

**RESEARCH FMVSS 214
RIGID POLE SIDE IMPACT TEST**

**GENERAL MOTORS DE MEXICO, S. DE R.L. DEC C.V
2020 GMC Terrain**

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Report Date: October 20, 2021

FINAL REPORT

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Project Manager, John Shultz

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16. Abstract A 31.00 km/h, 75° Oblique Rigid Pole Research Side Impact Test was conducted on the subject 2020 GMC Terrain in accordance with the specifications of the Laboratory Test Procedure for the Research Side Impact Rigid Pole Test 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 April 1, 2021. The impact velocity was 31.08 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.0°C. The test vehicle post-test maximum crush was 314 mm at level 2. The test vehicle's performance was as follows:																													
<table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="2">Driver ATD (WorldSID-50M)</th> </tr> <tr> <th>Units</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criterion (HIC15)</td> <td>N/A</td> <td>349</td> </tr> <tr> <td>Brain Injury Criterion (BrIC)</td> <td>N/A</td> <td>0.77</td> </tr> <tr> <td>Peak Shoulder Force</td> <td>N</td> <td>-2020.51</td> </tr> <tr> <td>Peak Thoracic Rib Deflection</td> <td>mm</td> <td>29.52</td> </tr> <tr> <td>Peak Abdominal Rib Deflection</td> <td>mm</td> <td>18.96</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>-544.50</td> </tr> <tr> <td>Peak Resultant Sacro-Iliac Force</td> <td>N</td> <td>3084.91</td> </tr> </tbody> </table>				Measurement Description	Driver ATD (WorldSID-50M)		Units	Result	Head Injury Criterion (HIC15)	N/A	349	Brain Injury Criterion (BrIC)	N/A	0.77	Peak Shoulder Force	N	-2020.51	Peak Thoracic Rib Deflection	mm	29.52	Peak Abdominal Rib Deflection	mm	18.96	Pubic Symphysis Force	N	-544.50	Peak Resultant Sacro-Iliac Force	N	3084.91
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The two doors on the struck side of the vehicle 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 Side Impact Pole WorldSID-50M		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, SE Washington, DC 20590																											
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SECTION 1

PURPOSE AND TEST PROCEDURE

PURPOSE AND TEST PROCEDURE

This rigid pole side impact test is a part of the Federal Motor Vehicle Safety Standard 214 Side Impact Protection program. It was conducted for the National Highway Traffic Safety Administration's (NHTSA) under 693JJ918D000019 by Transportation Research Center Inc.. The purpose of this test was to evaluate the repeatability, reproducibility, and durability of the WorldSID 50th percentile male ATD (WorldSID-50M) equipped with RibEye™, to determine whether the dummy is a viable option to replace the EuroSID-2 dummy with rib extension modifiers (ES-2re) in future side impact rigid pole tests conducted by NHTSA. The test was conducted using NHTSA's 'LABORATORY TEST PROCEDURE FOR FMVSS No. 214, DYNAMIC SIDE IMPACT PROTECTION – Rigid Pole Side Impact Test' dated September 2012 as a guideline.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2020 GMC Terrain. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 31.08 km/h. The test was conducted by the Transportation Research Center Inc. in East Liberty, Ohio, on April 1, 2021. Pre-test and post test photographs of the test vehicle and side impact dummy (WorldSID-50M with RibEye) are included in APPENDIX A of this report.

The test setup was conducted following the FMVSS 214 test procedure dated September 2012, including instrumentation and camera placement. One WorldSID-50M with RibEye dummy was placed in the driver designated seating position per NHTSA's "WorldSID 50th Male Dummy Seating Procedure, April 2019 (<https://rosap.nhtl.bts.gov/view/dot/41900>).

The dummy was instrumented in the following manner:

- Head CG tri-axial accelerometer
- Head angular rate sensor
- Upper and lower neck load cells
- Shoulder load cell
- RibEye measurement system in thorax ribs 1-3 and abdominal ribs 1 and 2, with three LEDs per rib
- Upper (T1), middle (T4), and lower spine (T12) tri-axial accelerometers
- Lumbar load cell
- Pelvic tri-axial accelerometers
- Pubic load cell
- Left and right sacroiliac load cells
- Left femur 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 of this report contains the test equipment and instrumentation calibration data. Worksheets and plots found in Appendix E describe dummy positions in detail.

Dummy injury readings were recorded as follows:

Measurement Description	Driver ATD (WorldSID-50M)	
	Units	Result
Head Injury Criterion (HIC15)	N/A	349
Brain Injury Criterion (BrIC)	N/A	0.77
Peak Shoulder Force	N	-2020.51
Peak Thoracic Rib Deflection	mm	29.52
Peak Abdominal Rib Deflection	mm	18.96
Pubic Symphysis Force	N	-544.50
Peak Resultant Sacro-Iliac Force	N	3084.91

Supplemental restraint information is given below:

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

GENERAL COMMENTS

All doors remained closed throughout the test. No fuel spillage occurred during the impact and the static rollover test was not performed.

Data Acquisition Explanations

Left Floor Sill Acceleration (Y); QD throughout

Left Mid A-Pillar Acceleration (Y); CF at 49.0 ms

Left B-Pillar Sill Acceleration (Y); CF at 25.0 ms

Left Mid B-Pillar Acceleration (Y); CF at 49.0 ms

Ribeye Error Codes:

- 1 if the top sensor is blocked or sees too much ambient light
- 2 if the bottom sensor is blocked or sees too much ambient light
- 3 if both top and bottom sensors are blocked or see too much ambient light
- 4 if the middle sensor is blocked or sees too much ambient light
- 5 if the middle and top sensors are blocked or see too much ambient light
- 6 if the middle and bottom sensors are blocked or see too much ambient light
- 7 if all three sensors are blocked or see too much ambient light
- 8 if a divide-by-zero condition occurred in the data processing
- 9 if data goes past the end of the calibration curves

**error codes may be positive or negative in data and will occur to all x, y, and z channels*

Driver Abdomen Rib 1 Front Displacement: Error code 4 at 62.9 ms

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

**DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2020 GMC Terrain
Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

TEST VEHICLE INFORMATION AND OPTIONS

Model Year	2020
Make	GMC
Model	Terrain
Body Style	MPV
VIN	3GKALMEV2LL331942
Body Color	Quicksilver Metallic
Odometer Reading (km/mi)	14 mi.
Engine Displacement (L)	1.5
Type/No. Cylinders	Straight/4
Engine Placement	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	No
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	No
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 DE MEXICO, S. DE R.L. DEC C.V
Date of Manufacturer	08/20
Vehicle Type	MPV

GWR (kg)	2225
GAWR Front (kg)	1175
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)				463.0
DSC X 68.04 kg				340.2
Rated Cargo and Luggage Weight (RCLW) (kg)				122.8

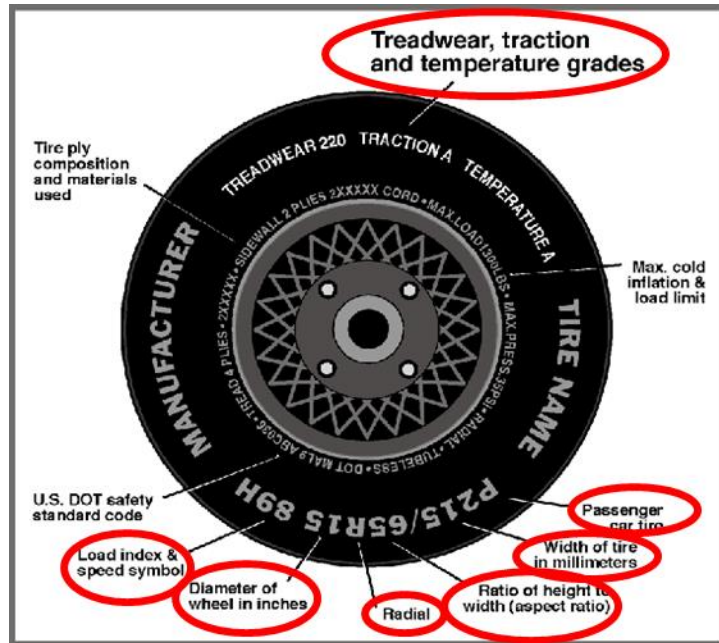
VEHICLE SEAT TYPE

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	Yes	N/A
Rear or Second Row Seat	N/A	N/A	Yes	Yes	N/A	Yes	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: 2020 GMC Terrain
 Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	225/65R17 H	225/65R17 H
Tire Size on Vehicle	225/65R17	225/65R17
Tire Manufacturer	Michelin	Michelin
Tire Model	Total Performance	Total Performance
Treadwear	540	540
Traction	B	B
Temperature Grades	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	5	5
Load Index/Speed Symbol	102H	102H
Tire Material	Polyester, Steel, Polyamide	Polyester, Steel, Polyamide
DOT Safety Code Left	M33T 08FX 3120	M33T 08FX 2970
DOT Safety Code Right	M33T 08FX 3120	M33T 08FX 2870

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

Test Vehicle: 2020 GMC Terrain
 Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	214	214	221	214
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	460.4	325.8		500.0	419.8		484.8	415.4	
Right	kg	444.4	306.0		433.6	373.8		452.4	381.8	
Ratio	%	58.9	41.1		54.1	45.9		54.0	46.0	
Totals	kg	904.8	631.8	1536.6	933.6	793.6	1727.2	936.8	797.2	1734.4

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1536.6	(A)
Actual Weight of 1 WorldSID-50M with RibEye Dummy Used	kg	75.0	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	122.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1734.4	(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.	-0.7	-0.6	0.0	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg.	-0.3	-0.3	-0.2	Yes
Front Bumper-Line Angle (left-to-right)**	Deg.	-0.1	-0.1	-0.1	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg.	-0.3	-0.4	-0.4	Yes
Vehicle CG (Aft of Front Axle)	mm	1120	1252	1253	
Vehicle CG (Left (+) / Right (-) from longitudinal Centerline)	mm	+19	+52	+30	

*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".

Test height adjustable suspension setting, if applicable:

N/A

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

Test Vehicle: 2020 GMC Terrain
Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Ballast: 6x plate weight	66.0
Components removed: None	0.0

DATA SHEET NO. 2

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

Test Vehicle: 2020 GMC Terrain
 Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the mid-track, lowest, mid-angle position. The struck-side rear passenger's seat, rear center seat, and nonstruck 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	19.5	15.1	17.3
Front Passenger Seat	15.5	11.1	13.3
Front Center Seat*	N/A	N/A	N/A
Struck Side Rear Seat	N/A	N/A	16.7
Non-Struck Side Rear Seat	N/A	N/A	16.6
Rear Center Seat*	N/A	N/A	14.6

* 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	17.3	260	Max	304	304	304
			Mid	260	260	260
			Min	248	248	248
Front Passenger Seat	13.2	270	Max	310	310	310
			Mid	270	270	270
			Min	265	265	265
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	16.7	294	Max	N/A	N/A	N/A
			Mid	N/A	294	N/A
			Min	N/A	N/A	N/A
Non-Struck Side Rear Seat	16.6	310	Max	N/A	N/A	N/A
			Mid	N/A	310	N/A
			Min	N/A	N/A	N/A
Rear Center Seat*	14.6	335	Max	N/A	N/A	N/A
			Mid	N/A	335	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: 2020 GMC Terrain

Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

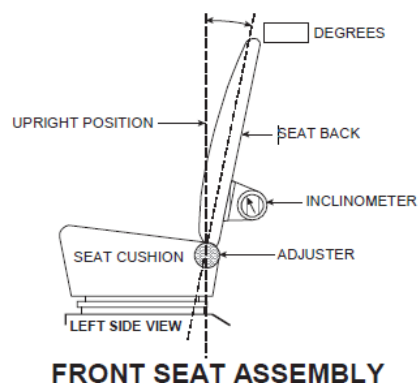
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	241	24	120	12
Front Passenger Seat	244	24	135	13
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	0	Fixed	0	Fixed
Non-Struck Side Rear Seat	0	Fixed	0	Fixed
Rear Center Seat*	0	Fixed	0	Fixed

* If applicable.

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back was positioned according to the manufacturer's information as provided on Form 1; resulting in a head rest post angle of 10.2° at the head rest post. The front passenger seat was set to match the driver seat.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detent*
Driver Seat w/ Seated Dummy	66.4	33	10.2	10
Front Passenger Seat	83.4	21	8.8	7
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	4.7	2	22.1	2
Non-Struck Side Rear Seat	4.7	2	22.1	2
Rear Center Seat*	5.0	2	22.1	2

* If applicable.

DATA SHEET NO. 2 (CONTINUED)

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

Test Vehicle: 2020 GMC Terrain

Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

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	1; Fixed	Fixed

HEAD RESTRAINT ADJUSTMENT

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

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

DATA SHEET NO. 2 (CONTINUED)

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

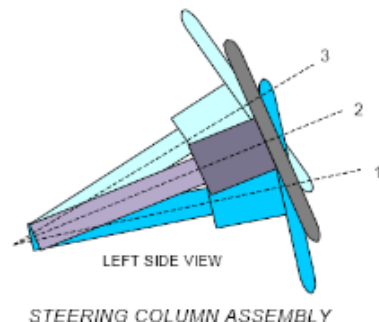
Test Vehicle: 2020 GMC Terrain
 Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

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.

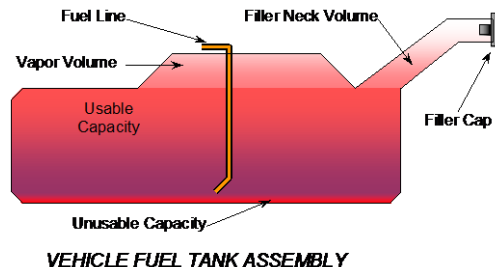
	Degrees	Fore/Aft Position, mm
Lowermost, Position No. 1	21.5	0
Geometric Center, Position No. 2	23.8	21
Uppermost, Position No. 3	26.2	42
Telescoping Steering Wheel Travel		42
Test Position	23.8	21



FUEL PUMP

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

The fuel pump will activate when the ignition is in the 'Run' position. When the working fuel system pressure is achieved; the pump will turn OFF.



FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	55.6
Usable Capacity of "Optional" Tank (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner's Manual)	55.6
Usable Capacity of Optional Tank (see Owner's Manual)	N/A
93% of Usable Capacity	51.8
Actual Amount of Solvent Used in Test	51.8
1/3 of Usable Capacity	18.5

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

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA

Test Vehicle: 2020 GMC Terrain

Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

Driver Dummy Serial Number: EB8888

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Head Acceleration (g)	X	6.94	192.30	-23.58	61.65
	Y	57.62	63.40	-12.00	143.00
	Z	8.72	105.15	-26.83	49.50
	R	63.60	62.10		
Head Angular Rate (deg/sec)	X	1513.71	124.90	-1291.03	49.85
	Y	567.69	147.25	-759.83	225.15
	Z	1170.03	258.25	-1516.76	208.40
Upper Neck Force (N)	X	160.76	167.25	-387.14	64.55
	Y	293.88	65.05	-521.57	147.70
	Z	1174.99	52.75	-307.72	103.85
Upper Neck Moment (Nm)	X	11.44	280.15	-31.93	151.10
	Y	12.70	264.75	-27.34	61.50
	Z	23.31	228.30	-12.26	287.80
Lower Neck Force (N)	X	345.93	180.20	-631.92	61.55
	Y	1018.97	59.95	-393.42	124.25
	Z	1305.81	51.60	-542.93	103.70
Lower Neck Moment (Nm)	X	79.26	61.95	-102.75	144.70
	Y	56.50	64.15	-53.21	168.75
	Z	24.40	229.00	-24.76	166.00
Driver Shoulder Force (N)	X	38.89	282.20	-890.51	57.05
	Y	85.09	123.55	-2020.51	49.60
	Z	650.95	56.90	-123.84	120.75
Shoulder Rear Ribeye Position (mm)	X	-31.85	119.95	-75.85	61.85
	Y	-55.20	52.35	-85.76	162.00
	Z	-42.29	119.20	-66.85	75.20
Length of Change (mm)		15.70	50.00	-1.22	15.90
Shoulder Middle Ribeye Position (mm)	X	4.15	119.45	-44.78	68.85
	Y	-49.54	55.40	-96.10	15.80
	Z	-42.95	121.80	-69.03	75.80
Length of Change (mm)		41.63	53.25	-1.06	15.80
Shoulder Front Ribeye Position (mm)	X	39.09	120.55	3.51	73.65
	Y	-29.31	57.60	-83.40	14.60
	Z	-49.73	122.85	-72.05	76.50
Length of Change (mm)		49.38	60.75	-1.97	184.70

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA (CONTINUED)

Test Vehicle: 2020 GMC Terrain

Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

Driver Dummy Serial Number: EB8888

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Thorax Rib 1 Rear Ribeye Position (mm)	X	-26.68	63.30	-37.92	80.85
	Y	-80.82	49.10	-100.82	191.45
	Z	9.36	113.70	-7.34	31.10
Length of Change (mm)		18.97	49.30	-1.13	285.00
Thorax Rib 1 Middle Ribeye Position (mm)	X	10.73	62.30	-4.01	137.50
	Y	-78.24	49.85	-114.63	131.70
	Z	11.58	111.10	-7.38	31.50
Length of Change (mm)		29.52	49.90	-0.36	177.30
Thorax Rib 1 Front Ribeye Position (mm) ¹	X	49.30	61.00	32.04	284.10
	Y	-65.17	51.50	-101.80	84.70
	Z	9.85	112.20	-9.43	32.75
Length of Change (mm)		25.91	49.90	-1.65	177.40
Thorax Rib 2 Rear Ribeye Position (mm)	X	-15.53	61.00	-28.53	280.65
	Y	-82.27	57.20	-103.50	135.40
	Z	43.12	144.10	32.26	63.40
Length of Change (mm)		19.84	57.20	-1.48	249.80
Thorax Rib 2 Middle Ribeye Position (mm)	X	24.53	60.95	5.75	284.75
	Y	-85.20	57.20	-112.15	200.10
	Z	45.41	43.30	34.68	63.05
Length of Change (mm)		23.38	57.05	-1.58	200.05
Thorax Rib 2 Front Ribeye Position (mm)	X	63.36	59.55	40.91	123.00
	Y	-74.99	57.75	-104.23	268.00
	Z	49.05	109.70	38.45	63.40
Length of Change (mm)		15.08	56.90	-2.58	178.75
Thorax Rib 3 Rear Ribeye Position (mm) ¹	X	-35.39	62.85	-49.81	81.70
	Y	-78.08	55.40	-95.60	263.60
	Z	-32.25	43.95	-43.82	63.20
Length of Change (mm)		16.88	55.35	-1.66	264.00
Thorax Rib 3 Middle Ribeye Position (mm)	X	0.37	60.10	-19.49	81.45
	Y	-81.13	54.50	-102.15	162.60
	Z	-31.42	135.55	-43.38	62.15
Length of Change (mm)		17.81	54.40	-1.16	162.35

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA (CONTINUED)

Test Vehicle: 2020 GMC Terrain

Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

Driver Dummy Serial Number: EB8888

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Thorax Rib 3 Front Ribeye Position (mm)	X	35.02	60.10	12.11	284.85
	Y	-71.45	55.20	-93.32	160.35
	Z	-32.89	132.35	-43.88	62.10
Length of Change (mm)		10.23	43.25	-1.81	160.35
Abdomen Rib 1 Rear Ribeye Position (mm)	X	-14.52	61.75	-32.14	80.70
	Y	-80.86	55.60	-96.89	5.30
	Z	-0.26	42.30	-12.76	63.20
Length of Change (mm)		17.89	56.35	-0.74	298.75
Abdomen Rib 1 Middle Ribeye Position (mm)	X	22.73	60.10	-0.58	101.95
	Y	-83.42	56.55	-104.16	290.80
	Z	1.09	170.70	-12.54	63.20
Length of Change (mm)		17.48	54.10	-0.60	290.70
Abdomen Rib 1 Front Ribeye Position (mm) ¹	X	61.06	63.05	4.00	62.90
	Y	4.00	62.90	-102.40	112.00
	Z	4.00	62.90	-12.27	62.75
Length of Change (mm) ¹		10.07	42.85	-5.29	112.05
Abdomen Rib 2 Rear Ribeye Position (mm)	X	17.04	65.45	-12.91	99.30
	Y	-77.63	61.40	-94.30	195.40
	Z	33.38	150.85	13.45	57.70
Length of Change (mm)		18.96	60.65	-1.17	289.65
Abdomen Rib 2 Middle Ribeye Position (mm)	X	44.74	60.10	11.68	99.75
	Y	-81.91	57.75	-107.51	117.10
	Z	35.49	176.50	17.47	65.20
Length of Change (mm)		18.02	55.45	-0.48	201.75
Abdomen Rib 2 Front Ribeye Position (mm)	X	74.79	60.10	42.43	100.80
	Y	-74.49	56.20	-97.00	192.30
	Z	35.58	175.45	18.30	63.40
Length of Change (mm)		9.97	41.65	-1.12	192.25
T1 Acceleration (g)	X	10.73	52.95	-14.15	105.80
	Y	30.56	57.15	-9.91	105.90
	Z	11.14	56.00	-4.49	132.70
	R	33.91	57.15		

¹See data acquisition explanation

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA (CONTINUED)

Test Vehicle: 2020 GMC Terrain

Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

Driver Dummy Serial Number: EB8888

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
T4 Acceleration (g)	X	14.34	104.55	-10.89	62.30
	Y	9.03	107.20	-31.87	45.65
	Z	9.12	51.30	-3.47	132.15
	R	33.78	45.65		
T12 Acceleration (g)	X	7.51	51.25	-15.75	104.60
	Y	38.97	42.95	-12.38	90.35
	Z	10.79	47.20	-11.12	64.25
	R	40.46	43.10		
Pubic Symphysis (N)	Y	65.34	16.00	-544.50	51.70
Left Sacro-Iliac Force (N)	X	138.60	17.90	-610.56	53.45
	Y	9.42	-2.10	-3005.66	45.00
	Z	545.55	107.50	-541.06	43.40
Left Sacro-Iliac Moment (Nm)	X	36.65	68.60	-53.46	108.15
	Y	35.26	57.10	-7.01	26.40
	Z	63.05	43.55	-20.04	105.65
Right Sacro-Iliac Force (N)	X	249.80	68.65	-465.66	43.90
	Y	26.96	105.85	-1808.68	44.80
	Z	666.01	62.60	-613.90	106.00
Right Sacro-Iliac Moment (Nm)	X	56.61	67.60	-50.01	106.35
	Y	19.12	56.95	-11.13	74.10
	Z	48.38	43.40	-24.33	105.55
Lumbar Force (N)	X	415.67	65.55	-278.04	17.70
	Y	589.47	54.55	-164.99	91.80
	Z	1709.63	63.50	-1090.08	106.35
Lumbar Moment (Nm)	X	36.26	57.15	-13.38	102.00
	Y	10.62	17.70	-20.06	64.40
	Z	8.42	53.40	-4.01	75.25
Pelvis Acceleration (g)	X	17.03	17.95	-15.87	55.65
	Y	53.58	43.50	-16.87	86.10
	Z	12.93	16.55	-8.66	54.15
	R	55.11	43.45		

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA (CONTINUED)

Test Vehicle: 2020 GMC Terrain

Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

Driver Dummy Serial Number: EB8888

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Left Femur Force (N)	X	112.28	95.10	-141.03	70.60
	Y	42.89	35.45	-109.81	112.60
	Z	767.15	70.70	-152.90	0.20
Left Femur Moment (Nm)	X	70.00	70.20	-41.32	79.10
	Y	17.51	38.75	-24.06	82.15
	Z	14.38	49.50	-16.11	113.95
Left Femoral Neck Force (N)	X	236.69	39.40	-300.93	113.65
	Y	306.04	85.00	-391.29	40.45
	Z	99.04	130.95	-1072.56	51.35
Outer Knee Force (N)	Y	737.91	70.25	-38.59	25.80
Inner Knee Force (N)	Y	4049.73	70.15	-59.39	20.75

Positive Direction

Longitudinal Forward
 Lateral Rightward
 Vertical Downward

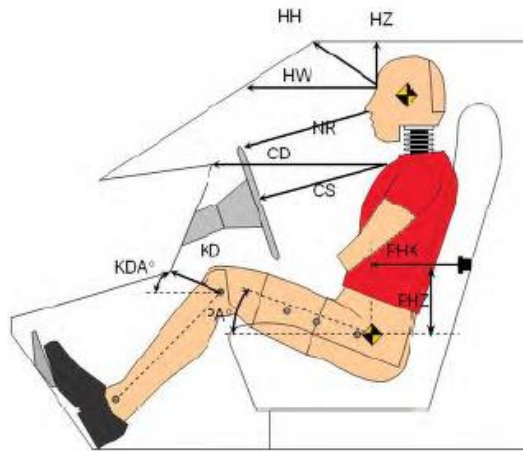
Negative Direction

Longitudinal Rearward
 Lateral Leftward
 Vertical Upward

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2020 GMC Terrain
 Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021



Code	Measurement Description	Driver WorldSID-50M SN # EB8888	
		Length (mm)	Angle
HH	Header to Header	462	
HW	Header to Windshield	711	
HZ	Head to Roof Liner	218	
NR	Nose to Rim/Seat Back	496	
CD	Chest to Dash/Seat Back	639	
CS	Chest to Steering Wheel	413	
KD(L)/KDA(L)°	Left Knee to Dash/Seat Back	143	37.2
KD(R)/KDA(R)°	Right Knee to Dash/Seat Back	162	63.7
PAX°	Pelvic Tilt Angle X		-0.6
PAY°	Pelvic Tilt Angle Y		-0.1
PHX	Hip Point to Striker (X-Axis)	155	
PHZ	Hip Point to Striker (Z-Axis)	96	
HAX°	Head Tilt Angle X		1.0
HAY ¹ °	Head Tilt Angle Y		-1.4
TAX°	Thorax Tilt Angle X		0.9
TAY°	Thorax Tilt Angle Y		-0.5
	Head Rest Angle		10.2
	H-Point Tool Angle		42.1
	Torso Angle		13.7
	Windshield Angle		58.9

Note: All measurements are in millimeters. 2-door vehicle shown. Rear dummy HX, HZ, PHX and PHZ measurements for 4-door vehicle would use the C-post striker as a reference point.

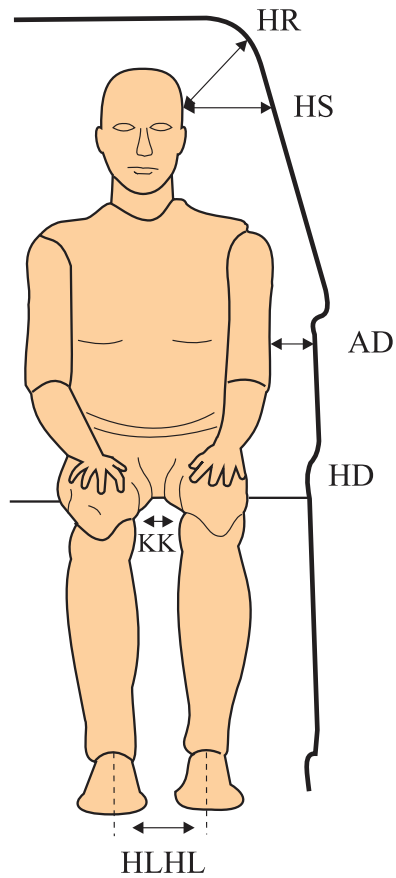
All tilt sensor angles are recorded digitally

WorldSID-50M neck was adjusted 0 notches

**DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2020 GMC Terrain
 Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021



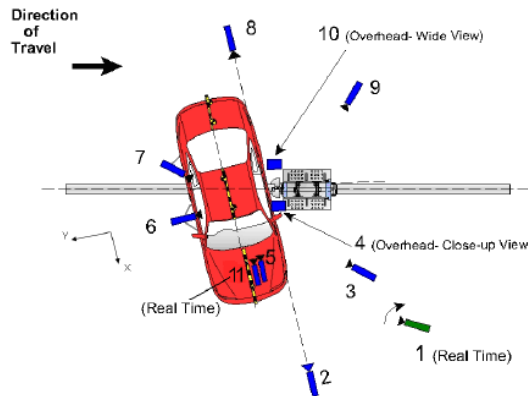
Code	Measurement Description	Driver WorldSID-50M SN # EB8888
HR	Head to Side Header	206
HS	Head to Side Window	328
AD	Arm to Door	138
HD	Hip Point to Door	104
KK	Knee to Knee	441
HLHL	Heel to Heel	360

Note: All measurements are in millimeters.

**DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA**

Test Vehicle: 2020 GMC Terrain
 Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021



REFERENCE (from Point of Impact for X and Y; from Ground for Z):
 + X = Forward of vehicle, + Y = Right of vehicle, + Z = Down

CAMERA LOCATIONS AND DATA

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	4366	0	-1467	20	1000
3	Impact side 45° – forward pole view	3195	-1126	-1620	20	1000
4	Overhead Close-up view of impact	0	0	-5252	28	1000
5	Onboard – dummy front view				12.5	1000
6	Onboard – dummy side view				12.5	1000
7	Onboard – dummy rear oblique view				12.5	1000
8	Rear ground level – impact view	-5151	0	-1462	20	1000
9	Impact side 45° – rearward pole view	-3058	-2819	-1454	20	1000
10	Overhead wide – view of impact	-301	280	-5261	18	1000
11	Real time (24-30 fps) – dummy front view				Zoom	30

* All measurements accurate to ± 6 mm.

NOTE: Vehicle is at a 75° angle to the rigid pole.

If applicable, explain why camera(s) did not operate as intended: N/A

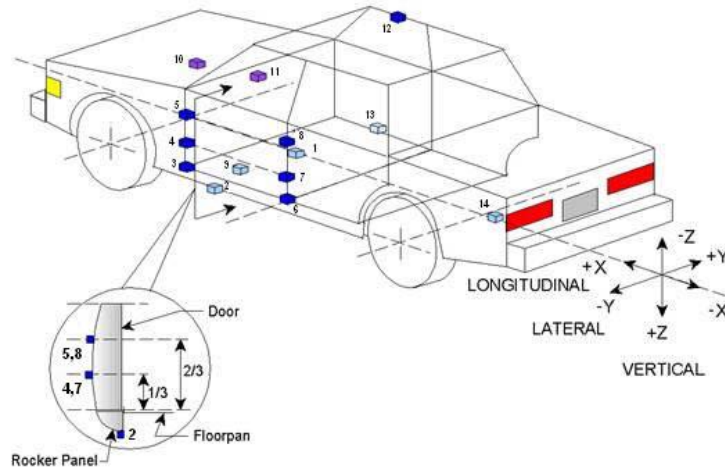
INSTRUMENTATION

Driver Dummy	135
Vehicle Structure	37
Pole Load Cells	8
Contact Channels	4
TOTAL	184

DATA SHEET NO. 6
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2020 GMC Terrain
Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021



Location		Coordinates (mm)			Positive Direction		Negative Direction	
		X	Y	Z	Max	Time (ms)	Max	Time (ms)
1	Vehicle CG	2273	15	-143				
	Longitudinal (g)				1.97	42.40	-9.30	66.60
	Lateral (g)				26.52	47.75	-0.88	167.35
	Vertical (g)				9.61	29.00	-11.93	51.60
	Resultant (g)				26.79	47.80		
2	Vehicle CG ARS	2273	17	-142				
	Longitudinal (deg/s)				219.95	45.95	-53.99	292.00
	Lateral (deg/s)				62.70	66.65	-50.12	122.65
	Vertical (deg/s)				91.66	123.35	-32.99	47.20
3	Left Floor Sill Acceleration	2862	-726	-148				
	Lateral (g)				---	---	---	---
4	Left A-Pillar Sill Acceleration	3099	-709	-102				
	Lateral (g)				32.96	59.70	-1.73	123.70
5	Left Lower A-Pillar Acceleration	3175	-823	-121				
	Lateral (g)				18.65	44.35	-0.65	3.90
6	Left Mid A-Pillar Acceleration	3199	-808	-393				
	Lateral (g)				---	---	---	---
7	Left B-Pillar Sill Acceleration	2070	-743	-138				
	Lateral (g)				---	---	---	---
8	Left Lower B-Pillar Acceleration	2215	-821	-116				
	Lateral (g)				84.03	19.20	-6.53	46.90
9	Left Mid B-Pillar Acceleration	2161	-801	-504				
	Lateral (g)				---	---	---	---

¹See data acquisition explanation

DATA SHEET NO. 6 (CONTINUED)
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2020 GMC Terrain
 Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

Location		Coordinates (mm)			Positive Direction		Negative Direction	
		X	Y	Z	Max	Time (ms)	Max	Time (ms)
10	Driver Seat Track at Dummy H-Point Acceleration	2354	-566	-75				
	Lateral (g)				102.86	35.75	-28.41	47.90
11	Engine Top Acceleration	3858	-6	-312				
	Longitudinal (g)				4.96	139.15	-13.46	34.50
	Lateral (g)				21.61	47.10	-4.12	222.65
12	Firewall Center Acceleration	3630	-31	-437				
	Lateral (g)				16.33	48.35	-0.70	5.15
13	Right Roof at Vertical Impact Reference Line Acceleration	2290	577	-1091				
	Lateral (g)				27.21	44.35	-2.25	66.90
14	Right Sill at Vertical Impact Reference Line Acceleration	2801	727	-130				
	Longitudinal (g)				1.66	87.80	-5.48	38.75
	Lateral (g)				19.94	47.45	-1.20	167.35
	Vertical (g)				6.87	48.60	-9.27	37.05
	Resultant (g)				21.43	47.55		
15	Right Sill at Rear Seat Acceleration	1878	636	-155				
	Longitudinal (g)				1.80	87.70	-6.59	38.55
	Lateral (g)				19.93	31.85	-0.93	169.85
	Vertical (g)				4.89	110.10	-9.92	36.65
	Resultant (g)				19.98	31.85		
16	Rear Floorpan Behind Rear Axle at Centerline Acceleration	1137	2	-92				
	Longitudinal (g)				3.74	124.90	-6.05	75.35
	Lateral (g)				18.60	64.25	-0.96	163.30
17	Left Front Door Mid Centerline Acceleration	2622	-770	-2622				
	Lateral (g)				106.21	15.20	-148.34	22.20
18	Left Front Door Mid Rear Acceleration	2327	-763	-204				
	Lateral (g)				111.68	20.30	-57.17	25.20
19	Left Front Door Upper Centerline Acceleration	2617	-767	-449				
	Lateral (g)				86.54	9.55	-40.09	24.30

¹See data acquisition explanation

DATA SHEET NO. 6 (CONTINUED)
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2020 GMC Terrain
 Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

Location		Coordinates (mm)			Positive Direction		Negative Direction	
		X	Y	Z	Max	Time (ms)	Max	Time (ms)
20	Left Rear Door Mid Rear Acceleration	1471	-776	-239				
	Lateral (g)				51.34	61.35	-15.57	35.75
21	Left Rear Door Upper Centerline Acceleration	1653	-757	-527				
	Lateral (g)				38.23	28.35	-11.45	85.50
22	Rear Deck Acceleration	223	-6	-108				
	Longitudinal (g)				9.31	127.20	-12.00	67.75
	Lateral (g)				23.02	43.75	-2.91	128.10
	Vertical (g)				7.51	50.35	-5.15	66.85
	Resultant (g)				23.15	43.75		
23	Rear Deck ARS	224	-34	-107				
	Longitudinal (deg/s)				91.67	43.10	-52.49	279.85
	Lateral (deg/s)				108.38	54.55	-110.64	66.45
	Vertical (deg/s)				45.11	30.00	-110.01	88.00

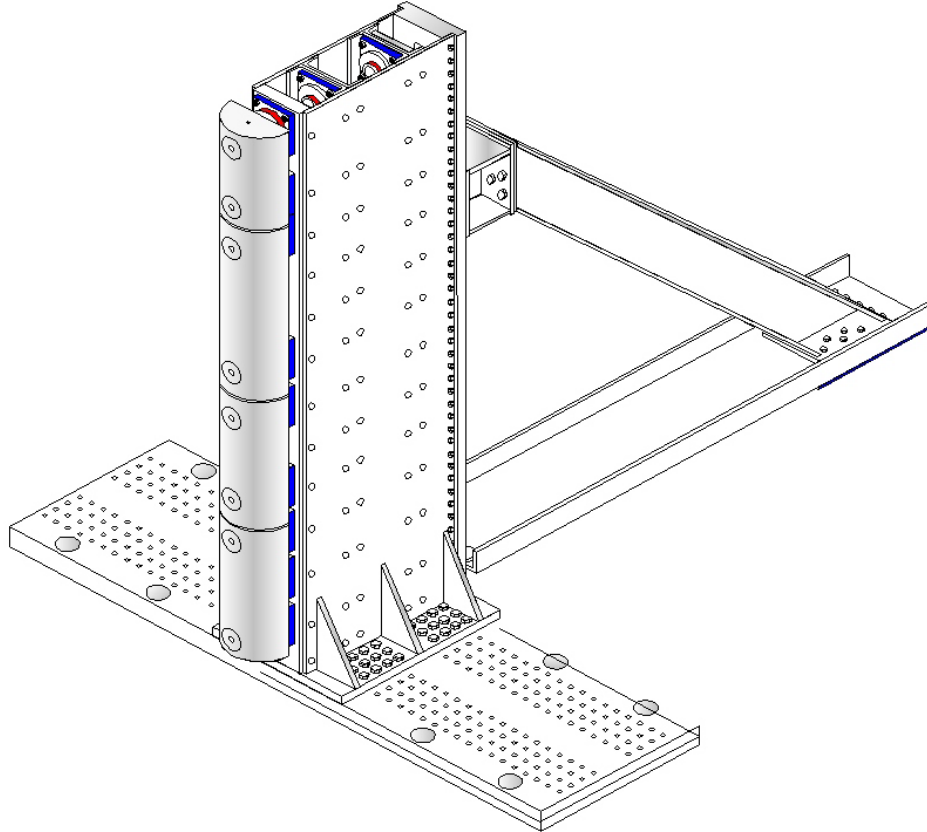
*0,0,0 located at rear bumper

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2020 GMC Terrain
Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

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: 2020 GMC Terrain

Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver WorldSID-50M Dummy
Face	SCAB
Top of Head	SCAB
Left Side of Head	SCAB
Back of head	None
Left Shoulder	SAB
Upper Torso	SAB; Side seat bolster
Lower Torso	SAB; Side seat bolster
Left Hip	SAB
Left Knee	Door panel

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	No	No	No
Seat Disengagement from Floor pan	No	No	No	No
Seat Back Movement from Initial Position	No	No	No	No
Seat Back Collapse	No	No	No	No

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Good
Sill Separation	Good
Windshield Damage	Webbing all across
Side Window Damage	Driver blown out; Passenger side no damage
Other Notable Effects	None

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

Test Vehicle: 2020 GMC Terrain
Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side (Driver)		Struck Side (Rear Passenger)	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	No		
Knee Airbag	N/A	N/A		
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	No	No	N/A
Other	No	N/A	No	N/A

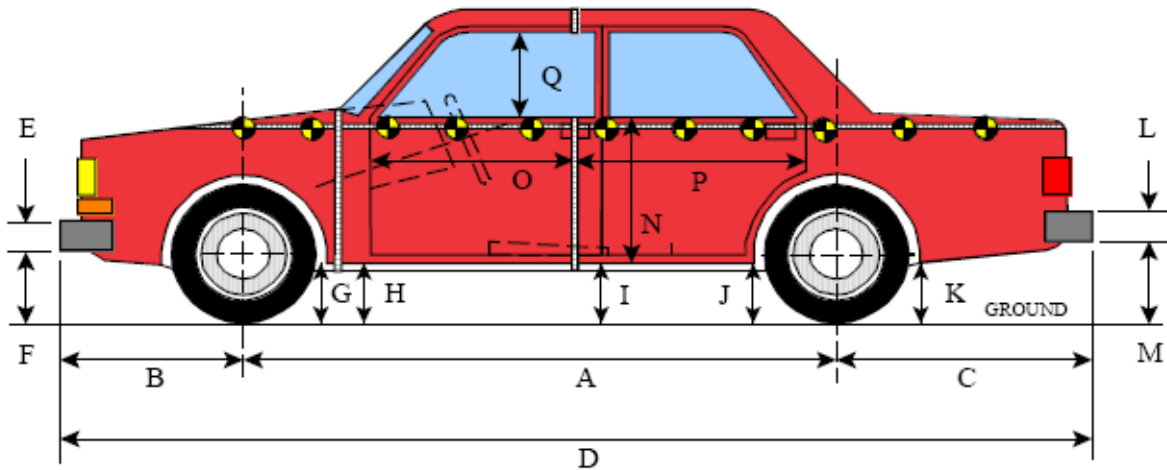
VEHICLE SPEED, VEHICLE ANGLE AT IMPACT, AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1250
Actual Impact Point (Aft of Front Axle)	mm		1260
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 of Intended Impact Point	-10
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	Degrees	75 +/- 3	75
Trap No. 1 Velocity (Primary)	km/h	30.1 to 31.9	31.08
Trap No. 2 Velocity (Redundant)	km/h	30.1 to 31.9	31.09

**DATA SHEET NO. 9
VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2020 GMC Terrain
Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021



LEFT SIDE VIEW

All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3 mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

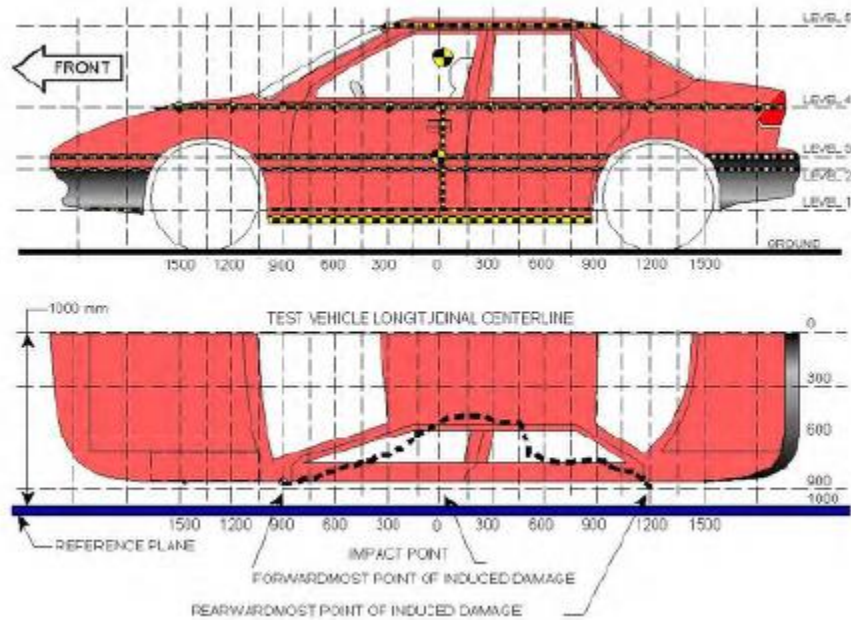
Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2725	2700	25
B	Front Axle to FSOV	933	933	0
C	Rear Axle to RSOV	972	972	0
D	Total Length at Centerline	4622	4600	22
E	Front Bumper Thickness	70	67	3
F	Front Bumper Bottom to Ground	472	490	-18
G	Sill Height at Front Wheel Well	352	368	-16
H	Sill Height at Front Door Leading Edge	355	372	-17
I	Sill Height at B Pillar	374	405	-31
J1	Sill Height at Rear Wheel Well	382	452	-70
J2	Pinch Weld Height at Rear Wheel Well	227	262	-35
K	Sill Height Aft of Rear Wheel Well	440	490	-50
L	Rear Bumper Thickness	88	77	11
M	Rear Bumper Bottom to Ground	500	546	-46
N	Sill Height to Bottom of Front Window Sill	895	904	-9
O	Front Door Leading Edge to Impact CL	819	775	44
P	Rear Door Trailing Edge to Impact CL	1357	1277	80
Q	Front Window Opening	462	427	35
R	Right Side Length	4325	4334	-9
S	Left Side Length	4325	4290	35
T	Maximum Vehicle Width at B-Pillars	1826	1680	146
U	Maximum Vehicle Width	1826	1828	-2

**All Dimensions in mm

**DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2020 GMC Terrain
 Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	297	221	0
2	Occupant H-Point	738	314	-150
3	Mid-Door	680	309	-150
4	Window Sill	1074	281	-150
5	Window Top	1597	96	0

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: 2020 GMC Terrain
 Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

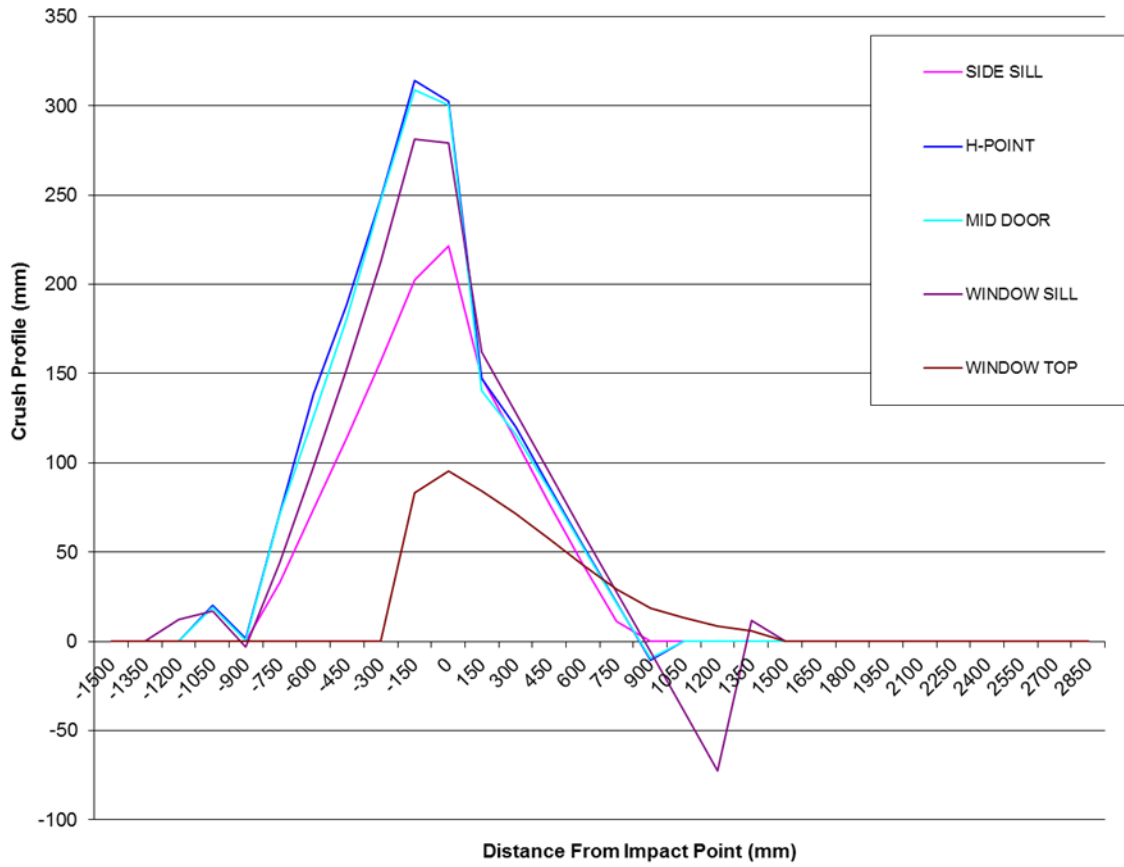
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1200				788					776					12	
-1050		913	911	796			893	892	779			20	19	17	
-900	882	903	902	798		860	902	902	801		22	1	0	-3	
-750	887	900	898	802		854	829	828	758		33	71	70	44	
-600	876	899	897	808		802	760	771	710		74	139	126	98	
-450	874	898	896	822		760	710	716	670		114	188	180	152	
-300	872	897	896	836		715	649	649	624		157	248	247	212	
-150	871	897	896	848	579	669	583	587	567	496	202	314	309	281	83
0	871	897	897	859	593	650	595	596	579	497	221	302	301	280	96
150	871	898	897	863	598	723	750	756	701	514	148	148	141	162	84
300	871	899	899	864	600	758	779	783	736	528	113	120	116	128	72
450	871	900	901	865	602	793	814	816	771	545	78	86	85	94	57
600	870	903	904	866	604	827	849	851	805	561	43	54	53	61	43
750	870	908	910	867	604	859	887	888	839	575	11	21	22	28	29
900		918	917	882	603		929	926	888	584		-11	-9	-6	19
1050				894	599				933	586				-39	13
1200				869	591				942	582				-73	9
1350				867	571				855	565				12	6

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 vertical impact reference line was set at (0, 0, 0).

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

Test Vehicle: 2020 GMC Terrain
Test Program: Rigid Pole Side Impact

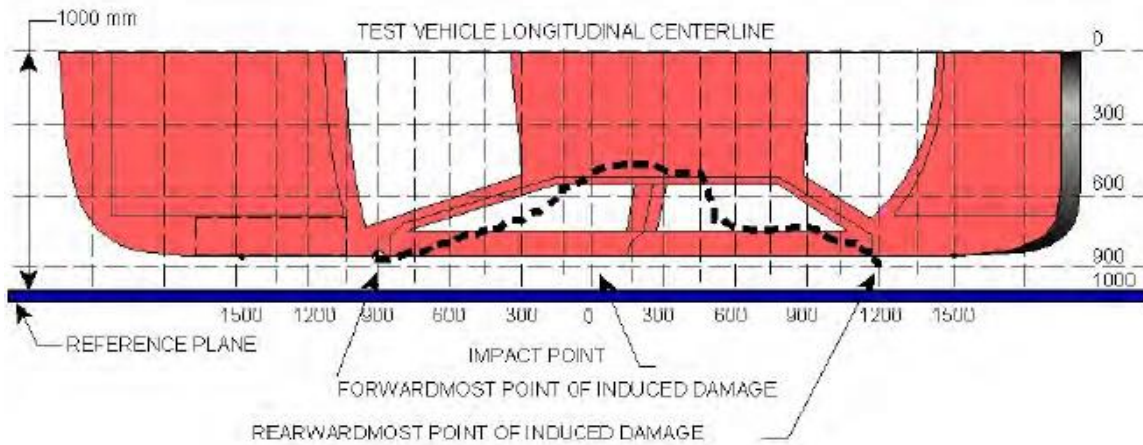
Test Date: 4/1/2021



**DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2020 GMC Terrain
 Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021

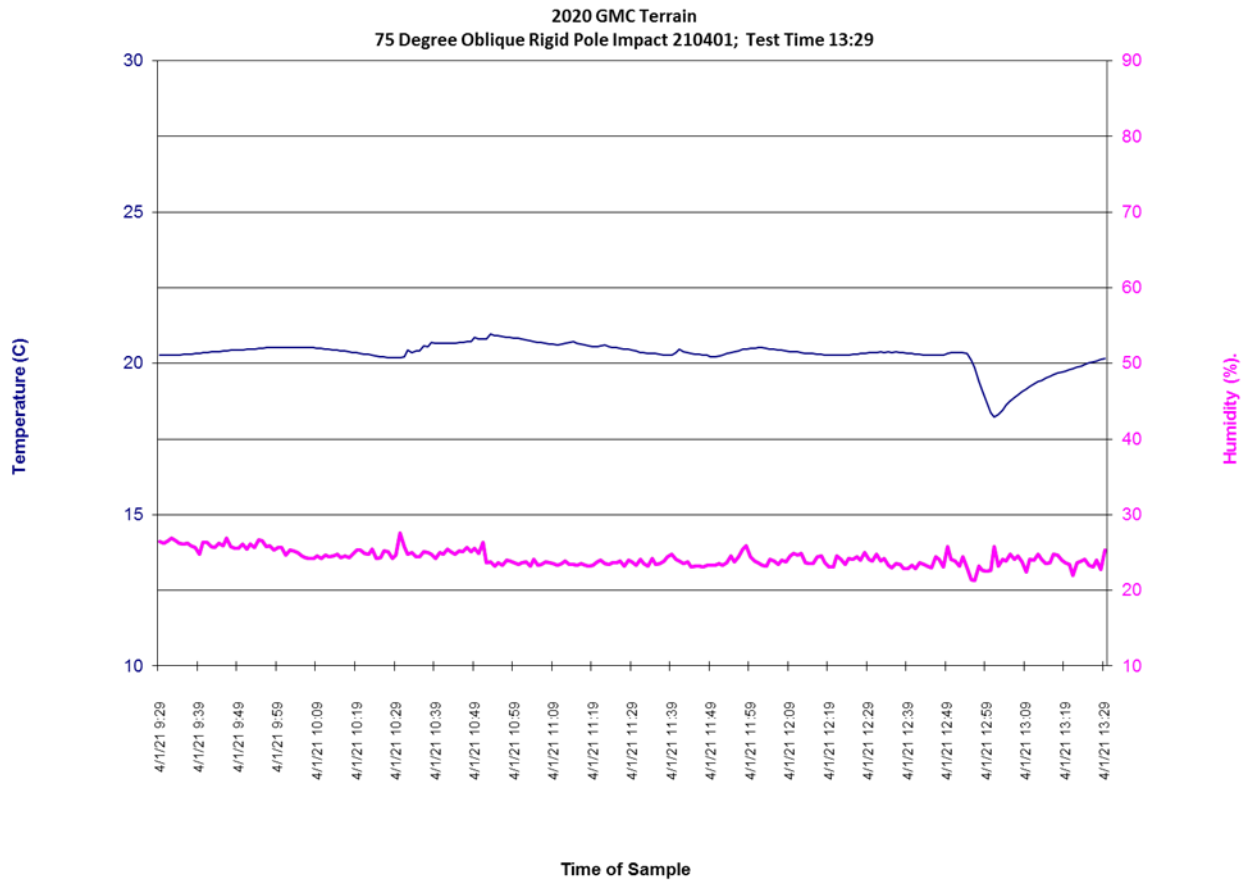


VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	1350	4	855	867	12
2	900	5	584	603	19
3	300	4	736	864	128
4	-150	2	583	897	314
5	-750	2	829	900	71
6	-1200	4	776	788	12

DATA SHEET NO. 12
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

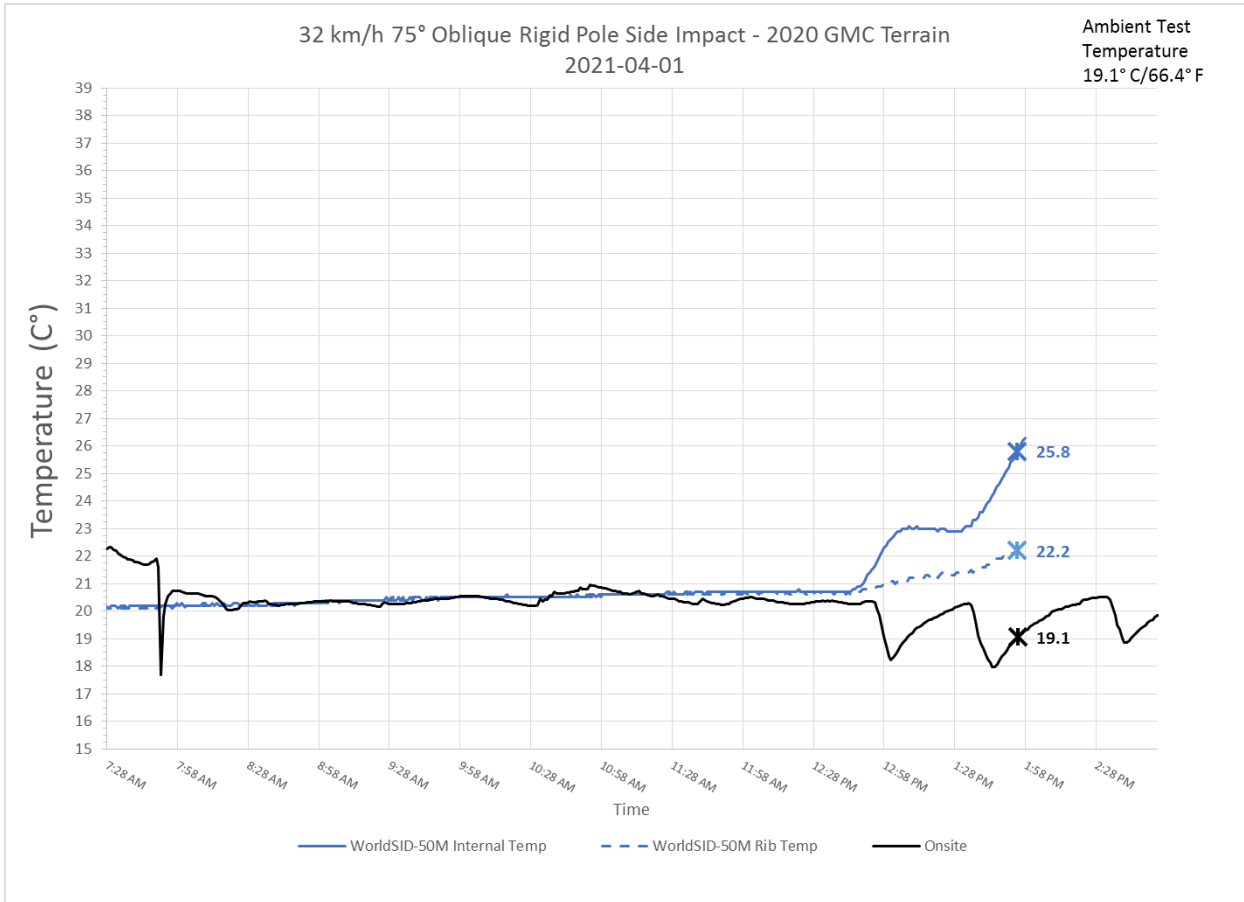
Test Vehicle: 2020 GMC Terrain
Test Program: Rigid Pole Side Impact Test Date: 4/1/2021



DATA SHEET NO. 12, CONTINUED
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2020 GMC Terrain
Test Program: Rigid Pole Side Impact

Test Date: 4/1/2021



**APPENDIX A
PHOTOGRAPHS**

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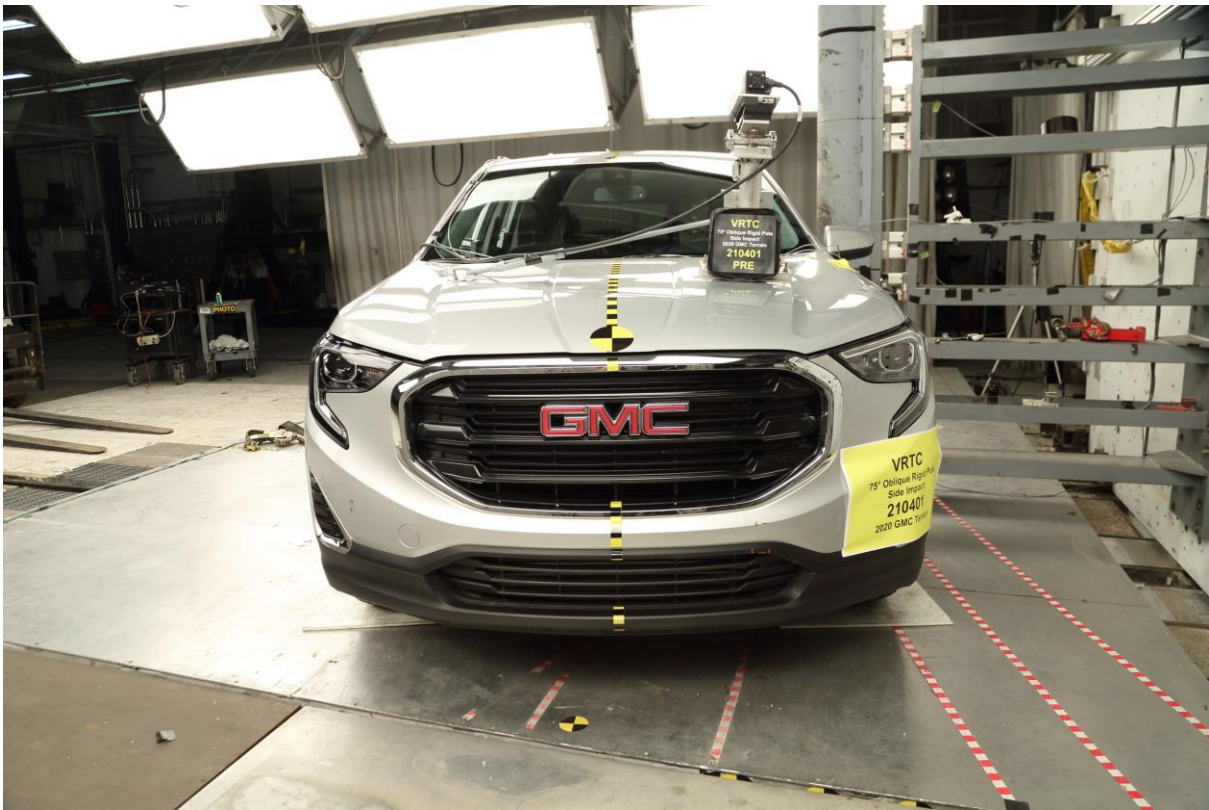
No.	Description	Page
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No. 001 As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



No. 002 As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle



No. 003 Pre-Test Frontal View of Test Vehicle



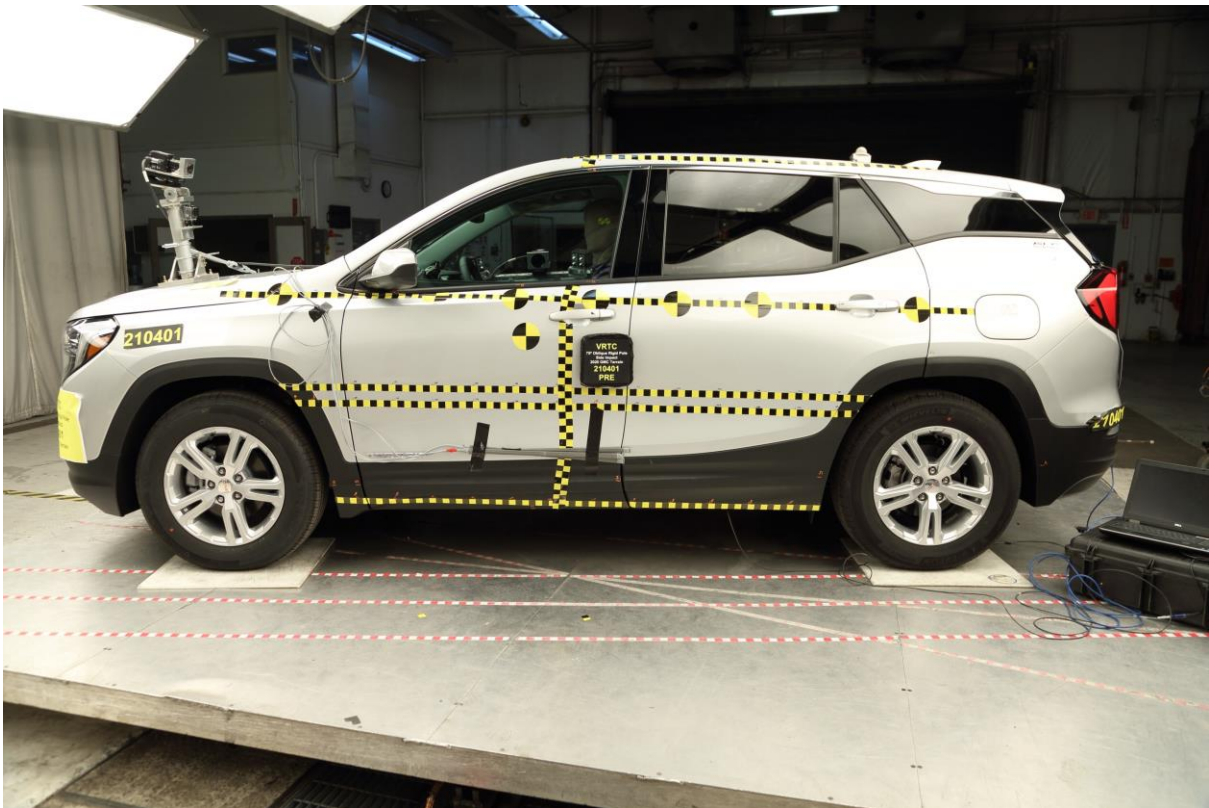
No. 004 Post-Test Frontal View of Test Vehicle



No. 005 Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle



No. 006 Post-Test Left Front $\frac{3}{4}$ 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 3/4 View of Test Vehicle



No. 010 Post-Test Left Rear 3/4 View of Test Vehicle



No. 011 Pre-Test Rear View of Test Vehicle



No. 012 Post-Test Rear View of Test Vehicle



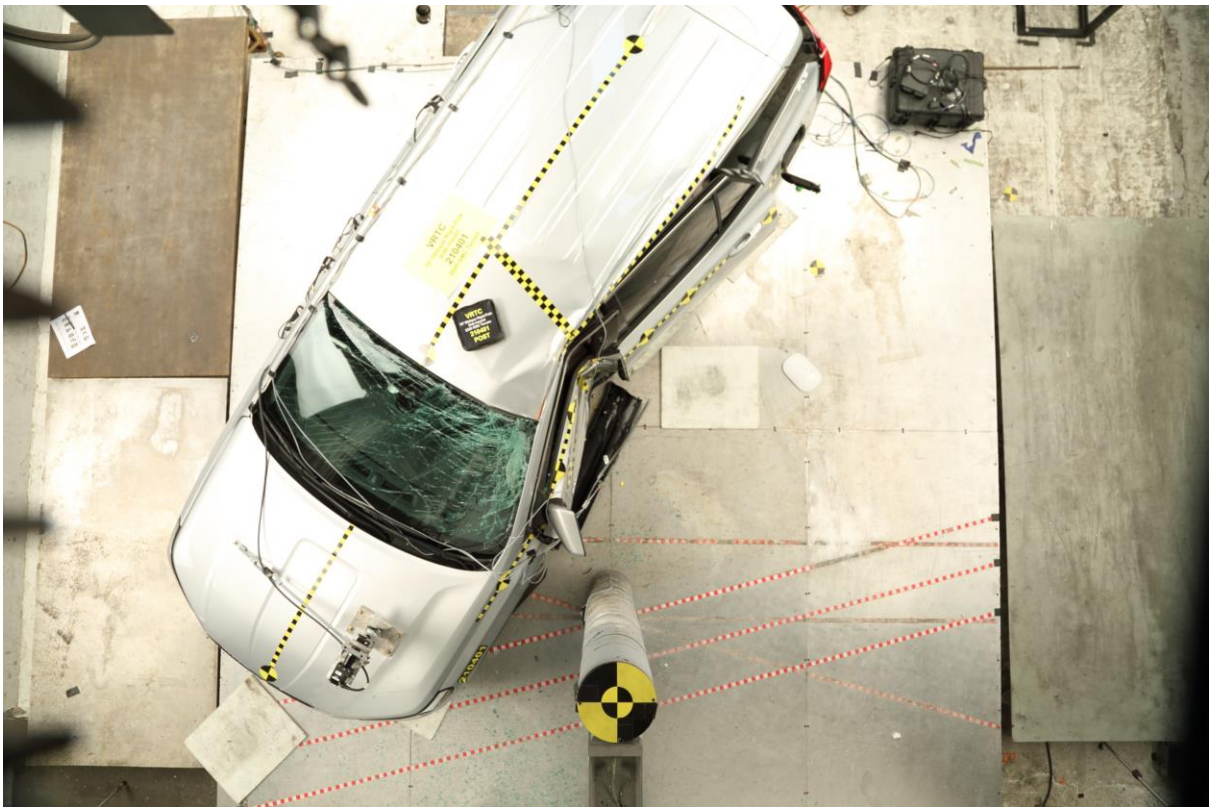
No. 013 Pre-Test Right Side View of Test Vehicle



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

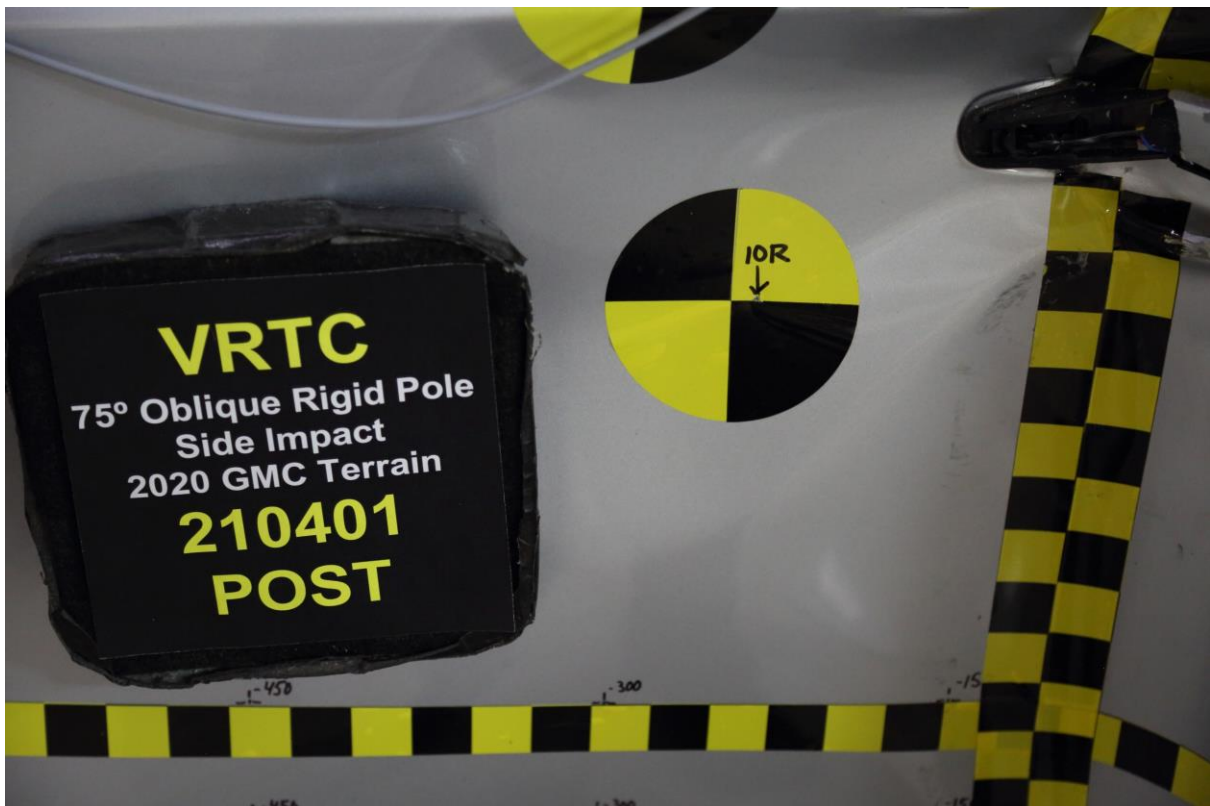
No. 018 Pre-Test Right Side View of Pole Positioned Against Side of Vehicle



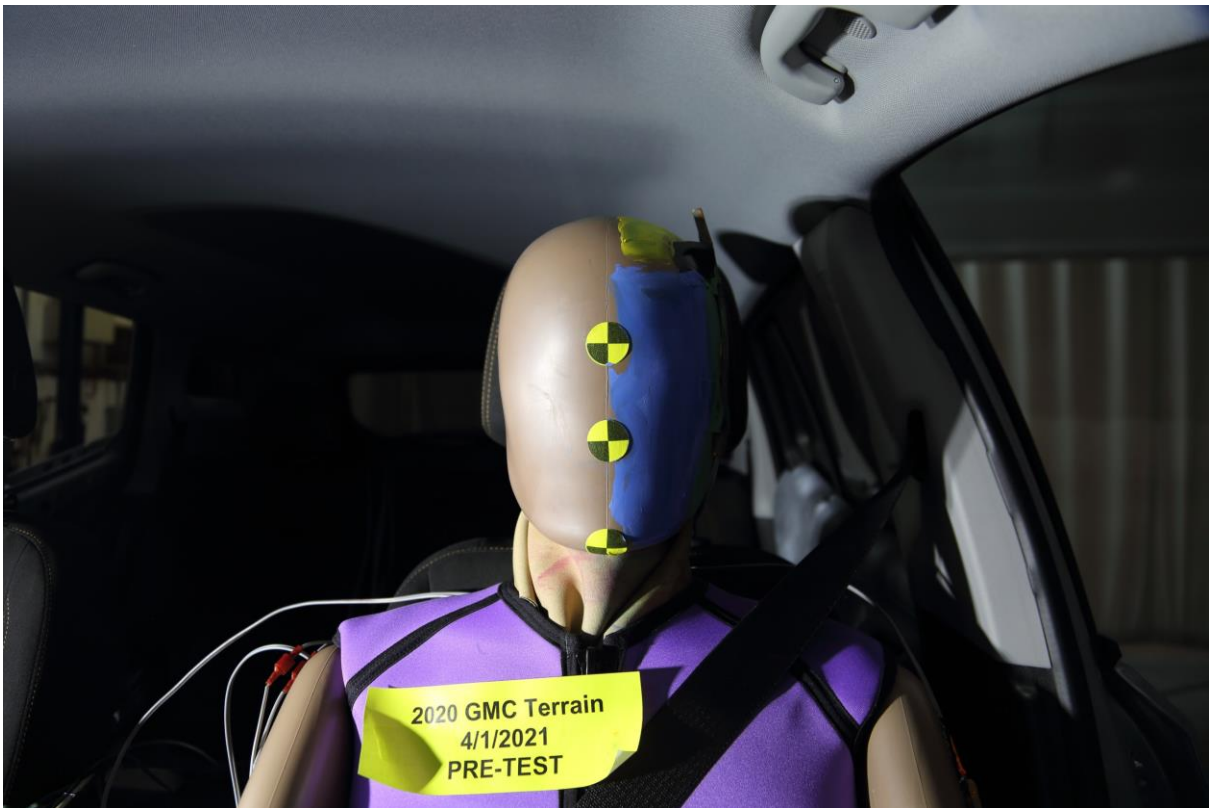
Right Side View of Pole Positioned Against Side of Vehicle



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

PHOTO NOT APPLICABLE

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

PHOTO NOT APPLICABLE

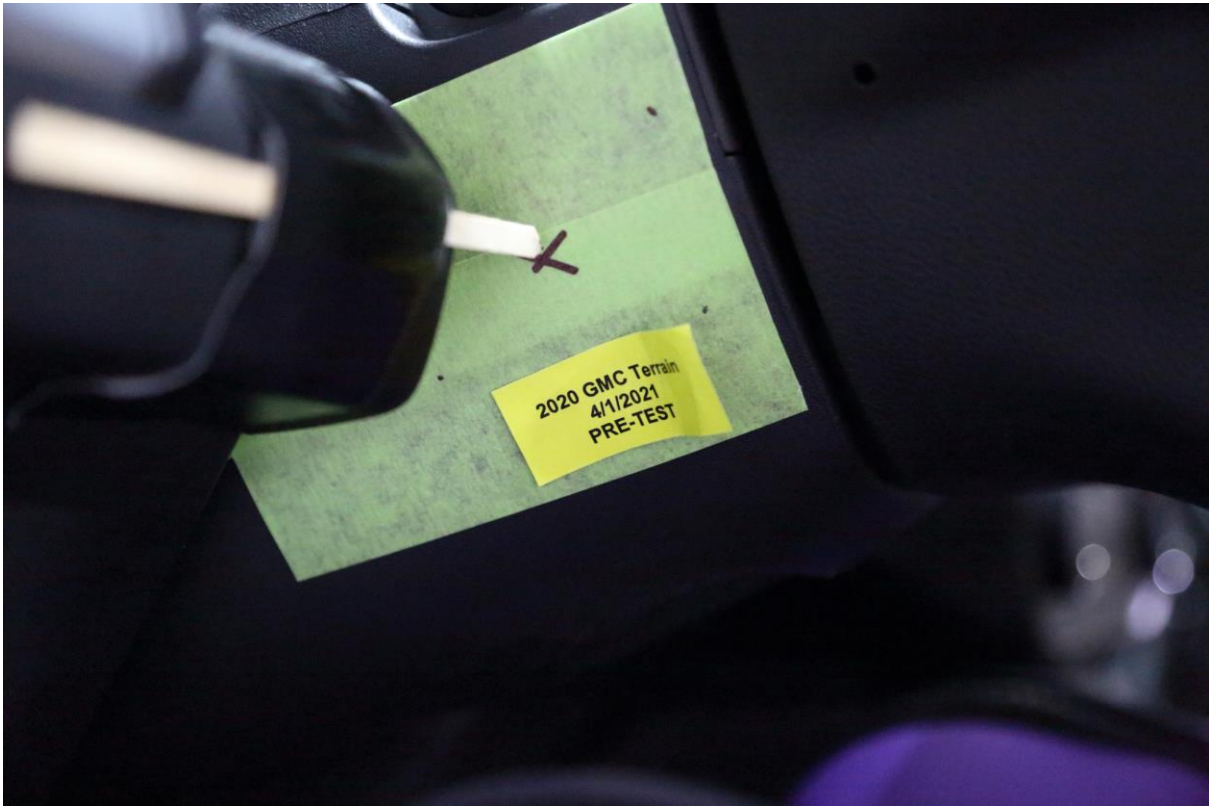
No. 031 Pre-Test Left Side View of Dummy Head Showing Dummy Head is Level



No. 032 Pre-Test Placement of Dummy Feet



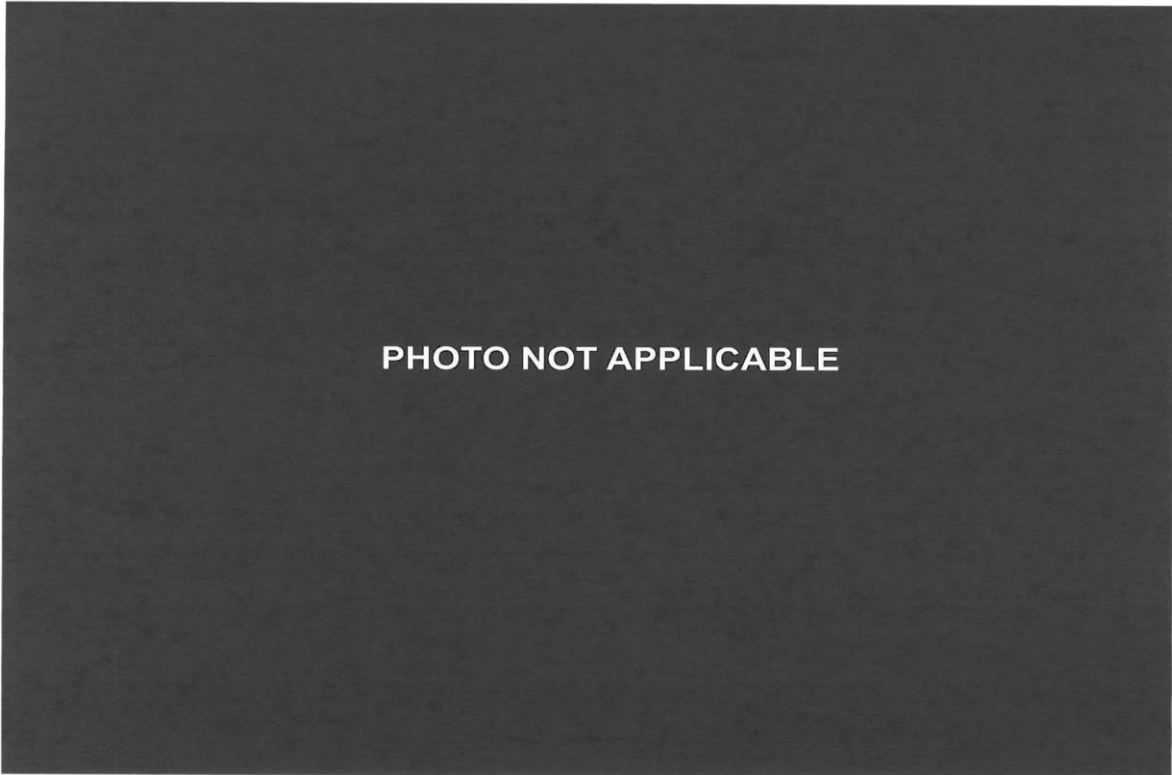
No. 033 Pre-Test View of Belt Anchorage for Dummy



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



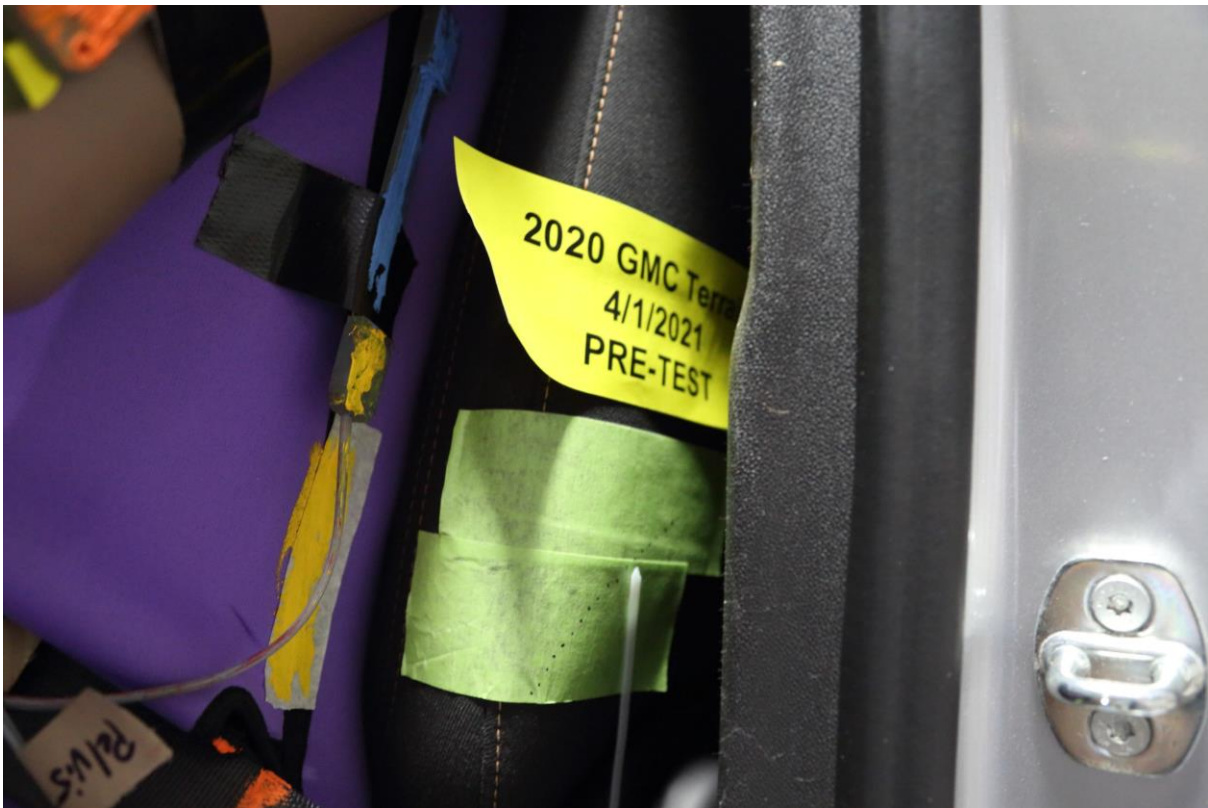
No. 035 Pre-Test View of Disengaged Parking Brake



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



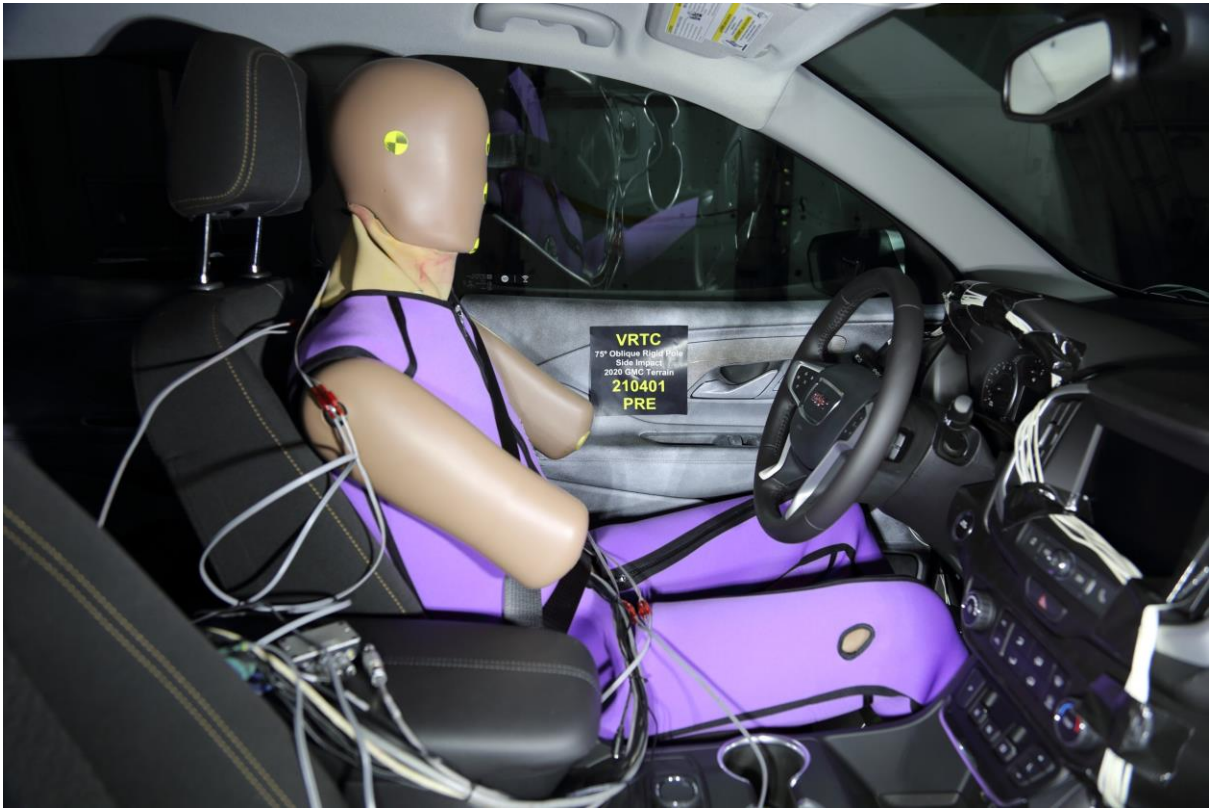
No. 039 Pre-Test Close-Up View of Driver Seat Back or Head Restraint



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

PHOTO NOT APPLICABLE

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

Intentionally Left Blank



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

PHOTO NOT AVAILABLE

No. 053 Post-Test Right Side View of Dummy and Rear Seat of Occupant Compartment

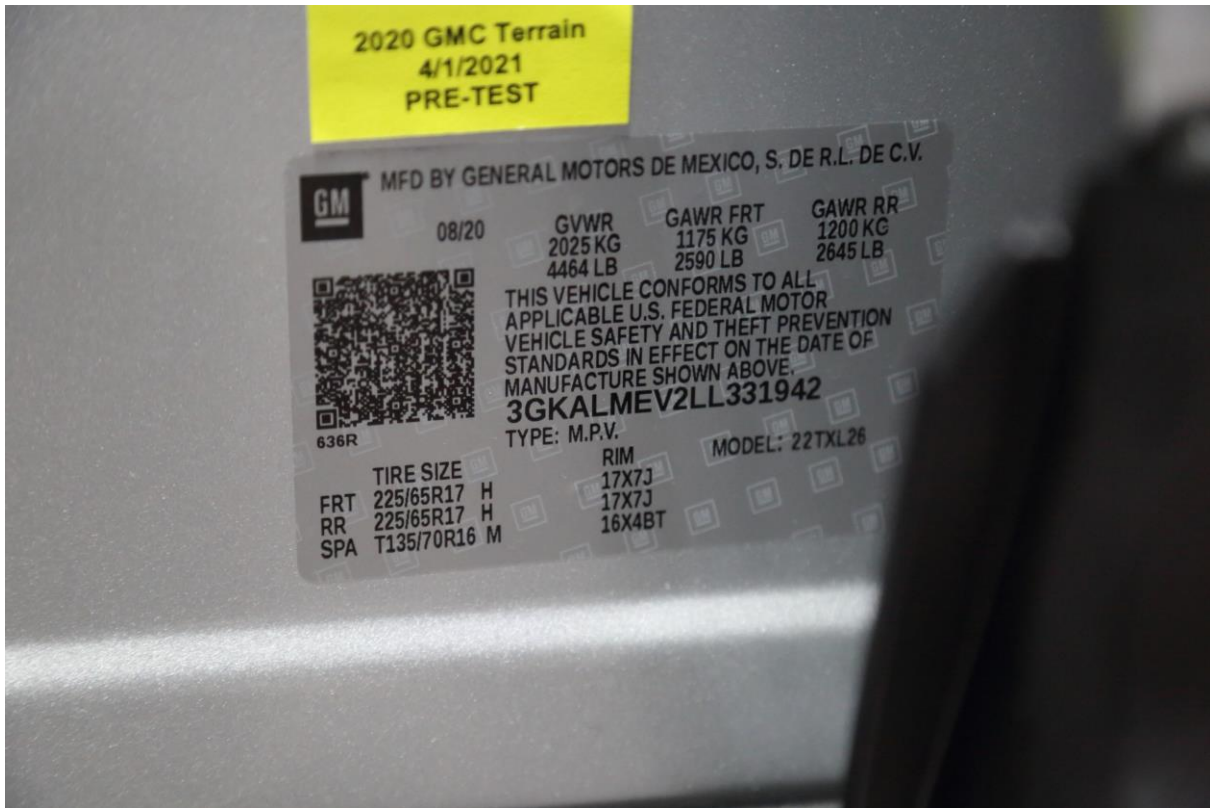
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No. 054 Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



No. 055 Post-Test View of Fuel Filler Cap or Fuel Filler Neck



No. 056 Close-Up View of Vehicle Certification Label



No. 057 Close-Up View of Vehicle Tire Information Placard or Label



No. 058 Pre-Test Pole Barrier Front View



No. 059 Post-Test Pole Barrier Front View



No. 060 Pre-Test Pole Barrier Side View



No. 061 Post-Test Pole Barrier Side View

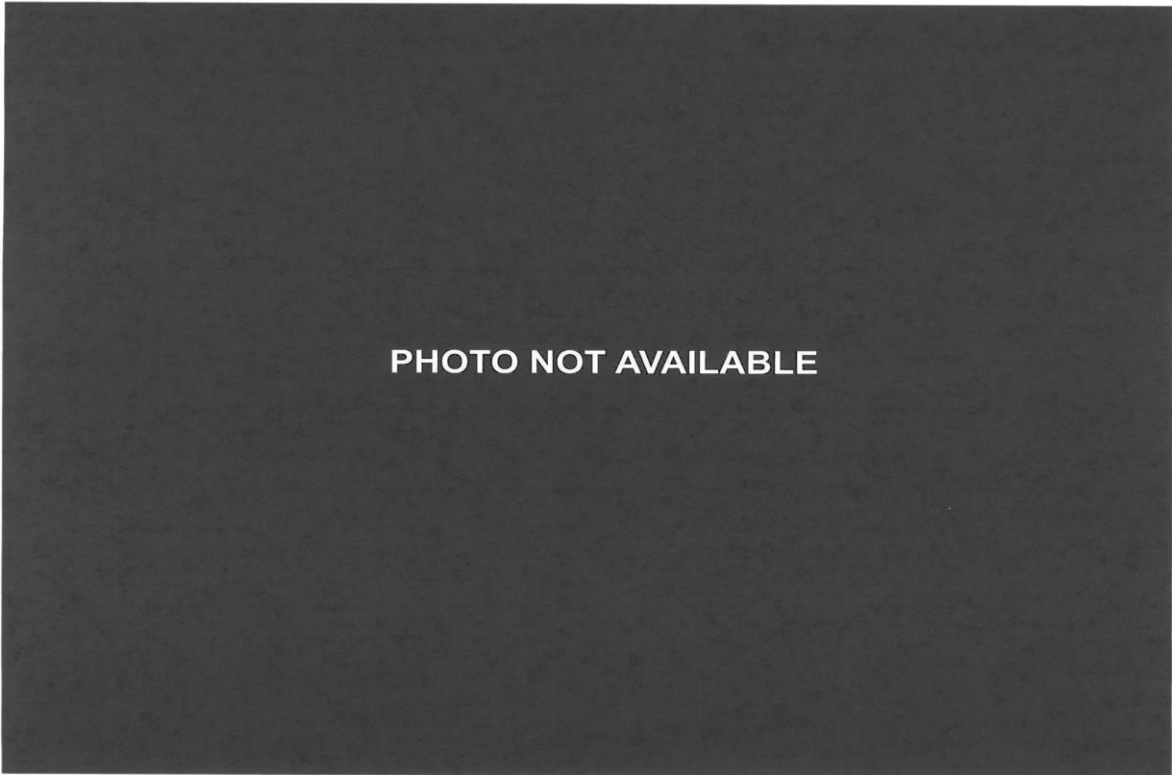


PHOTO NOT AVAILABLE

No. 062 Pre-Test Ballast View



No. 063 Post-Test Primary and Redundant Speed Trap Read Out



PHOTO NOT APPLICABLE

No. 064 FMVSS No. 301 Static Rollover 0 Degrees



PHOTO NOT APPLICABLE

No. 065 FMVSS No. 301 Static Rollover 90 Degrees



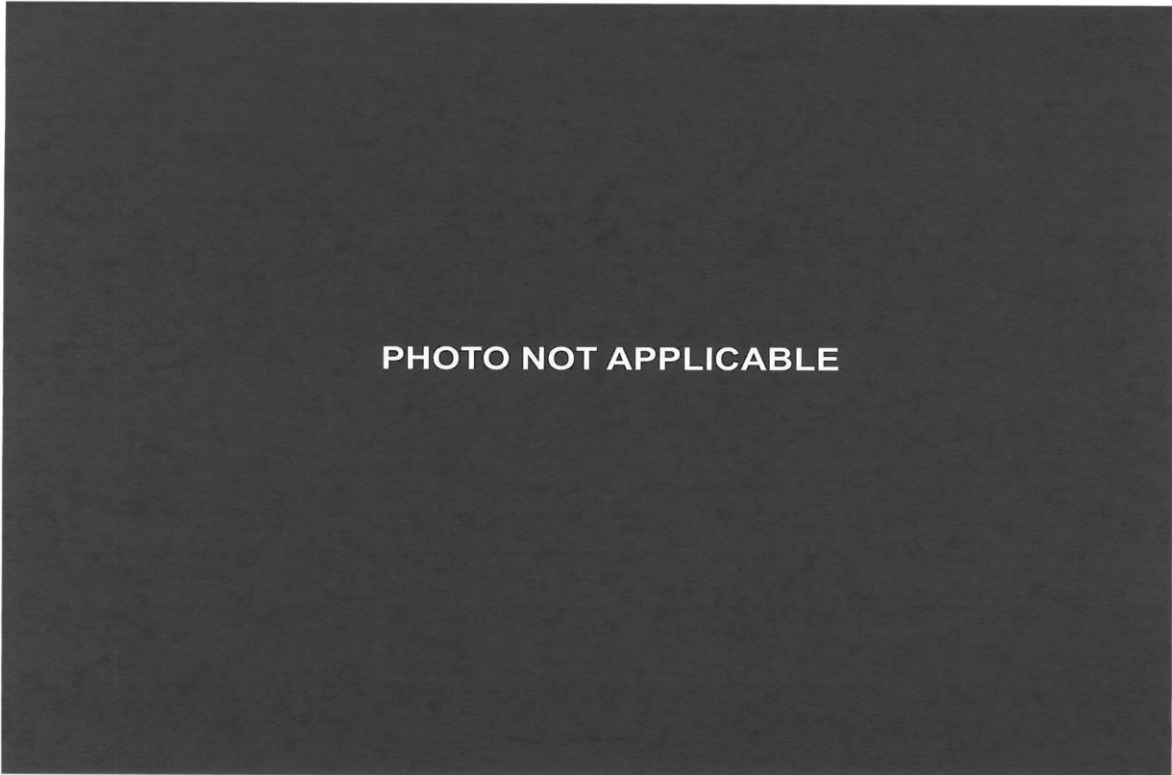
PHOTO NOT APPLICABLE

No. 066 FMVSS No. 301 Static Rollover 180 Degrees



PHOTO NOT APPLICABLE

No. 067 FMVSS No. 301 Static Rollover 270 Degrees



No. 068 FMVSS No. 301 Static Rollover 360 Degrees



No. 069 Impact Event



2020 TERRAIN FWD SLE

EXTERIOR: QUICKSILVER METALLIC
INTERIOR: JET BLACK

ENGINE: 1.5L TURBO DOHC 4-CYL
TRANSMISSION: 9-SPD AUTOMATIC

Visit us at www.gmc.com

STANDARD EQUIPMENT <small>STANDARD EQUIPMENT BELOW NOT INCLUDED AT NO EXTRA CHARGE IN THE STANDARD VEHICLE PRICE SHOWN.</small> OWNER BENEFITS <ul style="list-style-type: none"> • 3 YEAR/36,000 MILE* BUMPER-TO-BUMPER LIMITED WARRANTY • 5 YEAR/60,000 MILE* POWERTRAIN LIMITED WARRANTY, ROADSIDE ASSISTANCE & COURTESY TRANSPORTATION • FIRST MAINTENANCE VISIT • *WHICHEVER COMES FIRST SEE GMC.COM OR DEALER FOR TERMS, DETAILS & LIMITS INTERIOR <ul style="list-style-type: none"> • AIR CONDITIONING, SINGLE-ZONE MANUAL • SEATBACK, PASSENGER SIDE, FLAT FOLDING • POWER WINDOW W/ EXPRESS DRIVER UP/DOWN 		<ul style="list-style-type: none"> • STEERING WHEEL, LEATHER-WRAPPED 4 SPOKE • AUDIO SYSTEM, 6 SPEAKER • DRIVER INFO DISPLAY, 4.2" MULTI-COLOR EXTERIOR <ul style="list-style-type: none"> • HEADLAMPS, HIGH INTENSITY DISCHARGE • DAYTIME RUNNING LAMPS, LED SIGNATURE • TAIL LAMPS, LED SIGNATURE SAFETY & SECURITY <ul style="list-style-type: none"> • GMC PRO SAFETY: <ul style="list-style-type: none"> *INTELLISEAM *FRONT PEDESTRIAN BRAKING *AUTOMATIC EMERGENCY BRAKING *LANE KEEP ASSIST W/ LANE DEPARTURE WARNING *FORWARD COLLISION ALERT *FOLLOWING DISTANCE INDICATOR *REAR VISION CAMERA *TEEN DRIVER 	<ul style="list-style-type: none"> • REAR DR. LOCKS, CHILD SECURITY • THEFT DETERRENT SYSTEM • TIRE PRESSURE MONITOR, W/ TIRE FILL ALERT (EXCL. SPARE TIRE) PERFORMANCE & MECHANICAL <ul style="list-style-type: none"> • ELECTRONIC PRECISION SHIFT • TRACTION SELECT SYSTEM • COMPACT SPARE TIRE • HILL DESCENT CONTROL • STABILITRAK - STABILITY CONTROL SYSTEM W/ TRACTION CONTROL CONNECTIVITY & TECHNOLOGY <ul style="list-style-type: none"> • ONSTAR (R) SERVICES & 4G LTE W/FI (R) AVAILABLE; SEE ONSTAR.COM FOR TERMS • GMC INFOTAINMENT SYSTEM W/ 7" DIAG. COLOR TOUCHSCREEN ADDITIONAL FEATURES FOR COMPATIBLE PHONES INCLUDE: <ul style="list-style-type: none"> • BLUETOOTH AUDIO STREAMING 	VOICE COMMAND PASS/THROUGH TO PHONE, ANDROID AUTO & APPLE CARPLAY CAPABLE <ul style="list-style-type: none"> • USB CHARGING-ONLY PORTS, 2 • 2 USB PORTS, AUXILIARY INPUT JACK • REMOTE KEYLESS REMOTE OPEN <small>MANUFACTURER'S SUGGESTED RETAIL PRICE (STANDARD EQUIPMENT SHOWN)</small> STANDARD VEHICLE PRICE \$28,400.00 OPTIONS & PRICING <small>OPTIONS INSTALLED BY THE MANUFACTURER MAY REPLACE STANDARD EQUIPMENT (SOME)</small> QUICKSILVER METALLIC 495.00 TOTAL OPTIONS \$495.00 TOTAL VEHICLE & OPTIONS \$28,895.00 DESTINATION CHARGE 1,195.00 TOTAL VEHICLE PRICE* \$30,090.00					
EPA DOT Fuel Economy and Environment Fuel Economy 27 MPG <small>Small SUV's range from 16 to 120 MPG. The best vehicle rates 136 MPG.</small> 26 30 <small>combined city/hwy city highway</small> 3.7 gallons per 100 miles You save \$0 in fuel costs over 5 years <small>compared to the average new vehicle.</small>		Gasoline Vehicle GOVERNMENT 5-STAR SAFETY RATINGS Overall Vehicle Score ★★★★★ <small>Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.</small> <table border="1"> <tr> <td>Frontal Crash</td> <td>Driver Passenger</td> <td>★★★★★</td> </tr> <tr> <td>Side Crash</td> <td>Front seat Rear seat</td> <td>★★★★★</td> </tr> </table> <small>Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.</small> <small>Based on the risk of injury in a side impact.</small> Rollover ★★★★★ <small>Based on the risk of rollover in a single-vehicle crash.</small> Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. <small>Source: National Highway Traffic Safety Administration (NHTSA)</small> www.safercar.gov or 1-888-327-4236		Frontal Crash	Driver Passenger	★★★★★	Side Crash	Front seat Rear seat	★★★★★
Frontal Crash	Driver Passenger	★★★★★							
Side Crash	Front seat Rear seat	★★★★★							
Annual fuel cost \$1,500 Fuel Economy & Greenhouse Gas Rating (tailpipe only) 6 (Best) (Worst) <small>This vehicle emits 325 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also cause emissions, known as well-to-wheel.</small> Smog Rating (tailpipe only) 7 (Best) (Worst) <small>Smog Rating is based on the amount of smog-causing pollutants emitted by the vehicle.</small>		PARTS CONTENT INFORMATION FOR VEHICLES IN THIS CARLINE: U.S./CANADIAN PARTS CONTENT: 47% MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO 29% <small>NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.</small> FOR THIS VEHICLE: FINAL ASSEMBLY POINT: SAN LUIS POTOSI, MEXICO COUNTRY OF ORIGIN: ENGINE: MEXICO TRANSMISSION: UNITED STATES <small>© 2019 General Motors LLC. GM LLC. PRICE DOES NOT INCLUDE TAXES, LICENSE, AND REGISTRATION FEES.</small>							
fuel economy.gov <small>Calculate personalized estimates and compare vehicles.</small>		Equipped with the safety and security of OnStar: <small>visit onstar.com for details.</small>							

No. 70 Monroney Label


Head Restraints

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

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.

If your vehicle has rear head restraints that fold down, always return them to the full upright position whenever an occupant is seated in the seat.

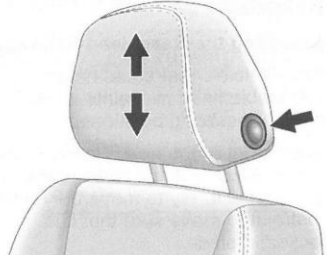


Adjust the head restraint so that the top of the restraint is at the same height as the top of the occupant's head. This position reduces the chance of a neck injury in a crash.

Front Seats

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

Seats and Restraints 37



The height of the head restraint can be adjusted.

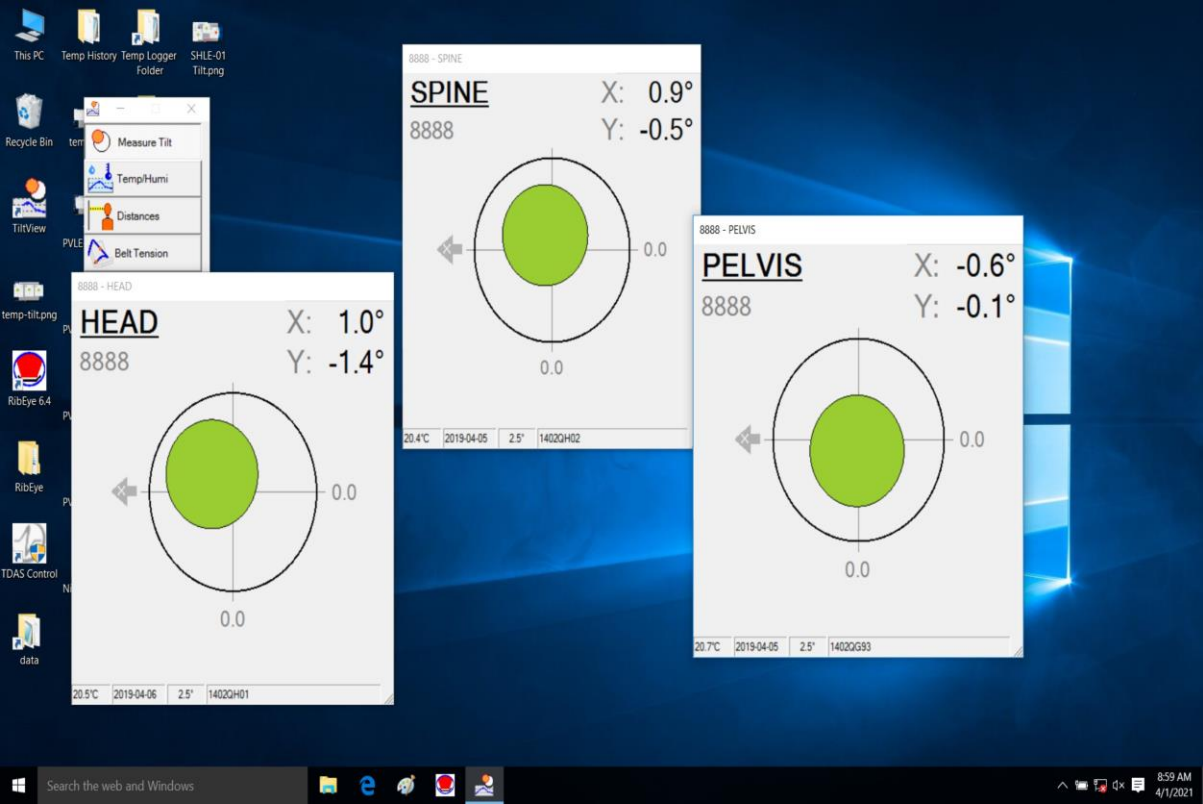
To raise or lower the head restraint, press the button located on the side of the head restraint and pull up or push the head restraint down, and release the button. Pull and push on the head restraint after the button is released to make sure that it is locked in place.

The front seat outboard head restraints are not removable.

No. 071 Head Restraint Use and Adjustment Information from Vehicle Owner Manual

PHOTO NOT APPLICABLE

No. 072 Post-Test View of Shattered Vehicle Inner Door Panel



No. 073 WorldSID-50M Pre-Test Tilt Sensor View

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

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4	Driver Head Resultant Acceleration	B-8
5	Driver Head Angular Rate (X)	B-9
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8	Driver Upper Neck Force (X)	B-10
9	Driver Upper Neck Force (Y)	B-10
10	Driver Upper Neck Force (Z)	B-10
11	Driver Upper Neck Moment (X)	B-11
12	Driver Upper Neck Moment (Y)	B-11
13	Driver Upper Neck Moment (Z)	B-11
14	Driver Lower Neck Force (X)	B-12
15	Driver Lower Neck Force (Y)	B-12
16	Driver Lower Neck Force (Z)	B-12
17	Driver Lower Neck Moment (X)	B-13
18	Driver Lower Neck Moment (Y)	B-13
19	Driver Lower Neck Moment (Z)	B-13
20	Driver Shoulder Force (X)	B-14
21	Driver Shoulder Force (Y)	B-14
22	Driver Shoulder Force (Z)	B-14
23	Driver Shoulder Rear Displacement (X)	B-15
24	Driver Shoulder Rear Displacement (Y)	B-15
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27	Driver Shoulder Middle Displacement (X)	B-16
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31	Driver Shoulder Front Displacement (X)	B-17
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37	Driver Thorax Rib 1 Rear Displacement (Z)	B-18
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39	Driver Thorax Rib 1 Middle Displacement (X)	B-19
40	Driver Thorax Rib 1 Middle Displacement (Y)	B-19
41	Driver Thorax Rib 1 Middle Displacement (Z)	B-19
42	Driver Thorax Rib 1 Middle Length Change	B-19
43	Driver Thorax Rib 1 Front Displacement (X)	B-20
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45	Driver Thorax Rib 1 Front Displacement (Z)	B-20
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47	Driver Thorax Rib 2 Rear Displacement (X)	B-21
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55	Driver Thorax Rib 2 Front Displacement (X)	B-23
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Driver Dummy & Vehicle Instrumentation Plots

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69	Driver Thorax Rib 3 Front Displacement (Z)	B-26
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74	Driver Abdomen Rib 1 Rear Length Change	B-27
75	Driver Abdomen Rib 1 Middle Displacement (X)	B-28
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77	Driver Abdomen Rib 1 Middle Displacement (Z)	B-28
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79	Driver Abdomen Rib 1 Front Displacement (X)	B-29
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93	Driver Abdomen Rib 2 Front Displacement (Z)	B-32
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101	Driver Spine T4 Acceleration (Z)	B-34
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159	Right Roof at Vertical Impact Reference Line Acceleration (Y)	B-52
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TABLE OF DATA PLOTS, CONTINUED

Driver Dummy & Vehicle Instrumentation Plots

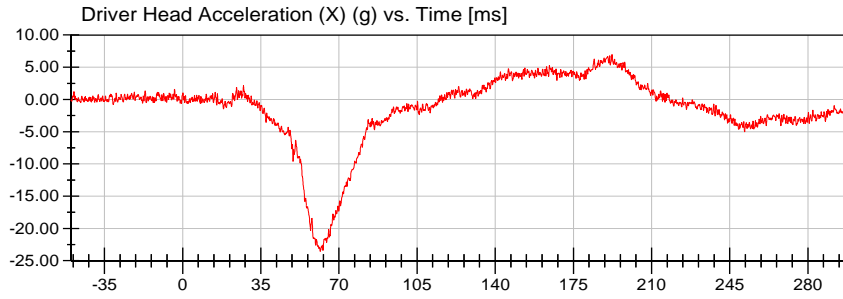
No.	Description	Page
168	Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)	B-55
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193	Load Cell Pole Barrier #8 Force (Y)	B-61

VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



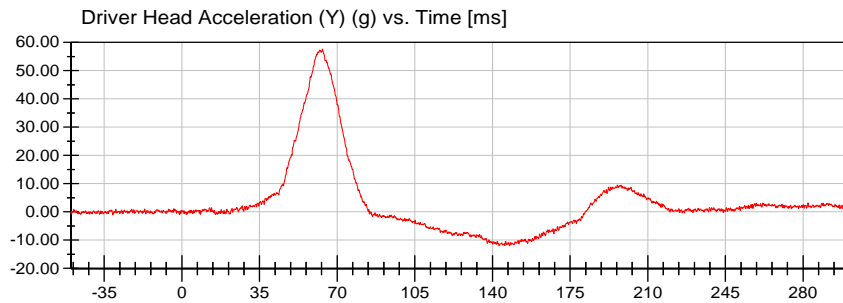
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6.94 g at 192.30 ms

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-23.58 g at 61.65 ms

CFC_1000



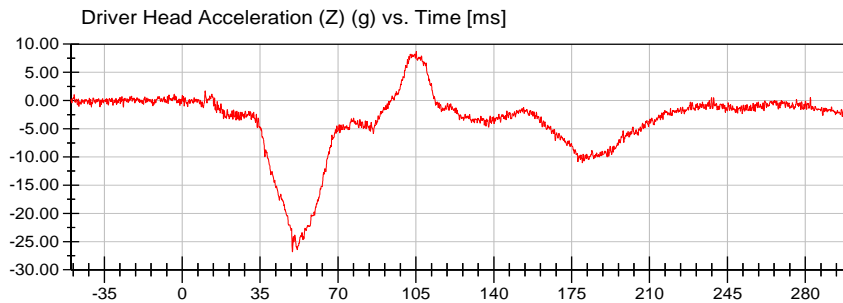
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57.62 g at 63.40 ms

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-12.00 g at 143.00 ms

CFC_1000



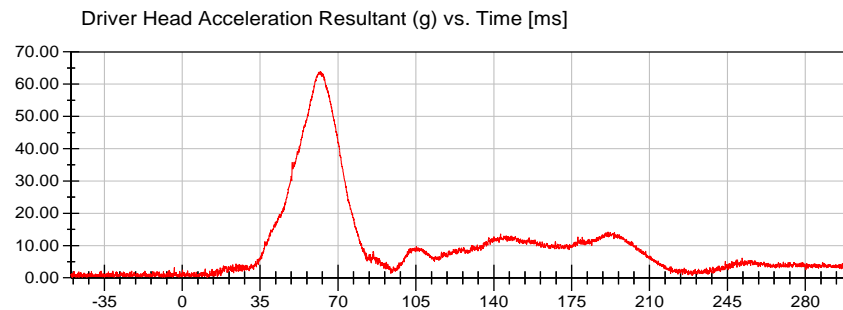
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8.72 g at 105.15 ms

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-26.83 g at 49.50 ms

CFC_1000



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63.86 g at 62.20 ms

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0.17 g at -34.90 ms

Prefiltered_> CFC 1000



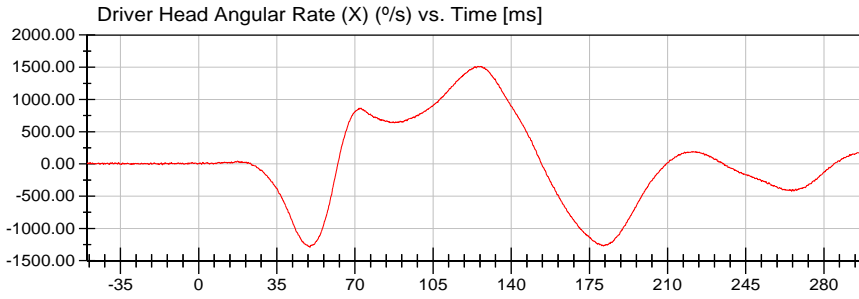
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



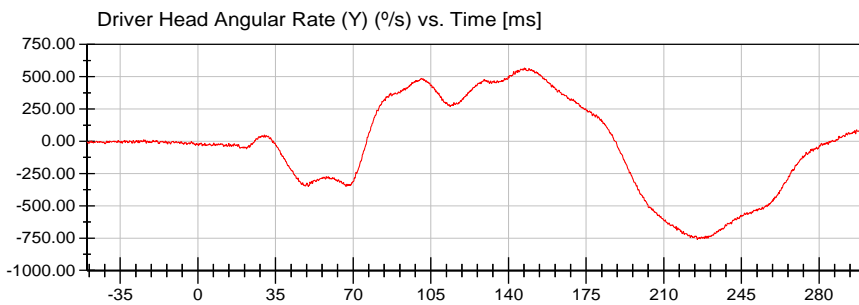
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1,513.71 °/s at 124.90 ms

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-1,291.03 °/s at 49.85 ms

CFC_1000



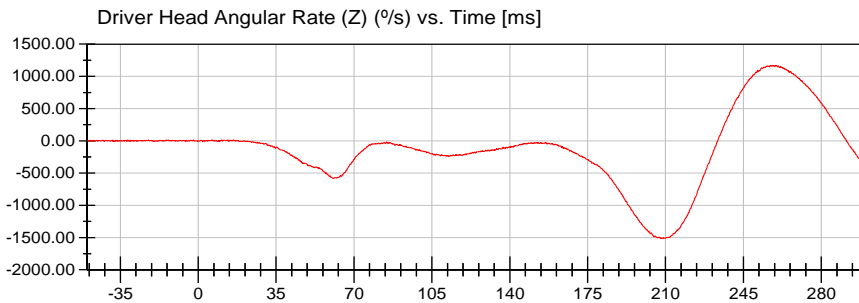
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567.69 °/s at 147.25 ms

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-759.83 °/s at 225.15 ms

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1,170.03 °/s at 258.25 ms

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-1,516.76 °/s at 208.40 ms

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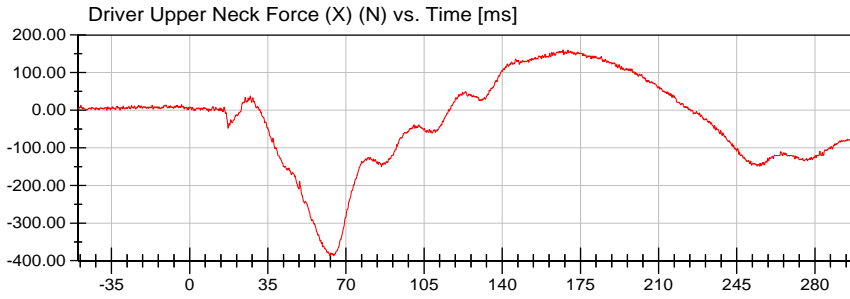


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



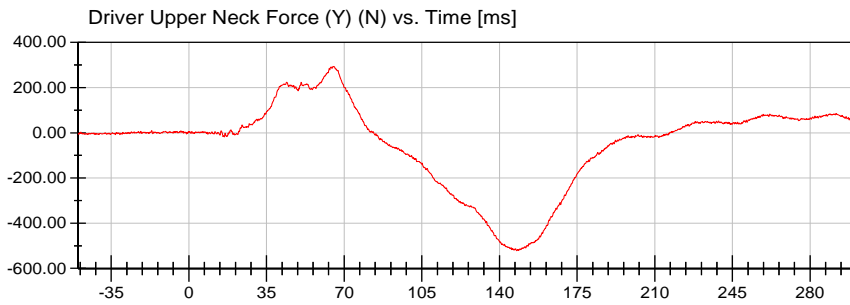
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160.76 N at 167.25 ms

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-387.14 N at 64.55 ms

CFC_1000



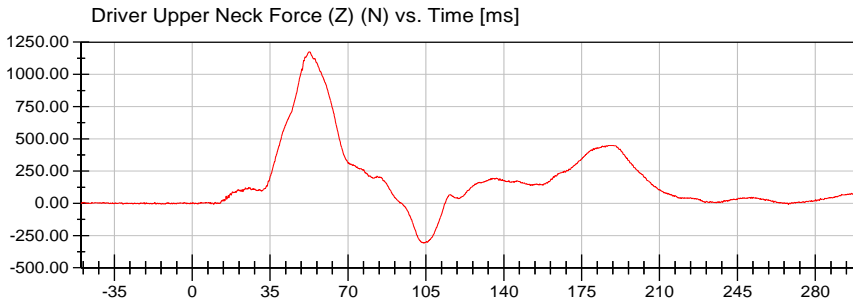
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293.88 N at 65.05 ms

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-521.57 N at 147.70 ms

CFC_1000



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1,174.99 N at 52.75 ms

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-307.72 N at 103.85 ms

CFC_1000



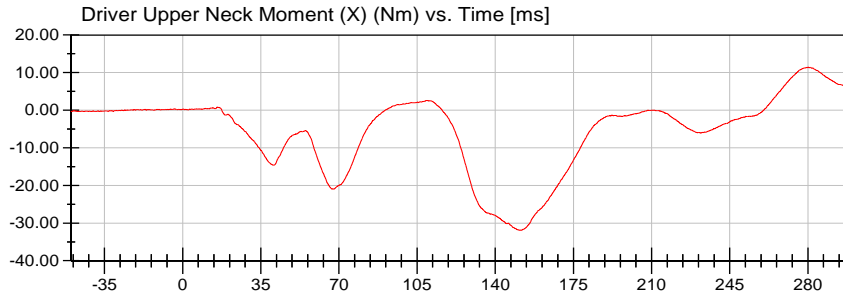
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Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



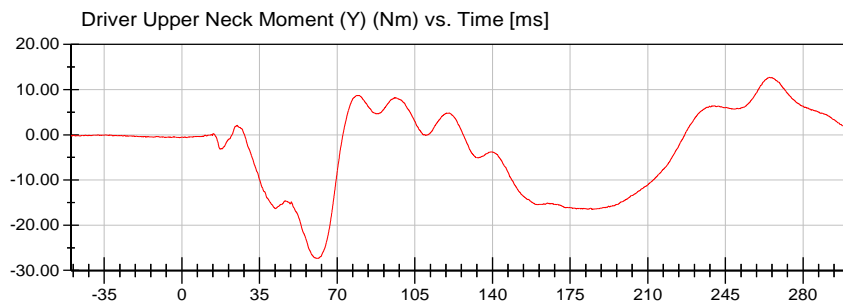
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11.44 Nm at 280.15 ms

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-31.93 Nm at 151.10 ms

CFC_600



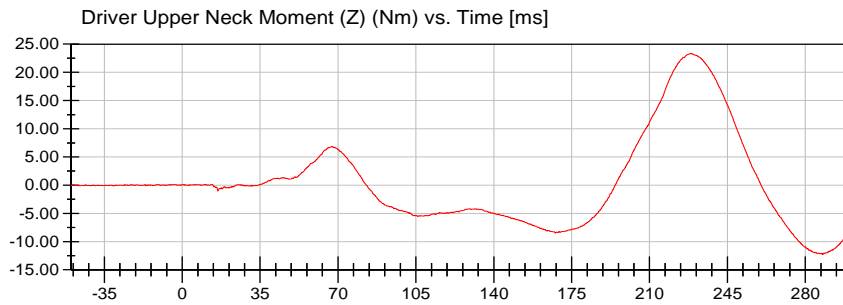
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12.70 Nm at 264.75 ms

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-27.34 Nm at 61.50 ms

CFC_600



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23.31 Nm at 228.30 ms

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-12.26 Nm at 287.80 ms

CFC_600



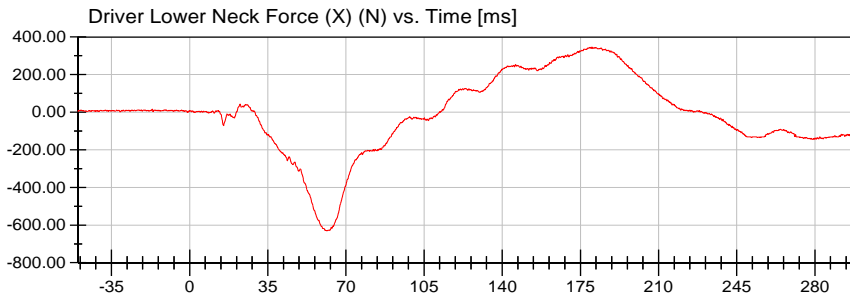
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



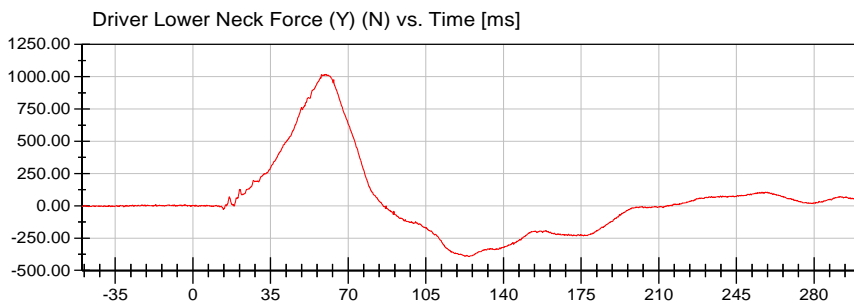
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345.93 N at 180.20 ms

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-631.92 N at 61.55 ms

CFC_1000



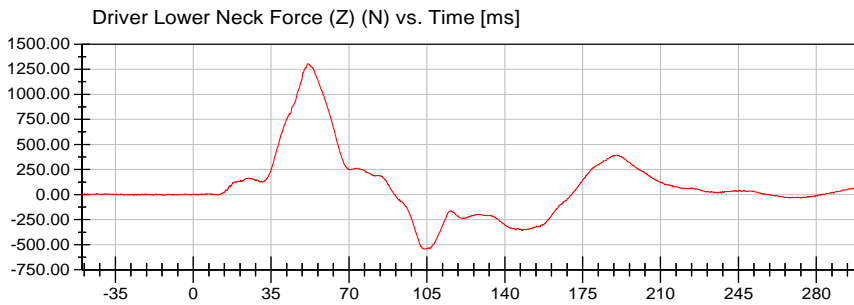
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1,018.97 N at 59.95 ms

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-393.42 N at 124.25 ms

CFC_1000



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1,305.81 N at 51.60 ms

<Min>

-542.93 N at 103.70 ms

CFC_1000



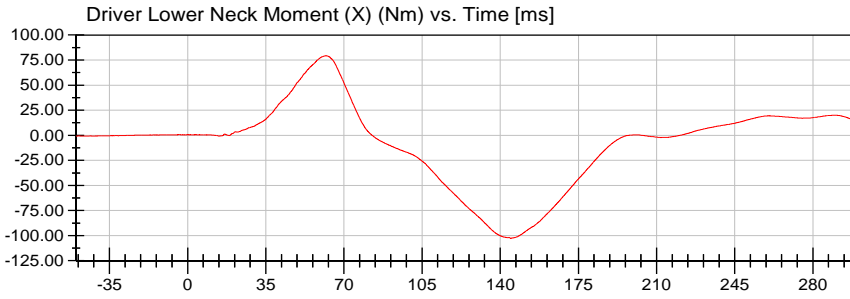
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



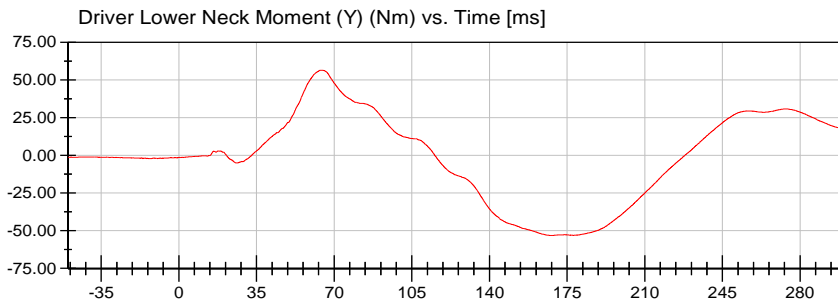
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79.26 Nm at 61.95 ms

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-102.75 Nm at 144.70 ms

CFC_600



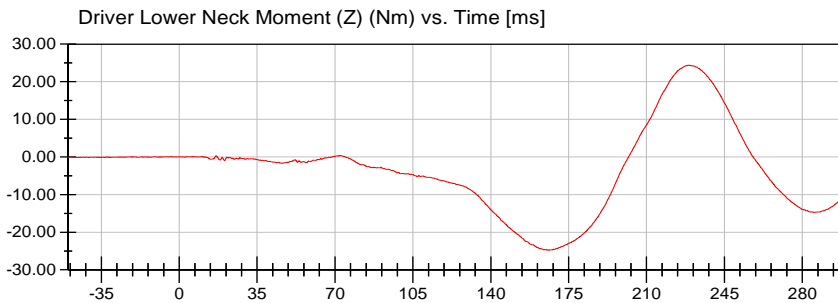
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56.50 Nm at 64.15 ms

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-53.21 Nm at 168.75 ms

CFC_600



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24.40 Nm at 229.00 ms

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-24.76 Nm at 166.00 ms

CFC_600



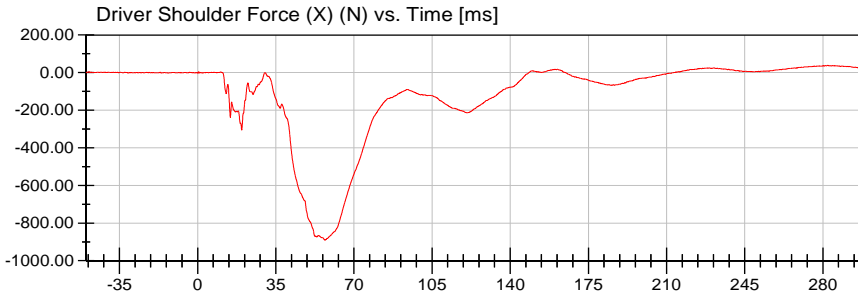
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



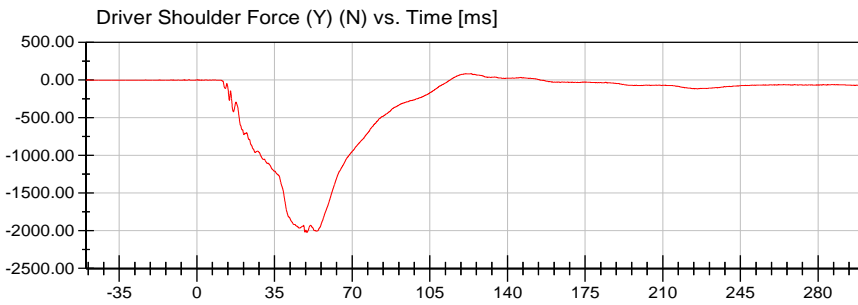
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38.89 N at 282.20 ms

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-890.51 N at 57.05 ms

CFC_600



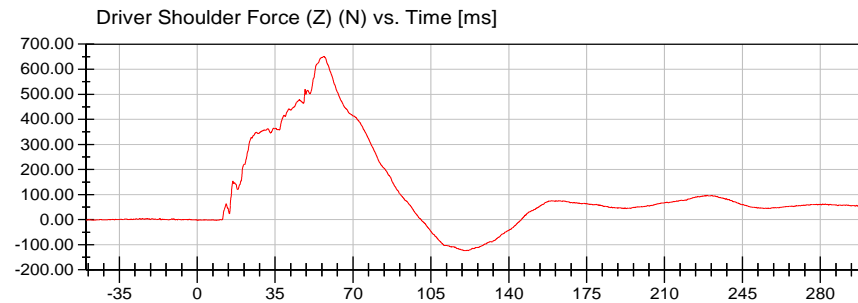
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85.09 N at 123.55 ms

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-2,020.51 N at 49.60 ms

CFC_600



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650.95 N at 56.90 ms

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-123.84 N at 120.75 ms

CFC_600

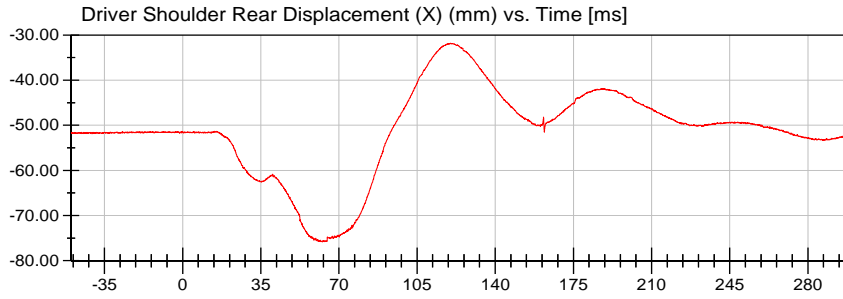


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



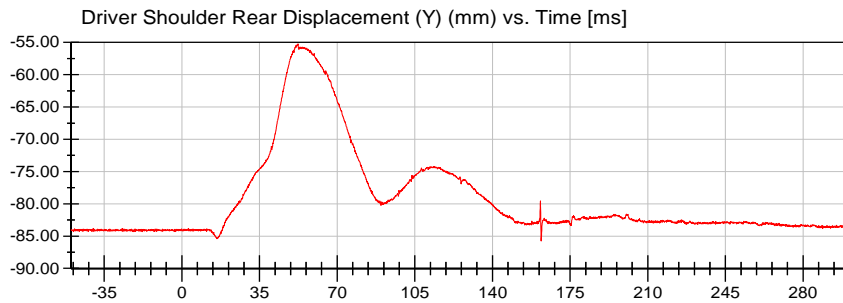
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-31.85 mm at 119.95 ms

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-75.84 mm at 61.85 ms

Unfiltered



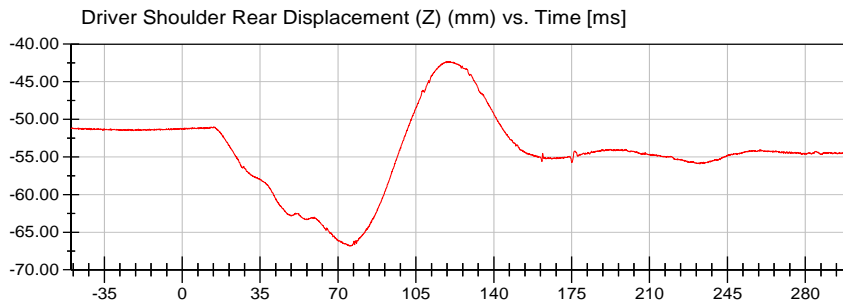
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-85.76 mm at 162.00 ms

Unfiltered



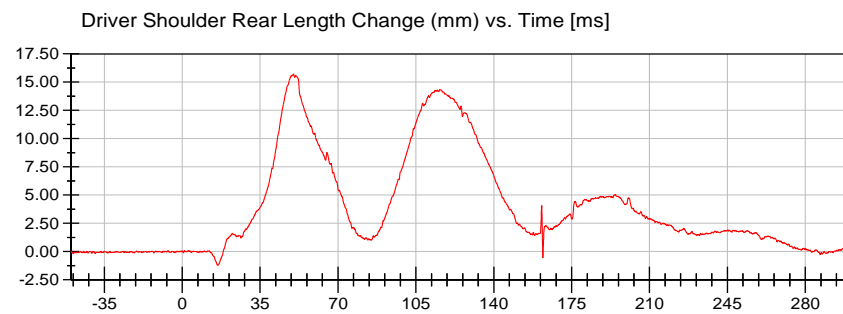
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-42.29 mm at 119.20 ms

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-66.85 mm at 75.20 ms

Unfiltered



<Max>

15.70 mm at 50.00 ms

<Min>

-1.21 mm at 15.90 ms

CFC_600

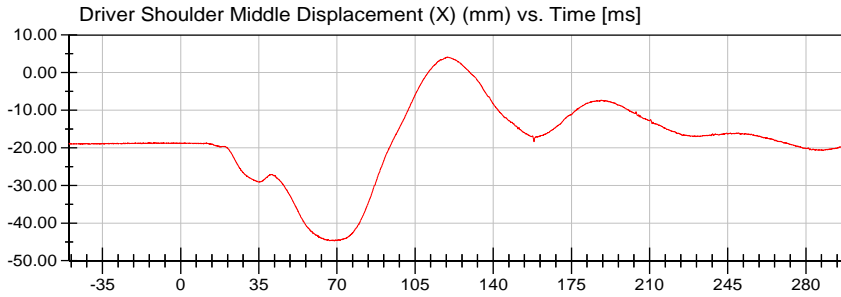


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



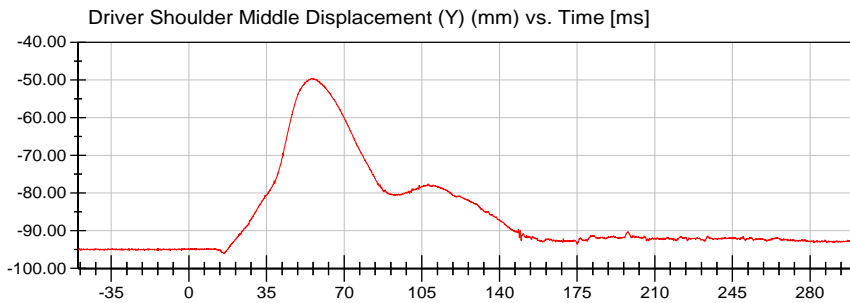
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4.15 mm at 119.45 ms

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-44.78 mm at 68.85 ms

Unfiltered



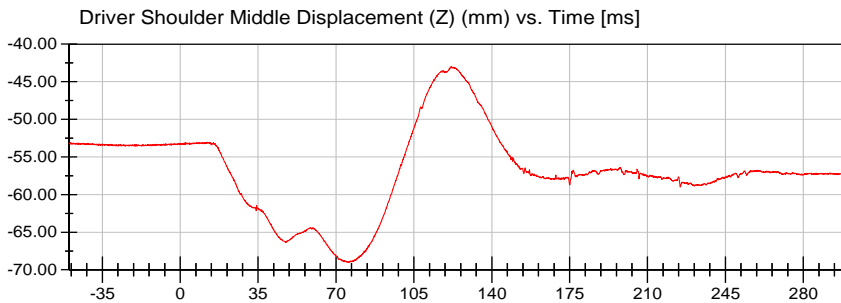
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-96.10 mm at 15.80 ms

Unfiltered



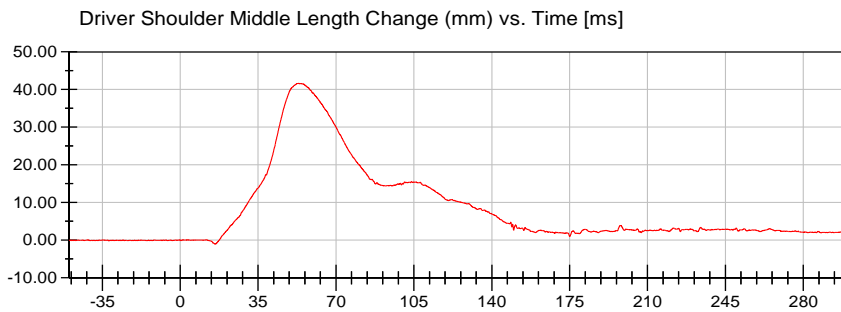
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-42.95 mm at 121.80 ms

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-69.03 mm at 75.80 ms

Unfiltered



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41.63 mm at 53.25 ms

<Min>

-1.06 mm at 15.80 ms

CFC_600

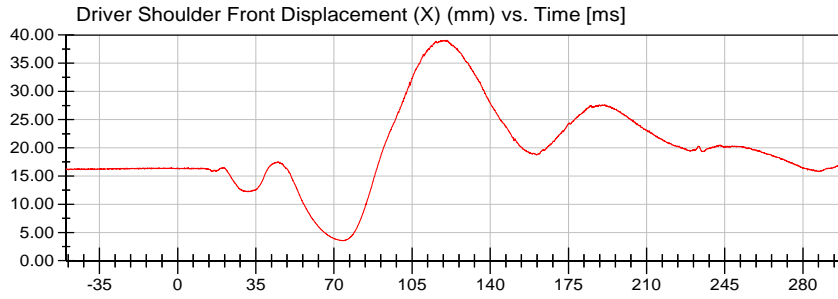


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

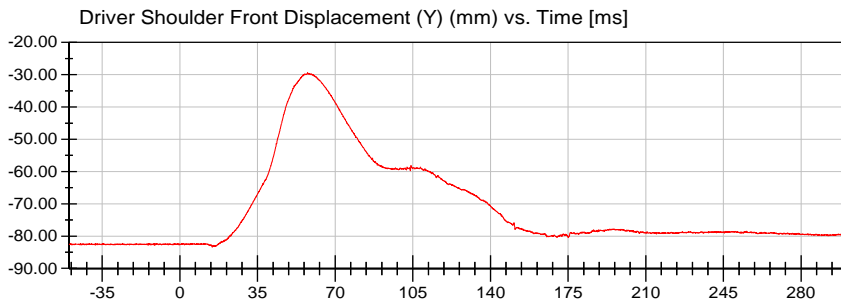
Test Date: 04/01/2021



<Max>
39.09 mm at 120.55 ms

<Min>
3.51 mm at 73.65 ms

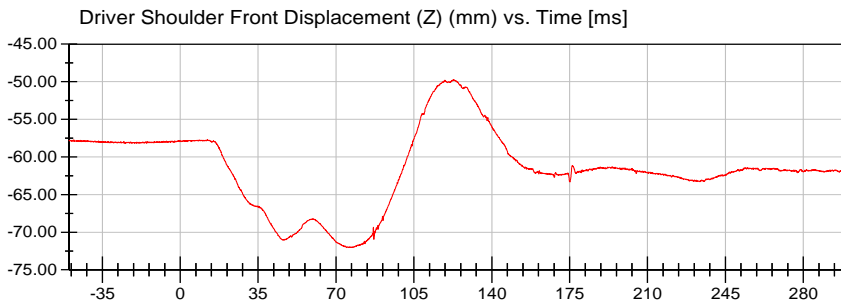
Unfiltered



<Max>
-29.31 mm at 57.60 ms

<Min>
-83.39 mm at 14.60 ms

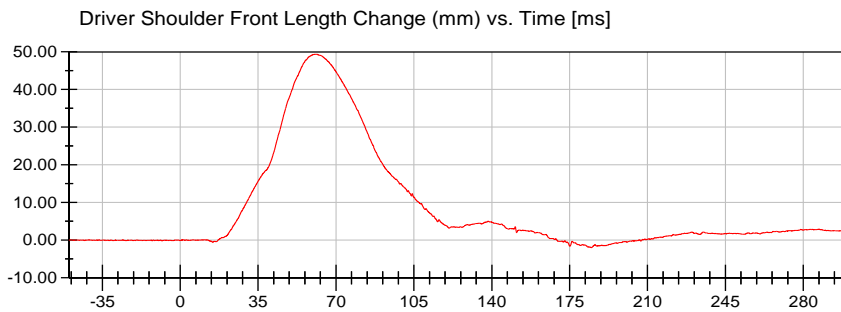
Unfiltered



<Max>
-49.73 mm at 122.85 ms

<Min>
-72.05 mm at 76.50 ms

Unfiltered



<Max>
49.38 mm at 60.75 ms

<Min>
-1.97 mm at 184.70 ms

CFC_600

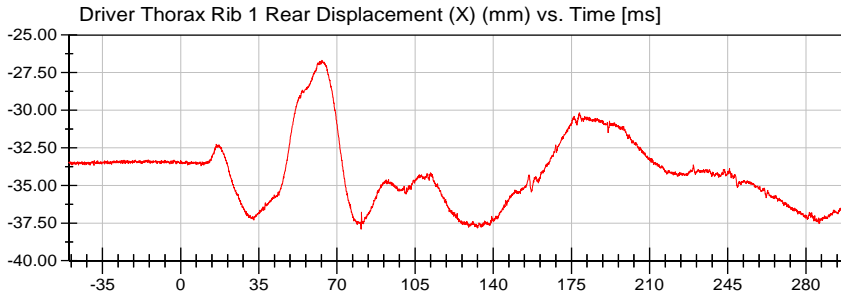


VRTC

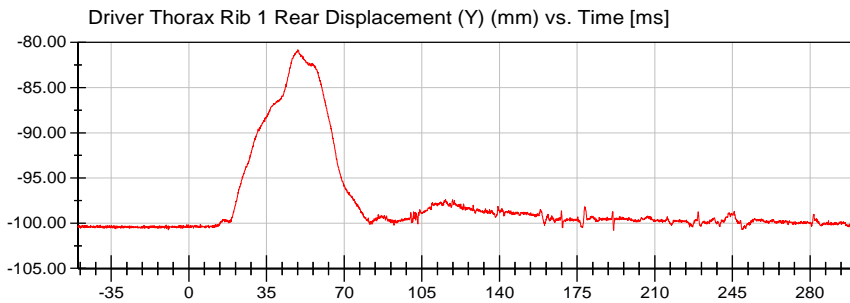
Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

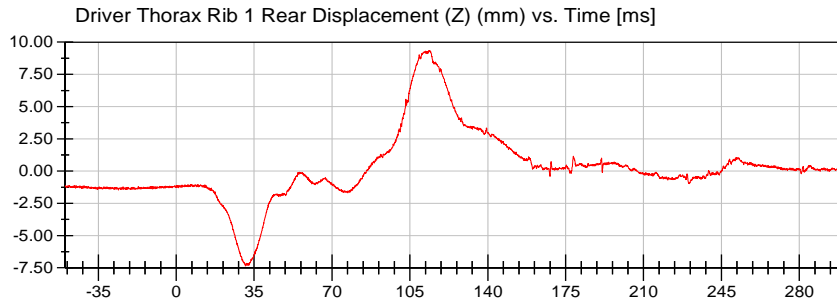
Test Date: 04/01/2021



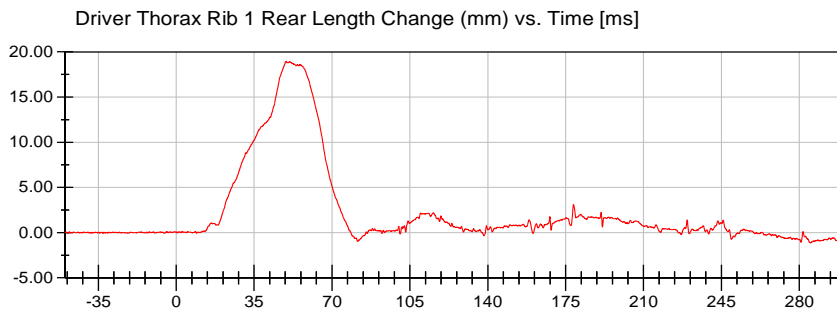
<Max>
-26.68 mm at 63.30 ms
<Min>
-37.91 mm at 80.85 ms
Unfiltered



<Max>
-80.82 mm at 49.10 ms
<Min>
-100.82 mm at 191.45 ms
Unfiltered



<Max>
9.36 mm at 113.70 ms
<Min>
-7.34 mm at 31.10 ms
Unfiltered



<Max>
18.97 mm at 49.30 ms
<Min>
-1.13 mm at 285.00 ms
CFC_600



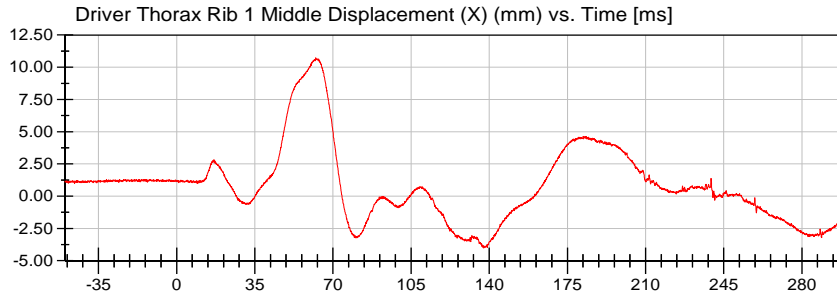
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



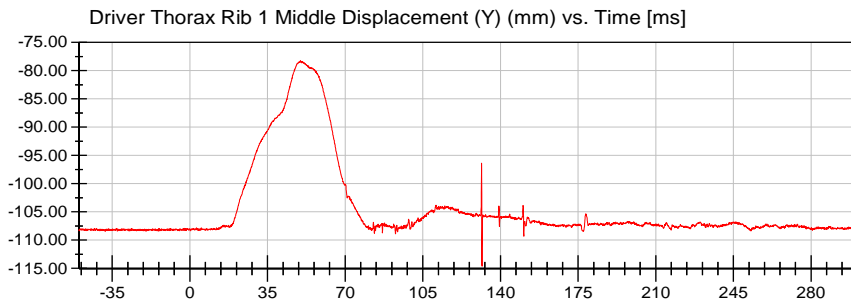
<Max>

10.73 mm at 62.30 ms

<Min>

-4.01 mm at 137.50 ms

Unfiltered



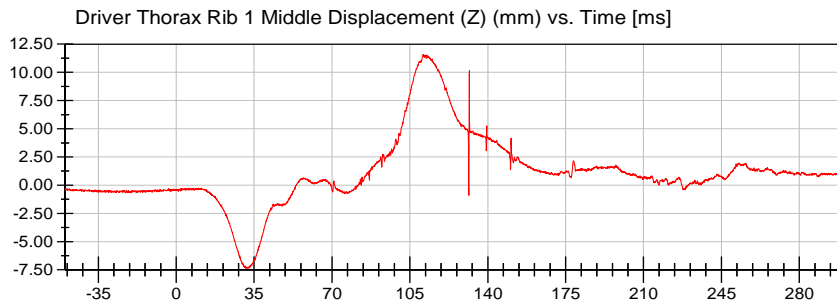
<Max>

-78.24 mm at 49.85 ms

<Min>

-114.63 mm at 131.70 ms

Unfiltered



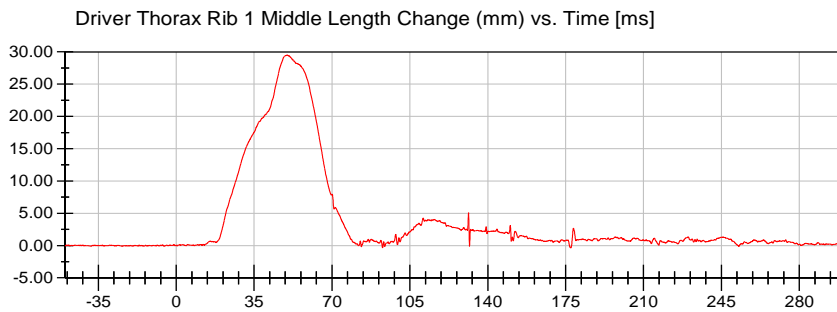
<Max>

11.58 mm at 111.10 ms

<Min>

-7.37 mm at 31.50 ms

Unfiltered



<Max>

29.52 mm at 49.90 ms

<Min>

-0.36 mm at 177.30 ms

CFC_600

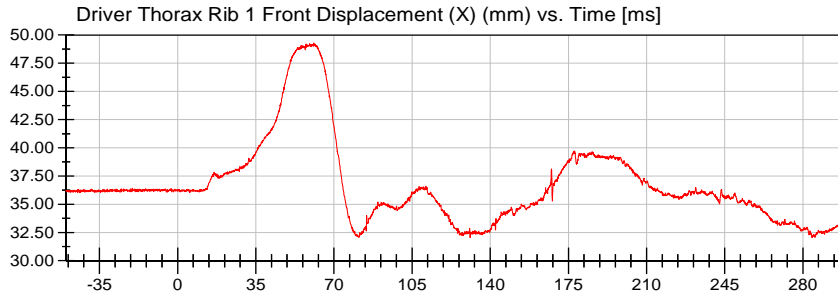


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



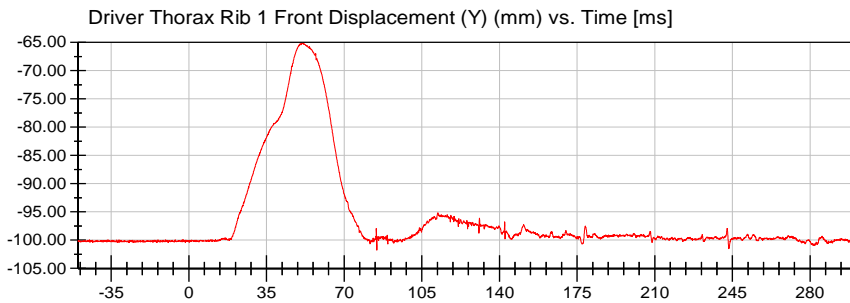
<Max>

49.30 mm at 61.00 ms

<Min>

32.04 mm at 284.10 ms

Unfiltered



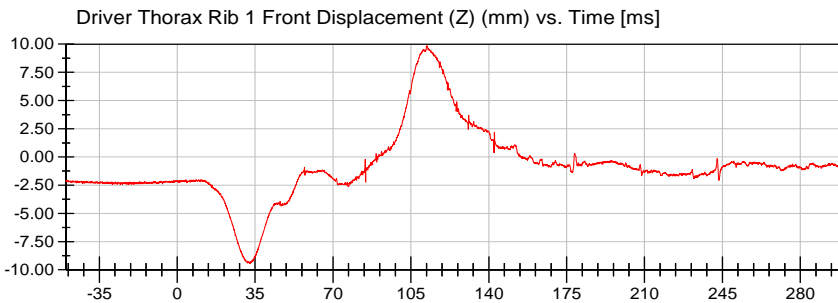
<Max>

-65.17 mm at 51.50 ms

<Min>

-101.80 mm at 84.70 ms

Unfiltered



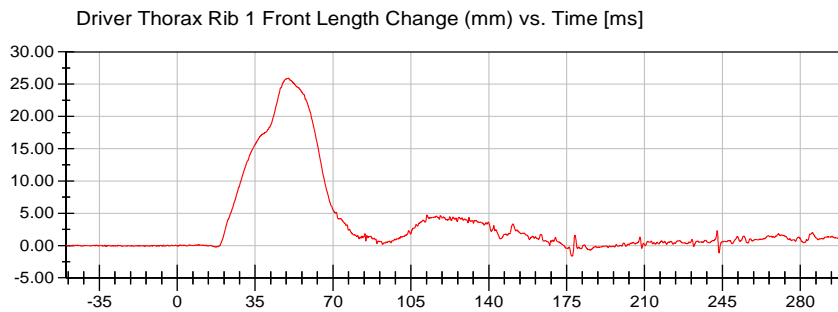
<Max>

9.85 mm at 112.20 ms

<Min>

-9.43 mm at 32.75 ms

Unfiltered



<Max>

25.91 mm at 49.90 ms

<Min>

-1.64 mm at 177.40 ms

CFC_600



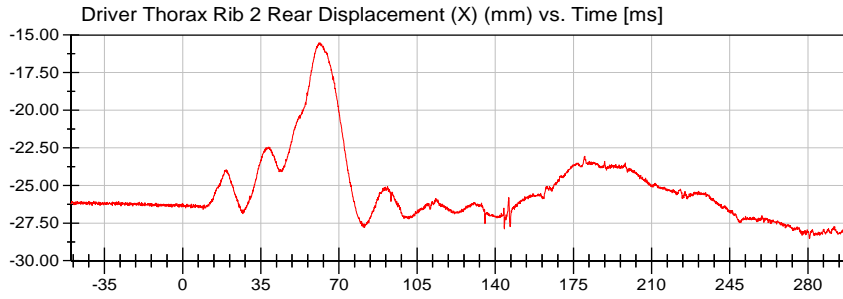
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



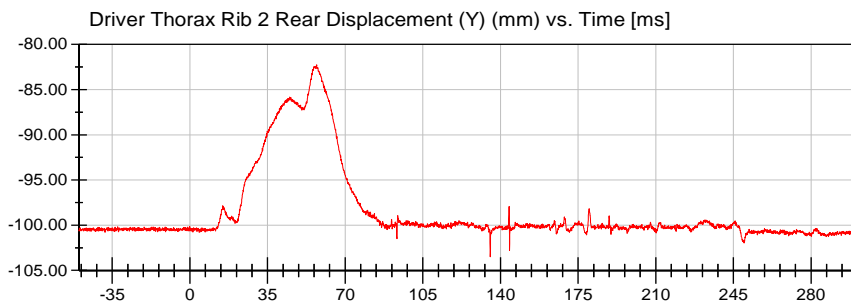
<Max>

-15.53 mm at 61.00 ms

<Min>

-28.53 mm at 280.65 ms

Unfiltered



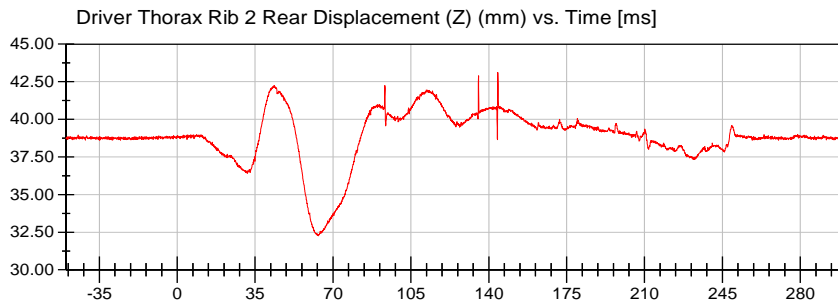
<Max>

-82.27 mm at 57.20 ms

<Min>

-103.50 mm at 135.40 ms

Unfiltered



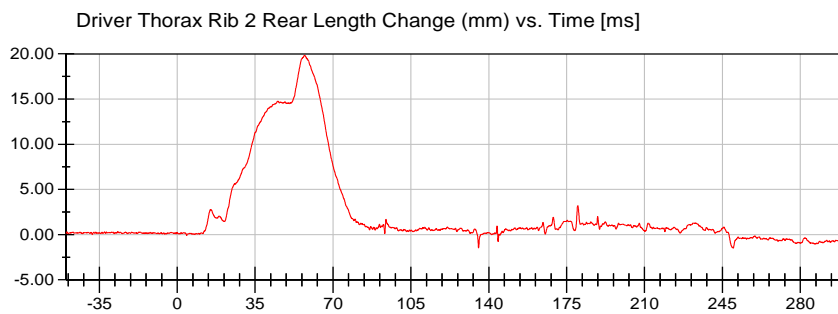
<Max>

43.12 mm at 144.10 ms

<Min>

32.26 mm at 63.40 ms

Unfiltered



<Max>

19.84 mm at 57.20 ms

<Min>

-1.48 mm at 249.80 ms

CFC_600



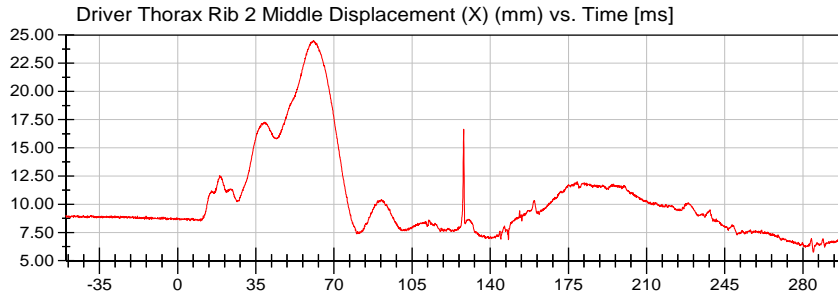
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



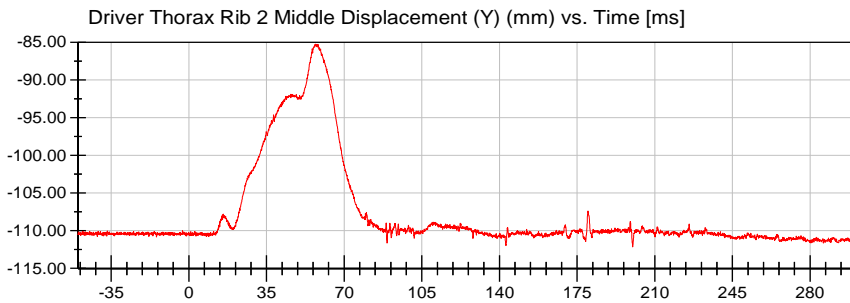
<Max>

24.53 mm at 60.95 ms

<Min>

5.74 mm at 284.75 ms

Unfiltered



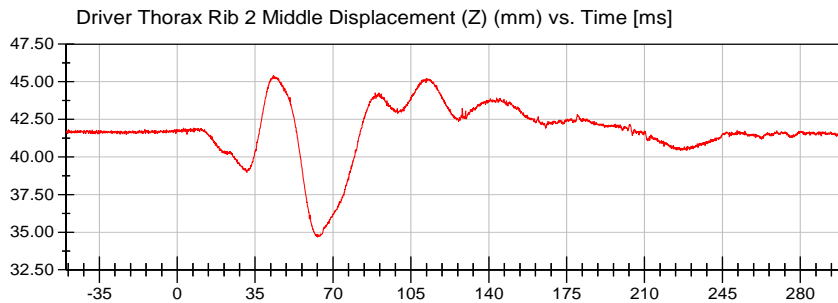
<Max>

-85.20 mm at 57.20 ms

<Min>

-112.15 mm at 200.10 ms

Unfiltered



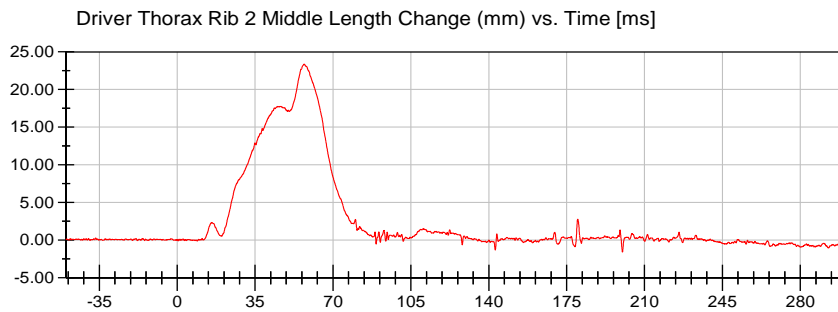
<Max>

45.41 mm at 43.30 ms

<Min>

34.68 mm at 63.05 ms

Unfiltered



<Max>

23.38 mm at 57.05 ms

<Min>

-1.58 mm at 200.05 ms

CFC_600

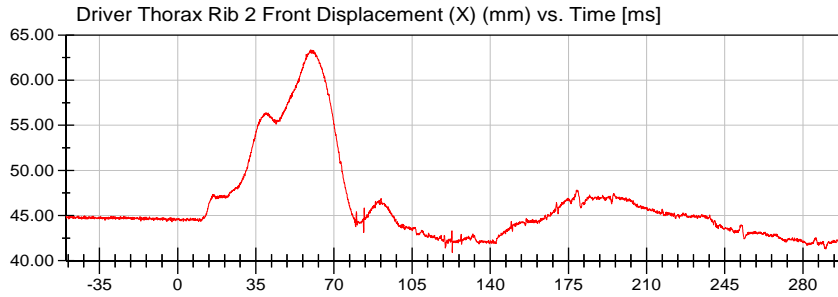


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



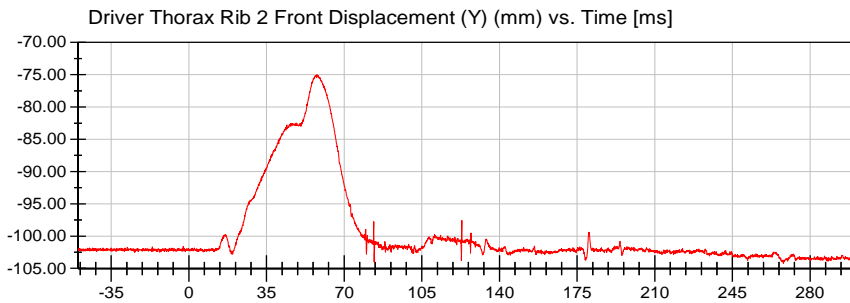
<Max>

63.36 mm at 59.55 ms

<Min>

40.91 mm at 123.00 ms

Unfiltered



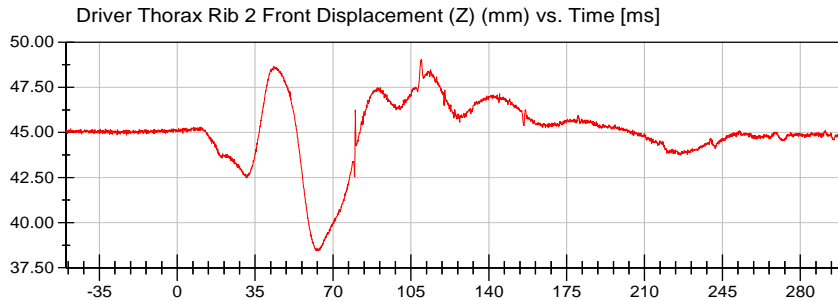
<Max>

-74.99 mm at 57.75 ms

<Min>

-104.23 mm at 268.00 ms

Unfiltered



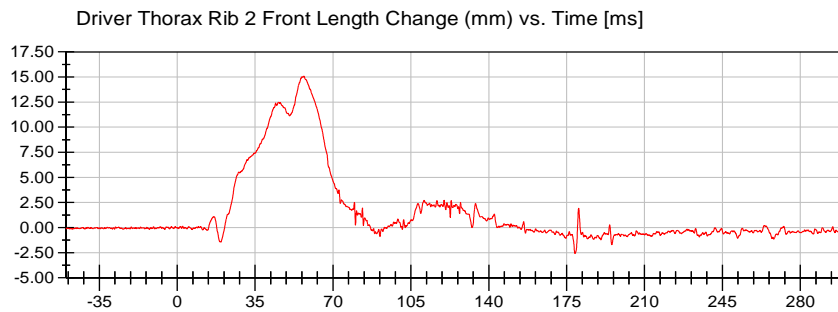
<Max>

49.05 mm at 109.70 ms

<Min>

38.45 mm at 63.40 ms

Unfiltered



<Max>

15.08 mm at 56.90 ms

<Min>

-2.58 mm at 178.75 ms

CFC_600

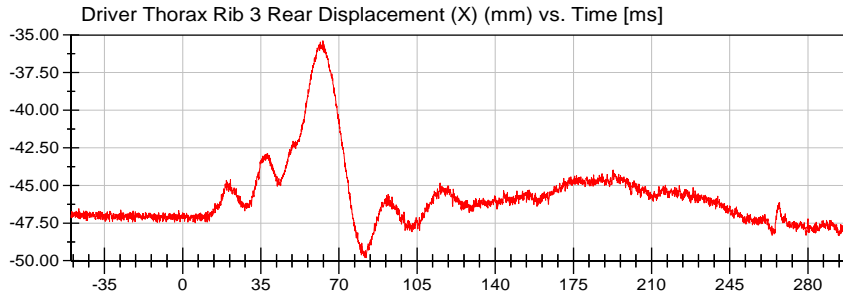


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



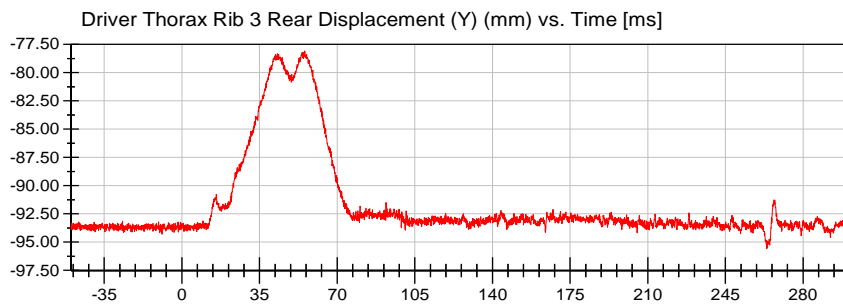
<Max>

-35.39 mm at 62.85 ms

<Min>

-49.81 mm at 81.70 ms

Unfiltered



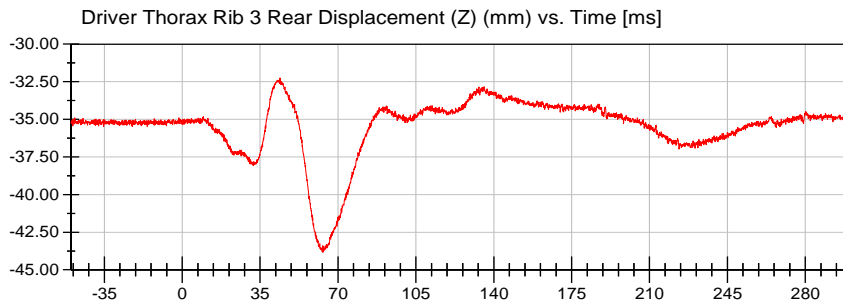
<Max>

-78.08 mm at 55.40 ms

<Min>

-95.60 mm at 263.60 ms

Unfiltered



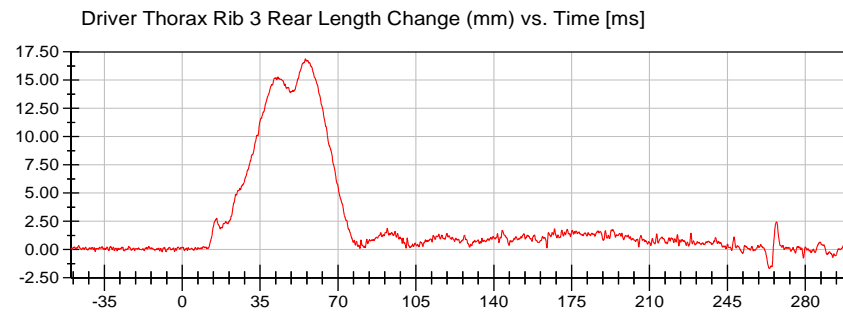
<Max>

-32.25 mm at 43.95 ms

<Min>

-43.82 mm at 63.20 ms

Unfiltered



<Max>

16.88 mm at 55.35 ms

<Min>

-1.66 mm at 264.00 ms

CFC_600



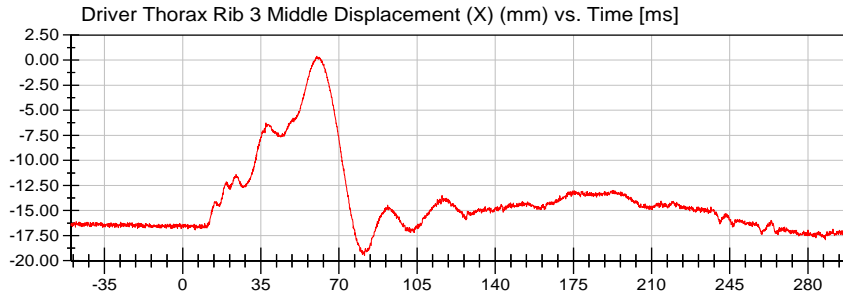
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



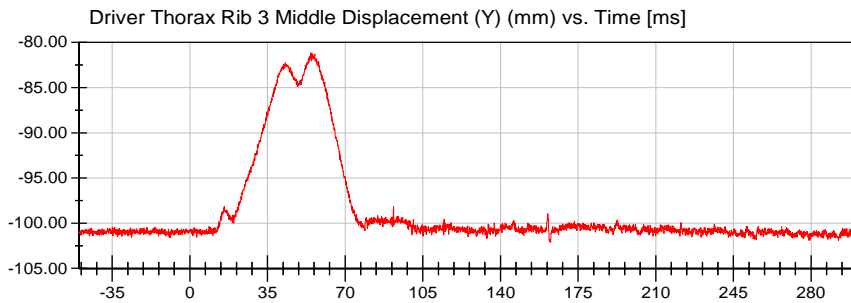
<Max>

0.37 mm at 60.10 ms

<Min>

-19.49 mm at 81.45 ms

Unfiltered



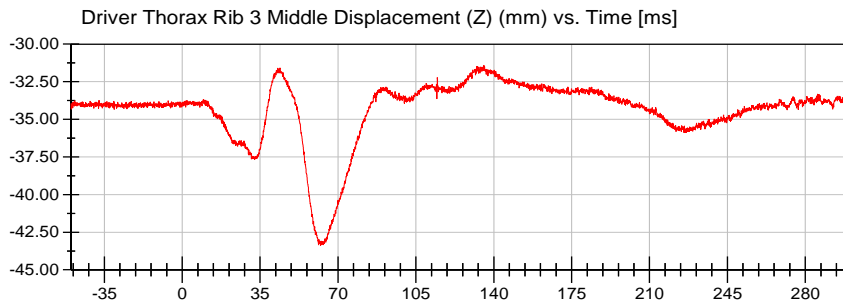
<Max>

-81.13 mm at 54.50 ms

<Min>

-102.15 mm at 162.60 ms

Unfiltered



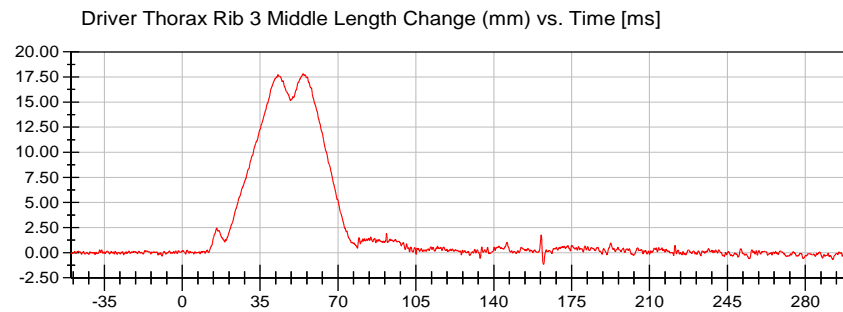
<Max>

-31.42 mm at 135.55 ms

<Min>

-43.38 mm at 62.15 ms

Unfiltered



<Max>

17.81 mm at 54.40 ms

<Min>

-1.16 mm at 162.35 ms

CFC_600

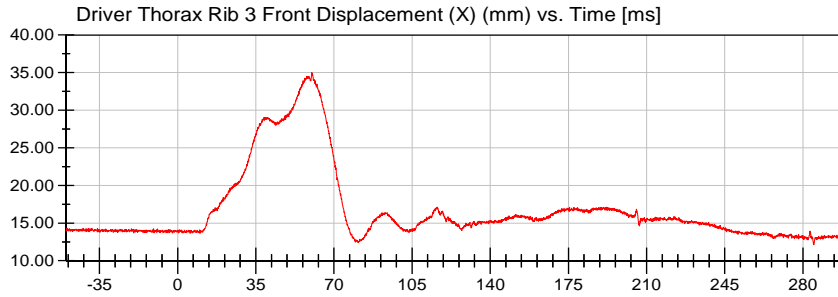


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



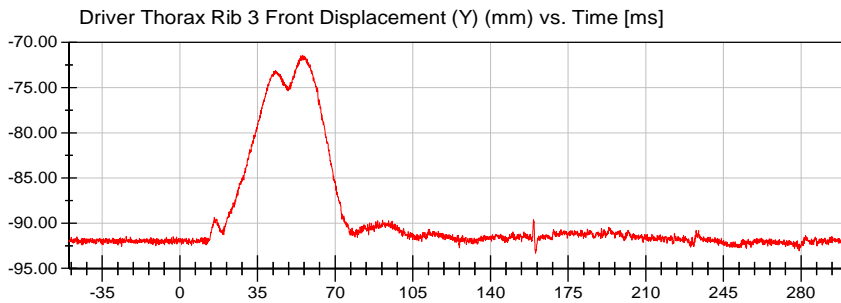
<Max>

35.02 mm at 60.10 ms

<Min>

12.11 mm at 284.85 ms

Unfiltered



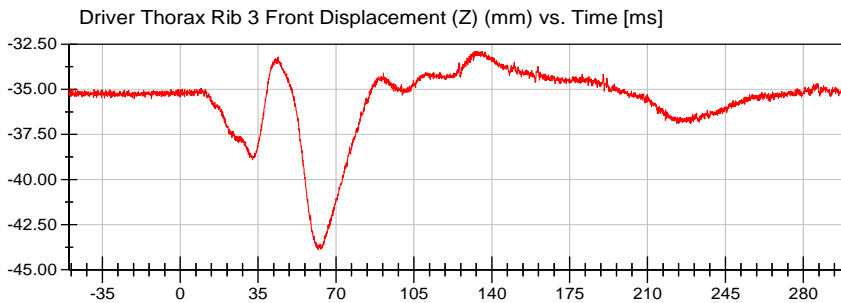
<Max>

-71.45 mm at 55.20 ms

<Min>

-93.32 mm at 160.35 ms

Unfiltered



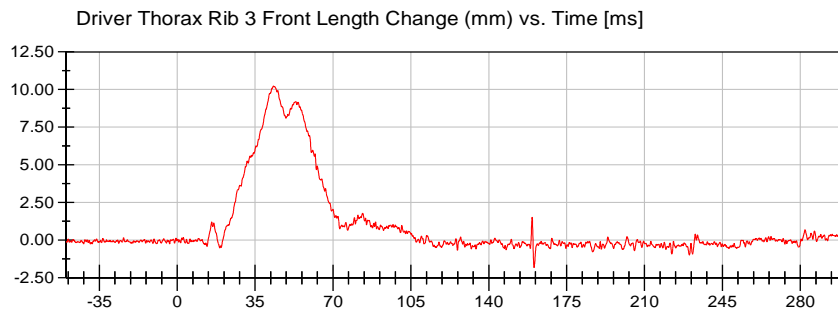
<Max>

-32.89 mm at 132.35 ms

<Min>

-43.88 mm at 62.10 ms

Unfiltered



<Max>

10.23 mm at 43.25 ms

<Min>

-1.81 mm at 160.35 ms

CFC_600



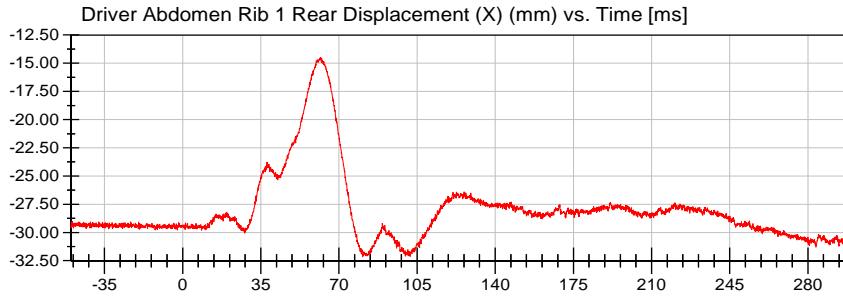
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



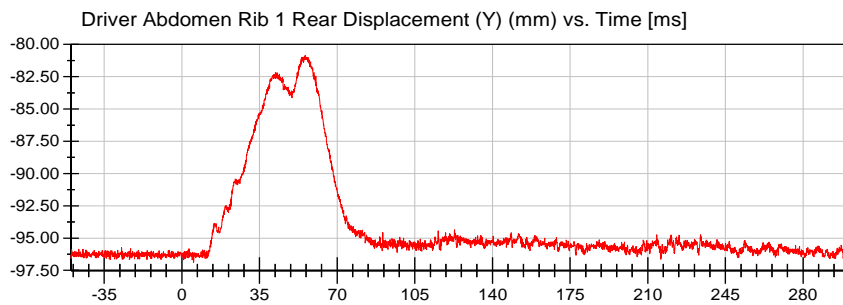
<Max>

-14.51 mm at 61.75 ms

<Min>

-32.14 mm at 80.70 ms

Unfiltered



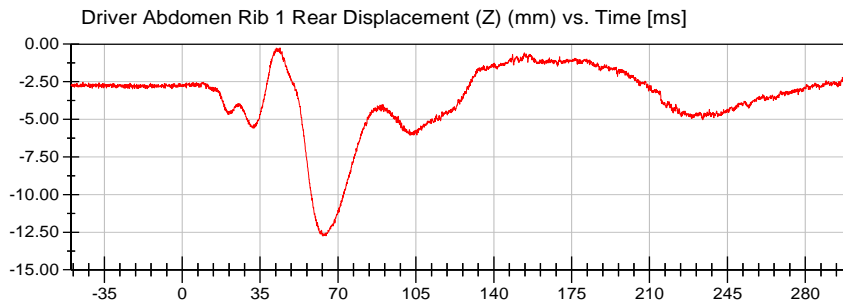
<Max>

-80.86 mm at 55.60 ms

<Min>

-96.89 mm at 5.30 ms

Unfiltered



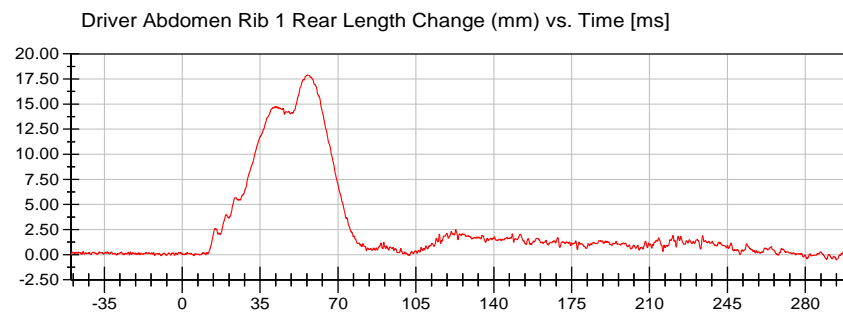
<Max>

-0.26 mm at 42.30 ms

<Min>

-12.76 mm at 63.20 ms

Unfiltered



<Max>

17.89 mm at 56.35 ms

<Min>

-0.74 mm at 298.75 ms

CFC_600

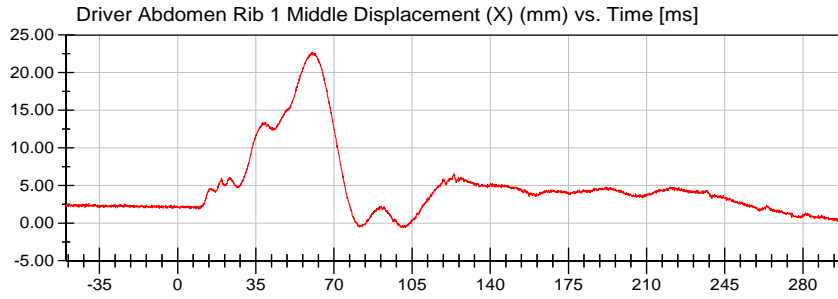


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



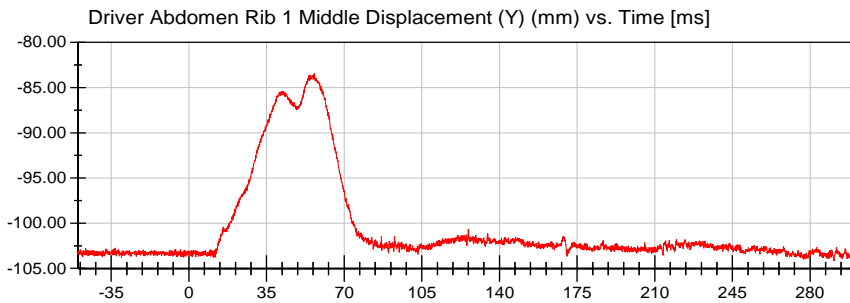
<Max>

22.73 mm at 60.10 ms

<Min>

-0.58 mm at 101.95 ms

Unfiltered



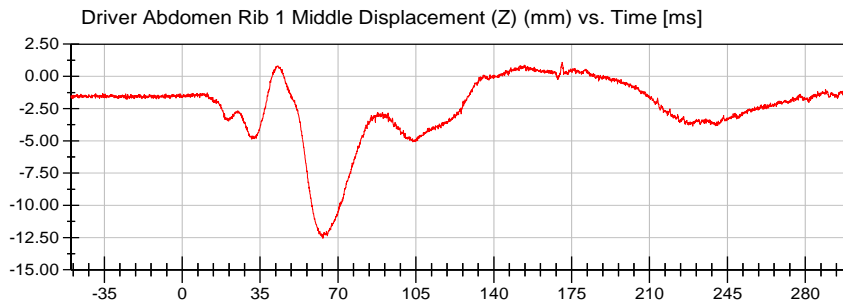
<Max>

-83.42 mm at 56.55 ms

<Min>

-104.16 mm at 290.80 ms

Unfiltered



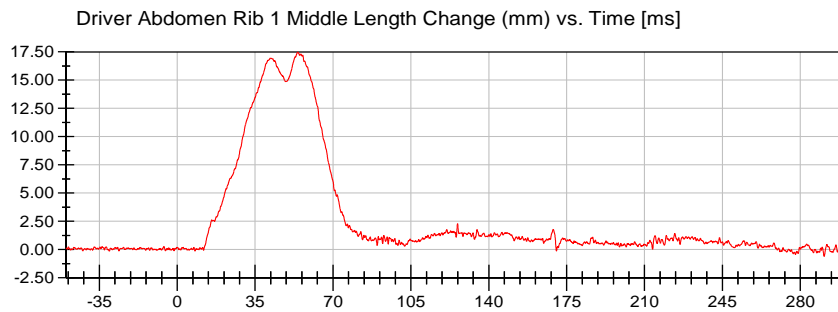
<Max>

1.09 mm at 170.70 ms

<Min>

-12.54 mm at 63.20 ms

Unfiltered



<Max>

17.48 mm at 54.10 ms

<Min>

-0.60 mm at 290.70 ms

CFC_600

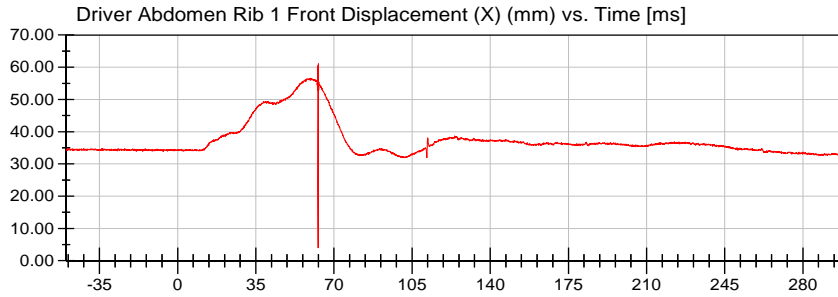


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



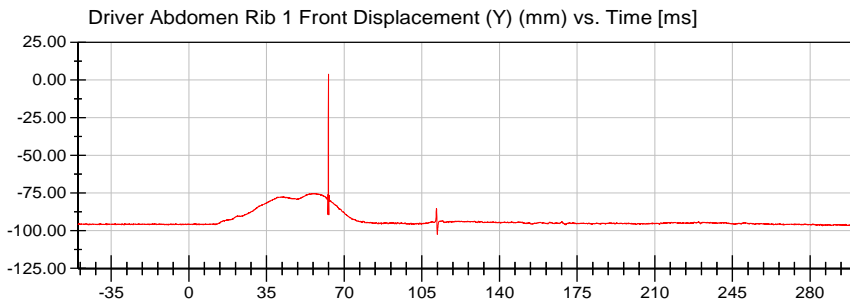
<Max>

61.06 mm at 63.05 ms

<Min>

4.00 mm at 62.90 ms

Unfiltered



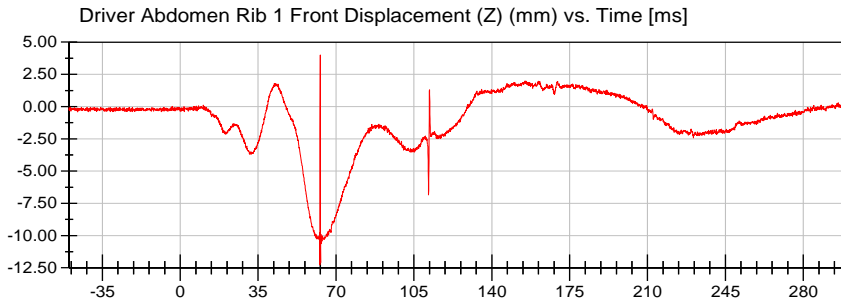
<Max>

4.00 mm at 62.90 ms

<Min>

-102.40 mm at 112.00 ms

Unfiltered



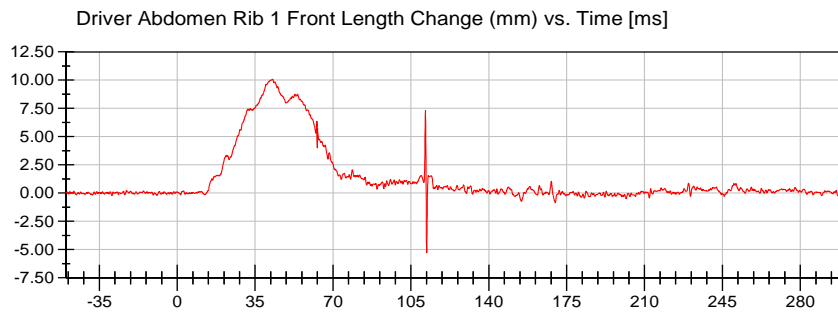
<Max>

4.00 mm at 62.90 ms

<Min>

-12.27 mm at 62.75 ms

Unfiltered



<Max>

10.07 mm at 42.85 ms

<Min>

-5.29 mm at 112.05 ms

CFC_600



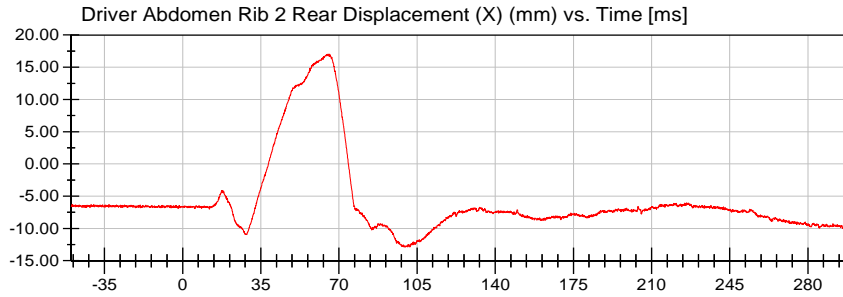
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



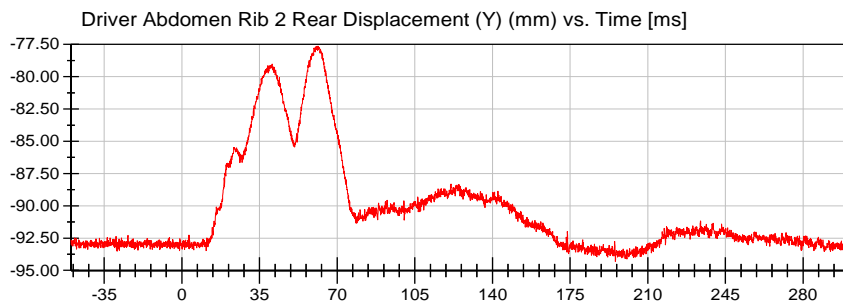
<Max>

17.04 mm at 65.45 ms

<Min>

-12.91 mm at 99.30 ms

Unfiltered



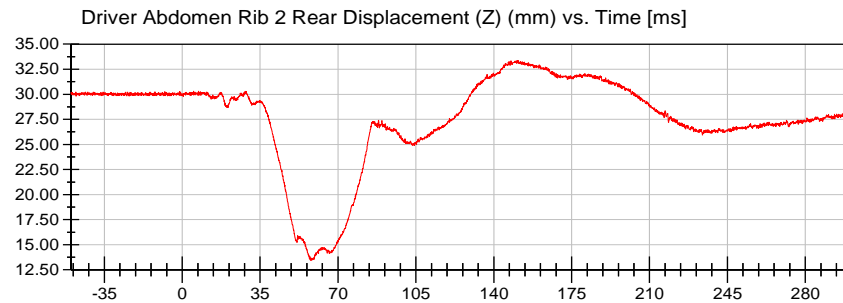
<Max>

-77.63 mm at 61.40 ms

<Min>

-94.30 mm at 195.40 ms

Unfiltered



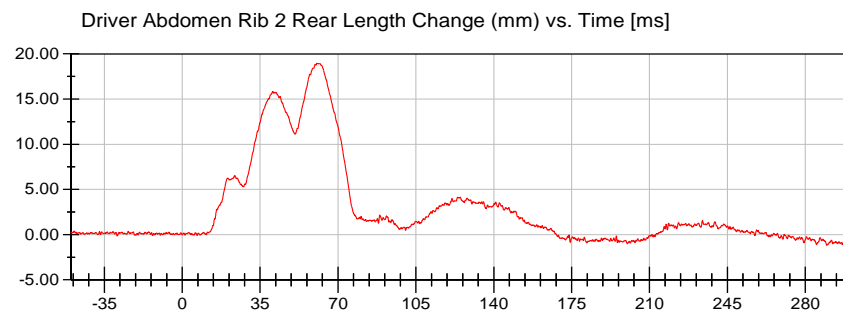
<Max>

33.38 mm at 150.85 ms

<Min>

13.45 mm at 57.70 ms

Unfiltered



<Max>

18.96 mm at 60.65 ms

<Min>

-1.17 mm at 289.65 ms

CFC_600



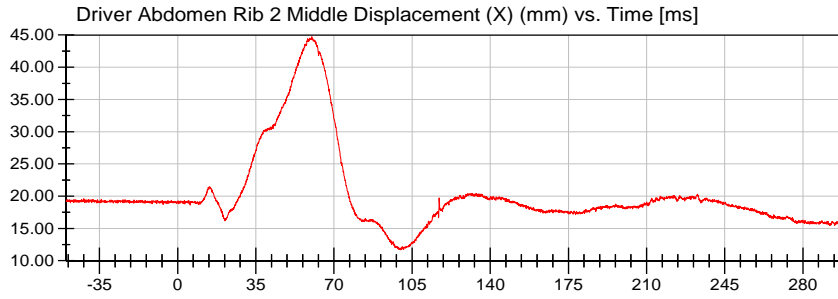
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



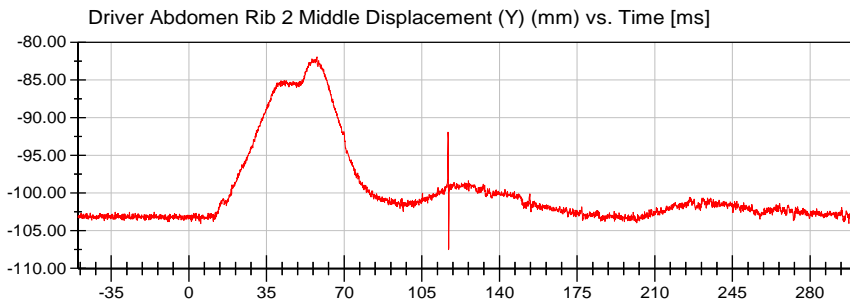
<Max>

44.74 mm at 60.10 ms

<Min>

11.68 mm at 99.75 ms

Unfiltered



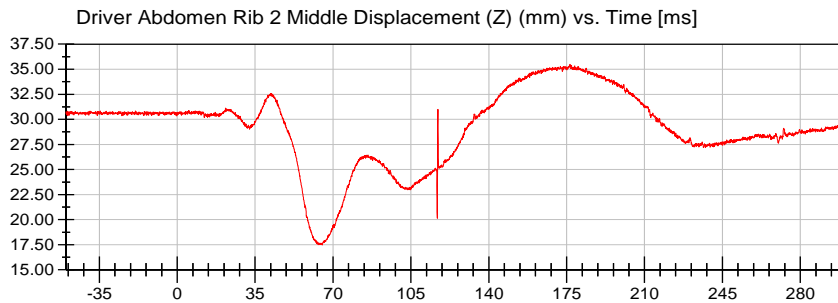
<Max>

-81.91 mm at 57.75 ms

<Min>

-107.51 mm at 117.10 ms

Unfiltered



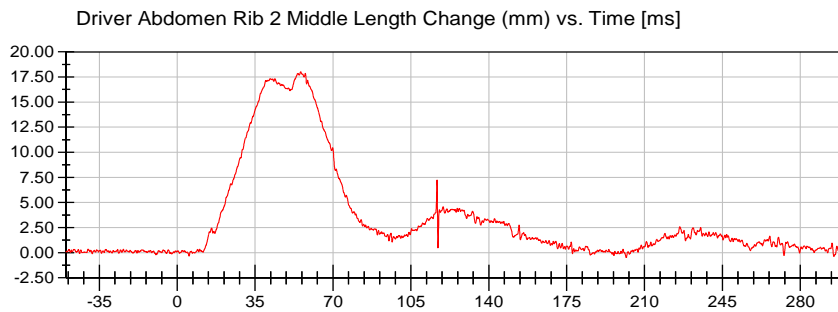
<Max>

35.49 mm at 176.50 ms

<Min>

17.47 mm at 65.20 ms

Unfiltered



<Max>

18.02 mm at 55.45 ms

<Min>

-0.48 mm at 201.75 ms

CFC_600



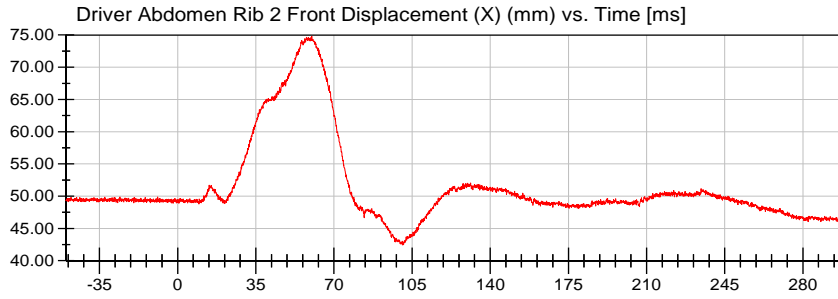
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



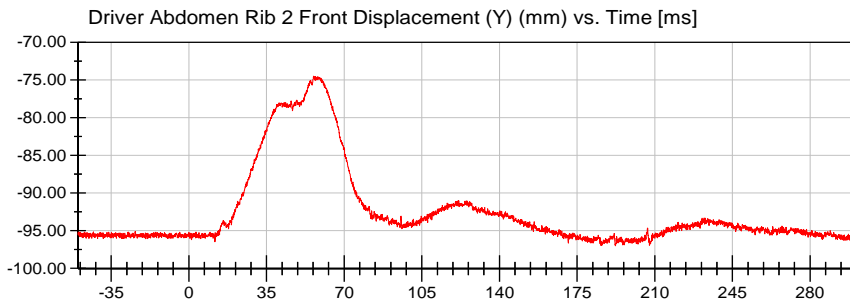
<Max>

74.79 mm at 60.10 ms

<Min>

42.43 mm at 100.80 ms

Unfiltered



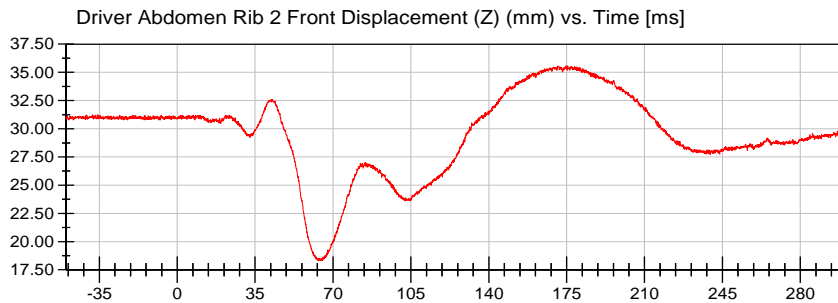
<Max>

-74.49 mm at 56.20 ms

<Min>

-97.00 mm at 192.30 ms

Unfiltered



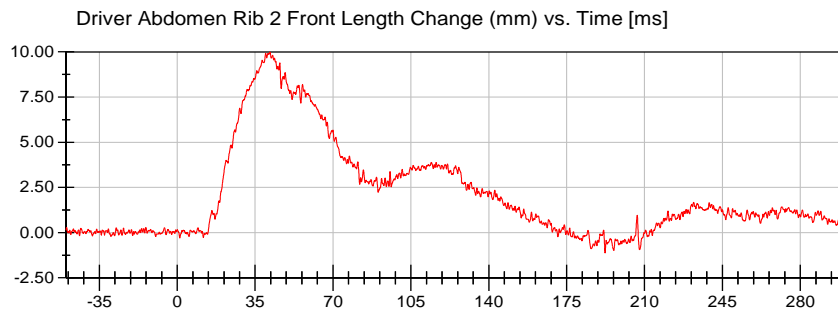
<Max>

35.58 mm at 175.45 ms

<Min>

18.30 mm at 63.40 ms

Unfiltered



<Max>

9.97 mm at 41.65 ms

<Min>

-1.12 mm at 192.25 ms

CFC_600



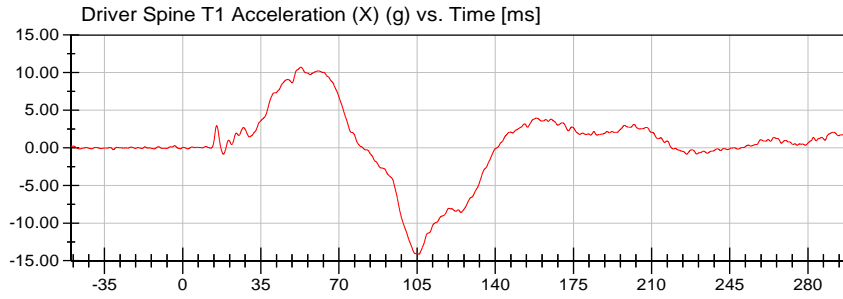
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



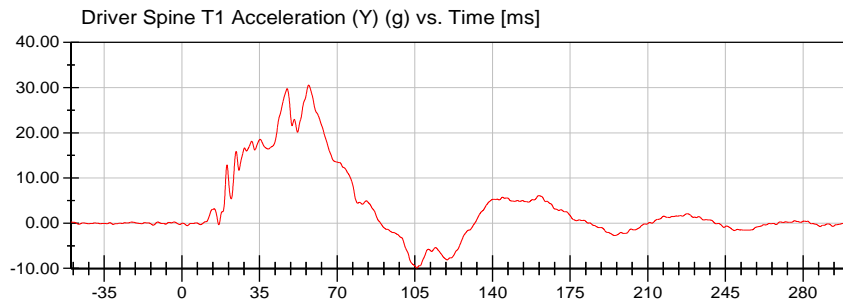
<Max>

10.73 g at 52.95 ms

<Min>

-14.15 g at 105.80 ms

CFC_180



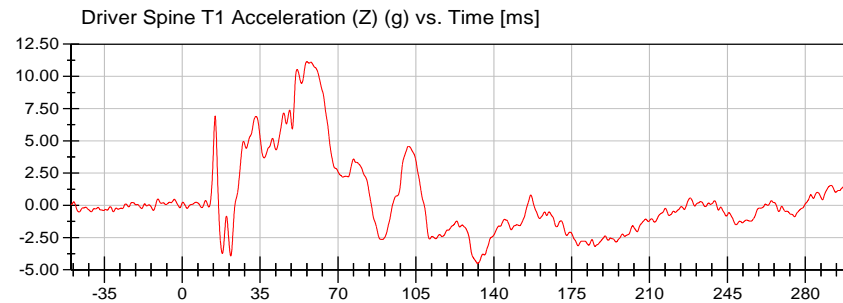
<Max>

30.56 g at 57.15 ms

<Min>

-9.91 g at 105.90 ms

CFC_180



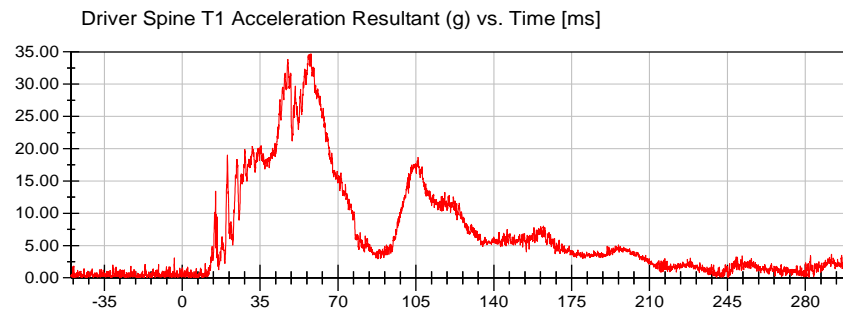
<Max>

11.14 g at 56.00 ms

<Min>

-4.49 g at 132.70 ms

CFC_180



<Max>

34.69 g at 57.85 ms

<Min>

0.07 g at -42.60 ms

Prefiltered_> CFC 1000



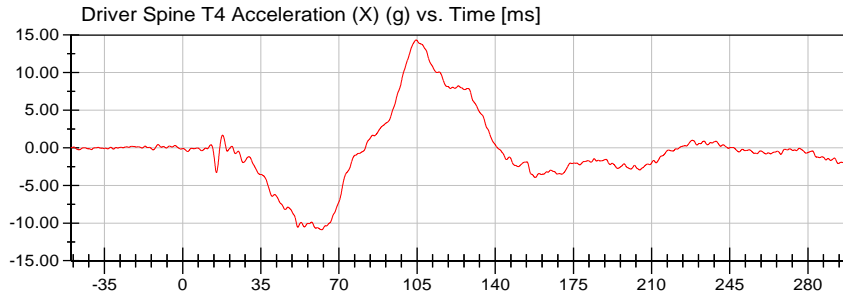
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



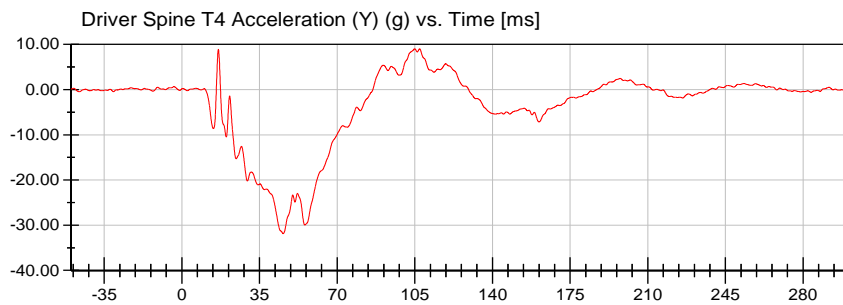
<Max>

14.34 g at 104.55 ms

<Min>

-10.89 g at 62.30 ms

CFC_180



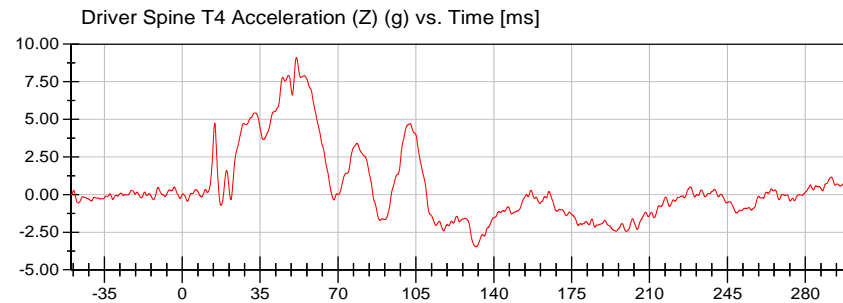
<Max>

9.03 g at 107.20 ms

<Min>

-31.87 g at 45.65 ms

CFC_180



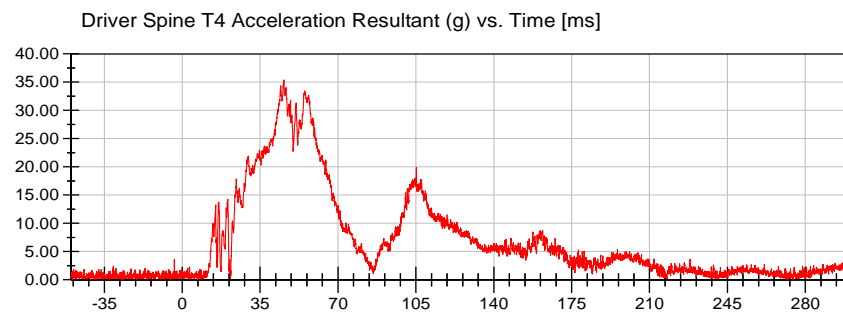
<Max>

9.12 g at 51.30 ms

<Min>

-3.47 g at 132.15 ms

CFC_180



<Max>

35.38 g at 45.60 ms

<Min>

0.04 g at -41.10 ms

Prefiltered_> CFC 1000



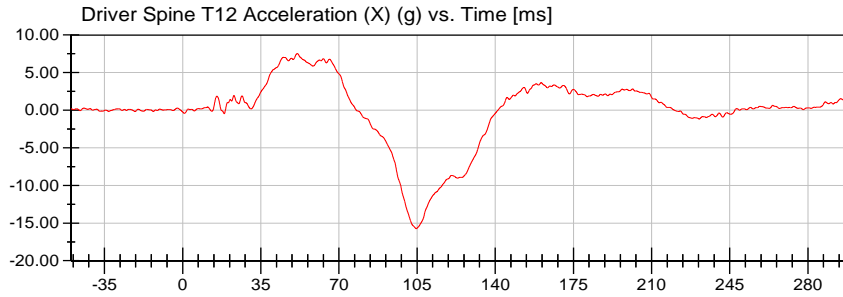
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



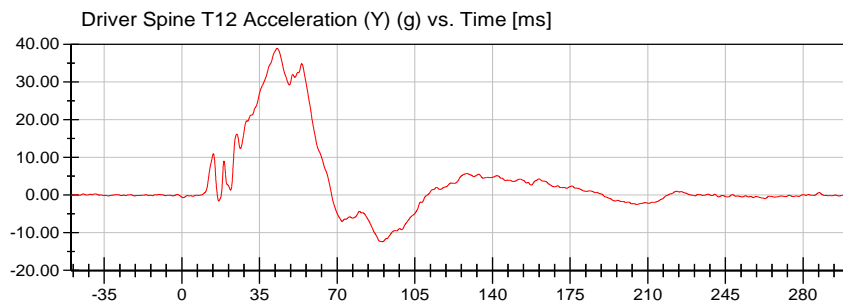
<Max>

7.51 g at 51.25 ms

<Min>

-15.75 g at 104.60 ms

CFC_180



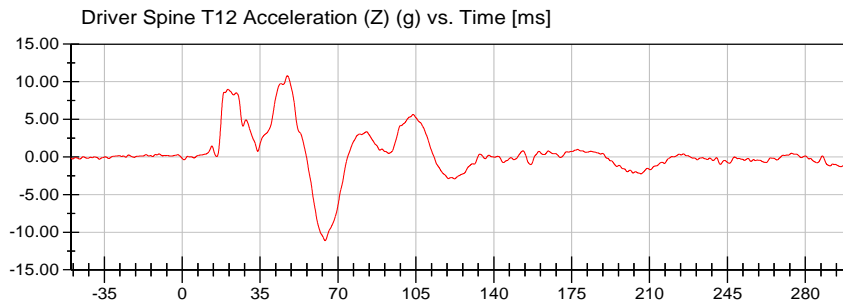
<Max>

38.97 g at 42.95 ms

<Min>

-12.38 g at 90.35 ms

CFC_180



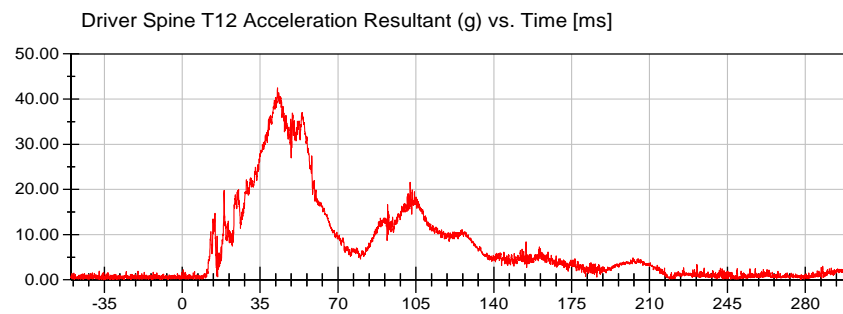
<Max>

10.79 g at 47.20 ms

<Min>

-11.12 g at 64.25 ms

CFC_180



<Max>

42.51 g at 42.80 ms

<Min>

0.02 g at -35.45 ms

Prefiltered_> CFC 1000



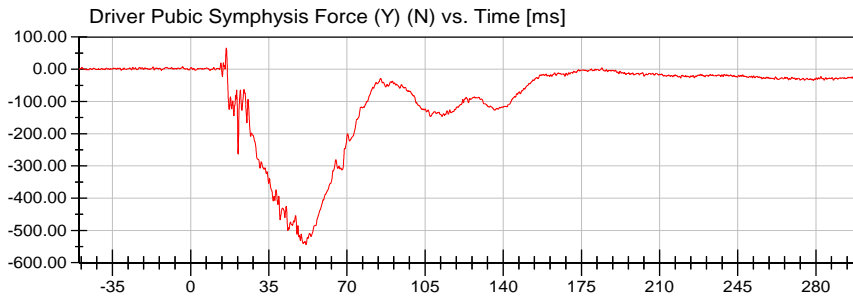
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



<Max>

65.34 N at 16.00 ms

<Min>

-544.50 N at 51.70 ms

CFC_600



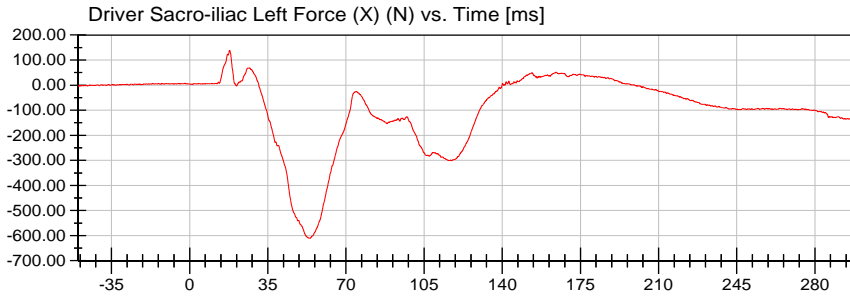
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



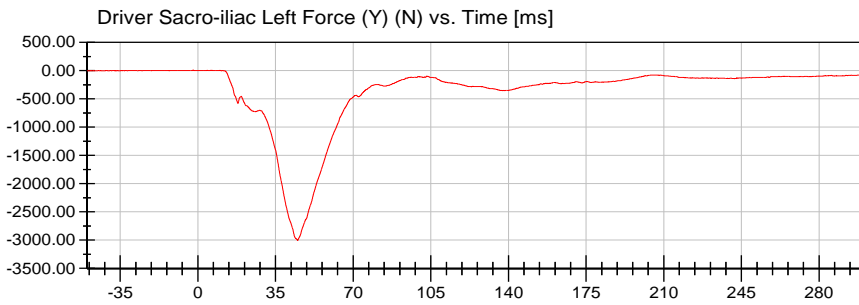
<Max>

138.60 N at 17.90 ms

<Min>

-610.56 N at 53.45 ms

CFC_600



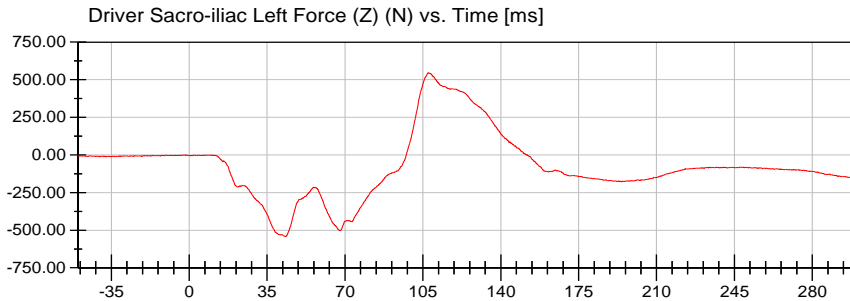
<Max>

9.42 N at -2.10 ms

<Min>

-3,005.66 N at 45.00 ms

CFC_600



<Max>

545.55 N at 107.50 ms

<Min>

-541.06 N at 43.40 ms

CFC_600



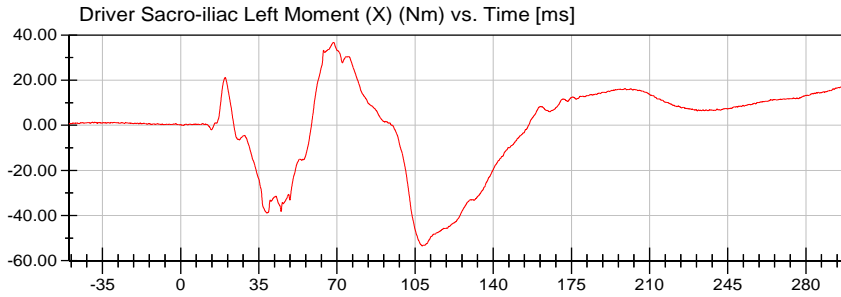
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



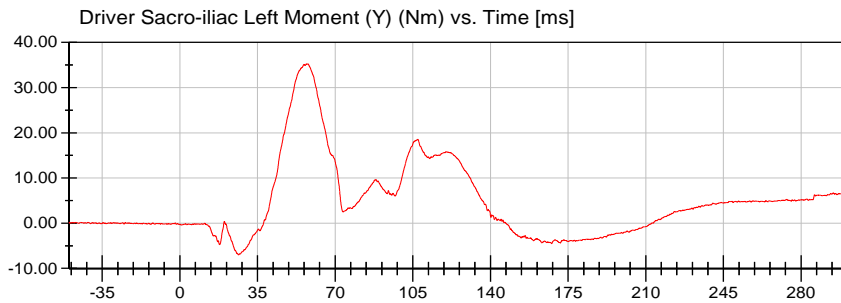
<Max>

36.65 Nm at 68.60 ms

<Min>

-53.46 Nm at 108.15 ms

CFC_600



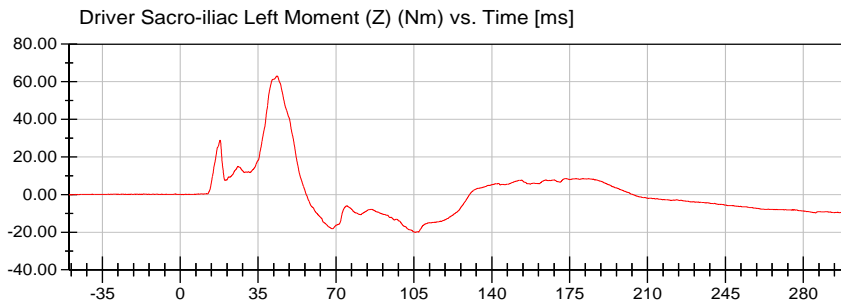
<Max>

35.26 Nm at 57.10 ms

<Min>

-7.01 Nm at 26.40 ms

CFC_600



<Max>

63.05 Nm at 43.55 ms

<Min>

-20.04 Nm at 105.65 ms

CFC_600

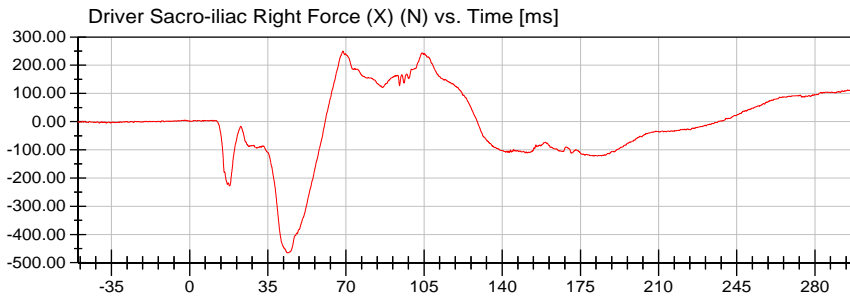


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



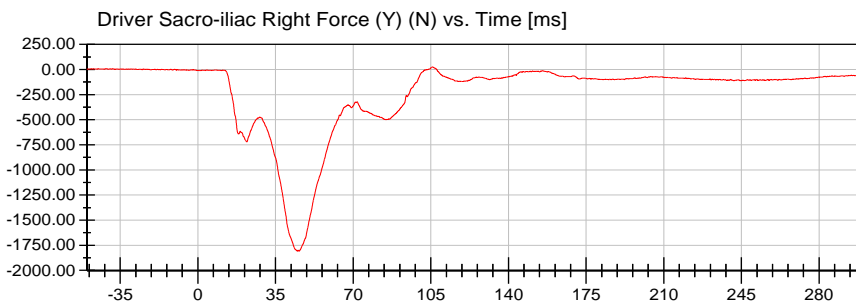
<Max>

249.79 N at 68.65 ms

<Min>

-465.66 N at 43.90 ms

CFC_600



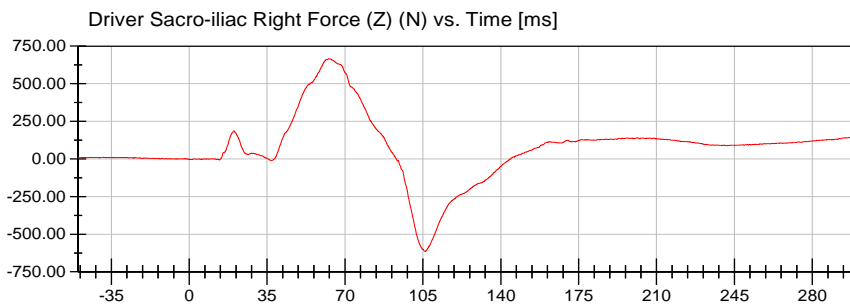
<Max>

26.95 N at 105.85 ms

<Min>

-1,808.68 N at 44.80 ms

CFC_600



<Max>

666.01 N at 62.60 ms

<Min>

-613.90 N at 106.00 ms

CFC_600

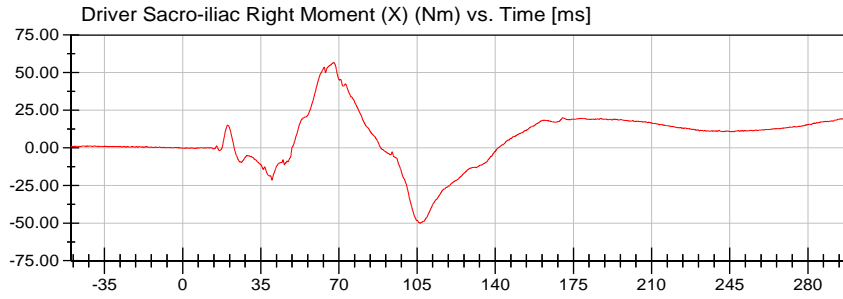


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



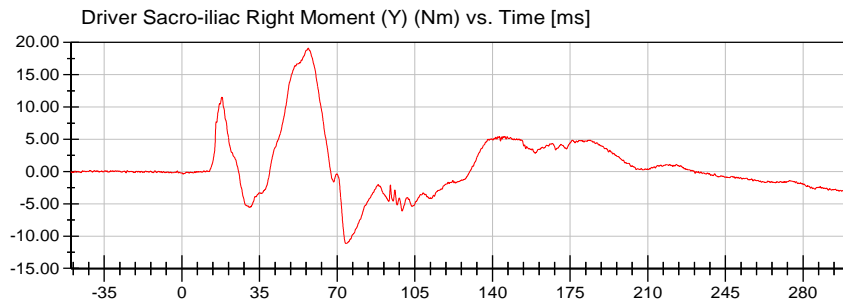
<Max>

56.61 Nm at 67.60 ms

<Min>

-50.01 Nm at 106.35 ms

CFC_600



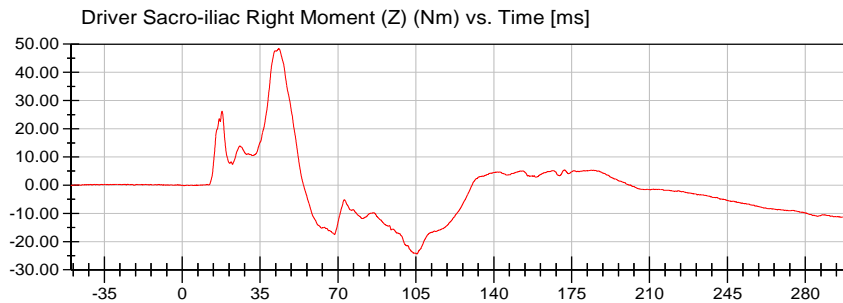
<Max>

19.11 Nm at 56.95 ms

<Min>

-11.13 Nm at 74.10 ms

CFC_600



<Max>

48.38 Nm at 43.40 ms

<Min>

-24.33 Nm at 105.55 ms

CFC_600



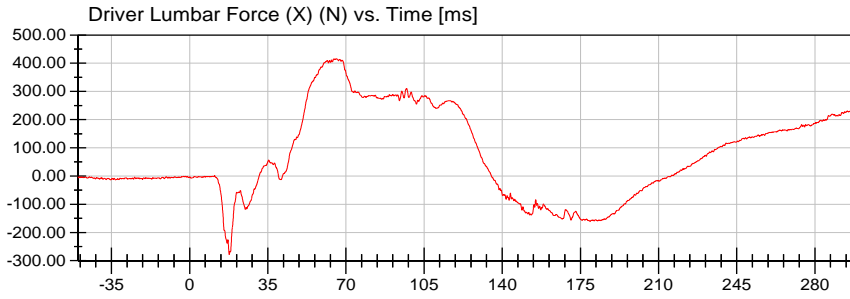
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



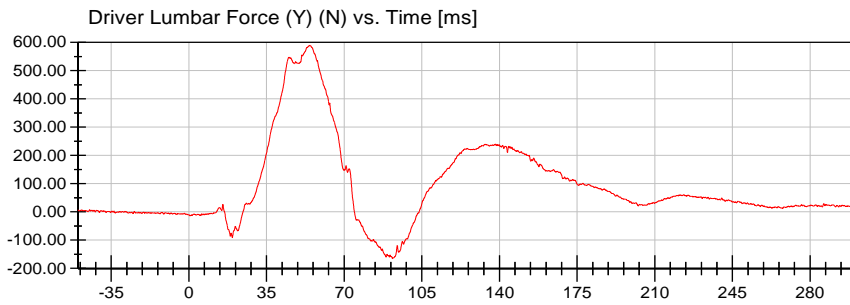
<Max>

415.67 N at 65.55 ms

<Min>

-278.04 N at 17.70 ms

CFC_600



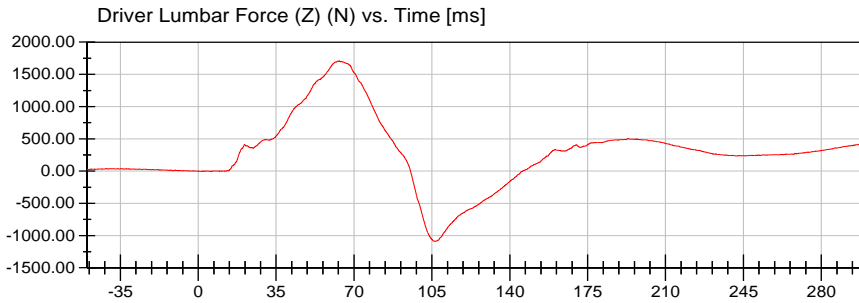
<Max>

589.47 N at 54.55 ms

<Min>

-164.99 N at 91.80 ms

CFC_600



<Max>

1,709.63 N at 63.50 ms

<Min>

-1,090.08 N at 106.35 ms

CFC_600

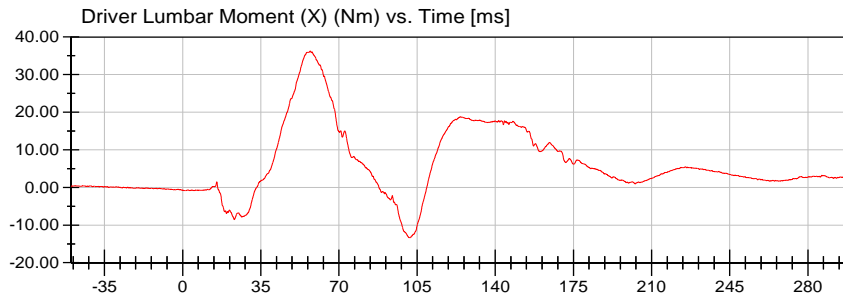


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



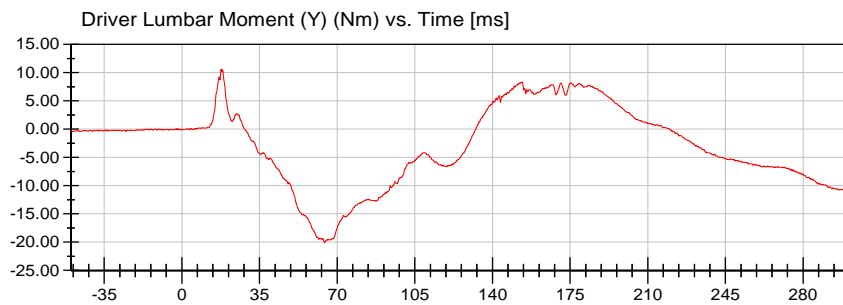
<Max>

36.26 Nm at 57.15 ms

<Min>

-13.38 Nm at 102.00 ms

CFC_600



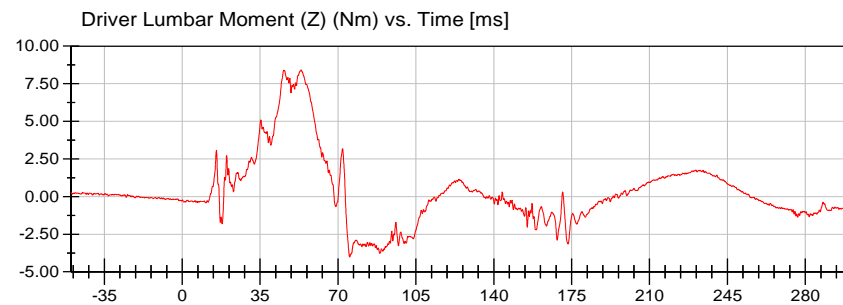
<Max>

10.62 Nm at 17.70 ms

<Min>

-20.06 Nm at 64.40 ms

CFC_600



<Max>

8.42 Nm at 53.40 ms

<Min>

-4.01 Nm at 75.25 ms

CFC_600



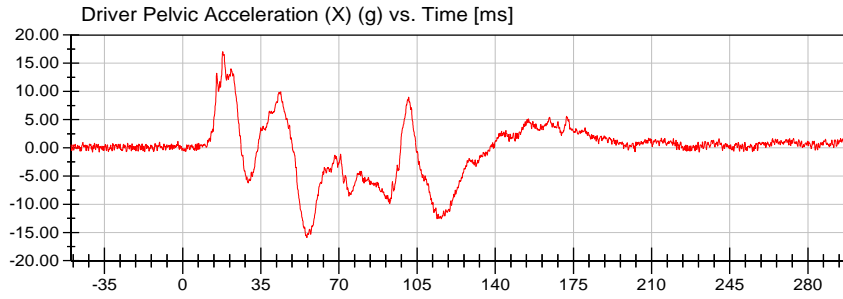
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



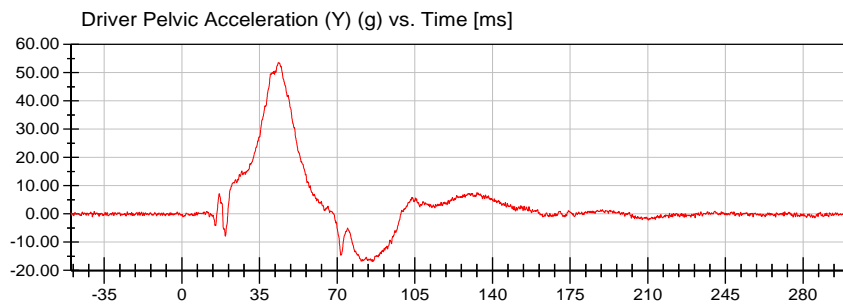
<Max>

17.03 g at 17.95 ms

<Min>

-15.87 g at 55.65 ms

CFC_1000



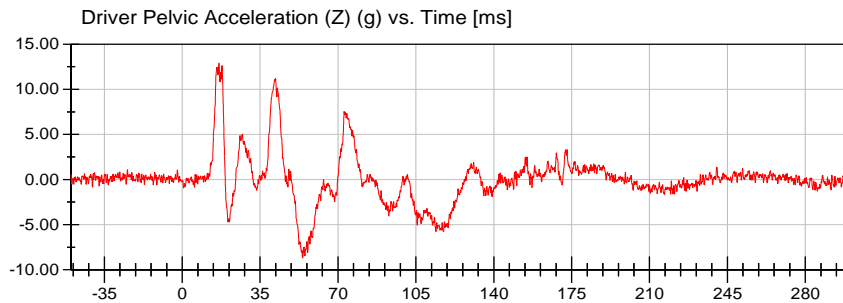
<Max>

53.58 g at 43.50 ms

<Min>

-16.87 g at 86.10 ms

CFC_1000



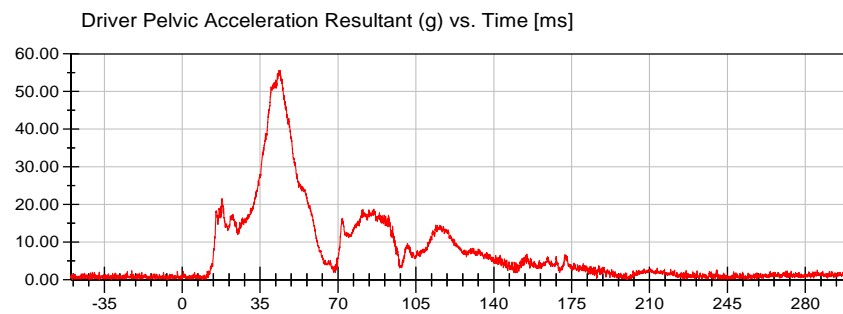
<Max>

12.93 g at 16.55 ms

<Min>

-8.66 g at 54.15 ms

CFC_1000



<Max>

55.55 g at 43.50 ms

<Min>

0.05 g at -37.15 ms

Prefiltered_> CFC 1000



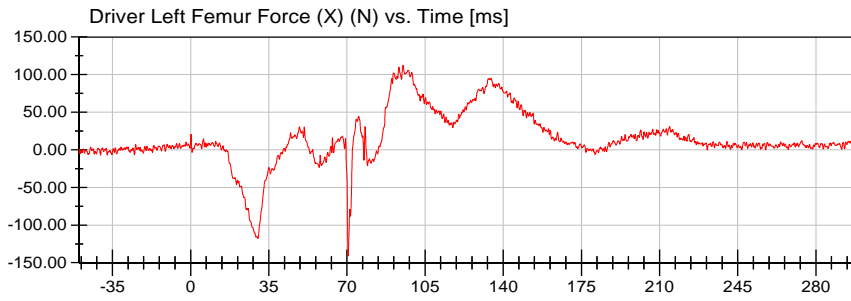
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



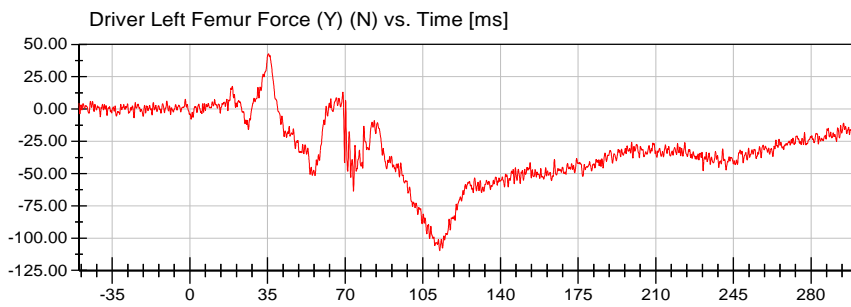
<Max>

112.28 N at 95.10 ms

<Min>

-141.03 N at 70.60 ms

CFC_600



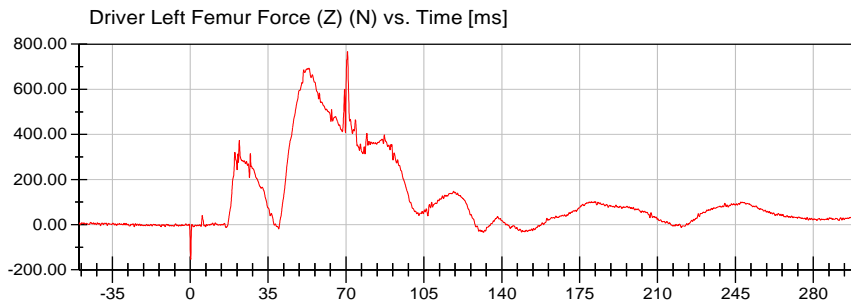
<Max>

42.89 N at 35.45 ms

<Min>

-109.81 N at 112.60 ms

CFC_600



<Max>

767.15 N at 70.70 ms

<Min>

-152.90 N at 0.20 ms

CFC_600

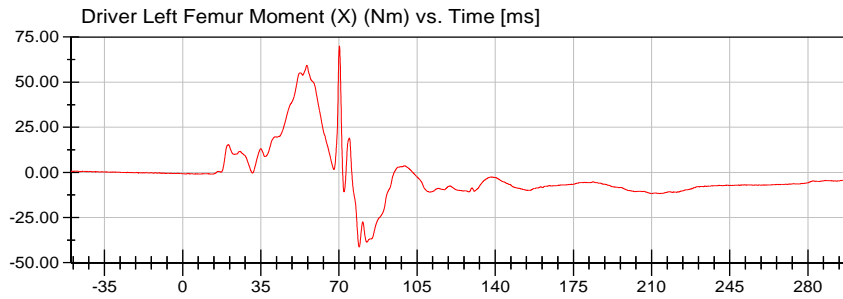


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



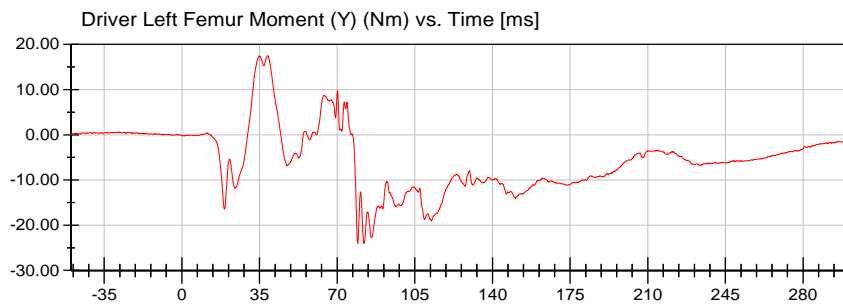
<Max>

70.00 Nm at 70.20 ms

<Min>

-41.31 Nm at 79.10 ms

CFC_600



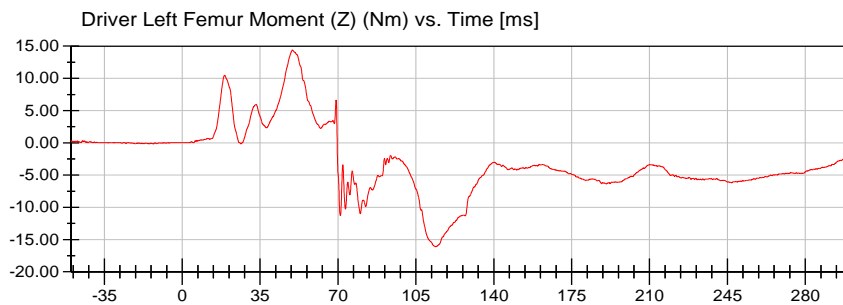
<Max>

17.51 Nm at 38.75 ms

<Min>

-24.06 Nm at 82.15 ms

CFC_600



<Max>

14.38 Nm at 49.50 ms

<Min>

-16.11 Nm at 113.95 ms

CFC_600



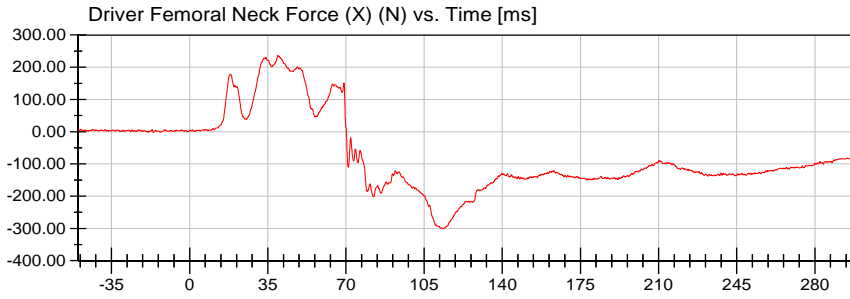
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



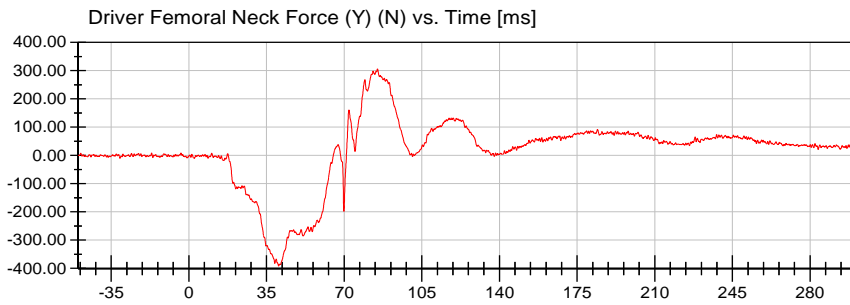
<Max>

236.68 N at 39.40 ms

<Min>

-300.93 N at 113.65 ms

CFC_600



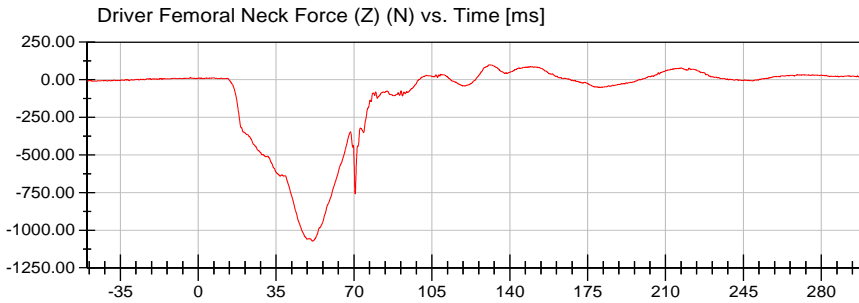
<Max>

306.04 N at 85.00 ms

<Min>

-391.29 N at 40.45 ms

CFC_600



<Max>

99.04 N at 130.95 ms

<Min>

-1,072.56 N at 51.35 ms

CFC_600



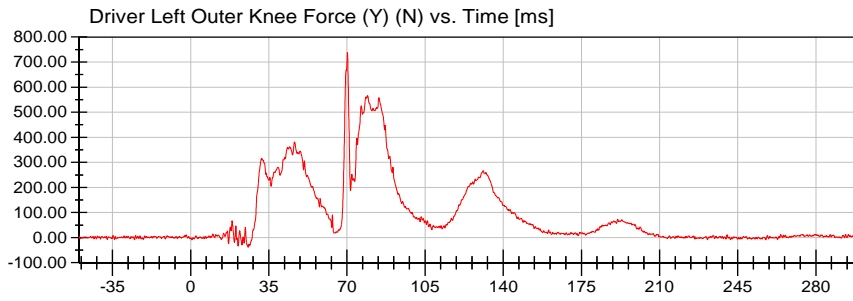
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



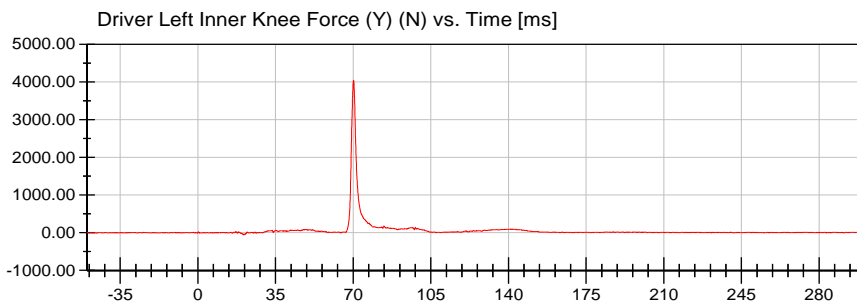
<Max>

737.91 N at 70.25 ms

<Min>

-38.59 N at 25.80 ms

CFC_600



<Max>

4,049.73 N at 70.15 ms

<Min>

-59.39 N at 20.75 ms

CFC_600



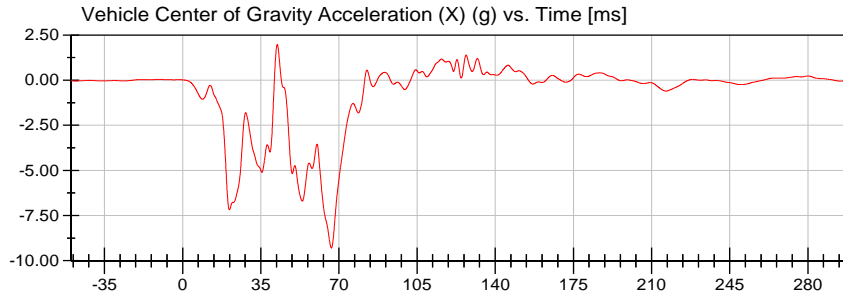
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



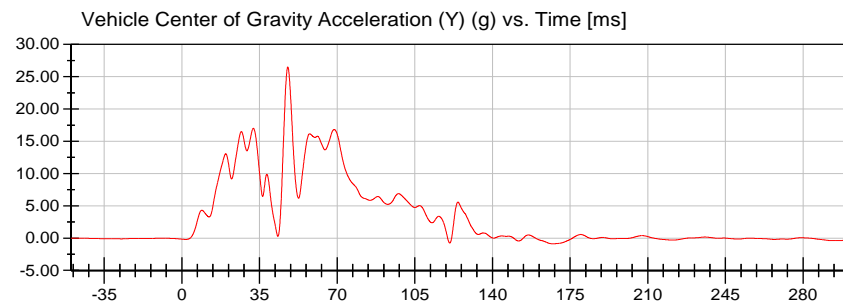
<Max>

1.97 g at 42.40 ms

<Min>

-9.30 g at 66.60 ms

CFC_60



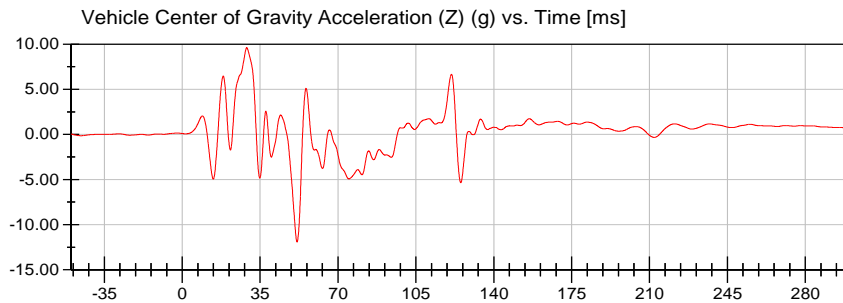
<Max>

26.52 g at 47.75 ms

<Min>

-0.88 g at 167.35 ms

CFC_60



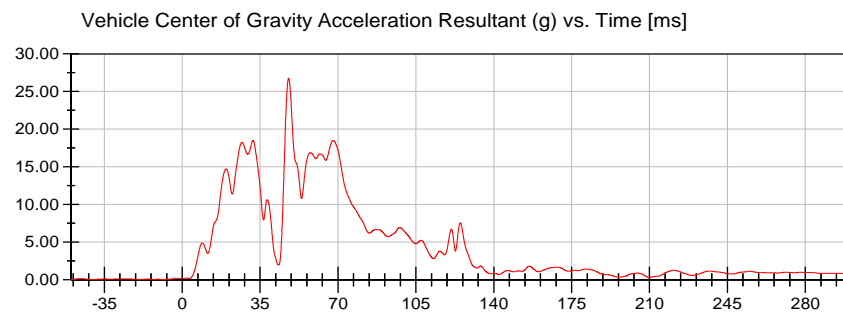
<Max>

9.61 g at 29.00 ms

<Min>

-11.93 g at 51.60 ms

CFC_60



<Max>

26.79 g at 47.80 ms

<Min>

0.04 g at -7.95 ms

CFC_60



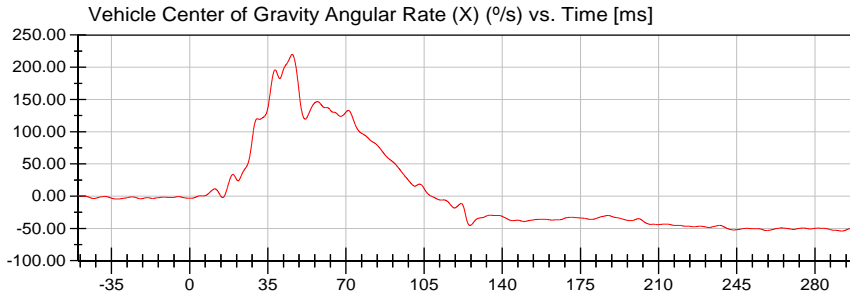
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



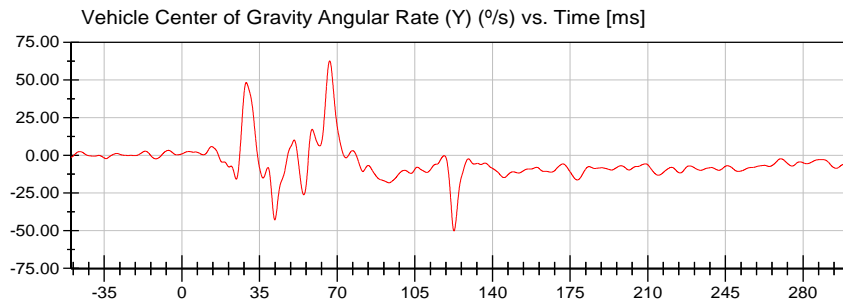
<Max>

219.95 °/s at 45.95 ms

<Min>

-53.99 °/s at 292.00 ms

CFC_60



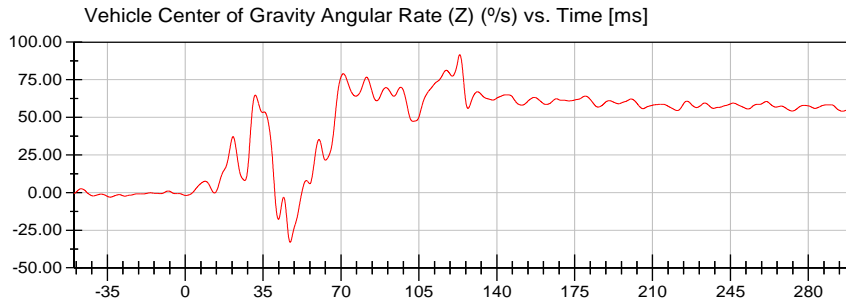
<Max>

62.70 °/s at 66.65 ms

<Min>

-50.12 °/s at 122.65 ms

CFC_60



<Max>

91.66 °/s at 123.35 ms

<Min>

-32.99 °/s at 47.20 ms

CFC_60

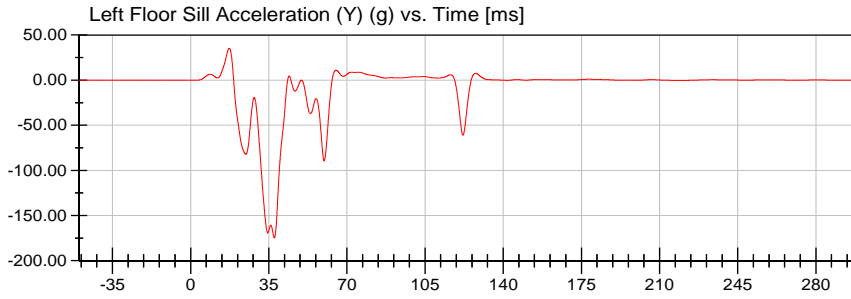


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



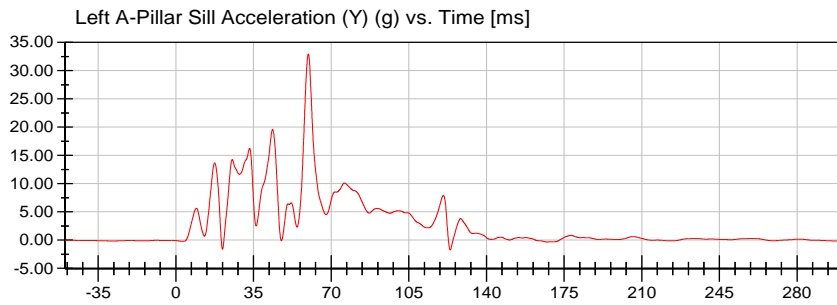
<Max>

35.22 g at 17.30 ms

<Min>

-174.85 g at 37.50 ms

CFC_60



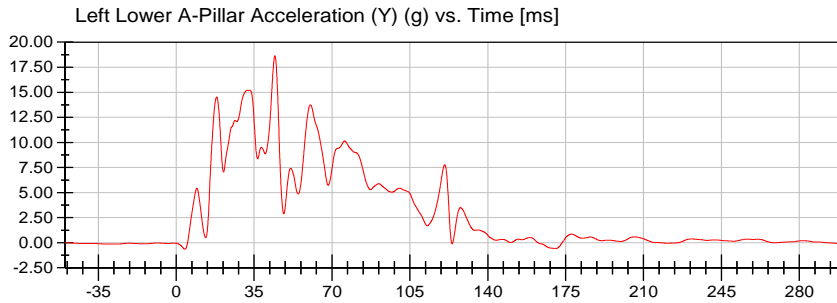
<Max>

32.96 g at 59.70 ms

<Min>

-1.73 g at 123.70 ms

CFC_60



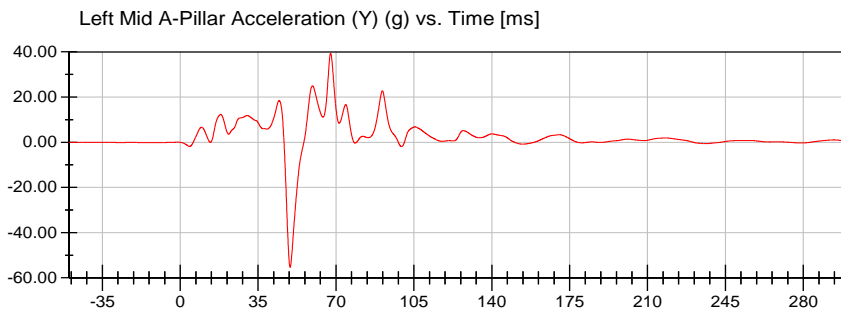
<Max>

18.65 g at 44.35 ms

<Min>

-0.65 g at 3.90 ms

CFC_60



<Max>

39.41 g at 67.60 ms

<Min>

-55.34 g at 49.40 ms

CFC_60

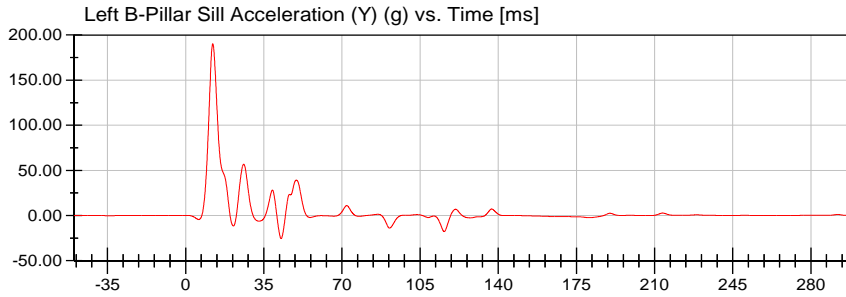


VRTC

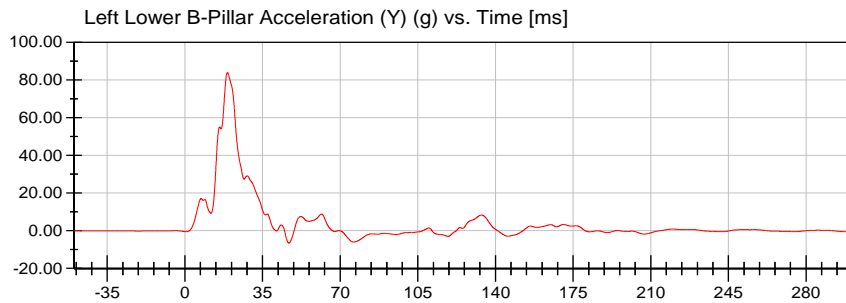
Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

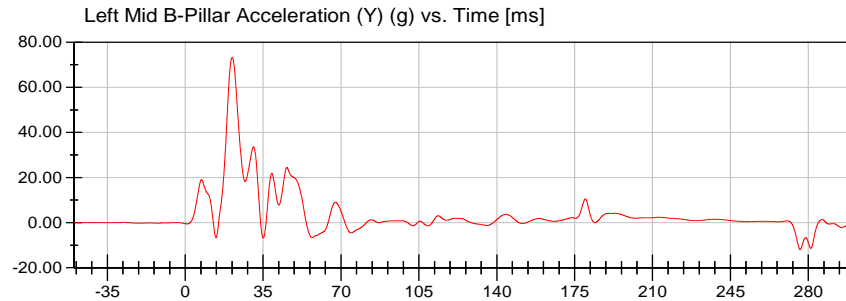
Test Date: 04/01/2021



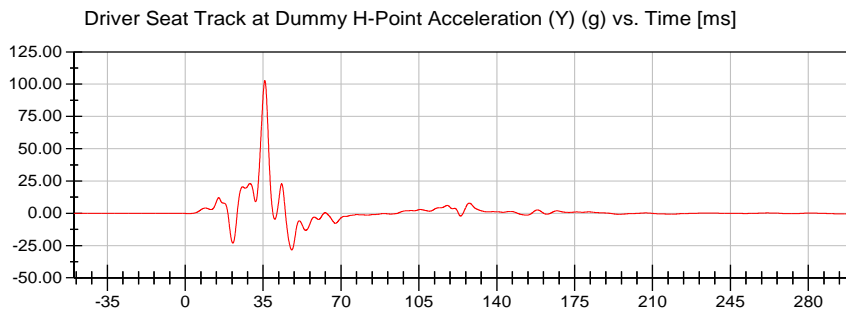
<Max>
190.20 g at 12.15 ms
<Min>
-25.51 g at 42.75 ms
CFC_60



<Max>
84.03 g at 19.20 ms
<Min>
-6.53 g at 46.90 ms
CFC_60



<Max>
73.21 g at 21.10 ms
<Min>
-11.92 g at 276.30 ms
CFC_60



<Max>
102.86 g at 35.75 ms
<Min>
-28.41 g at 47.90 ms
CFC_60



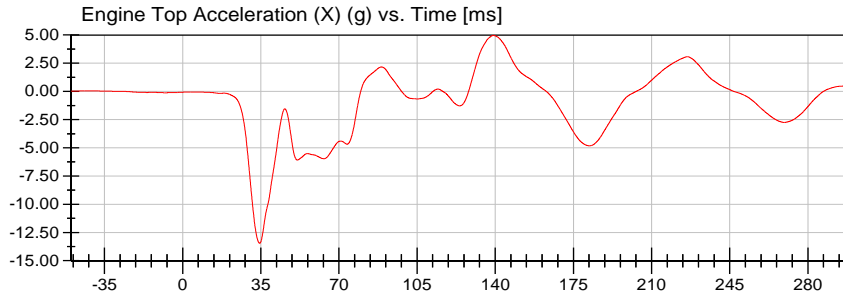
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



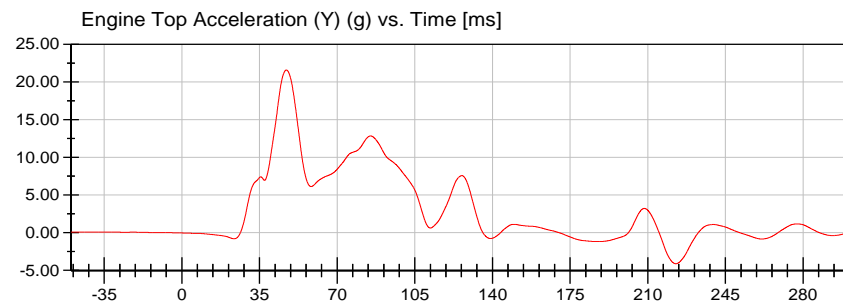
<Max>

4.96 g at 139.15 ms

<Min>

-13.46 g at 34.50 ms

CFC_60



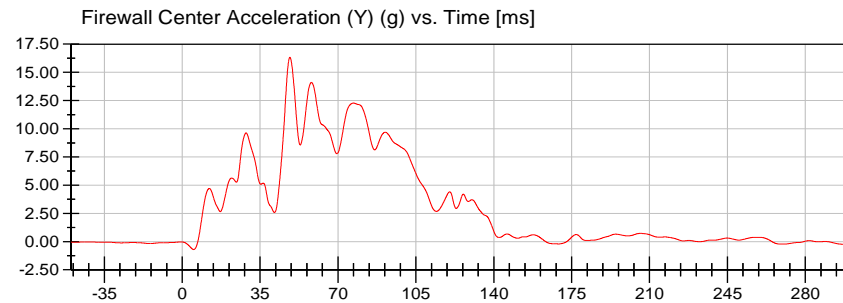
<Max>

21.61 g at 47.10 ms

<Min>

-4.12 g at 222.65 ms

CFC_60



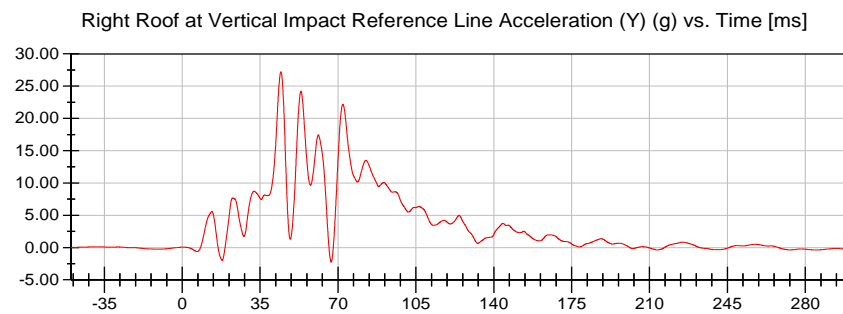
<Max>

16.33 g at 48.35 ms

<Min>

-0.70 g at 5.15 ms

CFC_60



<Max>

27.21 g at 44.35 ms

<Min>

-2.24 g at 66.90 ms

CFC_60

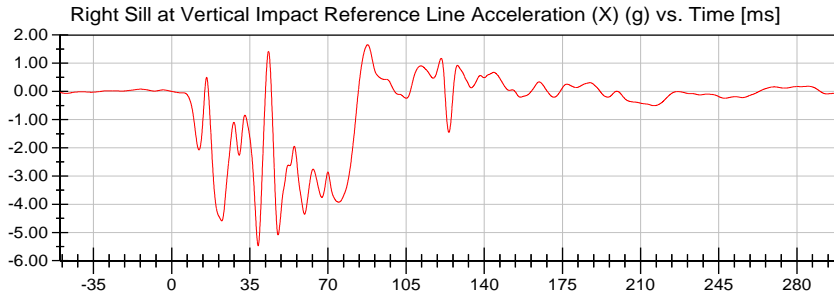


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



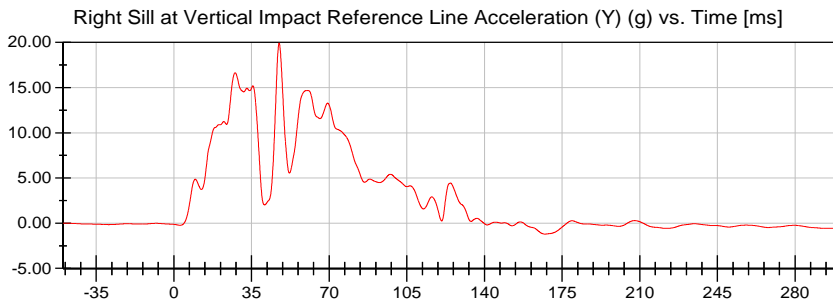
<Max>

1.66 g at 87.80 ms

<Min>

-5.48 g at 38.75 ms

CFC_60



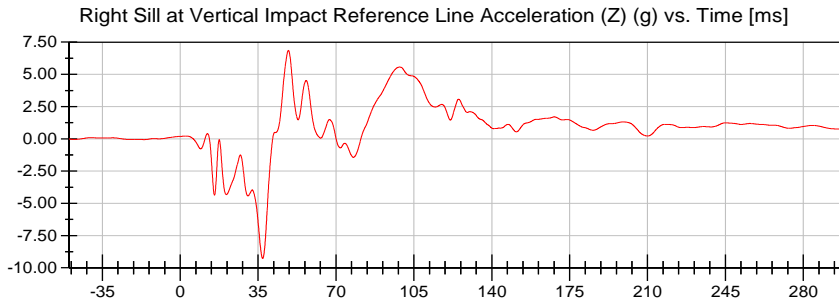
<Max>

19.94 g at 47.45 ms

<Min>

-1.20 g at 167.35 ms

CFC_60



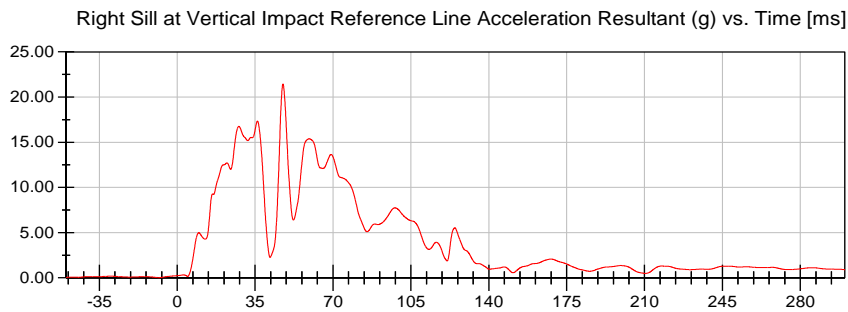
<Max>

6.87 g at 48.60 ms

<Min>

-9.27 g at 37.05 ms

CFC_60



<Max>

21.43 g at 47.55 ms

<Min>

0.02 g at -8.30 ms

CFC_60

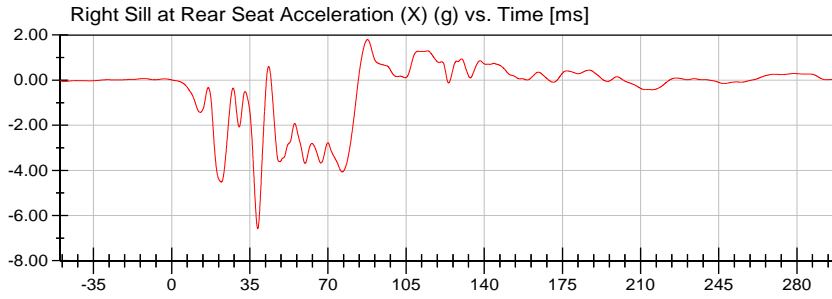


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



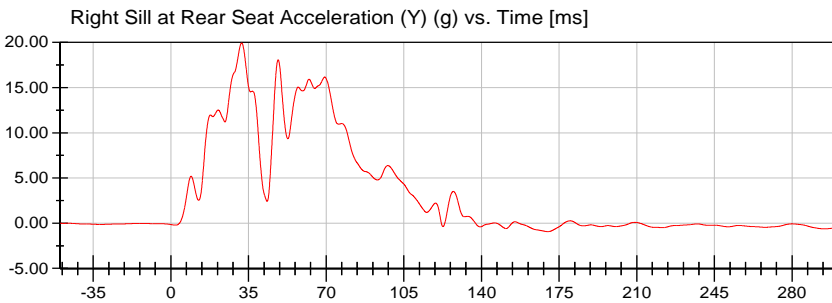
<Max>

1.80 g at 87.70 ms

<Min>

-6.59 g at 38.55 ms

CFC_60



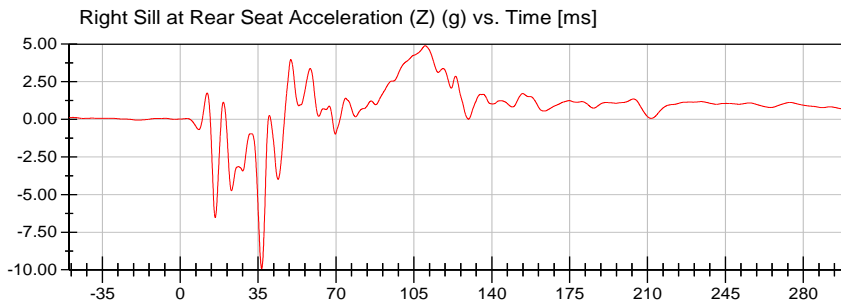
<Max>

19.93 g at 31.85 ms

<Min>

-0.93 g at 169.85 ms

CFC_60



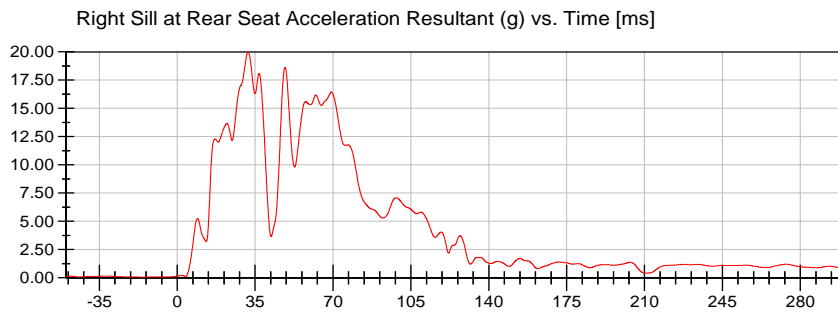
<Max>

4.89 g at 110.10 ms

<Min>

-9.92 g at 36.65 ms

CFC_60



<Max>

19.98 g at 31.85 ms

<Min>

0.06 g at -15.90 ms

CFC_60



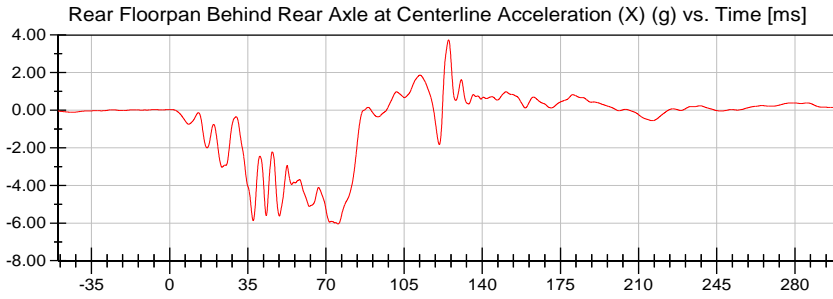
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



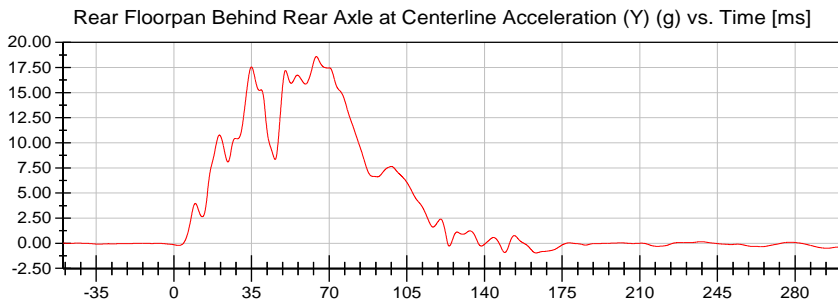
<Max>

3.74 g at 124.90 ms

<Min>

-6.05 g at 75.35 ms

CFC_60



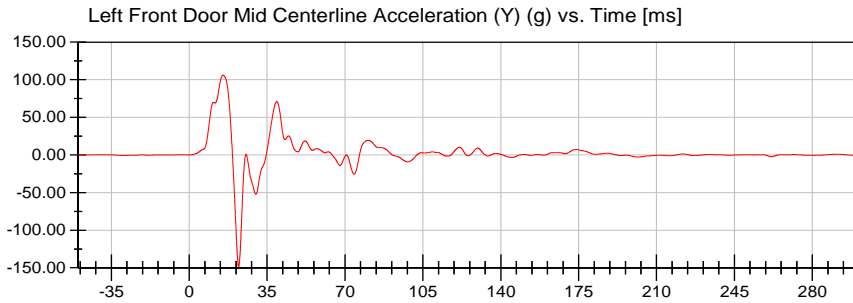
<Max>

18.60 g at 64.25 ms

<Min>

-0.96 g at 163.30 ms

CFC_60



<Max>

106.21 g at 15.20 ms

<Min>

-148.34 g at 22.20 ms

CFC_60

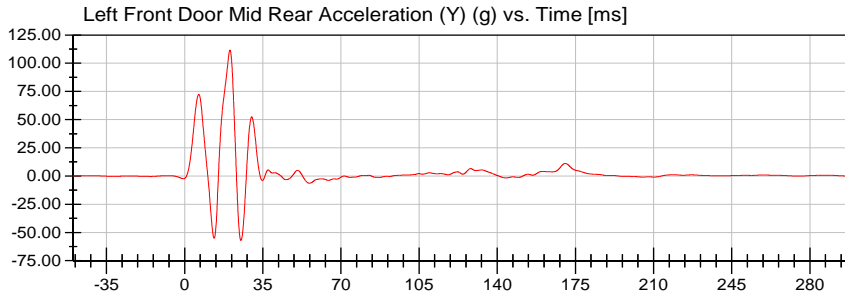


VRTC

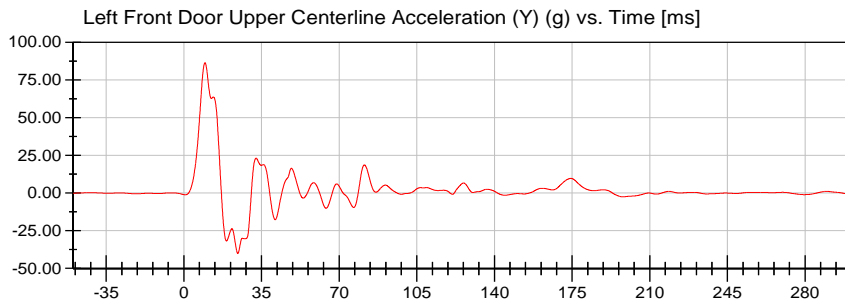
Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

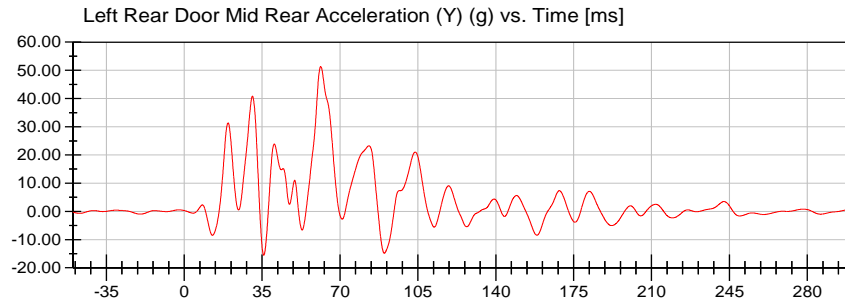
Test Date: 04/01/2021



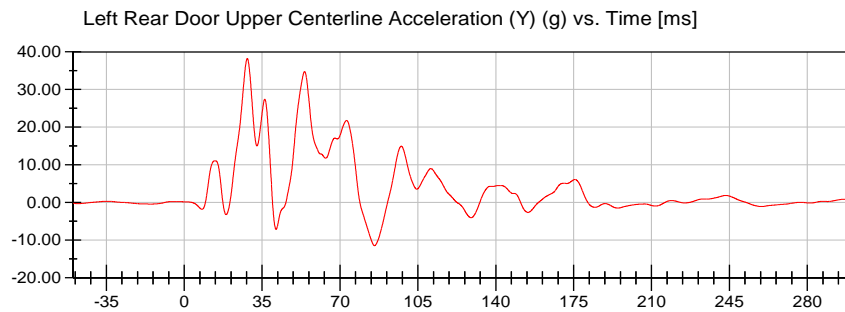
<Max>
111.67 g at 20.30 ms
<Min>
-57.17 g at 25.20 ms
CFC_60



<Max>
86.54 g at 9.55 ms
<Min>
-40.08 g at 24.30 ms
CFC_60



<Max>
51.34 g at 61.35 ms
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-15.57 g at 35.75 ms
CFC_60



<Max>
38.23 g at 28.35 ms
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-11.45 g at 85.50 ms
CFC_60



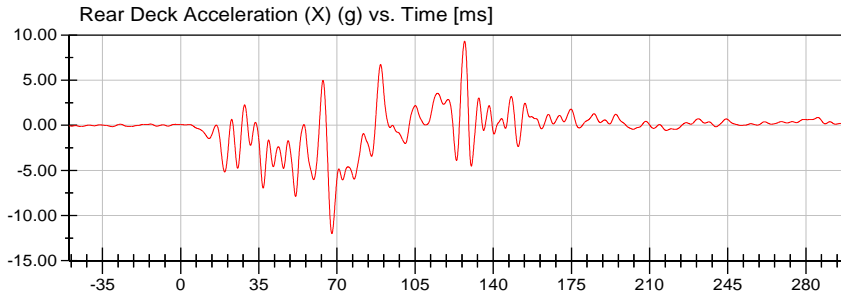
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



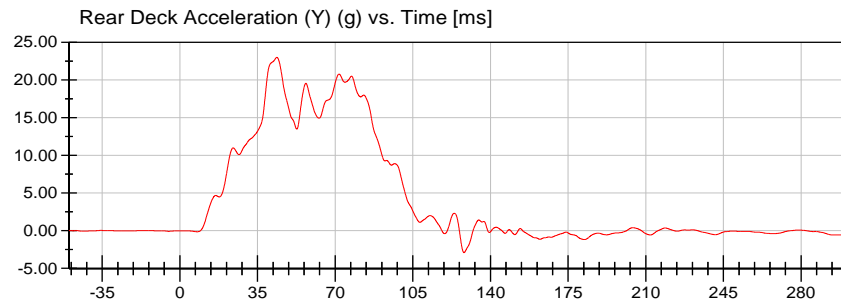
<Max>

9.31 g at 127.20 ms

<Min>

-12.00 g at 67.75 ms

CFC_60



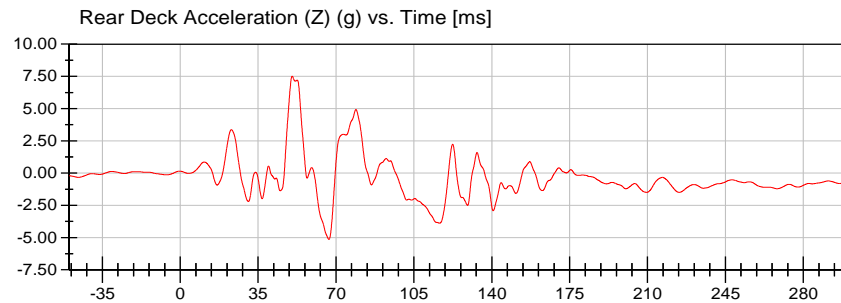
<Max>

23.02 g at 43.75 ms

<Min>

-2.91 g at 128.10 ms

CFC_60



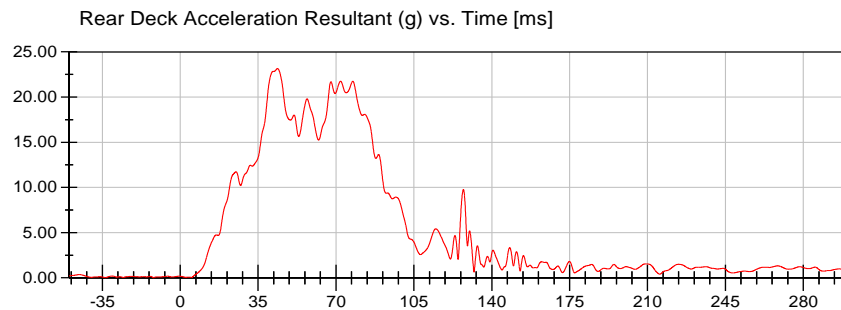
<Max>

7.51 g at 50.35 ms

<Min>

-5.14 g at 66.85 ms

CFC_60



<Max>

23.15 g at 43.75 ms

<Min>

0.01 g at -11.90 ms

CFC_60



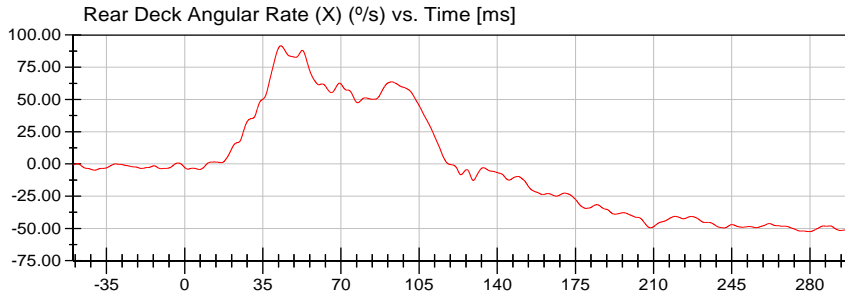
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



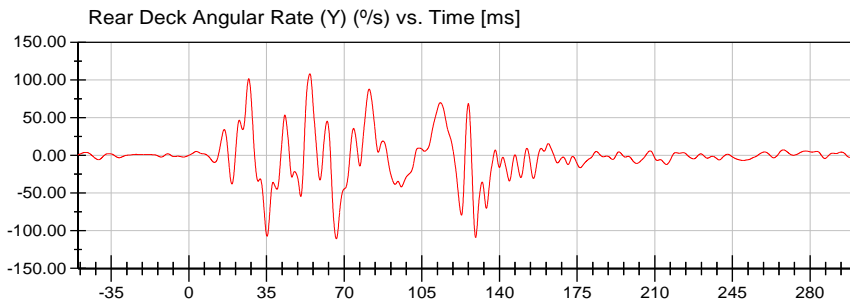
<Max>

91.67 °/s at 43.10 ms

<Min>

-52.49 °/s at 279.85 ms

CFC_60



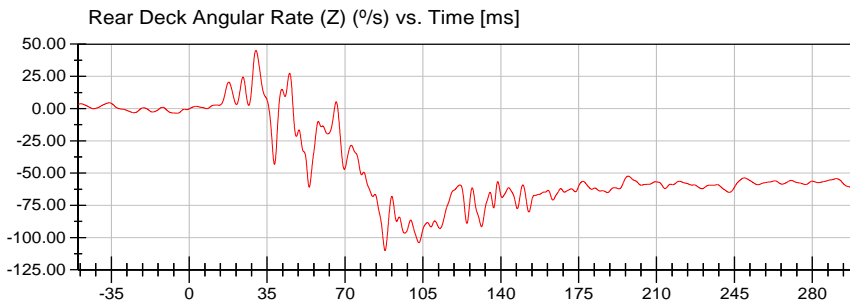
<Max>

108.38 °/s at 54.55 ms

<Min>

-110.64 °/s at 66.45 ms

CFC_60



<Max>

45.11 °/s at 30.00 ms

<Min>

-110.01 °/s at 88.00 ms

CFC_60



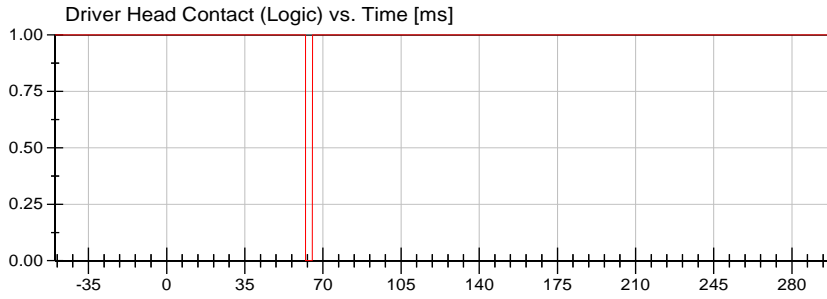
VRTC

Position #1 (11WS)

Test Date: 04/01/2021

Test Lab: CTF

Test Number: 210401 ()



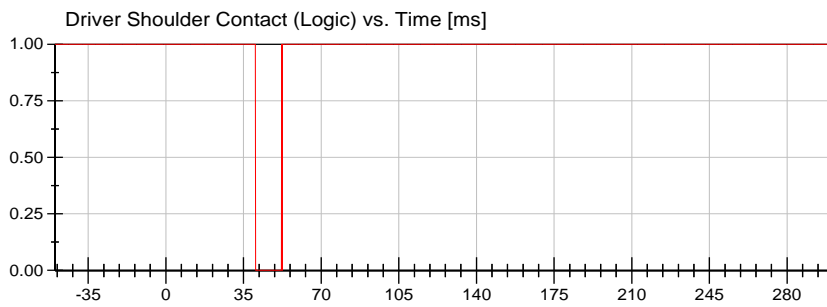
<Max>

1.00 Logic at -50.00 ms

<Min>

0.00 Logic at 62.25 ms

Unfiltered



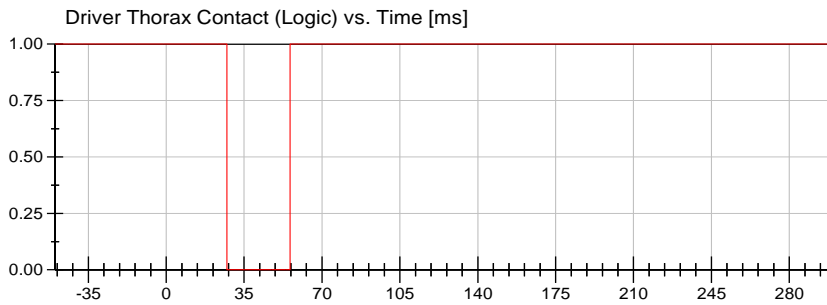
<Max>

1.00 Logic at -50.00 ms

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0.00 Logic at 40.45 ms

Unfiltered



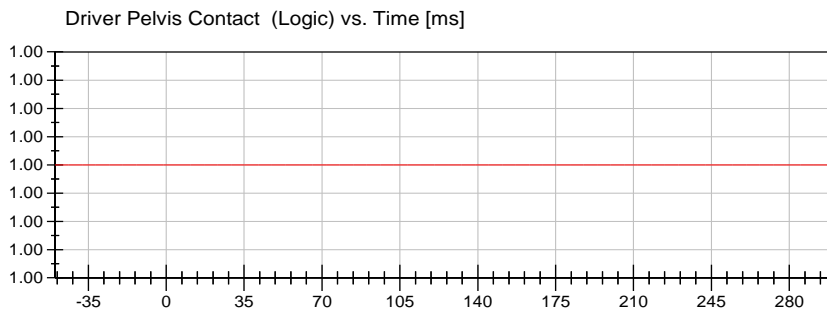
<Max>

1.00 Logic at -50.00 ms

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0.00 Logic at 27.30 ms

Unfiltered



<Max>

1.00 Logic at -50.00 ms

<Min>

1.00 Logic at -50.00 ms

Unfiltered

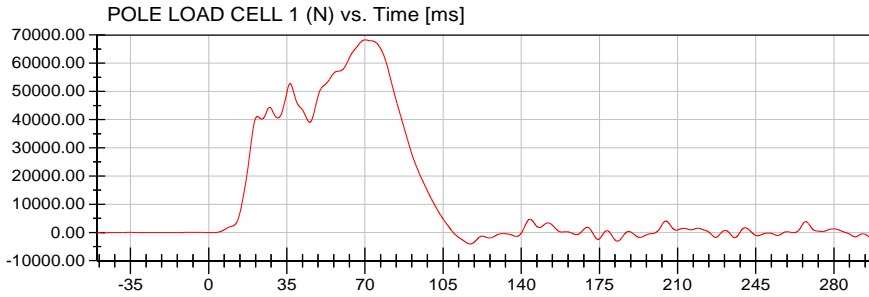


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



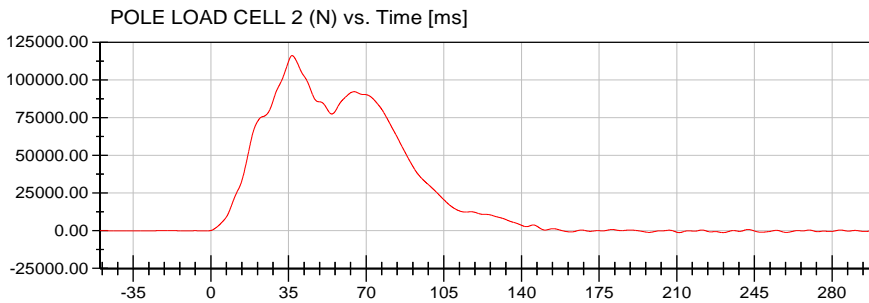
<Max>

68,281.71 N at 70.05 ms

<Min>

-4,073.59 N at 117.20 ms

CFC_60



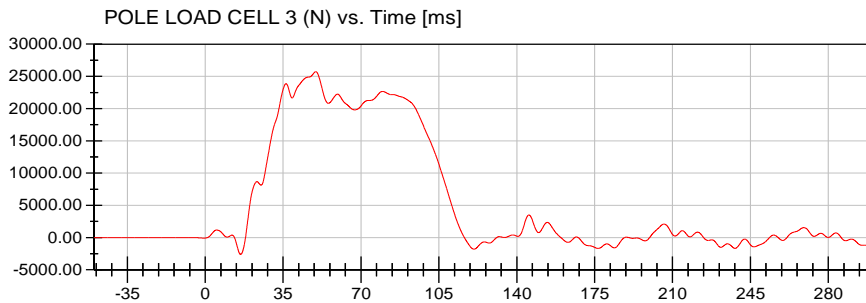
<Max>

116,307.24 N at 36.60 ms

<Min>

-1,198.15 N at 211.10 ms

CFC_60



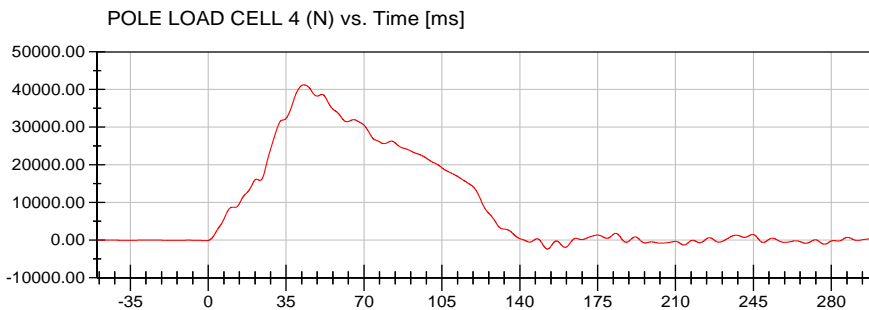
<Max>

25,733.69 N at 49.70 ms

<Min>

-2,597.24 N at 15.95 ms

CFC_60



<Max>

41,256.56 N at 42.85 ms

<Min>

-2,368.09 N at 152.40 ms

CFC_60

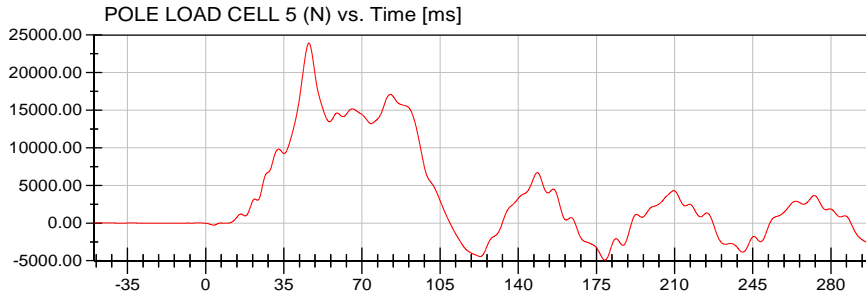


VRTC

Test Lab: CTF
Test Number: 210401 ()

Position #1 (11WS)

Test Date: 04/01/2021



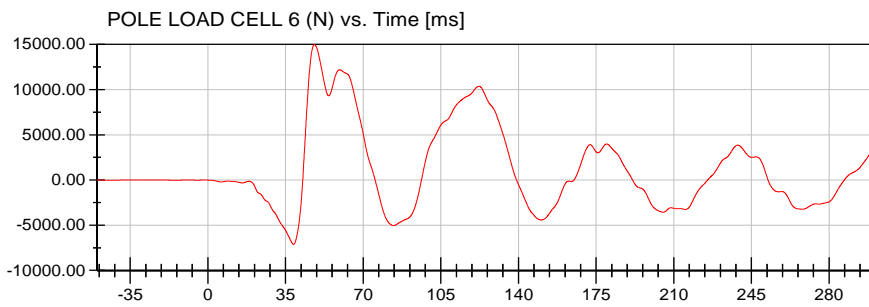
<Max>

23,919.15 N at 46.25 ms

<Min>

-4,920.76 N at 178.80 ms

CFC_60



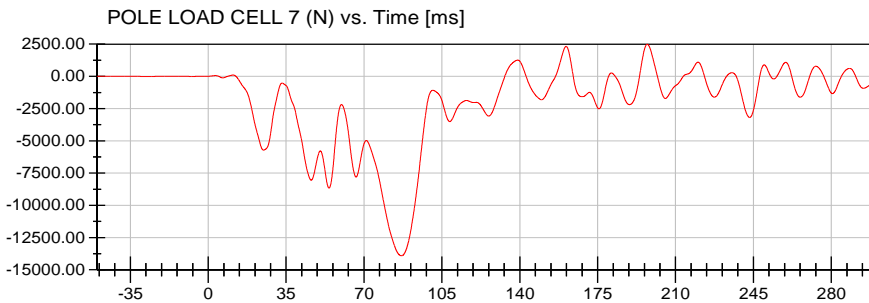
<Max>

14,980.32 N at 48.05 ms

<Min>

-7,112.28 N at 38.60 ms

CFC_60



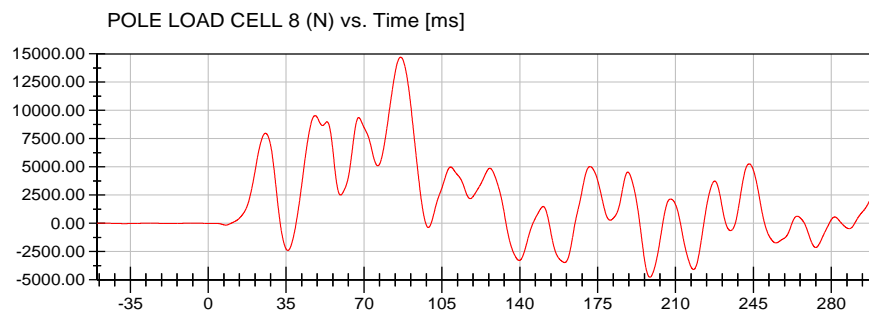
<Max>

2,485.11 N at 197.30 ms

<Min>

-13,909.24 N at 86.80 ms

CFC_60



<Max>

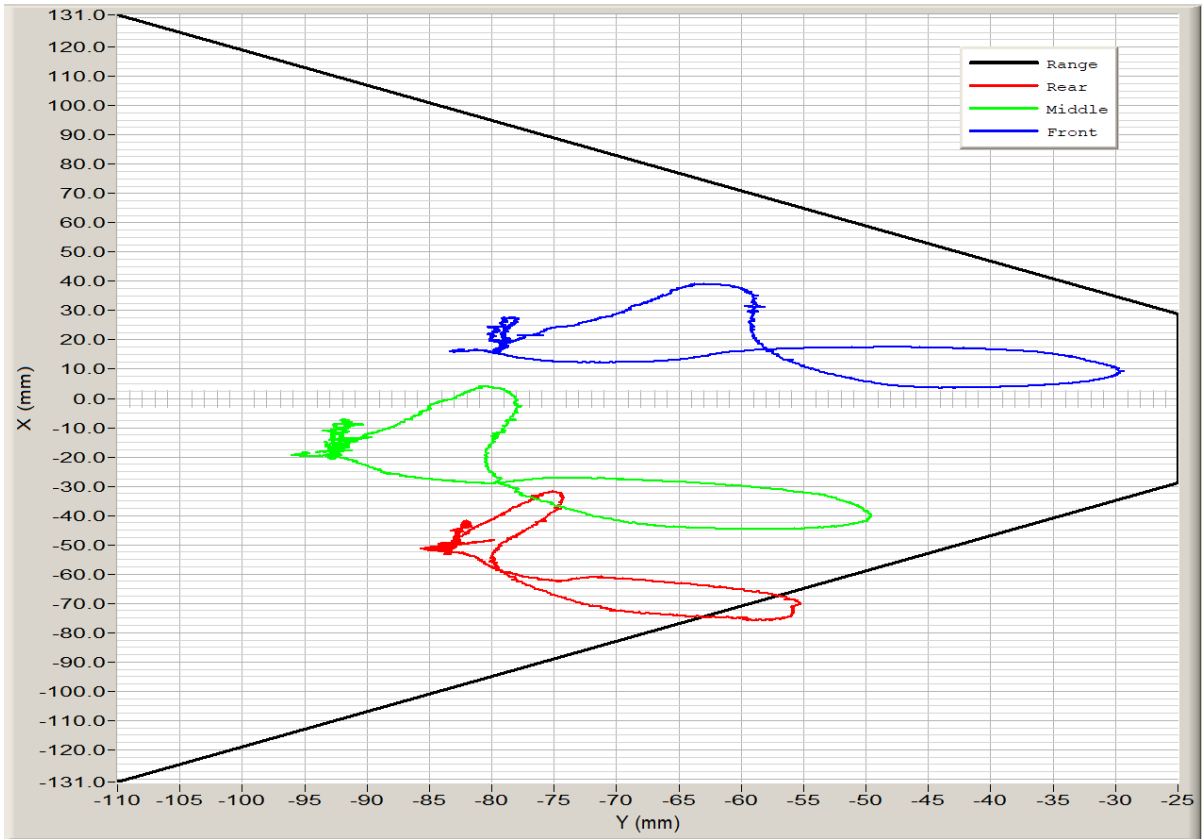
14,707.89 N at 86.45 ms

<Min>

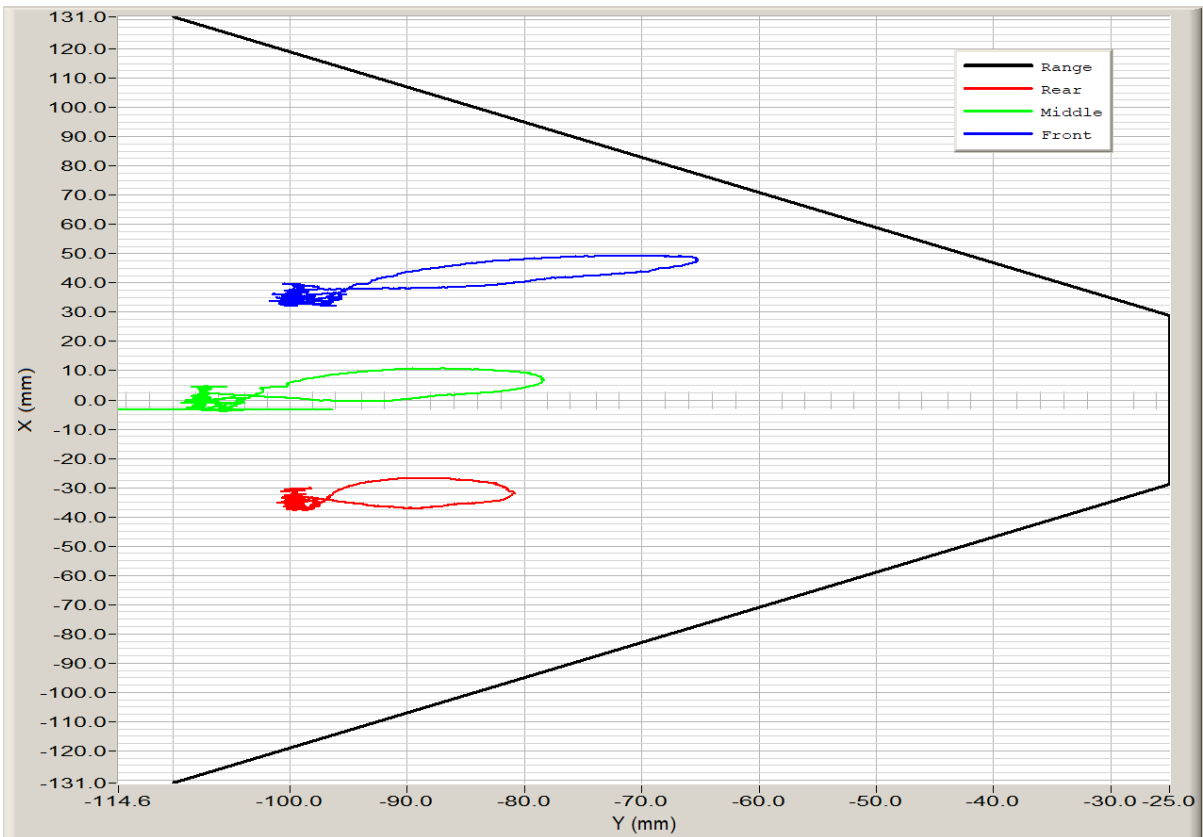
-4,774.60 N at 198.45 ms

CFC_60

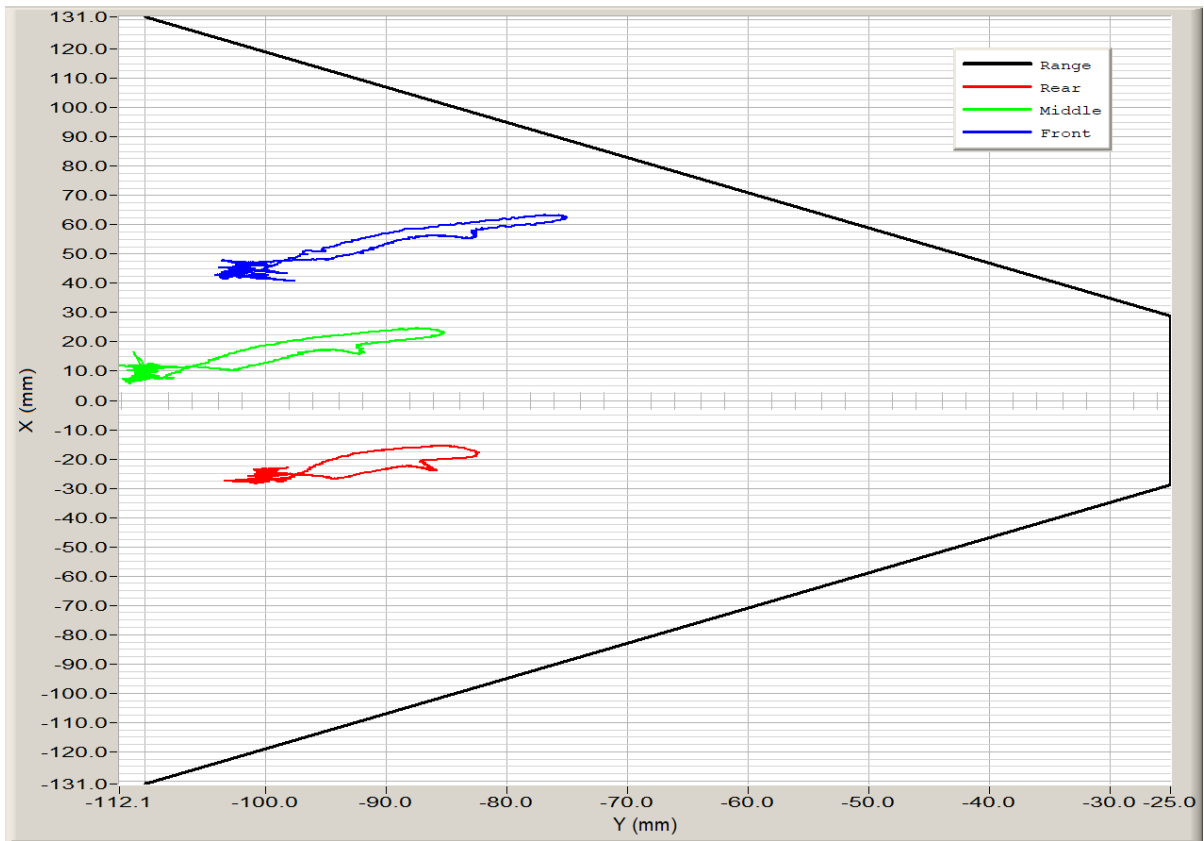




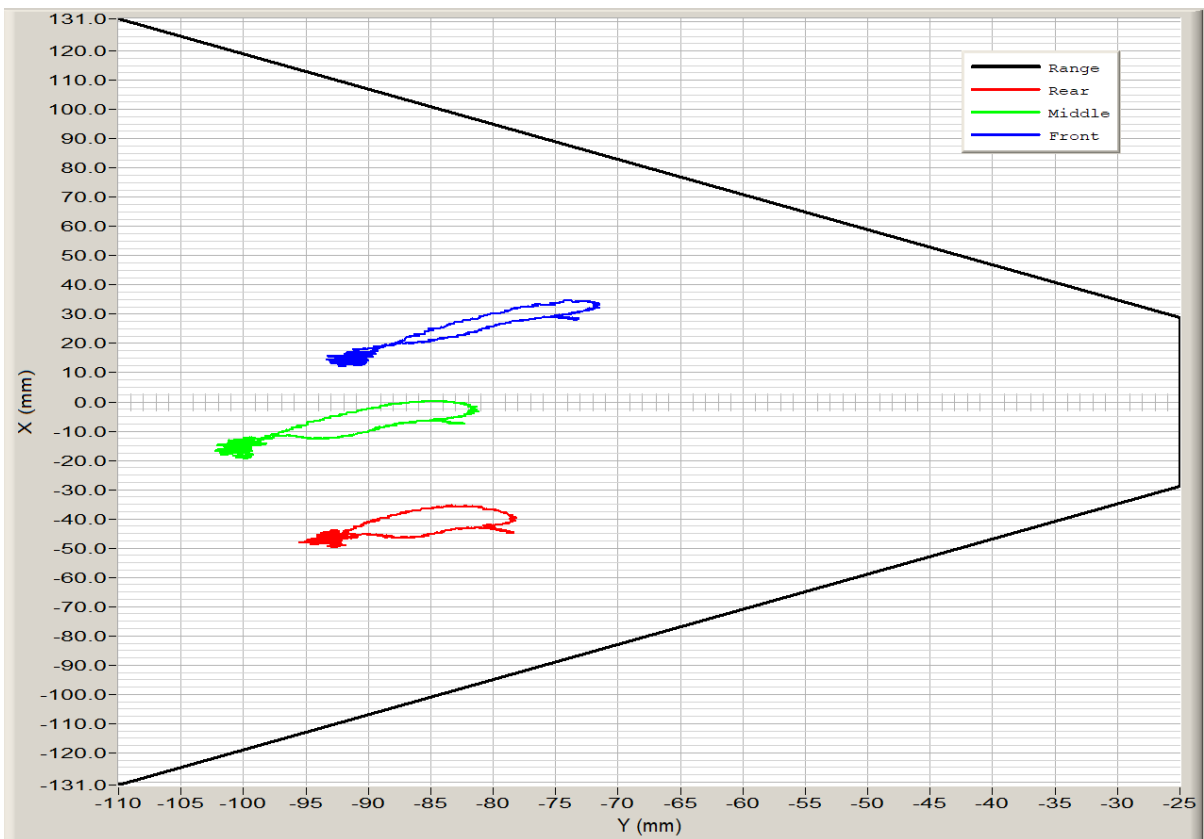
Shoulder_XY



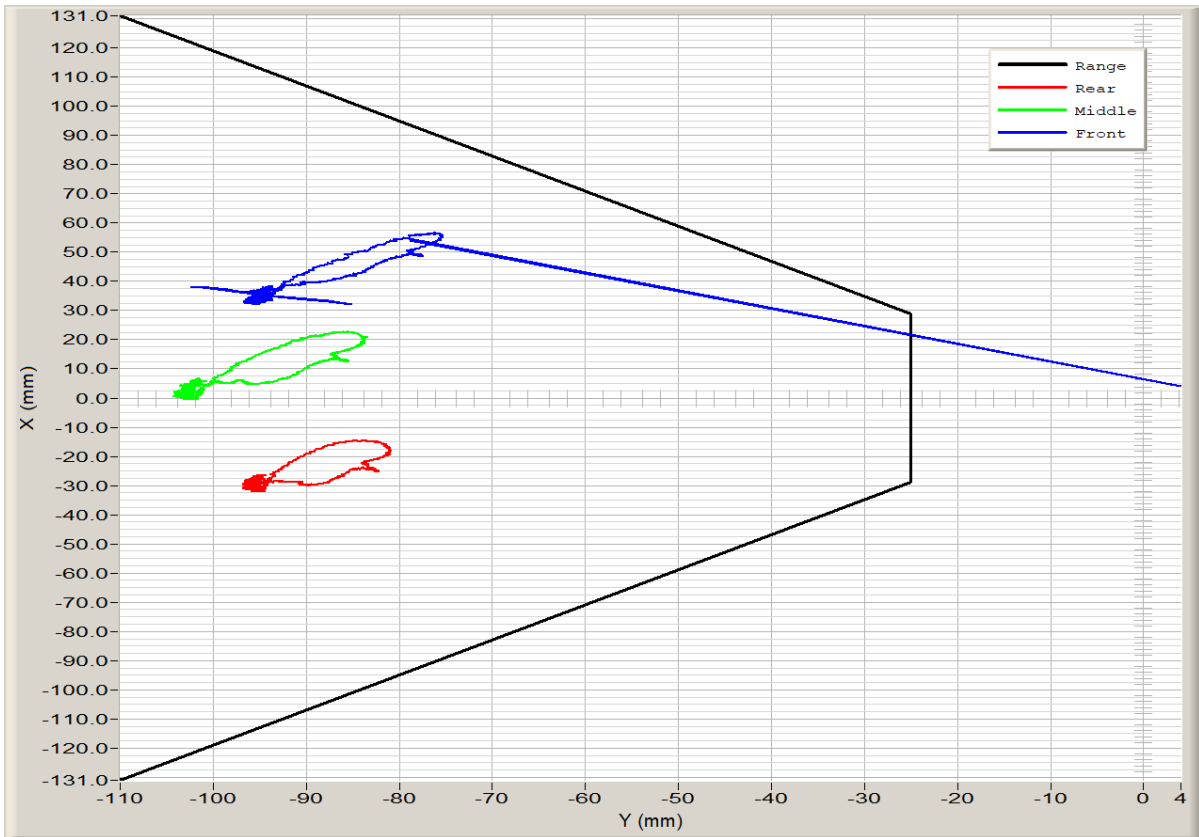
Thorax_1_XY



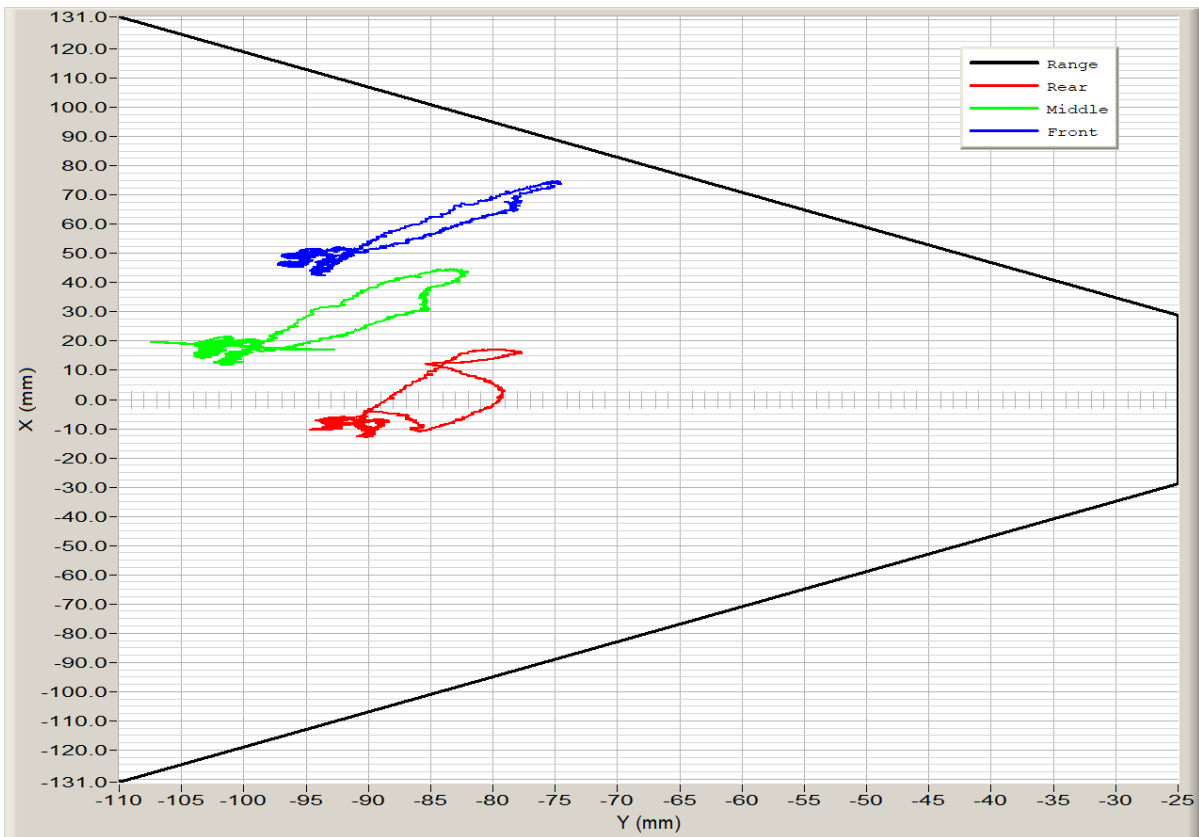
Thorax_2_XY



Thorax_3_XY



Abdomen_1_XY



Abdomen_2_XY

APPENDIX C
DUMMY PERFORMANCE QUALIFICATION TEST DATA

TABLE OF QUALIFICATION MEASUREMENTS AND PLOTS

WorldSID-50M (Driver) Dummy

Description

Table 1. External Measurements

Table 2. Front Head Drop Test

Resultant Head Acceleration (G's) vs. Time (ms)

Head (X) Acceleration (G's) vs. Time (ms)

Head (Y) Acceleration (G's) vs. Time (ms)

Head (Z) Acceleration (G's) vs. Time (ms)

Table 3. Left Lateral Head Drop Test

Resultant Head Acceleration (G's) vs. Time (ms)

Head (X) Acceleration (G's) vs. Time (ms)

Head (Y) Acceleration (G's) vs. Time (ms)

Head (Z) Acceleration (G's) vs. Time (ms)

Table 4. Right Lateral Head Drop Test

Resultant Head Acceleration (G's) vs. Time (ms)

Head (X) Acceleration (G's) vs. Time (ms)

Head (Y) Acceleration (G's) vs. Time (ms)

Head (Z) Acceleration (G's) vs. Time (ms)

Table 5. Left Lateral Neck Pendulum Test

Pendulum Acceleration (G's) vs. Time (ms)

Pendulum Velocity (m/s) vs. Time (ms)

Flexion Angle (°) vs. Time (ms)

Forward Potentiometer Rotation at Base of Pendulum (°) vs. Time (ms)

Rear Potentiometer Rotation at Base of Pendulum (°) vs. Time (ms)

Center Headform Potentiometer Rotation at CG (°) vs. Time (ms)

Neck Force Y (N) vs. Time (ms)

Neck Force Y (N) Filtered for Total Neck Occipital Condyle Moment Calculation vs. Time (ms)

Neck Moment X (Nm) vs. Time (ms)

Total Neck Occipital Condyle Moment X (Nm) vs. Time (ms)

Table 6. Right Lateral Neck Pendulum Test

Pendulum Acceleration (G's) vs. Time (ms)

Pendulum Velocity (m/s) vs. Time (ms)

Flexion Angle (°) vs. Time (ms)

Forward Potentiometer Rotation at Base of Pendulum (°) vs. Time (ms)

Rear Potentiometer Rotation at Base of Pendulum (°) vs. Time (ms)

Center Headform Potentiometer Rotation at CG (°) vs. Time (ms)

Neck Force Y (N) vs. Time (ms)

Neck Force Y (N) Filtered for Total Neck Occipital Condyle Moment Calculation vs. Time (ms)

Neck Moment X (Nm) vs. Time (ms)

Total Neck Occipital Condyle Moment X (Nm) vs. Time (ms)

Table 7. Left Lateral Shoulder Impact Test

Impactor Acceleration (G's) vs. Time (ms)

Impactor Force (N) vs. Time (ms)

Shoulder Displacement (mm) vs. Time (ms)

Table 8. Left Lateral Thorax with Arm Impact Test

Impactor Acceleration (G's) vs. Time (ms)

Impactor Force (N) vs. Time (ms)

TABLE OF QUALIFICATION MEASUREMENTS AND PLOTS (CONTUNUED)

WorldSID-50M (Driver) Dummy

Description

Upper Spine Acceleration (G's) vs. Time (ms)

Lower Spine Acceleration (G's) vs. Time (ms)

Upper Thorax Rib Displacement (mm) vs. Time (ms)

Center Thorax Rib Displacement (mm) vs. Time (ms)

Lower Thorax Rib Displacement (mm) vs. Time (ms)

Table 9. Left Lateral Thorax without Arm Impact Test

Impactor Acceleration (G's) vs. Time (ms)

Impactor Force (N) vs. Time (ms)

Upper Spine Acceleration (G's) vs. Time (ms)

Lower Spine Acceleration (G's) vs. Time (ms)

Upper Thorax Rib Displacement (mm) vs. Time (ms)

Center Thorax Rib Displacement (mm) vs. Time (ms)

Lower Thorax Rib Displacement (mm) vs. Time (ms)

Table 10. Left Lateral Abdomen Impact Test

Impactor Acceleration (G's) vs. Time (ms)

Impactor Force (N) vs. Time (ms)

Upper Abdominal Rib Displacement (mm) vs. Time (ms)

Lower Abdominal Rib Displacement (mm) vs. Time (ms)

Lower Spine Acceleration (G's) vs. Time (ms)

Table 11. Left Lateral Pelvis Impact Test

Impactor Acceleration (G's) vs. Time (ms)

Impactor Force (N) vs. Time (ms)

Pelvis Acceleration Y (G's) vs. Time (ms)

Lower Spine Acceleration Y (G's) vs. Time (ms)

Pre-Test Calibration Sheets
Driver S/N EB8888

Transportation Research Center Inc.
WorldSID-50M
External Measurements
Serial No. EB8888 Certification No. 09

WorldSID-50M Angular Reference Measurements					
Parameter	Symbol	Tilt Sensor (°)	Inclinometer (°)		
			Center	Left	Right
Head X-Axis	A1	0	n/a	n/a	n/a
Head Y-Axis	A2	2.2	n/a	2	Note 1
Neck Bracket X-Axis	A3	n/a	-0.5	n/a	n/a
Neck Bracket Y-Axis	A4	n/a	-3.1	n/a	n/a
Thorax X-Axis	A5	1.3	n/a	n/a	n/a
Thorax Y-Axis	A6	3.9	n/a	n/a	n/a
Pelvis X-Axis	A7	0.7	n/a	n/a	n/a
Pelvis Y-Axis	A8	10.2	n/a	n/a	n/a
H-point Tool	A9	n/a	n/a	33.1	33.9

WorldSID-50M External Linear Dimensions				
Parameter	Symbol	Specification (mm)		
		Center	Left	Right
Seated Height	L1	870	n/a	n/a
Hip Pivot Height	L2	n/a	89	89
Hip Pivot to Back Line	L3	n/a	187	177
Thigh Clearance	L4	n/a	181	180
Knee Height	L5	n/a	580	583
Knee to Backline	L6	n/a	667	670
Head Back to Seat Back	L7	156	n/a	n/a
Thorax Rib 1 Front to Back	L8	n/a	209	209
Abdomen Rib 2 Front to Back	L9	n/a	223	226
Arm Length	L10	n/a	330	330
Width Across Arms	L11	482	n/a	n/a
Waist Width	L12	341	n/a	n/a

Note 1: No land marks on the right side of head. Unable to align level.

Transportation Research Center Inc.

Front Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/25/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Peak Head Resultant Acceleration	211 - 261 g	234.5 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	7.3 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	1.33 %	Yes

Test meets specifications.

Condition: Used

Comments:

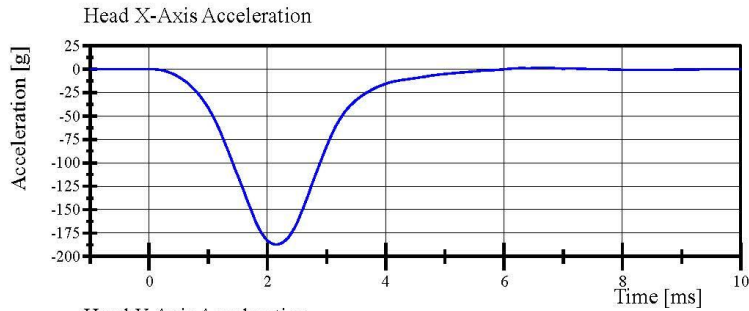
Head Skin S/N: EG2845

Transportation Research Center Inc.

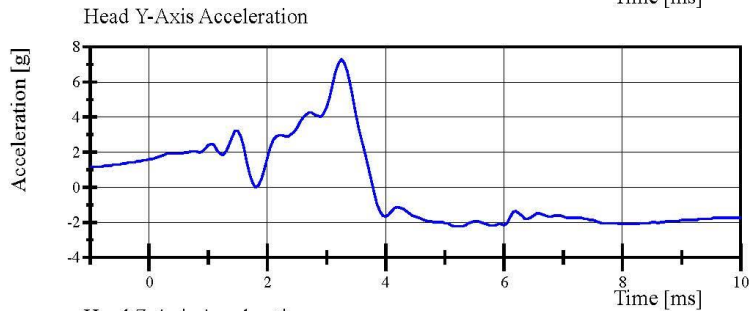
Front Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 9-1

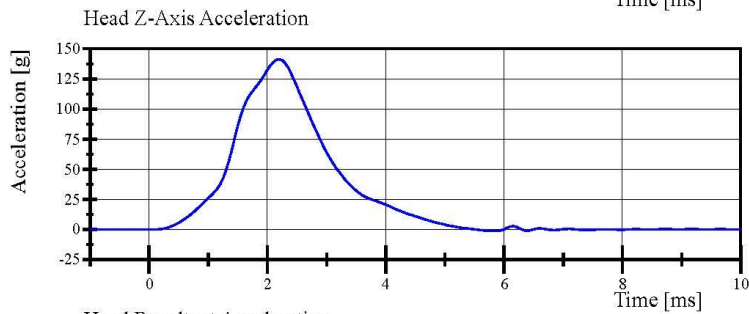
Test Date: 3/25/2021



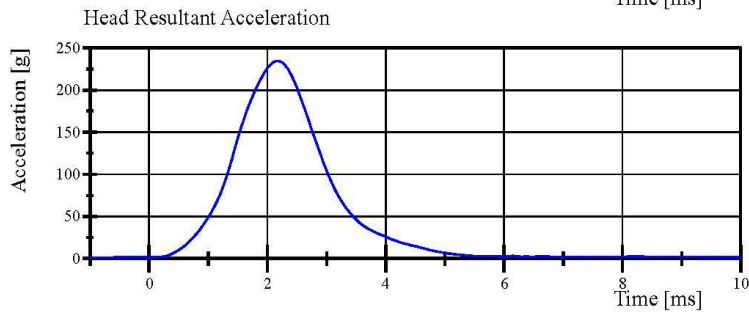
Filter Class: CFC_1000
Max: 1.8 g at 6.7 ms
Min: -187.3 g at 2.2 ms



Filter Class: CFC_1000
Max: 7.3 g at 3.3 ms
Min: -2.2 g at 5.2 ms



Filter Class: CFC_1000
Max: 141.5 g at 2.2 ms
Min: -1.2 g at 5.8 ms



Filter Class: CFC_1000
Max: 234.5 g at 2.2 ms
Min: 1.2 g at -1.0 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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Report Number: EB8888_WSH09

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Transportation Research Center Inc.

Left Lateral Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/25/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Peak Head Resultant Acceleration	107 - 126 g	113.3 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	1.9 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	2.20 %	Yes

Test meets specifications.

Condition: Used

Comments:

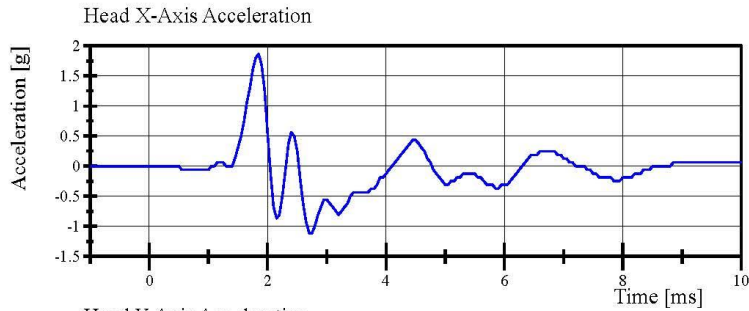
Head Skin S/N: EG2845

Transportation Research Center Inc.

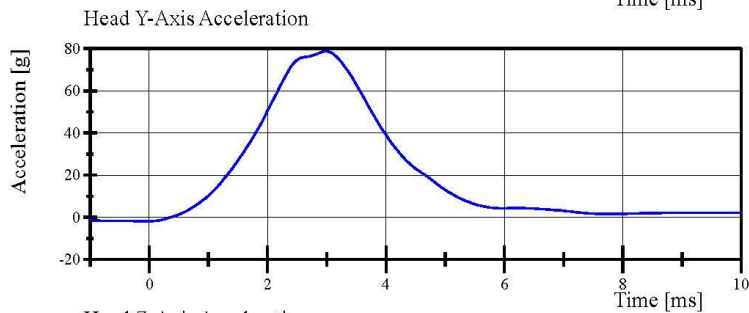
Left Lateral Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 9-1

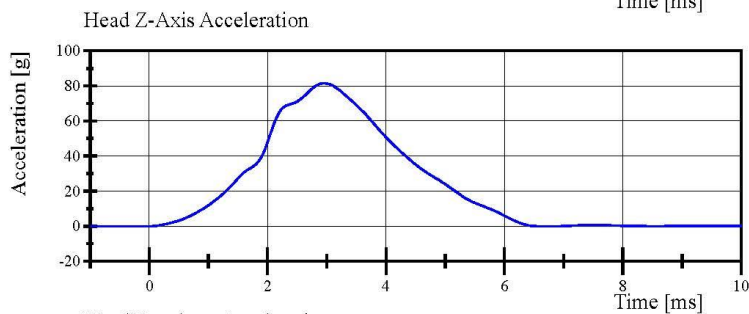
Test Date: 3/25/2021



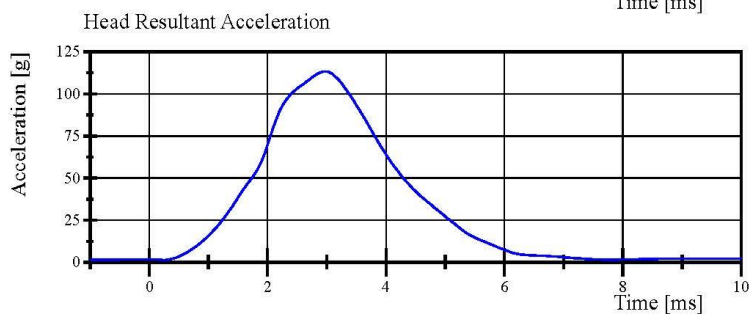
Filter Class: CFC_1000
Max: 1.9 g at 1.9 ms
Min: -1.1 g at 2.7 ms



Filter Class: CFC_1000
Max: 78.8 g at 3.0 ms
Min: -1.8 g at -0.1 ms



Filter Class: CFC_1000
Max: 81.5 g at 3.0 ms
Min: -0.1 g at -1.0 ms



Filter Class: CFC_1000
Max: 113.3 g at 3.0 ms
Min: 1.4 g at 0.3 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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Transportation Research Center Inc.

Right Lateral Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/25/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Peak Head Resultant Acceleration	107 - 126 g	116.3 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-3.7 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	2.53 %	Yes

Test meets specifications.

Condition: Used

Comments:

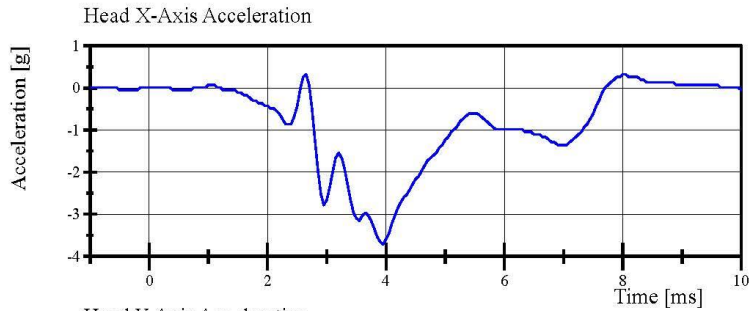
Head Skin S/N: EG2845

Transportation Research Center Inc.

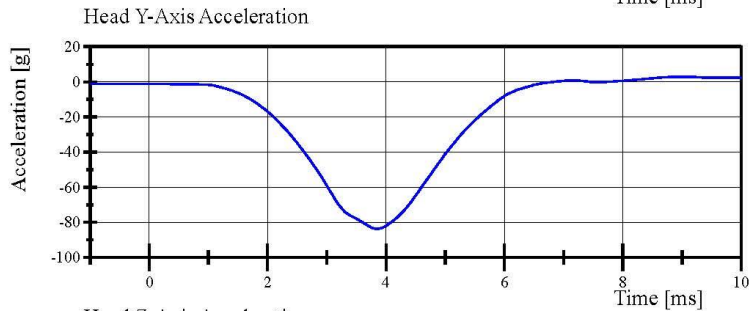
Right Lateral Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 9-1

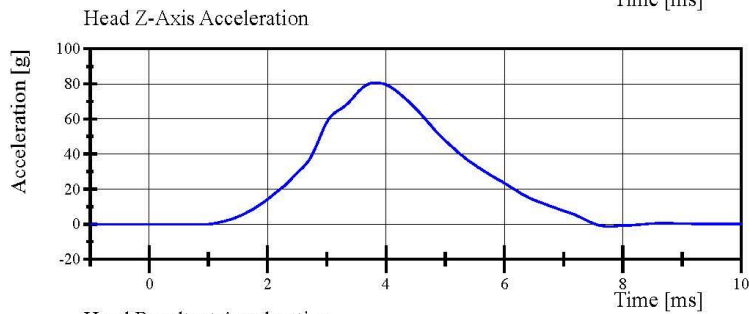
Test Date: 3/25/2021



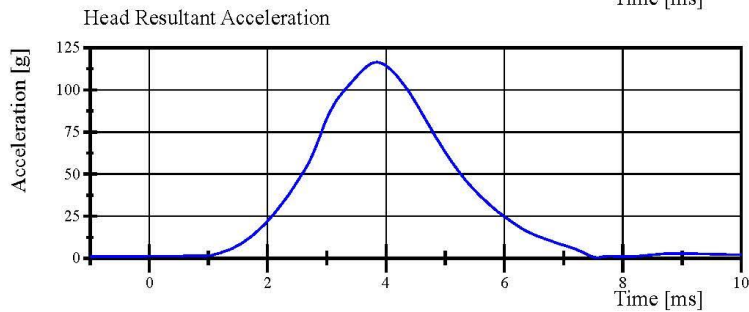
Filter Class: CFC_1000
Max: 0.3 g at 2.7 ms
Min: -3.7 g at 4.0 ms



Filter Class: CFC_1000
Max: 2.8 g at 8.9 ms
Min: -83.8 g at 3.9 ms



Filter Class: CFC_1000
Max: 80.7 g at 3.8 ms
Min: -1.3 g at 7.8 ms



Filter Class: CFC_1000
Max: 116.3 g at 3.9 ms
Min: 0.5 g at 7.6 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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Transportation Research Center Inc.

Left Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 9-1
Test Date: 3/25/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Pendulum Velocity	(-3.30) - (-3.50) m/s	-3.323 m/s	Yes
Pendulum Integrated Velocity			
Change at 4 ms	0.87 - 1.09 m/s	1.001 m/s	Yes
Change at 8 ms	1.72 - 2.1 m/s	1.952 m/s	Yes
Change at 12 ms	2.63 - 3.17 m/s	2.940 m/s	Yes
Maximum Headform Flexion	(-50) - (-61) deg	-53.4 deg	Yes
Headform Flexion Decay			
- from Peak to Zero Degrees	58 - 72 ms	60.6 ms	Yes
Total Neck Occipital Condyles Moment	54 - 67 N·m	59.3 N·m	Yes
Total Neck Occipital Condyles Moment			
Decay Time to 0 N·m	71 - 87 ms	75.9 ms	Yes
Maximum Forward Pot Rotation			
Peak	(-32) - (-39) °	-34.6 °	Yes
Time of Peak	56 - 68 ms	61.7 ms	Yes
Maximum Rear Pot Rotation			
Peak	(-29) - (-36) °	-31.0 °	Yes
Time of Peak	56 - 68 ms	61.9 ms	Yes
Maximum Headform Angular Rate	(-2,047) - (-2,503) %/s	-2,278.2 %/s	Yes

Test meets specifications.

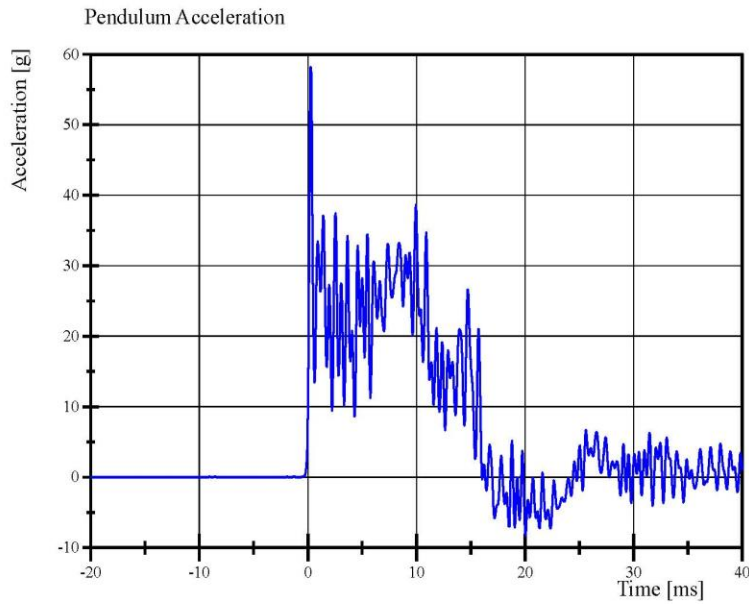
Condition: Used

Comments:

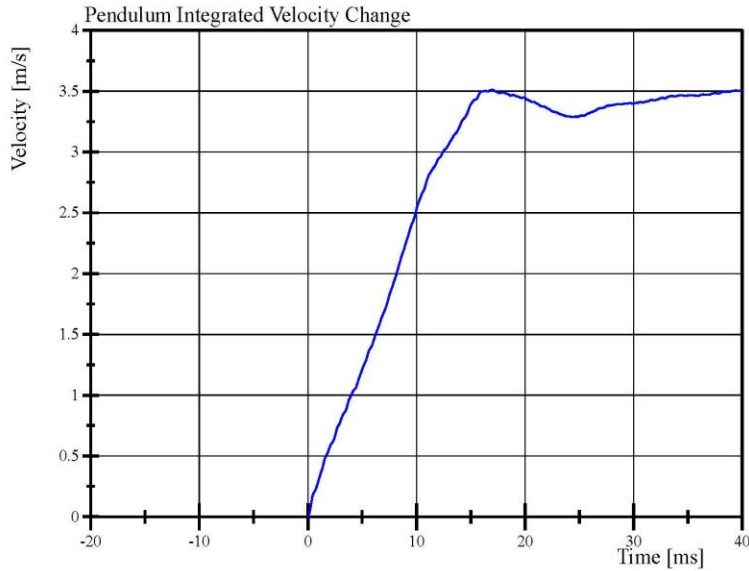
Neck S/N: EE8804

Transportation Research Center Inc.

Left Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 9-1
Test Date: 3/25/2021



Filter Class: CFC_1000
Max: 58.2 g at 0.3 ms
Min: -8.3 g at 20.1 ms



Filter Class: CFC_1000
Max: 3.5 m/s at 17.0 ms
Min: 0.0 m/s at -0.0 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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Report Number: EB8888_WSH09

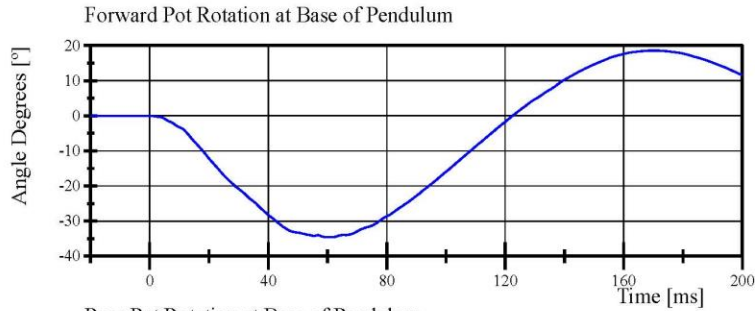
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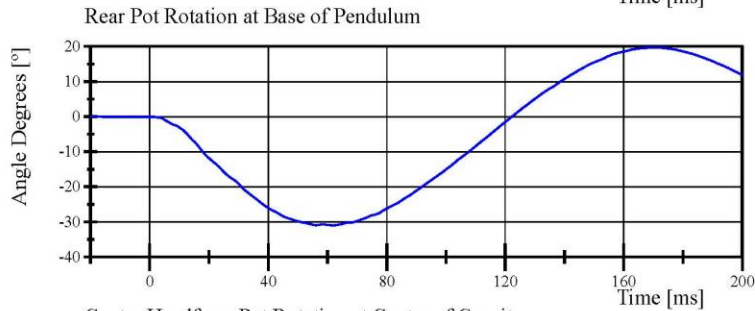
Left Lateral Neck

WorldSID 50th Serial No. EB8888 Certification No. 9-1

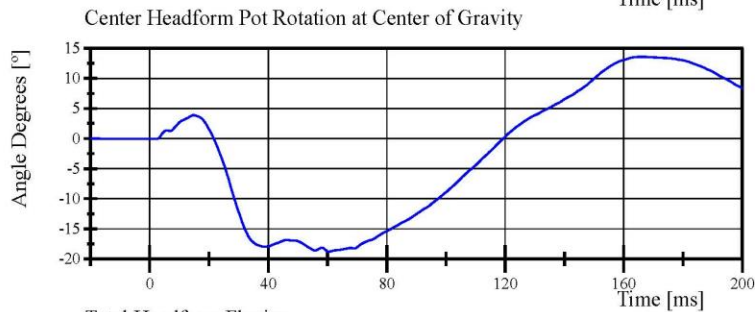
Test Date: 3/25/2021



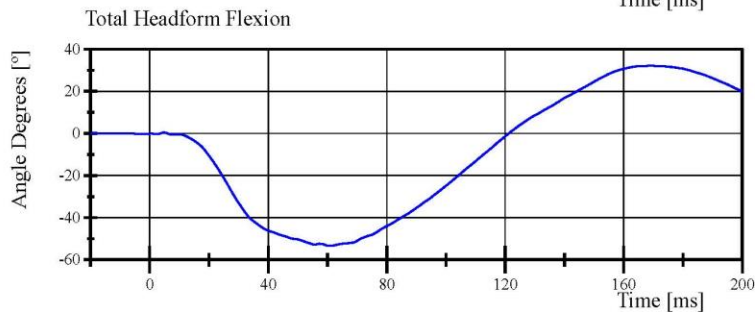
Filter Class: CFC_180
Max: 18.6 ° at 170.2 ms
Min: -34.6 ° at 61.7 ms



Filter Class: CFC_180
Max: 19.7 ° at 170.9 ms
Min: -31.0 ° at 61.9 ms



Filter Class: CFC_180
Max: 13.6 ° at 165.6 ms
Min: -18.8 ° at 60.5 ms



Filter Class: CFC_180
Max: 32.1 ° at 169.2 ms
Min: -53.4 ° at 60.6 ms

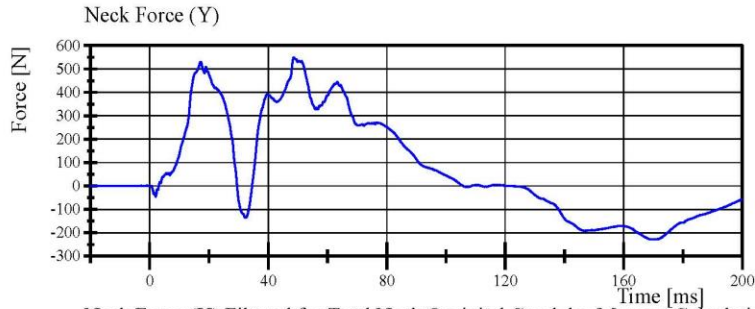
Specification Source: WorldSID 50th(WS) VRTC Nov 2020.xlsx
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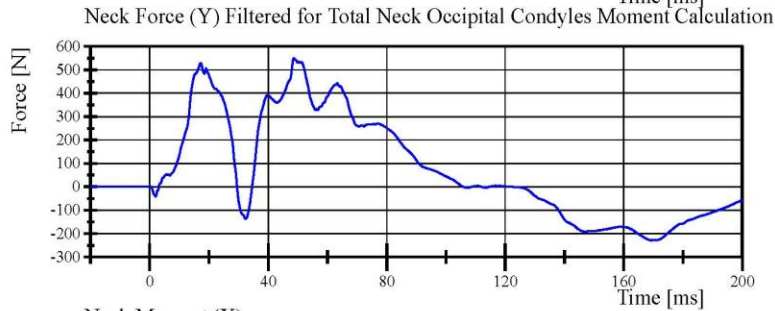


Transportation Research Center Inc.

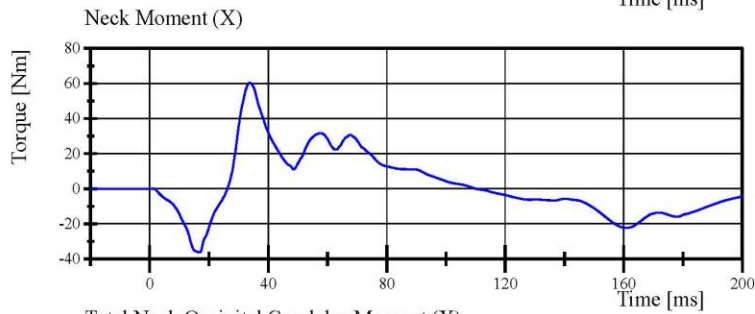
Left Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 9-1
Test Date: 3/25/2021



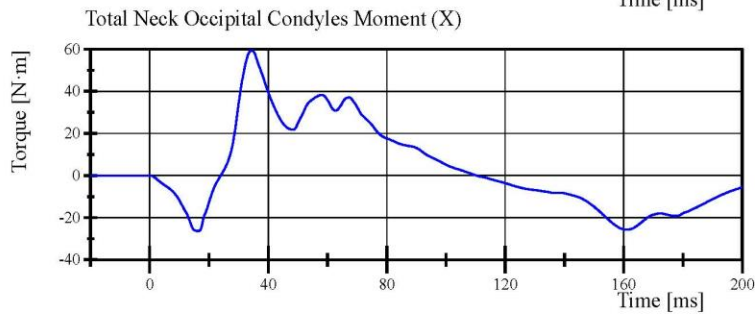
Filter Class: CFC_1000
Max: 550.1 N at 48.6 ms
Min: -228.5 N at 169.1 ms



Filter Class: CFC_600
Max: 549.5 N at 48.7 ms
Min: -228.5 N at 169.3 ms



Filter Class: CFC_600
Max: 60.4 Nm at 33.8 ms
Min: -36.3 Nm at 16.8 ms



Filter Class: Without_(Constar)
Max: 59.3 N·m at 34.4 ms
Min: -26.3 N·m at 16.3 ms

Specification Source: WorldSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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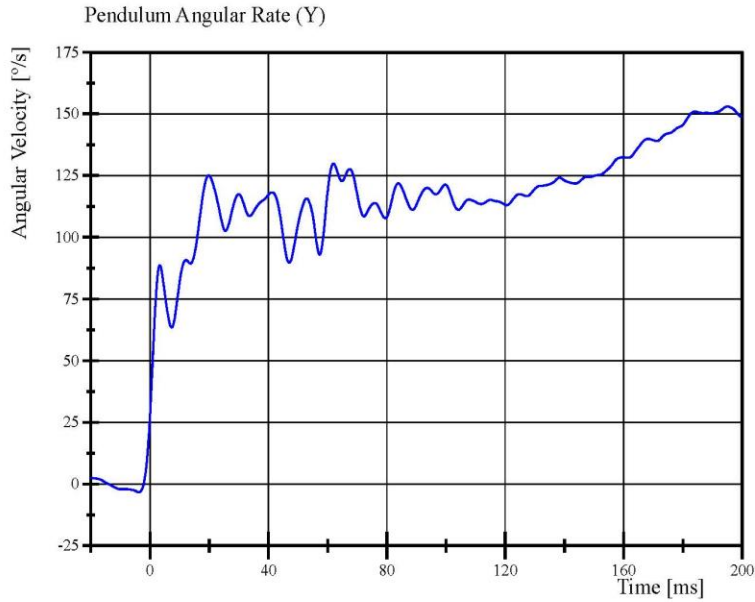


Transportation Research Center Inc.

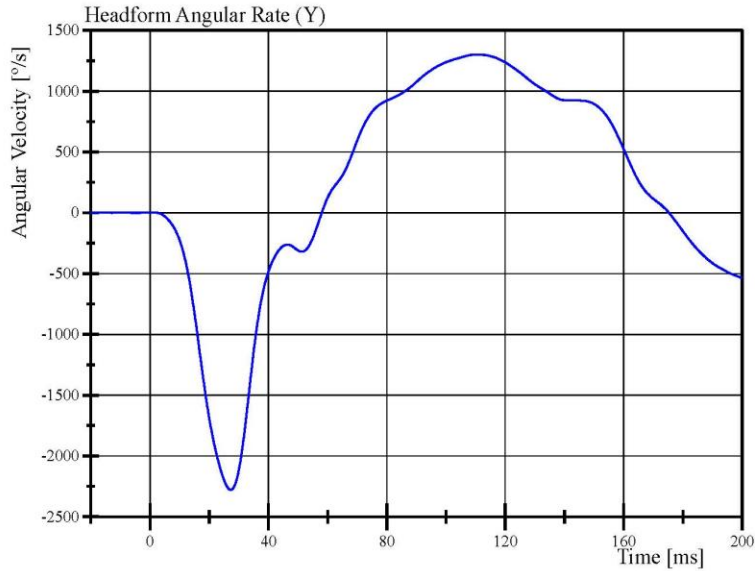
Left Lateral Neck

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/25/2021



Filter Class: CFC_60
Max: 153.0 °/s at 195.0 ms
Min: -3.4 °/s at -3.8 ms



Filter Class: CFC_60
Max: 1,300.9 °/s at 110.5 ms
Min: -2,278.2 °/s at 27.3 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
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Transportation Research Center Inc.

Right Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 9-1
Test Date: 3/25/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	3.30 - 3.50 m/s	3.332 m/s	Yes
Pendulum Integrated Velocity			
Change at 4 ms	(-0.87) - (-1.09) m/s	-0.969 m/s	Yes
Change at 8 ms	(-1.72) - (-2.1) m/s	-1.938 m/s	Yes
Change at 12 ms	(-2.63) - (-3.17) m/s	-2.901 m/s	Yes
Maximum Headform Flexion	50 - 61 deg	53.8 deg	Yes
Headform Flexion Decay			
- from Peak to Zero Degrees	58 - 72 ms	61.0 ms	Yes
Total Neck Occipital Condyles Moment	(-54) - (-67) N·m	-62.2 N·m	Yes
Total Neck Occipital Condyles Moment			
Decay Time to 0 N·m	71 - 87 ms	76.9 ms	Yes
Maximum Forward Pot Rotation			
Peak	32 - 39 °	34.8 °	Yes
Time of Peak	56 - 68 ms	61.2 ms	Yes
Maximum Rear Pot Rotation			
Peak	29 - 36 °	31.1 °	Yes
Time of Peak	56 - 68 ms	62.2 ms	Yes
Maximum Headform Angular Rate	2,047 - 2,503 %/s	2,289.6 %/s	Yes

Test meets specifications.

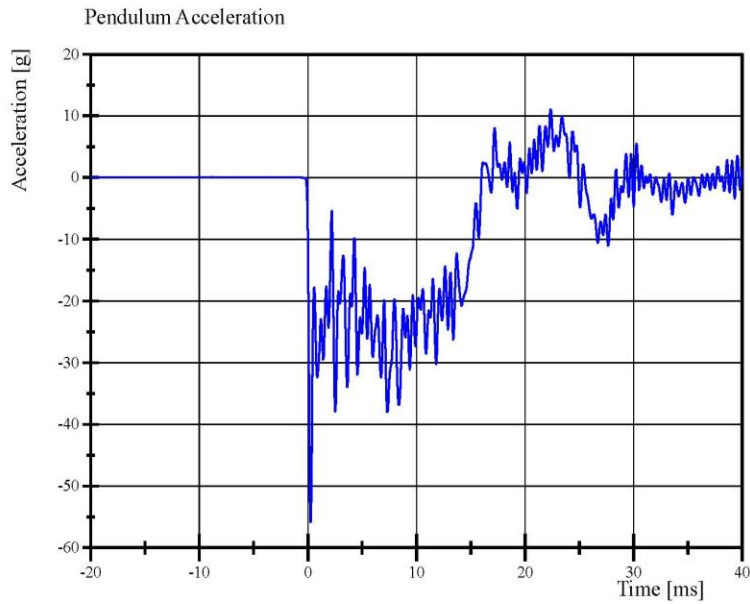
Condition: Used

Comments:

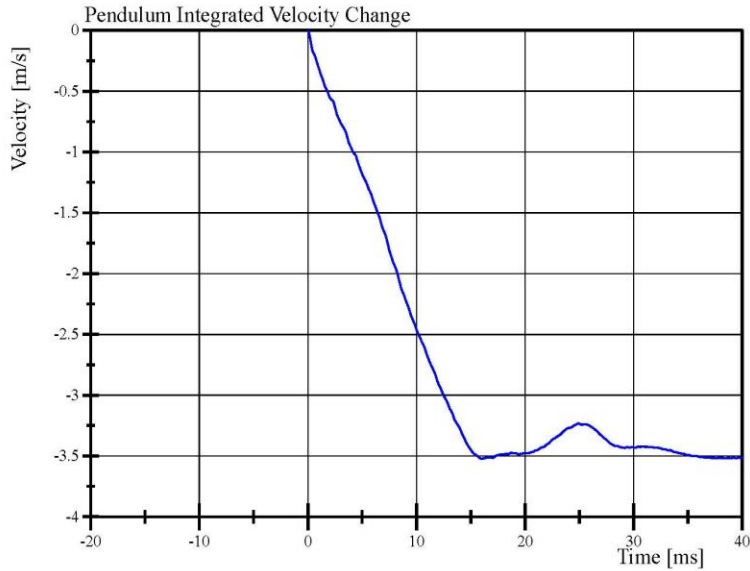
Neck S/N: EE8804

Transportation Research Center Inc.

Right Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 9-1
Test Date: 3/25/2021



Filter Class: CFC_1000
Max: 11.1 g at 22.4 ms
Min: -55.9 g at 0.3 ms



Filter Class: CFC_1000
Max: 0.0 m/s at 0.0 ms
Min: -3.5 m/s at 16.0 ms

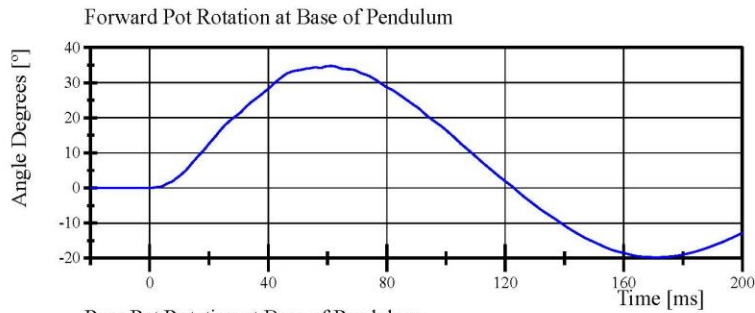
Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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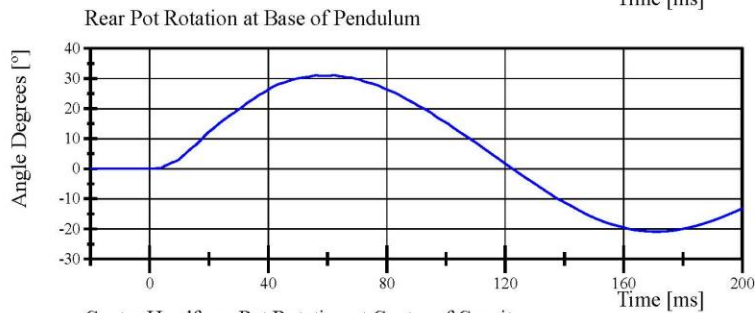


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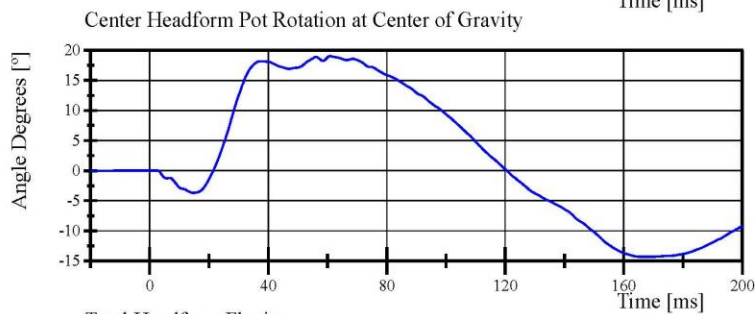
Right Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 9-1
Test Date: 3/25/2021



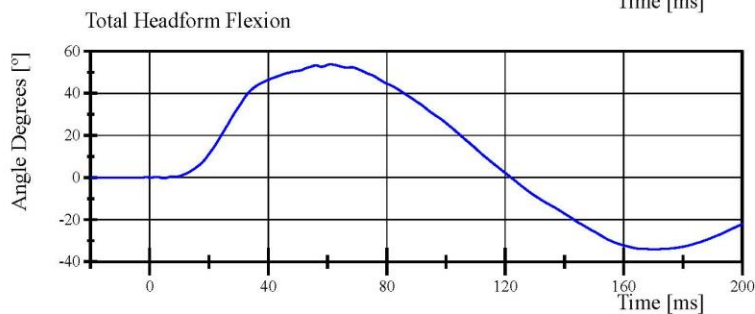
Filter Class: CFC_180
Max: 34.8 ° at 61.2 ms
Min: -19.8 ° at 171.0 ms



Filter Class: CFC_180
Max: 31.1 ° at 62.2 ms
Min: -20.9 ° at 171.1 ms



Filter Class: CFC_180
Max: 19.0 ° at 60.9 ms
Min: -14.3 ° at 165.5 ms



Filter Class: CFC_180
Max: 53.8 ° at 61.0 ms
Min: -34.1 ° at 170.7 ms

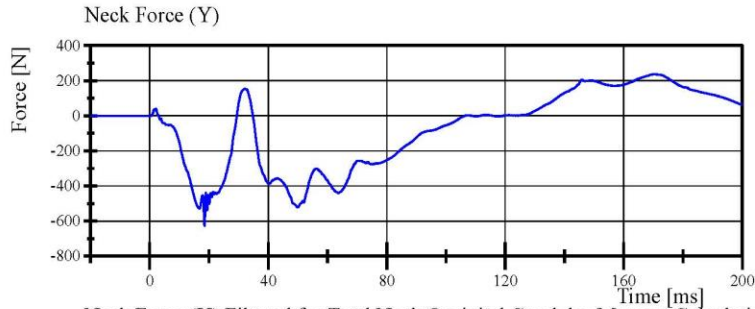
Specification Source: WorldSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qalification Manual 11_09_2020

03.25.2021 12:40:55 4008

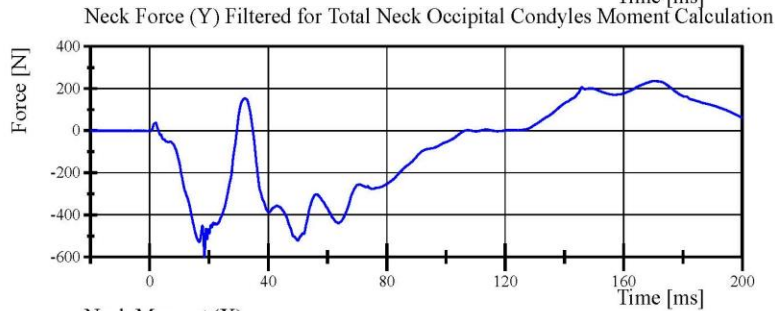


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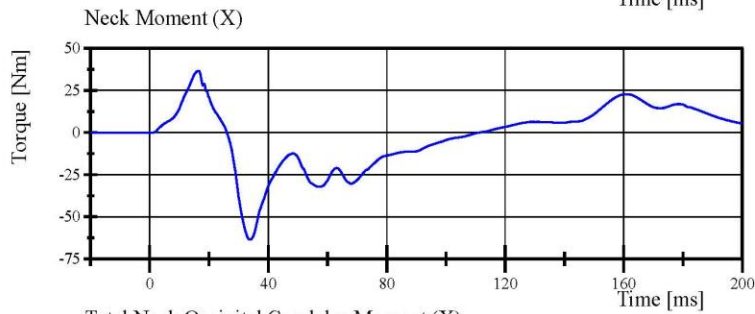
Right Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 9-1
Test Date: 3/25/2021



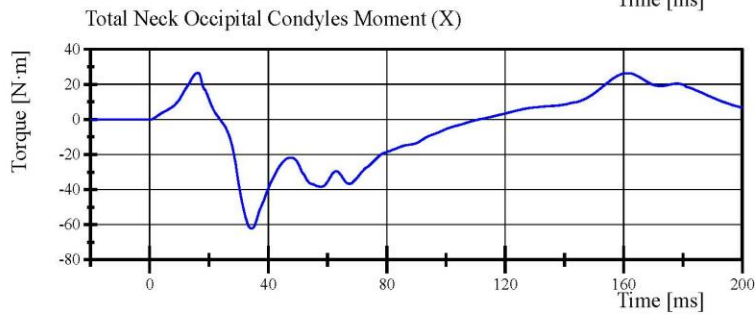
Filter Class: CFC_1000
Max: 236.9 N at 169.9 ms
Min: -626.8 N at 18.5 ms



Filter Class: CFC_600
Max: 236.7 N at 170.0 ms
Min: -598.3 N at 18.5 ms



Filter Class: CFC_600
Max: 36.6 Nm at 16.5 ms
Min: -63.6 Nm at 33.9 ms



Filter Class: Without_(Constar)
Max: 26.4 N·m at 16.2 ms
Min: -62.2 N·m at 34.3 ms

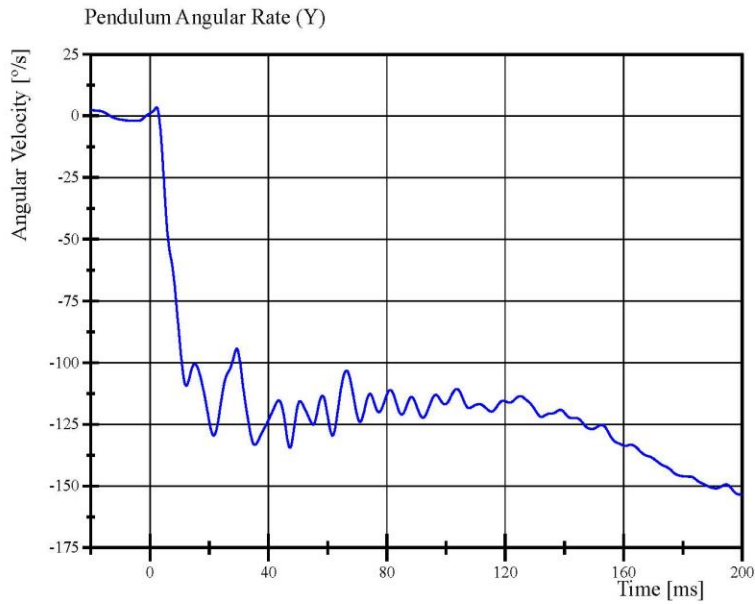
Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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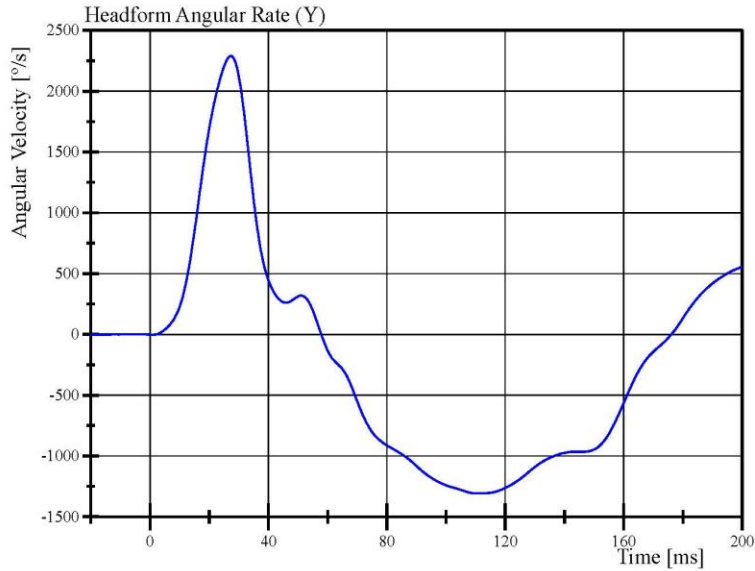


Transportation Research Center Inc.

Right Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 9-1
Test Date: 3/25/2021



Filter Class: CFC_60
Max: 3.4 °/s at 2.3 ms
Min: -153.6 °/s at 200.0 ms



Filter Class: CFC_60
Max: 2,289.6 °/s at 27.4 ms
Min: -1,307.8 °/s at 111.0 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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Transportation Research Center Inc.

Left Lateral Torsion

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/25/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	44 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.18 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.09 - 2.37 m/s	2.364 m/s	Yes
Change at 15 ms	3.19 - 3.63 m/s	3.565 m/s	Yes
Change at 20 ms	4.27 - 4.87 m/s	4.771 m/s	Yes
Peak Fixture Rotation	(-41.5) - (-51) °	-48.01 °	Yes
Decay Time to 0 deg from Peak Angle	35 - 43 ms	40.4 ms	Yes
Peak Head Angular Velocity Z-axis	(-1,345) - (-1,655) °/s	-1,590.8 °/s	Yes
Peak Lower Neck Moment Z-axis	34 - 42 N·m	37.5 N·m	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: EE8804

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qalification Manual 11_09_2020

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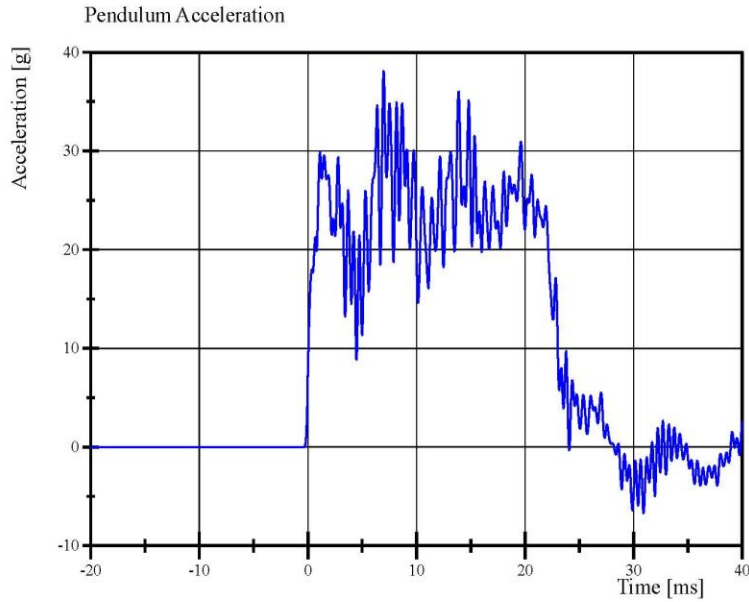


Transportation Research Center Inc.

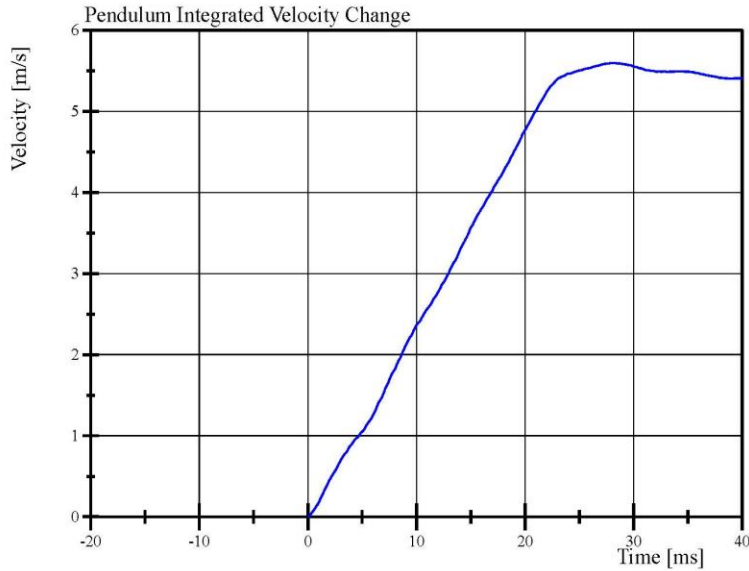
Left Lateral Torsion

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/25/2021



Filter Class: CFC_1000
Max: 38.1 g at 7.0 ms
Min: -6.7 g at 30.9 ms



Filter Class: CFC_1000
Max: 5.6 m/s at 28.2 ms
Min: 0.0 m/s at -0.0 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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Report Number: EB8888_WSH09

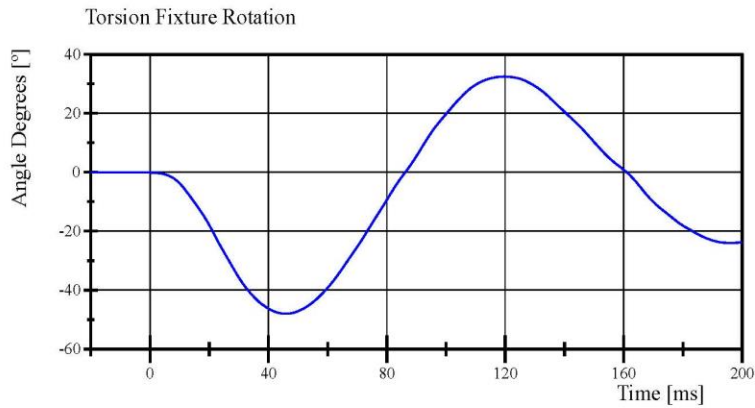
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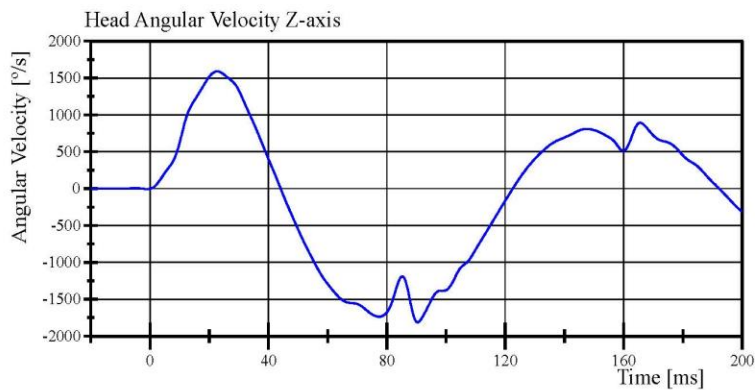
Left Lateral Torsion

WorldSID 50th Serial No. EB8888 Certification No. 9-1

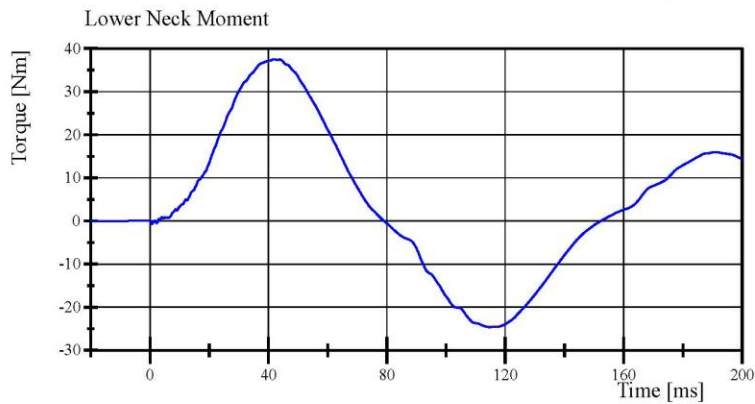
Test Date: 3/25/2021



Filter Class: CFC_60
Max: 32.4 ° at 119.7 ms
Min: -48.0 ° at 45.9 ms



Filter Class: CFC_60
Max: 1,590.8 °/s at 22.7 ms
Min: -1,812.1 °/s at 90.4 ms



Filter Class: CFC_600
Max: 37.5 Nm at 41.7 ms
Min: -24.6 Nm at 114.6 ms

Specification Source: WorldSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

03.25.2021 13:52:31 4010



Transportation Research Center Inc.

Right Lateral Torsion

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/25/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	45 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.18 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.09 - 2.37 m/s	2.249 m/s	Yes
Change at 15 ms	3.19 - 3.63 m/s	3.373 m/s	Yes
Change at 20 ms	4.27 - 4.87 m/s	4.527 m/s	Yes
Peak Fixture Rotation	41.5 - 51 °	47.63 °	Yes
Decay Time to 0 deg from Peak Angle	35 - 43 ms	40.1 ms	Yes
Peak Head Angular Velocity Z-axis	1,345 - 1,655 %/s	1,572.6 %/s	Yes
Peak Lower Neck Moment Z-axis	(-34) - (-42) N·m	-37.9 N·m	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: EE8804

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qalification Manual 11_09_2020

Report Number: EB8888_WSH09

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03.25.2021 14:24:23 4009

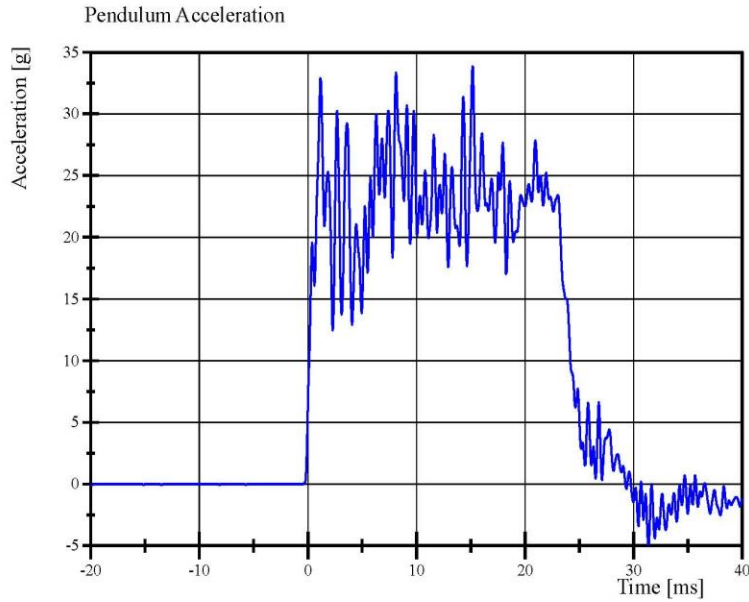


Transportation Research Center Inc.

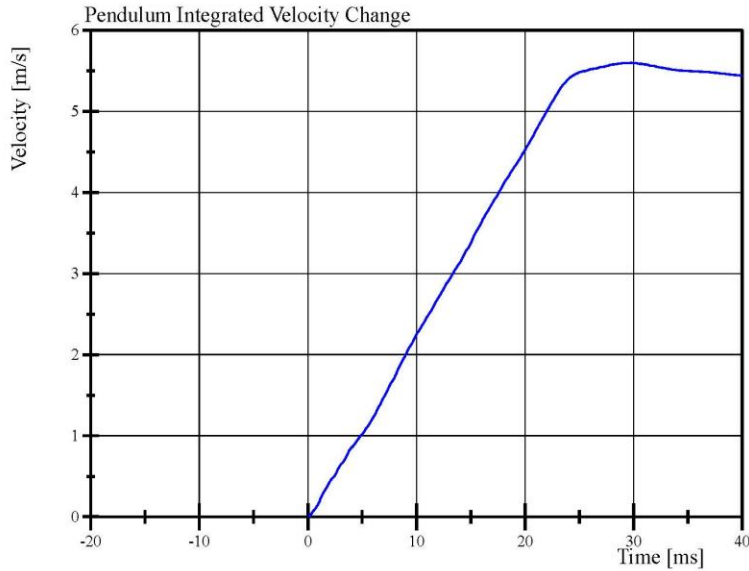
Right Lateral Torsion

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/25/2021



Filter Class: CFC_1000
Max: 33.9 g at 15.2 ms
Min: -4.9 g at 31.4 ms



Filter Class: CFC_1000
Max: 5.6 m/s at 29.8 ms
Min: 0.0 m/s at 0.0 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

03.25.2021 14:25:37 4009



Report Number: EB8888_WSH09

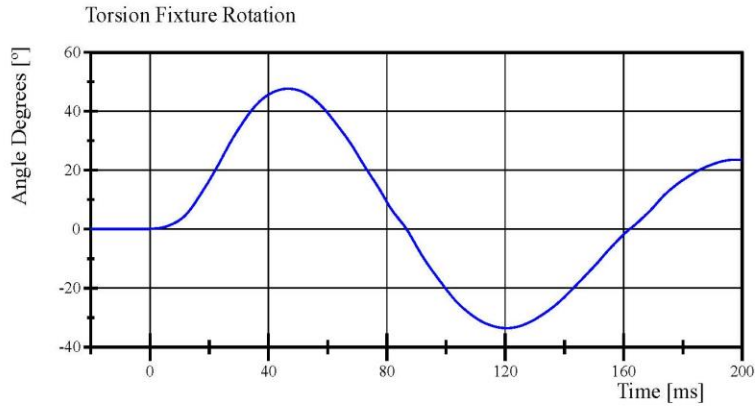
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Transportation Research Center Inc.

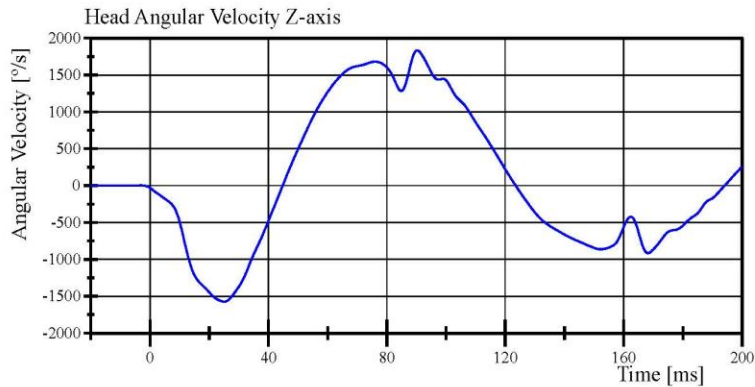
Right Lateral Torsion

WorldSID 50th Serial No. EB8888 Certification No. 9-1

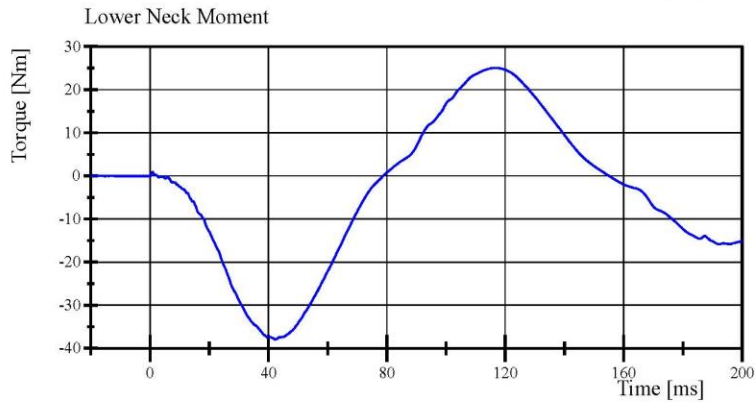
Test Date: 3/25/2021



Filter Class: CFC_60
Max: 47.6 ° at 46.6 ms
Min: -33.6 ° at 120.5 ms



Filter Class: CFC_60
Max: 1,833.1 °/s at 90.3 ms
Min: -1,572.6 °/s at 25.1 ms



Filter Class: CFC_600
Max: 25.0 Nm at 116.2 ms
Min: -37.9 Nm at 42.2 ms

Specification Source: WorldSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

03.25.2021 14:25:37 4009



Transportation Research Center Inc.

Left Lateral Shoulder

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/26/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.29 m/s	Yes
Impactor Force	2,600 - 3,300 N	3,027.4 N	Yes
Shoulder Force	(-1,470) - (-1,800) N	-1,668.3 N	Yes
Shoulder Rib Length Change	37 - 46 mm	41.2 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Arm S/N: EG3799

Shoulder Rib S/N: DW1916

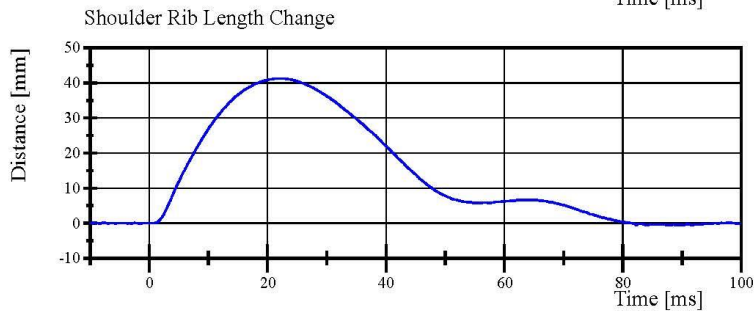
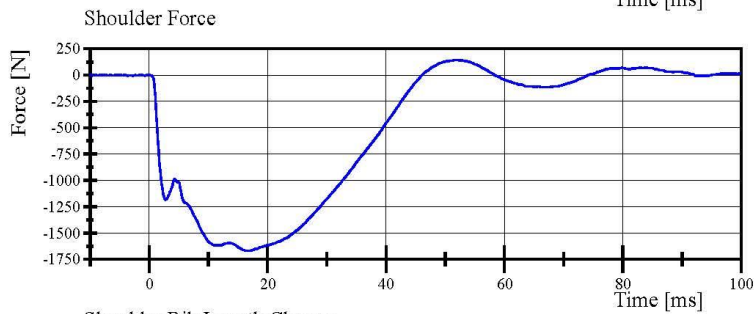
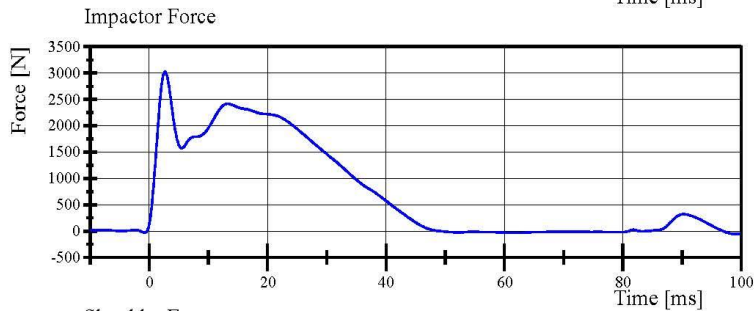
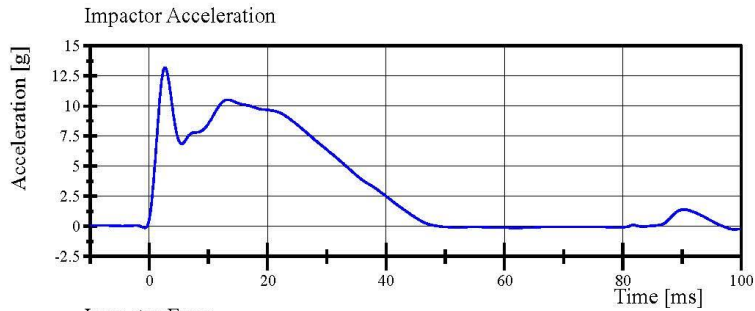
RibEye S/N: 124

Transportation Research Center Inc.

Left Lateral Shoulder

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/26/2021



Specification Source: WordSID 50th(W5) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

03.26.2021 08:31:03 1005



Report Number: EB8888_WSH09

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Transportation Research Center Inc.

Left Lateral Thorax with Arm
WorldSID 50th Serial No. EB8888 Certification No. 9-1
Test Date: 3/26/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	45 %	Yes
Impactor Velocity	6.6 - 6.8 m/s	6.70 m/s	Yes
Impactor Force	5,300 - 6,200 N	5,783.1 N	Yes
Peak Thorax Rib 1 Length Change	35 - 47 mm	41.0 mm	Yes
Peak Thorax Rib 2 Length Change	46 - 56 mm	48.3 mm	Yes
Peak Thorax Rib 3 Length Change	33.5 - 40.5 mm	34.97 mm	Yes
Peak T4 Acceleration, y-axis	28 - 37 g	32.8 g	Yes
Peak T12 Acceleration, y-axis	22 - 28 g	23.5 g	Yes

Test meets specifications.

Condition: Used

Comments:

Arm S/N: EG3799

Shoulder Rib S/N: DW1916

Thorax Rib 1 S/N: EB5400

Thorax Rib 2 S/N: EB5401

Thorax Rib 3 S/N: EB5402

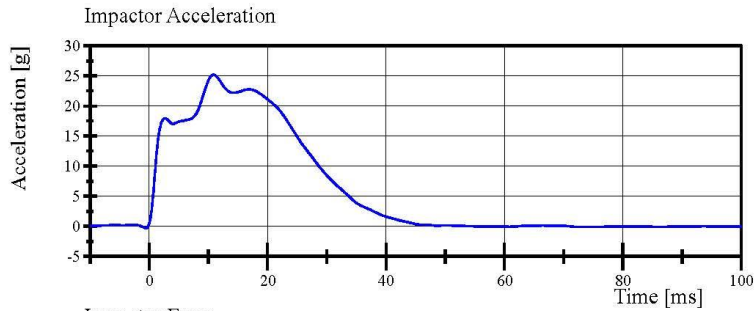
RibEye S/N: 124

Transportation Research Center Inc.

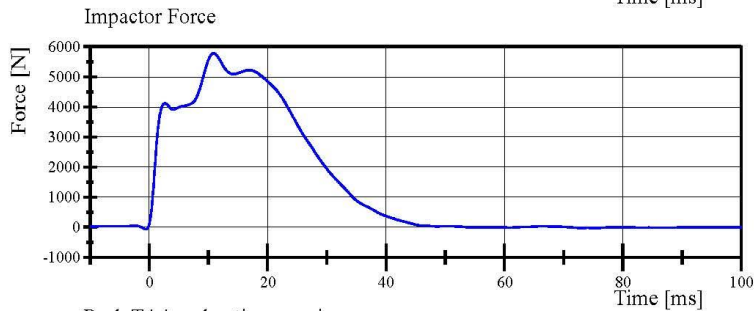
Left Lateral Thorax with Arm

WorldSID 50th Serial No. EB8888 Certification No. 9-1

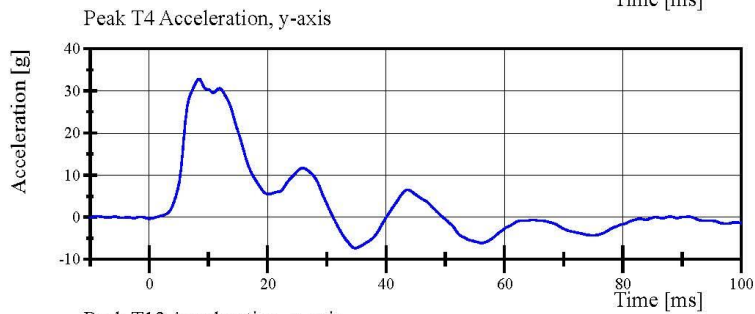
Test Date: 3/26/2021



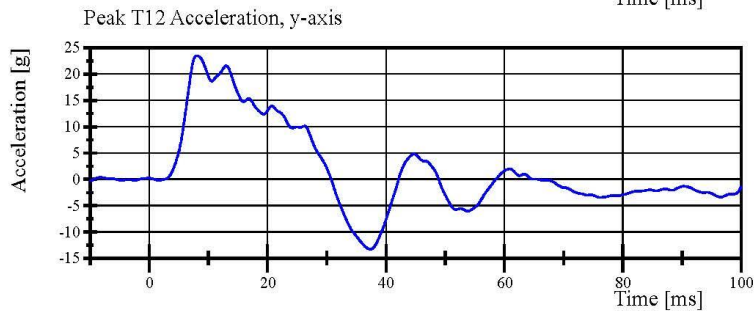
Filter Class: CFC_180
Max: 25.2 g at 10.9 ms
Min: -0.3 g at -0.6 ms



Filter Class: CFC_180
Max: 5,783.1 N at 10.9 ms
Min: -68.8 N at -0.6 ms



Filter Class: CFC_180
Max: 32.8 g at 8.4 ms
Min: -7.4 g at 34.9 ms



Filter Class: CFC_180
Max: 23.5 g at 8.1 ms
Min: -13.3 g at 37.4 ms

Specification Source: WordSID 50th(W5) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

03.26.2021 11:13:55 1000



Report Number: EB8888_WSH09

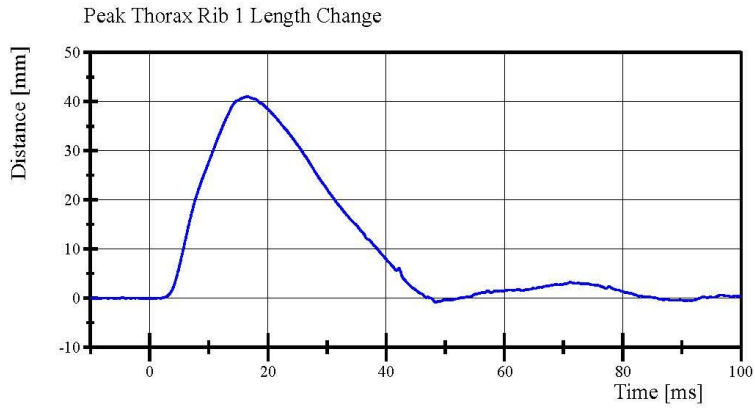
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Transportation Research Center Inc.

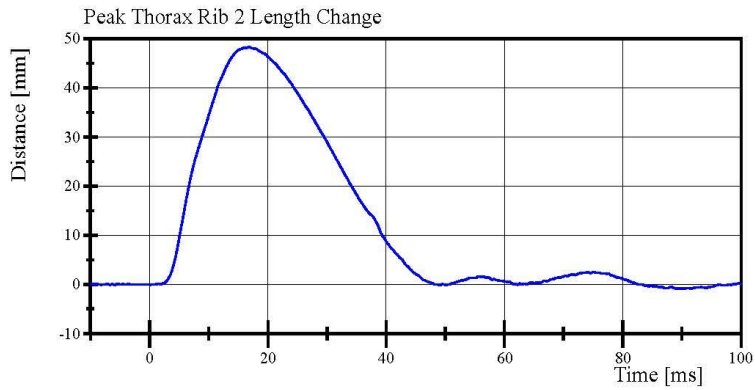
Left Lateral Thorax with Arm

WorldSID 50th Serial No. EB8888 Certification No. 9-1

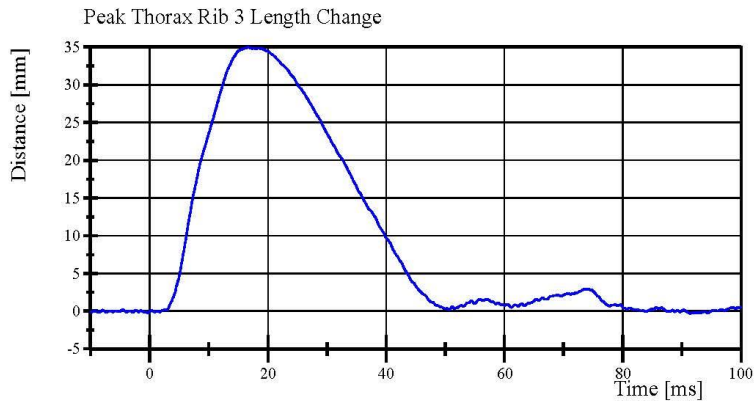
Test Date: 3/26/2021



Filter Class: CFC_600
Max: 41.0 mm at 16.5 ms
Min: -0.8 mm at 48.4 ms



Filter Class: CFC_600
Max: 48.3 mm at 16.8 ms
Min: -0.9 mm at 91.6 ms



Filter Class: CFC_600
Max: 35.0 mm at 16.7 ms
Min: -0.3 mm at 91.5 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

03.26.2021 11:13:56 1000

Report Number: EB8888_WSH09

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Transportation Research Center Inc.

Left Lateral Thorax without Arm
WorldSID 50th Serial No. EB8888 Certification No. 9-1
Test Date: 3/26/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	45 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.25 m/s	Yes
Impactor Force	3,200 - 3,800 N	3,449.3 N	Yes
Peak Thorax Rib 1 Length Change	33 - 43 mm	36.6 mm	Yes
Peak Thorax Rib 2 Length Change	35 - 43 mm	42.1 mm	Yes
Peak Thorax Rib 3 Length Change	32 - 40 mm	33.7 mm	Yes
Peak T4 Acceleration, y-axis	14 - 20 g	15.4 g	Yes
Peak T12 Acceleration, y-axis	14 - 22 g	14.8 g	Yes

Test meets specifications.

Condition: Used

Comments:

Thorax Rib 1 S/N: EB5400

Thorax Rib 2 S/N: EB5401

Thorax Rib 3 S/N: EB5402

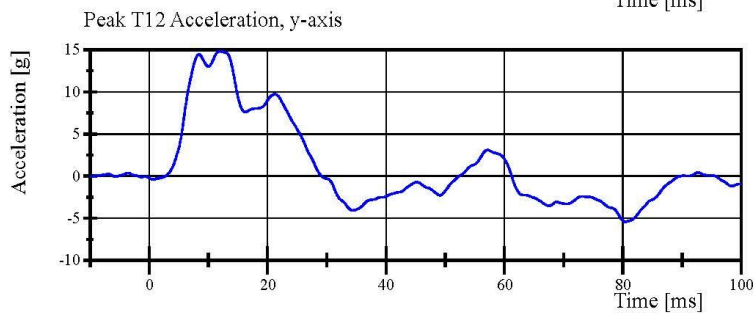
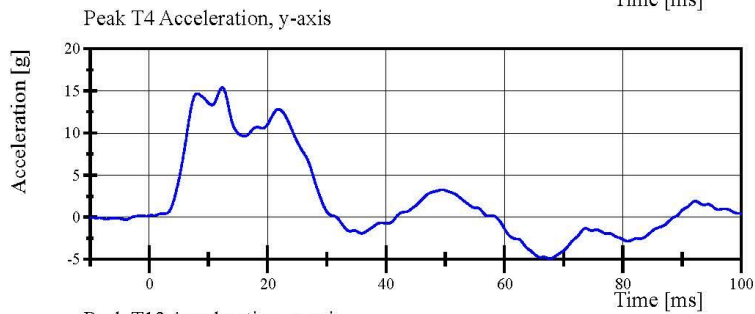
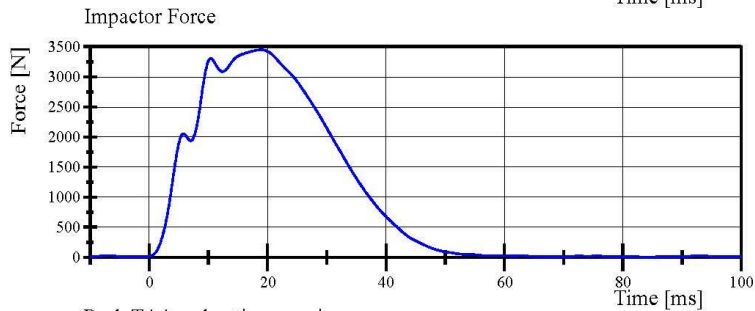
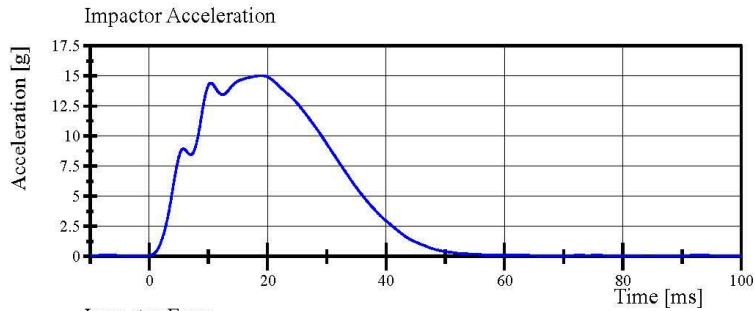
RibEye S/N: 124

Transportation Research Center Inc.

Left Lateral Thorax without Arm

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/26/2021



Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

03.26.2021 10:24:58 985

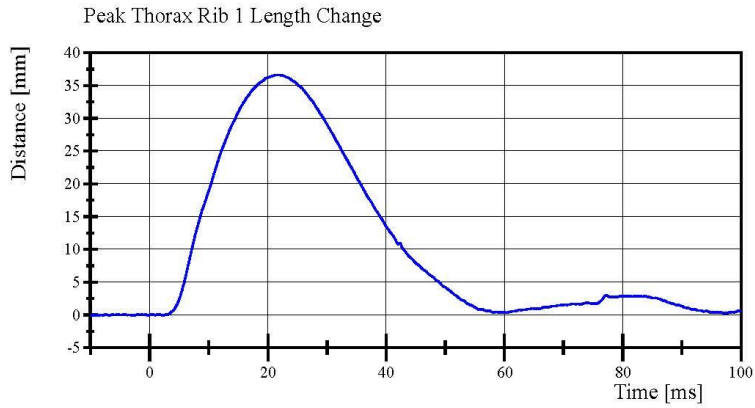


Report Number: EB8888_WSH09

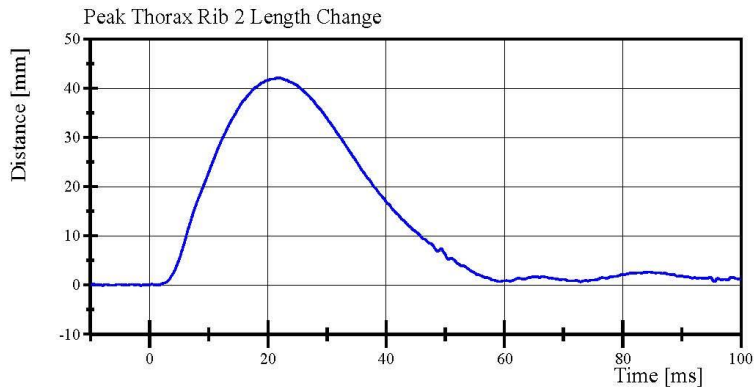
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Transportation Research Center Inc.

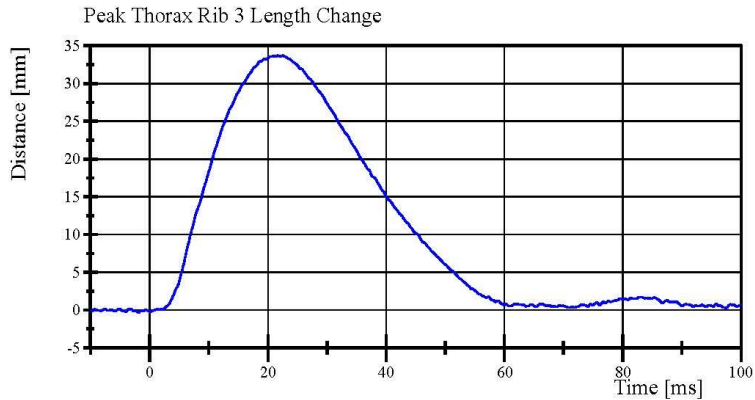
Left Lateral Thorax without Arm
WorldSID 50th Serial No. EB8888 Certification No. 9-1
Test Date: 3/26/2021



Filter Class: CFC_600
Max: 36.6 mm at 21.5 ms
Min: -0.1 mm at -9.8 ms



Filter Class: CFC_600
Max: 42.1 mm at 21.9 ms
Min: -0.1 mm at -7.9 ms



Filter Class: CFC_600
Max: 33.7 mm at 22.5 ms
Min: -0.3 mm at -1.9 ms



Transportation Research Center Inc.

Left Lateral Abdomen

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/26/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	46 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.32 m/s	Yes
Impactor Force	2,700 - 3,100 N	3,006.5 N	Yes
Peak Abdomen Rib 1 Length Change	32.5 - 39.5 mm	35.48 mm	Yes
Peak Abdomen Rib 2 Length Change	32 - 38 mm	34.5 mm	Yes
Peak T12 Acceleration, y-axis	14.5 - 19.5 g	17.94 g	Yes

Test meets specifications.

Condition: Used

Comments:

Abdomen Rib #1 S/N: DY5252

Abdomen Rib #2 S/N: DY5253

RibEye S/N: 124

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qalification Manual 11_09_2020

Report Number: EB8888_WSH09

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03.26.2021 09:27:34 994

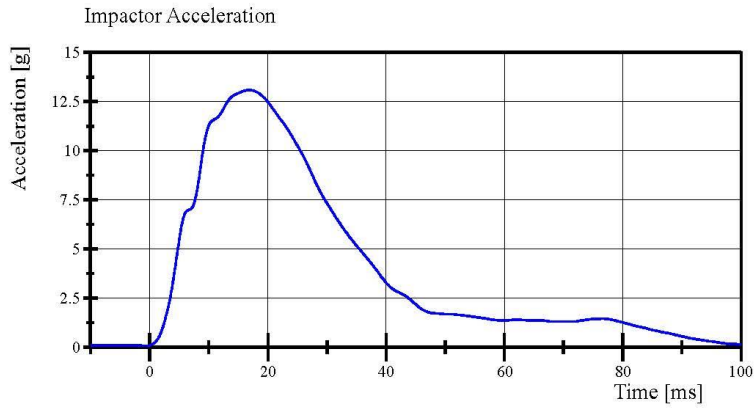


Transportation Research Center Inc.

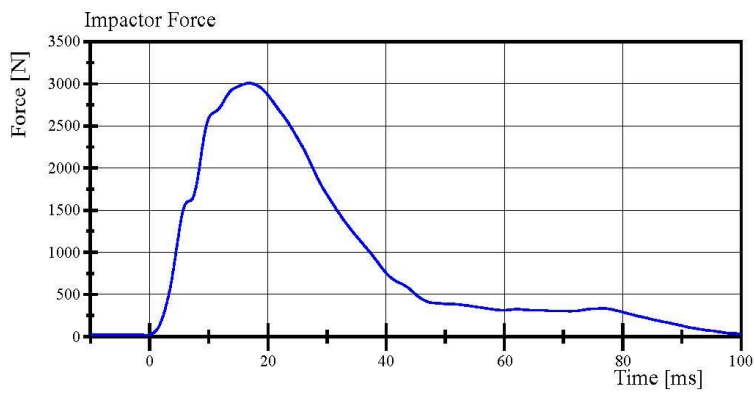
Left Lateral Abdomen

WorldSID 50th Serial No. EB8888 Certification No. 9-1

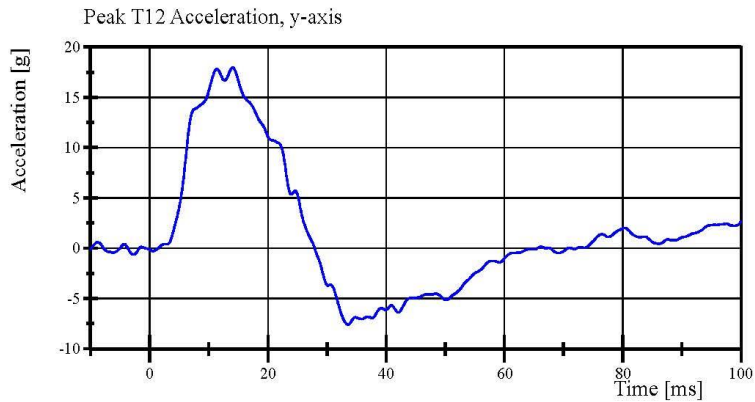
Test Date: 3/26/2021



Filter Class: CFC_180
Max: 13.1 g at 16.9 ms
Min: 0.1 g at -0.5 ms



Filter Class: CFC_180
Max: 3,006.5 N at 16.9 ms
Min: 16.4 N at -0.5 ms



Filter Class: CFC_180
Max: 17.9 g at 14.1 ms
Min: -7.6 g at 33.6 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

03.26.2021 09:28:20 994



Report Number: EB8888_WSH09

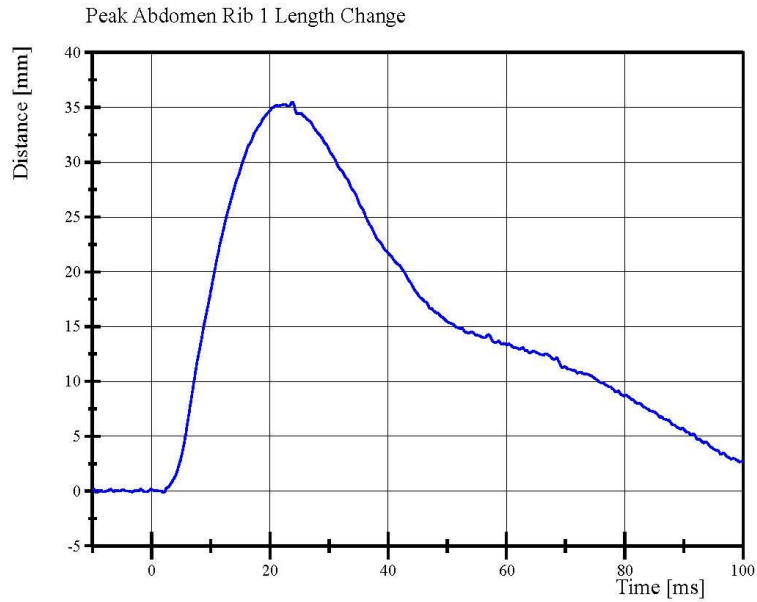
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Transportation Research Center Inc.

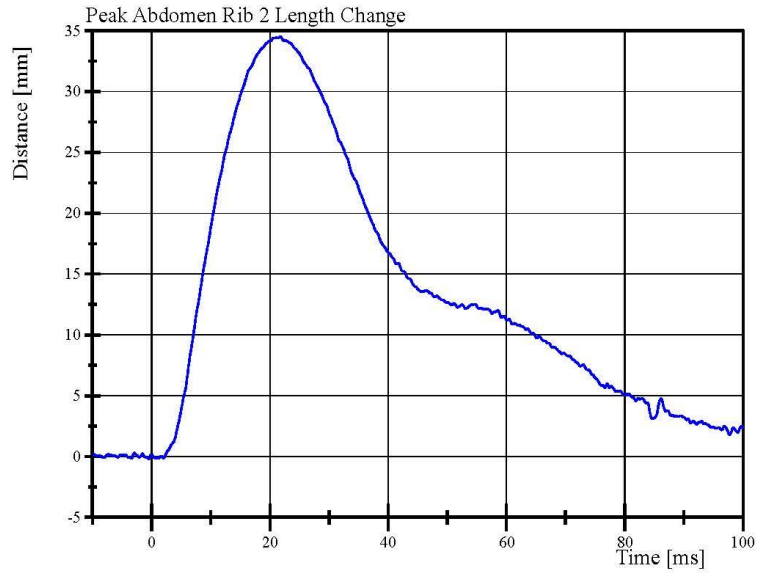
Left Lateral Abdomen

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/26/2021



Filter Class: CFC_600
Max: 35.5 mm at 23.8 ms
Min: -0.1 mm at -9.4 ms



Filter Class: CFC_600
Max: 34.5 mm at 21.8 ms
Min: -0.2 mm at -0.5 ms

Specification Source: WordSID 50th(W5) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

03.26.2021 09:28:20 994

Report Number: EB8888_WSH09

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Transportation Research Center Inc.

Left Lateral Pelvis

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/29/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Impactor Velocity	6.6 - 6.8 m/s	6.71 m/s	Yes
Impactor Force	6,800 - 8,200 N	7,475.3 N	Yes
Pelvis Lateral Acceleration	38.5 - 48.5 g	42.15 g	Yes
Peak T12 Acceleration, y-axis	10 - 14 g	12.4 g	Yes
Pubic Lateral Force	(-1,300) - (-1,590) N	-1,359.1 N	Yes
Sacroiliac Lateral Force	(-1,860) - (-2,280) N	-2,118.0 N	Yes

Test meets specifications.

Condition: Used

Comments:

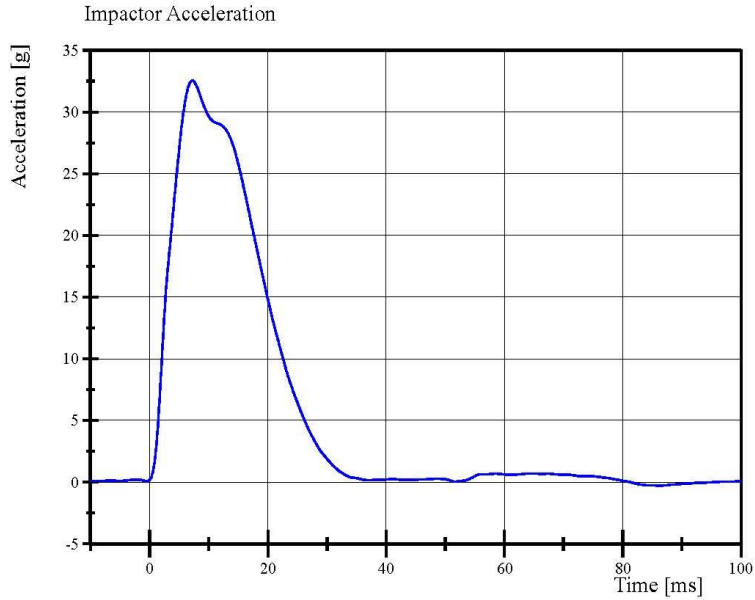
Pelvis S/N: EC3628

Transportation Research Center Inc.

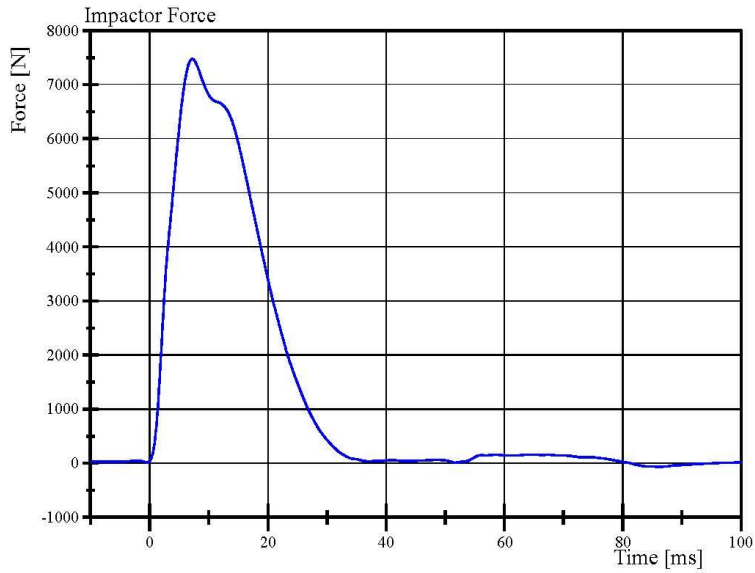
Left Lateral Pelvis

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/29/2021



Filter Class: CFC_180
Max: 32.6 g at 7.2 ms
Min: -0.3 g at 86.2 ms



Filter Class: CFC_180
Max: 7,475.3 N at 7.2 ms
Min: -65.0 N at 86.2 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

03.29.2021 08:54:31 997

Report Number: EB8888_WSH09

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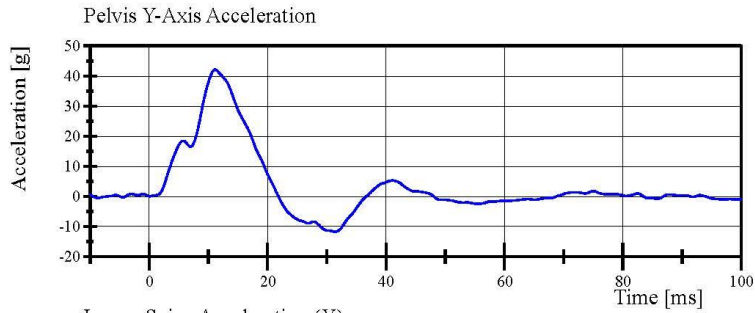


Transportation Research Center Inc.

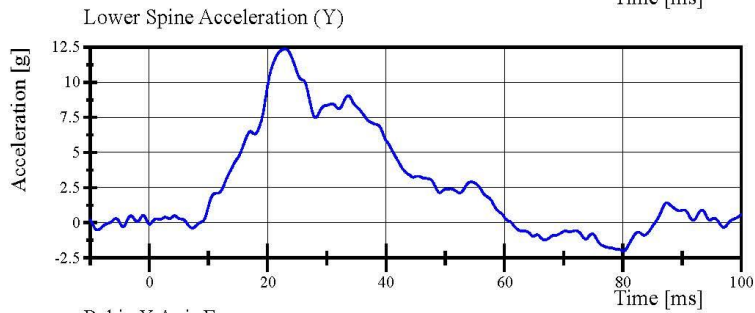
Left Lateral Pelvis

WorldSID 50th Serial No. EB8888 Certification No. 9-1

Test Date: 3/29/2021



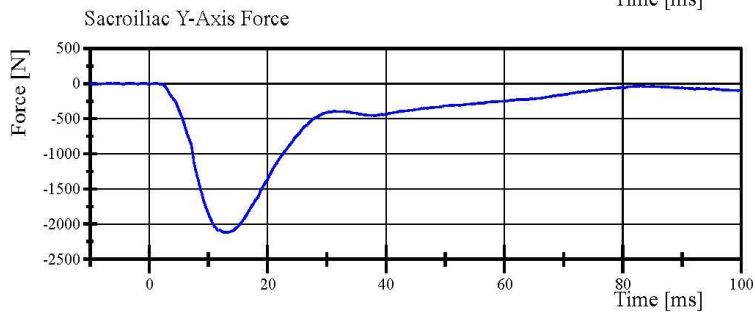
Filter Class: CFC_180
Max: 42.1 g at 11.1 ms
Min: -11.7 g at 31.5 ms



Filter Class: CFC_180
Max: 12.4 g at 23.0 ms
Min: -2.0 g at 80.1 ms



Filter Class: CFC_600
Max: 55.1 N at 42.5 ms
Min: -1,359.1 N at 11.5 ms



Filter Class: CFC_600
Max: 9.0 N at -0.9 ms
Min: -2,118.0 N at 12.7 ms

Post-Test Calibration Sheets
Driver S/N EB8888

Transportation Research Center Inc.
WorldSID-50M
External Measurements
Serial No. EB8888 Certification No. 10

WorldSID-50M Angular Reference Measurements					
Parameter	Symbol	Tilt Sensor (°)	Inclinometer (°)		
			Center	Left	Right
Head X-Axis	A1	0	n/a	n/a	n/a
Head Y-Axis	A2	2.2	n/a	2	Note 1
Neck Bracket X-Axis	A3	n/a	-0.5	n/a	n/a
Neck Bracket Y-Axis	A4	n/a	-3.1	n/a	n/a
Thorax X-Axis	A5	1.3	n/a	n/a	n/a
Thorax Y-Axis	A6	3.9	n/a	n/a	n/a
Pelvis X-Axis	A7	0.7	n/a	n/a	n/a
Pelvis Y-Axis	A8	10.2	n/a	n/a	n/a
H-point Tool	A9	n/a	n/a	33.1	33.9

WorldSID-50M External Linear Dimensions				
Parameter	Symbol	Specification (mm)		
		Center	Left	Right
Seated Height	L1	870	n/a	n/a
Hip Pivot Height	L2	n/a	89	89
Hip Pivot to Back Line	L3	n/a	187	177
Thigh Clearance	L4	n/a	181	180
Knee Height	L5	n/a	580	583
Knee to Backline	L6	n/a	667	670
Head Back to Seat Back	L7	156	n/a	n/a
Thorax Rib 1 Front to Back	L8	n/a	209	209
Abdomen Rib 2 Front to Back	L9	n/a	223	226
Arm Length	L10	n/a	330	330
Width Across Arms	L11	482	n/a	n/a
Waist Width	L12	341	n/a	n/a

Note 1: No land marks on the right side of head. Unable to align level.

Transportation Research Center Inc.

Front Head Drop
WorldSID 50th Serial No. EB8888 Certification No. 10-2
Test Date: 4/19/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Peak Head Resultant Acceleration	211 - 261 g	239.4 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-11.0 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	0.84 %	Yes

Test meets specifications.

Condition: Used

Comments:

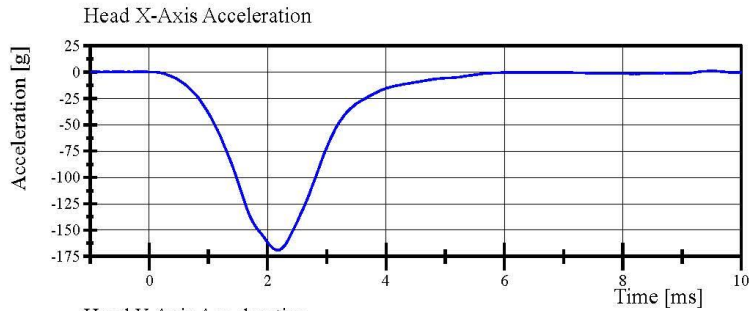
Head Skin S/N: EG2845

Transportation Research Center Inc.

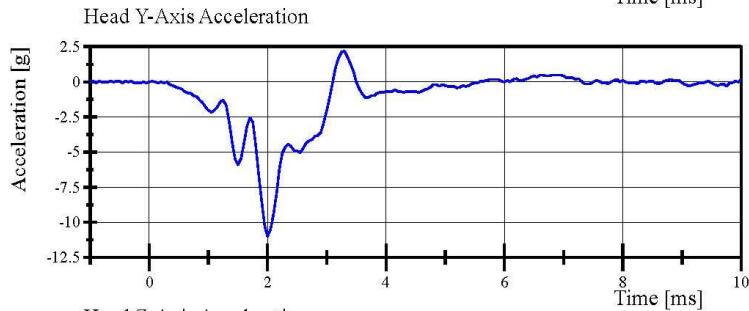
Front Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 10-2

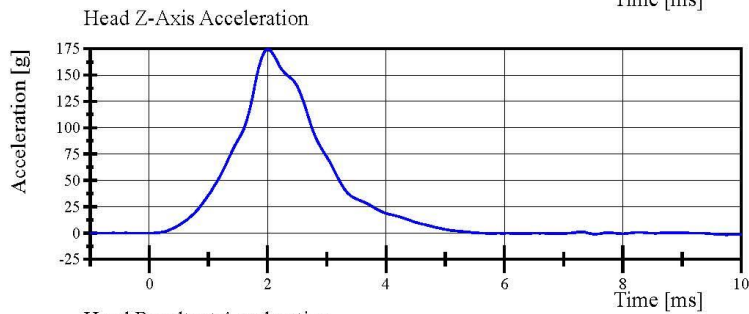
Test Date: 4/19/2021



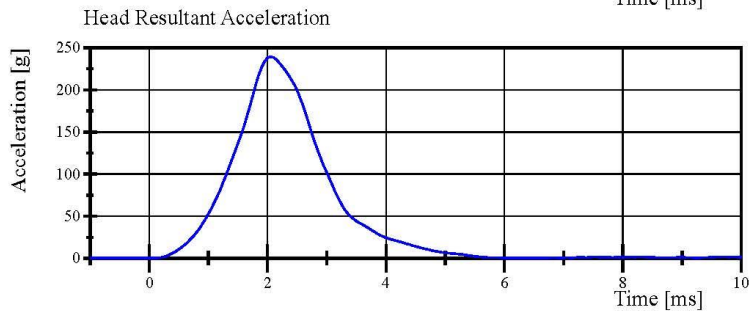
Filter Class: CFC_1000
Max: 1.0 g at 9.5 ms
Min: -169.2 g at 2.2 ms



Filter Class: CFC_1000
Max: 2.2 g at 3.3 ms
Min: -11.0 g at 2.0 ms



Filter Class: CFC_1000
Max: 174.6 g at 2.0 ms
Min: -1.7 g at 9.8 ms



Filter Class: CFC_1000
Max: 239.4 g at 2.1 ms
Min: 0.1 g at -1.0 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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Report Number: EB8888_WSH10

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Transportation Research Center Inc.

Left Lateral Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 10-4

Test Date: 4/19/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Peak Head Resultant Acceleration	107 - 126 g	118.7 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-6.1 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	1.52 %	Yes

Test meets specifications.

Condition: Used

Comments:

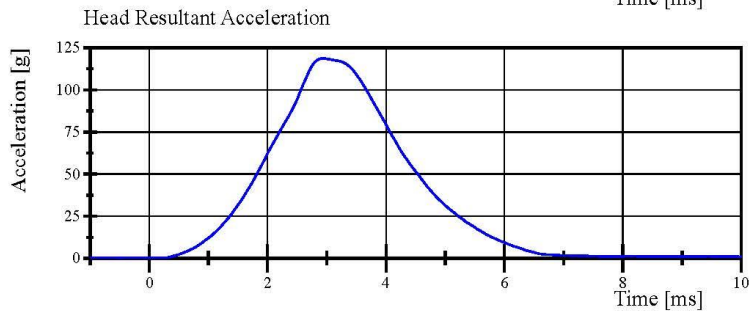
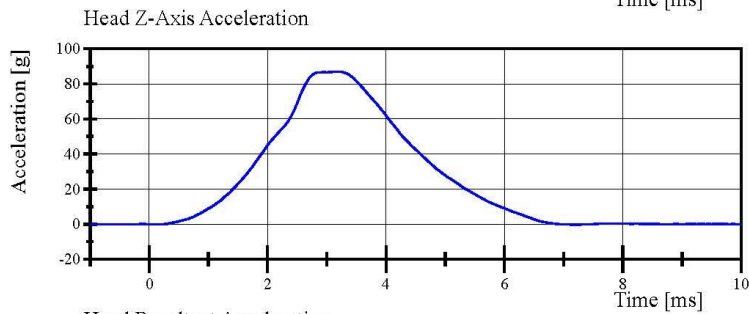
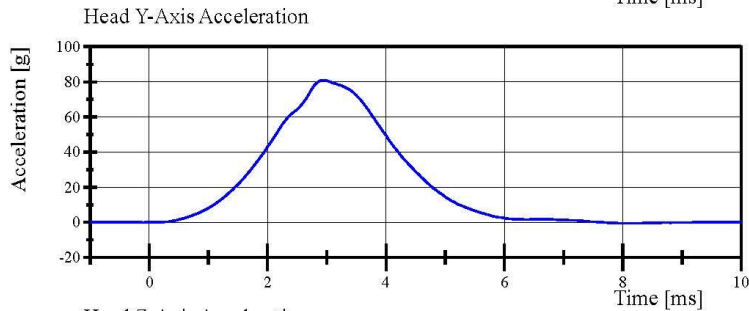
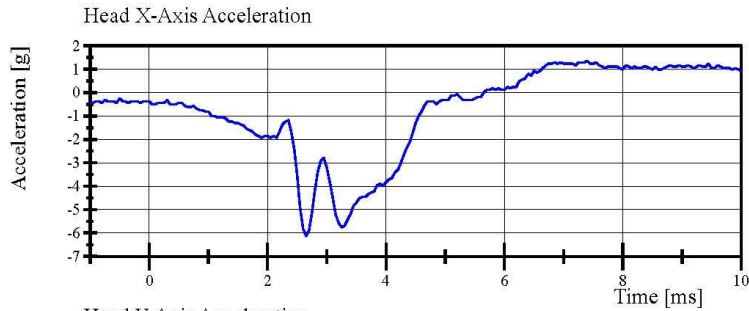
Head Skin S/N: EG2845

Transportation Research Center Inc.

Left Lateral Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 10-4

Test Date: 4/19/2021



Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
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Report Number: EB8888_WSH10

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Transportation Research Center Inc.

Right Lateral Head Drop
WorldSID 50th Serial No. EB8888 Certification No. 10-2
Test Date: 4/19/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Peak Head Resultant Acceleration	107 - 126 g	112.6 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-4.2 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	2.34 %	Yes

Test meets specifications.

Condition: Used

Comments:

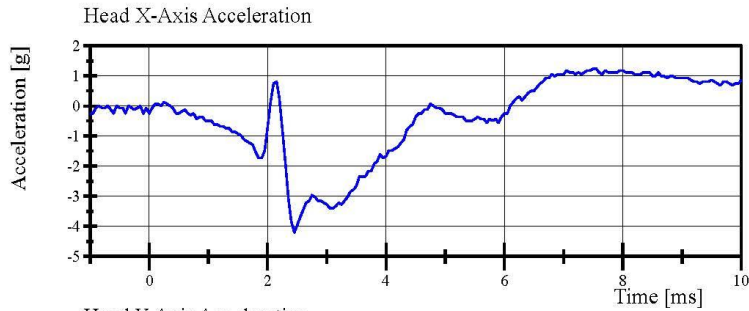
Head Skin S/N: EG2845

Transportation Research Center Inc.

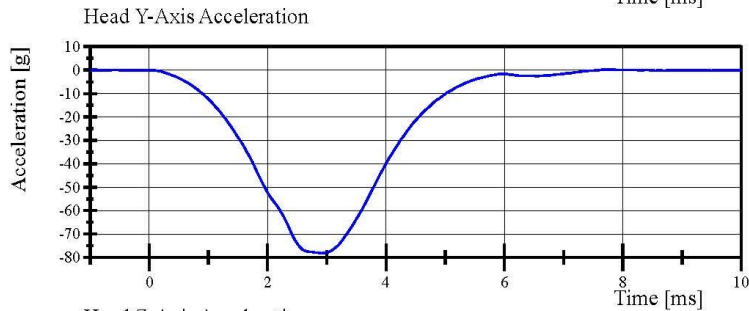
Right Lateral Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 10-2

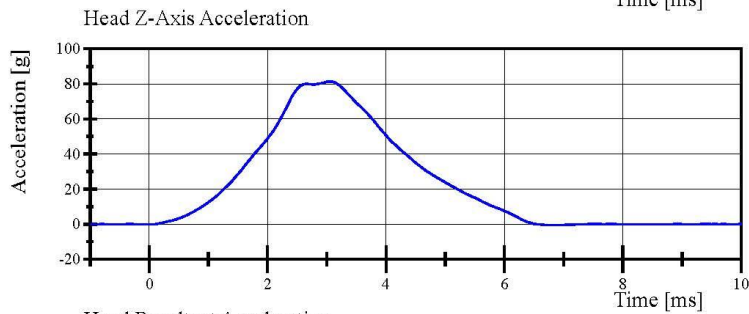
Test Date: 4/19/2021



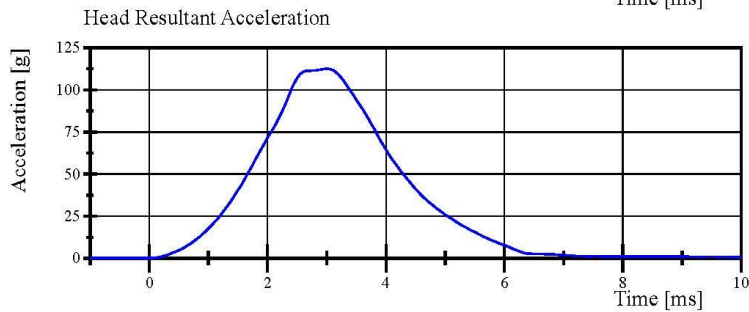
Filter Class: CFC_1000
Max: 1.2 g at 7.5 ms
Min: -4.2 g at 2.5 ms



Filter Class: CFC_1000
Max: 0.3 g at 7.8 ms
Min: -78.2 g at 2.9 ms



Filter Class: CFC_1000
Max: 81.3 g at 3.1 ms
Min: -0.5 g at 6.7 ms



Filter Class: CFC_1000
Max: 112.6 g at 3.0 ms
Min: 0.0 g at -0.7 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
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Report Number: EB8888_WSH10

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Transportation Research Center Inc.

Left Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 10-5
Test Date: 4/15/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Pendulum Velocity	(-3.30) - (-3.50) m/s	-3.345 m/s	Yes
Pendulum Integrated Velocity			
Change at 4 ms	0.87 - 1.09 m/s	0.944 m/s	Yes
Change at 8 ms	1.72 - 2.1 m/s	1.830 m/s	Yes
Change at 12 ms	2.63 - 3.17 m/s	2.742 m/s	Yes
Maximum Headform Flexion	(-50) - (-61) deg	-55.2 deg	Yes
Headform Flexion Decay			
- from Peak to Zero Degrees	58 - 72 ms	60.6 ms	Yes
Total Neck Occipital Condyles Moment	54 - 67 N·m	60.3 N·m	Yes
Total Neck Occipital Condyles Moment			
Decay Time to 0 N·m	71 - 87 ms	76.9 ms	Yes
Maximum Forward Pot Rotation			
Peak	(-32) - (-39) °	-35.8 °	Yes
Time of Peak	56 - 68 ms	63.2 ms	Yes
Maximum Rear Pot Rotation			
Peak	(-29) - (-36) °	-31.9 °	Yes
Time of Peak	56 - 68 ms	61.3 ms	Yes
Maximum Headform Angular Rate	(-2,047) - (-2,503) %/s	-2,300.2 %/s	Yes

Test meets specifications.

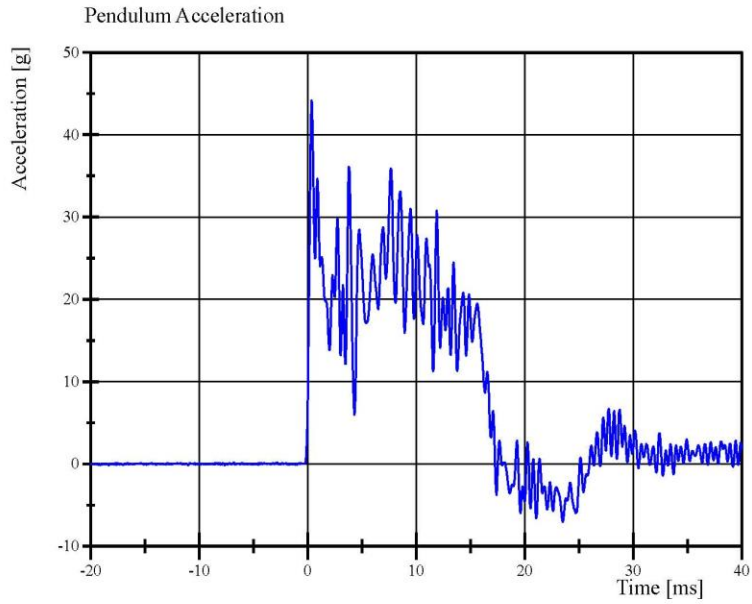
Condition: Used

Comments:

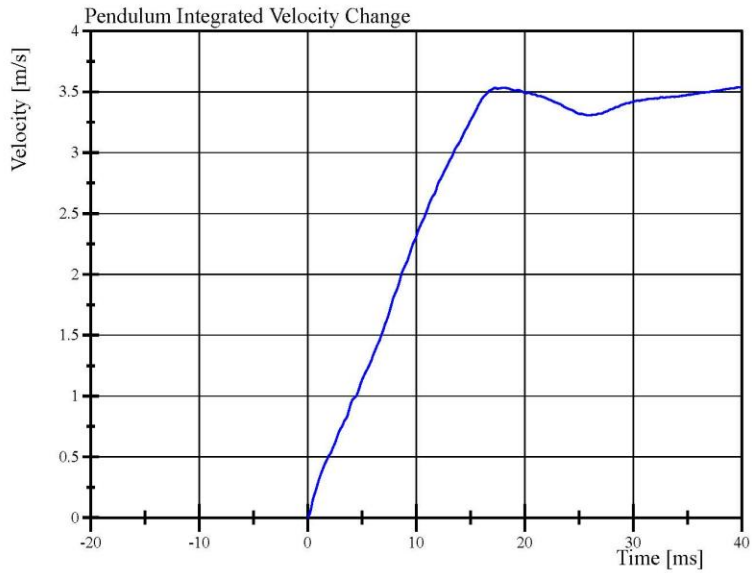
Neck S/N: EE8804

Transportation Research Center Inc.

Left Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 10-5
Test Date: 4/15/2021



Filter Class: CFC_1000
Max: 44.1 g at 0.4 ms
Min: -7.0 g at 23.5 ms



Filter Class: CFC_1000
Max: 3.5 m/s at 40.0 ms
Min: 0.0 m/s at 0.0 ms

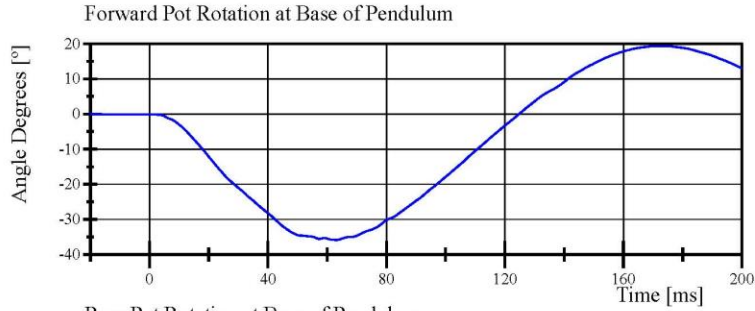
Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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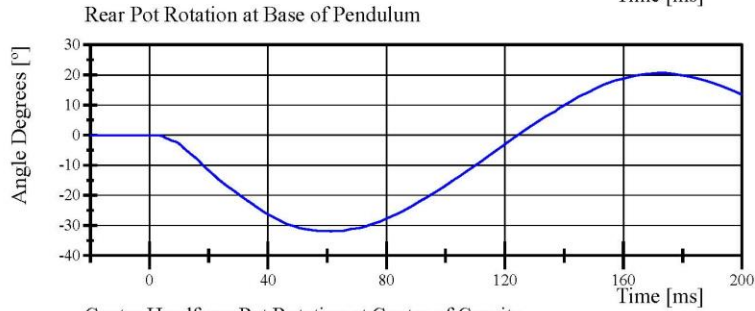


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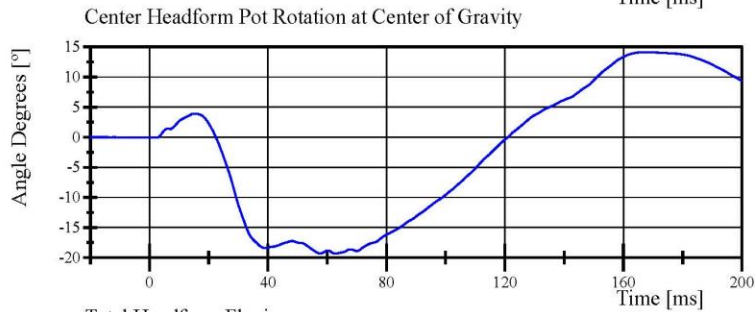
Left Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 10-5
Test Date: 4/15/2021



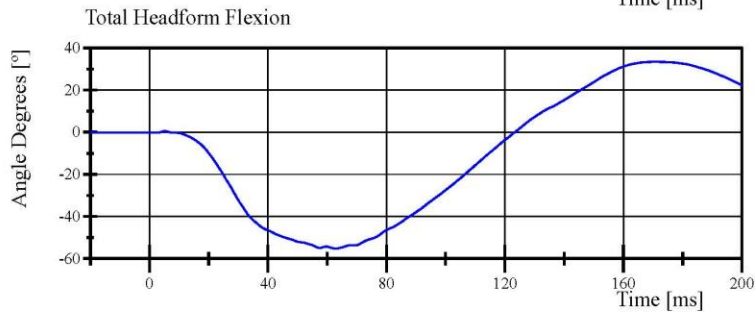
Filter Class: CFC_180
Max: 19.4 ° at 172.6 ms
Min: -35.8 ° at 63.2 ms



Filter Class: CFC_180
Max: 20.7 ° at 173.2 ms
Min: -31.9 ° at 61.3 ms



Filter Class: CFC_180
Max: 14.1 ° at 168.0 ms
Min: -19.3 ° at 62.7 ms



Filter Class: CFC_180
Max: 33.4 ° at 170.8 ms
Min: -55.2 ° at 62.8 ms

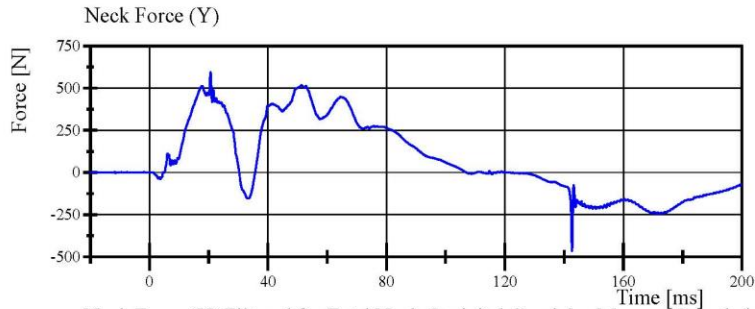
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WorldSID 50th_Qalification Manual 11_09_2020

04.15.2021 14:46:13 4009

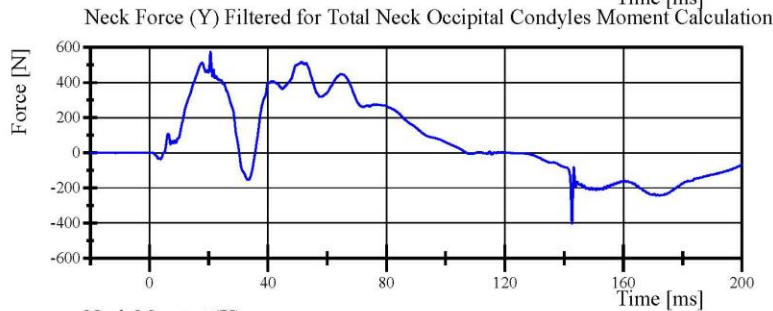


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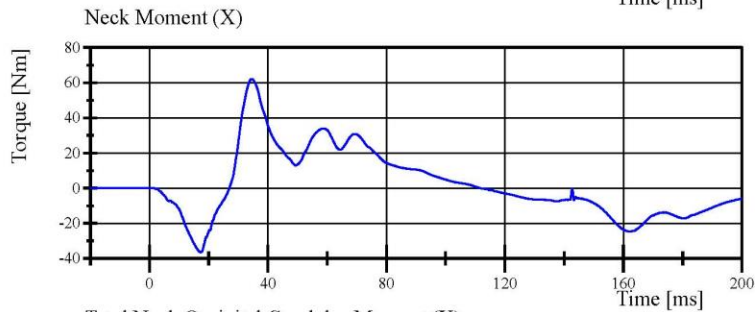
Left Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 10-5
Test Date: 4/15/2021



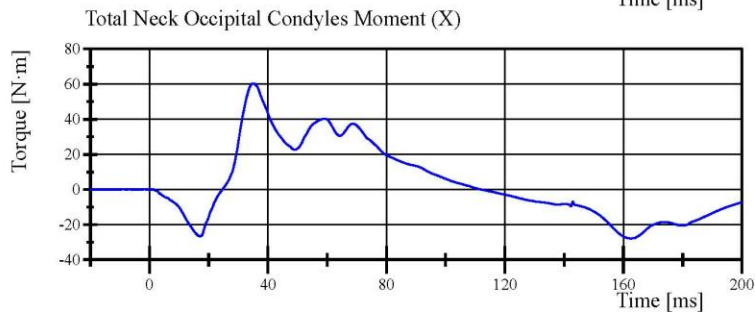
Filter Class: CFC_1000
Max: 594.3 N at 20.6 ms
Min: -464.0 N at 142.7 ms



Filter Class: CFC_600
Max: 574.6 N at 20.6 ms
Min: -403.0 N at 142.6 ms



Filter Class: CFC_600
Max: 62.1 Nm at 34.5 ms
Min: -36.4 Nm at 17.3 ms

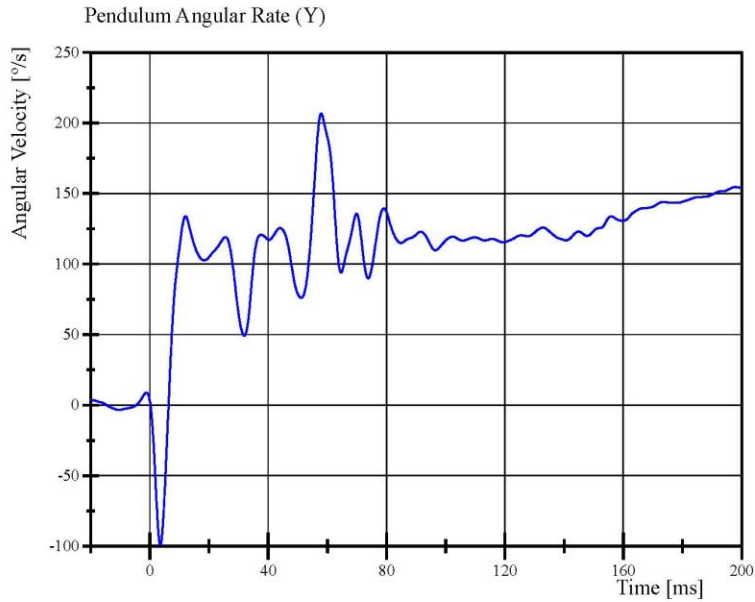


Filter Class: Without_(Constar)
Max: 60.3 N·m at 35.1 ms
Min: -27.9 N·m at 162.5 ms

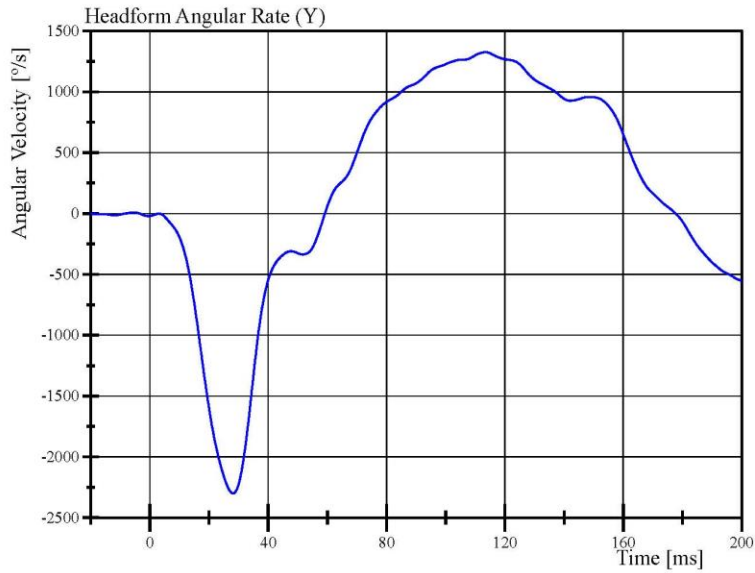


Transportation Research Center Inc.

Left Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 10-5
Test Date: 4/15/2021



Filter Class: CFC_60
Max: 206.7 °/s at 57.9 ms
Min: -99.1 °/s at 3.6 ms



Filter Class: CFC_60
Max: 1,325.6 °/s at 113.4 ms
Min: -2,300.2 °/s at 28.2 ms



Transportation Research Center Inc.

Right Lateral Neck
 WorldSID 50th Serial No. EB8888 Certification No. 10-1
 Test Date: 4/15/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Pendulum Velocity	3.30 - 3.50 m/s	3.339 m/s	Yes
Pendulum Integrated Velocity			
Change at 4 ms	(-0.87) - (-1.09) m/s	-0.882 m/s	Yes
Change at 8 ms	(-1.72) - (-2.1) m/s	-1.778 m/s	Yes
Change at 12 ms	(-2.63) - (-3.17) m/s	-2.718 m/s	Yes
Maximum Headform Flexion	50 - 61 deg	53.8 deg	Yes
Headform Flexion Decay			
- from Peak to Zero Degrees	58 - 72 ms	60.2 ms	Yes
Total Neck Occipital Condyles Moment	(-54) - (-67) N·m	-62.1 N·m	Yes
Total Neck Occipital Condyles Moment			
Decay Time to 0 N·m	71 - 87 ms	76.8 ms	Yes
Maximum Forward Pot Rotation			
Peak	32 - 39 °	34.9 °	Yes
Time of Peak	56 - 68 ms	62.5 ms	Yes
Maximum Rear Pot Rotation			
Peak	29 - 36 °	31.2 °	Yes
Time of Peak	56 - 68 ms	60.0 ms	Yes
Maximum Headform Angular Rate	2,047 - 2,503 %/s	2,285.3 %/s	Yes

Test meets specifications.

Condition: Used

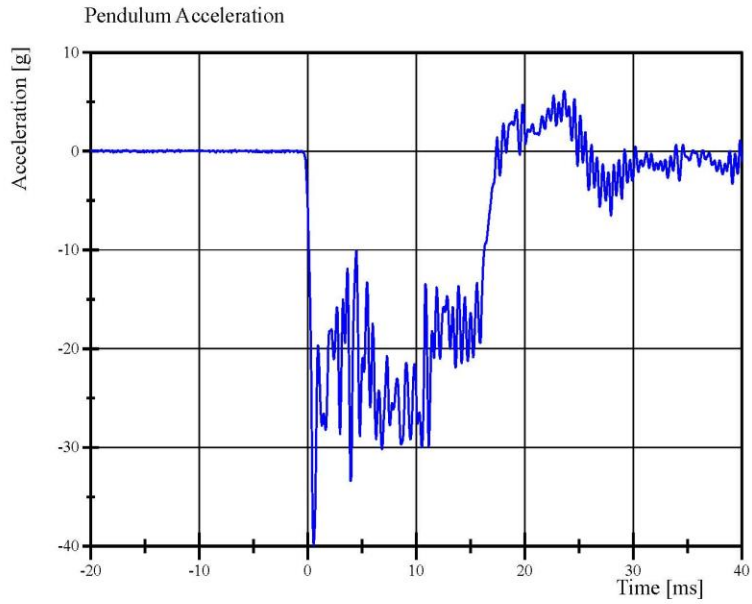
Comments:

Neck S/N: EE8804

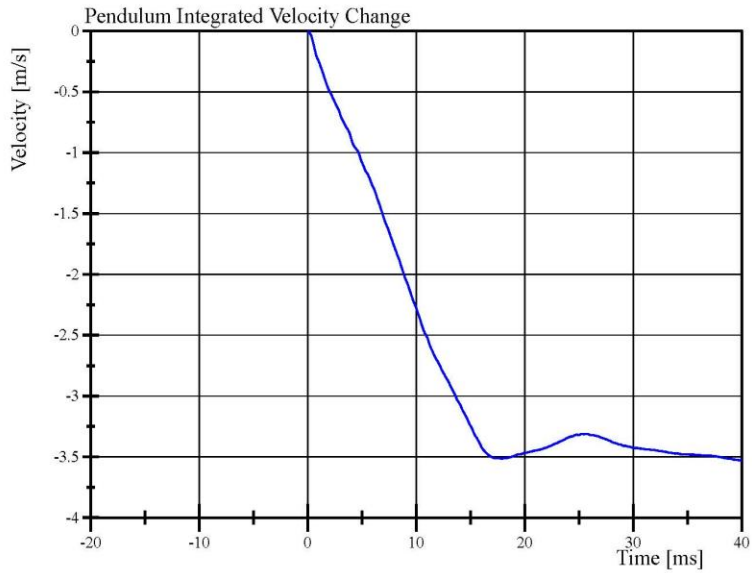


Transportation Research Center Inc.

Right Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 10-1
Test Date: 4/15/2021



Filter Class: CFC_1000
Max: 6.1 g at 23.7 ms
Min: -39.9 g at 0.6 ms

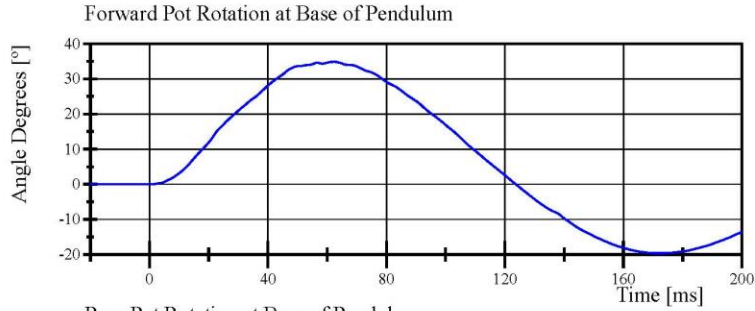


Filter Class: CFC_1000
Max: 0.0 m/s at 0.0 ms
Min: -3.5 m/s at 39.8 ms

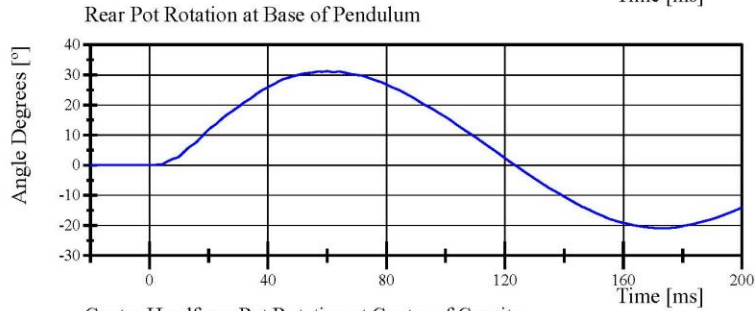


Transportation Research Center Inc.

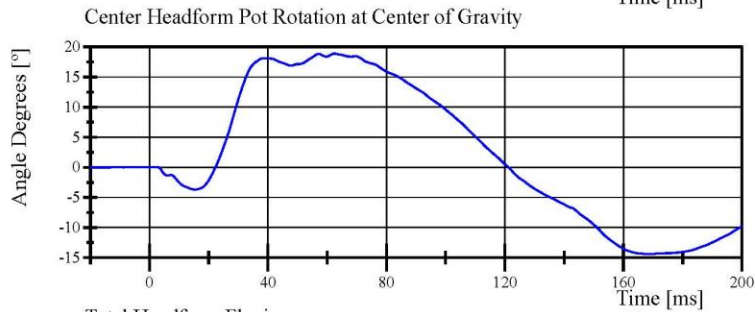
Right Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 10-1
Test Date: 4/15/2021



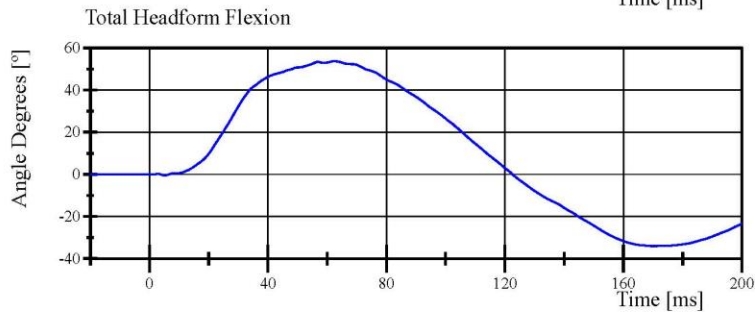
Filter Class: CFC_180
Max: 34.9 ° at 62.5 ms
Min: -19.6 ° at 171.6 ms



Filter Class: CFC_180
Max: 31.2 ° at 60.0 ms
Min: -20.9 ° at 171.8 ms



Filter Class: CFC_180
Max: 18.9 ° at 62.4 ms
Min: -14.4 ° at 169.0 ms



Filter Class: CFC_180
Max: 53.8 ° at 62.5 ms
Min: -34.0 ° at 170.1 ms

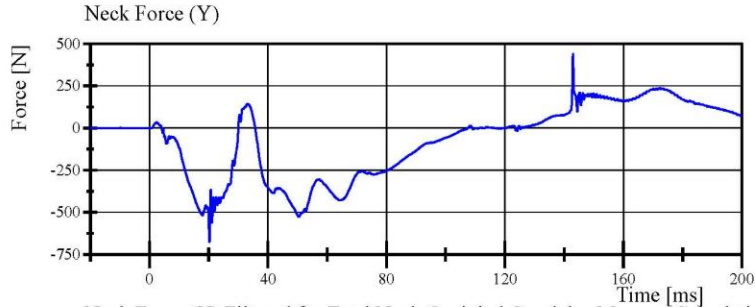
Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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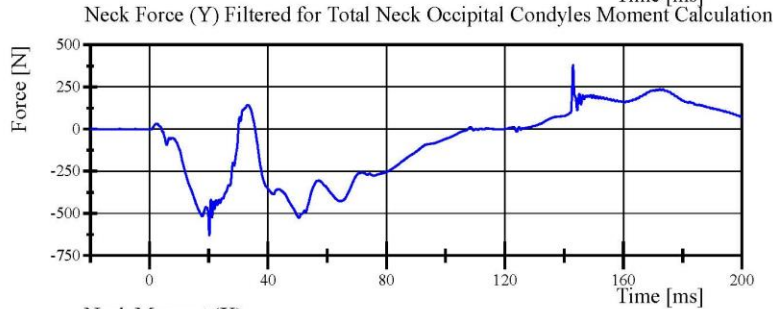


Transportation Research Center Inc.

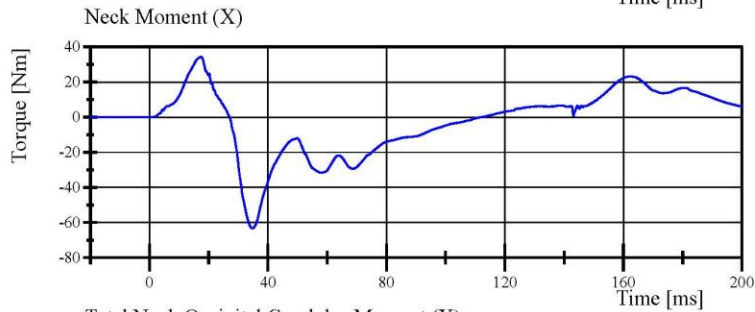
Right Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 10-1
Test Date: 4/15/2021



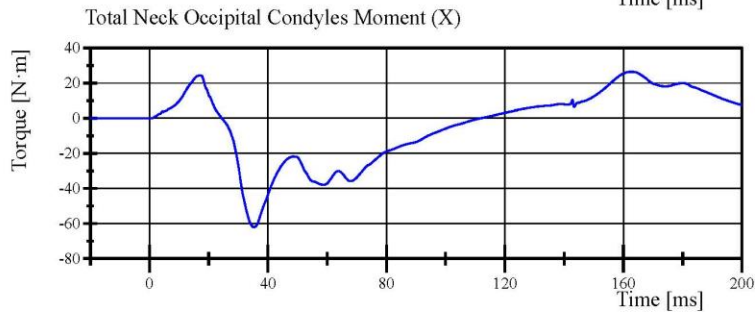
Filter Class: CFC_1000
Max: 440.3 N at 143.0 ms
Min: -676.2 N at 20.3 ms



Filter Class: CFC_600
Max: 379.9 N at 143.0 ms
Min: -631.1 N at 20.2 ms



Filter Class: CFC_600
Max: 34.2 Nm at 17.4 ms
Min: -63.3 Nm at 34.8 ms



Filter Class: Without_(Constar)
Max: 26.5 N·m at 162.7 ms
Min: -62.1 N·m at 35.3 ms

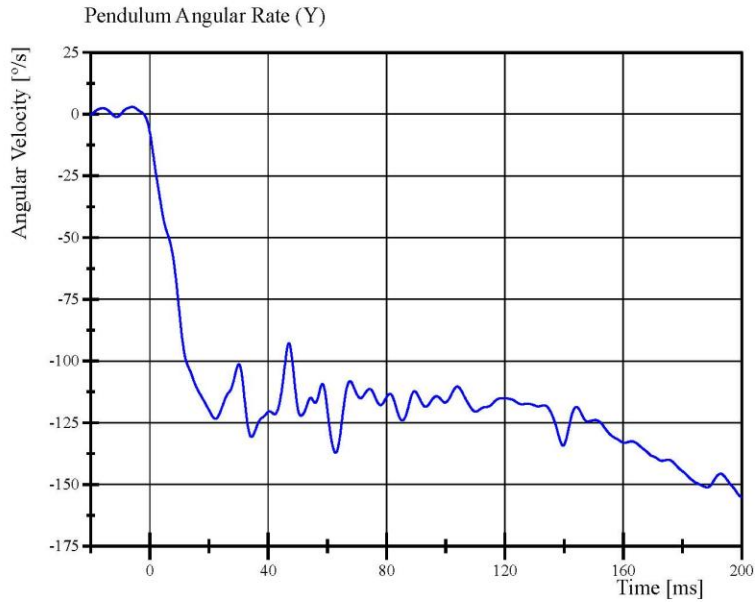
Specification Source: WorldSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

04.15.2021 15:21:09 4021

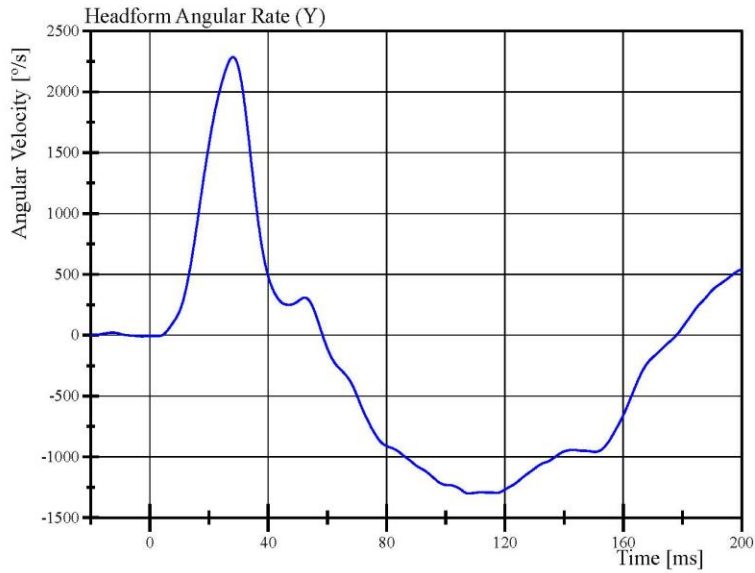


Transportation Research Center Inc.

Right Lateral Neck
WorldSID 50th Serial No. EB8888 Certification No. 10-1
Test Date: 4/15/2021



Filter Class: CFC_60
Max: 2.9 °/s at -6.0 ms
Min: -155.0 °/s at 200.0 ms



Filter Class: CFC_60
Max: 2,285.3 °/s at 28.1 ms
Min: -1,301.0 °/s at 107.8 ms



Transportation Research Center Inc.

Left Lateral Torsion

WorldSID 50th Serial No. EB8888 Certification No. 10-1

Test Date: 4/16/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.18 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.09 - 2.37 m/s	2.277 m/s	Yes
Change at 15 ms	3.19 - 3.63 m/s	3.419 m/s	Yes
Change at 20 ms	4.27 - 4.87 m/s	4.604 m/s	Yes
Peak Fixture Rotation	(-41.5) - (-51) °	-47.66 °	Yes
Decay Time to 0 deg from Peak Angle	35 - 43 ms	39.9 ms	Yes
Peak Head Angular Velocity Z-axis	(-1,345) - (-1,655) °/s	-1,548.2 °/s	Yes
Peak Lower Neck Moment Z-axis	34 - 42 N·m	37.9 N·m	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: EE8804

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
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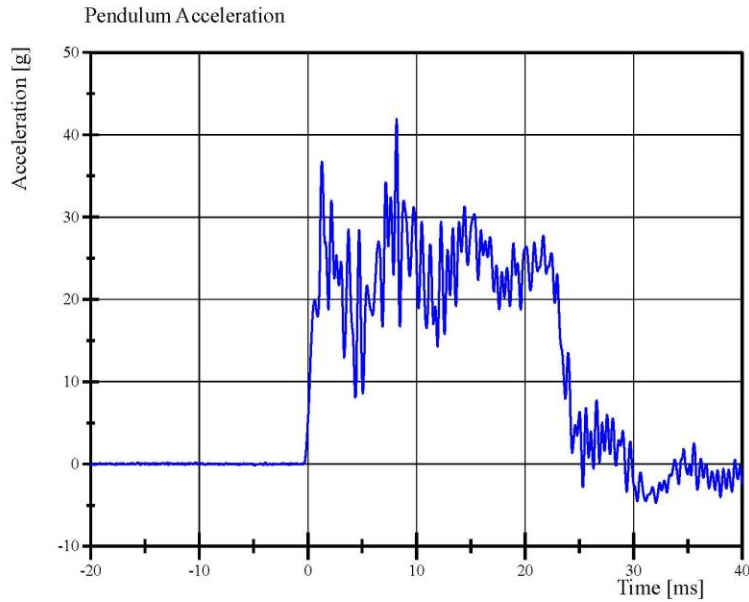


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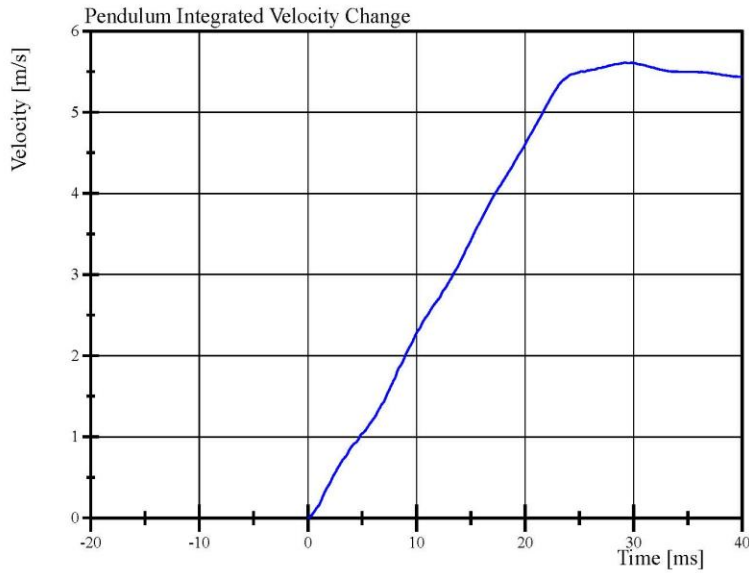
Left Lateral Torsion

WorldSID 50th Serial No. EB8888 Certification No. 10-1

Test Date: 4/16/2021



Filter Class: CFC_1000
Max: 41.9 g at 8.2 ms
Min: -4.7 g at 32.1 ms



Filter Class: CFC_1000
Max: 5.6 m/s at 29.2 ms
Min: 0.0 m/s at -0.0 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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Report Number: EB8888_WSH10

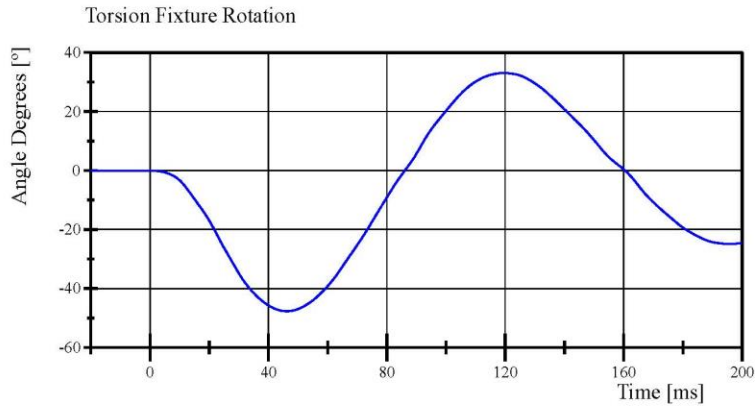
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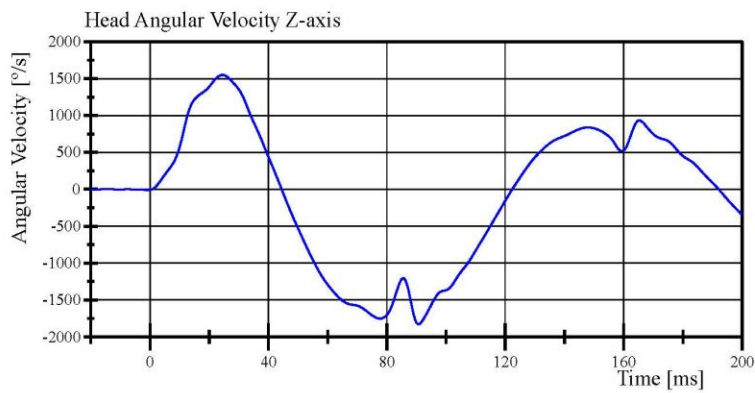
Left Lateral Torsion

WorldSID 50th Serial No. EB8888 Certification No. 10-1

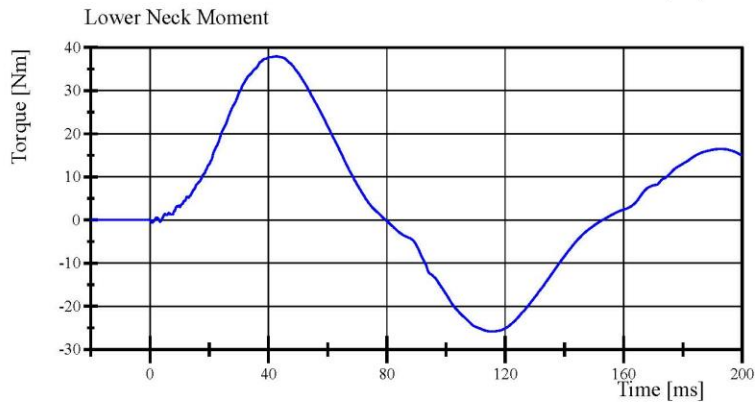
Test Date: 4/16/2021



Filter Class: CFC_60
Max: 33.0 ° at 119.4 ms
Min: -47.7 ° at 46.2 ms



Filter Class: CFC_60
Max: 1,548.2 °/s at 24.5 ms
Min: -1,828.6 °/s at 90.7 ms



Filter Class: CFC_600
Max: 37.9 Nm at 42.7 ms
Min: -25.9 Nm at 115.7 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

04.16.2021 09:24:22 4016



Transportation Research Center Inc.

Right Lateral Torsion

WorldSID 50th Serial No. EB8888 Certification No. 10-1

Test Date: 4/16/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.18 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.09 - 2.37 m/s	2.273 m/s	Yes
Change at 15 ms	3.19 - 3.63 m/s	3.451 m/s	Yes
Change at 20 ms	4.27 - 4.87 m/s	4.676 m/s	Yes
Peak Fixture Rotation	41.5 - 51 °	47.44 °	Yes
Decay Time to 0 deg from Peak Angle	35 - 43 ms	39.6 ms	Yes
Peak Head Angular Velocity Z-axis	1,345 - 1,655 %/s	1,570.6 %/s	Yes
Peak Lower Neck Moment Z-axis	(-34) - (-42) N·m	-38.6 N·m	Yes

Test meets specifications.

Condition: Used

Comments:

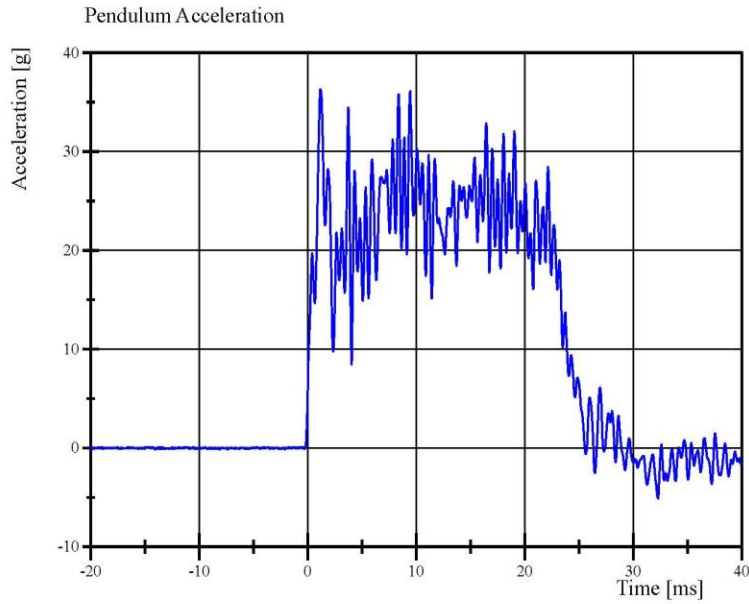
Neck S/N: EE8804

Transportation Research Center Inc.

Right Lateral Torsion

WorldSID 50th Serial No. EB8888 Certification No. 10-1

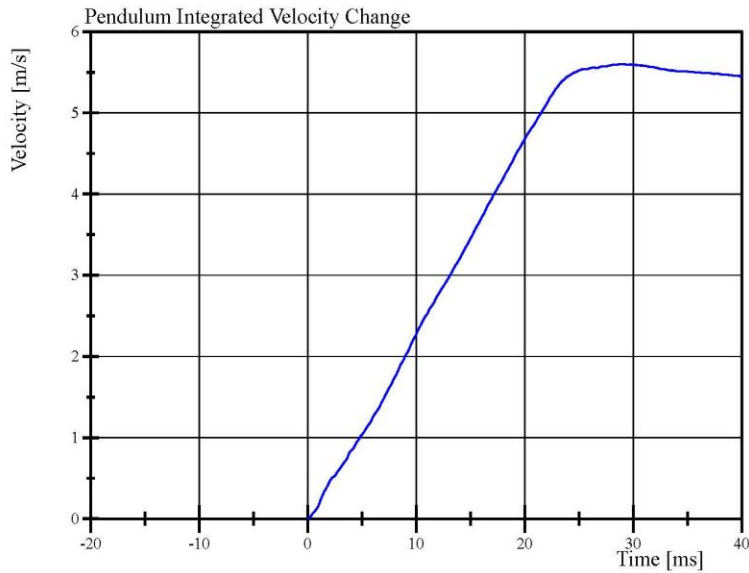
Test Date: 4/16/2021



Filter Class: CFC_1000

Max: 36.3 g at 1.2 ms

Min: -5.1 g at 32.3 ms



Filter Class: CFC_1000

Max: 5.6 m/s at 28.9 ms

Min: 0.0 m/s at 0.0 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

04.16.2021 10:27:38 4008



Report Number: EB8888_WSH10

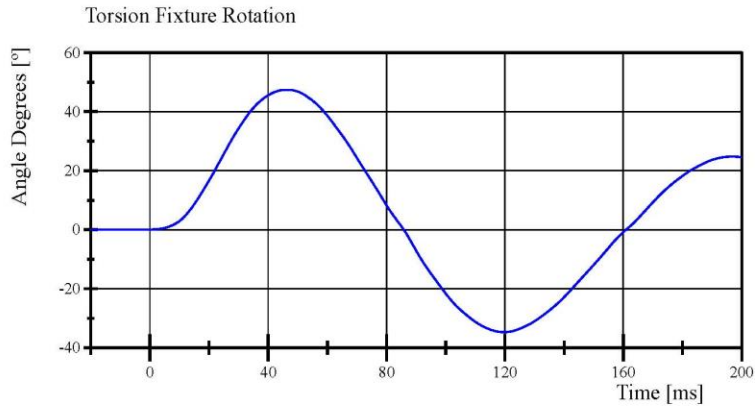
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Transportation Research Center Inc.

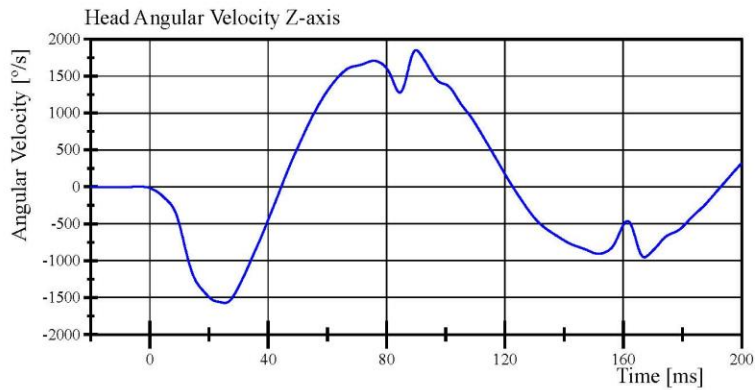
Right Lateral Torsion

WorldSID 50th Serial No. EB8888 Certification No. 10-1

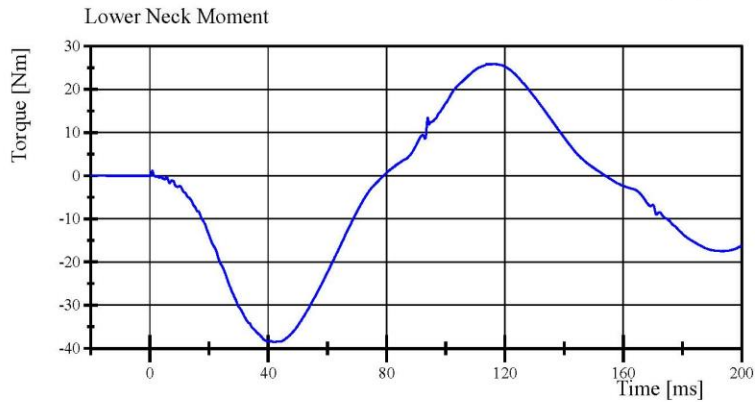
Test Date: 4/16/2021



Filter Class: CFC_60
Max: 47.4 ° at 46.3 ms
Min: -34.7 ° at 119.7 ms



Filter Class: CFC_60
Max: 1,850.0 °/s at 90.0 ms
Min: -1,570.6 °/s at 25.3 ms



Filter Class: CFC_600
Max: 25.9 Nm at 116.1 ms
Min: -38.6 Nm at 42.1 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

04.16.2021 10:27:40 4008



Transportation Research Center Inc.

Left Lateral Shoulder
WorldSID 50th Serial No. EB8888 Certification No. 10-1
Test Date: 4/19/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.30 m/s	Yes
Impactor Force	2,600 - 3,300 N	2,958.6 N	Yes
Shoulder Force	(-1,470) - (-1,800) N	-1,672.0 N	Yes
Shoulder Rib Length Change	37 - 46 mm	42.0 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Arm S/N: EG3799

Shoulder Rib S/N: DW1916

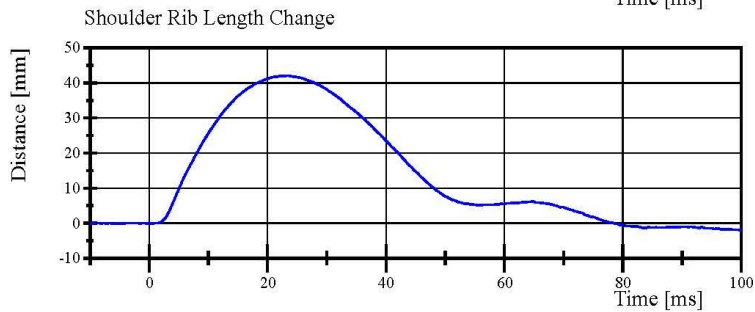
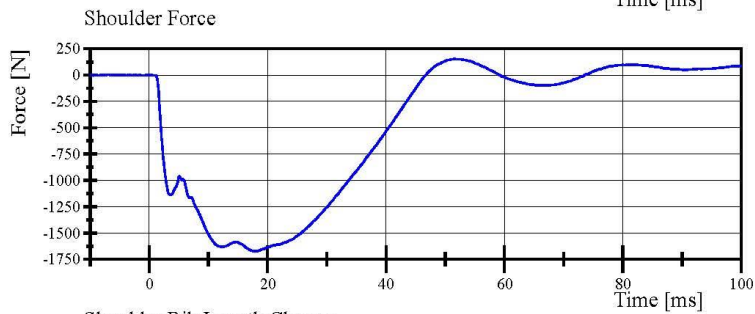
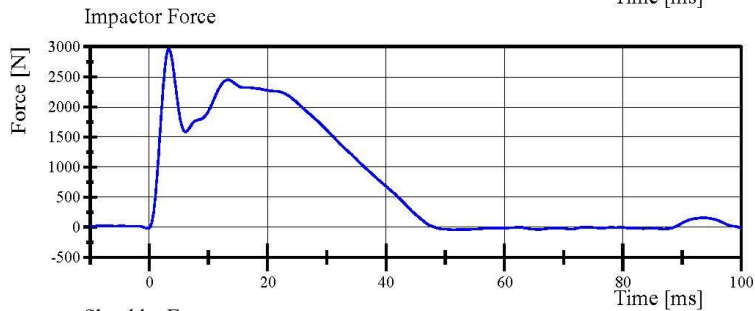
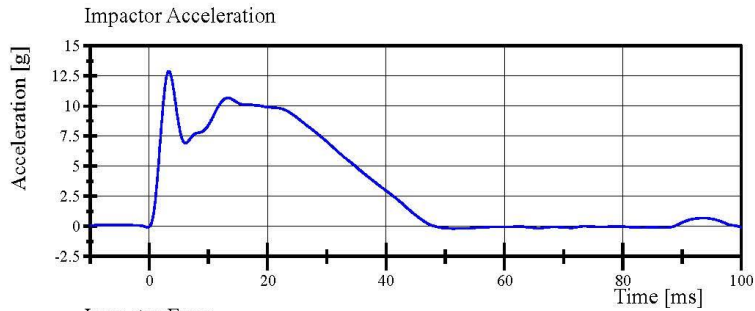
RibEye S/N: 124

Transportation Research Center Inc.

Left Lateral Shoulder

WorldSID 50th Serial No. EB8888 Certification No. 10-1

Test Date: 4/19/2021



Specification Source: WordSID 50th(W5) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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Report Number: EB8888_WSH10

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Transportation Research Center Inc.

Left Lateral Thorax with Arm
WorldSID 50th Serial No. EB8888 Certification No. 10-2
Test Date: 4/20/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Impactor Velocity	6.6 - 6.8 m/s	6.75 m/s	Yes
Impactor Force	5,300 - 6,200 N	5,441.6 N	Yes
Peak Thorax Rib 1 Length Change	35 - 47 mm	44.8 mm	Yes
Peak Thorax Rib 2 Length Change	46 - 56 mm	49.7 mm	Yes
Peak Thorax Rib 3 Length Change	33.5 - 40.5 mm	36.33 mm	Yes
Peak T4 Acceleration, y-axis	28 - 37 g	32.1 g	Yes
Peak T12 Acceleration, y-axis	22 - 28 g	22.2 g	Yes

Test meets specifications.

Condition: Used

Comments:

Arm S/N: EG3799

Shoulder Rib S/N: DW1916

Thorax Rib 1 S/N: EB5400

Thorax Rib 2 S/N: EB5401

Thorax Rib 3 S/N: EB5402

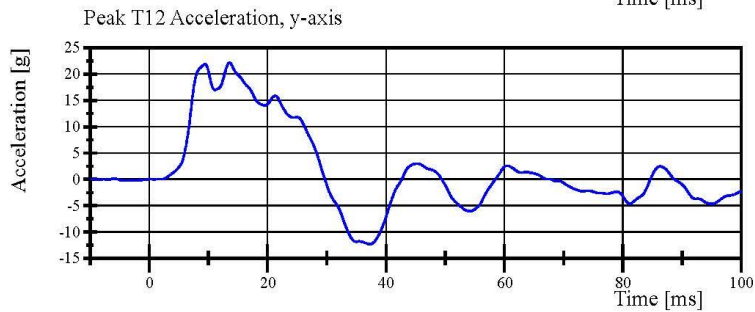
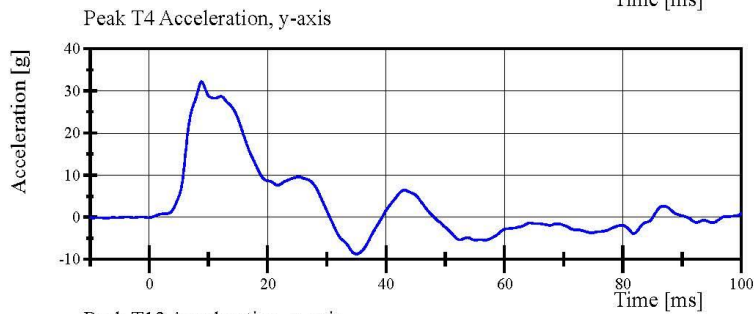
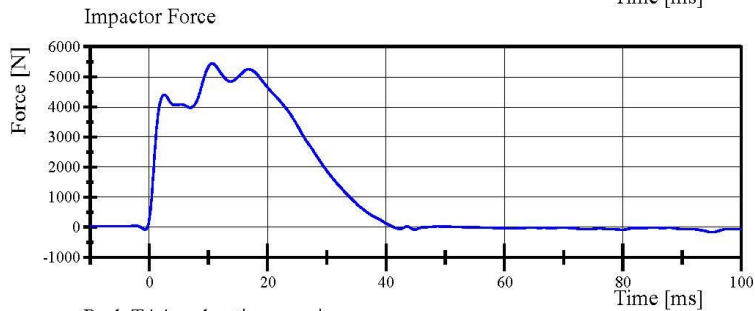
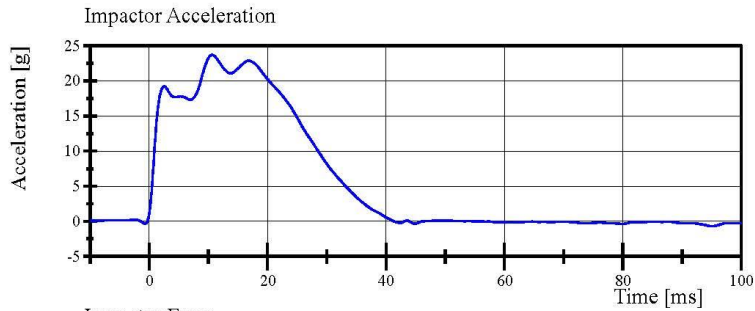
RibEye S/N: 124

Transportation Research Center Inc.

Left Lateral Thorax with Arm

WorldSID 50th Serial No. EB8888 Certification No. 10-2

Test Date: 4/20/2021



Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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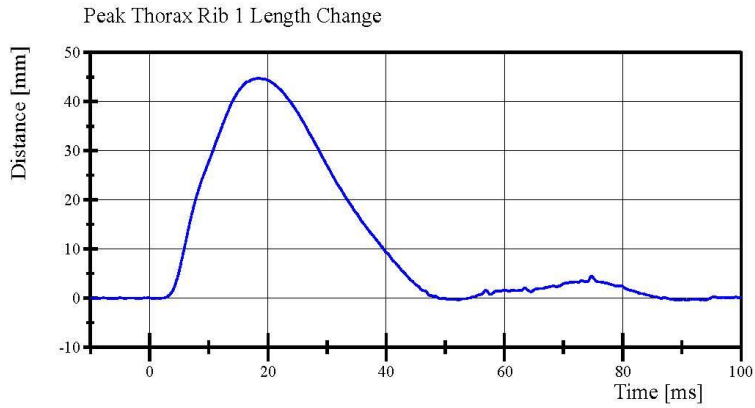


Report Number: EB8888_WSH10

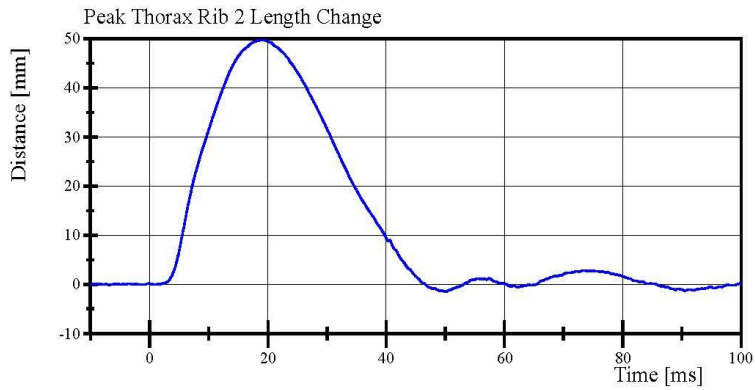
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Transportation Research Center Inc.

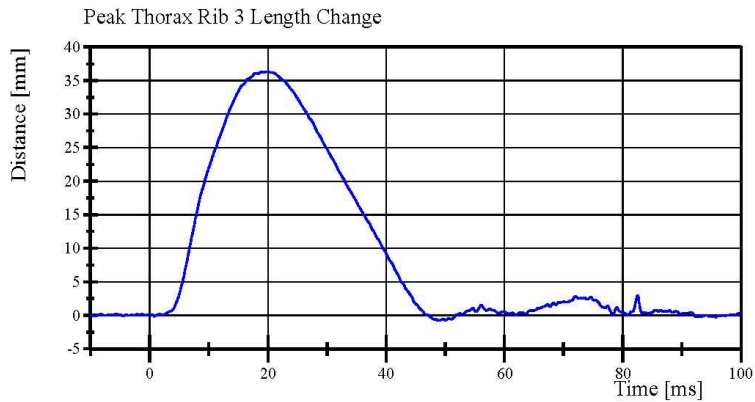
Left Lateral Thorax with Arm
WorldSID 50th Serial No. EB8888 Certification No. 10-2
Test Date: 4/20/2021



Filter Class: CFC_600
Max: 44.8 mm at 18.4 ms
Min: -0.4 mm at 90.8 ms



Filter Class: CFC_600
Max: 49.7 mm at 19.1 ms
Min: -1.4 mm at 50.1 ms



Filter Class: CFC_600
Max: 36.3 mm at 19.8 ms
Min: -0.8 mm at 49.0 ms

Transportation Research Center Inc.

Left Lateral Thorax without Arm
WorldSID 50th Serial No. EB8888 Certification No. 10-2
Test Date: 4/19/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.29 m/s	Yes
Impactor Force	3,200 - 3,800 N	3,485.7 N	Yes
Peak Thorax Rib 1 Length Change	33 - 43 mm	35.3 mm	Yes
Peak Thorax Rib 2 Length Change	35 - 43 mm	41.4 mm	Yes
Peak Thorax Rib 3 Length Change	32 - 40 mm	35.0 mm	Yes
Peak T4 Acceleration, y-axis	14 - 20 g	14.2 g	Yes
Peak T12 Acceleration, y-axis	14 - 22 g	14.1 g	Yes

Test meets specifications.

Condition: Used

Comments:

Thorax Rib 1 S/N: EB5400

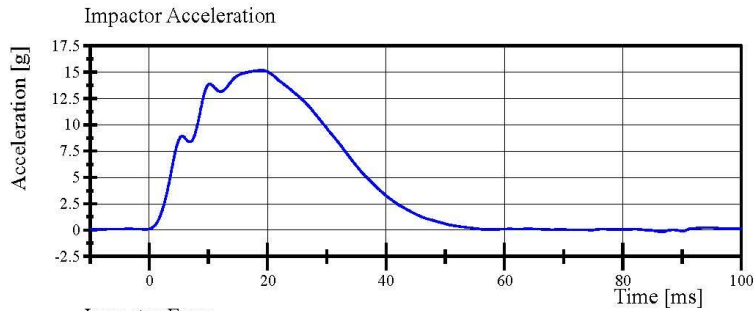
Thorax Rib 2 S/N: EB5401

Thorax Rib 3 S/N: EB5402

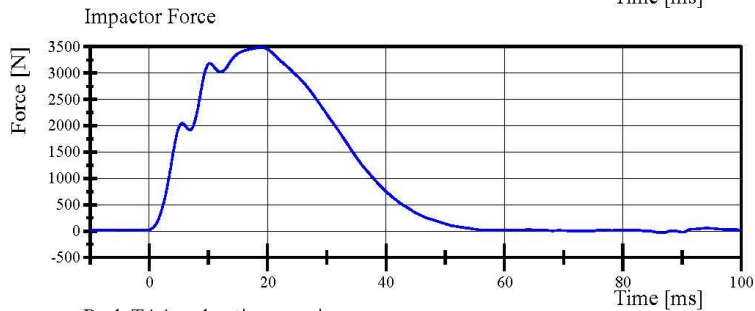
RibEye S/N: 124

Transportation Research Center Inc.

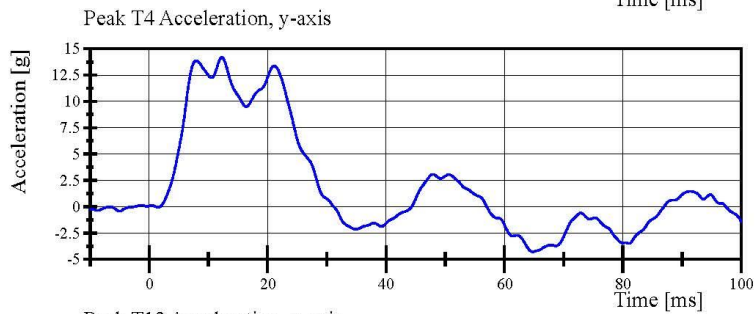
Left Lateral Thorax without Arm
WorldSID 50th Serial No. EB8888 Certification No. 10-2
Test Date: 4/19/2021



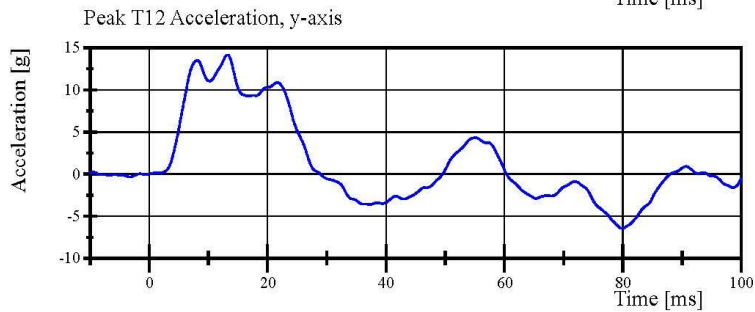
Filter Class: CFC_180
Max: 15.2 g at 18.9 ms
Min: -0.2 g at 86.6 ms



Filter Class: CFC_180
Max: 3,485.7 N at 18.9 ms
Min: -36.8 N at 86.6 ms



Filter Class: CFC_180
Max: 14.2 g at 12.3 ms
Min: -4.3 g at 64.8 ms

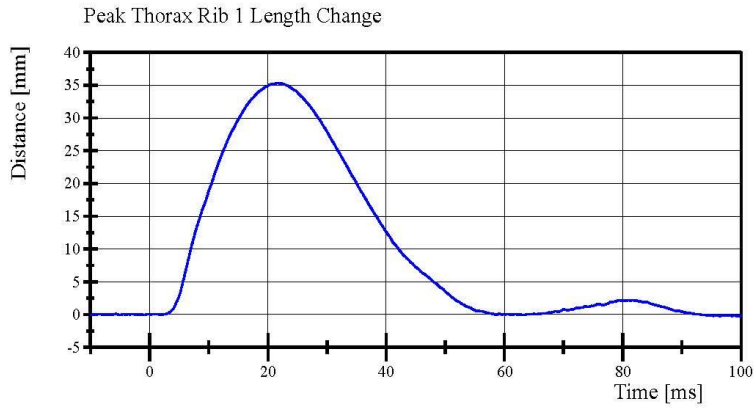


Filter Class: CFC_180
Max: 14.1 g at 13.2 ms
Min: -6.5 g at 79.9 ms

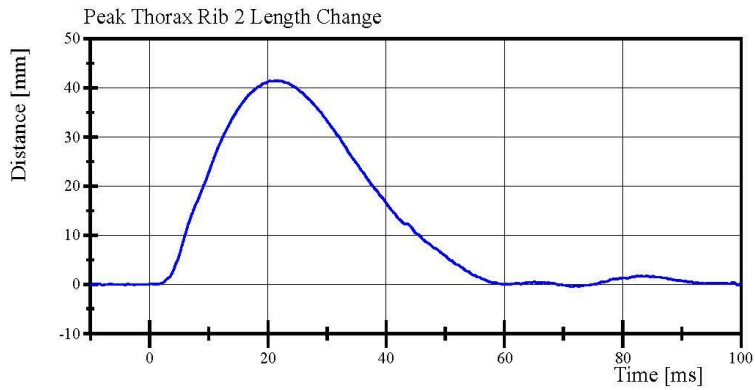


Transportation Research Center Inc.

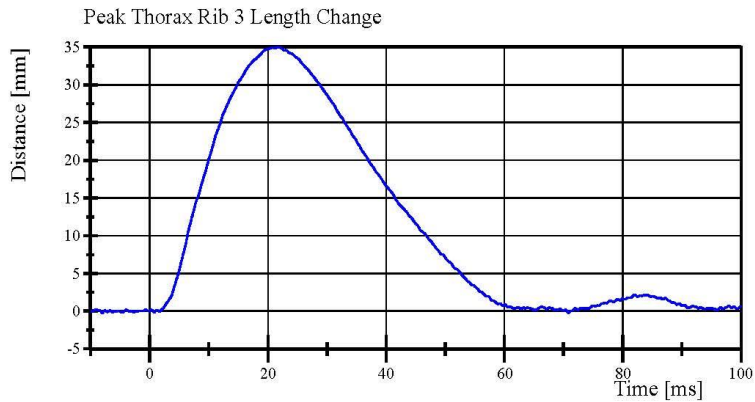
Left Lateral Thorax without Arm
WorldSID 50th Serial No. EB8888 Certification No. 10-2
Test Date: 4/19/2021



Filter Class: CFC_600
Max: 35.3 mm at 21.7 ms
Min: -0.2 mm at 96.5 ms



Filter Class: CFC_600
Max: 41.4 mm at 21.5 ms
Min: -0.4 mm at 71.4 ms



Filter Class: CFC_600
Max: 35.0 mm at 21.6 ms
Min: -0.2 mm at -8.0 ms



Transportation Research Center Inc.

Left Lateral Abdomen

WorldSID 50th Serial No. EB8888 Certification No. 10-2

Test Date: 4/19/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	22.0 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.33 m/s	Yes
Impactor Force	2,700 - 3,100 N	3,049.8 N	Yes
Peak Abdomen Rib 1 Length Change	32.5 - 39.5 mm	34.41 mm	Yes
Peak Abdomen Rib 2 Length Change	32 - 38 mm	35.3 mm	Yes
Peak T12 Acceleration, y-axis	14.5 - 19.5 g	17.55 g	Yes

Test meets specifications.

Condition: Used

Comments:

Abdomen Rib #1 S/N: DY5252

Abdomen Rib #2 S/N: DY5253

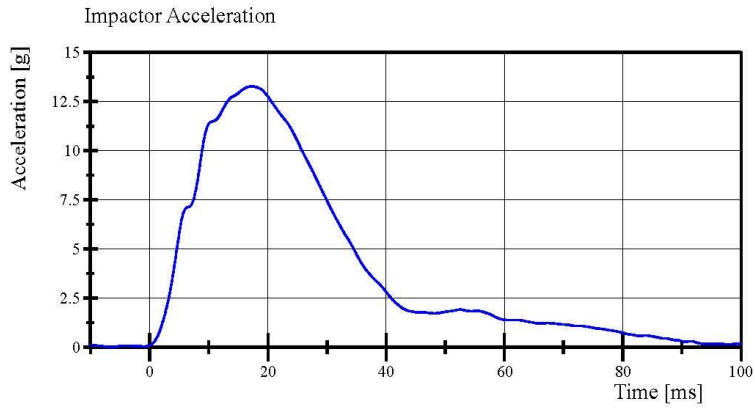
RibEye S/N: 124

Transportation Research Center Inc.

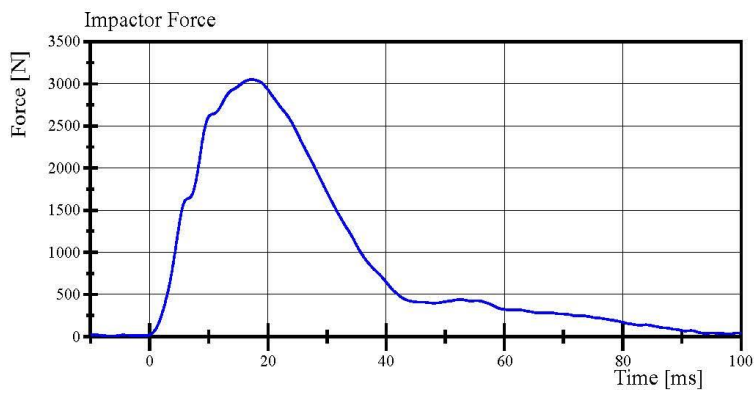
Left Lateral Abdomen

WorldSID 50th Serial No. EB8888 Certification No. 10-2

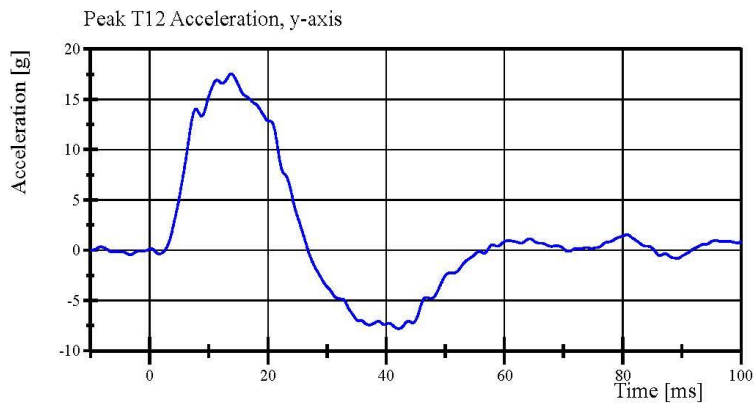
Test Date: 4/19/2021



Filter Class: CFC_180
Max: 13.3 g at 17.3 ms
Min: 0.0 g at -6.2 ms



Filter Class: CFC_180
Max: 3,049.8 N at 17.3 ms
Min: 6.8 N at -6.2 ms



Filter Class: CFC_180
Max: 17.6 g at 13.8 ms
Min: -7.8 g at 42.2 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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Report Number: EB8888_WSH10

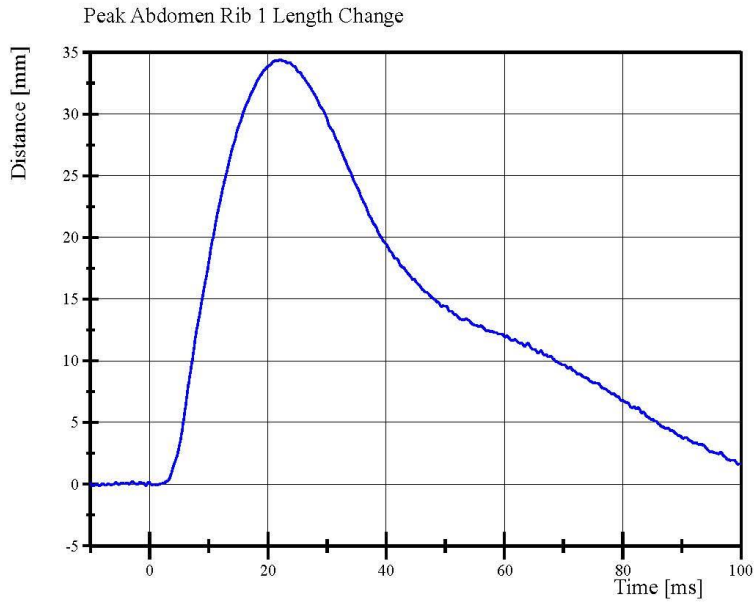
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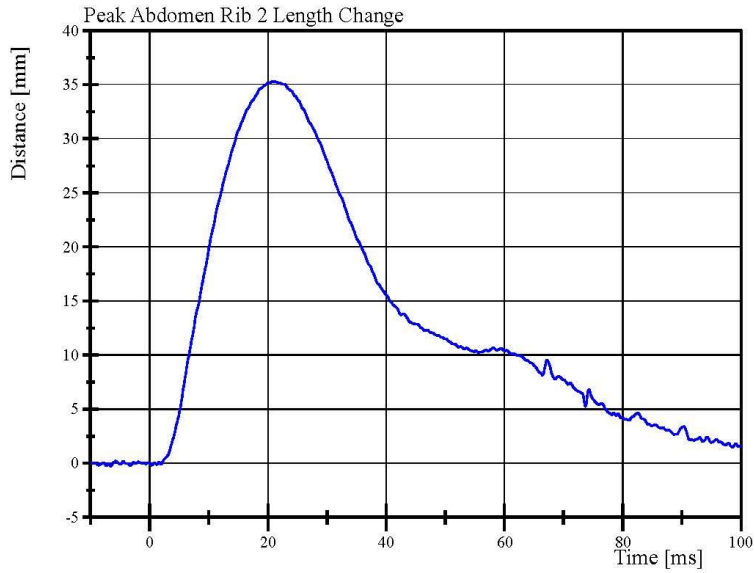
Left Lateral Abdomen

WorldSID 50th Serial No. EB8888 Certification No. 10-2

Test Date: 4/19/2021



Filter Class: CFC_600
Max: 34.4 mm at 22.1 ms
Min: -0.1 mm at -9.5 ms



Filter Class: CFC_600
Max: 35.3 mm at 20.8 ms
Min: -0.3 mm at -6.6 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

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Transportation Research Center Inc.

Left Lateral Pelvis
WorldSID 50th Serial No. EB8888 Certification No. 10-1
Test Date: 4/20/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Impactor Velocity	6.6 - 6.8 m/s	6.72 m/s	Yes
Impactor Force	6,800 - 8,200 N	7,370.2 N	Yes
Pelvis Lateral Acceleration	38.5 - 48.5 g	40.71 g	Yes
Peak T12 Acceleration, y-axis	10 - 14 g	11.9 g	Yes
Pubic Lateral Force	(-1,300) - (-1,590) N	-1,422.0 N	Yes
Sacroiliac Lateral Force	(-1,860) - (-2,280) N	-1,997.7 N	Yes

Test meets specifications.

Condition: Used

Comments:

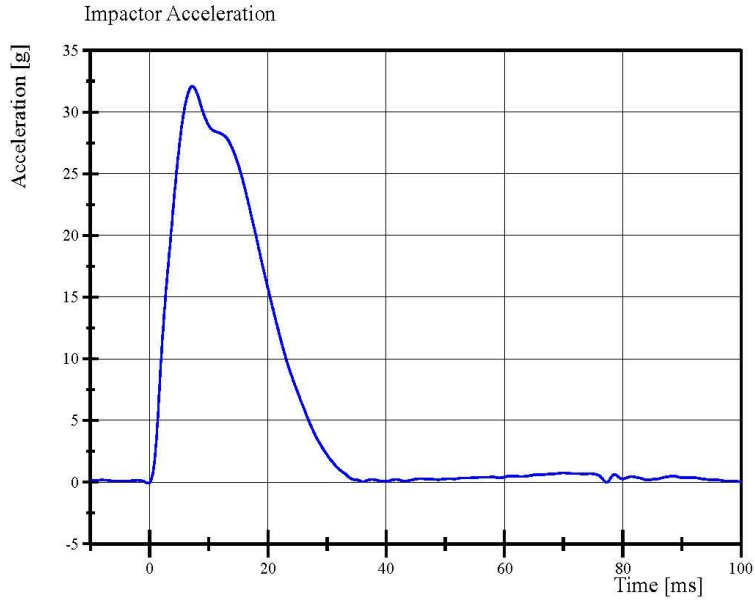
Pelvis S/N: EC3628

Transportation Research Center Inc.

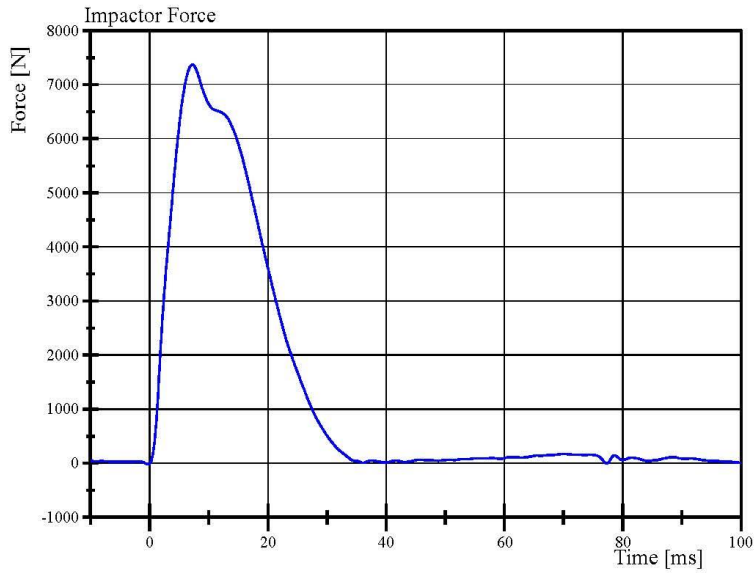
Left Lateral Pelvis

WorldSID 50th Serial No. EB8888 Certification No. 10-1

Test Date: 4/20/2021



Filter Class: CFC_180
Max: 32.1 g at 7.3 ms
Min: -0.1 g at -0.3 ms



Filter Class: CFC_180
Max: 7,370.2 N at 7.3 ms
Min: -18.2 N at -0.3 ms

Specification Source: WordSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020

Report Number: EB8888_WSH10

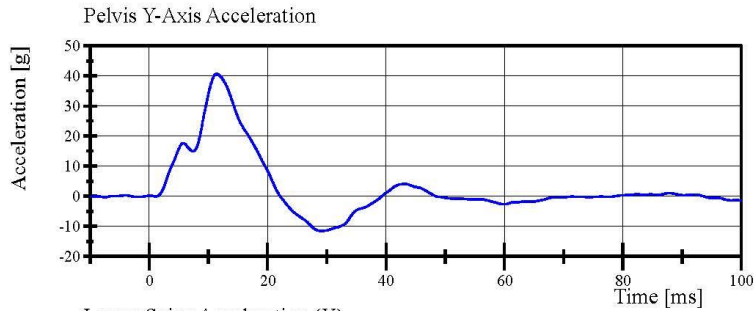
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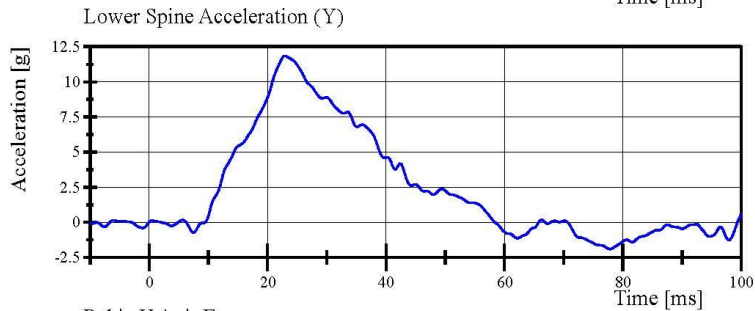


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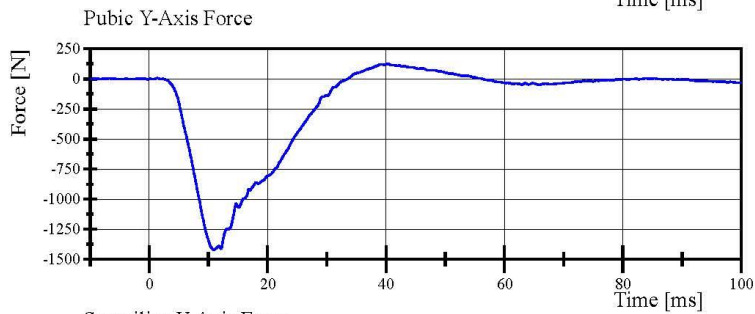
Left Lateral Pelvis
WorldSID 50th Serial No. EB8888 Certification No. 10-1
Test Date: 4/20/2021



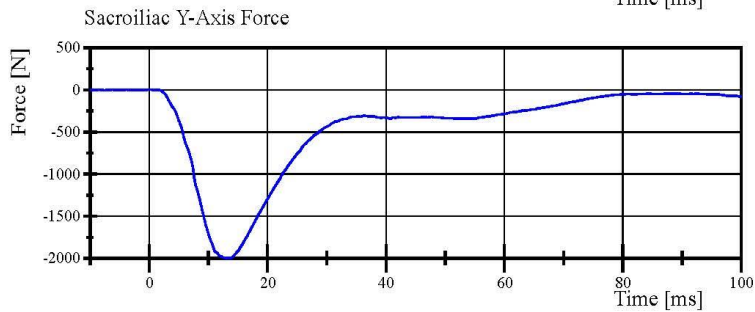
Filter Class: CFC_180
Max: 40.7 g at 11.4 ms
Min: -11.6 g at 29.1 ms



Filter Class: CFC_180
Max: 11.9 g at 22.9 ms
Min: -1.9 g at 77.8 ms



Filter Class: CFC_600
Max: 123.5 N at 40.3 ms
Min: -1,422.0 N at 10.9 ms



Filter Class: CFC_600
Max: 2.5 N at 0.1 ms
Min: -1,997.7 N at 13.3 ms

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – Dummy Instrumentation (WorldSID-50M with RibEye™)

		WorldSID-50M S/N EB8888		
		Serial Number	Manufacturer	Calibration Date
Head Accelerometers (g)	X	12324-1	Endevco	22-Jul-2020
	Y	12324-3	Endevco	22-Jul-2020
	Z	12324-2	Endevco	22-Jul-2020
Head Angular Rates Sensors (deg/sec)	X	ARS12047	DTS	4-Aug-2020
	Y	ARS15094	DTS	4-Aug-2020
	Z	ARS11060	DTS	4-Aug-2020
Upper Neck Force (N)	X	DO9753	Humanetics	21-Jul-2020
	Y	DO9753	Humanetics	21-Jul-2020
	Z	DO9753	Humanetics	21-Jul-2020
Upper Neck Moment (Nm)	X	DO9753	Humanetics	21-Jul-2020
	Y	DO9753	Humanetics	21-Jul-2020
	Z	DO9753	Humanetics	21-Jul-2020
Lower Neck Force (N)	X	EB8143	Humanetics	21-Jul-2020
	Y	EB8143	Humanetics	21-Jul-2020
	Z	EB8143	Humanetics	21-Jul-2020
Lower Neck Moment (Nm)	X	EB8143	Humanetics	21-Jul-2020
	Y	EB8143	Humanetics	21-Jul-2020
	Z	EB8143	Humanetics	21-Jul-2020
Shoulder Force (N)	X	EC1630	Humanetics	21-Jul-2020
	Y	EC1630	Humanetics	21-Jul-2020
	Z	EC1630	Humanetics	21-Jul-2020
Upper Spine Accelerometers (T1) (g)	X	12037-3	Endevco	21-Jul-2020
	Y	12037-2	Endevco	21-Jul-2020
	Z	12037-1	Endevco	21-Jul-2020
Middle Spine Accelerometers (T4) (g)	X	12352-3	Endevco	21-Jul-2020
	Y	12352-2	Endevco	21-Jul-2020
	Z	12352-1	Endevco	21-Jul-2020
Lower Spine Accelerometers (T12) (g)	X	12375-3	Endevco	22-Jul-2020
	Y	12375-2	Endevco	22-Jul-2020
	Z	12375-1	Endevco	22-Jul-2020
Pubic Symphysis Force (N)	Y	EC4386	Humanetics	21-Jul-2020
Sacro-Iliac Left Force (N)	X	EG4066	Humanetics	21-Jul-2020
	Y	EG4066	Humanetics	21-Jul-2020
	Z	EG4066	Humanetics	21-Jul-2020
Sacro-Iliac Left Moment (Nm)	X	EG4066	Humanetics	21-Jul-2020
	Y	EG4066	Humanetics	21-Jul-2020
	Z	EG4066	Humanetics	21-Jul-2020

TABLE 1 – Dummy Instrumentation (WorldSID-50M with RibEye™) (CONTINUED)

		WorldSID-50M S/N EB8888		
		Serial Number	Manufacturer	Calibration Date
Sacro-Iliac Right Force (N)	X	EG4066	Humanetics	21-Jul-2020
	Y	EG4066	Humanetics	21-Jul-2020
	Z	EG4066	Humanetics	21-Jul-2020
Sacro-Iliac Right Moment (Nm)	X	EG4066	Humanetics	21-Jul-2020
	Y	EG4066	Humanetics	21-Jul-2020
	Z	EG4066	Humanetics	21-Jul-2020
Lumbar Force (N)	X	EC2349	Humanetics	21-Jul-2020
	Y	EC2349	Humanetics	21-Jul-2020
	Z	EC2349	Humanetics	21-Jul-2020
Lumbar Moment (Nm)	X	EC2349	Humanetics	21-Jul-2020
	Y	EC2349	Humanetics	21-Jul-2020
	Z	EC2349	Humanetics	21-Jul-2020
Pelvis Accelerometers (g)	X	11905-3	Endevco	22-Jul-2020
	Y	11905-2	Endevco	22-Jul-2020
	Z	11905-1	Endevco	22-Jul-2020
Left Femur Force (N)	X	EA4925TPS	Humanetics	29-Jul-2020
	Y	EA4925TPS	Humanetics	29-Jul-2020
	Z	EA4925TPS	Humanetics	29-Jul-2020
Left Femur Moment (Nm)	X	EA4925TPS	Humanetics	29-Jul-2020
	Y	EA4925TPS	Humanetics	29-Jul-2020
	Z	EA4925TPS	Humanetics	29-Jul-2020
Left Femoral Neck Force (N)	X	EB6234T	Humanetics	21-Jul-2020
	Y	EB6234T	Humanetics	21-Jul-2020
	Z	EB6234T	Humanetics	21-Jul-2020
Driver Left Outer Knee Force (N)	Y	93	Humanetics	21-Jul-2020
Driver Left Inner Knee Force (N)	Y	95	Humanetics	21-Jul-2020

TABLE 1 – Dummy Instrumentation (WorldSID-50M with RibEye™) (CONTINUED)

			WorldSID-50M S/N EB8888		
			Serial Number	Manufacturer	Calibration Date
Shoulder RibEye (mm)	Front	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
	Middle	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
	Rear	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
Thorax Rib 1 RibEye (mm)	Front	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
	Middle	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
	Rear	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
Thorax Rib 2 RibEye (mm)	Front	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
	Middle	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
	Rear	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
Thorax Rib 3 RibEye (mm)	Front	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
	Middle	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
	Rear	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020

TABLE 1 – Dummy Instrumentation (WorldSID-50M with RibEye™) (CONTINUED)

			WorldSID-50M S/N EB8888		
			Serial Number	Manufacturer	Calibration Date
Abdomen Rib 1 RibEye (mm)	Front	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
	Middle	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
	Rear	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
Abdomen Rib 2 RibEye (mm)	Front	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
	Middle	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020
	Rear	X	124	Boxboro Systems	7-Jul-2020
		Y	124	Boxboro Systems	7-Jul-2020
		Z	124	Boxboro Systems	7-Jul-2020

TABLE 2 – VEHICLE INSTRUMENTATION

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity (g)	X	P34046	ENDEVCO	11-Feb-2021
	Y	P50393	ENDEVCO	11-Feb-2021
	Z	P57803	ENDEVCO	11-Feb-2021
Vehicle Center of Gravity Angular Rate (deg/sec)	X	ARS9185	DTS	6-Jul-2020
	Y	ARS8290	DTS	6-Jul-2020
	Z	ARS8001	DTS	6-Jul-2020
Left Floor Sill (g)	Y	P80720	ENDEVCO	8-Feb-2021
Left A-Pillar Sill (g)	Y	P97714	ENDEVCO	18-Mar-2021
Left Lower A-Pillar (g)	Y	P72593	ENDEVCO	18-Mar-2021
Left Mid A-Pillar (g)	Y	P83443	ENDEVCO	18-Mar-2021
Left B-Pillar Sill (g)	Y	P84600	ENDEVCO	18-Mar-2021
Left Lower B-Pillar (g)	Y	P45667	ENDEVCO	18-Mar-2021
Left Mid B-Pillar (g)	Y	P48673	ENDEVCO	18-Mar-2021
Driver Seat Track at Dummy H-Point (g)	Y	P87134	ENDEVCO	11-Feb-2021
Engine Top (g)	X	P50400	ENDEVCO	18-Mar-2021
	Y	P45643	ENDEVCO	18-Mar-2021
Firewall Center (g)	Y	P97889	ENDEVCO	18-Mar-2021
Right Roof at Vertical Impact Reference Line (g)	Y	P62618	ENDEVCO	18-Mar-2021
Right Sill at Vertical Impact Reference Line (g)	X	P87064	ENDEVCO	18-Mar-2021
	Y	P94559	ENDEVCO	18-Mar-2021
	Z	P81617	ENDEVCO	18-Mar-2021
Right Sill at Rear Seat Acceleration (g)	X	P94567	ENDEVCO	20-Nov-2020
	Y	P33547	ENDEVCO	20-Nov-2020
	Z	P75115	ENDEVCO	20-Nov-2020
Rear Floorpan Behind Rear Axle at Centerline (g)	X	T20648	ENDEVCO	15-Mar-2021
Rear Floorpan Behind Rear Axle at Centerline (g)	Y	T25513	ENDEVCO	15-Mar-2021
Left Front Door Mid Centerline (g)	Y	P58494	ENDEVCO	20-Nov-2020
Left Front Door Mid Rear (g)	Y	P58537	ENDEVCO	20-Nov-2020
Left Front Door Upper Centerline (g)	Y	P74456	ENDEVCO	20-Nov-2020
Left Rear Door Mid Rear (g)	Y	P90297	ENDEVCO	11-Feb-2021
Left Rear Door Upper Centerline (g)	Y	P88030	ENDEVCO	11-Feb-2021
Rear Deck (g)	X	P69075	ENDEVCO	19-Mar-2021
	Y	P88565	ENDEVCO	19-Mar-2021
	Z	P87077	ENDEVCO	19-Mar-2021
Rear Deck Angular Rate (deg/sec)	X	ARS12500	DTS	11-Sep-2020
	Y	ARS8813	DTS	11-Sep-2020
	Z	ARS12511	DTS	11-Sep-2020

TABLE 3 – POLE INSTRUMENTATION

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Pole Load Cell 1	DK7091S	Humanetics	12-Nov-2020
Pole Load Cell 2	DK7120S	Humanetics	12-Nov-2020
Pole Load Cell 3	DK7118S	Humanetics	12-Nov-2020
Pole Load Cell 4	DK7124S	Humanetics	12-Nov-2020
Pole Load Cell 5	DK7111S	Humanetics	12-Nov-2020
Pole Load Cell 6	DK7126S	Humanetics	12-Nov-2020
Pole Load Cell 7	DK7112S	Humanetics	12-Nov-2020
Pole Load Cell 8	DK7074S	Humanetics	12-Nov-2020

Sign Convention
SAE J211 MAR95

Accelerometers:
+X: Forward
+Y: Rightward
+Z: Downward

Potentiometers:
+Chest longitudinal deflection: Outward
+Chest lateral deflection: Rightward
+Seat belt displacement: Outward
+Seat belt extension: Elongation
+Knee slider displacement: Distance between femur and tibia increased (in relation to a seated dummy)

Rotation potentiometers:
+About the X-axis: Left foot-eversion
Right foot-inversion
+About the Y-axis: Left/right foot-dorsiflexion
+About the Z-axis: Left foot-internal
Right foot-external

Load cells:
+Femur force: Tension
+Seat belt force: Tension
+Barrier force: Tension

Neck load cells:
+X force: Head pushed rearward
+Y force: Head pushed leftward
+Z force: Head pulled upward (tension on neck)
+X moment: Left ear rotating toward left shoulder
+Y moment: Chin rotating toward chest
+Z moment: Chin rotating toward left shoulder

Tibia load cells:
+X force: Ankle forward, knee rearward
+Y force: Ankle rightward, knee leftward
+Z force: Tension
+X moment: Bottom of tibia moving leftward
+Y moment: Bottom of tibia moving rearward

Sign Convention (Continued)
SAE J211 MAR95

Lumbar load cells: +X force: Chest rearward, pelvis forward
+Y force: Chest leftward, pelvis rightward
+Z force: Chest upward, pelvis downward
+X moment: Left shoulder toward left hip
+Y moment: Sternum toward front of legs
+Z moment: Right shoulder forward, left shoulder rearward

Frequency Response Classes
SAE J211 MAR95

<u>Typical Test Measurements</u>	<u>Channel Class</u>
Vehicle Structural Accelerations for use in:	
Total vehicle comparison	60
Collision simulation input	60
Component analysis	600
Integration for velocity or displacement	180
Barrier Face Forces	60
Belt Restraint System Loads	60
Anthropomorphic Test Device	
Head accelerations (linear and angular)	1000
Neck	
Forces	1000
Moments	600
Thorax	
Spine accelerations	180
Rib accelerations	1000
Sternum accelerations	1000
Deflections	600
Lumbar	
Forces	1000
Moments	1000
Pelvis	
Accelerations	1000
Forces	1000
Moments	1000
Femur/Knee/Tibia/Ankle	
Forces	600
Moments	600
Displacements	180
Sled Accelerations	60
Steering Column Loads	600
Head Form Accelerations	1000

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
1	11HEADCG00WSACXP	Driver Head Acceleration (X)	1000	+	yes	2000
2	11HEADCG00WSACYP	Driver Head Acceleration (Y)	1000	+	yes	2000
3	11HEADCG00WSACZP	Driver Head Acceleration (Z)	1000	+	yes	2000
3A	11HEADCG00WSACRP	Driver Head Acceleration Resultant	1000			
4	11HEADCG00WSAVXP	Driver Head Angular Rate (X)	1000	+	yes	8000
5	11HEADCG00WSAVYP	Driver Head Angular Rate (Y)	1000	+	yes	8000
6	11HEADCG00WSAVZP	Driver Head Angular Rate (Z)	1000	+	yes	8000
7	11NECKUP00WSFOXP	Driver Upper Neck Force (X)	1000	+	yes	10000
8	11NECKUP00WSFOYP	Driver Upper Neck Force (Y)	1000	+	yes	10000
9	11NECKUP00WSFOZP	Driver Upper Neck Force (Z)	1000	+	yes	12000
10	11NECKUP00WSMOXP	Driver Upper Neck Moment (X)	600	+	yes	300
11	11NECKUP00WSMOYP	Driver Upper Neck Moment (Y)	600	+	yes	300
12	11NECKUP00WSMOZP	Driver Upper Neck Moment (Z)	600	+	yes	200
13	11NECKLO00WSFOXP	Driver Lower Neck Force (X)	1000	+	yes	10000
14	11NECKLO00WSFOYP	Driver Lower Neck Force (Y)	1000	+	yes	10000
15	11NECKLO00WSFOZP	Driver Lower Neck Force (Z)	1000	+	yes	12000
16	11NECKLO00WSMOXP	Driver Lower Neck Moment (X)	600	+	yes	300
17	11NECKLO00WSMOYP	Driver Lower Neck Moment (Y)	600	+	yes	300
18	11NECKLO00WSMOZP	Driver Lower Neck Moment (Z)	600	+	yes	200
19	11SHLDLE00WSFOXP	Driver Shoulder Force (X)	600	+	yes	5000
20	11SHLDLE00WSFOYP	Driver Shoulder Force (Y)	600	+	yes	10000
21	11SHLDLE00WSFOZP	Driver Shoulder Force (Z)	600	+	yes	5000
22	11SHRILEREWSDSX0	Driver Shoulder Rear Displacement (X)	0	+	no	60
23	11SHRILEREWSDSY0	Driver Shoulder Rear Displacement (Y)	0	+	no	60
24	11SHRILEREWSDSZ0	Driver Shoulder Rear Displacement (Z)	0	+	no	60
25	11SHRILEREWSDSL0	Driver Shoulder Rear Length Change	600	+	no	60
26	11SHRILEMIWSDSX0	Driver Shoulder Middle Displacement (X)	0	+	no	60
27	11SHRILEMIWSDSY0	Driver Shoulder Middle Displacement (Y)	0	+	no	60
28	11SHRILEMIWSDSZ0	Driver Shoulder Middle Displacement (Z)	0	+	no	60
29	11SHRILEMIWSDSL0	Driver Shoulder Middle Length Change	600	+	no	60
30	11SHRILEFRWSDSX0	Driver Shoulder Front Displacement (X)	0	+	no	60
31	11SHRILEFRWSDSY0	Driver Shoulder Front Displacement (Y)	0	+	no	60
32	11SHRILEFRWSDSZ0	Driver Shoulder Front Displacement (Z)	0	+	no	60
33	11SHRILEFRWSDSL0	Driver Shoulder Front Length Change	600	+	no	60

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
34	11TRRILUREWSDSX0	Driver Thorax Rib 1 Rear Displacement (X)	0	+	no	60
35	11TRRILUREWSDSY0	Driver Thorax Rib 1 Rear Displacement (Y)	0	+	no	60
36	11TRRILUREWSDSZ0	Driver Thorax Rib 1 Rear Displacement (Z)	0	+	no	60
37	11TRRILUREWSDSLB	Driver Thorax Rib 1 Rear Length Change	600	+	no	60
38	11TRRILUMIWSDSX0	Driver Thorax Rib 1 Middle Displacement (X)	0	+	no	60
39	11TRRILUMIWSDSY0	Driver Thorax Rib 1 Middle Displacement (Y)	0	+	no	60
40	11TRRILUMIWSDSZ0	Driver Thorax Rib 1 Middle Displacement (Z)	0	+	no	60
41	11TRRILUMIWSDSLB	Driver Thorax Rib 1 Middle Length Change	600	+	no	60
42	11TRRILUFRWSDSX0	Driver Thorax Rib 1 Front Displacement (X)	0	+	no	60
43	11TRRILUFRWSDSY0	Driver Thorax Rib 1 Front Displacement (Y)	0	+	no	60
44	11TRRILUFRWSDSZ0	Driver Thorax Rib 1 Front Displacement (Z)	0	+	no	60
45	11TRRILUFRWSDSLB	Driver Thorax Rib 1 Front Length Change	600	+	no	60
46	11TRRILMREWSDSX0	Driver Thorax Rib 2 Rear Displacement (X)	0	+	no	60
47	11TRRILMREWSDSY0	Driver Thorax Rib 2 Rear Displacement (Y)	0	+	no	60
48	11TRRILMREWSDSZ0	Driver Thorax Rib 2 Rear Displacement (Z)	0	+	no	60
49	11TRRILMREWSDSLB	Driver Thorax Rib 2 Rear Length Change	600	+	no	60
50	11TRRILMMIWSDSX0	Driver Thorax Rib 2 Middle Displacement (X)	0	+	no	60
51	11TRRILMMIWSDSY0	Driver Thorax Rib 2 Middle Displacement (Y)	0	+	no	60
52	11TRRILMMIWSDSZ0	Driver Thorax Rib 2 Middle Displacement (Z)	0	+	no	60
53	11TRRILMMIWSDSLB	Driver Thorax Rib 2 Middle Length Change	600	+	no	60
54	11TRRILMFRWSDSX0	Driver Thorax Rib 2 Front Displacement (X)	0	+	no	60
55	11TRRILMFRWSDSY0	Driver Thorax Rib 2 Front Displacement (Y)	0	+	no	60
56	11TRRILMFRWSDSZ0	Driver Thorax Rib 2 Front Displacement (Z)	0	+	no	60
57	11TRRILMFRWSDSLB	Driver Thorax Rib 2 Front Length Change	600	+	no	60

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
58	11TRRILLREWSDSX0	Driver Thorax Rib 3 Rear Displacement (X)	0	+	no	60
59	11TRRILLREWSDSY0	Driver Thorax Rib 3 Rear Displacement (Y)	0	+	no	60
60	11TRRILLREWSDSZ0	Driver Thorax Rib 3 Rear Displacement (Z)	0	+	no	60
61	11TRRILLREWSDSLB	Driver Thorax Rib 3 Rear Length Change	600	+	no	60
62	11TRRILLMIWSDSX0	Driver Thorax Rib 3 Middle Displacement (X)	0	+	no	60
63	11TRRILLMIWSDSY0	Driver Thorax Rib 3 Middle Displacement (Y)	0	+	no	60
64	11TRRILLMIWSDSZ0	Driver Thorax Rib 3 Middle Displacement (Z)	0	+	no	60
65	11TRRILLMIWSDSLB	Driver Thorax Rib 3 Middle Length Change	600	+	no	60
66	11TRRILLFRWSDSX0	Driver Thorax Rib 3 Front Displacement (X)	0	+	no	60
67	11TRRILLFRWSDSY0	Driver Thorax Rib 3 Front Displacement (Y)	0	+	no	60
68	11TRRILLFRWSDSZ0	Driver Thorax Rib 3 Front Displacement (Z)	0	+	no	60
69	11TRRILLFRWSDSLB	Driver Thorax Rib 3 Front Length Change	600	+	no	60
70	11ABRILUREWSDSX0	Driver Abdomen Rib 1 Rear Displacement (X)	0	+	no	60
71	11ABRILUREWSDSY0	Driver Abdomen Rib 1 Rear Displacement (Y)	0	+	no	60
72	11ABRILUREWSDSZ0	Driver Abdomen Rib 1 Rear Displacement (Z)	0	+	no	60
73	11ABRILUREWSDSLB	Driver Abdomen Rib 1 Rear Length Change	600	+	no	60
74	11ABRILUMIWSDSX0	Driver Abdomen Rib 1 Middle Displacement (X)	0	+	no	60
75	11ABRILUMIWSDSY0	Driver Abdomen Rib 1 Middle Displacement (Y)	0	+	no	60
76	11ABRILUMIWSDSZ0	Driver Abdomen Rib 1 Middle Displacement (Z)	0	+	no	60
77	11ABRILUMIWSDSLB	Driver Abdomen Rib 1 Middle Length Change	600	+	no	60
78	11ABRILUFRWSDSX0	Driver Abdomen Rib 1 Front Displacement (X)	0	+	no	60
79	11ABRILUFRWSDSY0	Driver Abdomen Rib 1 Front Displacement (Y)	0	+	no	60
80	11ABRILUFRWSDSZ0	Driver Abdomen Rib 1 Front Displacement (Z)	0	+	no	60
81	11ABRILUFRWSDSLB	Driver Abdomen Rib 1 Front Length Change	600	+	no	60

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
82	11ABRILLREWSDSX0	Driver Abdomen Rib 2 Rear Displacement (X)	0	+	no	60
83	11ABRILLREWSDSY0	Driver Abdomen Rib 2 Rear Displacement (Y)	0	+	no	60
84	11ABRILLREWSDSZ0	Driver Abdomen Rib 2 Rear Displacement (Z)	0	+	no	60
85	11ABRILLREWSDSLB	Driver Abdomen Rib 2 Rear Length Change	600	+	no	60
86	11ABRILLMIWSDSX0	Driver Abdomen Rib 2 Middle Displacement (X)	0	+	no	60
87	11ABRILLMIWSDSY0	Driver Abdomen Rib 2 Middle Displacement (Y)	0	+	no	60
88	11ABRILLMIWSDSZ0	Driver Abdomen Rib 2 Middle Displacement (Z)	0	+	no	60
89	11ABRILLMIWSDSLB	Driver Abdomen Rib 2 Middle Length Change	600	+	no	60
90	11ABRILLFRWSDSX0	Driver Abdomen Rib 2 Front Displacement (X)	0	+	no	60
91	11ABRILLFRWSDSY0	Driver Abdomen Rib 2 Front Displacement (Y)	0	+	no	60
92	11ABRILLFRWSDSZ0	Driver Abdomen Rib 2 Front Displacement (Z)	0	+	no	60
93	11ABRILLFRWSDSLB	Driver Abdomen Rib 2 Front Length Change	600	+	no	60
94	11THSP0100WSACXP	Driver Spine T1 Acceleration (X)	180	+	yes	2000
95	11THSP0100WSACYP	Driver Spine T1 Acceleration (Y)	180	+	yes	2000
96	11THSP0100WSACZP	Driver Spine T1 Acceleration (Z)	180	+	yes	2000
96A	11THSP0100WSACRP	Driver Spine T1 Acceleration Resultant	180			
97	11THSP0400WSACXP	Driver Spine T4 Acceleration (X)	180	+	yes	2000
98	11THSP0400WSACYP	Driver Spine T4 Acceleration (Y)	180	+	yes	2000
99	11THSP0400WSACZP	Driver Spine T4 Acceleration (Z)	180	+	yes	2000
99A	11THSP0400WSACRP	Driver Spine T4 Acceleration Resultant	180			
100	11THSP1200WSACXP	Driver Spine T12 Acceleration (X)	180	+	yes	2000
101	11THSP1200WSACYP	Driver Spine T12 Acceleration (Y)	180	+	yes	2000
102	11THSP1200WSACZP	Driver Spine T12 Acceleration (Z)	180	+	yes	2000
102A	11THSP1200WSACRP	Driver Spine T12 Acceleration Resultant	180			
103	11PUBC0000WSFOYP	Driver Pubic Symphysis Force (Y)	600	+	yes	12000
104	11SACRLE00WSFOXP	Driver Sacro-iliac Left Force (X)	600	+	yes	6000
105	11SACRLE00WSFOYP	Driver Sacro-iliac Left Force (Y)	600	+	yes	12000
106	11SACRLE00WSFOZP	Driver Sacro-iliac Left Force (Z)	600	+	yes	6000
107	11SACRLE00WSMOXP	Driver Sacro-iliac Left Moment (X)	600	+	yes	800
108	11SACRLE00WSMOYP	Driver Sacro-iliac Left Moment (Y)	600	+	yes	400
109	11SACRLE00WSMOZP	Driver Sacro-iliac Left Moment (Z)	600	+	yes	400

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
110	11SACRRI00WSFOXP	Driver Sacro-iliac Right Force (X)	600	+	yes	6000
111	11SACRRI00WSFOYP	Driver Sacro-iliac Right Force (Y)	600	+	yes	12000
112	11SACRRI00WSFOZP	Driver Sacro-iliac Right Force (Z)	600	+	yes	6000
113	11SACRRI00WSMOXP	Driver Sacro-iliac Right Moment (X)	600	+	yes	800
114	11SACRRI00WSMOYP	Driver Sacro-iliac Right Moment (Y)	600	+	yes	400
115	11SACRRI00WSMOZP	Driver Sacro-iliac Right Moment (Z)	600	+	yes	400
116	11LUSP0000WSFOXP	Driver Lumbar Force (X)	600	+	yes	10000
117	11LUSP0000WSFOYP	Driver Lumbar Force (Y)	600	+	yes	10000
118	11LUSP0000WSFOZP	Driver Lumbar Force (Z)	600	+	yes	12000
119	11LUSP0000WSMOXP	Driver Lumbar Moment (X)	600	+	yes	300
120	11LUSP0000WSMOYP	Driver Lumbar Moment (Y)	600	+	yes	300
121	11LUSP0000WSMOZP	Driver Lumbar Moment (Z)	600	+	yes	200
122	11PELV0000WSACXP	Driver Pelvic Acceleration (X)	1000	+	yes	2000
123	11PELV0000WSACYP	Driver Pelvic Acceleration (Y)	1000	+	yes	2000
124	11PELV0000WSACZP	Driver Pelvic Acceleration (Z)	1000	+	yes	2000
124A	11PELV0000WSACRP	Driver Pelvic Acceleration Resultant	1000			
125	11FEMRLE00WSFOXP	Driver Left Femur Force (X)	600	+	yes	15000
126	11FEMRLE00WSFOYP	Driver Left Femur Force (Y)	600	+	yes	15000
127	11FEMRLE00WSFOZP	Driver Left Femur Force (Z)	600	+	yes	15000
128	11FEMRLE00WSMOXP	Driver Left Femur Moment (X)	600	+	yes	350
129	11FEMRLE00WSMOYP	Driver Left Femur Moment (Y)	600	+	yes	350
130	11FEMRLE00WSMOZP	Driver Left Femur Moment (Z)	600	+	yes	300
131	11FEACLE00WSFOXP	Driver Femoral Neck Force (X)	600	+	yes	10000
132	11FEACLE00WSFOYP	Driver Femoral Neck Force (Y)	600	+	yes	25000
133	11FEACLE00WSFOZP	Driver Femoral Neck Force (Z)	600	+	yes	10000
134	11KNEELEOUWSFOYP	Driver Left Outer Knee Force (Y)	600	+	yes	20000
135	11KNEELEINWSFOYP	Driver Left Inner Knee Force (Y)	600	+	yes	20000
136	11VEHCCG0000ACXA	Vehicle Center of Gravity Acceleration (X)	60	+	yes	2000
137	11VEHCCG0000ACYA	Vehicle Center of Gravity Acceleration (Y)	60	+	yes	2000
138	11VEHCCG0000ACZA	Vehicle Center of Gravity Acceleration (Z)	60	+	yes	2000
138A	11VEHCCG0000ACRA	Vehicle Center of Gravity Acceleration Resultant	60			
139	11VEHCCG0000AVXA	Vehicle Center of Gravity Angular Rate (X)	60	+	yes	8000
140	11VEHCCG0000AVYA	Vehicle Center of Gravity Angular Rate (Y)	60	+	yes	1500
141	11VEHCCG0000AVZA	Vehicle Center of Gravity Angular Rate (Z)	60	+	yes	8000
142	11VEHC00LO00ACYA	Left Floor Sill Acceleration (Y)	60	+	yes	2000
143	11APIL000000ACYA	Left A-Pillar Sill Acceleration (Y)	60	+	yes	2000
144	11APILLO0000ACYA	Left Lower A-Pillar Acceleration (Y)	60	+	yes	2000
145	11APILMI0000ACYA	Left Mid A-Pillar Acceleration (Y)	60	+	yes	2000

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
146	11BPIL000000ACYA	Left B-Pillar Sill Acceleration (Y)	60	+	yes	2000
147	11BPILLO0000ACYA	Left Lower B-Pillar Acceleration (Y)	60	+	yes	2000
148	11BPILMI0000ACYA	Left Mid B-Pillar Acceleration (Y)	60	+	yes	2000
149	11SETR000000ACYA	Driver Seat Track at Dummy H-Point Acceleration (Y)	60	+	yes	2000
150	11ENGNTTP0000ACXA	Engine Top Acceleration (X)	60	+	yes	2000
151	11ENGNTTP0000ACYA	Engine Top Acceleration (Y)	60	+	yes	2000
152	12FIRCX000000ACYA	Firewall Center Acceleration (Y)	60	+	yes	2000
153	13ROFR000000ACYA	Right Roof at Vertical Impact Reference Line Acceleration (Y)	60	+	yes	2000
154	13SILB000000ACXA	Right Sill at Vertical Impact Reference Line Acceleration (X)	60	+	yes	2000
155	13SILB000000ACYA	Right Sill at Vertical Impact Reference Line Acceleration (Y)	60	+	yes	2000
156	13SILB000000ACZA	Right Sill at Vertical Impact Reference Line Acceleration (Z)	60	+	yes	2000
156A	13SILB000000ACRA	Right Sill at Vertical Impact Reference Line Acceleration Resultant	60			
157	16SILB000000ACXA	Right Sill at Rear Seat Acceleration (X)	60	+	yes	2000
158	16SILB000000ACYA	Right Sill at Rear Seat Acceleration (Y)	60	+	yes	2000
159	16SILB000000ACZA	Right Sill at Rear Seat Acceleration (Z)	60	+	yes	2000
159A	16SILB000000ACRA	Right Sill at Rear Seat Acceleration Resultant	60			
160	11FORA000000ACXA	Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)	60	+	yes	2000
161	11FORA000000ACYA	Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)	60	+	yes	2000
162	11DOORMIMI71ACYA	Left Front Door Mid Centerline Acceleration (Y)	60	+	yes	2000
163	11DOORMIRE71ACYA	Left Front Door Mid Rear Acceleration (Y)	60	+	yes	2000
164	11DOORMIUP71ACYA	Left Front Door Upper Centerline Acceleration (Y)	60	+	yes	2000
165	14DOORMIRE71ACYA	Left Rear Door Mid Rear Acceleration (Y)	60	+	yes	2000
166	14DOORMIUP71ACYA	Left Rear Door Upper Centerline Acceleration (Y)	60	+	yes	2000
167	10FORARD0000ACXA	Rear Deck Acceleration (X)	60	+	yes	2000
168	10FORARD0000ACYA	Rear Deck Acceleration (Y)	60	+	yes	2000
169	10FORARD0000ACZA	Rear Deck Acceleration (Z)	60	+	yes	2000
169A	10FORARD0000ACRA	Rear Deck Acceleration Resultant	60			
170	10FORARD0000AVXA	Rear Deck Angular Rate (X)	60	+	yes	8000
171	10FORARD0000AVYA	Rear Deck Angular Rate (Y)	60	+	yes	8000
172	10FORARD0000AVZA	Rear Deck Angular Rate (Z)	60	+	yes	8000

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
173	11HEADCONT00VO00	Driver Head Contact	0	+	no	1
174	11SHOUCONT00VO00	Driver Shoulder Contact	0	+	no	1
175	11THORCONT00VO00	Driver Thorax Contact	0	+	no	1
176	11PELVCONT00VO00	Driver Pelvis Contact	0	+	no	1
177	K0FBAR010000FOXA	POLE LOAD CELL 1	60	+	yes	400000
178	K0FBAR020000FOXA	POLE LOAD CELL 2	60	+	yes	400000
179	K0FBAR030000FOXA	POLE LOAD CELL 3	60	+	yes	400000
180	K0FBAR040000FOXA	POLE LOAD CELL 4	60	+	yes	400000
181	K0FBAR050000FOXA	POLE LOAD CELL 5	60	+	yes	400000
182	K0FBAR060000FOXA	POLE LOAD CELL 6	60	+	yes	400000
183	K0FBAR070000FOXA	POLE LOAD CELL 7	60	+	yes	400000
184	K0FBAR080000FOXA	POLE LOAD CELL 8	60	+	yes	400000

APPENDIX E
SEATING PROCEDURE WORKSHEETS AND PLOTS

Driver WSID 50th Seating Worksheet

Vehicle	2020 GMC Terrain	Technician	K. Brown
VIN #	3GKALMEV2LL331942	Position	Driver
ATD	EB8888	Date	4/1/2021
Test #	210401		

SCRL Angle	Max	19.5	WSID 50th Tilt Sensors	X	Y		
	Min -	15.1		Head	0°±2	1.0	-1.4
	Difference	4.4		T6	0°±2	0.9	-0.5
	/2	2.2		Pelvis	0°±2	-0.6	-0.1
	Min +	2.2					
Mid Angle	17.3						

Seat Back Angle	W/Level °	26.4	HEAD REST POST ANGLE	10.2	FINAL HEAD REST POST ANGLE
Seat Pan Angle	W/Level °	14.5			

Pelvis Angle	WSID 50th 0° +/-2.5°	Manual Inclinometer	41.0	Tilt Sensor	-0.1
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Collected Points			
Name	Meas X	Meas Y	Meas Z
SBU -	-32.883	2.145	-13.065
SBL -	-28.796	-0.164	22.668
STRIKER -	0.000	0.000	0.000
FOSB -	399.461	197.091	333.412
FISB -	398.729	642.661	331.448
ROSB -	3.679	194.384	335.905
RISB -	-18.533	640.037	334.530
PCP - (Pedal Center Point)	1009.636	603.172	299.145
RHP - (Right Heel Point)	872.015	603.988	440.744
LHP - (Left Heel Point)	872.229	226.019	427.921
S0 -	499.503	416.898	-248.124
TS -	569.274	414.667	-409.106
BS -	428.960	416.228	-85.786
SC1 -	632.031	334.493	-143.232
OSCAR H-POINT -	143.600	220.347	109.806
DR PROJECTED WSID H-POINT AT MID-POSITION -	164.000		90.000
DRIVER STP 15.27 MID-POSITION -	166.000		159.000
DRIVER STP STEP 18.6 TRIAL 1 -	163.035	184.383	159.963
DR PROJECTED WSID H-POINT STEP 18.6.2 TRIAL 1 -	161.000		90.000
DRIVER STP STEP 18.6 TRIAL 2 -			
DR PROJECTED WSID H-POINT STEP 18.6.2 TRIAL 2 -			
DRIVER STP STEP 18.6 TRIAL 3 -			
DR PROJECTED WSID H-POINT STEP 18.6.2 TRIAL 3 -			
RHDCG -	-8.512	502.125	-566.593
3DLHCG -	16.779	345.249	-572.557
LHDCG -	-7.802	342.984	-572.230
BON -	88.937	421.161	-568.997
TN -	84.180	418.669	-513.219
TC -	69.733	420.790	-445.482
SHLD R1 -	39.425	420.767	-344.266
THX R1 -	76.270	420.423	-268.262
THX R2 -	111.940	417.992	-202.256
THX R3 -	127.588	418.082	-155.425
ABD R1 -	143.450	422.673	-101.096
ABD R2 -	165.733	416.877	-49.284
TPS -	200.760	420.533	-24.943
C1 -	60.112	420.868	-319.745
C2 -	86.424	417.376	-248.953
C3 -	148.955	419.514	-86.470
SHT -	-36.990	202.444	-306.833
E1 -	161.394	179.564	-168.702
P1 -	101.765	194.784	47.613
H-POINT -	155.157	194.167	95.830
H-POINT 2 -	156.113	202.144	95.516

OK -	555.404	204.236	5.693
IK -	556.625	644.561	23.501
OA -	807.657	261.729	338.674
IA -	811.788	555.106	330.725
OH -	825.839	238.281	456.263
IH -	843.874	597.992	452.339
OP -	-237.737	339.251	-417.244
R -	87.755	420.155	-787.226
H -	529.079	421.117	-709.446
W1 -	799.810	420.234	-569.800
W1 - Outside	818.234	421.314	-568.649
W2 - Outside	1111.661	421.797	-391.721
D1 -	696.647	421.081	-379.380
D2 -	667.513	181.374	-79.303
D3 -	622.298	579.648	-109.269
HRP -	88.900	277.662	-716.790
HSP -	88.643	93.276	-568.869
ADP -	162.205	41.932	-167.777
HDP -	155.795	89.788	96.166

Calculated Measurements					
Name	Cal X	Cal Y	Cal Z	Cal 3D Distance	Deg
HZ -			218		
HH -				462	
HW -	711				
NR -				496	
CD -				639	
CS -	413				
CBS -	280				
IKD -				162	
OKD -				143	
HR -				206	
HS -		328			
AD -		138			
HD -		104			
HLHL -				360	
KK -				441	
SH -				266	
HRA -					10.2
H-POINT TOOL ANGLE -					42.1
TORSO ANGLE -					13.7
WINDSHIELD ANGLE -					58.9