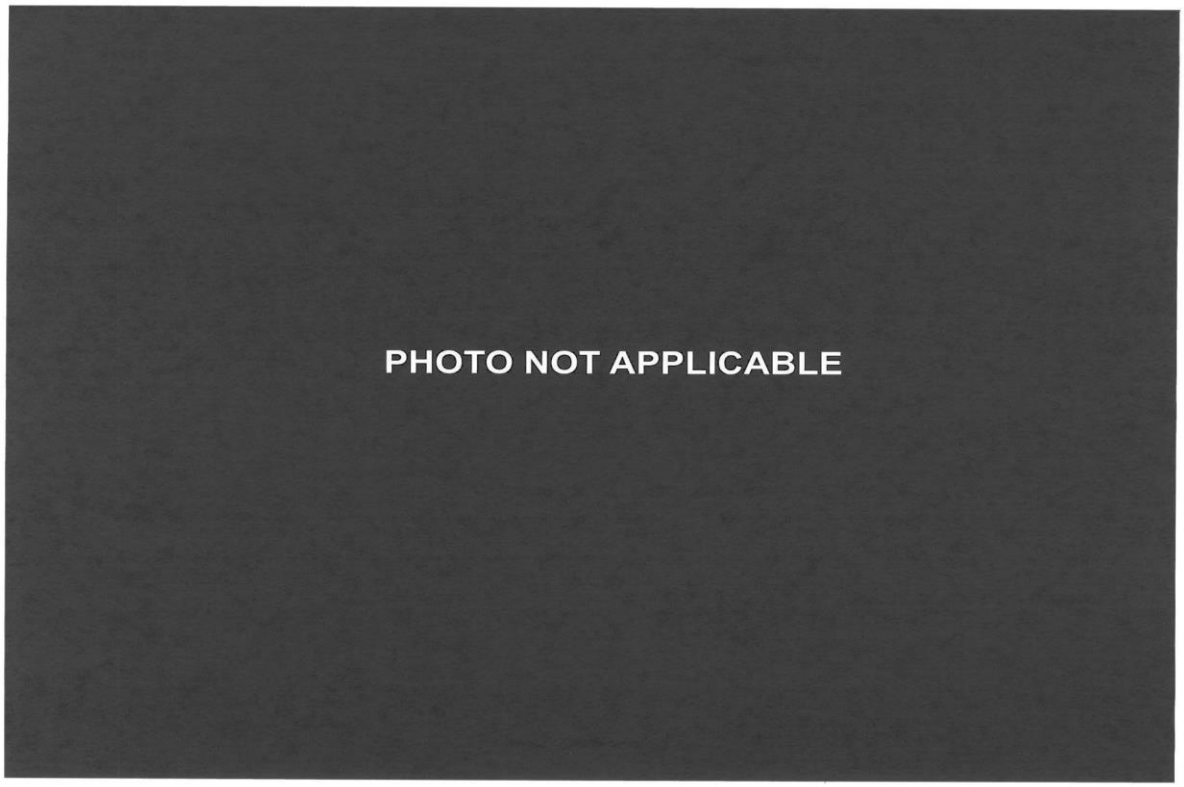
No. 047 Post-Test Dummy Close-Up Head Contact with Side Airbag View

No. 048 Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View

No. 049 Post-Test Dummy Close-Up Torso Contact with Side Airbag View

No. 050 Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View

No. 051 Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View



No. 052 Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View

Intentionally Left Blank

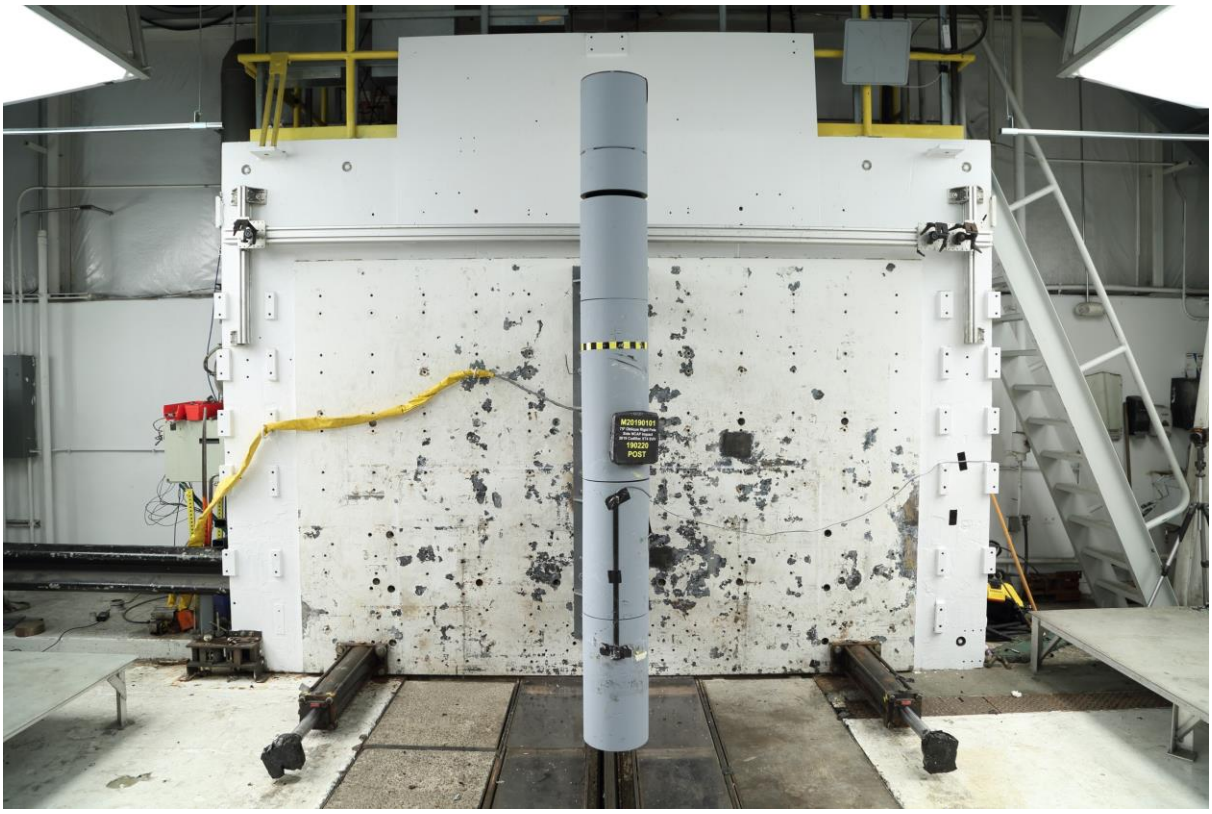
No. 053 Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

No. 054 Post-Test View of Fuel Filler Cap or Fuel Filler Neck

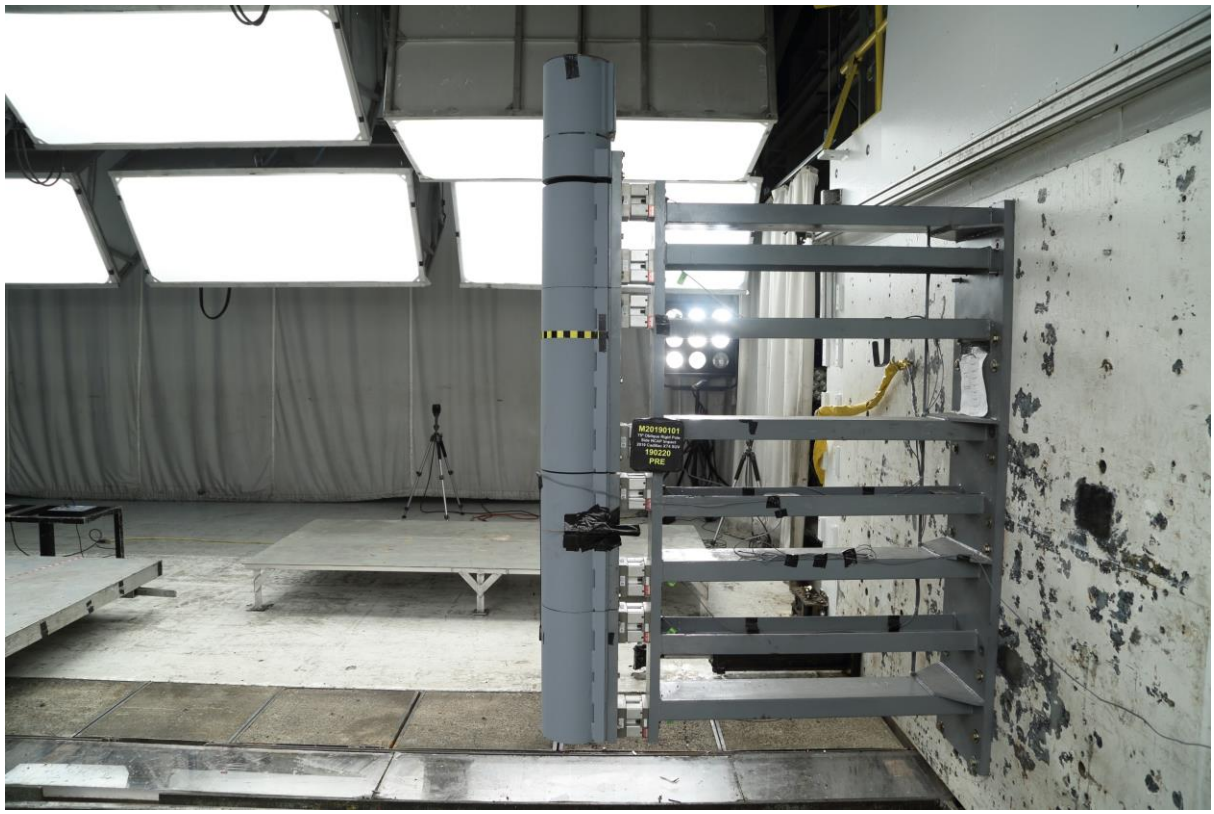
No. 055 Close-Up View of Vehicle Certification Label

No. 056 Close-Up View of Vehicle Tire Information Placard or Label

No. 057 Pre-Test Pole Barrier Front View



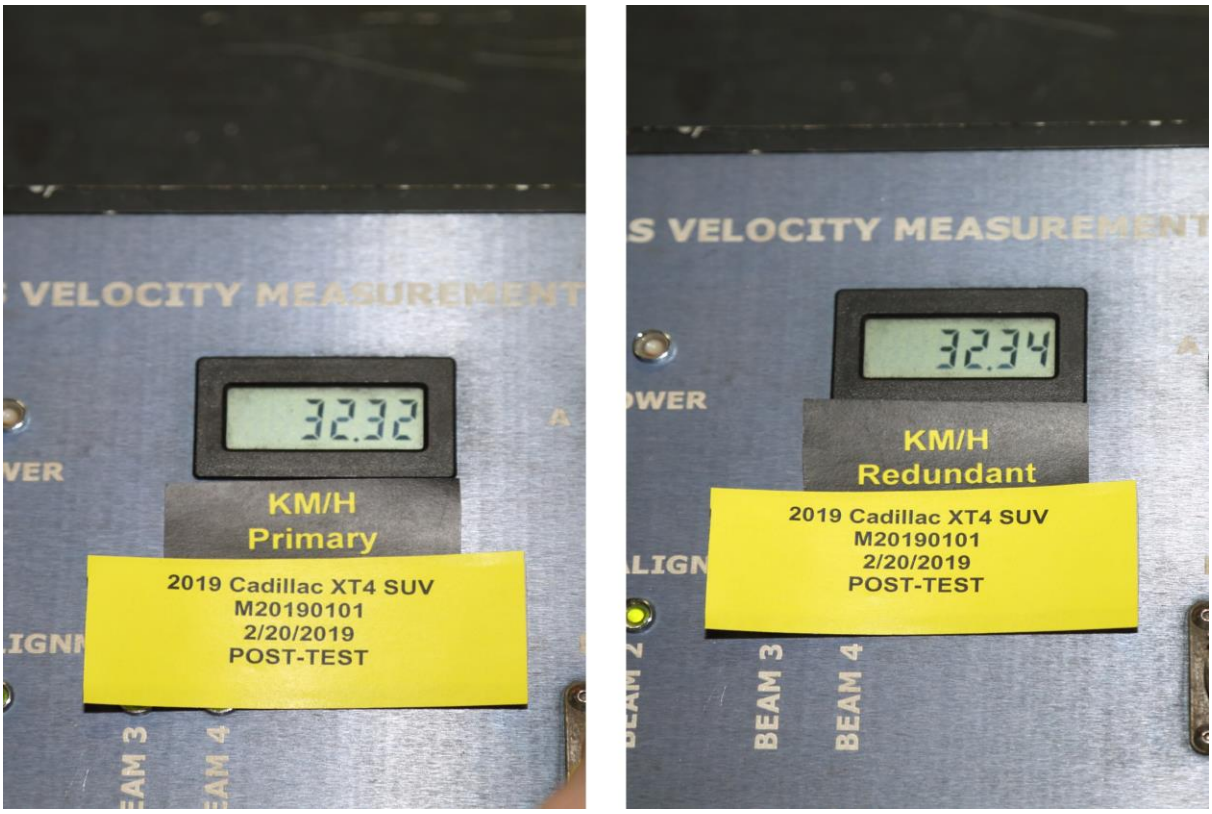
No. 058 Post-Test Pole Barrier Front View



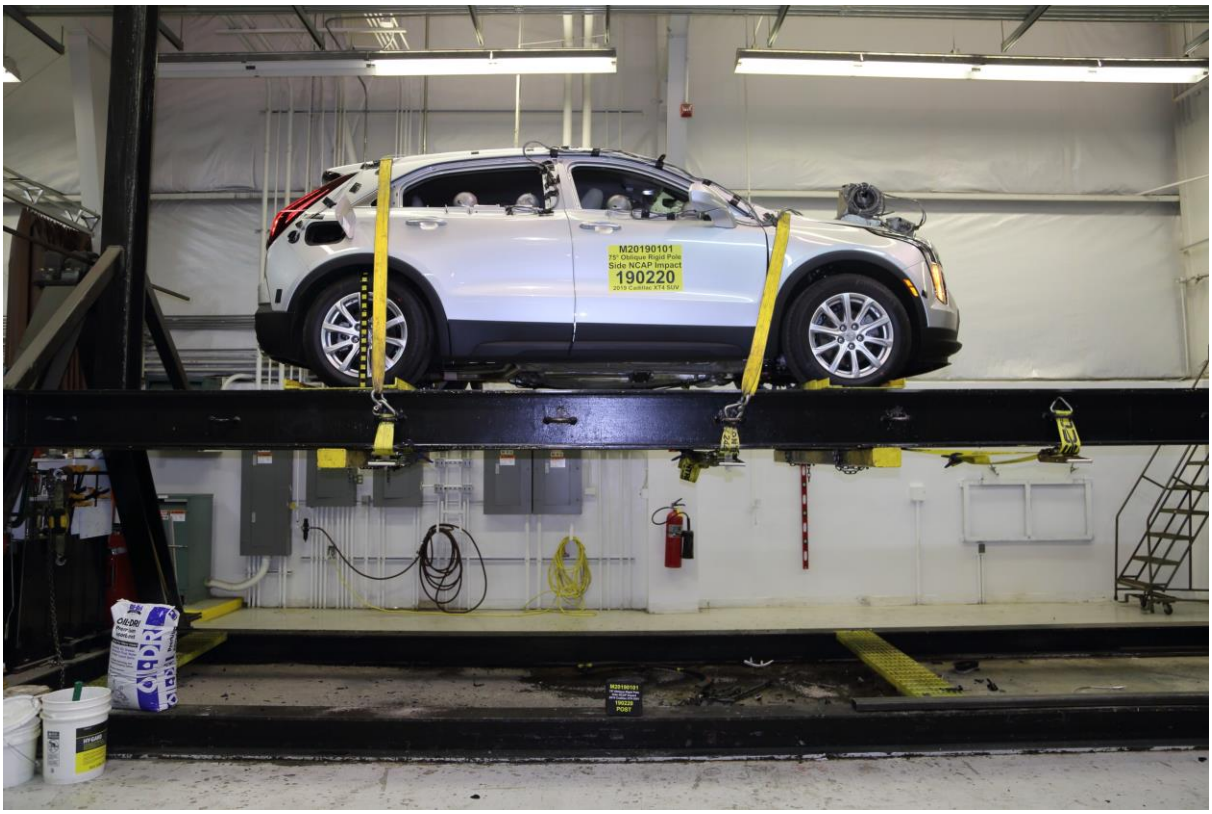
No. 059 Pre-Test Pole Barrier Side View

No. 060 Post-Test Pole Barrier Side View

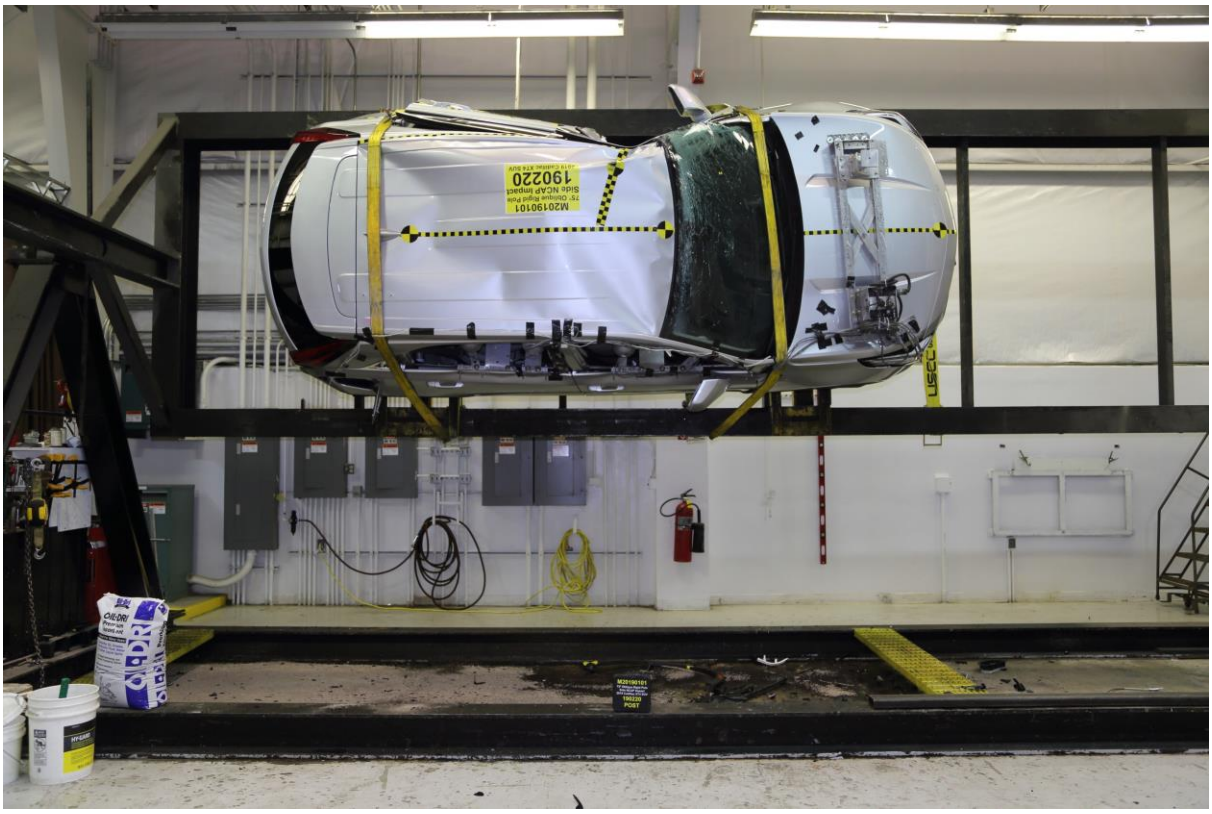
No. 061 Pre-Test Ballast View



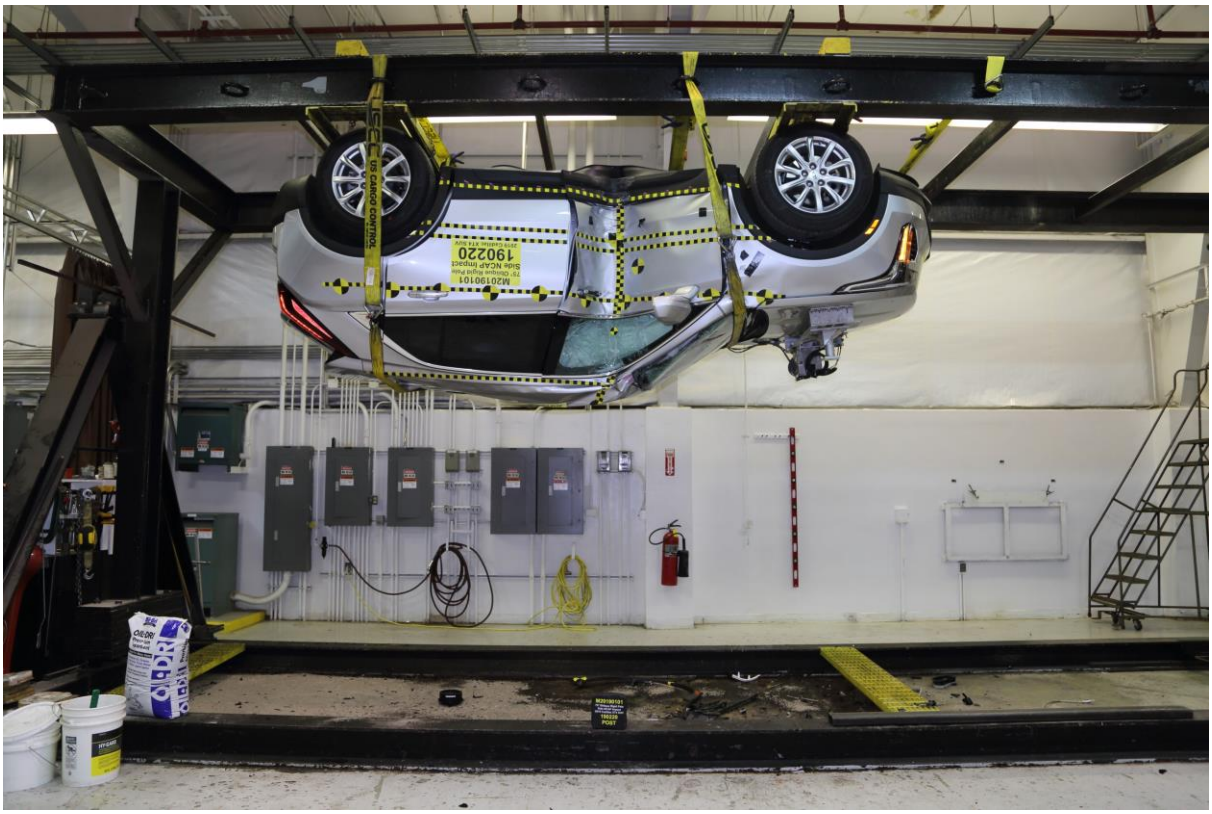
No. 062 Post-Test Primary and Redundant Speed Trap Read Out



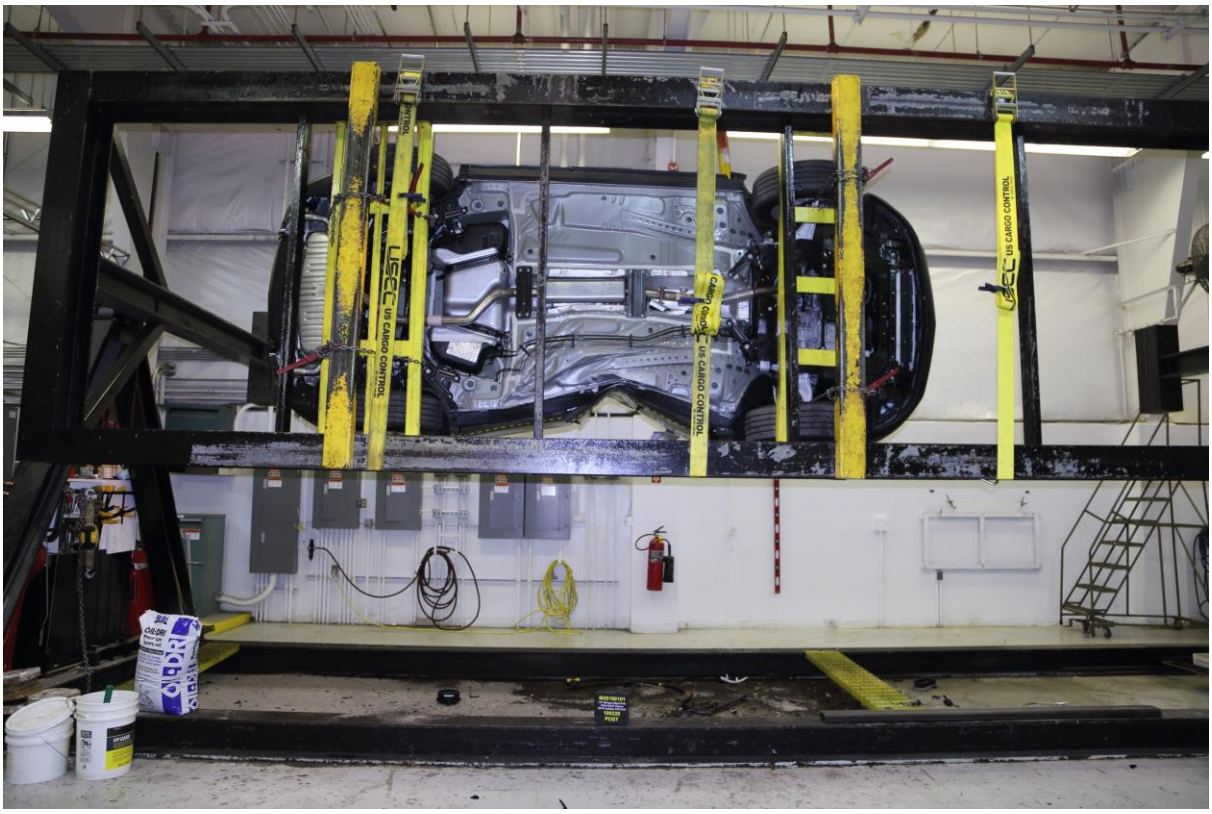
No. 063 FMVSS No. 301 Static Rollover 0 Degrees



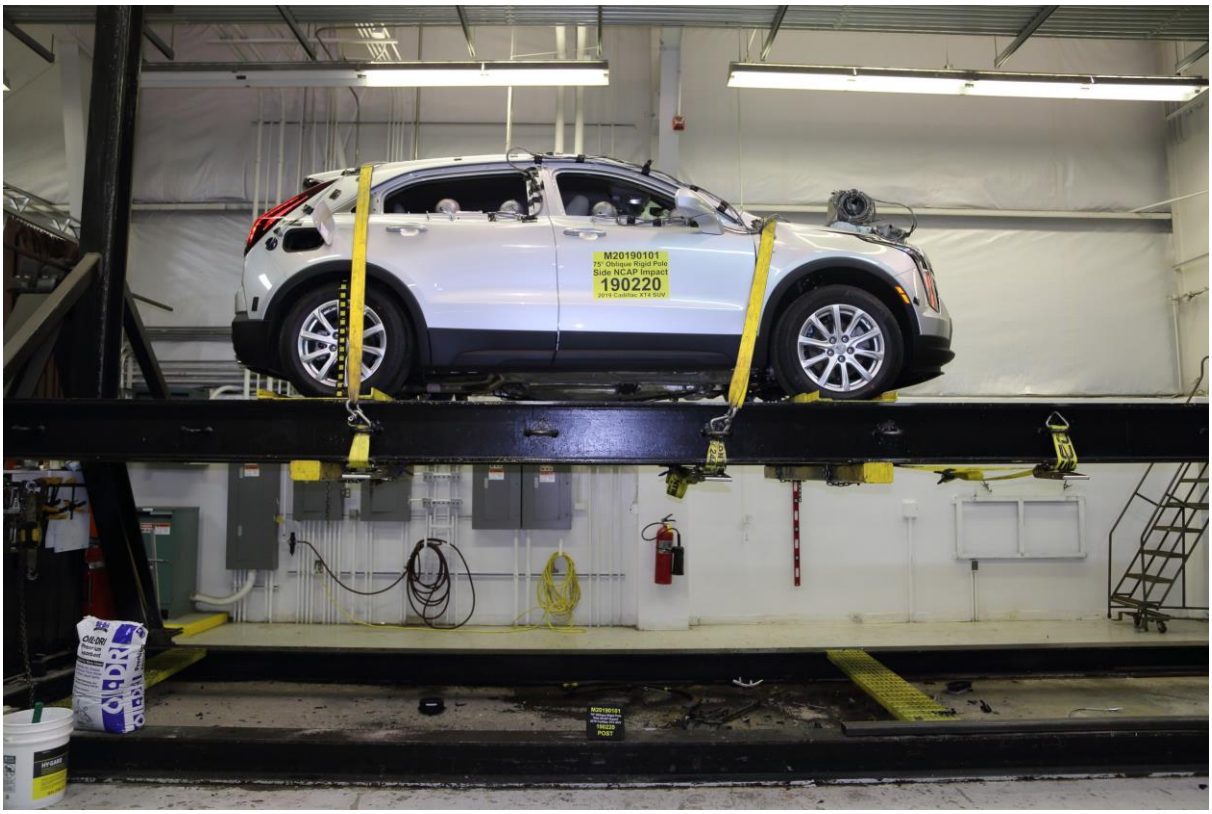
No. 064 FMVSS No. 301 Static Rollover 90 Degrees



No. 065 FMVSS No. 301 Static Rollover 180 Degrees

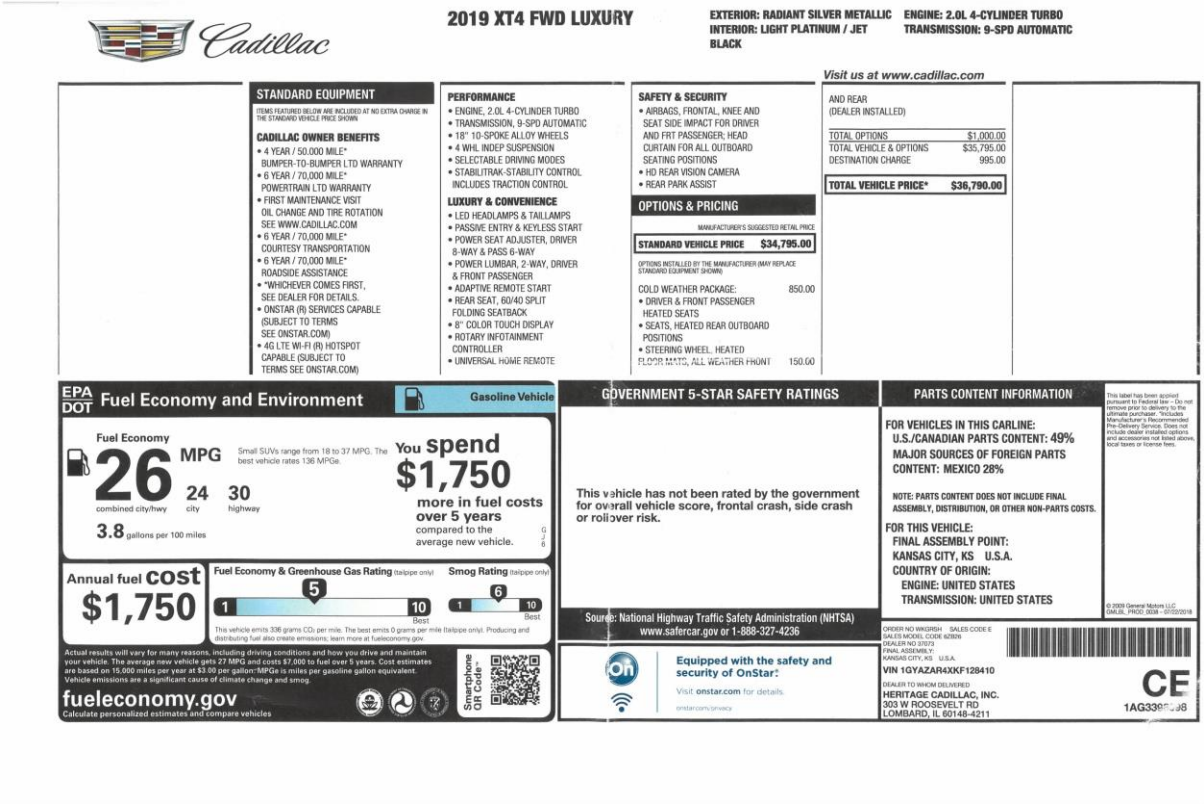


No. 066 FMVSS No. 301 Static Rollover 270 Degrees



No. 067 FMVSS No. 301 Static Rollover 360 Degrees

No. 068 Impact Event



2019 XT4 FWD LUXURY

EXTERIOR: RADIANT SILVER METALLIC
INTERIOR: LIGHT PLATINUM / JET BLACK

ENGINE: 2.0L 4-CYLINDER TURBO
TRANSMISSION: 9-SPD AUTOMATIC

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STANDARD EQUIPMENT

ITEMS FEATURED BELOW ARE INCLUDED AT NO EXTRA CHARGE IN THE STANDARD VEHICLE PRICE SHOWN

CADILLAC OWNER BENEFITS
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- 6 YEAR / 70,000 MILE* POWERTRAIN LTD WARRANTY
- FIRST MAINTENANCE VISIT OIL CHANGE AND TIRE ROTATION SEE WWW.CADILLAC.COM
- 6 YEAR / 70,000 MILE* COURTESY TRANSPORTATION
- 6 YEAR / 70,000 MILE* ROADSIDE ASSISTANCE
- *WHICHEVER COMES FIRST, SEE DEALER FOR DETAILS.
- ONSTAR (R) SERVICES CAPABLE (SUBJECT TO TERMS SEE ONSTAR.COM)
- 4G LTE WI-FI (R) HOTSPOT CAPABLE (SUBJECT TO TERMS SEE ONSTAR.COM)

PERFORMANCE
- ENGINE, 2.0L 4-CYLINDER TURBO
- TRANSMISSION, 9-SPD AUTOMATIC
- 18" 10-SPOKE ALLOY WHEELS
- 4 WHL INDEP SUSPENSION
- SELECTABLE DRIVING MODES
- STABILITRAK-STABILITY CONTROL INCLUDES TRACTION CONTROL

LUXURY & CONVENIENCE
- LED HEADLAMPS & TAILLAMPS
- PASSIVE ENTRY & KEYLESS START
- POWER SEAT ADJUSTER, DRIVER 8-WAY & PASS 6-WAY
- POWER LUMBAR, 2-WAY, DRIVER & FRONT PASSENGER
- ADAPTIVE REMOTE START
- REAR SEAT, 60/40 SPLIT FOLDING SEATBACK
- 8" COLOR TOUCH DISPLAY
- ROTARY INFOTAINMENT CONTROLLER
- UNIVERSAL HOME REMOTE

SAFETY & SECURITY
- AIRBAGS, FRONTAL, KNEE AND SEAT SIDE IMPACT FOR DRIVER AND FRT PASSENGER; HEAD CURTAIN FOR ALL OUTBOARD SEATING POSITIONS
- HD REAR VISION CAMERA
- REAR PARK ASSIST

OPTIONS & PRICING

MANUFACTURER'S SUGGESTED RETAIL PRICE

STANDARD VEHICLE PRICE	$34,795.00

OPTIONS INSTALLED BY THE MANUFACTURER (MAY REPLACE STANDARD EQUIPMENT SHOWN)

COLD WEATHER PACKAGE:	850.00
• DRIVER & FRONT PASSENGER HEATED SEATS	
• SEATS, HEATED REAR OUTBOARD POSITIONS	
• STEERING WHEEL, HEATED	
FLOOR MATS, ALL WEATHER FRONT	150.00
AND REAR (DEALER INSTALLED)	
TOTAL OPTIONS	$1,000.00
TOTAL VEHICLE & OPTIONS	$35,795.00
DESTINATION CHARGE	995.00
TOTAL VEHICLE PRICE*	**$36,790.00**

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy: 26 MPG combined city/hwy (24 city, 30 highway)
3.8 gallons per 100 miles

Small SUVs range from 18 to 37 MPG. The best vehicle rates 136 MPGe.

You spend $1,750 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost $1,750

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 5 (1 – 10 Best)
Smog Rating (tailpipe only): 6 (1 – 10 Best)

This vehicle emits 336 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs $7,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $3.00 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code™

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.

Source: National Highway Traffic Safety Administration (NHTSA)
www.safercar.gov or 1-888-327-4236

Equipped with the safety and security of OnStar®
Visit onstar.com for details.
onstar.com/privacy

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CARLINE:
U.S./CANADIAN PARTS CONTENT: 49%
MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO 28%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE:
FINAL ASSEMBLY POINT:
KANSAS CITY, KS U.S.A.
COUNTRY OF ORIGIN:
ENGINE: UNITED STATES
TRANSMISSION: UNITED STATES

This label has been applied pursuant to Federal law – Do not remove prior to delivery to the ultimate purchaser. "Includes Destination Charges, Excludes Pre-Delivery Service. Does not include dealer installed options and accessories not listed above, local taxes or license fees.

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GMLBL PROD 2018 – 07/22/2018

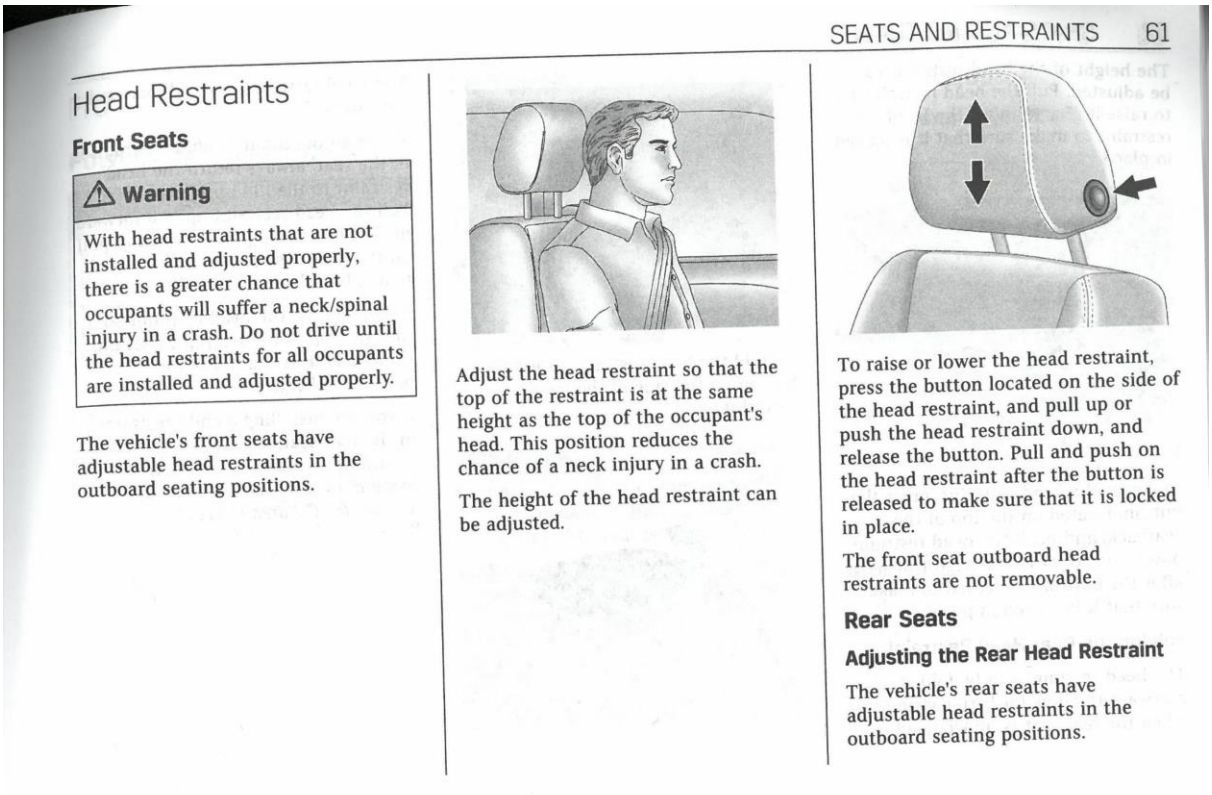
ORDER NO 9KGR3H SALES CODE E
SALES MODEL CODE 62806
DEALER NO 07073
FINAL ASSEMBLY:
KANSAS CITY, KS U.S.A.

VIN 1GYAZAR4XKF128410

DEALER TO WHOM DELIVERED
HERITAGE CADILLAC, INC.
303 W ROOSEVELT RD
LOMBARD, IL 60148-4211

CE
1AG33[illegible]

No. 069 Monroney Label



Head Restraints

Front Seats

⚠ Warning

With head restraints that are not installed and adjusted properly, there is a greater chance that occupants will suffer a neck/spinal injury in a crash. Do not drive until the head restraints for all occupants are installed and adjusted properly.

The vehicle's front seats have adjustable head restraints in the outboard seating positions.

Adjust the head restraint so that the top of the restraint is at the same height as the top of the occupant's head. This position reduces the chance of a neck injury in a crash.

The height of the head restraint can be adjusted.

To raise or lower the head restraint, press the button located on the side of the head restraint, and pull up or push the head restraint down, and release the button. Pull and push on the head restraint after the button is released to make sure that it is locked in place.

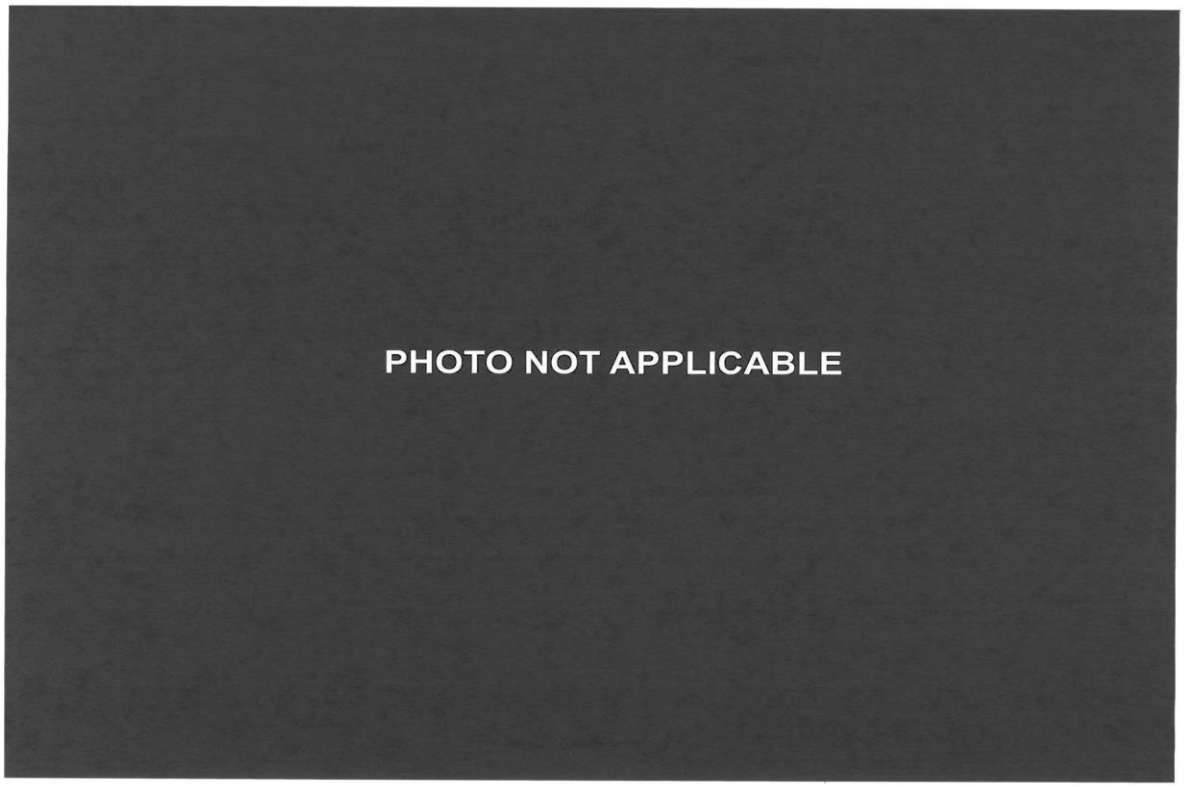
The front seat outboard head restraints are not removable.

Rear Seats

Adjusting the Rear Head Restraint

The vehicle's rear seats have adjustable head restraints in the outboard seating positions.

No. 070 Head Restraint Use and Adjustment Information from Vehicle Owner Manual



No. 071 Post-Test View of Shattered Vehicle Inner Door Panel

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

The following additional data for this test can be obtained from the Research and Development section of the NHTSA website. The website can be found at: www.nhtsa.gov.

Additional Driver Dummy Instrumentation Data

Driver Head Acceleration (X) Redundant
Driver Head Acceleration (Y) Redundant
Driver Head Acceleration (Z) Redundant
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection (Y)
Driver Head Angular Velocity (X)
Driver Head Angular Velocity (Y)
Driver Head Angular Velocity (Z)

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration (Y)
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy Hip Point Acceleration (Y)
Engine Top Acceleration (X)
Engine Top Acceleration (Y)
Firewall Center Acceleration (Y)
Right Roof at Vertical Impact Reference Line Acceleration (Y)
Right Sill at Vertical Impact Reference Line Acceleration (Y)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

Pole Instrumentation Data

Load Cell Pole Barrier #1 Force (X)
Load Cell Pole Barrier #2 Force (X)
Load Cell Pole Barrier #3 Force (X)
Load Cell Pole Barrier #4 Force (X)
Load Cell Pole Barrier #5 Force (X)
Load Cell Pole Barrier #6 Force (X)
Load Cell Pole Barrier #7 Force (X)
Load Cell Pole Barrier #8 Force (X)

NHTSA

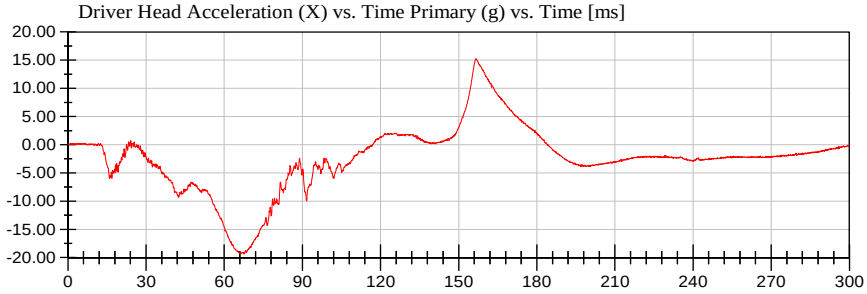
Test Date: 02/20/2019

Position #1 SID IIs Dummy (297)

Test Lab: CTF

Test Number: 190220 (M20190101)

Driver Head Acceleration (X) vs. Time Primary (g) vs. Time [ms]



<Max>

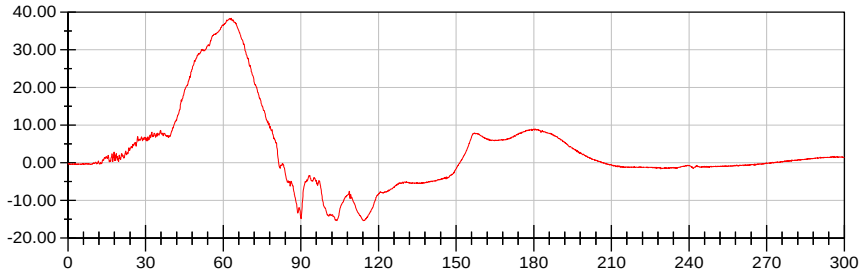
15.25 g at 156.72 ms

<Min>

-19.39 g at 67.60 ms

CFC_1000

Driver Head Acceleration (Y) vs. Time Primary (g) vs. Time [ms]



<Max>

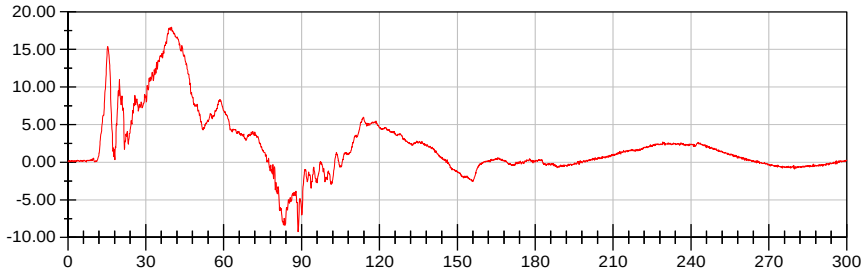
38.39 g at 63.04 ms

<Min>

-15.35 g at 103.92 ms

CFC_1000

Driver Head Acceleration (Z) vs. Time Primary (g) vs. Time [ms]



<Max>

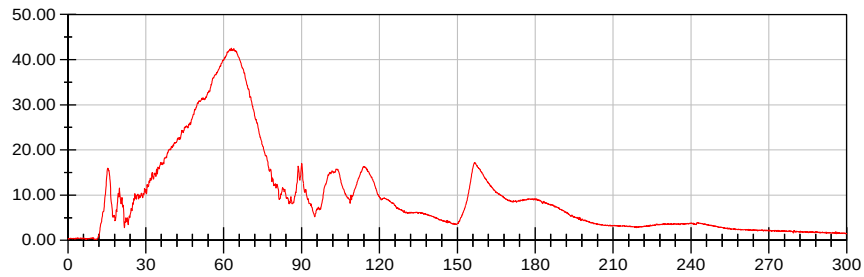
17.94 g at 39.84 ms

<Min>

-9.24 g at 88.72 ms

CFC_1000

Driver Head Acceleration Resultant Primary vs. Time (g) vs. Time [ms]



<Max>

42.55 g at 63.04 ms

<Min>

0.12 g at 10.88 ms

CFC_1000

NHTSA

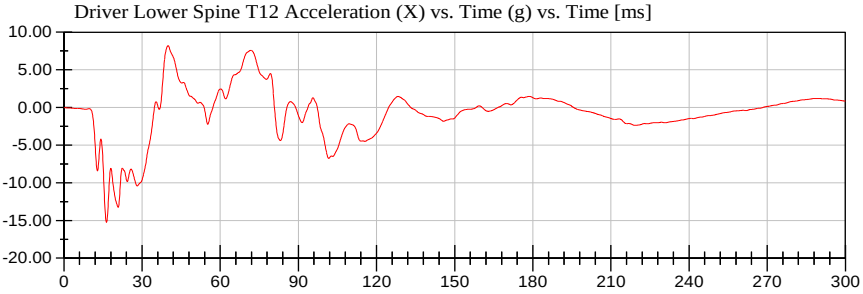
Test Date: 02/20/2019

Position #1 SID IIs Dummy (297)

Test Lab: CTF

Test Number: 190220 (M20190101)

Driver Lower Spine T12 Acceleration (X) vs. Time (g) vs. Time [ms]



<Max>

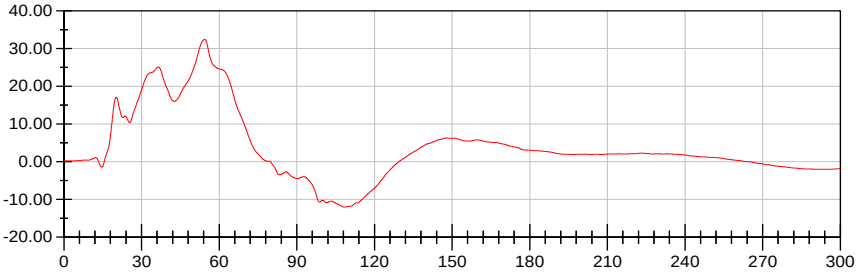
8.20 g at 40.00 ms

<Min>

-15.25 g at 16.32 ms

CFC_180

Driver Lower Spine T12 Acceleration (Y) vs. Time (g) vs. Time [ms]



<Max>

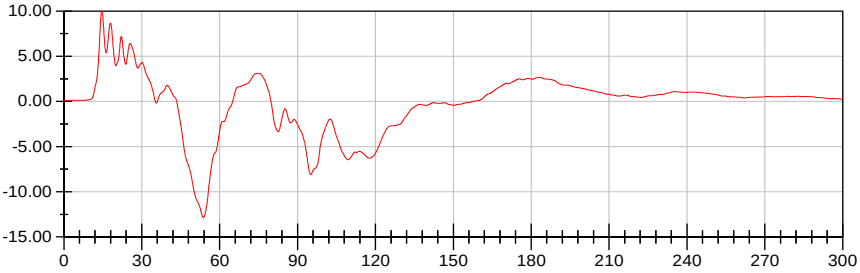
32.44 g at 54.40 ms

<Min>

-12.00 g at 108.48 ms

CFC_180

Driver Lower Spine T12 Acceleration (Z) vs. Time (g) vs. Time [ms]



<Max>

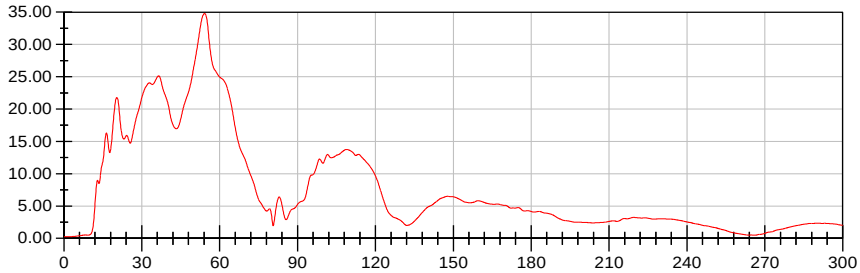
9.97 g at 14.64 ms

<Min>

-12.83 g at 53.76 ms

CFC_180

Driver Lower Spine T12 Acceleration Resultant vs. Time (g) vs. Time [ms]



<Max>

34.79 g at 54.24 ms

<Min>

0.26 g at 1.20 ms

CFC_180

NHTSA

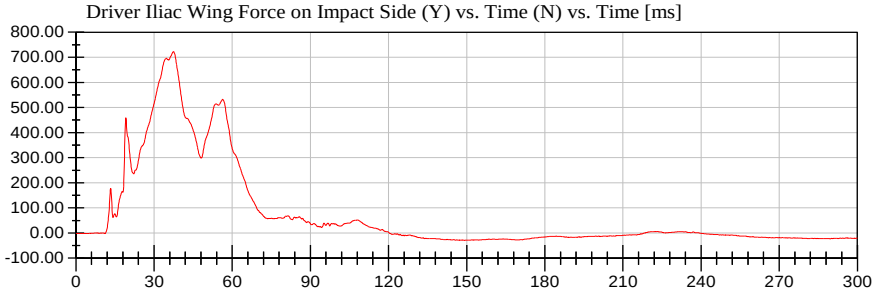
Test Date: 02/20/2019

Position #1 SID IIs Dummy (297)

Test Lab: CTF

Test Number: 190220 (M20190101)

Driver Iliac Wing Force on Impact Side (Y) vs. Time (N) vs. Time [ms]



<Max>

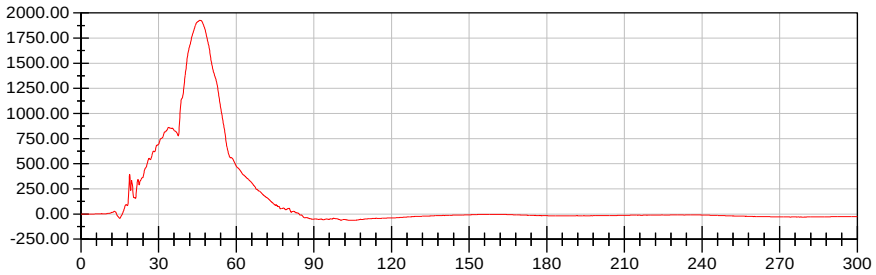
722.73 N at 37.44 ms

<Min>

-29.19 N at 149.28 ms

CFC_600

Driver Acetabulum Force on Impact Side (Y) vs. Time (N) vs. Time [ms]



<Max>

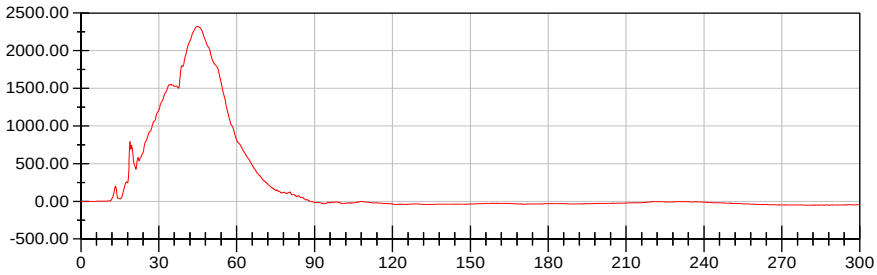
1,926.90 N at 46.00 ms

<Min>

-61.90 N at 104.00 ms

CFC_600

Driver Total Pelvis Force on Impact Side (Y) vs. Time (N) vs. Time [ms]



<Max>

2,322.67 N at 44.80 ms

<Min>

-51.91 N at 281.12 ms

CFC_600

APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

TABLE OF CALIBRATION MEASUREMENTS AND PLOTS
SID-IIs (Driver) Dummy
Description

Pre-Test Calibration Sheets
Driver S/N 297

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. 297 Calibration No. 32

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	780	Yes
B	Shoulder Pivot Height	437.0 - 453.0	450	Yes
C	H-Point Height	79.0 - 89.0	84	Yes
D	H-Point from Seat Back	141.0 - 151.0	147	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	103	Yes
F	Thigh Clearance	119.0 - 135.0	129	Yes
G	Head Breadth	140.0 - 148.0	147	Yes
H	Head Back from Backline	40.0 - 46.0	45	Yes
I	Head Depth	178.0 - 188.0	183	Yes
J	Head Circumference	541.0 - 551.0	544	Yes
K	Buttock to Knee Length	514.0 - 540.0	528	Yes
L	Popliteal Height	343.0 - 369.0	353	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	400	Yes
N	Buttock Popliteal Length	416.0 - 442.0	430	Yes
O	Chest Depth without Jacket	195.0 - 211.0	201	Yes
P	Foot Length (right)	216.0 - 232.0	223	Yes
P	Foot Length (left)	216.0 - 232.0	221	Yes
Q	Hip Breadth	313.0 - 323.0	319	Yes
R	Arm Length	249.0 - 259.0	254	Yes
S	Knee Joint to seat Back	478.0 - 493.0	485	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	347	Yes
W	Foot Width (right)	78.0 - 94.0	85	Yes
W	Foot Width (left)	78.0 - 94.0	85	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	879	Yes
Z	Waist Circumference	761.0 - 791.0	780	Yes

Transportation Research Center Inc.

Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/9/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	118.6 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-5.4 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

Condition: Used
Comments:
Head S/N: 1330

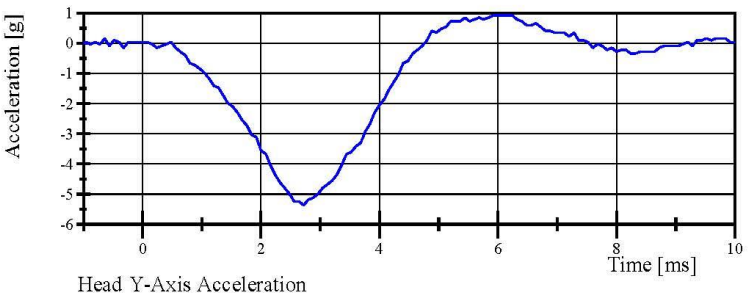
Specification Source: CFR49 Part 572 Subpart V with Polarity in accordance with J211

01.09.2019 12:39 233

Transportation Research Center Inc.

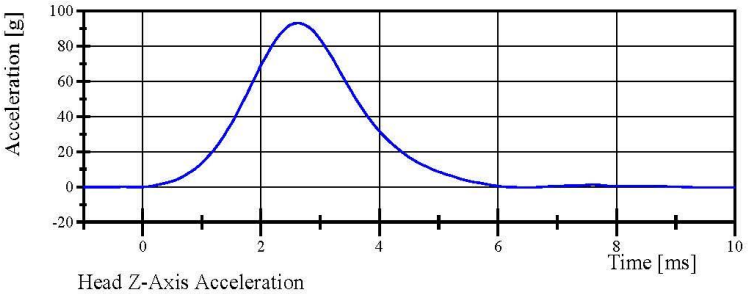
Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/9/2019

Head X-Axis Acceleration



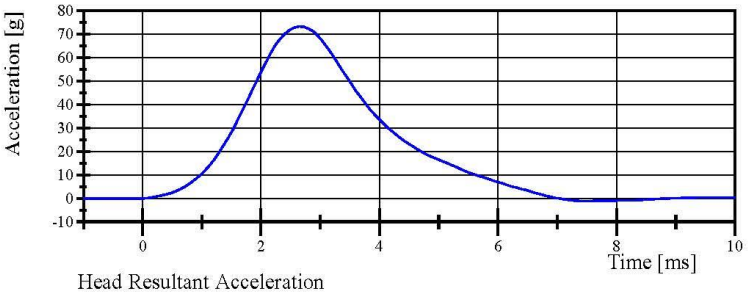
Filter Class: CFC_1000
Max: 0.9 g at 5.9 ms
Min: -5.4 g at 2.7 ms

Head Y-Axis Acceleration



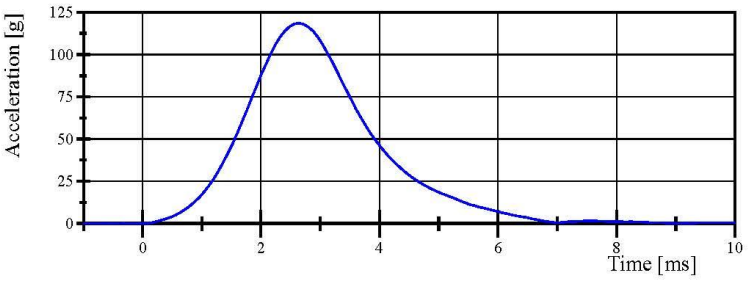
Filter Class: CFC_1000
Max: 93.2 g at 2.6 ms
Min: -0.3 g at 6.4 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 73.2 g at 2.6 ms
Min: -1.2 g at 7.4 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 118.6 g at 2.6 ms
Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

01.09.2019 12:39 233

Transportation Research Center Inc.

Left Lateral Neck
SID IIs Serial No. 297 Certification No. 31-2
Test Date: 1/9/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.626 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.20 - 2.80 m/s	2.448 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.591 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	4.795 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.785 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	5.987 m/s	Yes
Maximum Headform Flexion occurring between 50ms and 70ms.			
Peak	(-71) - (-81) deg	-71.1 deg	Yes
Time of Peak	50 - 70 ms	67.4 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	41.4 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	102 - 126 ms	118.8 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 779

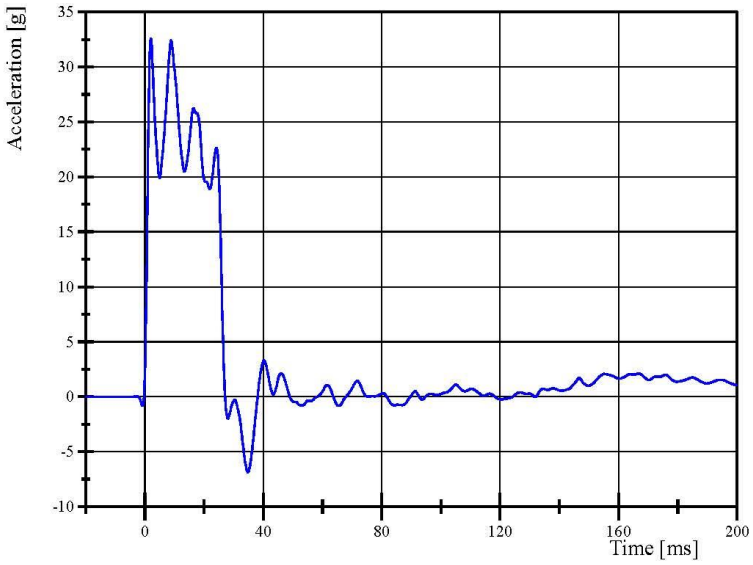
Specification Source: CFR49 Part 572 Subpart V with Polarity in accordance with J211

01.09.2019 15:40 746

Transportation Research Center Inc.

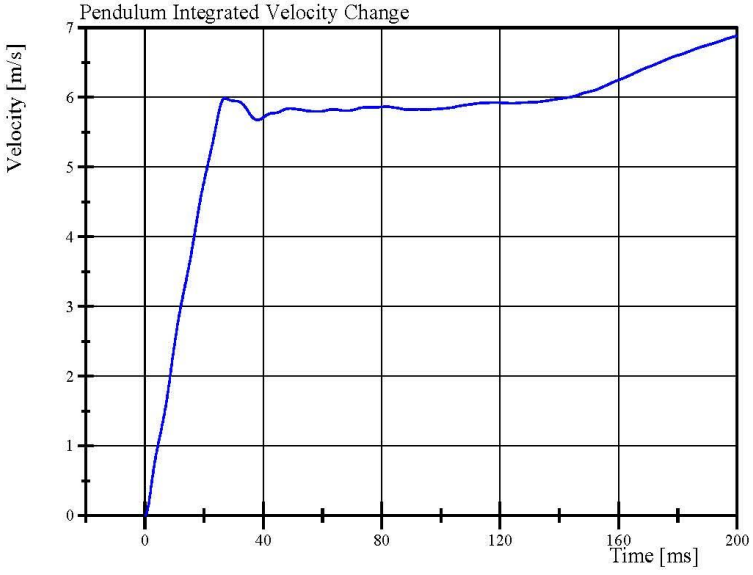
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 31-2
Test Date: 1/9/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 32.6 g at 2.0 ms
Min: -6.9 g at 34.9 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.9 m/s at 200.0 ms
Min: 0.0 m/s at 0.0 ms

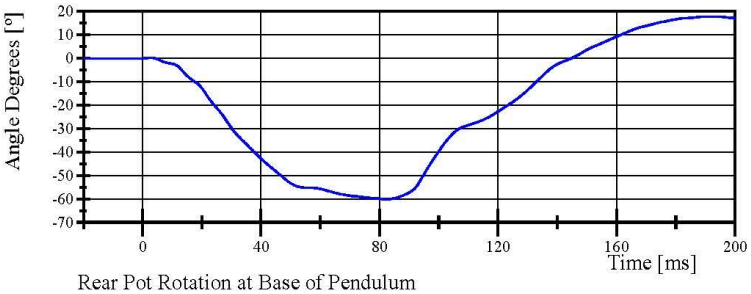
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

01.09.2019 15:40 746

Transportation Research Center Inc.

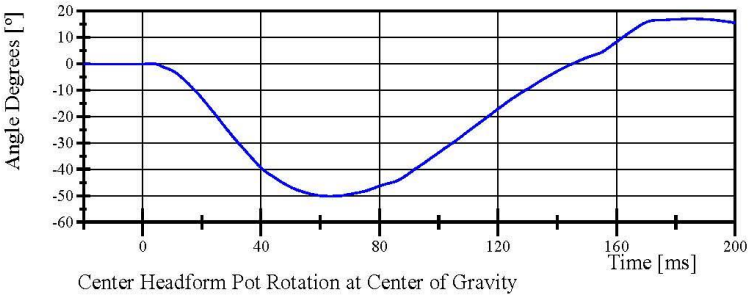
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 31-2
Test Date: 1/9/2019

Forward Pot Rotation at Base of Pendulum



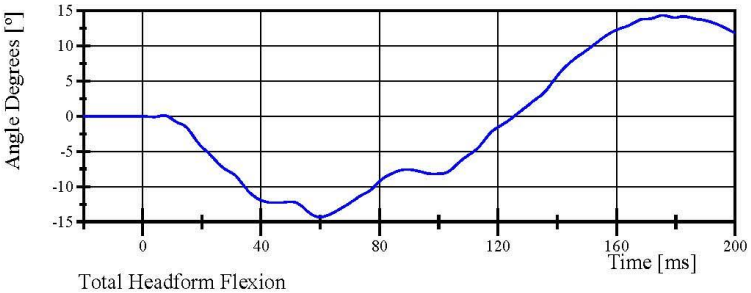
Filter Class: CFC_60
Max: 17.8 ° at 191.4 ms
Min: -60.1 ° at 82.4 ms

Rear Pot Rotation at Base of Pendulum



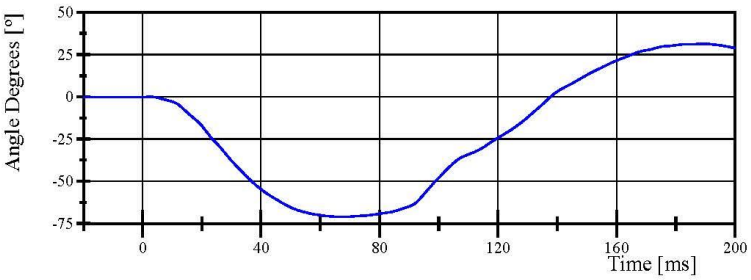
Filter Class: CFC_60
Max: 17.1 ° at 185.4 ms
Min: -50.2 ° at 63.3 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_60
Max: 14.3 ° at 175.6 ms
Min: -14.3 ° at 59.9 ms

Total Headform Flexion



Filter Class: CFC_60
Max: 31.4 ° at 189.4 ms
Min: -71.1 ° at 67.4 ms

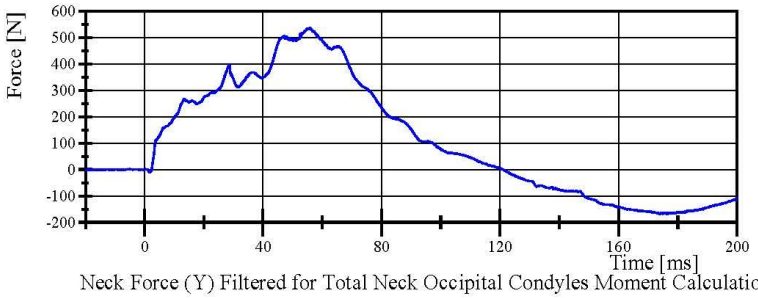
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

01.09.2019 15:40 746

Transportation Research Center Inc.

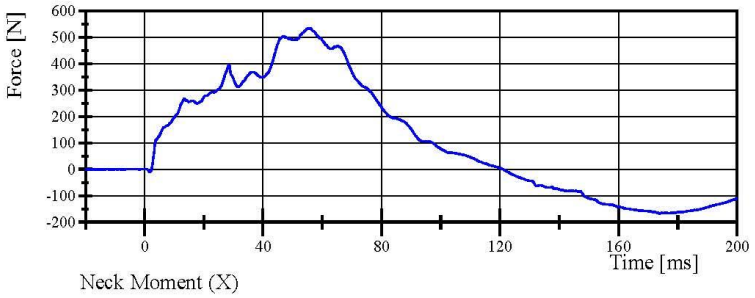
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 31-2
Test Date: 1/9/2019

Neck Force (Y)



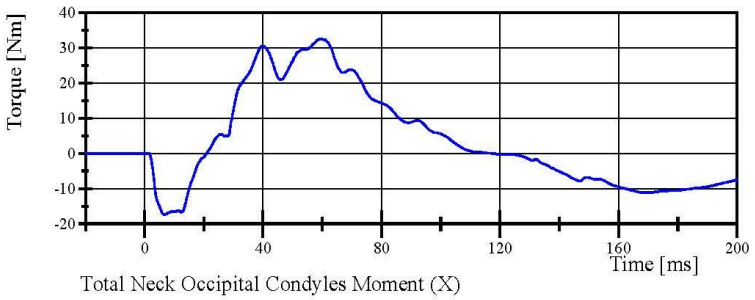
Filter Class: CFC_1000
Max: 536.1 N at 55.8 ms
Min: -168.2 N at 173.9 ms

Neck Force (Y) Filtered for Total Neck Occipital Condyles Moment Calculation



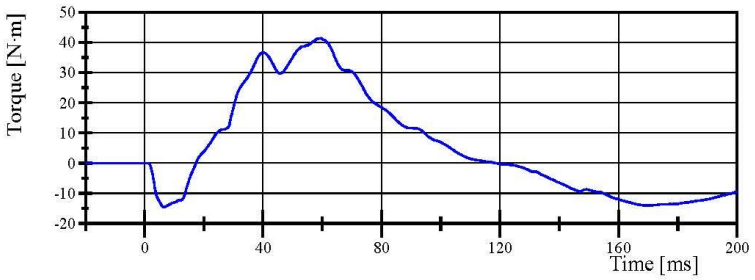
Filter Class: CFC_600
Max: 534.5 N at 55.8 ms
Min: -167.1 N at 173.9 ms

Neck Moment (X)



Filter Class: CFC_600
Max: 32.6 Nm at 59.5 ms
Min: -17.3 Nm at 6.6 ms

Total Neck Occipital Condyles Moment (X)



Filter Class: Without_(Constar
Max: 41.4 N·m at 59.6 ms
Min: -14.4 N·m at 6.6 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

01.09.2019 15:40 746

Transportation Research Center Inc.

Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.29 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-15.7 g	Yes
Shoulder Displacement	28 - 37 mm	30.7 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	19.8 g	Yes

Test meets specifications.

Condition: Used

Comments:
Left Arm S/N: 940L
Shoulder Rib S/N: 180-3355 259

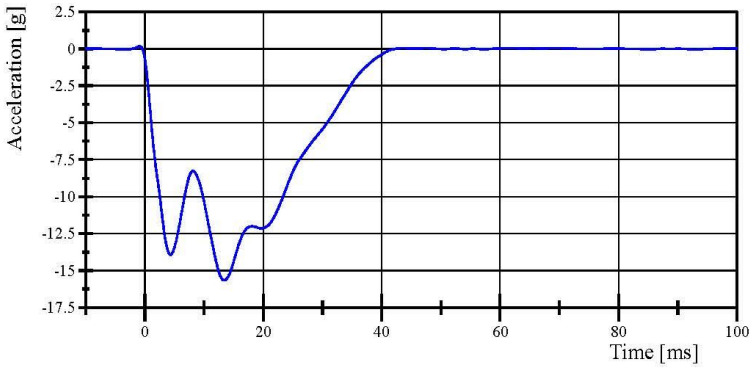
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

01.10.2019 06:37 865

Transportation Research Center Inc.

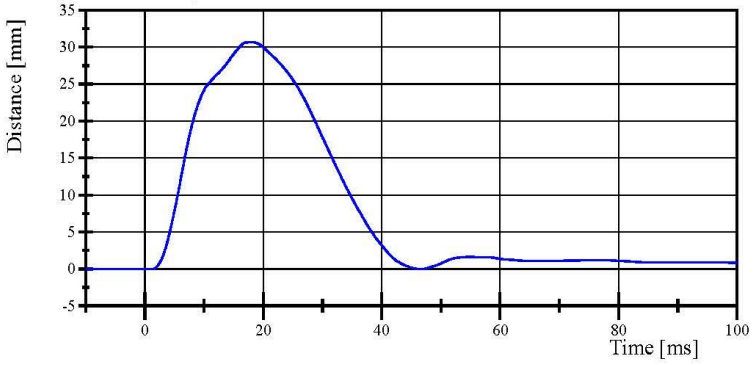
Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Probe Acceleration



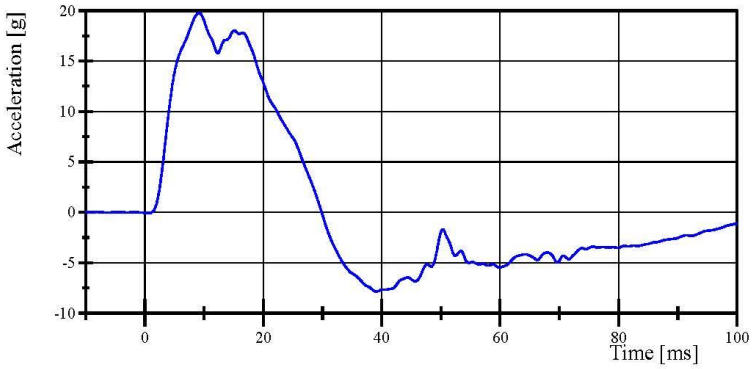
Filter Class: CFC_180
Max: 0.2 g at -0.9 ms
Min: -15.7 g at 13.4 ms

Shoulder Displacement



Filter Class: CFC_600
Max: 30.7 mm at 17.8 ms
Min: -0.0 mm at 1.3 ms

Upper Spine Acceleration (Y)



Filter Class: CFC_180
Max: 19.8 g at 9.1 ms
Min: -7.9 g at 39.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

01.10.2019 06:37 865

Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.750 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-34.8 g	Yes
Shoulder Displacement	31 - 40 mm	35.9 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	27.4 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	31.0 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	33.8 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	38.9 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	36.2 g	Yes

Test meets specifications.

Condition: Used

Comments:
Left Arm S/N: 940L
Upper Thorax Rib #1 S/N: 2009
MiddleThorax Rib #2 S/N: 2010
LowerThorax Rib #3 S/N: 2029

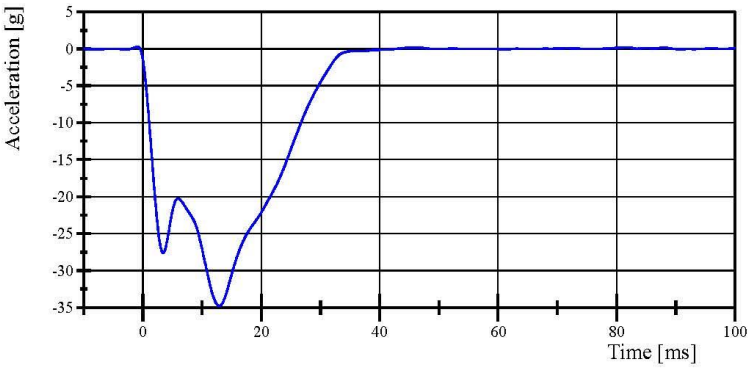
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

01.10.2019 07:36 633

Transportation Research Center Inc.

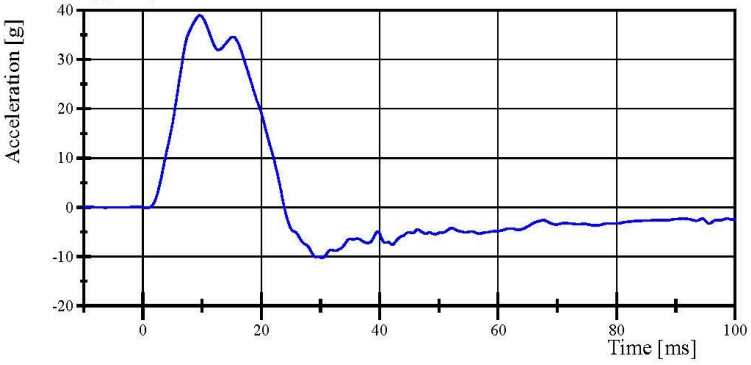
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Probe Acceleration



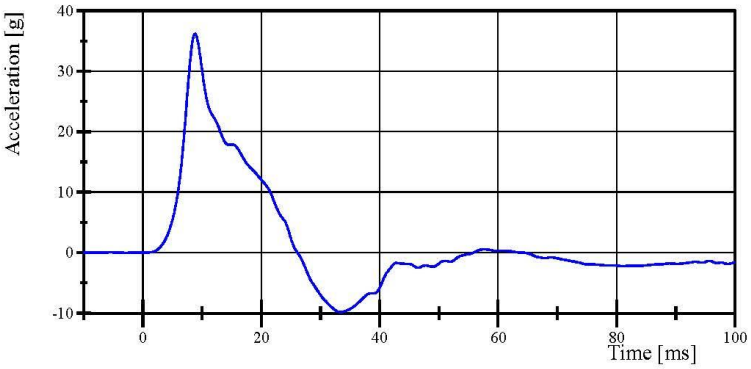
Filter Class: CFC_180
Max: 0.3 g at -1.0 ms
Min: -34.8 g at 12.9 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 38.9 g at 9.6 ms
Min: -10.2 g at 30.3 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 36.2 g at 8.8 ms
Min: -9.8 g at 33.4 ms

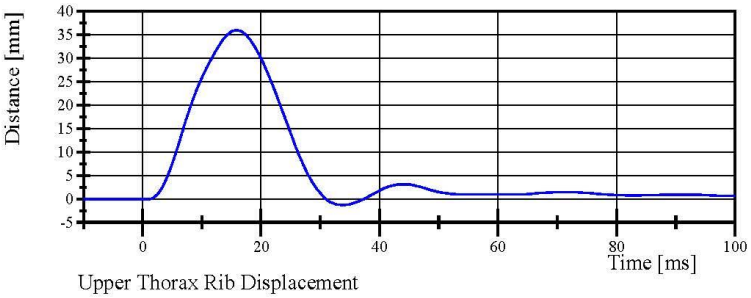
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

01.10.2019 07:36 633

Transportation Research Center Inc.

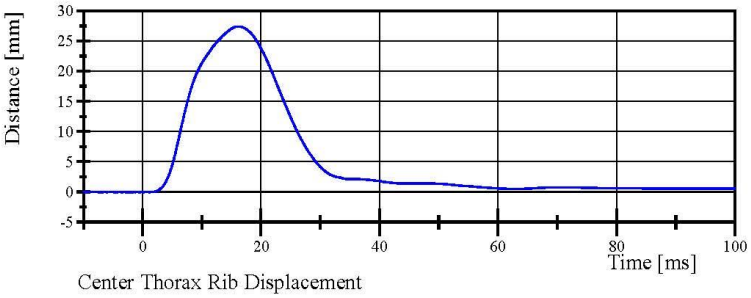
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Shoulder Rib Displacement



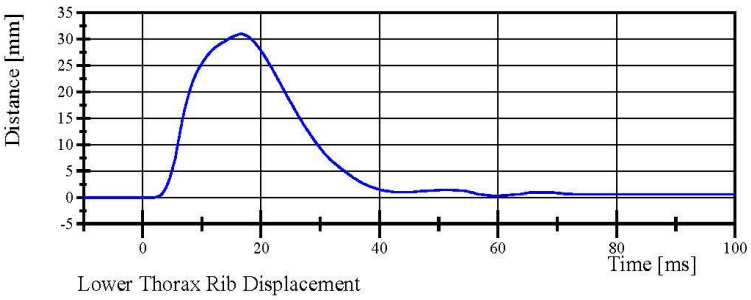
Filter Class: CFC_600
Max: 35.9 mm at 15.9 ms
Min: -1.3 mm at 33.8 ms

Upper Thorax Rib Displacement



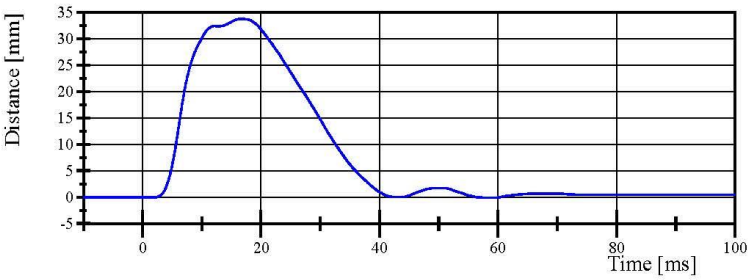
Filter Class: CFC_600
Max: 27.4 mm at 16.2 ms
Min: -0.0 mm at -7.0 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 31.0 mm at 16.6 ms
Min: -0.0 mm at -4.9 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 33.8 mm at 16.9 ms
Min: -0.1 mm at 59.5 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

01.10.2019 07:36 633

Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.335 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-16.0 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	36.9 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	41.3 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	38.7 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	15.0 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	9.6 g	Yes

Test meets specifications.

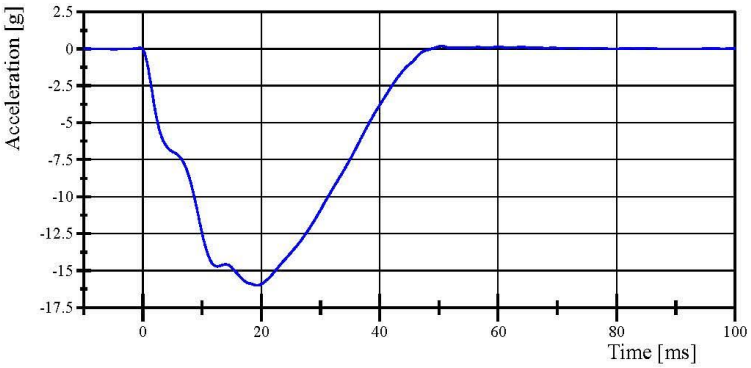
Condition: Used

Comments:
Upper Thorax Rib #1 S/N: 2009
Middle Thorax Rib #2 S/N: 2010
Lower Thorax Rib #3 S/N: 2029

Transportation Research Center Inc.

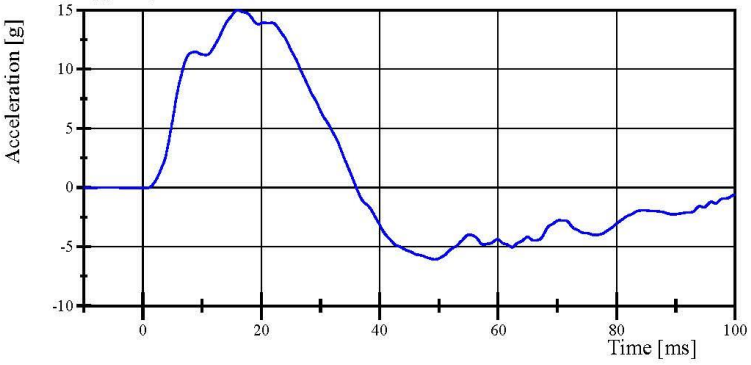
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Probe Acceleration



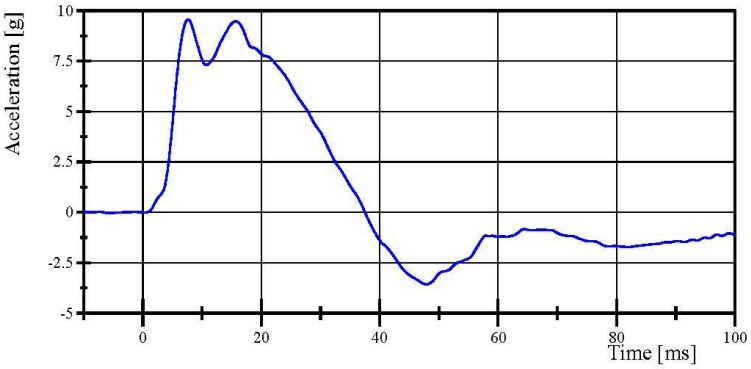
Filter Class: CFC_180
Max: 0.2 g at 50.4 ms
Min: -16.0 g at 19.3 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 15.0 g at 16.0 ms
Min: -6.1 g at 49.3 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 9.6 g at 7.7 ms
Min: -3.6 g at 47.8 ms

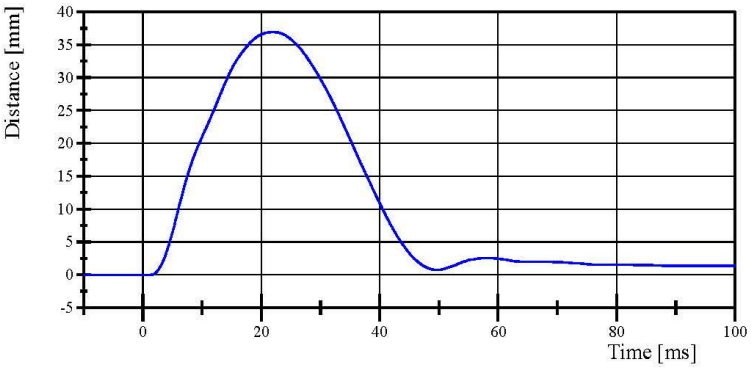
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

01.10.2019 06:59 848

Transportation Research Center Inc.

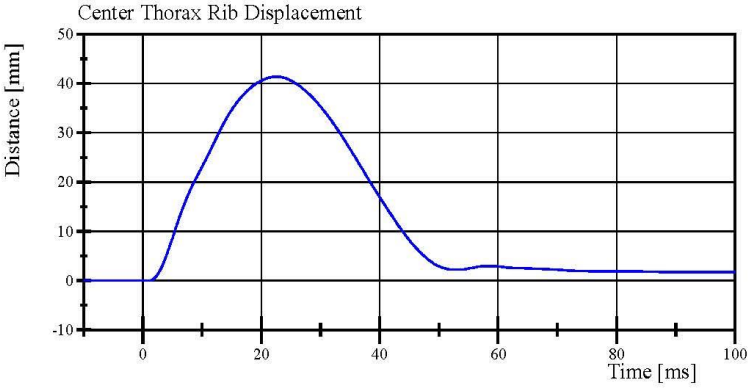
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Upper Thorax Rib Displacement



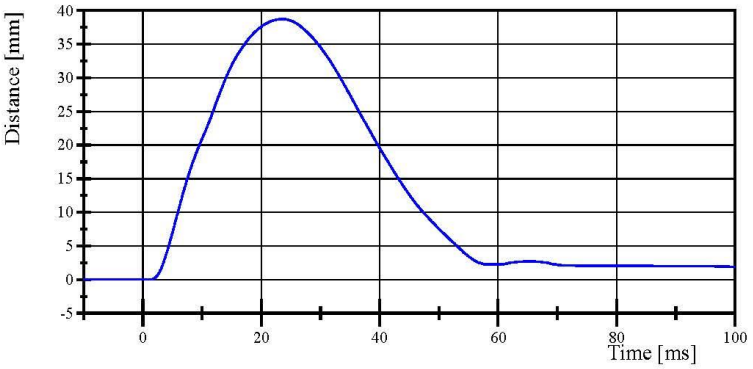
Filter Class: CFC_600
Max: 36.9 mm at 22.0 ms
Min: -0.0 mm at -7.5 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 41.3 mm at 22.7 ms
Min: -0.0 mm at 1.0 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 38.7 mm at 23.3 ms
Min: -0.0 mm at 0.2 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

01.10.2019 06:59 848

Transportation Research Center Inc.

Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.26 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-14.1 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	37.9 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	39.3 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	10.84 g	Yes

Test meets specifications.

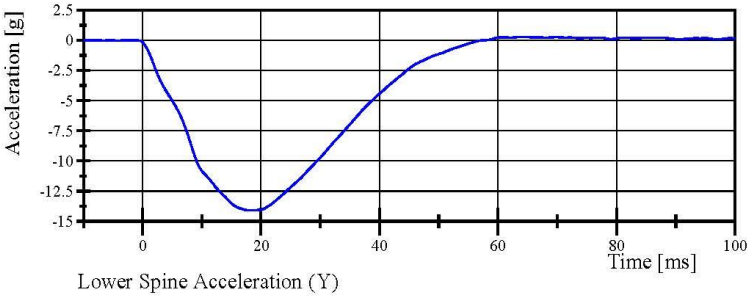
Condition: Used

Comments:
Upper Abdominal Rib S/N: 1747
Lower Abdominal Rib S/N: 1748

Transportation Research Center Inc.

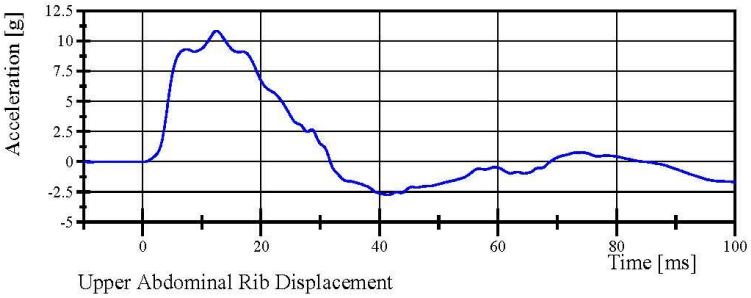
Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Probe Acceleration



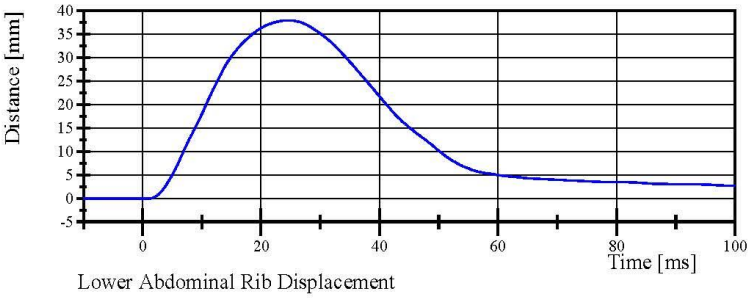
Filter Class: CFC_180
Max: 0.3 g at 64.3 ms
Min: -14.1 g at 18.4 ms

Lower Spine Acceleration (Y)



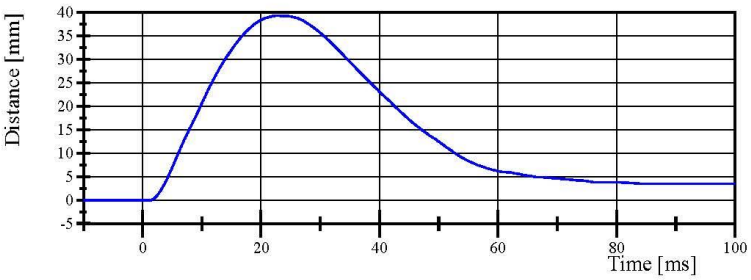
Filter Class: CFC_180
Max: 10.8 g at 12.5 ms
Min: -2.7 g at 41.4 ms

Upper Abdominal Rib Displacement



Filter Class: CFC_600
Max: 37.9 mm at 24.4 ms
Min: -0.0 mm at 1.1 ms

Lower Abdominal Rib Displacement



Filter Class: CFC_600
Max: 39.3 mm at 22.6 ms
Min: -0.0 mm at 1.2 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

01.10.2019 06:48 703

Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 32-3
Test Date: 2/15/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.63 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-43.63 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	40.0 g	Yes
Acetabulum Force	3,600 - 4,300 N	3,768.8 N	Yes

Test meets specifications.

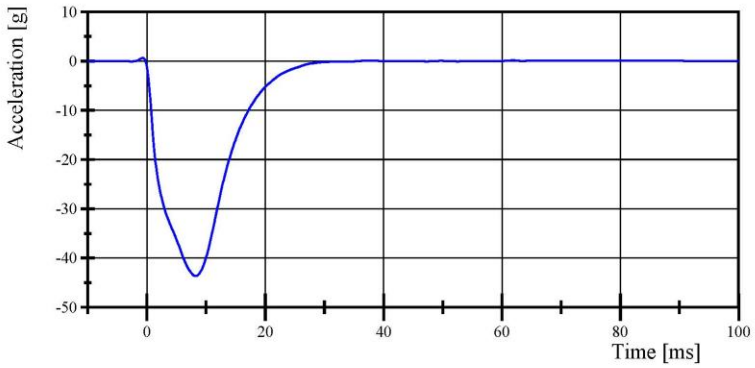
Condition: New

Comments:
Pelvis Skin S/N: 1141
Pelvis Plug Info:
Manufacturer: Saco
S/N: 11718
Cal Date: 20160327

Transportation Research Center Inc.

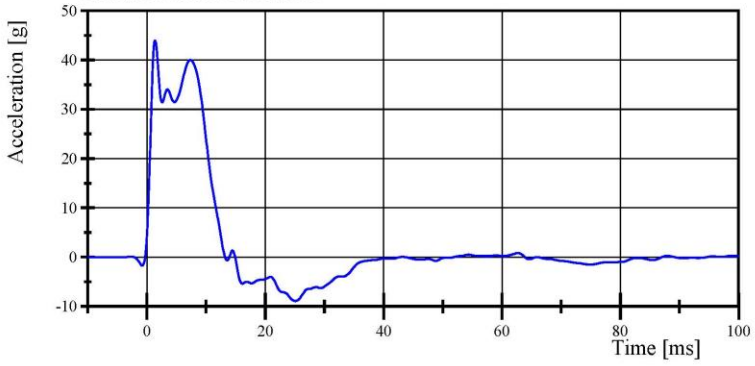
Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 32-3
Test Date: 2/15/2019

Probe Acceleration



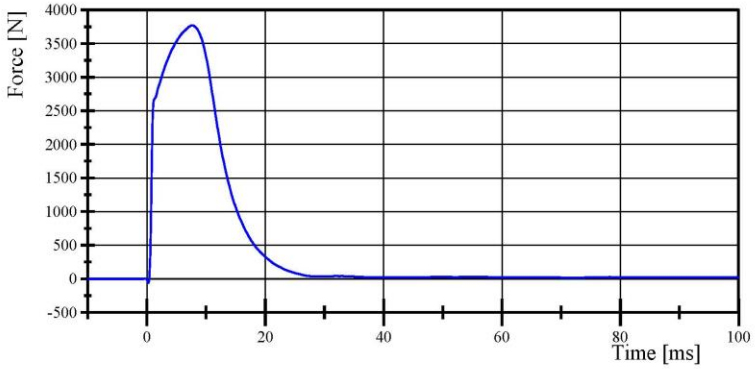
Filter Class: CFC_180
Max: 0.6 g at -0.7 ms
Min: -43.6 g at 8.2 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 44.0 g at 1.4 ms
Min: -8.9 g at 25.0 ms

Acetabulum Y-Axis Force



Filter Class: CFC_600
Max: 3,768.8 N at 7.7 ms
Min: -59.8 N at 0.2 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.15.2019 18:17:45 456

Transportation Research Center Inc.

Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 32-12
Test Date: 2/15/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.39 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-42.7 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	36.9 g	Yes
Iliac Force	4,100 - 5,100 N	4,784.8 N	Yes

Test meets specifications.

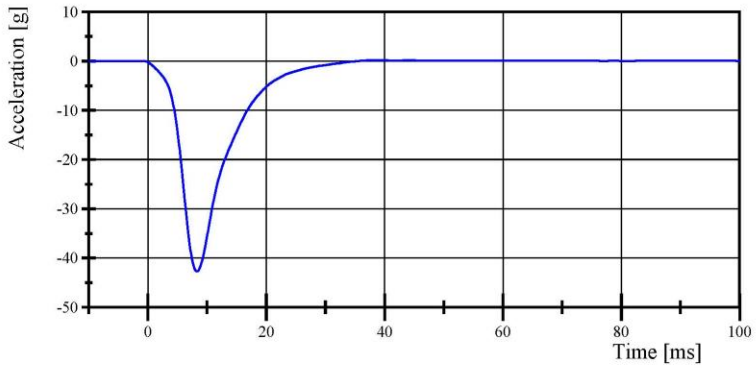
Condition: New

Comments:
Pelvis Skin S/N: 1141

Transportation Research Center Inc.

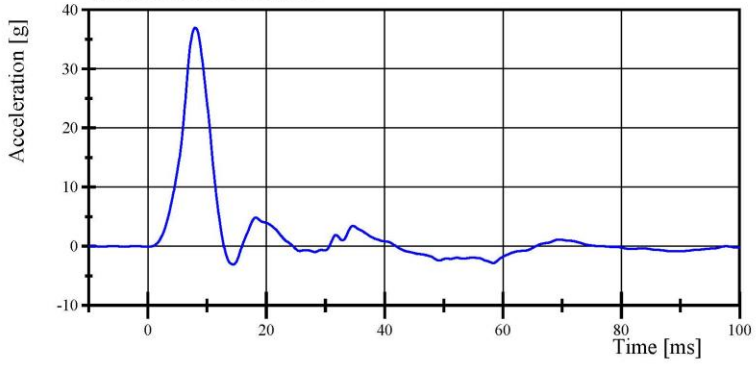
Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 32-12
Test Date: 2/15/2019

Probe Acceleration



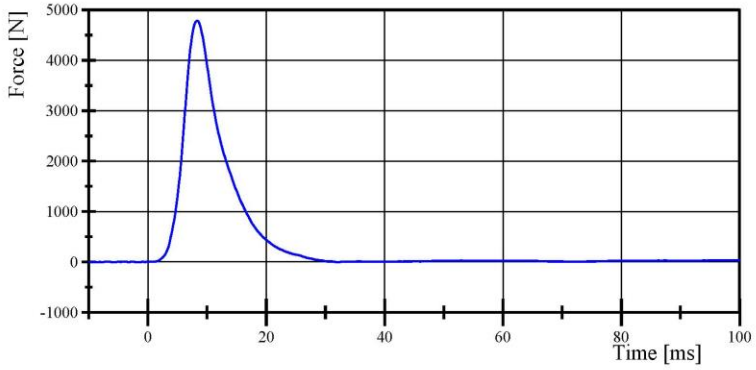
Filter Class: CFC_180
Max: 0.2 g at 38.3 ms
Min: -42.7 g at 8.3 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 36.9 g at 8.0 ms
Min: -3.1 g at 14.4 ms

Iliac Y-Axis Force



Filter Class: CFC_600
Max: 4,784.8 N at 8.3 ms
Min: -2.0 N at 32.1 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.15.2019 18:10:04 632

Post-Test Calibration Sheets
Driver S/N 297

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. 297 Calibration No. 33

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	781	Yes
B	Shoulder Pivot Height	437.0 - 453.0	450	Yes
C	H-Point Height	79.0 - 89.0	84	Yes
D	H-Point from Seat Back	141.0 - 151.0	147	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	103	Yes
F	Thigh Clearance	119.0 - 135.0	129	Yes
G	Head Breadth	140.0 - 148.0	147	Yes
H	Head Back from Backline	40.0 - 46.0	45	Yes
I	Head Depth	178.0 - 188.0	183	Yes
J	Head Circumference	541.0 - 551.0	544	Yes
K	Buttock to Knee Length	514.0 - 540.0	528	Yes
L	Popliteal Height	343.0 - 369.0	353	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	400	Yes
N	Buttock Popliteal Length	416.0 - 442.0	430	Yes
O	Chest Depth without Jacket	195.0 - 211.0	201	Yes
P	Foot Length (right)	216.0 - 232.0	223	Yes
P	Foot Length (left)	216.0 - 232.0	221	Yes
Q	Hip Breadth	313.0 - 323.0	320	Yes
R	Arm Length	249.0 - 259.0	254	Yes
S	Knee Joint to seat Back	478.0 - 493.0	485	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	347	Yes
W	Foot Width (right)	78.0 - 94.0	85	Yes
W	Foot Width (left)	78.0 - 94.0	85	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	879	Yes
Z	Waist Circumference	761.0 - 791.0	780	Yes

Transportation Research Center Inc.

Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	117.1 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	1.6 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

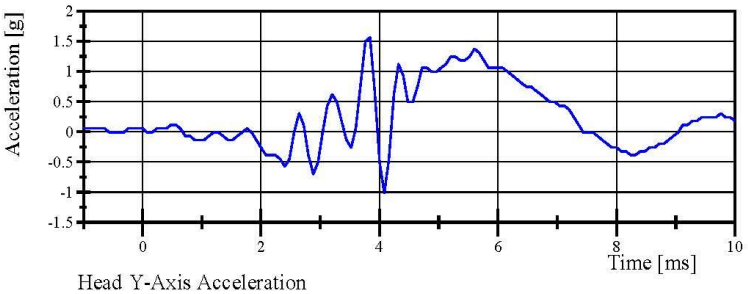
Condition: Used

Comments:
Head S/N: 1330

Transportation Research Center Inc.

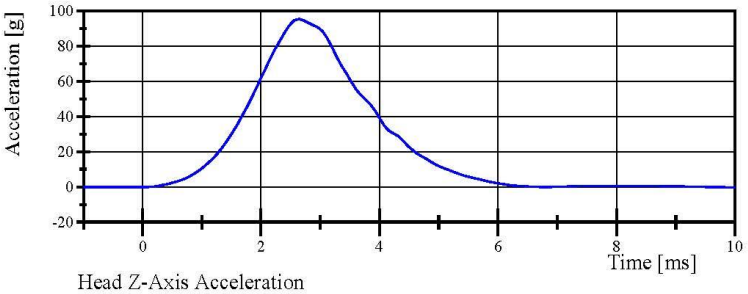
Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Head X-Axis Acceleration



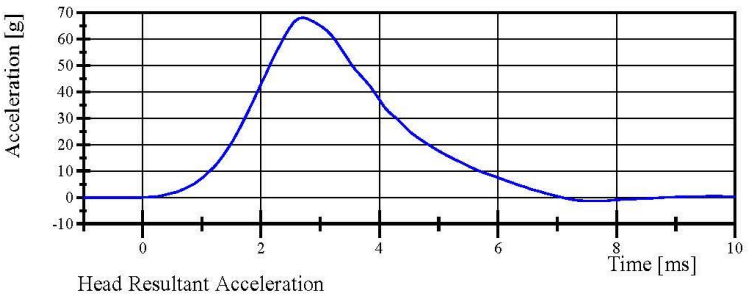
Filter Class: CFC_1000
Max: 1.6 g at 3.8 ms
Min: -1.0 g at 4.1 ms

Head Y-Axis Acceleration



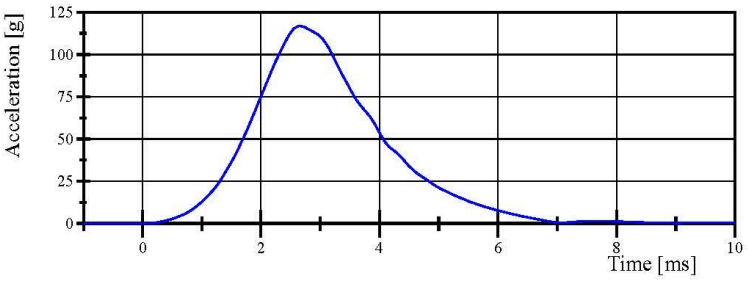
Filter Class: CFC_1000
Max: 95.5 g at 2.6 ms
Min: -0.2 g at 9.8 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 68.1 g at 2.7 ms
Min: -1.3 g at 7.5 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 117.1 g at 2.6 ms
Min: 0.0 g at -0.6 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 13:14:22 197

Transportation Research Center Inc.

Left Lateral Neck
SID IIs Serial No. 297 Certification No. 33-2
Test Date: 2/21/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.607 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.20 - 2.80 m/s	2.559 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.719 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	5.023 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.958 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	6.015 m/s	Yes
Maximum Headform Flexion occurring between 50ms and 70ms.			
Peak	(-71) - (-81) deg	-72.8 deg	Yes
Time of Peak	50 - 70 ms	67.5 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	42.1 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	102 - 126 ms	124.4 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 779

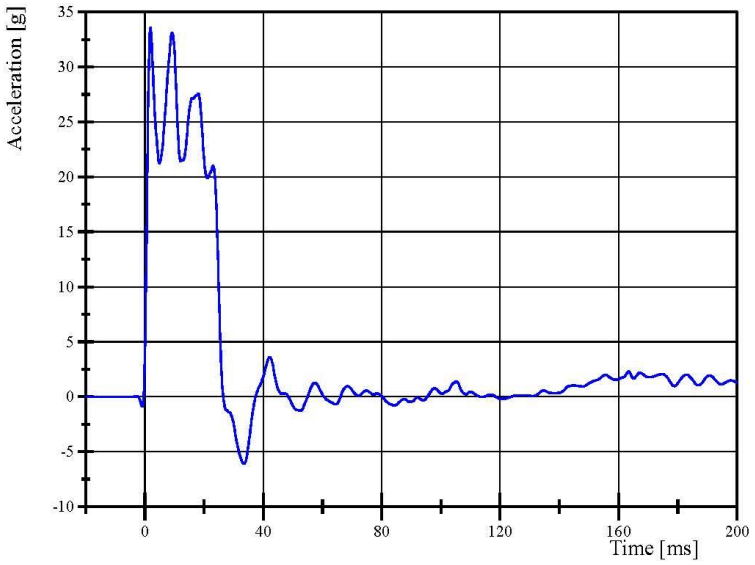
Specification Source: CFR49 Part 572 Subpart V with Polarity in accordance with J211

02.21.2019 16:09:46 717

Transportation Research Center Inc.

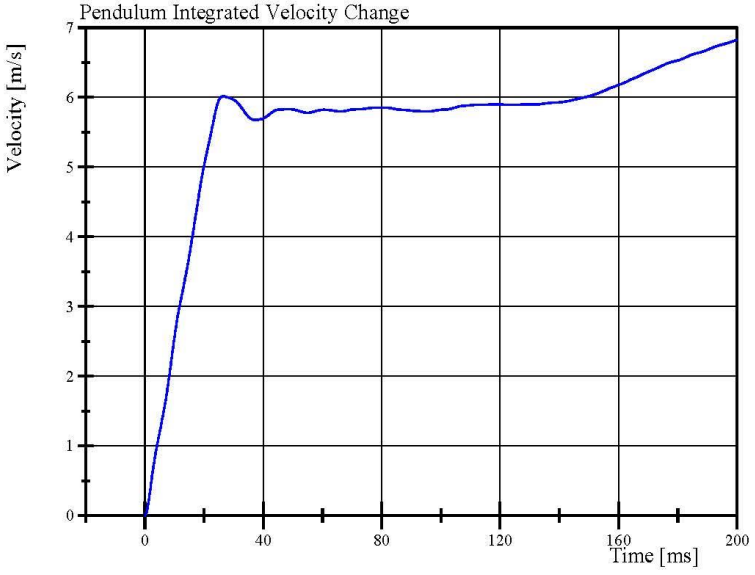
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 33-2
Test Date: 2/21/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 33.6 g at 1.9 ms
Min: -6.1 g at 33.4 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.8 m/s at 200.0 ms
Min: 0.0 m/s at 0.0 ms

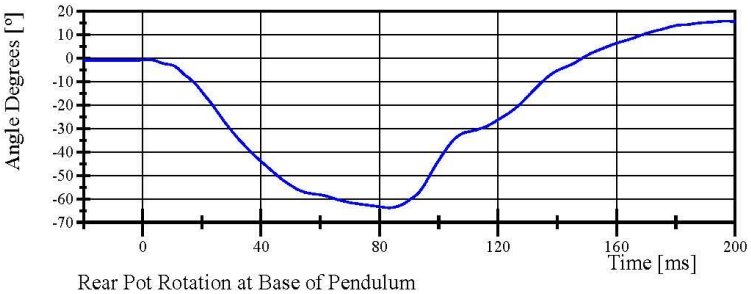
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 16:11:04 717

Transportation Research Center Inc.

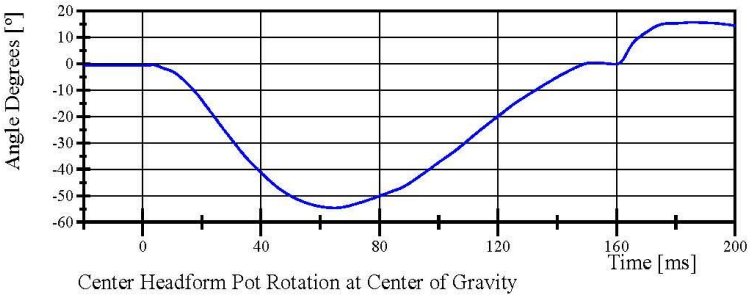
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 33-2
Test Date: 2/21/2019

Forward Pot Rotation at Base of Pendulum



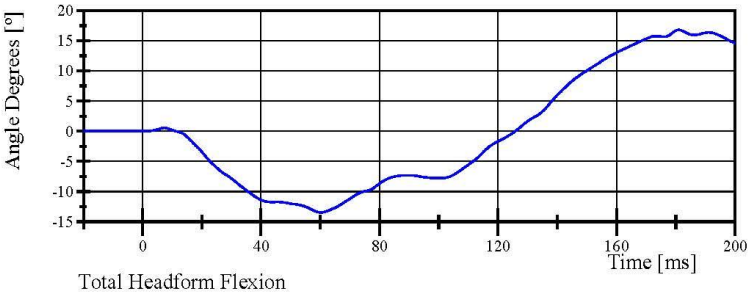
Filter Class: CFC_60
Max: 15.8 ° at 196.7 ms
Min: -63.7 ° at 83.3 ms

Rear Pot Rotation at Base of Pendulum



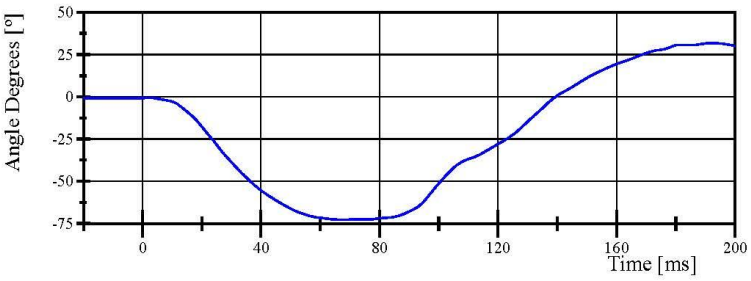
Filter Class: CFC_60
Max: 15.7 ° at 185.4 ms
Min: -54.5 ° at 64.8 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_60
Max: 16.8 ° at 181.0 ms
Min: -13.4 ° at 60.1 ms

Total Headform Flexion



Filter Class: CFC_60
Max: 31.7 ° at 191.8 ms
Min: -72.8 ° at 67.5 ms

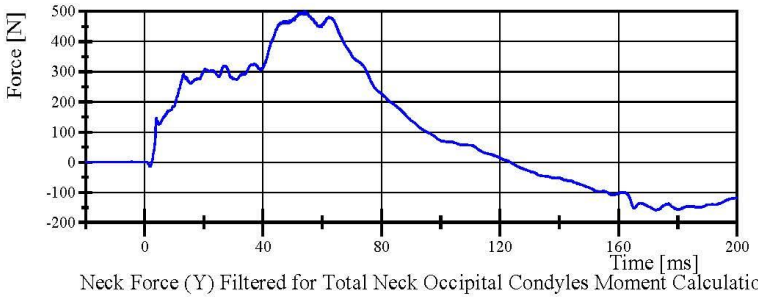
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 16:11:05 717

Transportation Research Center Inc.

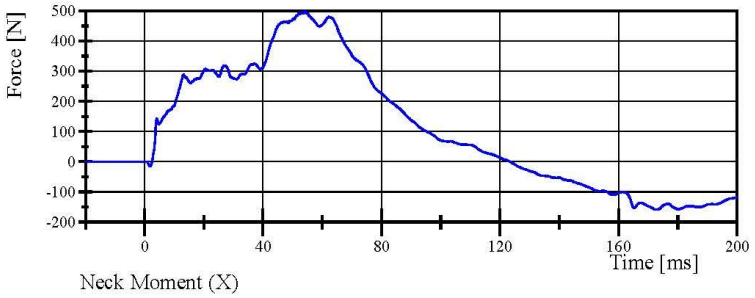
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 33-2
Test Date: 2/21/2019

Neck Force (Y)



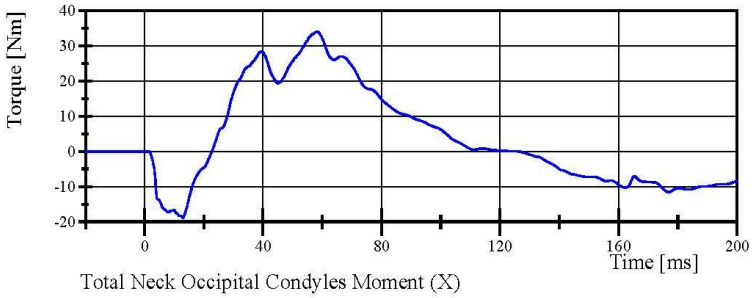
Filter Class: CFC_1000
Max: 500.1 N at 54.2 ms
Min: -159.4 N at 172.6 ms

Neck Force (Y) Filtered for Total Neck Occipital Condyles Moment Calculation



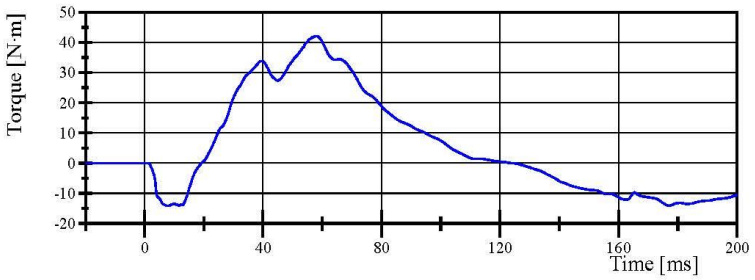
Filter Class: CFC_600
Max: 498.5 N at 54.1 ms
Min: -158.9 N at 172.6 ms

Neck Moment (X)



Filter Class: CFC_600
Max: 34.1 Nm at 58.3 ms
Min: -18.8 Nm at 13.0 ms

Total Neck Occipital Condyles Moment (X)



Filter Class: Without_(Constar
Max: 42.1 N·m at 58.2 ms
Min: -14.2 N·m at 8.1 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 16:11:06 717

Transportation Research Center Inc.

Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.27 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-15.0 g	Yes
Shoulder Displacement	28 - 37 mm	29.9 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	19.7 g	Yes

Test meets specifications.

Condition: Used

Comments:
Left Arm S/N: 940L
Shoulder Rib S/N: 180-3355 259

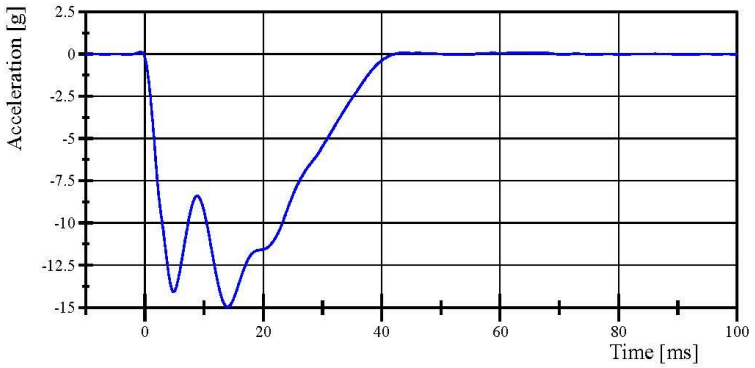
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 09:34:26 815

Transportation Research Center Inc.

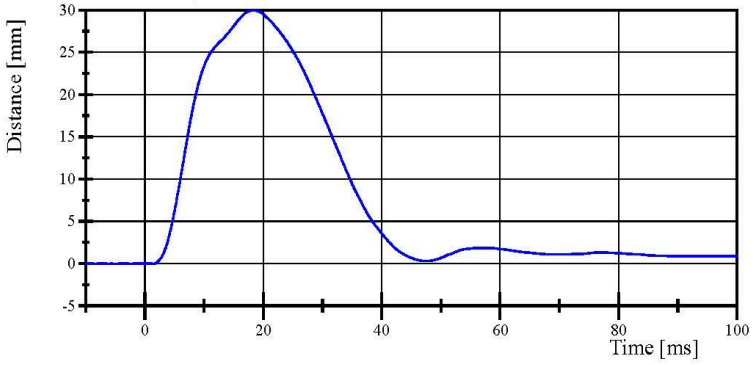
Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Probe Acceleration



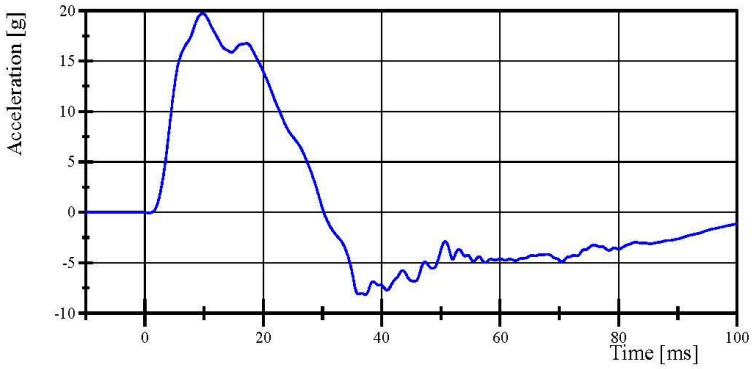
Filter Class: CFC_180
Max: 0.1 g at -0.7 ms
Min: -15.0 g at 13.9 ms

Shoulder Displacement



Filter Class: CFC_600
Max: 29.9 mm at 18.3 ms
Min: -0.0 mm at 1.5 ms

Upper Spine Acceleration (Y)



Filter Class: CFC_180
Max: 19.7 g at 9.8 ms
Min: -8.2 g at 37.2 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 09:35:01 815

Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.737 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-34.4 g	Yes
Shoulder Displacement	31 - 40 mm	35.1 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	27.4 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	31.0 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	34.1 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	38.9 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	35.0 g	Yes

Test meets specifications.

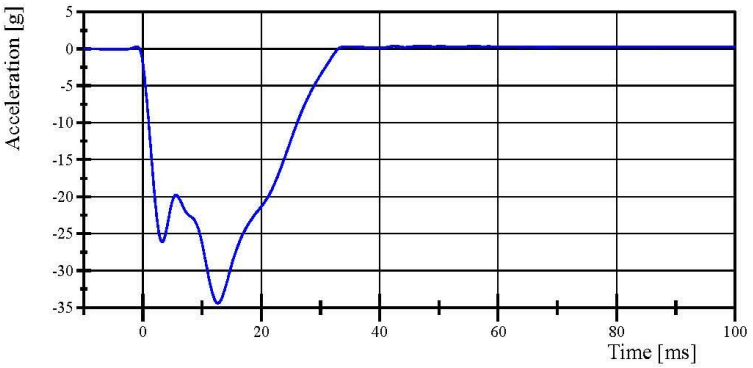
Condition: Used

Comments:
Left Arm S/N: 940L
Upper Thorax Rib #1 S/N: 2009
MiddleThorax Rib #2 S/N: 2010
LowerThorax Rib #3 S/N: 2029

Transportation Research Center Inc.

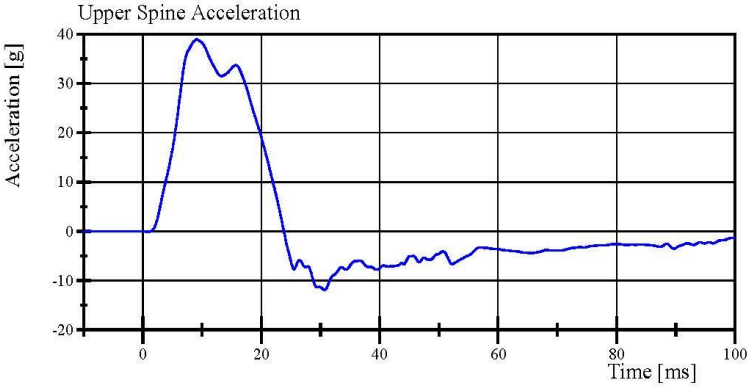
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Probe Acceleration



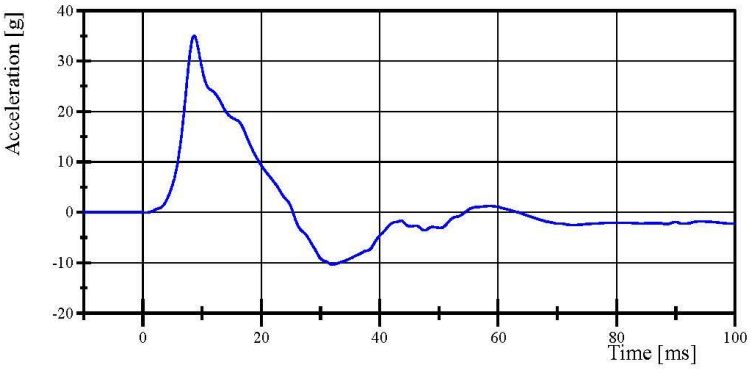
Filter Class: CFC_180
Max: 0.4 g at 42.4 ms
Min: -34.4 g at 12.6 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 38.9 g at 9.1 ms
Min: -11.9 g at 30.7 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 35.0 g at 8.6 ms
Min: -10.4 g at 32.0 ms

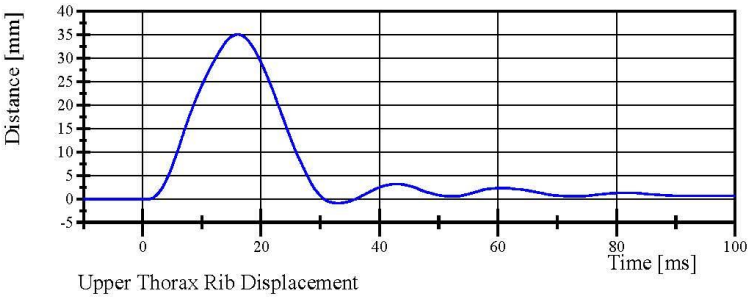
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 10:47:21 631

Transportation Research Center Inc.

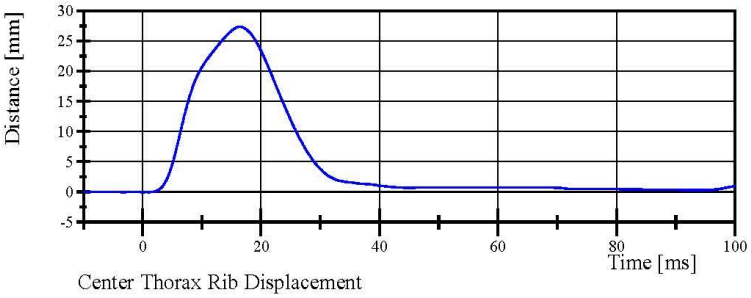
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Shoulder Rib Displacement



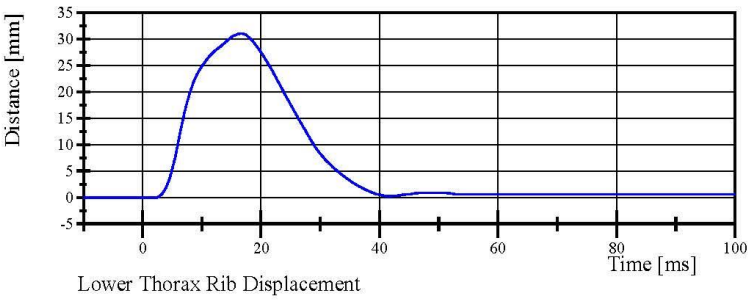
Filter Class: CFC_600
Max: 35.1 mm at 16.1 ms
Min: -0.8 mm at 32.9 ms

Upper Thorax Rib Displacement



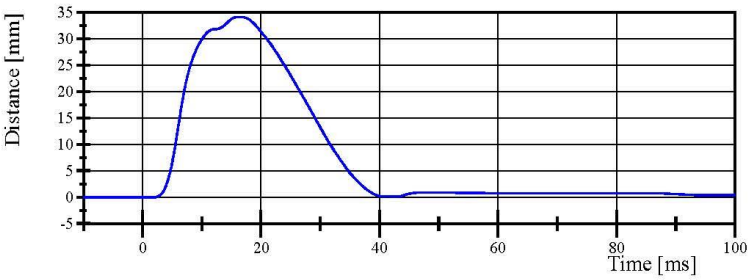
Filter Class: CFC_600
Max: 27.4 mm at 16.4 ms
Min: -0.0 mm at -3.3 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 31.0 mm at 16.6 ms
Min: -0.0 mm at 2.2 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 34.1 mm at 16.6 ms
Min: -0.0 mm at 2.1 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 10:47:22 631

Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.335 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-15.9 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	35.8 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	40.4 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	38.2 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	14.9 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	9.6 g	Yes

Test meets specifications.

Condition: Used

Comments:
Upper Thorax Rib #1 S/N: 2009
Middle Thorax Rib #2 S/N: 2010
Lower Thorax Rib #3 S/N: 2029

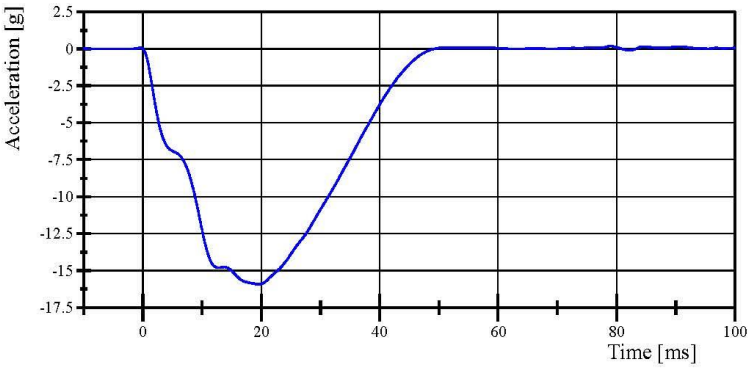
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 09:59:51 824

Transportation Research Center Inc.

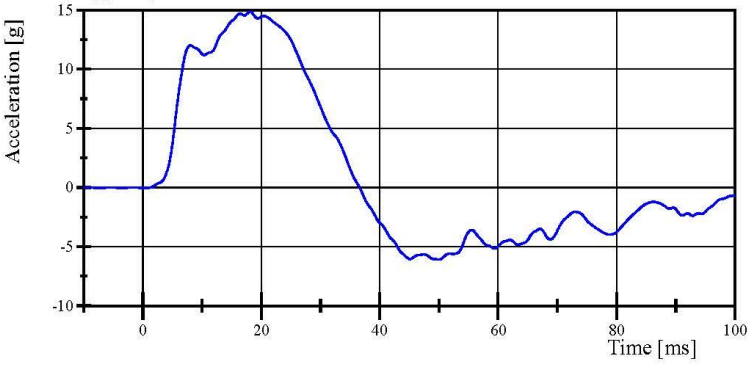
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Probe Acceleration



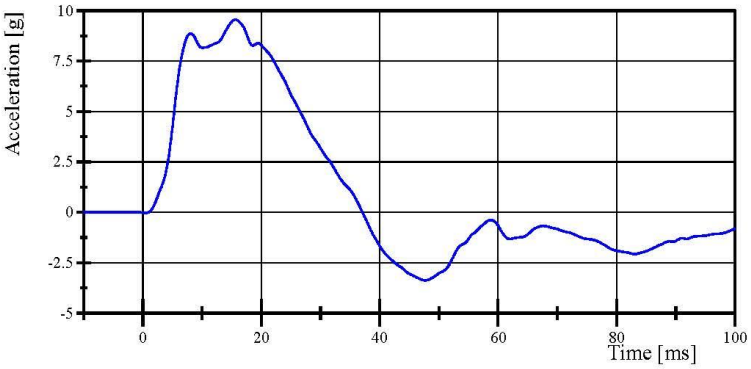
Filter Class: CFC_180
Max: 0.2 g at 79.0 ms
Min: -15.9 g at 19.5 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 14.9 g at 18.1 ms
Min: -6.1 g at 50.1 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 9.6 g at 15.6 ms
Min: -3.4 g at 47.7 ms

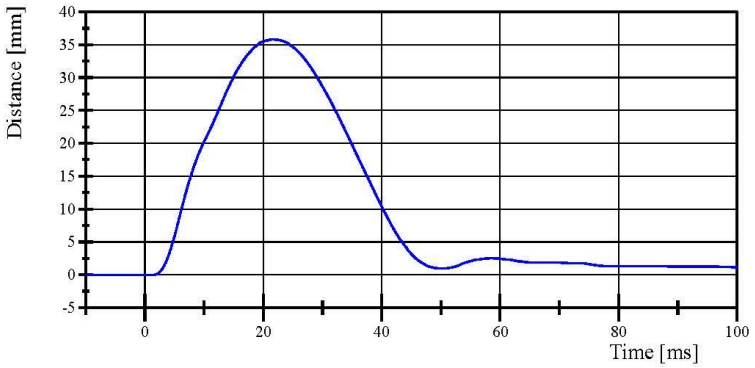
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 10:00:36 824

Transportation Research Center Inc.

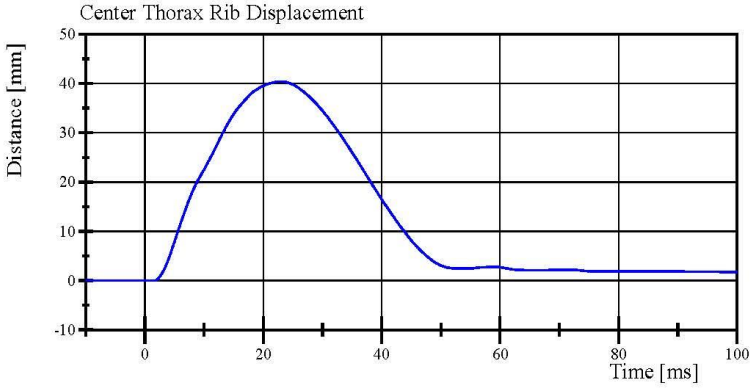
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Upper Thorax Rib Displacement



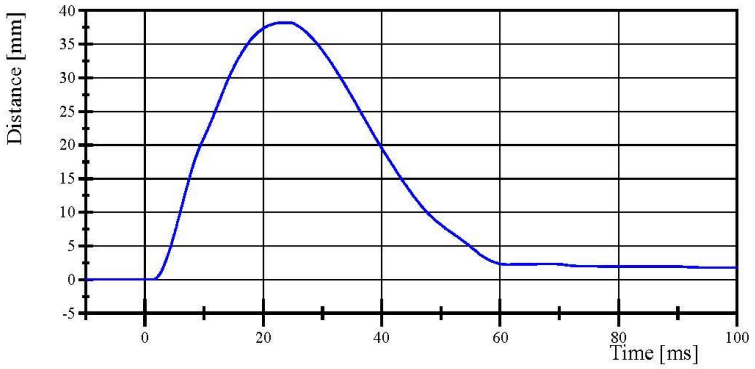
Filter Class: CFC_600
Max: 35.8 mm at 21.7 ms
Min: -0.0 mm at 1.4 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 40.4 mm at 22.7 ms
Min: -0.0 mm at 1.6 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 38.2 mm at 23.5 ms
Min: -0.0 mm at 1.3 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 10:00:37 824

Transportation Research Center Inc.

Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.33 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-14.4 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	39.2 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	37.7 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	11.26 g	Yes

Test meets specifications.

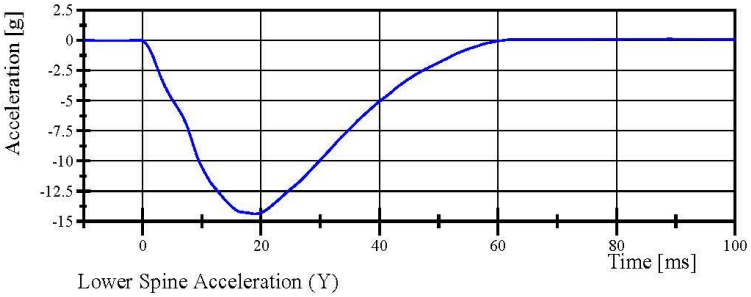
Condition: Used

Comments:
Upper Abdominal Rib S/N: 1747
Lower Abdominal Rib S/N: 1748

Transportation Research Center Inc.

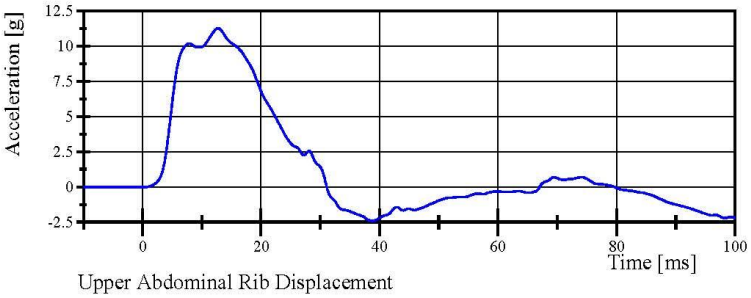
Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Probe Acceleration



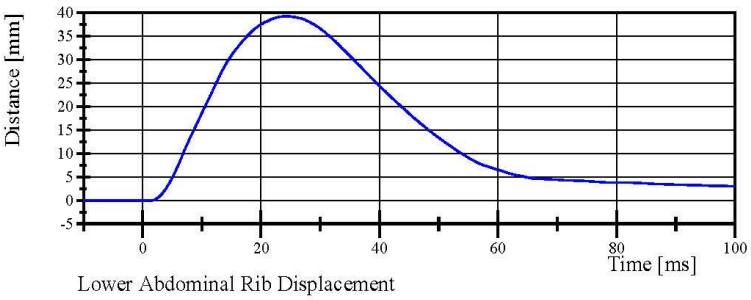
Filter Class: CFC_180
Max: 0.1 g at 88.9 ms
Min: -14.4 g at 19.0 ms

Lower Spine Acceleration (Y)



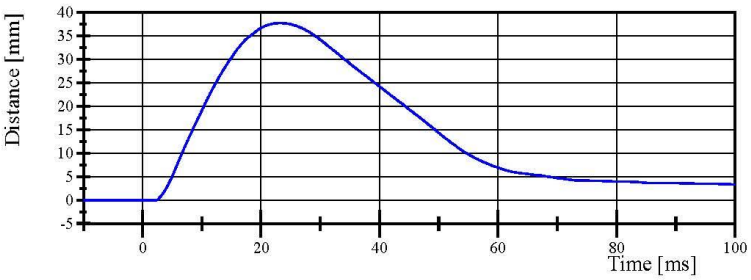
Filter Class: CFC_180
Max: 11.3 g at 12.7 ms
Min: -2.4 g at 38.7 ms

Upper Abdominal Rib Displacement



Filter Class: CFC_600
Max: 39.2 mm at 24.2 ms
Min: -0.0 mm at 1.4 ms

Lower Abdominal Rib Displacement



Filter Class: CFC_600
Max: 37.7 mm at 23.1 ms
Min: -0.0 mm at 2.2 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 09:47:47 603

Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.63 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-44.89 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	39.6 g	Yes
Acetabulum Force	3,600 - 4,300 N	4,251.3 N	Yes

Test meets specifications.

Condition: Used

Comments:
Pelvis Skin S/N: 1141
Pelvis Plug Info:
Manufacturer: Saco
S/N: 12324
Cal Date: 20180321

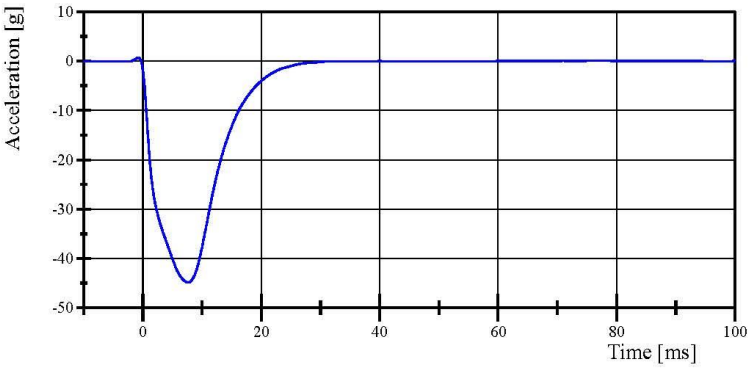
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 09:06:23 419

Transportation Research Center Inc.

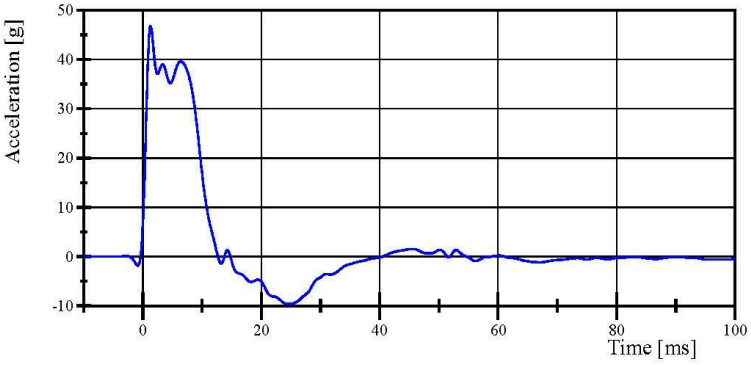
Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 33-1
Test Date: 2/21/2019

Probe Acceleration



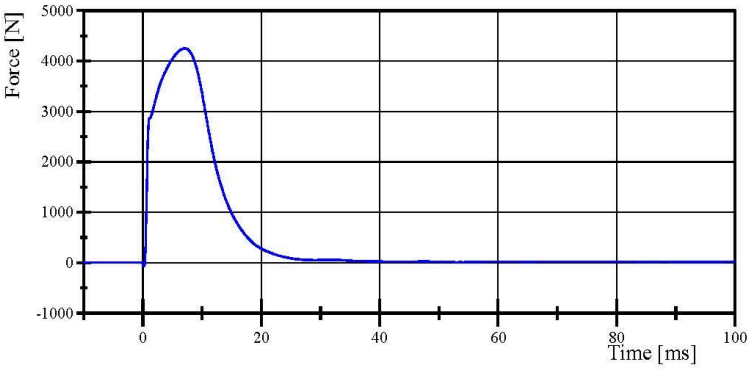
Filter Class: CFC_180
Max: 0.7 g at -0.8 ms
Min: -44.9 g at 7.6 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 46.8 g at 1.3 ms
Min: -9.6 g at 24.6 ms

Acetabulum Y-Axis Force



Filter Class: CFC_600
Max: 4,251.3 N at 7.1 ms
Min: -69.5 N at 0.2 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 09:10:16 419

Transportation Research Center Inc.

Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 33-2
Test Date: 2/21/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.24 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-43.8 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	36.5 g	Yes
Iliac Force	4,100 - 5,100 N	5,042.2 N	Yes

Test meets specifications.

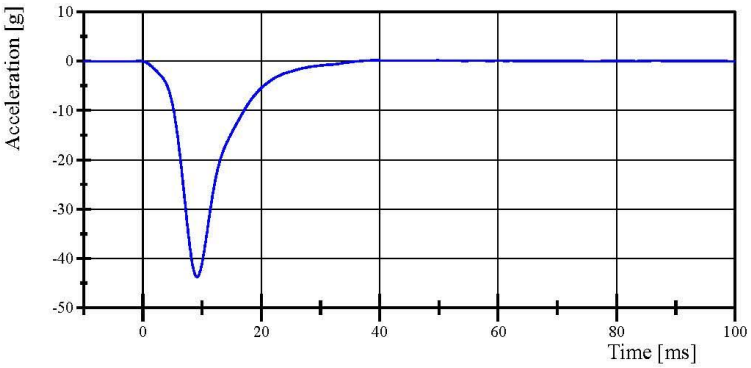
Condition: Used

Comments:
Pelvis Skin S/N: 1141

Transportation Research Center Inc.

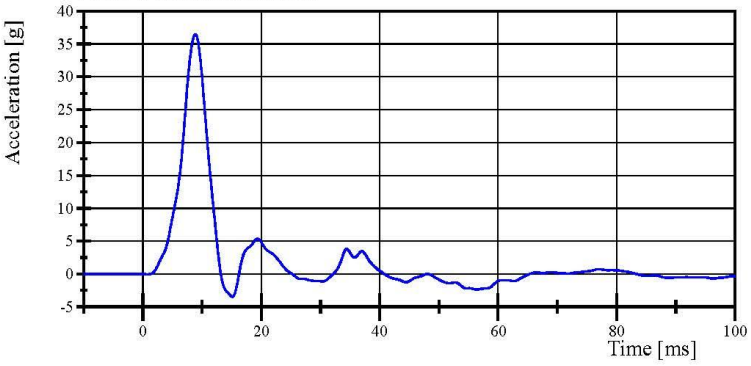
Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 33-2
Test Date: 2/21/2019

Probe Acceleration



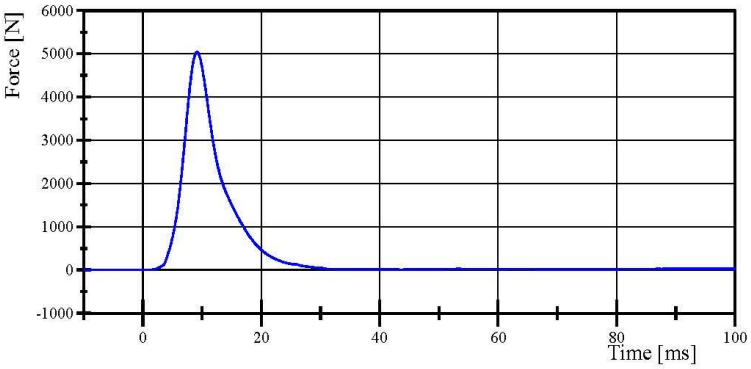
Filter Class: CFC_180
Max: 0.2 g at 39.4 ms
Min: -43.8 g at 9.1 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 36.5 g at 8.9 ms
Min: -3.5 g at 15.1 ms

Iliac Y-Axis Force



Filter Class: CFC_600
Max: 5,042.2 N at 9.1 ms
Min: -1.1 N at -9.4 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

02.21.2019 14:24:00 664

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 297		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers			X	P93539	Endevco	3-Dec-2018
			Y	P93549	Endevco	3-Dec-2018
			Z	P93776	Endevco	3-Dec-2018
Displacement Potentiometers	Shoulder		Y	N/A	N/A	N/A
	Thoracic Rib	Upper	Y	047	Servo	9-Apr-2018
		Middle	Y	01815	Servo	9-Apr-2018
		Lower	Y	043	Servo	9-Apr-2018
	Abdominal Rib	Upper	Y	01811	Servo	9-Apr-2018
		Lower	Y	051	Servo	9-Apr-2018
Lower Spine Accelerometers (T12)			X	P94425	Endevco	3-Dec-2018
			Y	P91522	Endevco	3-Dec-2018
			Z	P91511	Endevco	3-Dec-2018
Acetabulum Load Cell			Y	235-FY	FTSS	9-Apr-2018
Iliac Wing Load Cell			Y	320-FY	FTSS	9-Apr-2018
Pelvis Plug (struck side)				11748	SACO	15-Mar-2018
Pelvis Plug (non-struck side)				36505	FTSS	24-Sep-2010

TABLE 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	T11821	Endevco	7-Jan-2019
Vehicle Center of Gravity	Y	T11834	Endevco	7-Jan-2019
Vehicle Center of Gravity	Z	T11823	Endevco	7-Jan-2019
Left Floor Sill	Y	P73570	Endevco	24-Oct-2018
A-Pillar Sill	Y	T11847	Endevco	8-Jan-2019
A-Pillar Low	Y	P88043	Endevco	24-Oct-2018
A-Pillar Mid	Y	P97719	Endevco	24-Oct-2018
B-Pillar Sill	Y	P81065	Endevco	3-Jan-2019
B-Pillar Low	Y	P88455	Endevco	3-Jan-2019
B-Pillar Mid	Y	T11843	Endevco	7-Jan-2019
Driver Seat	Y	T11862	Endevco	8-Jan-2019
Engine Top	X	P97729	Endevco	3-Jan-2019
Engine Top	Y	P97876	Endevco	3-Jan-2019
Firewall	Y	P94569	Endevco	7-Jan-2019
Right Roof	Y	P88453	Endevco	21-Dec-2018
Right Floor Sill	Y	P57192	Endevco	3-Jan-2019
Rear Floor Pan	X	T11388	Endevco	3-Jan-2019
Rear Floor Pan	Y	T11448	Endevco	3-Jan-2019

TABLE 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	DK7091S	Humanetics	14-Nov-2018
Load Cell 2	DK7120S	Humanetics	14-Nov-2018
Load Cell 3	DK7118S	Humanetics	14-Nov-2018
Load Cell 4	DK7124S	Humanetics	14-Nov-2018
Load Cell 5	DK7111S	Humanetics	14-Nov-2018
Load Cell 6	DK7126S	Humanetics	14-Nov-2018
Load Cell 7	DK7112S	Humanetics	14-Nov-2018
Load Cell 8	DK7074S	Humanetics	14-Nov-2018