

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

**GENERAL MOTORS LLC
2019 Chevrolet Malibu 4-DR Sedan**

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Report Date: May 26, 2021

FINAL REPORT

**PREPARED FOR:
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Project Manager, John Shultz

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16. Abstract A 32.20 km/h, 75° Oblique Rigid Pole Research Side Impact Test was conducted on the subject 2019 Chevrolet Malibu 4-DR Sedan 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 September 25, 2020. The impact velocity was 32.81 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 22.0°C. The test vehicle post-test maximum crush was 304 mm at level 3. 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>547</td> </tr> <tr> <td>Brain Injury Criterion (BrIC)</td> <td>N/A</td> <td>0.92</td> </tr> <tr> <td>Peak Shoulder Force</td> <td>N</td> <td>-2549.7</td> </tr> <tr> <td>Peak Thoracic Rib Deflection</td> <td>mm</td> <td>51.0</td> </tr> <tr> <td>Peak Abdominal Rib Deflection</td> <td>mm</td> <td>30.6</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>7690</td> </tr> <tr> <td>Peak Resultant Sacro-Iliac Force</td> <td>N</td> <td>2684.6</td> </tr> </tbody> </table>				Measurement Description	Driver ATD (WorldSID-50M)		Units	Result	Head Injury Criterion (HIC15)	N/A	547	Brain Injury Criterion (BrIC)	N/A	0.92	Peak Shoulder Force	N	-2549.7	Peak Thoracic Rib Deflection	mm	51.0	Peak Abdominal Rib Deflection	mm	30.6	Pubic Symphysis Force	N	7690	Peak Resultant Sacro-Iliac Force	N	2684.6
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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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TABLE OF CONTENTS

<u>Section</u>	<u>Description</u>	<u>Page</u>
1	Test Purpose and Procedure	1-1
2	Summary of Test Results	2-1
3	Occupant and Vehicle Information	3-1
Appendix A	Photographs	A-1
Appendix B	Vehicle and Dummy Response Data Plots	B-1
Appendix C	Dummy Performance Qualification Test Data	C-1
Appendix D	Test Equipment and Instrumentation Calibration Data	D-1
Appendix E	Seating Procedure Worksheets and Plots	E-1
<u>Data Sheet No</u>	<u>Description</u>	<u>Page</u>
1	General Test and Vehicle Parameter Data	3-2
2	Seat, Seat Belt, Steering Wheel Adjustment And Fuel Systems Data	3-6
3	Dummy Longitudinal Clearance Dimensions	3-15
4	Dummy Lateral Clearance Dimensions	3-16
5	Camera and Instrumentation Data	3-17
6	Vehicle Accelerometer Data	3-18
7	Rigid Pole Load Cell Data	3-21
8	Post Test Observations	3-22
9	Vehicle Profile Measurements	3-24
10	Vehicle Exterior Crush Measurements	3-25
11	Vehicle Damage Profile Distances	3-28
12	Dummy/Vehicle Temperature and Humidity Stabilization Data	3-29
<u>List of Tables</u>		
<u>Number</u>	<u>Description</u>	<u>Page</u>
1	WorldSID-50M Instrumentation Data	3-10

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 2019 Chevrolet Malibu 4-DR Sedan. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.81 km/h. The test was conducted by the Transportation Research Center Inc. in East Liberty, Ohio, on September 25, 2020. 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	547
Brain Injury Criterion (BrIC)	N/A	0.92
Peak Shoulder Force	N	-2549.7
Peak Thoracic Rib Deflection	mm	51.0
Peak Abdominal Rib Deflection	mm	30.6
Pubic Symphysis Force	N	-769.0
Peak Resultant Sacro-Iliac Force	N	2684.6

Supplemental restraint information is given below:

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

Driver Lower Neck Force Y; CF 42.0-59.0 ms

Driver Shoulder Force Z; CF 42.0-59.0 ms

Driver Left Sacro-Iliac Force X; CF 37.0-63.0 ms

Driver Left Sacro-Iliac Force Z; CF 27.0-33.0 ms

Driver Lumbar Force Y; CF 37.0-56.0 ms

Driver Lumbar Force Z; CF 53.0-67.0 ms

Left B-Pillar Sill Acceleration (Y); Open after 20.0 ms

Driver Seat Track at Dummy H-Point Acceleration Y; QD, looks to have fallen off or been hit around 45.0 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 Shoulder Rib Rear Led Position; Error Code 9 at 44.6-51.8 ms and Error Code 4 at 56.0-60.0 ms

Driver Shoulder Rib Front Led Position; Error Code 9 at 48.8-57.9 ms

Driver Thorax Rib 2 Middle Led Position; Error Code 1 at 45.8-66.7 ms

Driver Thorax Rib 2 Front Led Position; Error Code 4 at 38.3-67.5 ms, Error Code 7 at 81.1-113 ms, Error Code 7 at 120.1-125.2 ms, and Error Code 7 at 146.7-160.1 ms

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

TEST VEHICLE INFORMATION AND OPTIONS

Model Year	2019
Make	Chevrolet
Model	Malibu
Body Style	4-Dr Sedan
VIN	1G1ZC5ST0KF216863
Body Color	Mosaic Black Metallic
Odometer Reading (km/mi)	103.0 mi
Engine Displacement (L)	1.5
Type/No. Cylinders	Straight/4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	CVT
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	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	Yes
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	No

Does owner's manual provide instructions to turn off automatic door locks?

No

DATA FROM CERTIFICATION LABEL

Manufactured By	GENERAL MOTORS LLC.
Date of Manufacturer	05/19
Vehicle Type	PASS CAR

GVWR (kg)	1838
GAWR Front (kg)	946
GAWR Rear (kg)	892

VEHICLE SEATING AND WEIGHT CAPACITY DATA

	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	N/A	5
Vehicle Capacity Weight (VCW) (kg)				408.0
DSC X 68.04 kg				340.2
Rated Cargo and Luggage Weight (RCLW) (kg)				67.8

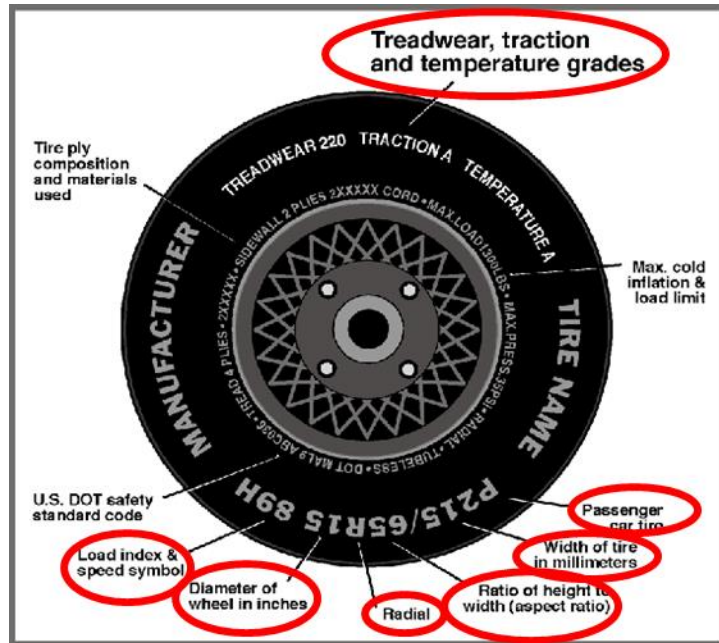
VEHICLE SEAT TYPE

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

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan
 Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	P205/65R16 H	P205/65R16
Tire Size on Vehicle	P205/65R16 H	P205/65R16
Tire Manufacturer	Firestone	Firestone
Tire Model	FT140	FT140
Treadwear	560	560
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1	1
Tire Plies Body	4	4
Load Index/Speed Symbol	94H	94H
Tire Material	Polyester/Steel/Nylon	Polyester/Steel/Nylon
DOT Safety Code Left	8X84 FTO 1319	8X84 FTO 1319
DOT Safety Code Right	8X84 FTO 1319	8X84 FTO 1319

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	165	193	193	193
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	437.4	291.2		458.2	352.0		459.0	433.2	
Right	kg	422.0	264.2		427.6	314.4		351.8	314.2	
Ratio	%	60.7	39.3		57.1	42.9		52.0	48.0	
Totals	kg	859.4	555.4	1414.8	885.8	666.4	1552.2	810.8	747.4	1558.2

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1414.8	(A)
Actual Weight of 1 WorldSID-50M with RibEye Dummy Used	kg	75.0	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	67.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1557.6	(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.	-0.1	0.2	0.3	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg.	0.1	0.1	0.2	Yes
Front Bumper-Line Angle (left-to-right)**	Deg.	0.5	-0.4	-0.7	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg.	0.2	0.2	-0.3	Yes
Vehicle CG (Aft of Front Axle)	mm	1111	1215	1357	
Vehicle CG (Left (+) / Right (-) from longitudinal Centerline)	mm	+24	+35	+116	

*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: 2019 Chevrolet Malibu 4-DR Sedan
Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Ballast: None	0.0
Components removed: None	0.0

DATA SHEET NO. 2

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

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	17.4	13.0	15.2
Front Passenger Seat	17.0	12.6	14.8
Front Center Seat*	N/A	N/A	N/A
Struck Side Rear Seat	N/A	N/A	15.0
Non-Struck Side Rear Seat	N/A	N/A	14.7
Rear Center Seat*	N/A	N/A	12.0

* If applicable.

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid Fore/Aft	Forward-Most
Driver Seat	15.2	137	Max	115	124	130
			Mid	128	137	143
			Min	169	179	188
Front Passenger Seat	14.8	135	Max	166	174	184
			Mid	126	135	142
			Min	114	123	130
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	15.0	140	Max	N/A	N/A	N/A
			Mid	N/A	140	N/A
			Min	N/A	N/A	N/A
Non-Struck Side Rear Seat	14.7	139	Max	N/A	N/A	N/A
			Mid	N/A	139	N/A
			Min	N/A	N/A	N/A
Rear Center Seat*	12.0	232	Max	N/A	N/A	N/A
			Mid	N/A	232	N/A
			Min	N/A	N/A	N/A

* If applicable.

DATA SHEET NO. 2 (CONTINUED)

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

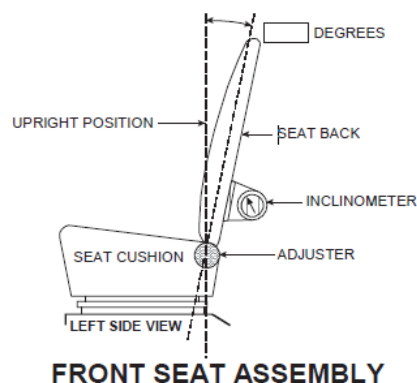
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	260	27	130	13
Front Passenger Seat	240	25	120	12
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed	Fixed

* If applicable.

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned such that the dummy's head is level. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck-side rear passenger seat back is positioned in accordance with the information provided by the manufacturer on Form No. 1 for the 50th percentile male dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back is set to match the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detent*
Driver Seat w/ Seated Dummy	66.5	33	13.3	9
Front Passenger Seat	66.0	33	12.8	9
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	19.9	Fixed	N/A	N/A
Non-Struck Side Rear Seat	19.8	N/A	N/A	N/A
Rear Center Seat*	20.2	N/A	N/A	N/A

* If applicable.

DATA SHEET NO. 2 (CONTINUED)

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

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	8	8, Uppermost

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

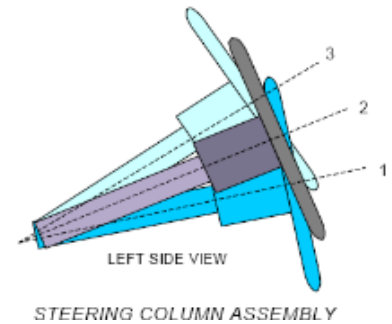
Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan
 Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

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.

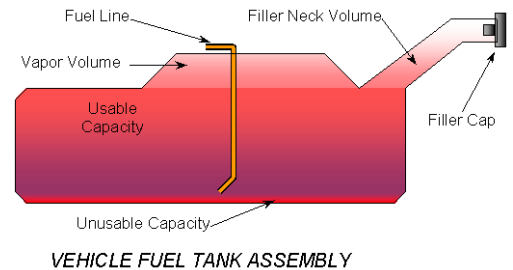
	Degrees	Fore/Aft Position, mm
Lowermost, Position No. 1	20.3	0
Geometric Center, Position No. 2	22.3	31
Uppermost, Position No. 3	24.4	62
Telescoping Steering Wheel Travel		62
Test Position	22.3	31



FUEL PUMP

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

Pump will run for about 3 seconds when the key is turned on and then will not run unless the engine is cranking or running



FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	59.8
Usable Capacity of "Optional" Tank (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner's Manual)	59.8
Usable Capacity of Optional Tank (see Owner's Manual)	N/A
93% of Usable Capacity	55.6
Actual Amount of Solvent Used in Test	55.6
1/3 of Usable Capacity	19.9

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: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

Driver Dummy Serial Number: EB8888

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Head Acceleration (g)	X	5.49	136.35	-13.52	56.05
	Y	75.14	51.65	-12.68	149.50
	Z	7.27	54.45	-11.96	130.90
	R	75.99	51.70		
Head Angular Rate (deg/sec)	X	1710.12	129.15	-1271.61	199.90
	Y	802.92	109.50	-805.16	241.25
	Z	1275.41	267.95	-1859.10	225.95
Upper Neck Force (N)	X	171.09	140.25	-209.21	47.00
	Y	306.77	49.25	-495.24	150.75
	Z	777.74	46.15	-111.66	280.90
Upper Neck Moment (Nm)	X	9.97	293.25	-60.98	50.70
	Y	13.50	90.25	-28.83	46.45
	Z	30.98	243.95	-13.63	176.40
Lower Neck Force (N)	X	276.96	135.95	-391.62	47.60
	Y	--- ¹	--- ¹	--- ¹	--- ¹
	Z	962.96	46.10	-382.45	163.45
Lower Neck Moment (Nm)	X	61.51	51.50	-118.34	148.70
	Y	34.62	265.30	-50.24	138.65
	Z	33.55	243.85	-23.84	178.90
Driver Shoulder Force (N)	X	137.52	278.70	-1346.92	50.90
	Y	59.64	18.60	-2549.73	48.85
	Z	--- ¹	--- ¹	--- ¹	--- ¹
Shoulder Rear Ribeye Position (mm) ¹	X	18.67	49.45	-100.15	49.15
	Y	16.04	49.45	-87.11	22.50
	Z	16.45	44.65	-73.38	60.15
Length of Change (mm) ¹		22.11	55.85	-4.89	282.55
Shoulder Middle Ribeye Position (mm)	X	0.83	90.30	-42.62	51.95
	Y	-41.94	50.70	-99.29	23.40
	Z	-49.06	118.65	-70.12	75.90
Length of Change (mm) ¹		47.73	49.05	-3.81	23.40
Shoulder Front Ribeye Position (mm) ¹	X	37.61	88.80	3.89	281.40
	Y	12.12	48.85	-85.82	23.40
	Z	16.65	48.85	-74.77	48.65
Length of Change (mm) ¹		57.44	58.05	-2.64	23.35

¹See data acquisition explanation

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA (CONTINUED)

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

Driver Dummy Serial Number: EB8888

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Thorax Rib 1 Rear Ribeye Position (mm)	X	-23.52	32.00	-48.71	117.60
	Y	-66.88	50.20	-99.64	175.35
	Z	8.36	119.20	-5.16	36.70
Length of Change (mm)		30.70	50.40	-4.30	277.75
Thorax Rib 1 Middle Ribeye Position (mm)	X	16.62	32.95	-12.57	116.85
	Y	-55.76	50.45	-108.44	17.70
	Z	10.50	118.75	-5.46	36.90
Length of Change (mm)		51.03	50.40	-0.96	17.80
Thorax Rib 1 Front Ribeye Position (mm)	X	55.94	36.85	27.10	117.35
	Y	-37.67	51.00	-99.45	18.70
	Z	8.41	119.40	-7.45	36.35
Length of Change (mm)		41.44	50.30	-3.29	29.25
Thorax Rib 2 Rear Ribeye Position (mm)	X	-13.31	33.75	-36.02	118.50
	Y	-78.50	48.45	-99.45	284.80
	Z	48.26	113.60	37.67	64.85
Length of Change (mm)		20.61	51.25	-1.85	290.55
Thorax Rib 2 Middle Ribeye Position (mm) ¹	X	26.25	33.80	-3.03	117.20
	Y	12.82	66.25	-123.02	66.55
	Z	50.65	114.90	-2.94	45.85
Length of Change (mm) ¹		23.53	44.50	-1.72	287.25
Thorax Rib 2 Front Ribeye Position (mm) ¹	X	66.08	38.15	-3.04	67.45
	Y	17.74	84.15	-110.61	83.95
	Z	59.49	113.15	-3.67	112.95
Length of Change (mm) ¹		10.10	67.65	-2.17	262.90
Thorax Rib 3 Rear Ribeye Position (mm)	X	-36.35	34.40	-54.17	76.90
	Y	-78.16	48.05	-94.52	113.25
	Z	-31.58	119.00	-46.03	57.55
Length of Change (mm)		16.00	47.90	-1.81	113.10
Thorax Rib 3 Middle Ribeye Position (mm)	X	-0.33	36.30	-24.55	77.65
	Y	-79.34	48.60	-102.82	112.70
	Z	-28.97	119.70	-46.20	56.45
Length of Change (mm)		19.52	48.60	-1.77	133.45

¹See data acquisition explanation

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA (CONTINUED)

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

Driver Dummy Serial Number: EB8888

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Thorax Rib 3 Front Ribeye Position (mm)	X	33.81	47.90	8.34	76.80
	Y	-68.29	50.10	-94.29	132.40
	Z	-30.99	117.75	-47.19	57.30
Length of Change (mm)		10.87	50.05	-1.89	22.00
Abdomen Rib 1 Rear Ribeye Position (mm)	X	-22.61	22.40	-38.28	76.10
	Y	-74.47	44.55	-96.28	300.00
	Z	1.87	126.00	-11.18	57.25
Length of Change (mm)		20.00	44.55	-1.70	78.20
Abdomen Rib 1 Middle Ribeye Position (mm)	X	14.96	24.20	-5.19	76.80
	Y	-74.56	46.20	-107.56	147.85
	Z	2.88	102.60	-12.33	57.35
Length of Change (mm)		28.48	45.95	-3.39	147.90
Abdomen Rib 1 Front Ribeye Position (mm)	X	50.84	44.70	28.35	77.10
	Y	-64.31	48.40	-96.51	78.00
	Z	1.09	123.40	-13.88	57.60
Length of Change (mm)		20.07	48.50	-0.68	14.15
Abdomen Rib 2 Rear Ribeye Position (mm)	X	-8.00	207.80	-23.73	96.95
	Y	-67.56	46.20	-94.18	113.70
	Z	44.79	152.25	24.72	59.50
Length of Change (mm)		19.54	46.25	-4.03	97.10
Abdomen Rib 2 Middle Ribeye Position (mm)	X	24.68	206.20	5.62	96.20
	Y	-72.12	47.20	-104.42	171.50
	Z	45.81	152.50	21.28	59.80
Length of Change (mm)		30.55	46.80	-1.70	99.35
Abdomen Rib 2 Front Ribeye Position (mm)	X	61.40	46.60	37.91	98.80
	Y	-65.06	47.20	-99.01	277.35
	Z	48.03	149.40	23.42	58.80
Length of Change (mm)		22.73	47.05	-4.68	277.35
T1 Acceleration (g)	X	8.25	53.85	-6.62	102.10
	Y	46.78	42.95	-14.65	107.40
	Z	13.36	42.85	-7.23	91.95
	R	48.90	42.90		

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA (CONTINUED)

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

Driver Dummy Serial Number: EB8888

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
T4 Acceleration (g)	X	7.84	99.35	-9.55	55.85
	Y	12.29	107.65	-39.40	47.40
	Z	10.16	38.05	-4.91	88.85
	R	40.65	47.45		
T12 Acceleration (g)	X	6.98	55.25	-7.64	101.65
	Y	41.05	42.35	-13.83	87.40
	Z	9.37	42.05	-9.84	62.10
	R	42.17	42.30		
Pubic Symphysis (N)	Y	49.57	270.20	-768.95	45.85
Left Sacro-Iliac Force (N)	X	--- ¹	--- ¹	--- ¹	--- ¹
	Y	44.94	278.55	-2662.21	44.15
	Z	--- ¹	--- ¹	--- ¹	--- ¹
Left Sacro-Iliac Moment (Nm)	X	27.35	68.50	-46.40	41.40
	Y	26.35	49.50	-11.02	105.75
	Z	41.03	30.85	-28.58	64.55
Right Sacro-Iliac Force (N)	X	283.32	65.35	-336.44	31.35
	Y	115.11	156.75	-1318.86	43.15
	Z	603.25	52.00	-46.71	101.55
Right Sacro-Iliac Moment (Nm)	X	47.73	63.75	-15.67	101.45
	Y	18.60	47.30	-13.18	71.30
	Z	29.50	30.45	-27.64	63.30
Lumbar Force (N)	X	572.14	63.30	-225.36	16.35
	Y	--- ¹	--- ¹	--- ¹	--- ¹
	Z	--- ¹	--- ¹	--- ¹	--- ¹
Lumbar Moment (Nm)	X	44.56	49.55	-0.79	-33.40
	Y	11.03	103.15	-25.36	65.70
	Z	12.40	45.10	-12.90	113.45
Pelvis Acceleration (g)	X	14.95	16.20	-21.33	56.80
	Y	43.53	40.65	-15.07	79.50
	Z	12.09	15.05	-9.84	51.65
	R	47.22	42.70		

¹See data acquisition explanation

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA (CONTINUED)

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

Driver Dummy Serial Number: EB8888

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Left Femur Force (N)	X	67.53	75.25	-347.06	44.40
	Y	4.21	9.25	-276.13	48.35
	Z	599.69	68.05	-155.56	0.20
Left Femur Moment (Nm)	X	119.97	50.75	-20.42	107.15
	Y	49.54	49.05	-18.09	110.35
	Z	12.40	139.90	-12.02	39.90
Left Femoral Neck Force (N)	X	243.77	49.05	-151.90	27.05
	Y	194.81	86.75	-1036.18	47.05
	Z	24.96	300.00	-1098.11	44.05
Left Outer Knee Force (N)	Y	404.12	68.15	-73.76	34.10
Left Inner Knee Force (N)	Y	2086.66	67.95	-45.02	20.70

¹See data acquisition explanation

Positive Direction

Longitudinal Forward
 Lateral Rightward
 Vertical Downward

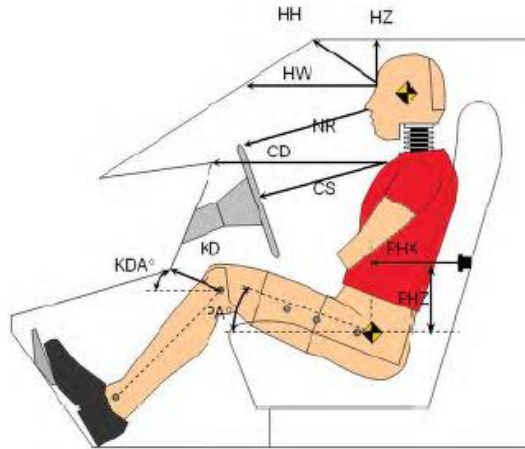
Negative Direction

Longitudinal Rearward
 Lateral Leftward
 Vertical Upward

**DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan
 Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020



Code	Measurement Description	Driver WorldSID-50M SN # EB8888	
		Length (mm)	Angle
HH	Header to Header	432	
HW	Header to Windshield	742	
HZ	Head to Roof Liner	208	
NR	Nose to Rim/Seat Back	518	
CD	Chest to Dash/Seat Back	654	
CS	Chest to Steering Wheel	443	
KD(L)/KDA(L)°	Left Knee to Dash/Seat Back	199	26.7
KD(R)/KDA(R)°	Right Knee to Dash/Seat Back	170	43.6
PAX°	Pelvic Tilt Angle X		1.2
PAY°	Pelvic Tilt Angle Y		-0.9
PHX	Hip Point to Striker (X-Axis)	176	
PHZ	Hip Point to Striker (Z-Axis)	152	
HAX°	Head Tilt Angle X		-0.4
HAY ¹ °	Head Tilt Angle Y		-1.0
TAX°	Thorax Tilt Angle X		1.8
TAY°	Thorax Tilt Angle Y		0.5
	Head Rest Angle		12.9
	H-Point Tool Angle		43.6
	Torso Angle		15.6
	Windshield Angle		62.5

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

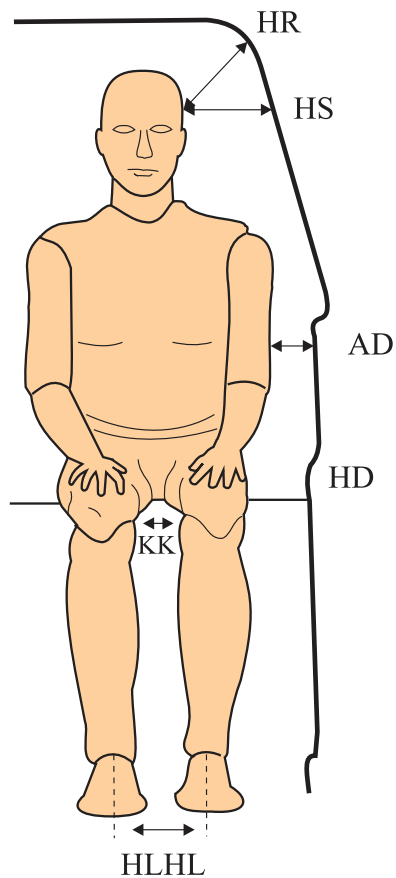
WorldSID-50M neck was adjusted 0 notches

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020



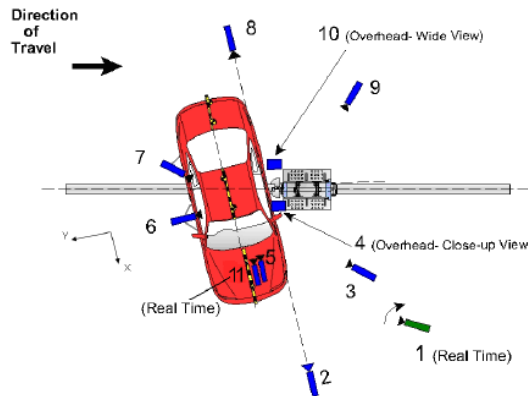
Code	Measurement Description	Driver WorldSID-50M SN # EB8888
HR	Head to Side Header	225
HS	Head to Side Window	365
AD	Arm to Door	153
HD	Hip Point to Door	96
KK	Knee to Knee	430
HLHL	Heel to Heel	355

Note: All measurements are in millimeters.

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan
 Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020



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	4589	0	-1663	20	1000
3	Impact side 45° – forward pole view	2989	-1655	-1517	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	-5978	0	-1608	20	1000
9	Impact side 45° – rearward pole view	-3383	-2252	-1963	20	1000
10	Overhead wide – view of impact	383	252	-5261	18.5	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

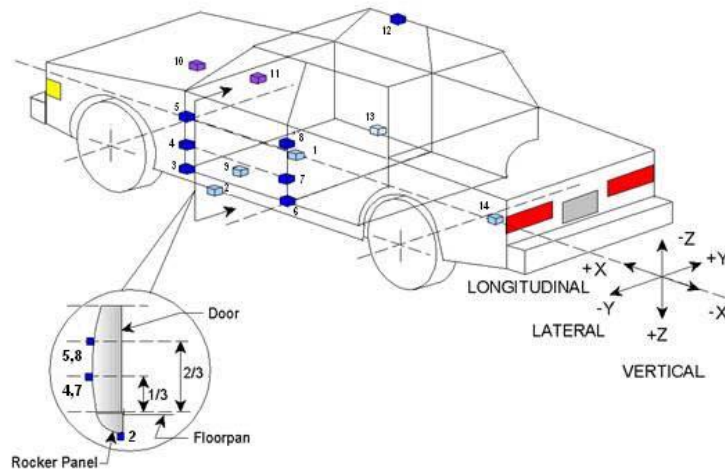
INSTRUMENTATION

Driver Dummy	135
Vehicle Structure	32
Pole Load Cells	8
Contact Channels	4
TOTAL	179

DATA SHEET NO. 6
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan
Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020



Location		Coordinates (mm)			Positive Direction		Negative Direction	
		X	Y	Z	Max	Time (ms)	Max	Time (ms)
1	Vehicle CG	2638	3	-77				
	Longitudinal (g)				3.84	14.55	-8.58	53.90
	Lateral (g)				26.75	53.90	-2.08	67.15
	Vertical (g)				19.20	48.90	-8.83	56.90
	Resultant (g)				30.62	53.80		
2	Vehicle CG ARS	2610	7	-74				
	Longitudinal (deg/s)				232.96	154.35	-1777.39	52.25
	Lateral (deg/s)				224.79	44.35	-294.89	55.45
	Vertical (deg/s)				71.34	48.45	-126.21	9.85
3	Left Floor Sill Acceleration	3004	-747	-116				
	Lateral (g)				39.47	13.20	-96.90	31.15
4	Left A-Pillar Sill Acceleration	3383	-708	-70				
	Lateral (g)				21.56	28.00	-7.82	33.15
5	Left Lower A-Pillar Acceleration	3453	-843	-6				
	Lateral (g)				20.41	17.45	-1.12	2.65
6	Left Mid A-Pillar Acceleration	3464	-828	-383				
	Lateral (g)				15.36	43.65	-37.00	28.80
7	Left B-Pillar Sill Acceleration	2259	-745	-53				
	Lateral (g)				---	---	---	---
8	Left Lower B-Pillar Acceleration	2308	-836	-103				
	Lateral (g)				83.31	14.25	-3.39	63.70
9	Left Mid B-Pillar Acceleration	2281	-819	-454				
	Lateral (g)				78.09	16.80	-23.86	11.35

¹See data acquisition explanation

DATA SHEET NO. 6 (CONTINUED)
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan
 Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

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	2654	-566	-150				
	Lateral (g)				---	---	---	---
11	Engine Top Acceleration	4120	65	-349				
	Longitudinal (g)				3.46	151.10	-11.60	29.00
	Lateral (g)				18.45	43.95	-1.38	276.10
12	Firewall Center Acceleration	3808	2	-374				
	Lateral (g)				13.05	42.55	-1.34	4.45
13	Right Roof at Vertical Impact Reference Line Acceleration	2408	615	-975				
	Lateral (g)				27.84	38.05	-6.91	54.45
14	Right Sill at Vertical Impact Reference Line Acceleration	2986	733	-112				
	Lateral (g)				20.69	16.50	-1.39	176.65
15	Rear Floorpan Behind Rear Axle at Centerline Acceleration	774	-1	-111				
	Longitudinal (g)				5.51	20.50	-8.05	61.65
	Lateral (g)				18.89	30.55	-1.49	212.45
16	Left Front Door Mid Centerline Acceleration	2866	-773	-197				
	Lateral (g)				132.13	9.60	-40.09	16.35
17	Left Front Door Mid Rear Acceleration	2479	-757	-195				
	Lateral (g)				139.62	15.25	-78.50	9.60
18	Left Front Door Upper Centerline Acceleration	2869	-786	-427				
	Lateral (g)				86.84	6.00	-60.93	18.00
19	Left Rear Door Mid Rear Acceleration	1568	-768	-235				
	Lateral (g)				80.44	19.15	-21.61	25.70
20	Left Rear Door Upper Centerline Acceleration	1809	-749	-508				
	Lateral (g)				49.50	26.60	-21.96	36.65
21	Rear Deck Acceleration	360	492	-109				
	Longitudinal (g)				3.24	127.70	-5.46	61.85
	Lateral (g)				18.37	47.00	-1.70	181.35
	Vertical (g)				4.11	104.35	-4.62	56.90
	Resultant (g)				18.40	46.80		

¹See data acquisition explanation

DATA SHEET NO. 6 (CONTINUED)
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

Location		Coordinates (mm)			Positive Direction		Negative Direction	
		X	Y	Z	Max	Time (ms)	Max	Time (ms)
22	Rear Deck ARS	332	490	-111				
	Longitudinal (deg/s)				56.52	300.00	-86.61	45.35
	Lateral (deg/s)				30.92	45.85	-28.26	18.45
	Vertical (deg/s)				22.76	29.80	-119.15	129.90

*0,0,0 located at rear bumper

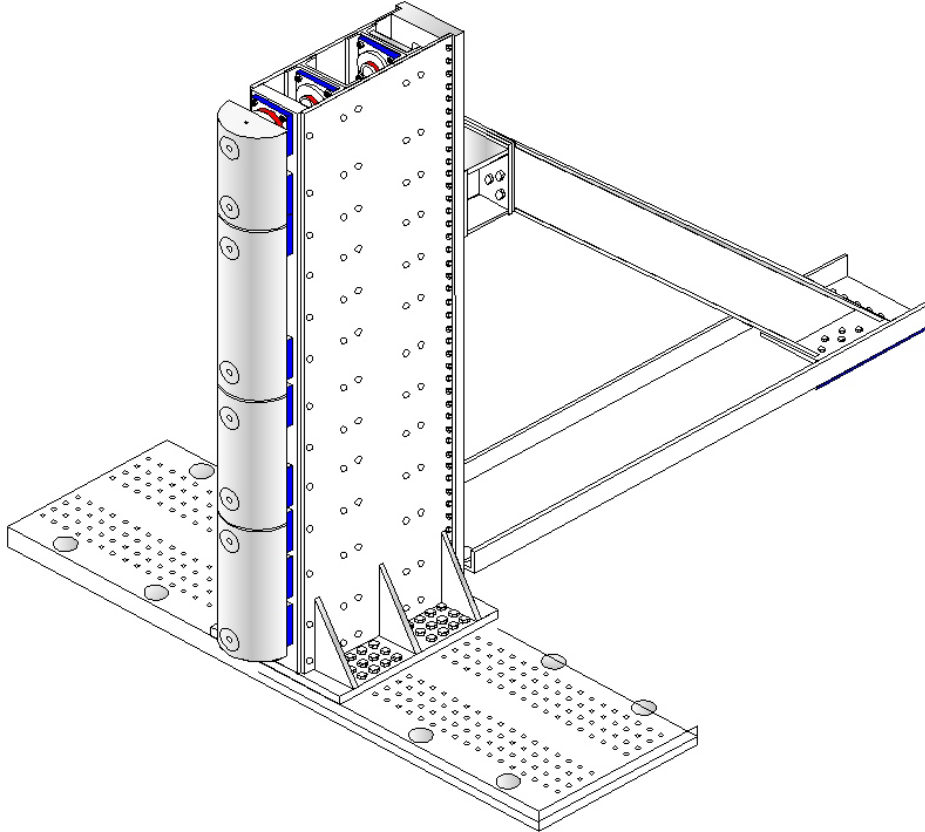
DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

FOIL 300K RIGID POLE



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

**DATA SHEET NO. 8
POST TEST OBSERVATIONS**

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver WorldSID-50M Dummy
Face	SCAB
Top of Head	Headliner, SCAB
Left Side of Head	Headliner, SCAB, Headrest
Back of head	SCAB, Headrest
Left Shoulder	SAB, B pillar
Upper Torso	Seatback bolster, SAB
Lower Torso	Seatback bolster, SAB
Left Hip	Seatback bolster, SAB, Door panel
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	N/A	No	N/A
Seat Disengagement from Floor pan	No	N/A	No	N/A
Seat Back Movement from Initial Position	No	No	No	No
Seat Back Collapse	No	No	No	No

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Good
Sill Separation	None
Windshield Damage	Along A pillar and across top
Side Window Damage	Driver window broken out
Other Notable Effects	None

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side (Driver)		Struck Side (Rear Passenger)	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	Yes		
Knee Airbag	Yes	Yes		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	Yes	Yes
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

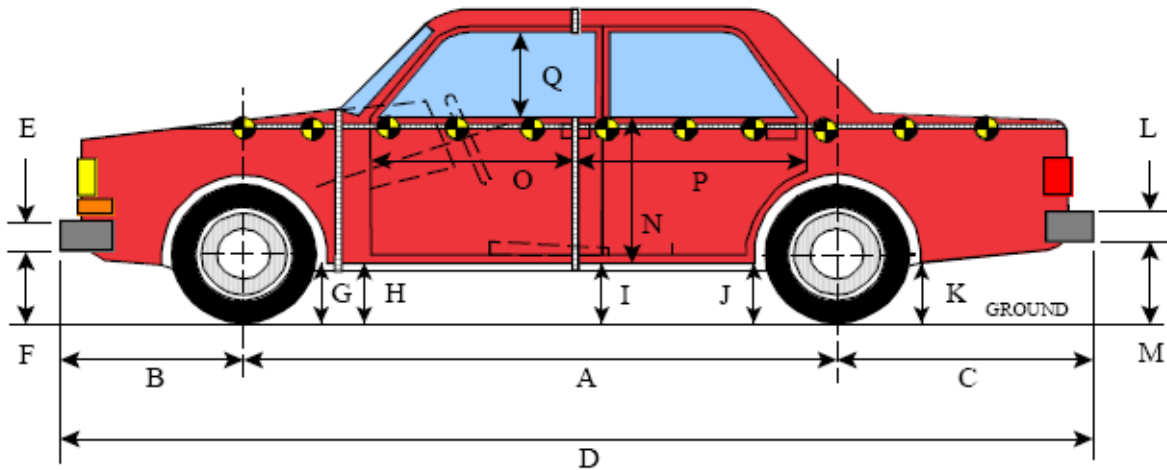
Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1429
Actual Impact Point (Aft of Front Axle)	mm		1429
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 of Intended Impact Point	0
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	Degrees	75 +/- 3	75
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.81
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.80

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020



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	2830	2778	52
B	Front Axle to FSOV	940	940	0
C	Rear Axle to RSOV	1130	1130	0
D	Total Length at Centerline	4900	4905	-5
E	Front Bumper Thickness	110	110	0
F	Front Bumper Bottom to Ground	415	473	-58
G	Sill Height at Front Wheel Well	250	271	-21
H	Sill Height at Front Door Leading Edge	260	278	-18
I	Sill Height at B Pillar	290	328	-38
J1	Sill Height at Rear Wheel Well	280	330	-50
J2	Pinch Weld Height at Rear Wheel Well	150	200	-50
K	Sill Height Aft of Rear Wheel Well	328	360	-32
L	Rear Bumper Thickness	172	172	0
M	Rear Bumper Bottom to Ground	450	463	-13
N	Sill Height to Bottom of Front Window Sill	758	750	8
O	Front Door Leading Edge to Impact CL	948	878	70
P	Rear Door Trailing Edge to Impact CL	1309	1265	44
Q	Front Window Opening	388	362	26
R	Right Side Length	4600	4610	-10
S	Left Side Length	4600	4555	45
T	Maximum Vehicle Width at B-Pillars	1835	1631	204
U	Maximum Vehicle Width	1860	1858	2

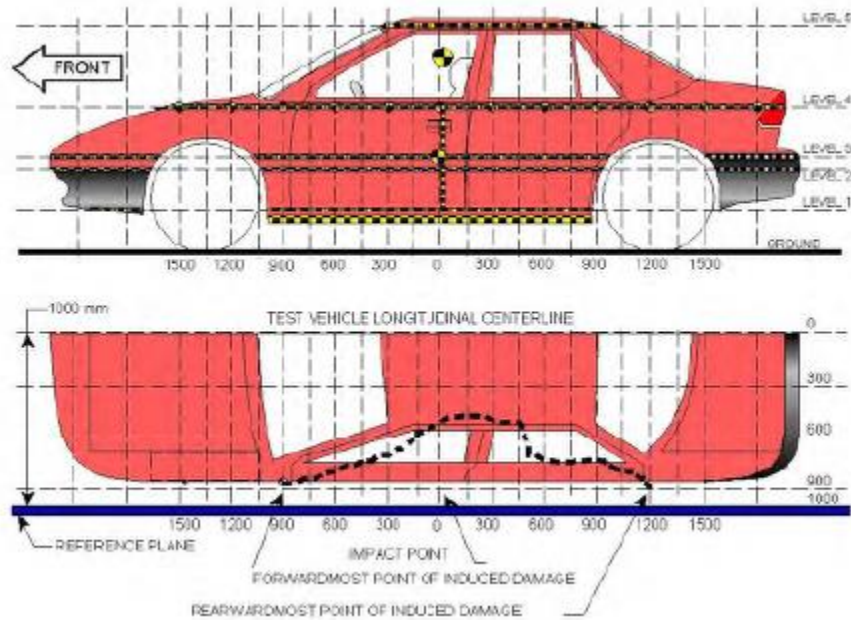
**All Dimensions in mm

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	340	269	0
2	Occupant H-Point	502	285	0
3	Mid-Door	631	304	0
4	Window Sill	908	283	0
5	Window Top	1381	109	150

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

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500				725					775					-50	
-1350				763					808					-45	
-1200				791					831					-40	
-1050			925	813				940	839				-15	-26	
-900	905	916	920	829		918	939	942	847		-13	-23	-22	-18	
-750	895	910	918	838		880	896	884	850		15	14	34	-12	
-600	894	908	916	849		851	846	826	840		43	62	90	9	
-450	896	908	915	859		813	794	770	789		83	114	145	70	
-300	898	907	915	868		769	743	714	729		129	164	201	139	
-150	901	907	914	872		713	693	663	664		188	214	251	208	
0	903	907	914	874	628	634	622	610	591	535	269	285	304	283	93
150	906	907	915	874	641	654	649	646	617	532	252	258	269	257	109
300	908	905	913	871	641	790	786	794	744	553	118	119	119	127	88
450	907	905	913	869	640	817	810	815	770	573	90	95	98	99	67
600	902	906	912	867	638	839	839	842	795	589	63	67	70	72	49
750	898	908	913	865	632	862	868	870	821	599	36	40	43	44	33
900	896	910	915	865	619	888	897	899	848	602	8	13	16	17	17
1050	902	913	919	893		902	914	927	902			-1	-8	-9	
1200				883					918					-35	
1350				866					861					5	

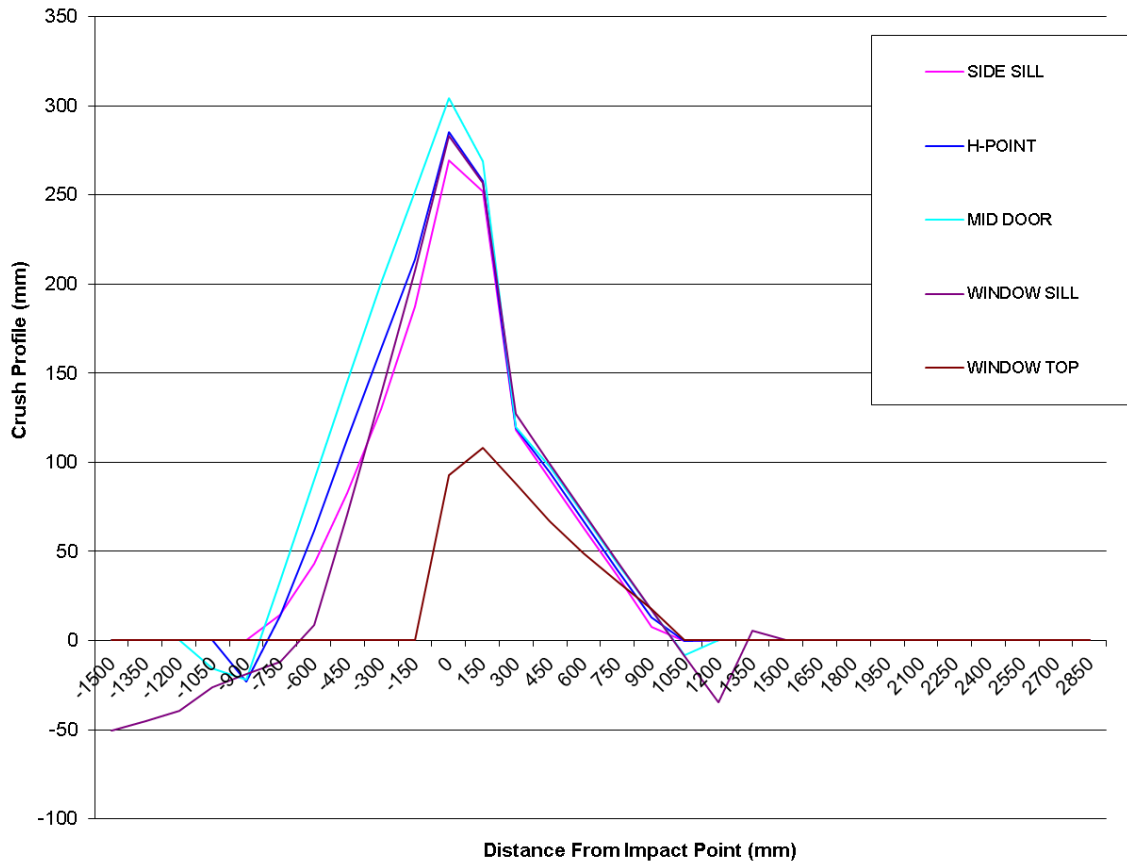
NOTE: Pre-test measurements are taken when the vehicle is in the “As Tested” weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point. The vertical impact reference line was set at (0, 0, 0).

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020

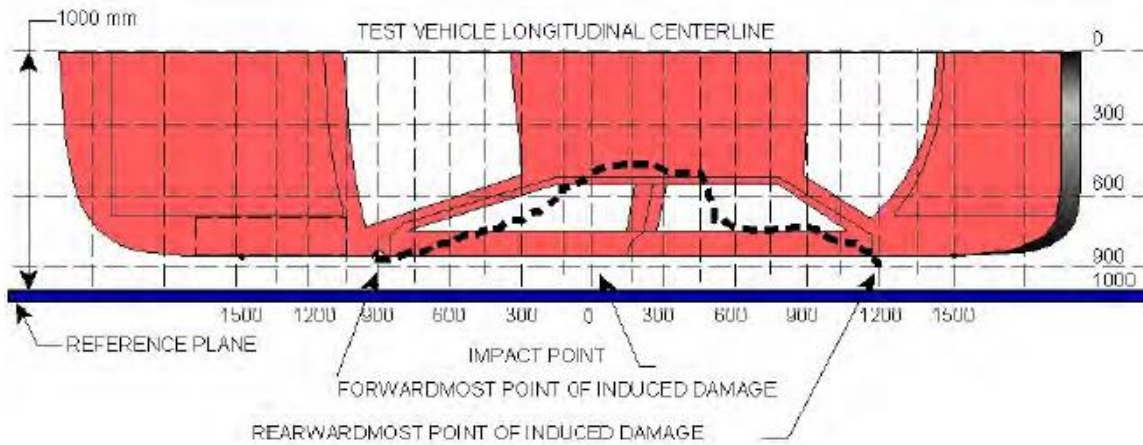


DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020



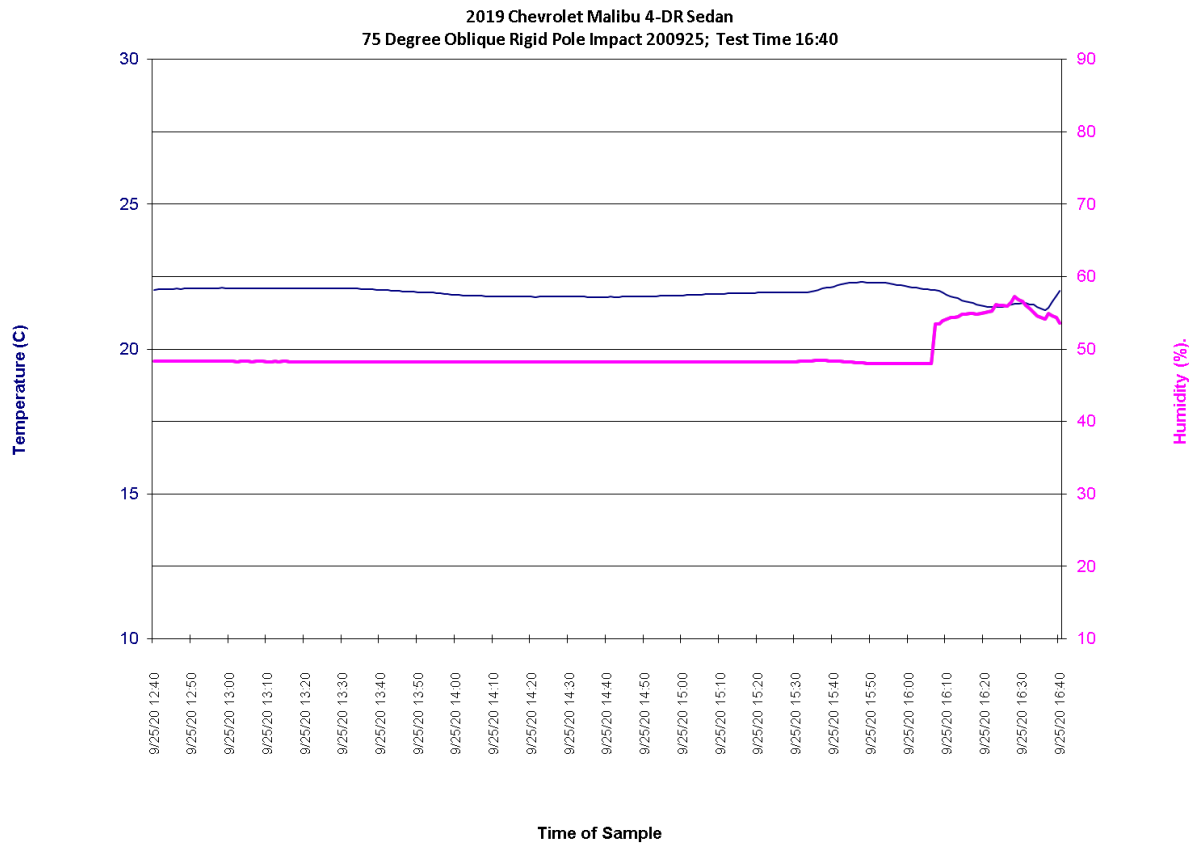
VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	1350	4	861	866	5
2	900	4	848	865	17
		5	602	619	17
3	450	4	770	869	99
4	0	3	610	914	304
5	-300	3	714	915	201
6 ¹	-750	3	884	918	0

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

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

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan
 Test Program: Rigid Pole Side Impact Test Date: 9/25/2020

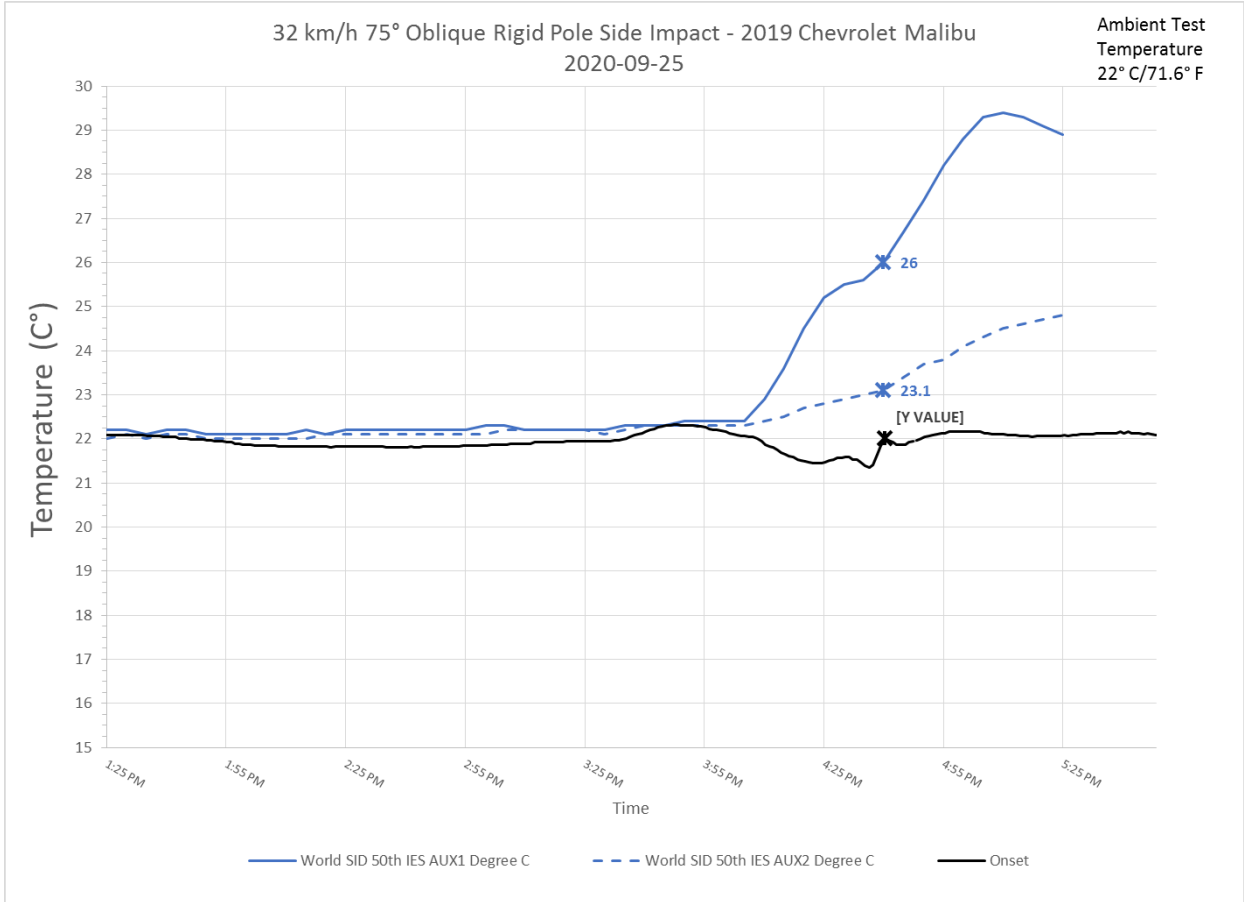


DATA SHEET NO. 12, CONTINUED
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2019 Chevrolet Malibu 4-DR Sedan

Test Program: Rigid Pole Side Impact

Test Date: 9/25/2020



**APPENDIX A
PHOTOGRAPHS**

TABLE OF PHOTOGRAPHS

No.	Description	Page
1	As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle	A-4
2	As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle	A-4
3	Pre-Test Frontal View of Test Vehicle	A-5
4	Post-Test Frontal View of Test Vehicle	A-5
5	Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-6
6	Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-6
7	Pre-Test Left Side View of Test Vehicle	A-7
8	Post-Test Left Side View of Test Vehicle	A-7
9	Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-8
10	Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-8
11	Pre-Test Rear View of Test Vehicle	A-9
12	Post-Test Rear View of Test Vehicle	A-9
13	Pre-Test Right Side View of Test Vehicle	A-10
14	Post-Test Right Side View of Test Vehicle	A-10
15	Pre-Test Overhead View of Test Area	A-11
16	Post-Test Overhead View of Test Area	A-11
17	Pre-Test Left Side View of Pole Positioned Against Side of Vehicle	A-12
18	Pre-Test Right Side View of Pole Positioned Against Side of Vehicle	A-12
19	Pre-Test Close-Up View of Impact Point Target	A-13
20	Post-Test Close-Up View of Impact Point Target Showing Impact Location	A-13
21	Pre-Test Front Close-Up View of Dummy Head and Chest	A-14
22	Post-Test Front Close-Up View of Dummy	A-14
23	Pre-Test Left Side View of Dummy Showing Belt and Chalking	A-15
24	Pre-Test Left Side View of Dummy Shoulder and Door Top View	A-16
25	Post-Test Left Side View of Dummy Shoulder and Door Top View	A-16
26	Pre-Test Front View of Seat Back Prior to Dummy Positioning	A-17
27	Pre-Test Front View of Dummy Head and Shoulders in Relation to Head Restraint	A-17
28	Pre-Test Front View of Seat Pan Prior to Dummy Positioning	A-18
29	Pre-Test Overhead View of Dummy Thighs on Seat Pan	A-18
30	Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket	A-19
31	Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level	A-19
32	Pre-Test Placement of Dummy's Feet	A-20
33	Pre-Test View of Belt Anchorage for Dummy	A-20
34	Pre-Test Left Side View of Steering Wheel	A-21
35	Pre-Test View of Disengaged Parking Brake	A-21

TABLE OF PHOTOGRAPHS (CONTINUED)

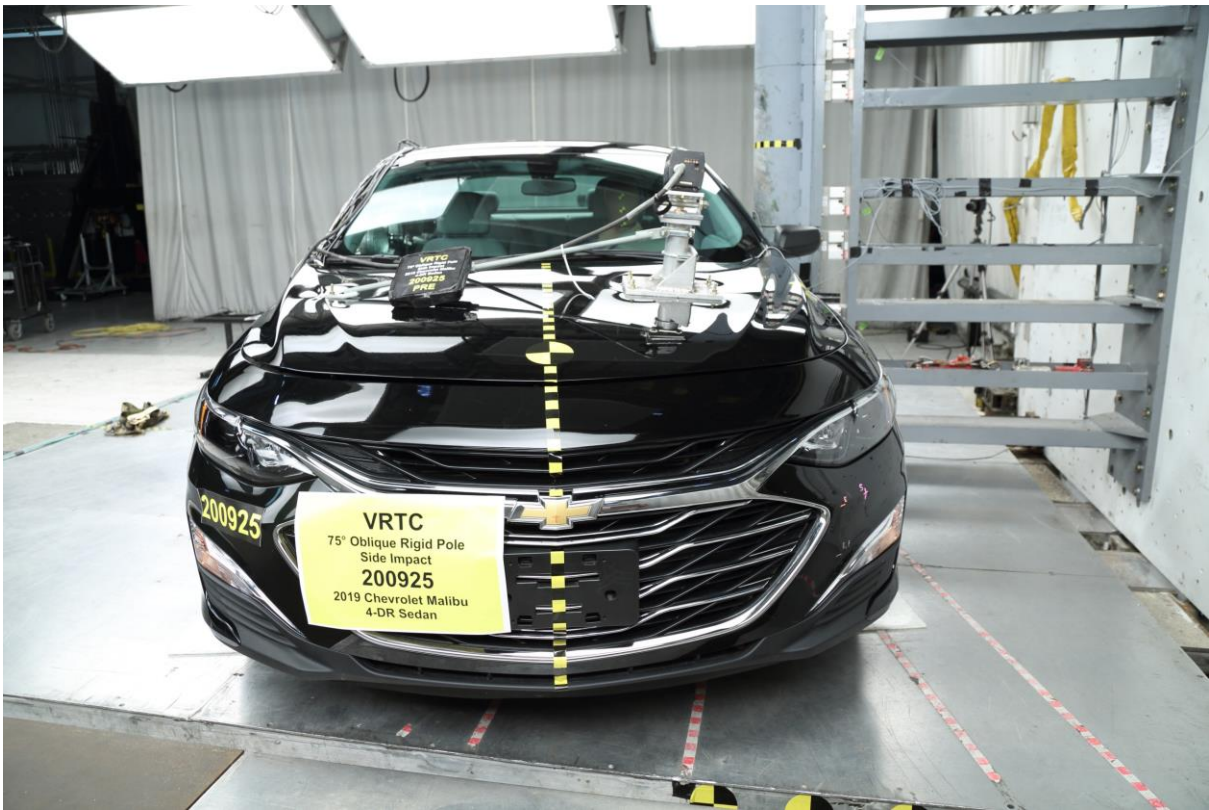
No.	Description	Page
36	Pre-Test View of Parking Brake	A-22
37	Pre-Test Close-Up Left Side View of Driver Seat Track	A-22
38	Pre-Test Close-Up Left Side View of Driver Seat Back	A-23
39	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-23
40	Pre-Test Dummy and Door Clearance View	A-24
41	Post-Test Dummy and Door Clearance View	A-24
42	Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-25
43	Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-25
44	Pre-Test Inner Driver Door Panel View	A-26
45	Post-Test Inner Driver Door Panel View Showing Dummy Contact Location	A-26
46	Post-Test Dummy Close-Up Head Contact with Vehicle Interior View	A-27
47	Post-Test Dummy Close-Up Head Contact with Side Airbag View	A-27
48	Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View	A-28
49	Post-Test Dummy Close-Up Torso Contact with Side Airbag View	A-28
50	Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View	A-29
51	Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View	A-29
52	Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View	A-30
53	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-31
54	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-31
55	Close-Up View of Vehicle's Certification Label	A-32
56	Close-Up View of Vehicle's Tire Information Placard or Label	A-32
57	Pre-Test Pole Barrier Front View	A-33
58	Post-Test Pole Barrier Front View	A-33
59	Pre-Test Pole Barrier Side View	A-34
60	Post-Test Pole Barrier Side View	A-34
61	Pre-Test Ballast View	A-35
62	Post-Test Primary and Redundant Speed Trap Read-Out	A-35
63	FMVSS No. 301 Static Rollover 0 Degrees	A-36
64	FMVSS No. 301 Static Rollover 90 Degrees	A-36
65	FMVSS No. 301 Static Rollover 180 Degrees	A-37
66	FMVSS No. 301 Static Rollover 270 Degrees	A-37
67	FMVSS No. 301 Static Rollover 360 Degrees	A-38
68	Impact Event	A-38
69	Monroney Label	A-39
70	Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-39
71	Post-Test View of Shattered Vehicle Inner Door Panel	A-40
72	Pre-Test Tilt Sensor View for WorldSID-50M	A-41



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



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



No. 003 Pre-Test Frontal View of Test Vehicle



No. 004 Post-Test Frontal View of Test Vehicle



No. 005 Pre-Test Left Front 3/4 View of Test Vehicle



No. 006 Post-Test Left Front 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



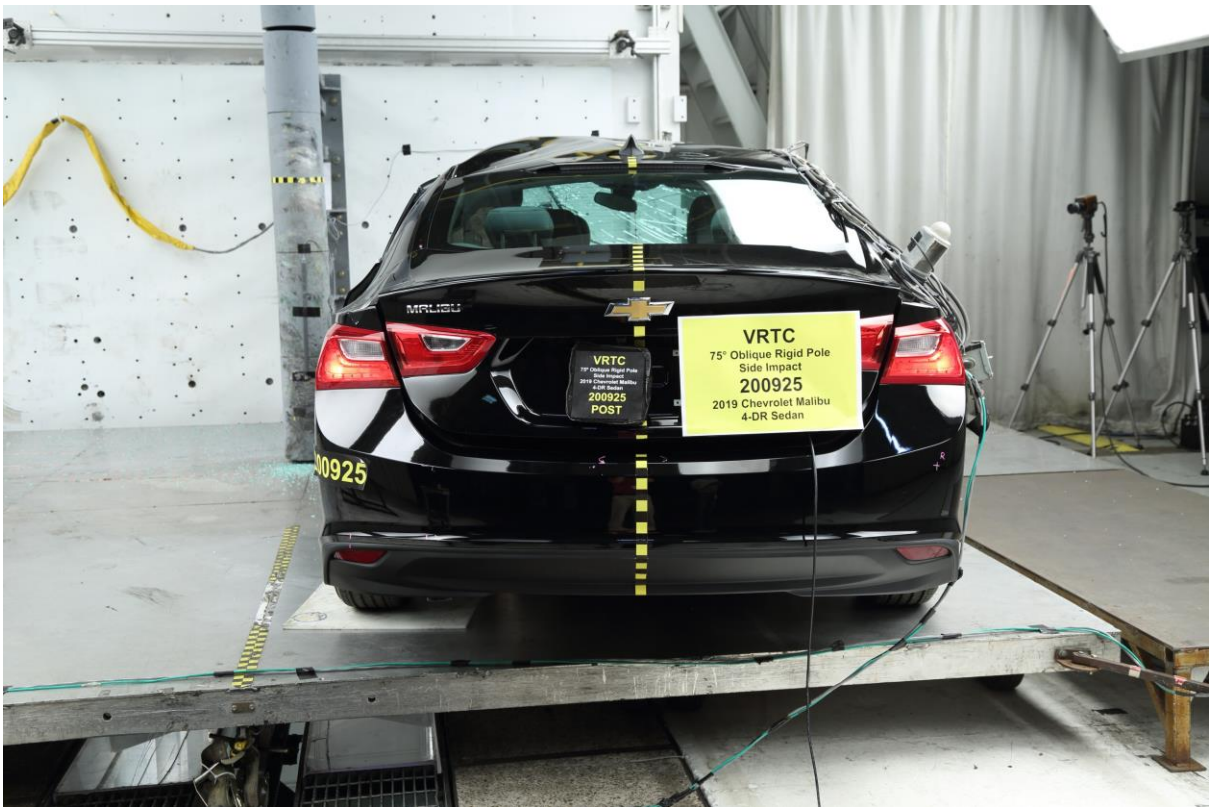
No. 009 Pre-Test Left Rear 3/4 View of Test Vehicle



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



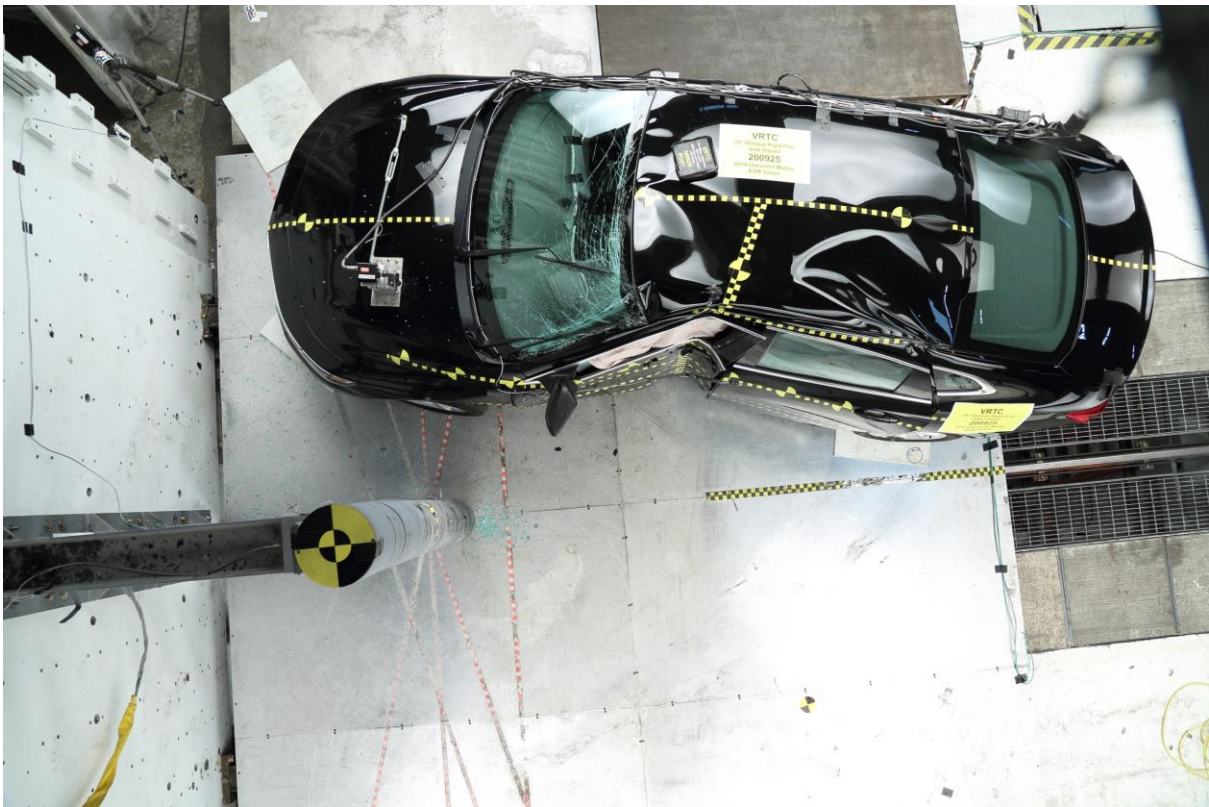
No. 013 Pre-Test Right Side View of Test Vehicle



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



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

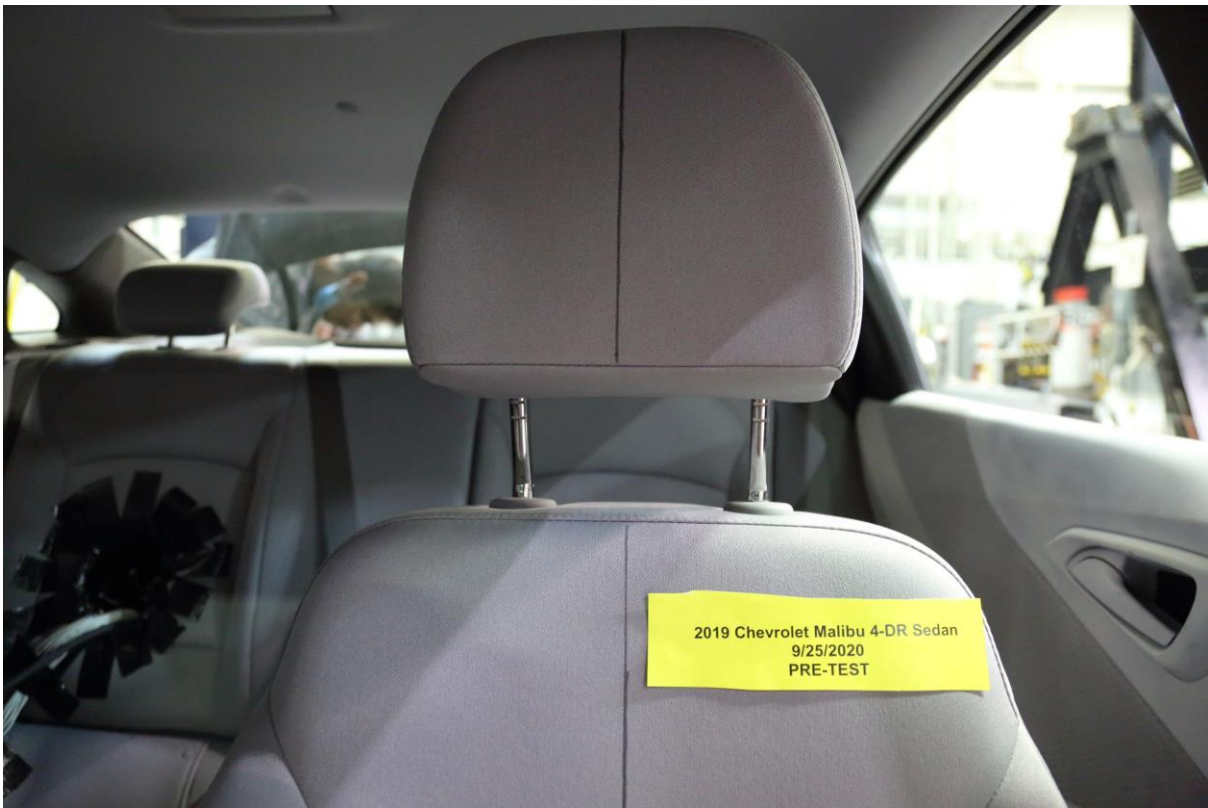
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No. 024 Pre-Test Left Side View of Dummy Shoulder and Door Top View



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



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



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



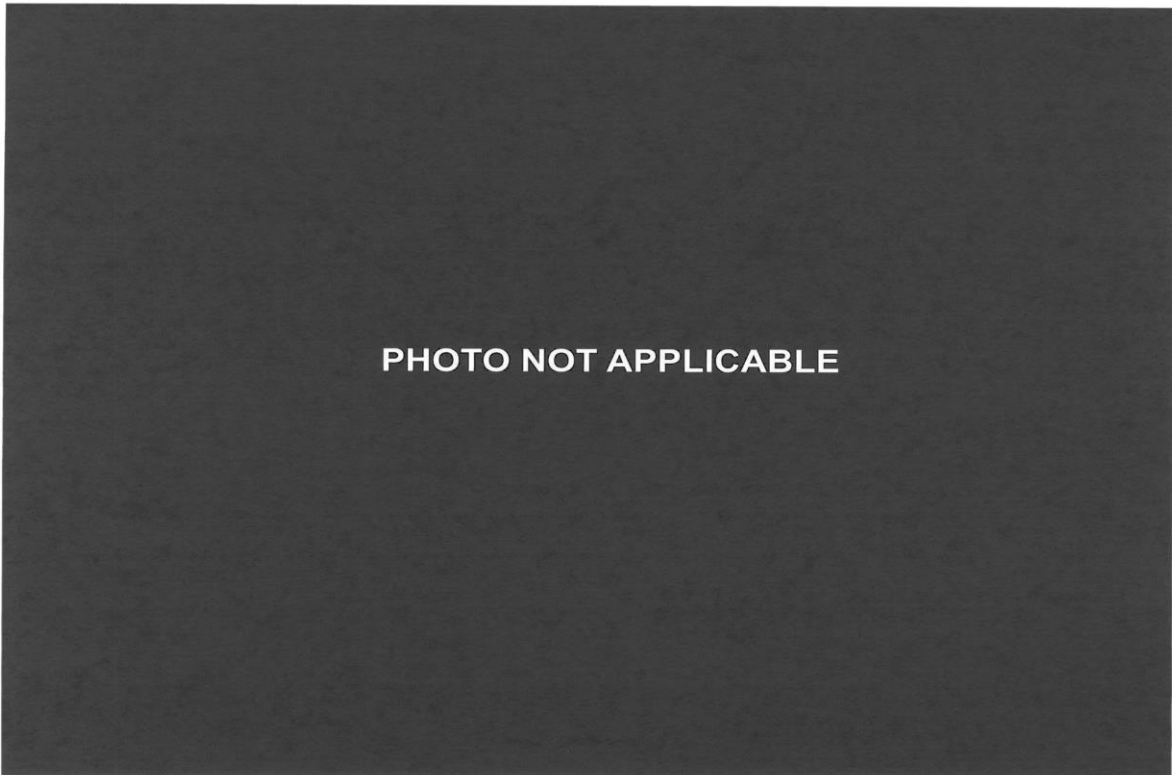
No. 028 Pre-Test Front View of Seat Pan Prior to Dummy Positioning



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



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



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



No. 032 Pre-Test Placement of Dummy Feet



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



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



No. 035 Pre-Test View of Disengaged Parking Brake



No. 036 Pre-Test View of Parking Brake



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



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



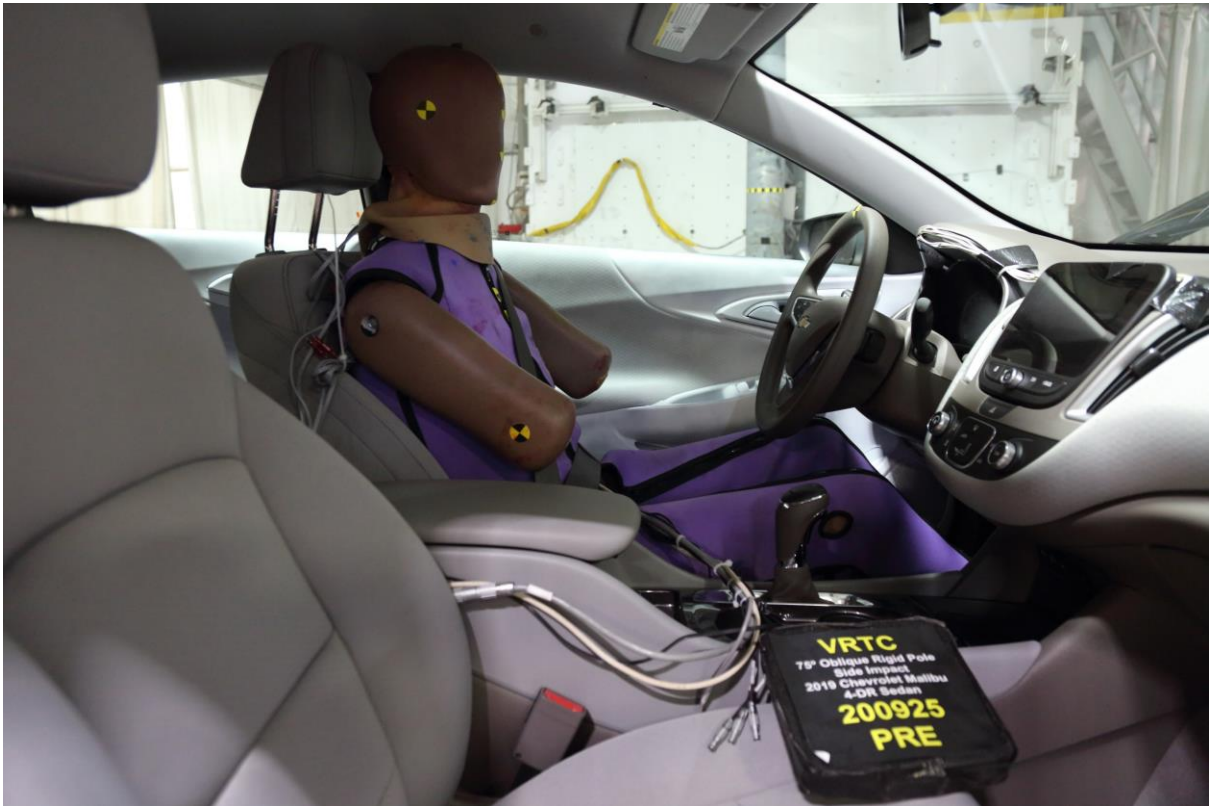
No. 039 Pre-Test Close-Up View of Driver Seat Back or Head Restraint



No. 040 Pre-Test Dummy and Door Clearance View



No. 041 Post-Test Dummy and Door Clearance View



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



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



No. 044 Pre-Test Inner Door Panel View



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



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

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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

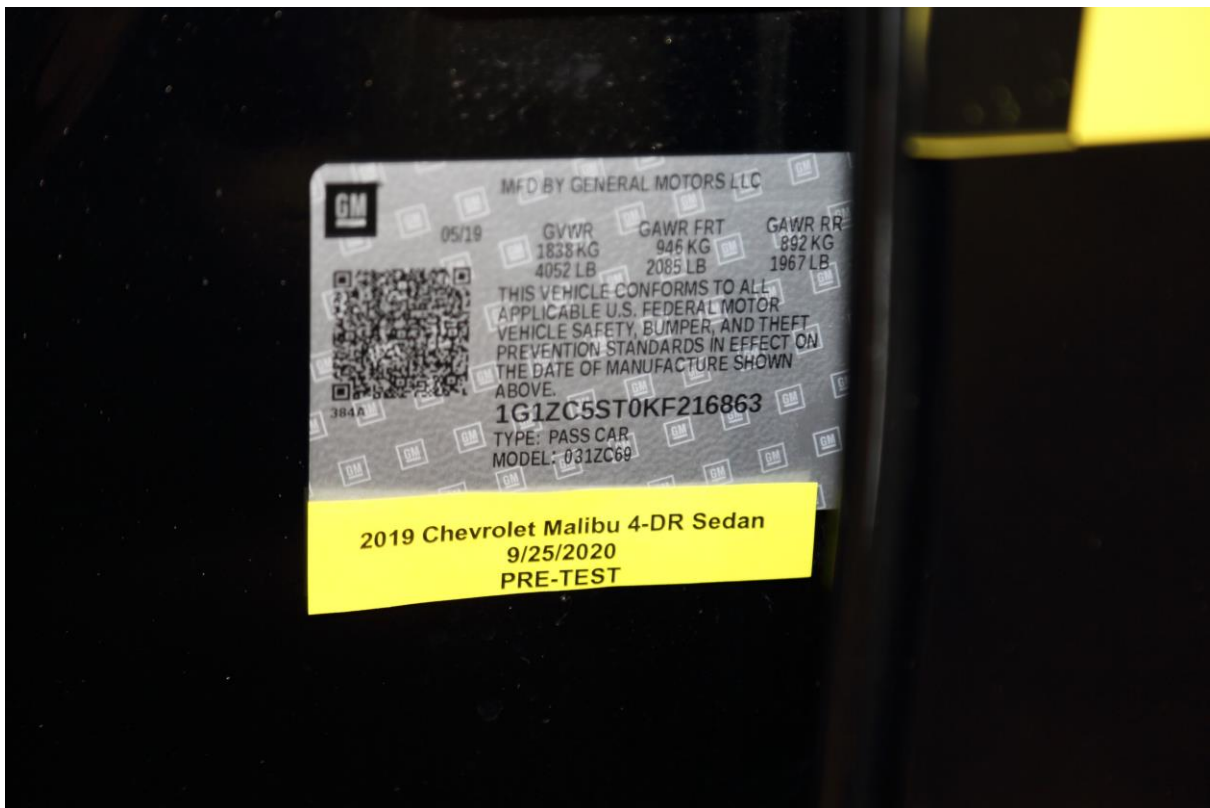
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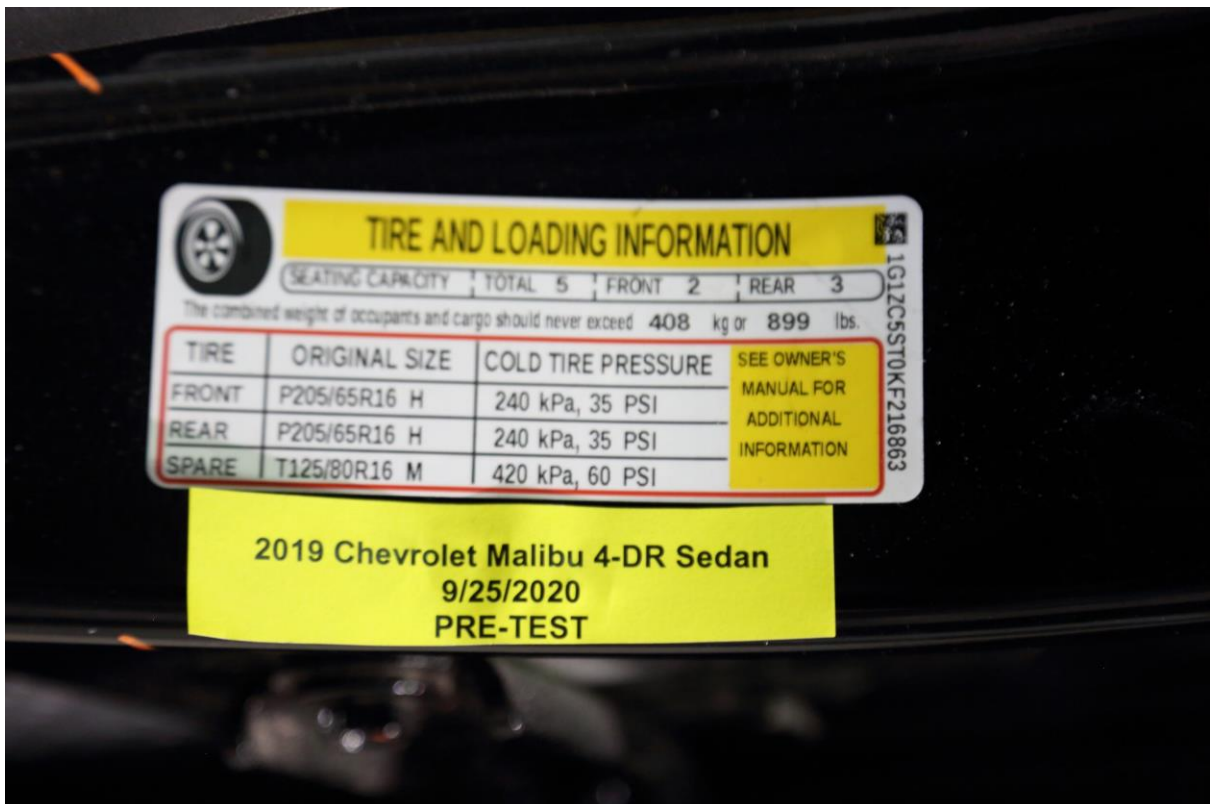
No. 054 Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



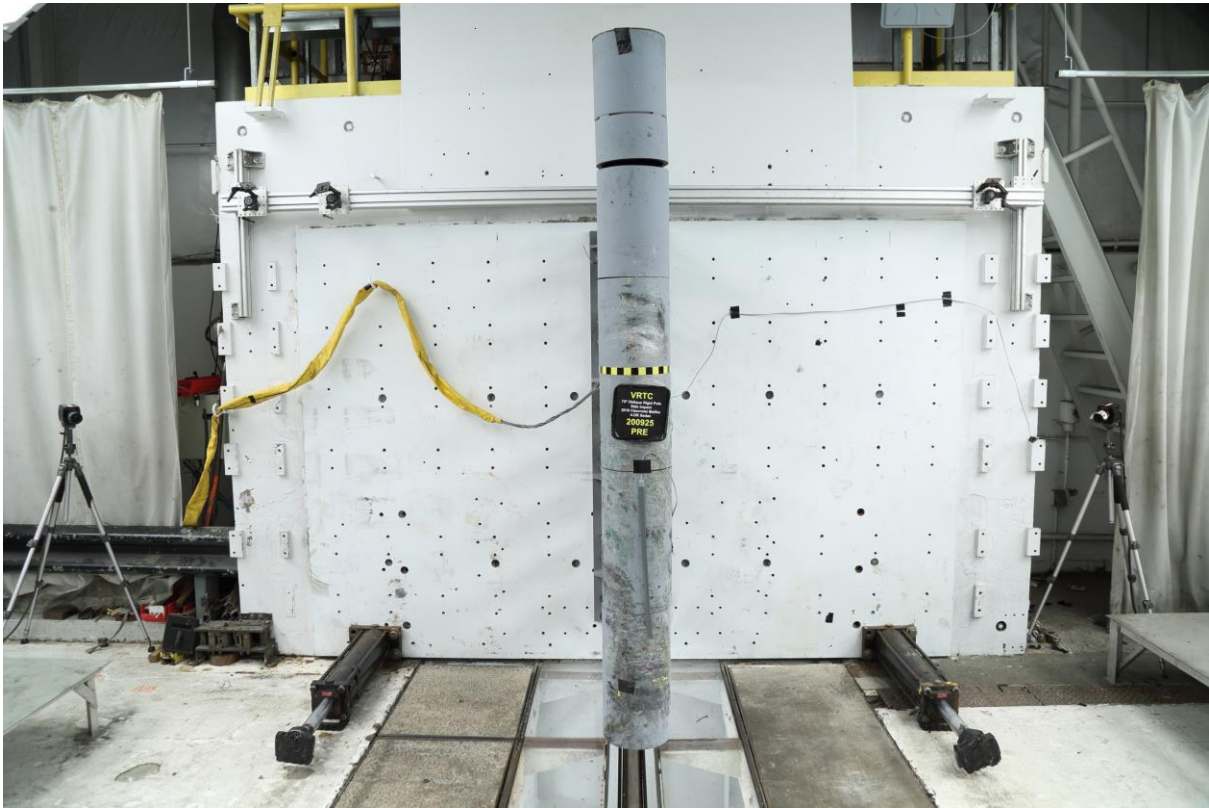
No. 055 Post-Test View of Fuel Filler Cap or Fuel Filler Neck



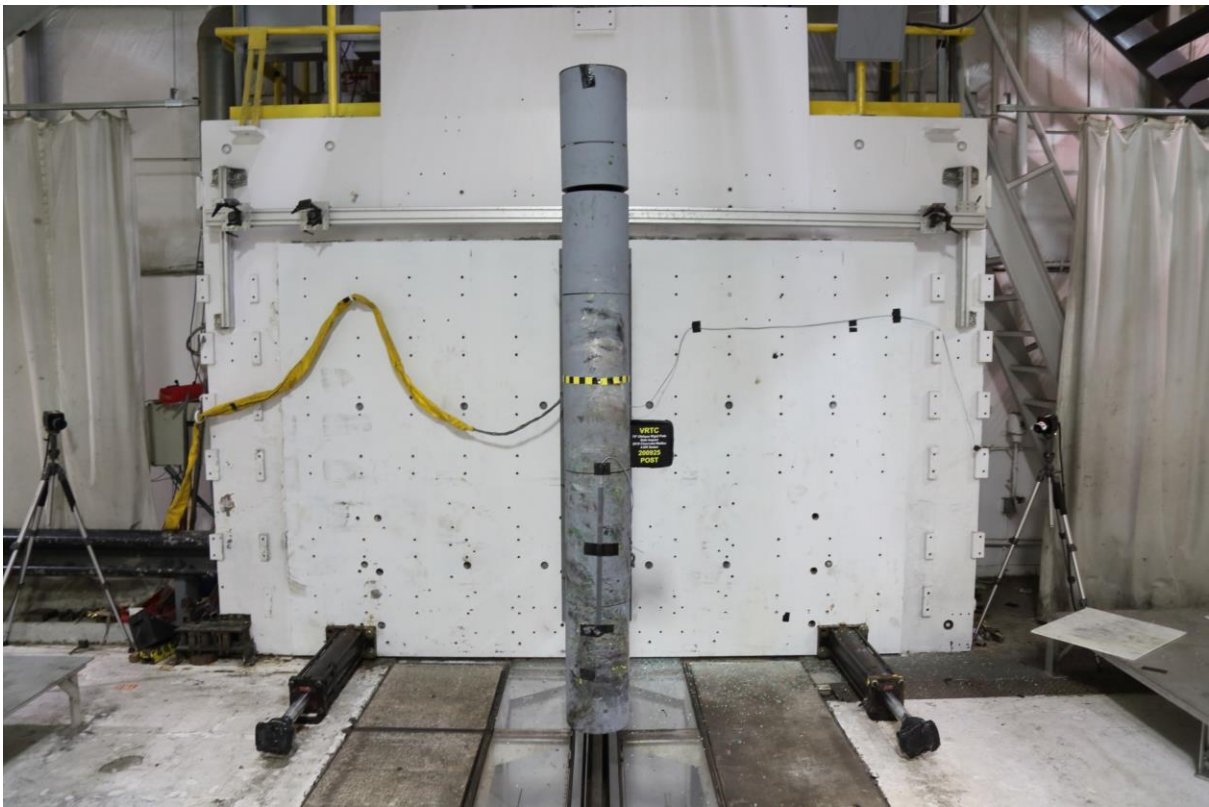
No. 056 Close-Up View of Vehicle Certification Label



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



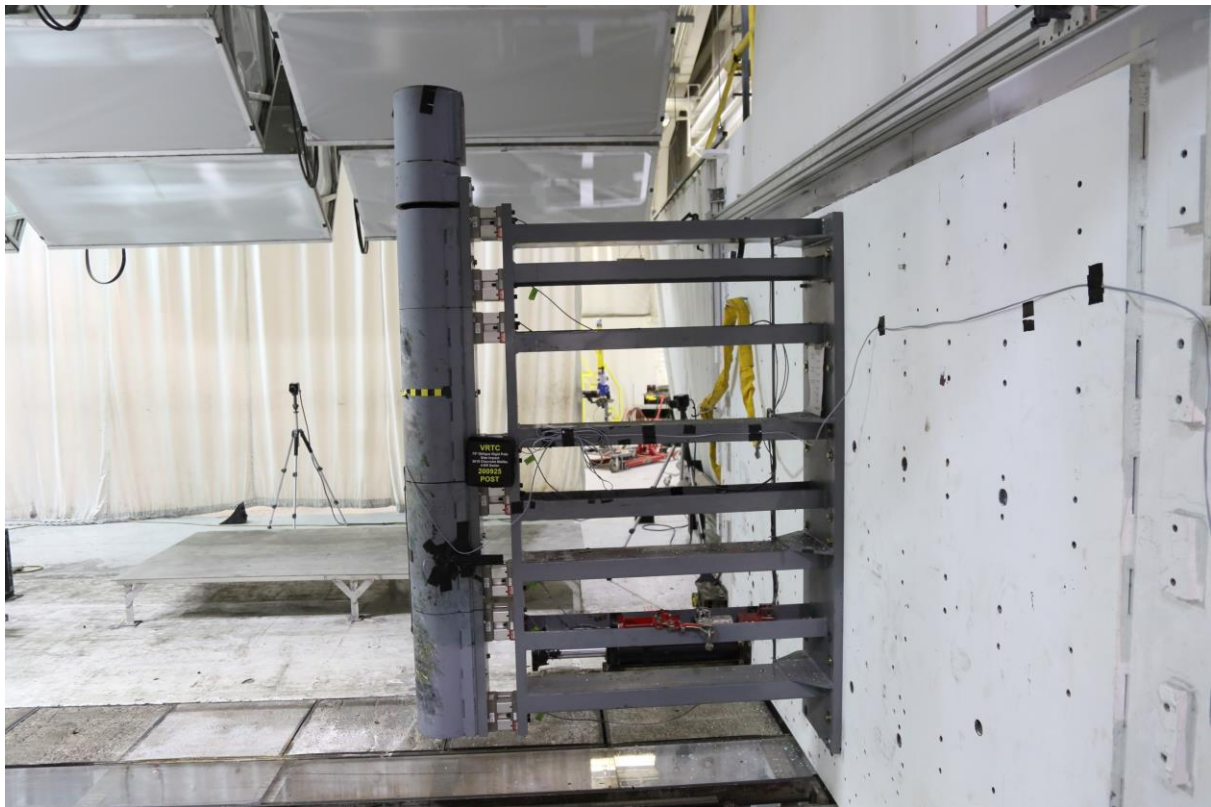
No. 058 Pre-Test Pole Barrier Front View



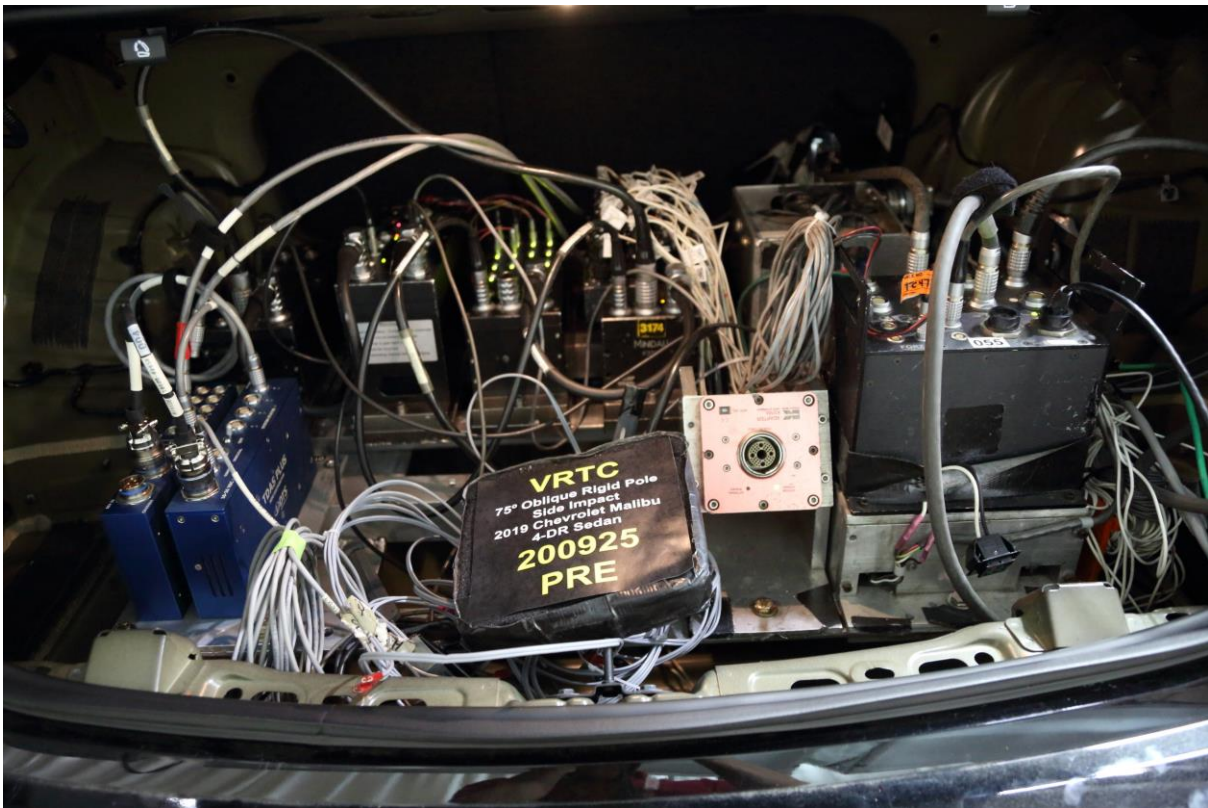
No. 059 Post-Test Pole Barrier Front View



No. 060 Pre-Test Pole Barrier Side View



No. 061 Post-Test Pole Barrier Side View



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



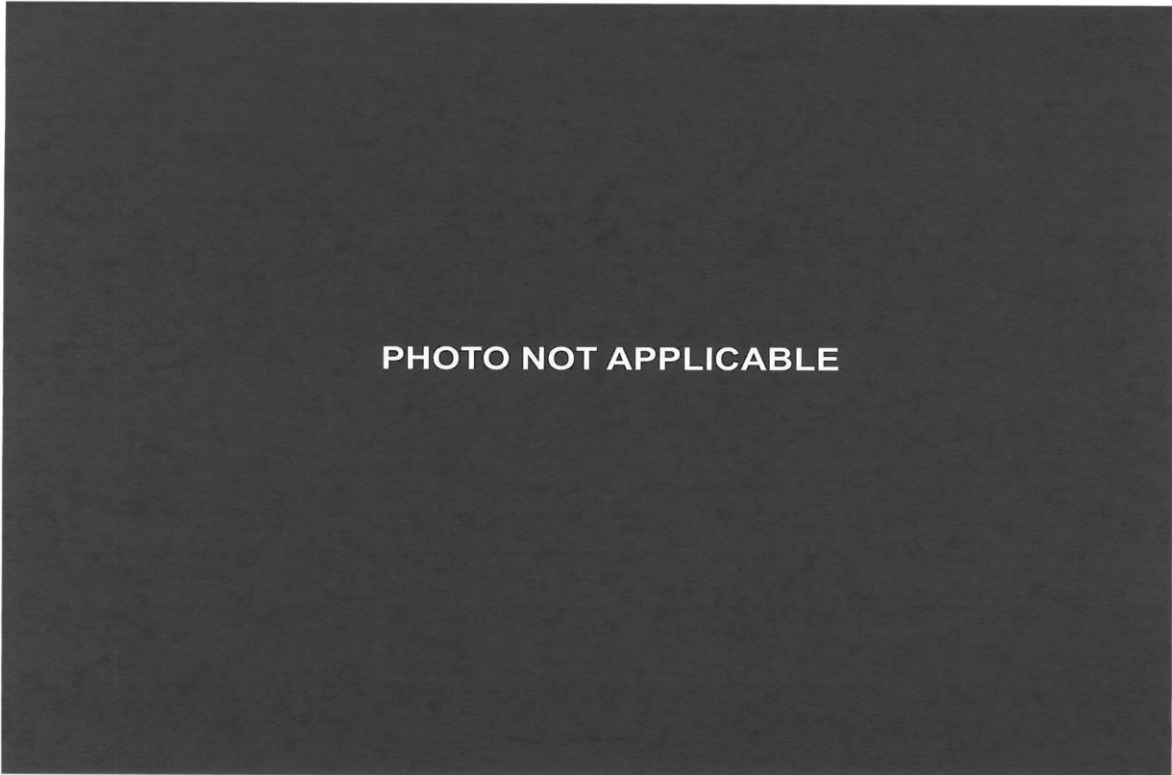
PHOTO NOT APPLICABLE

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



2019 MALIBU FL

EXTERIOR: MOSAIC BLACK METALLIC ENGINE: 1.5L TURBO DOHC 4-CYL
 INTERIOR: DK ATMOSPHERE/MEDIUM TRANSMISSION, CONTINUOUSLY
 ASH GRAY

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<p>STANDARD EQUIPMENT</p> <p>ITEMS FEATURED BELOW ARE INCLUDED AT NO EXTRA CHARGE IN THE STANDARD VEHICLE PRICE SHOWN.</p> <ul style="list-style-type: none"> CHEVROLET COMPLETE CARE SEE WWW.CHEVY.COM OR DEALER FOR TERMS, DETAILS & LIMITS FIRST MAINTENANCE VISIT OIL CHANGE AND TIRE ROTATION MULTI-POINT VEH. INSPECTION 3 YR/36,000 MILES BUMPER-TO-BUMPER WARRANTY 5 YR/60,000 MILES POWERTRAIN LIMITED WARRANTY ROADSIDE ASSISTANCE COURTESY TRANSPORTATION <p>MECHANICAL</p> <ul style="list-style-type: none"> ENGINE, 1.5L TURBO DOHC 4-CYL STOP/START ENGINE SYSTEM <p>SAFETY & SECURITY</p> <ul style="list-style-type: none"> STABILITRAK-STABILITY CONTROL INCLUDES TRACTION CONTROL ANTILOCK BRAKE SYSTEM 	<p>4 WHEEL DISC</p> <ul style="list-style-type: none"> THEFT DETERENT SYSTEM, CONTENT THEFT ALARM REAR DR. LOCKS, CHLD. SECURITY TIRE, COMPACT SPARE REMOTE PANIC ALARM TIRE PRESSURE MONITOR SYSTEM REAR VISION CAMERA AIRBAGS <p>EXTERIOR</p> <ul style="list-style-type: none"> HEADLAMPS, HALOGEN DAYTIME RUNNING LAMPS POWER DUAL OUTSIDE MIRRORS HEADLAMP CONTROL AUTOMATIC ON & OFF WHEELS, 16" ALUMINUM <p>INTERIOR</p> <ul style="list-style-type: none"> KEYLESS START SEAT ADJUSTER, DRIVER 6-WAY MANUAL SEAT ADJUSTER, FRONT PASSENGER 6-WAY MANUAL 	<ul style="list-style-type: none"> VISORS, INCL. VANITY MIRRORS STEERING COLUMN, TILT & TELESCOPIC DRIVER INFORMATION CENTER STEERING WHEEL CONTROLS, AUDIO, CRUISE, BLUETOOTH REAR SEAT, 60/40 SPLIT FOLDING SEATBACK WINDOWS, POWER WITH EXPRESS DOWN ALL <p>CONNECTIVITY FEATURES</p> <ul style="list-style-type: none"> ONSTAR (R) SERVICES CAPABLE (SUBJECT TO TERMS SEE ONSTAR.COM) CHEVROLET INFOTAINMENT 3 8" DIA. COLOR TOUCHSCREEN <p>ADDITIONAL FEATURES FOR COMPATIBLE PHONES INCLUDE:</p> <ul style="list-style-type: none"> BLUETOOTH AUDIO STREAMING VOICE COMMAND PASS/THROUGH TO PHONE, ANDROID, AUTO AND APPLE CARPLAY CAPABLE 	<p>OPTIONS & PRICING</p> <p>MANUFACTURER'S SUGGESTED RETAIL PRICE</p> <table border="1"> <tr> <td>STANDARD VEHICLE PRICE</td> <td>\$23,120.00</td> </tr> </table> <p>OPTIONS INSTALLED BY THE MANUFACTURER (MAY REPLACE STANDARD EQUIPMENT SHOWN)</p> <table border="1"> <tr> <td>FLOOR MATS, ALL WEATHER FRONT AND REAR (DEALER INSTALLED)</td> <td>150.00</td> </tr> <tr> <td>FLEET MAINTENANCE CREDIT</td> <td>-33.75</td> </tr> <tr> <td>FLEET</td> <td>INC.</td> </tr> <tr> <td>TOTAL OPTIONS</td> <td>\$116.25</td> </tr> <tr> <td>TOTAL VEHICLE & OPTIONS</td> <td>\$23,236.25</td> </tr> <tr> <td>DESTINATION CHARGE</td> <td>875.00</td> </tr> <tr> <td>TOTAL VEHICLE PRICE*</td> <td>\$24,111.25</td> </tr> </table>	STANDARD VEHICLE PRICE	\$23,120.00	FLOOR MATS, ALL WEATHER FRONT AND REAR (DEALER INSTALLED)	150.00	FLEET MAINTENANCE CREDIT	-33.75	FLEET	INC.	TOTAL OPTIONS	\$116.25	TOTAL VEHICLE & OPTIONS	\$23,236.25	DESTINATION CHARGE	875.00	TOTAL VEHICLE PRICE*	\$24,111.25
STANDARD VEHICLE PRICE	\$23,120.00																		
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TOTAL VEHICLE & OPTIONS	\$23,236.25																		
DESTINATION CHARGE	875.00																		
TOTAL VEHICLE PRICE*	\$24,111.25																		

<p>EPA DOT Fuel Economy and Environment</p> <p>Fuel Economy</p> <p>32 MPG <small>combined city/highway</small></p> <p>29 city 36 highway</p> <p>3.1 gallons per 100 miles</p> <p>Midsize cars range from 14 to 136 MPG. The best vehicle rates 136 MPG.</p> <p>You save \$1,000 in fuel costs over 5 years compared to the average new vehicle.</p> <p>Annual fuel Cost \$1,200</p> <p>Fuel Economy & Greenhouse Gas Rating (tailpipe only)</p> <p>Smog Rating (tailpipe only)</p> <p><small>This vehicle emits 280 grams CO₂ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions, learn more at fuelconomy.gov.</small></p> <p><small>Actual results will vary for many reasons. Smogging means greenhouse and toxic air pollutants from your vehicle. The average new vehicle gets 27 MPG and costs \$7,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.55 per gallon. MPG is miles per gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.</small></p> <p>fuelconomy.gov Calculate personalized estimates and compare vehicles</p>	<p>Gasoline Vehicle</p> <p>GOVERNMENT 5-STAR SAFETY RATINGS</p> <p>Overall Vehicle Score Not Rated <small>Based on the combined ratings of frontal, side, and rollover. Should ONLY be compared to other vehicles of similar size and weight.</small></p> <table border="1"> <tr> <td>Frontal Crash</td> <td>Driver</td> <td>★★★★★</td> </tr> <tr> <td></td> <td>Passenger</td> <td>★★★★★</td> </tr> </table> <p><small>Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.</small></p> <table border="1"> <tr> <td>Side Crash</td> <td>Front seat</td> <td>Not Rated</td> </tr> <tr> <td></td> <td>Rear seat</td> <td>Not Rated</td> </tr> </table> <p><small>Based on the risk of injury in a side impact.</small></p> <p>Rollover ★★★★★ <small>Based on the risk of rollover in a single-vehicle crash.</small></p> <p>Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA) www.safercar.gov or 1-888-327-4236</p>	Frontal Crash	Driver	★★★★★		Passenger	★★★★★	Side Crash	Front seat	Not Rated		Rear seat	Not Rated	<p>PARTS CONTENT INFORMATION</p> <p><small>This label has been applied pursuant to Federal law. It is not intended to be used for any other purpose. ©2018 GM Corp. Manufacture's Recommended Pre-Delivery Service. Does not include dealer-installed options and accessories. Not for resale, local loan or license fees.</small></p> <p>FOR VEHICLES IN THIS CARLINE: U.S./CANADIAN PARTS CONTENT: 49% MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO 28%</p> <p><small>NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.</small></p> <p>FOR THIS VEHICLE: FINAL ASSEMBLY POINT: KANSAS CITY, KS U.S.A. COUNTRY OF ORIGIN: ENGINE-UNITED STATES TRANSMISSION: MEXICO</p> <p><small>© 2018 General Motors LLC. MODEL PRICE \$24,111.25</small></p> <p>ORDER NO: 895058 SALES CODE 8 DEALER MODEL CODE 12089 DEALER MD CODE 7 FROM ASSEMBLY KANSAS CITY, KS U.S.A. VIN 1G1ZC5ST0K2F18663 DEALER TO WHOLESALE/ELCO ELCO CHEVROLET/ENTERPRISE FLEET SVC 8310 OLIVE BOULEVARD SAINT LOUIS, MO 63132</p> <p>UL 1AG3486652</p>
Frontal Crash	Driver	★★★★★												
	Passenger	★★★★★												
Side Crash	Front seat	Not Rated												
	Rear seat	Not Rated												

No. 70 Monroney Label

54 Seats and Restraints

Head Restraints

Warning

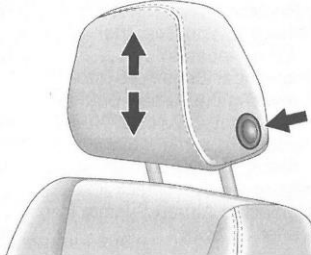
With head restraints that are not installed and adjusted properly, there is a greater chance that occupants will suffer a neck/spinal injury in a crash. Do not drive until the head restraints for all occupants are installed and adjusted properly.



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 Seat

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



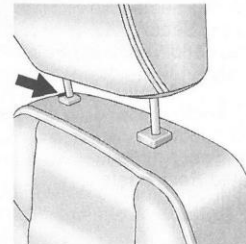
To raise or lower the head restraint, press the button located on the side of the head restraint and pull up or push the head restraint down and release the button.

Pull and push on the head restraint after the button is released to make sure that it is locked in place.

The front seat outboard head restraints are not removable.

Rear Seat

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

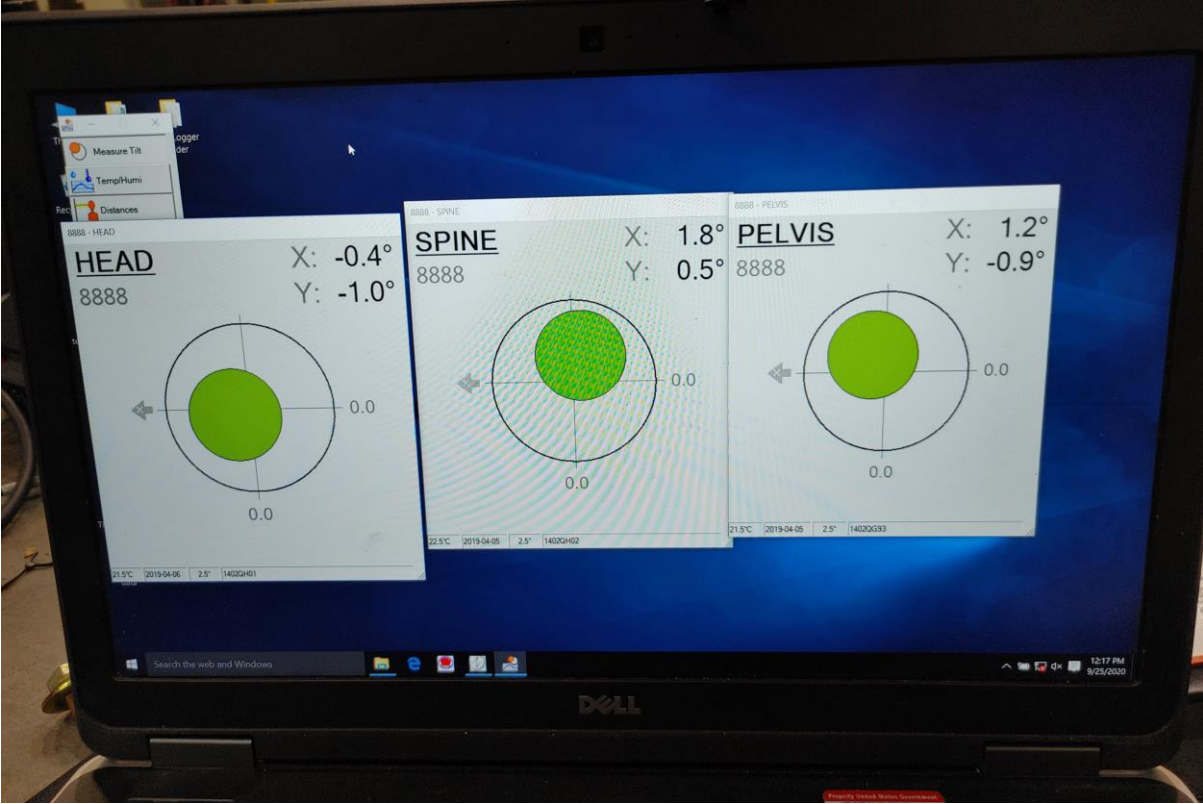


The height of the head restraint can be adjusted. Pull the head restraint up to raise it. Try to move the head restraint to make sure that it is locked in place.

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

TABLE OF DATA PLOTS

Driver Dummy & Vehicle Instrumentation Plots

No.	Description	Page
1	Driver Head Acceleration (X)	B-8
2	Driver Head Acceleration (Y)	B-8
3	Driver Head Acceleration (Z)	B-8
4	Driver Head Resultant Acceleration	B-8
5	Driver Head Angular Rate (X)	B-9
6	Driver Head Angular Rate (Y)	B-9
7	Driver Head Angular Rate (Z)	B-9
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
25	Driver Shoulder Rear Displacement (Z)	B-15
26	Driver Shoulder Rear Length Change	B-15
27	Driver Shoulder Middle Displacement (X)	B-16
28	Driver Shoulder Middle Displacement (Y)	B-16
29	Driver Shoulder Middle Displacement (Z)	B-16
30	Driver Shoulder Middle Length Change	B-16
31	Driver Shoulder Front Displacement (X)	B-17
32	Driver Shoulder Front Displacement (Y)	B-17
33	Driver Shoulder Front Displacement (Z)	B-17
34	Driver Shoulder Front Length Change	B-17

TABLE OF DATA PLOTS, CONTINUED

Driver Dummy & Vehicle Instrumentation Plots

No.	Description	Page
35	Driver Thorax Rib 1 Rear Displacement (X)	B-18
36	Driver Thorax Rib 1 Rear Displacement (Y)	B-18
37	Driver Thorax Rib 1 Rear Displacement (Z)	B-18
38	Driver Thorax Rib 1 Rear Length Change	B-18
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
44	Driver Thorax Rib 1 Front Displacement (Y)	B-20
45	Driver Thorax Rib 1 Front Displacement (Z)	B-20
46	Driver Thorax Rib 1 Front Length Change	B-20
47	Driver Thorax Rib 2 Rear Displacement (X)	B-21
48	Driver Thorax Rib 2 Rear Displacement (Y)	B-21
49	Driver Thorax Rib 2 Rear Displacement (Z)	B-21
50	Driver Thorax Rib 2 Rear Length Change	B-21
51	Driver Thorax Rib 2 Middle Displacement (X)	B-22
52	Driver Thorax Rib 2 Middle Displacement (Y)	B-22
53	Driver Thorax Rib 2 Middle Displacement (Z)	B-22
54	Driver Thorax Rib 2 Middle Length Change	B-22
55	Driver Thorax Rib 2 Front Displacement (X)	B-23
56	Driver Thorax Rib 2 Front Displacement (Y)	B-23
57	Driver Thorax Rib 2 Front Displacement (Z)	B-23
58	Driver Thorax Rib 2 Front Length Change	B-23
59	Driver Thorax Rib 3 Rear Displacement (X)	B-24
60	Driver Thorax Rib 3 Rear Displacement (Y)	B-24
61	Driver Thorax Rib 3 Rear Displacement (Z)	B-24
62	Driver Thorax Rib 3 Rear Length Change	B-24
63	Driver Thorax Rib 3 Middle Displacement (X)	B-25
64	Driver Thorax Rib 3 Middle Displacement (Y)	B-25
65	Driver Thorax Rib 3 Middle Displacement (Z)	B-25
66	Driver Thorax Rib 3 Middle Length Change	B-25

TABLE OF DATA PLOTS, CONTINUED

Driver Dummy & Vehicle Instrumentation Plots

No.	Description	Page
67	Driver Thorax Rib 3 Front Displacement (X)	B-26
68	Driver Thorax Rib 3 Front Displacement (Y)	B-26
69	Driver Thorax Rib 3 Front Displacement (Z)	B-26
70	Driver Thorax Rib 3 Front Length Change	B-26
71	Driver Abdomen Rib 1 Rear Displacement (X)	B-27
72	Driver Abdomen Rib 1 Rear Displacement (Y)	B-27
73	Driver Abdomen Rib 1 Rear Displacement (Z)	B-27
74	Driver Abdomen Rib 1 Rear Length Change	B-27
75	Driver Abdomen Rib 1 Middle Displacement (X)	B-28
76	Driver Abdomen Rib 1 Middle Displacement (Y)	B-28
77	Driver Abdomen Rib 1 Middle Displacement (Z)	B-28
78	Driver Abdomen Rib 1 Middle Length Change	B-28
79	Driver Abdomen Rib 1 Front Displacement (X)	B-29
80	Driver Abdomen Rib 1 Front Displacement (Y)	B-29
81	Driver Abdomen Rib 1 Front Displacement (Z)	B-29
82	Driver Abdomen Rib 1 Front Length Change	B-29
83	Driver Abdomen Rib 2 Rear Displacement (X)	B-30
84	Driver Abdomen Rib 2 Rear Displacement (Y)	B-30
85	Driver Abdomen Rib 2 Rear Displacement (Z)	B-30
86	Driver Abdomen Rib 2 Rear Length Change	B-30
87	Driver Abdomen Rib 2 Middle Displacement (X)	B-31
88	Driver Abdomen Rib 2 Middle Displacement (Y)	B-31
89	Driver Abdomen Rib 2 Middle Displacement (Z)	B-31
90	Driver Abdomen Rib 2 Middle Length Change	B-31
91	Driver Abdomen Rib 2 Front Displacement (X)	B-32
92	Driver Abdomen Rib 2 Front Displacement (Y)	B-32
93	Driver Abdomen Rib 2 Front Displacement (Z)	B-32
94	Driver Abdomen Rib 2 Front Length Change	B-32
95	Driver Spine T1 Acceleration (X)	B-33
96	Driver Spine T1 Acceleration (Y)	B-33
97	Driver Spine T1 Acceleration (Z)	B-33
98	Driver Spine T1 Acceleration Resultant	B-33

TABLE OF DATA PLOTS, CONTINUED

Driver Dummy & Vehicle Instrumentation Plots

No.	Description	Page
99	Driver Spine T4 Acceleration (X)	B-34
100	Driver Spine T4 Acceleration (Y)	B-34
101	Driver Spine T4 Acceleration (Z)	B-34
102	Driver Spine T4 Acceleration Resultant	B-34
103	Driver Spine T12 Acceleration (X)	B-35
104	Driver Spine T12 Acceleration (Y)	B-35
105	Driver Spine T12 Acceleration (Z)	B-35
106	Driver Spine T12 Acceleration Resultant	B-35
107	Driver Pubic Symphysis Force (Y)	B-36
108	Driver Sacro-iliac Left Force (X)	B-37
109	Driver Sacro-iliac Left Force (Y)	B-37
110	Driver Sacro-iliac Left Force (Z)	B-37
111	Driver Sacro-iliac Left Force (X)	B-38
112	Driver Sacro-iliac Left Force (Y)	B-38
113	Driver Sacro-iliac Left Force (Z)	B-38
114	Driver Sacro-iliac Right Force (X)	B-39
115	Driver Sacro-iliac Right Force (Y)	B-39
116	Driver Sacro-iliac Right Force (Z)	B-39
117	Driver Sacro-iliac Right Force (X)	B-40
118	Driver Sacro-iliac Right Force (Y)	B-40
119	Driver Sacro-iliac Right Force (Z)	B-40
120	Driver Lumbar Force (X)	B-41
121	Driver Lumbar Force (Y)	B-41
122	Driver Lumbar Force (Z)	B-41
123	Driver Lumbar Moment (X)	B-42
124	Driver Lumbar Moment (Y)	B-42
125	Driver Lumbar Moment (Z)	B-42
126	Driver Pelvic Acceleration (X)	B-43
127	Driver Pelvic Acceleration (Y)	B-43
128	Driver Pelvic Acceleration (Z)	B-43
129	Driver Pelvic Acceleration Resultant	B-43
130	Driver Left Femur Force (X)	B-44
131	Driver Left Femur Force (Y)	B-44
132	Driver Left Femur Force (Z)	B-44

TABLE OF DATA PLOTS, CONTINUED

Driver Dummy & Vehicle Instrumentation Plots

No.	Description	Page
133	Driver Left Femur Moment (X)	B-45
134	Driver Left Femur Moment (Y)	B-45
135	Driver Left Femur Moment (Z)	B-45
136	Driver Femoral Neck Force (X)	B-46
137	Driver Femoral Neck Force (Y)	B-46
138	Driver Femoral Neck Force (Z)	B-46
139	Driver Left Outer Knee Force (Y)	B-47
140	Driver Left Outer Knee Force (Y)	B-47
141	Vehicle Center of Gravity Acceleration (X)	B-48
142	Vehicle Center of Gravity Acceleration (Y)	B-48
143	Vehicle Center of Gravity Acceleration (Z)	B-48
144	Vehicle Center of Gravity Acceleration Resultant	B-48
145	Vehicle Center of Gravity Angular Rate (X)	B-49
146	Vehicle Center of Gravity Angular Rate (Y)	B-49
147	Vehicle Center of Gravity Angular Rate (Z)	B-49
148	Left Floor Sill Acceleration (Y)	B-50
149	Left A-Pillar Sill Acceleration (Y)	B-50
150	Left Lower A-Pillar Acceleration (Y)	B-50
151	Left Mid A-Pillar Acceleration (Y)	B-50
152	Left B-Pillar Sill Acceleration (Y)	B-51
153	Left Lower B-Pillar Acceleration (Y)	B-51
154	Left Mid B-Pillar Acceleration (Y)	B-51
155	Driver Seat Track at Dummy H-Point Acceleration (Y)	B-51
156	Engine Top Acceleration (X)	B-52
157	Engine Top Acceleration (Y)	B-52
158	Firewall Center Acceleration (Y)	B-52
159	Right Roof at Vertical Impact Reference Line Acceleration (Y)	B-52
160	Right Sill at Vertical Impact Reference Line Acceleration (Y)	B-53
161	Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)	B-53
162	Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)	B-53
163	Left Front Door Mid Centerline Acceleration (Y)	B-53
164	Left Front Door Mid Rear Acceleration (Y)	B-54
165	Left Front Door Upper Centerline Acceleration (Y)	B-54
166	Left Rear Door Mid Rear Acceleration (Y)	B-54
167	Left Rear Door Upper Centerline Acceleration (Y)	B-54

TABLE OF DATA PLOTS, CONTINUED

Driver Dummy & Vehicle Instrumentation Plots

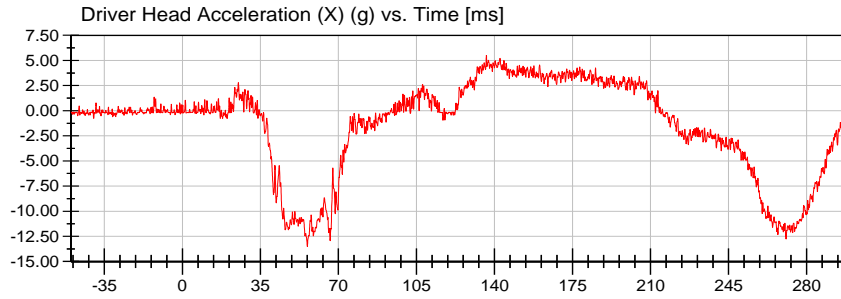
No.	Description	Page
168	Rear Deck Acceleration (X)	B-55
169	Rear Deck Acceleration (Y)	B-55
170	Rear Deck Acceleration (Z)	B-55
171	Rear Deck Acceleration Resultant	B-55
172	Rear Deck Angular Rate (X)	B-56
173	Rear Deck Angular Rate (Y)	B-56
174	Rear Deck Angular Rate (Z)	B-56
175	Driver Head Contact	B-57
176	Driver Shoulder Contact	B-57
177	Driver Thorax Contact	B-57
178	Driver Pelvis Contact	B-57
179	Load Cell Pole Barrier #1 Force (Y)	B-58
180	Load Cell Pole Barrier #2 Force (Y)	B-58
181	Load Cell Pole Barrier #3 Force (Y)	B-58
182	Load Cell Pole Barrier #4 Force (Y)	B-58
183	Load Cell Pole Barrier #5 Force (Y)	B-59
184	Load Cell Pole Barrier #6 Force (Y)	B-59
185	Load Cell Pole Barrier #7 Force (Y)	B-59
186	Load Cell Pole Barrier #8 Force (Y)	B-59

VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



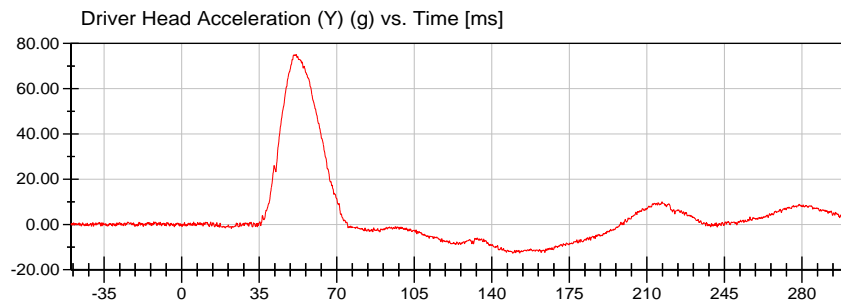
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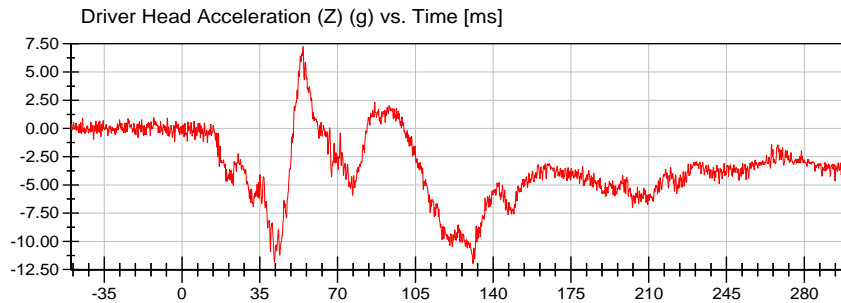
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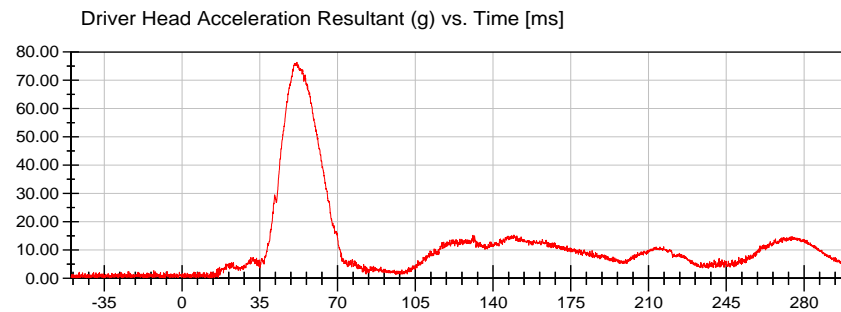
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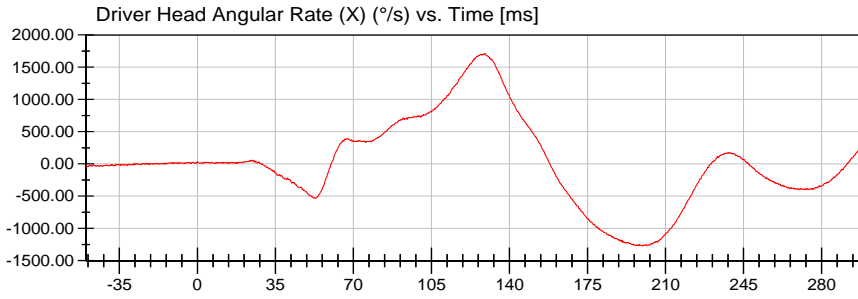
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VRTC

Test Lab: CTF
Test Number: 200925 ()

Test Date: 09/25/2020



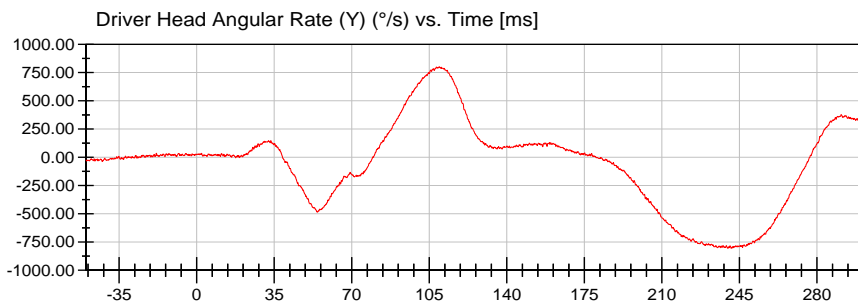
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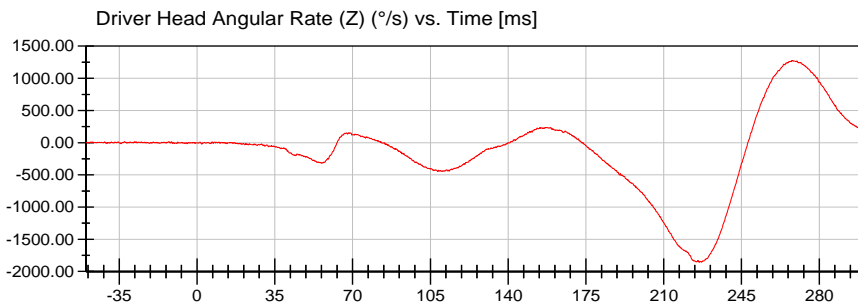
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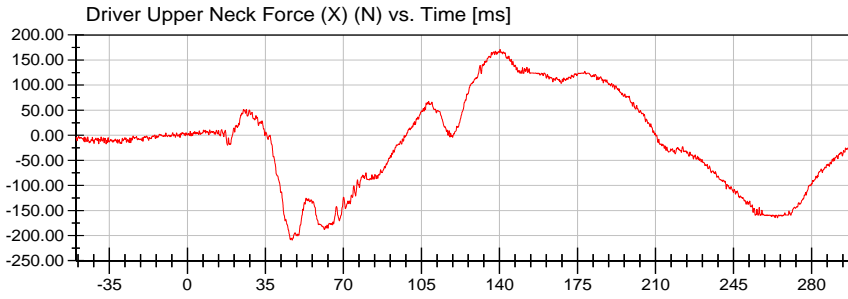


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Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



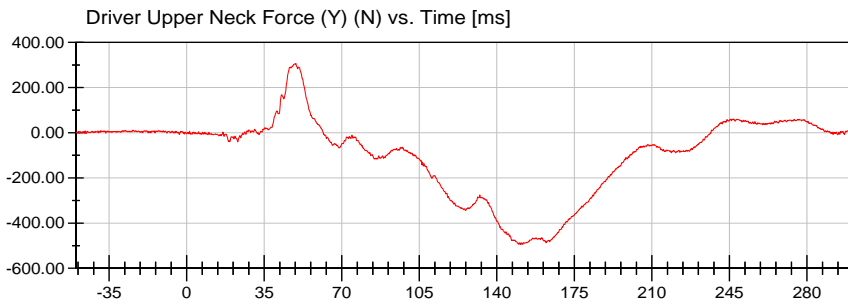
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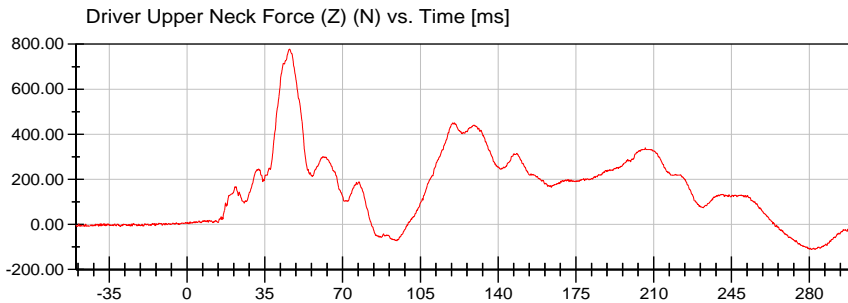
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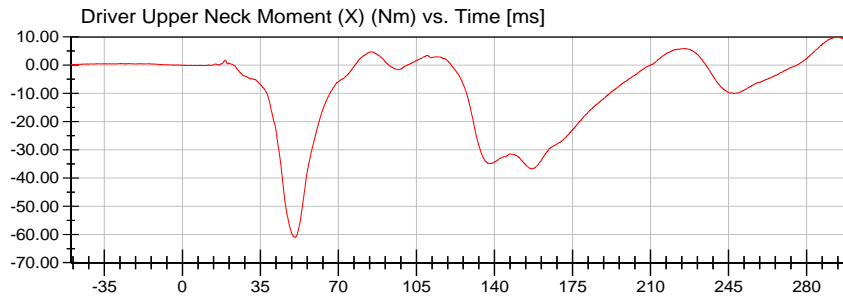
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VRTC

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Test Lab: CTF
Test Number: 200925 ()



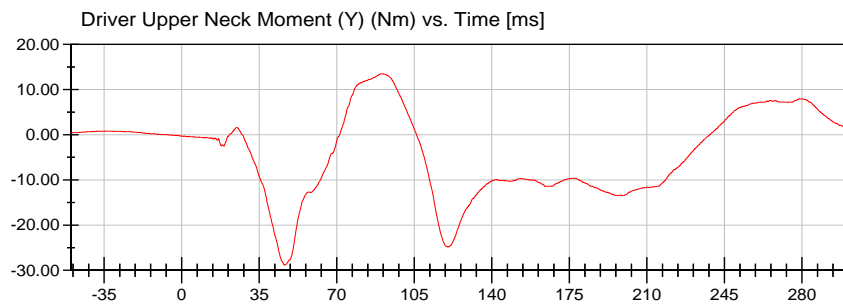
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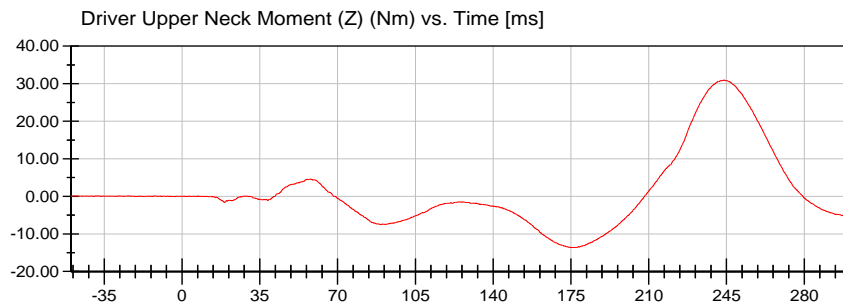
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CFC_600



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-13.63 Nm at 176.40 ms

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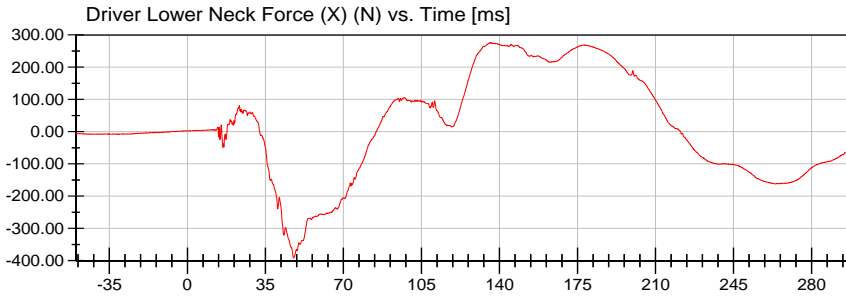


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Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



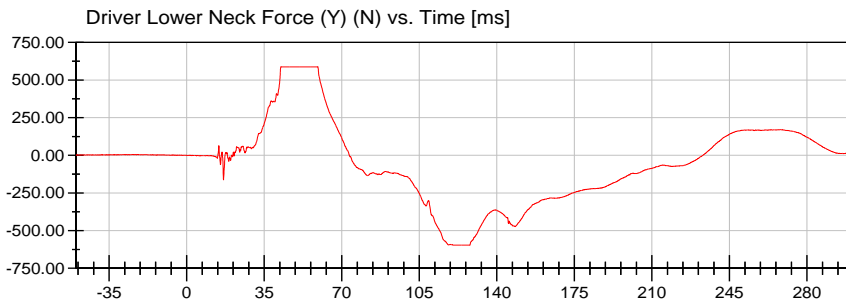
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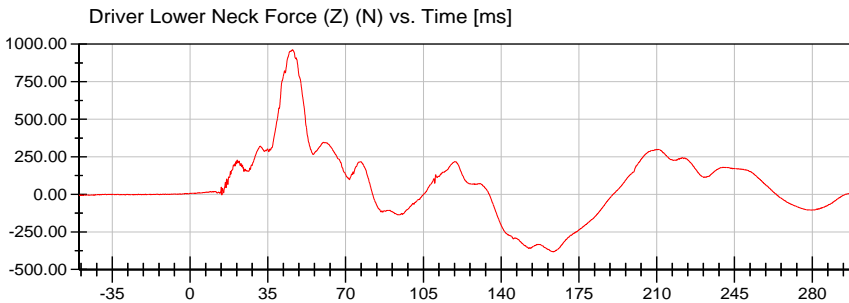
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-382.44 N at 163.45 ms

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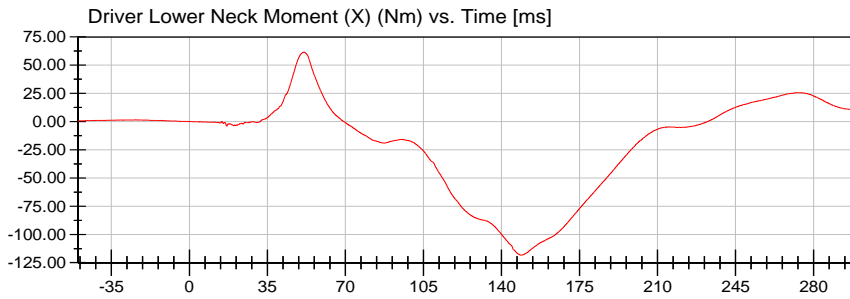


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Test Number: 200925 ()



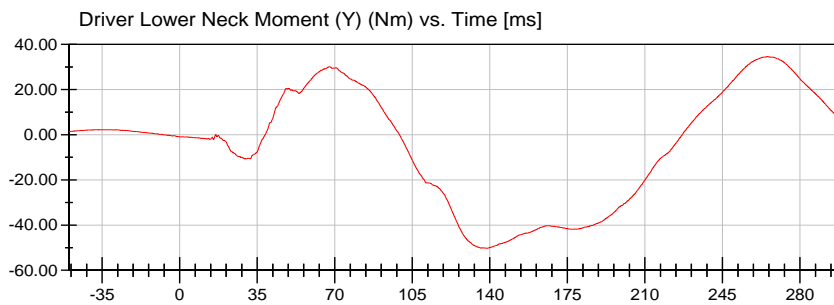
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-118.33 Nm at 148.70 ms

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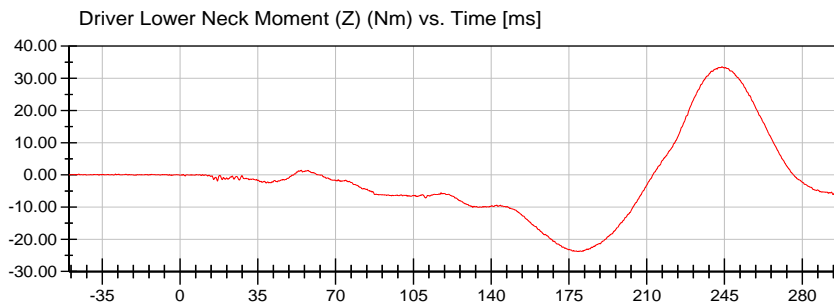
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-50.24 Nm at 138.65 ms

CFC_600



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33.55 Nm at 243.85 ms

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-23.84 Nm at 178.90 ms

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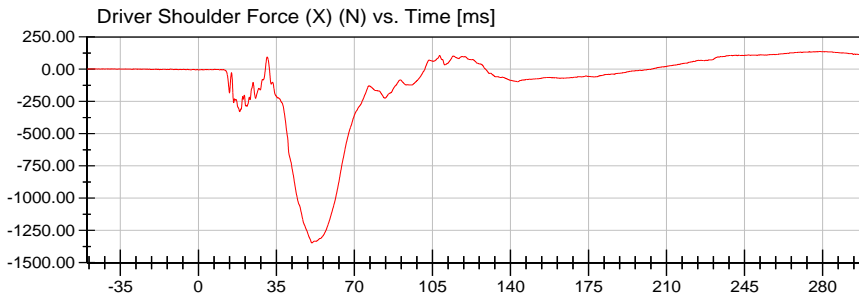


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Test Number: 200925 ()



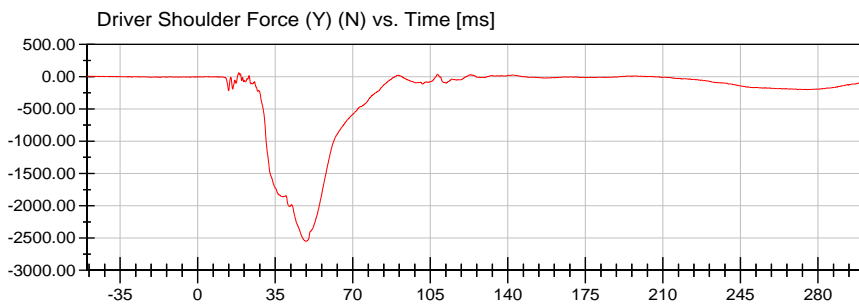
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-1,346.92 N at 50.90 ms

CFC_600



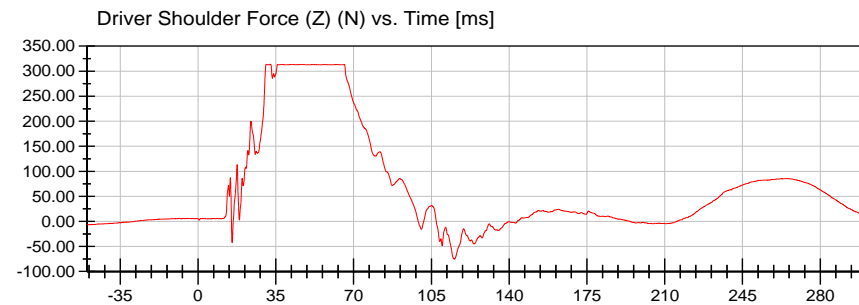
<Max>

59.64 N at 18.60 ms

<Min>

-2,549.73 N at 48.85 ms

CFC_600



<Max>

313.84 N at 32.70 ms

<Min>

-75.29 N at 115.30 ms

CFC_600

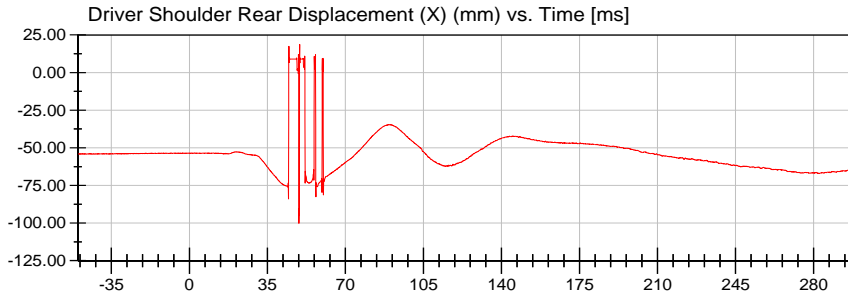


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



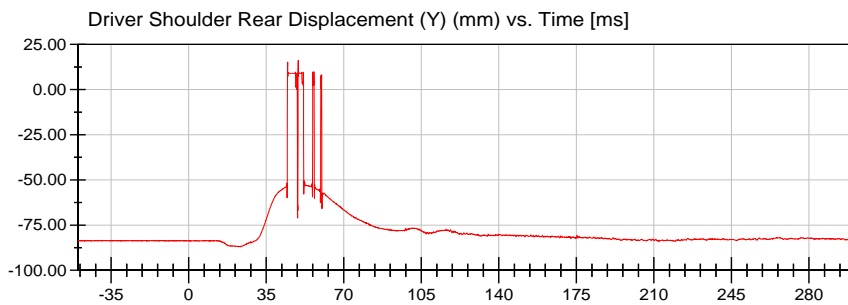
<Max>

18.66 mm at 49.45 ms

<Min>

-100.15 mm at 49.15 ms

Unfiltered



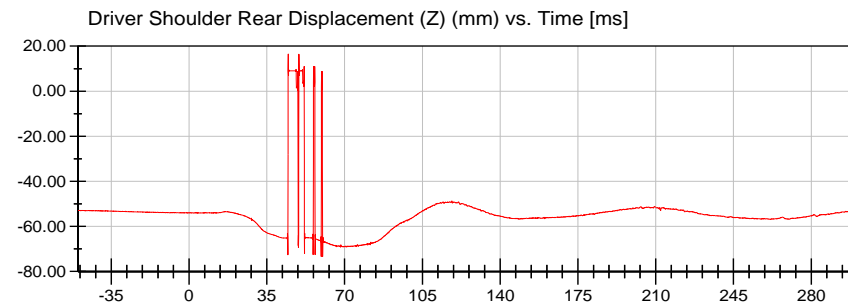
<Max>

16.04 mm at 49.45 ms

<Min>

-87.11 mm at 22.50 ms

Unfiltered



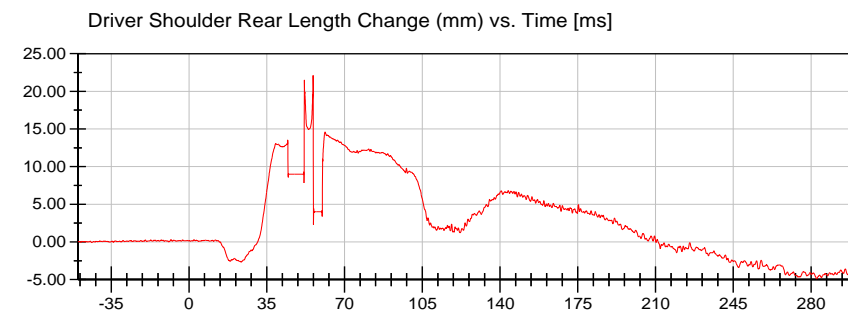
<Max>

16.45 mm at 44.65 ms

<Min>

-73.38 mm at 60.15 ms

Unfiltered



<Max>

22.11 mm at 55.85 ms

<Min>

-4.89 mm at 282.55 ms

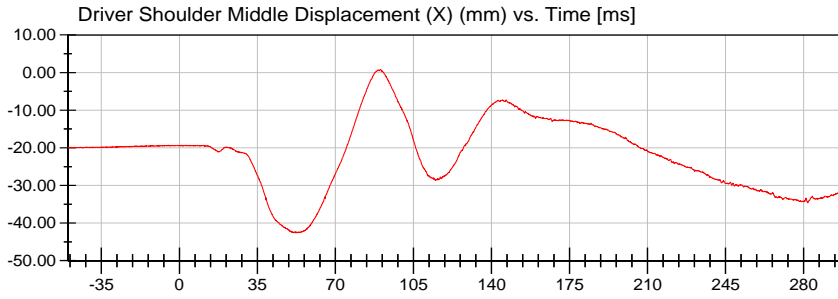
CFC_600



VRTC

Test Lab: CTF
Test Number: 200925 ()

Test Date: 09/25/2020



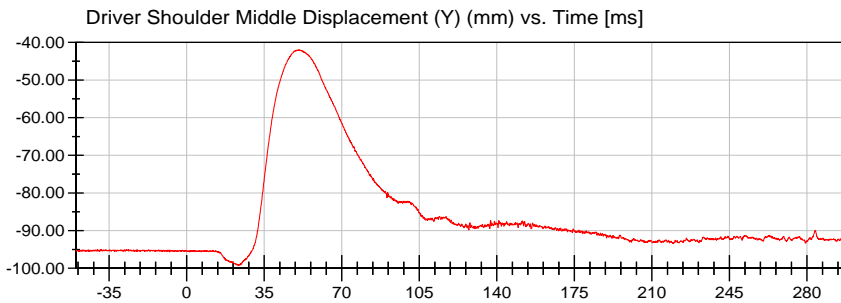
<Max>

0.83 mm at 90.30 ms

<Min>

-42.62 mm at 51.95 ms

Unfiltered



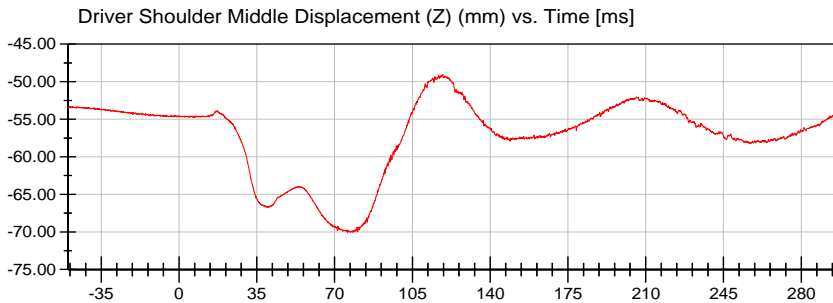
<Max>

-41.93 mm at 50.70 ms

<Min>

-99.29 mm at 23.40 ms

Unfiltered



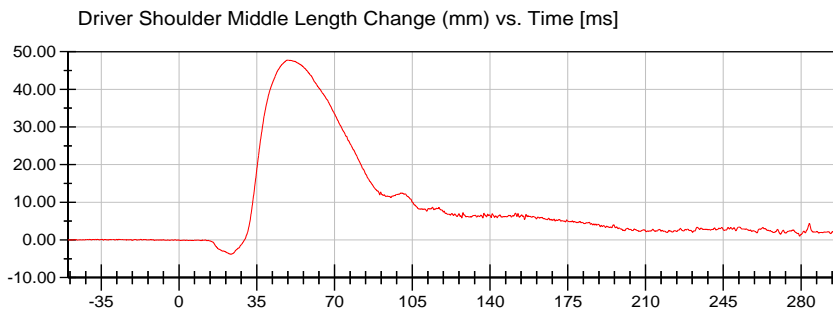
<Max>

-49.06 mm at 118.65 ms

<Min>

-70.12 mm at 75.90 ms

Unfiltered



<Max>

47.73 mm at 49.05 ms

<Min>

-3.81 mm at 23.40 ms

CFC_600

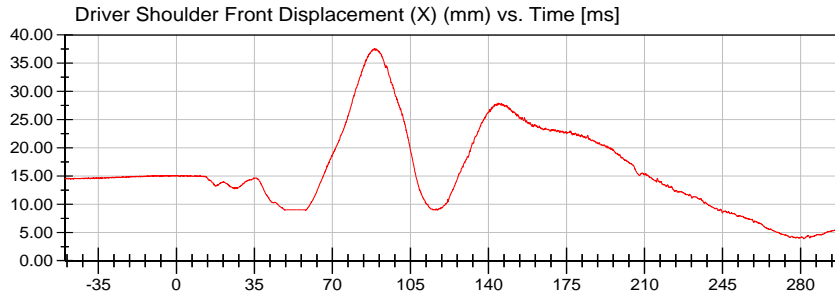


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



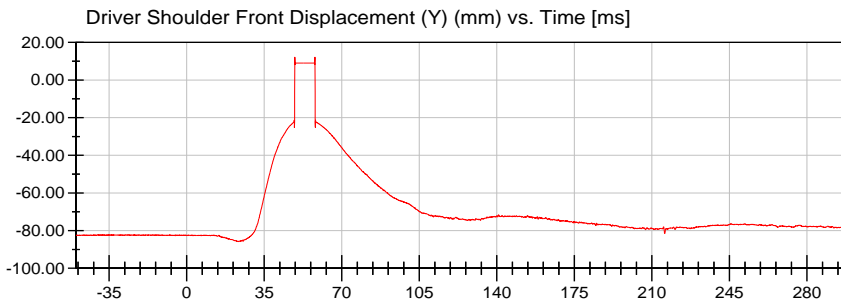
<Max>

37.61 mm at 88.80 ms

<Min>

3.89 mm at 281.40 ms

Unfiltered



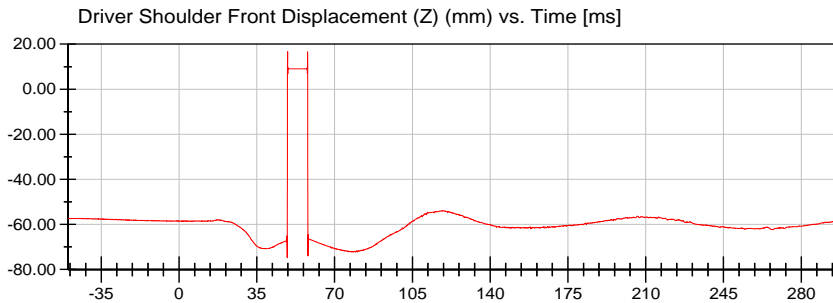
<Max>

12.12 mm at 48.85 ms

<Min>

-85.82 mm at 23.40 ms

Unfiltered



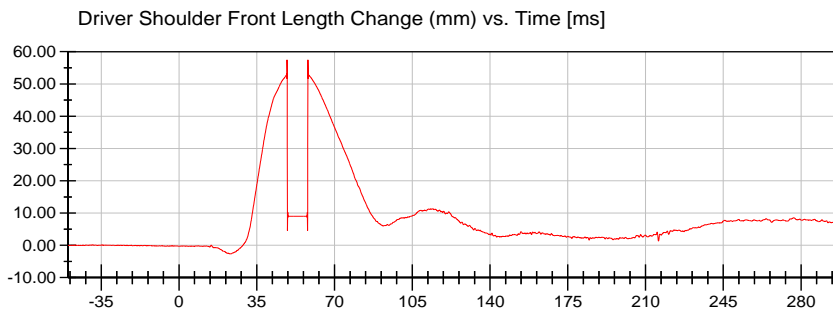
<Max>

16.65 mm at 48.85 ms

<Min>

-74.77 mm at 48.65 ms

Unfiltered



<Max>

57.44 mm at 58.05 ms

<Min>

-2.64 mm at 23.35 ms

CFC_600

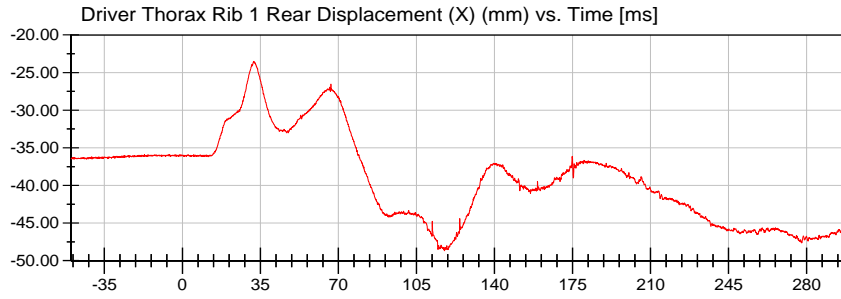


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



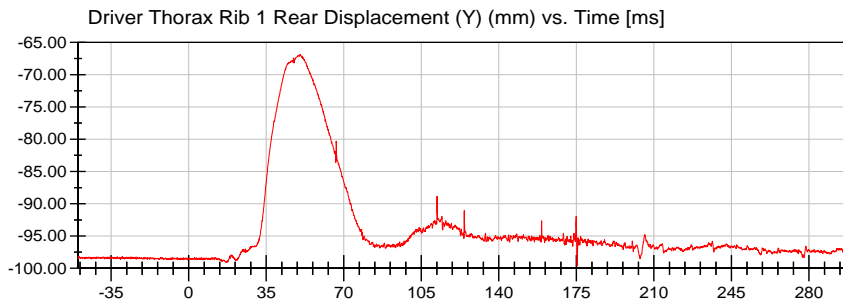
<Max>

-23.52 mm at 32.00 ms

<Min>

-48.70 mm at 117.60 ms

Unfiltered



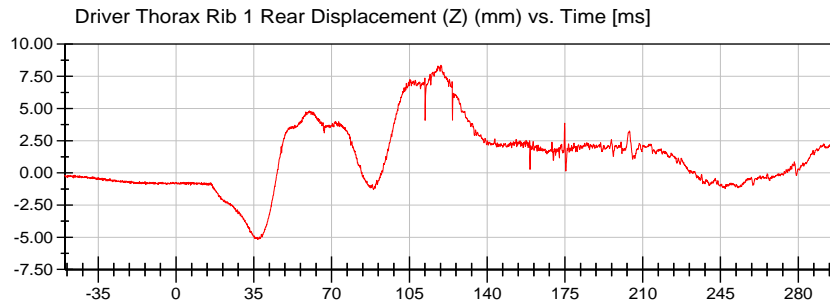
<Max>

-66.88 mm at 50.20 ms

<Min>

-99.64 mm at 175.35 ms

Unfiltered



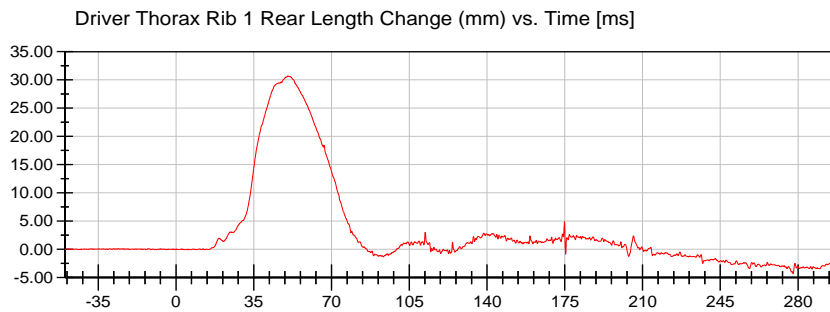
<Max>

8.36 mm at 119.20 ms

<Min>

-5.16 mm at 36.70 ms

Unfiltered



<Max>

30.70 mm at 50.40 ms

<Min>

-4.30 mm at 277.75 ms

CFC_600

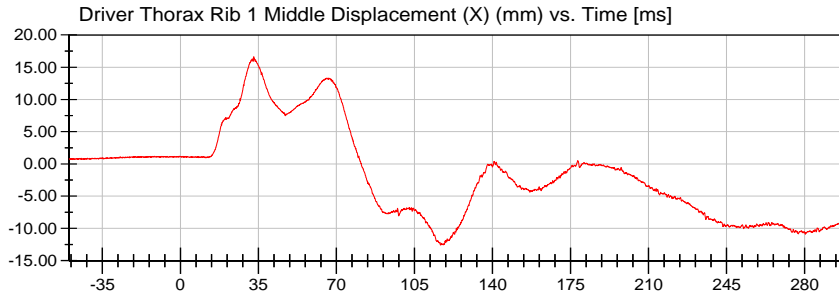


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



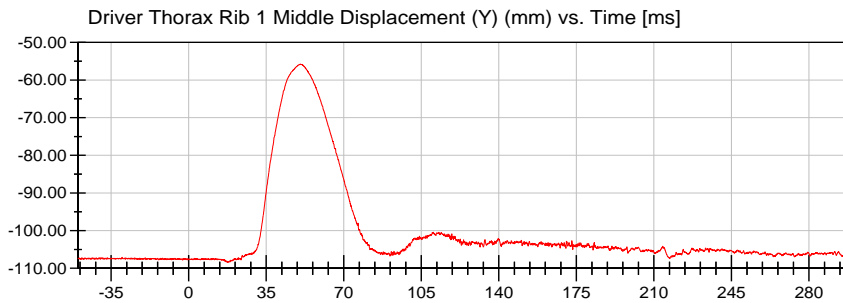
<Max>

16.62 mm at 32.95 ms

<Min>

-12.57 mm at 116.85 ms

Unfiltered



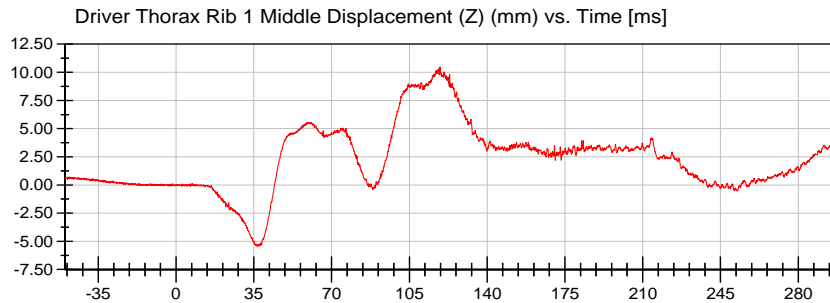
<Max>

-55.76 mm at 50.45 ms

<Min>

-108.44 mm at 17.70 ms

Unfiltered



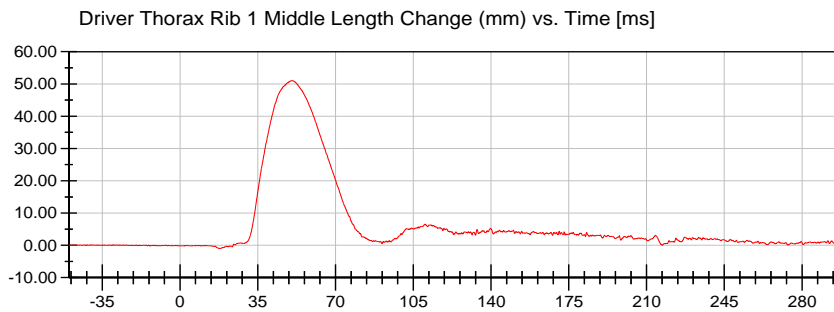
<Max>

10.50 mm at 118.75 ms

<Min>

-5.46 mm at 36.90 ms

Unfiltered



<Max>

51.03 mm at 50.40 ms

<Min>

-0.96 mm at 17.80 ms

CFC_600

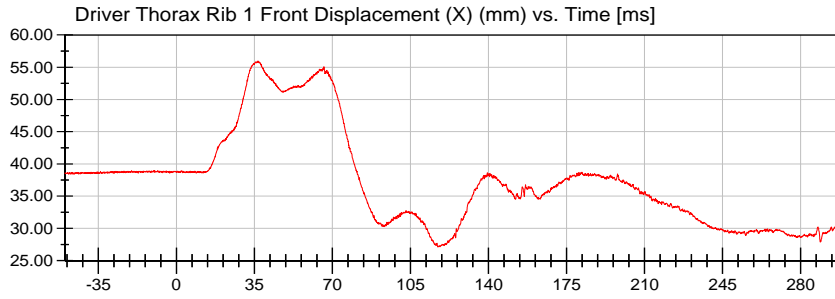


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



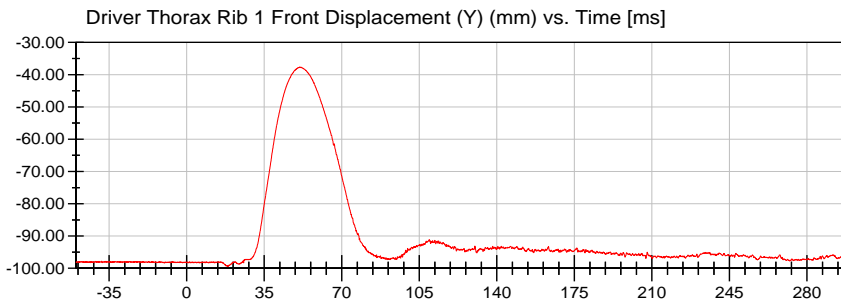
<Max>

55.94 mm at 36.85 ms

<Min>

27.10 mm at 117.35 ms

Unfiltered



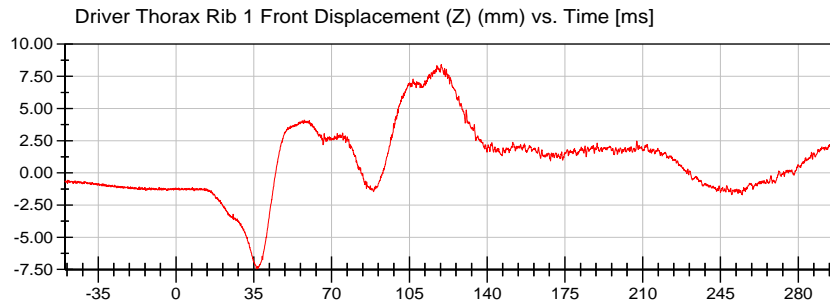
<Max>

-37.67 mm at 51.00 ms

<Min>

-99.45 mm at 18.70 ms

Unfiltered



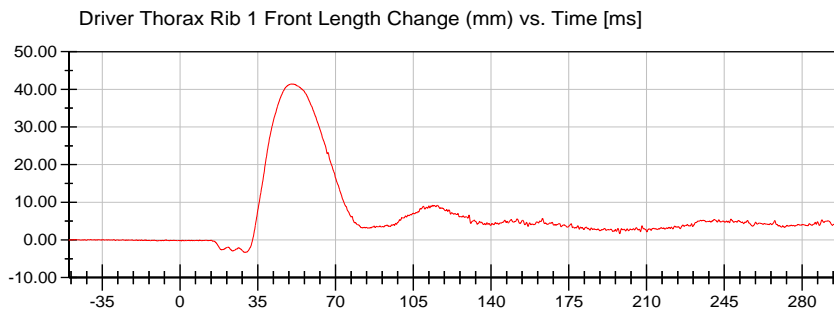
<Max>

8.41 mm at 119.40 ms

<Min>

-7.45 mm at 36.35 ms

Unfiltered



<Max>

41.44 mm at 50.30 ms

<Min>

-3.29 mm at 29.25 ms

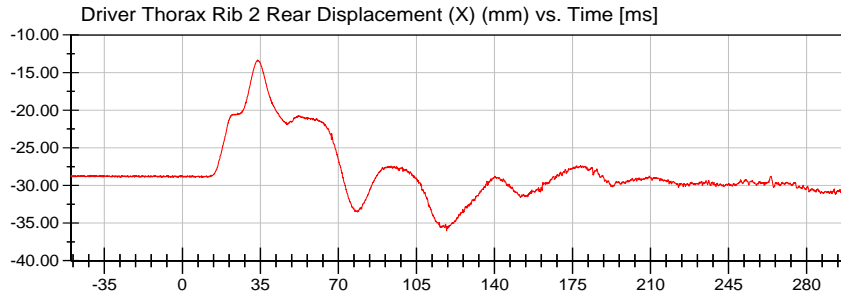
CFC_600



VRTC

Test Lab: CTF
Test Number: 200925 ()

Test Date: 09/25/2020



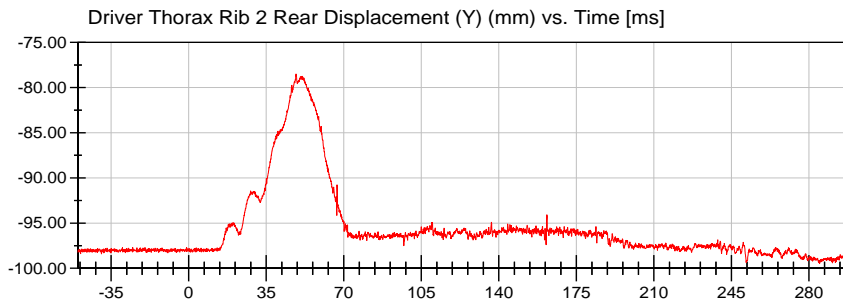
<Max>

-13.31 mm at 33.75 ms

<Min>

-36.02 mm at 118.50 ms

Unfiltered



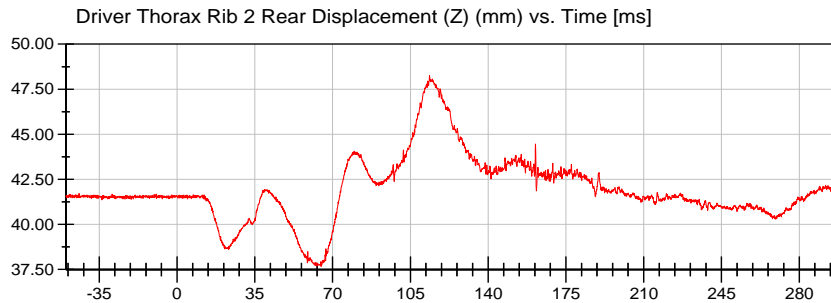
<Max>

-78.50 mm at 48.45 ms

<Min>

-99.45 mm at 284.80 ms

Unfiltered



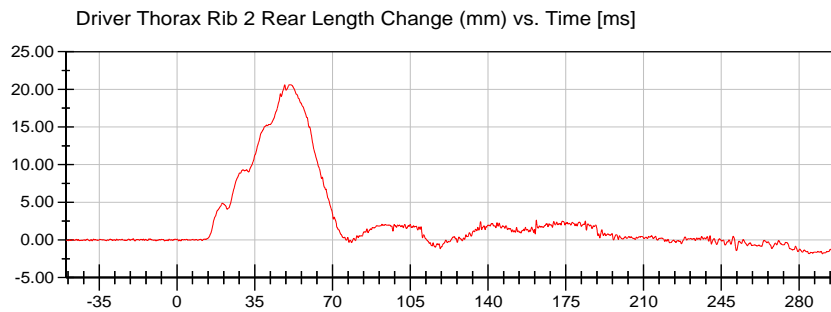
<Max>

48.26 mm at 113.60 ms

<Min>

37.67 mm at 64.85 ms

Unfiltered



<Max>

20.61 mm at 51.25 ms

<Min>

-1.85 mm at 290.55 ms

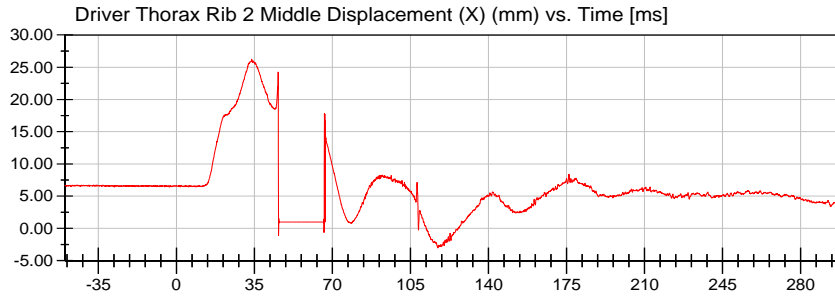
CFC_600



VRTC

Test Lab: CTF
Test Number: 200925 ()

Test Date: 09/25/2020



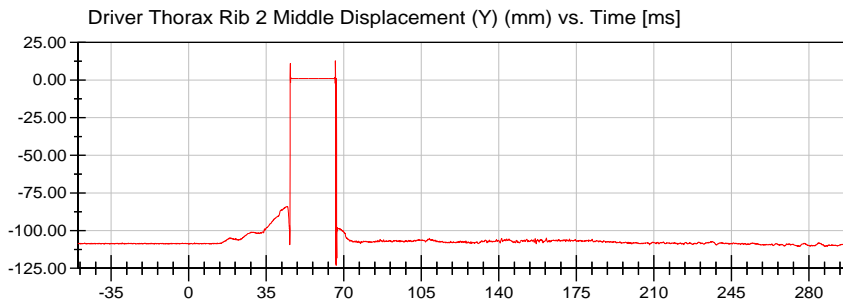
<Max>

26.25 mm at 33.80 ms

<Min>

-3.03 mm at 117.20 ms

Unfiltered



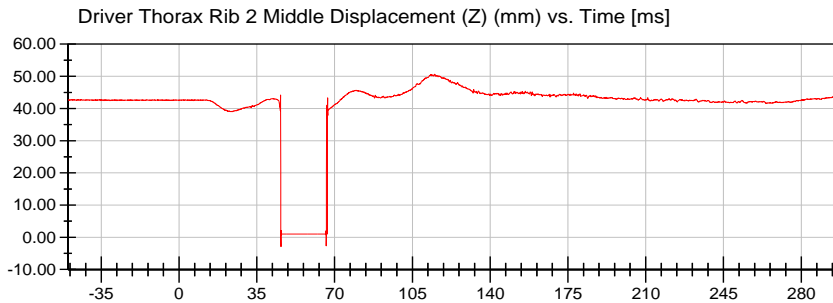
<Max>

12.82 mm at 66.25 ms

<Min>

-123.02 mm at 66.55 ms

Unfiltered



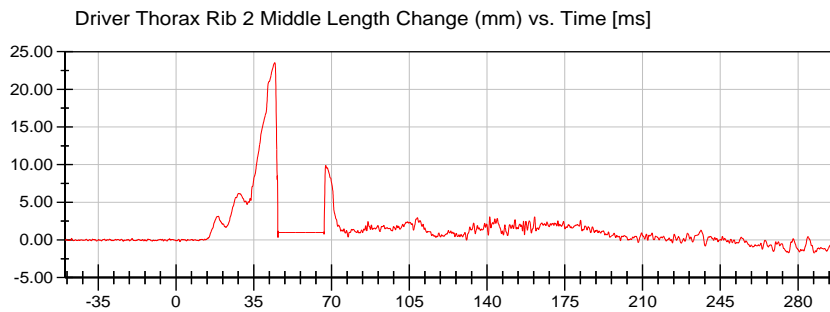
<Max>

50.65 mm at 114.90 ms

<Min>

-2.94 mm at 45.85 ms

Unfiltered



<Max>

23.53 mm at 44.50 ms

<Min>

-1.72 mm at 287.25 ms

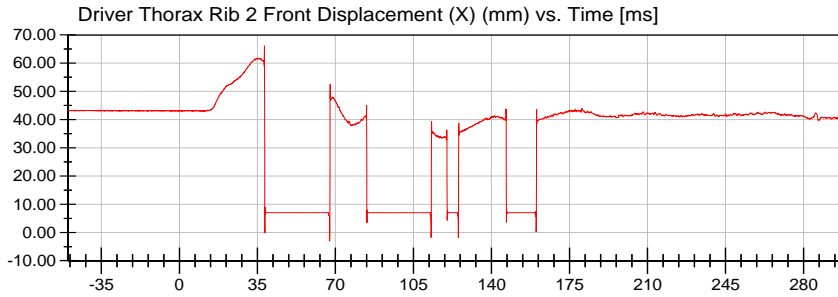
CFC_600



VRTC

Test Lab: CTF
Test Number: 200925 ()

Test Date: 09/25/2020



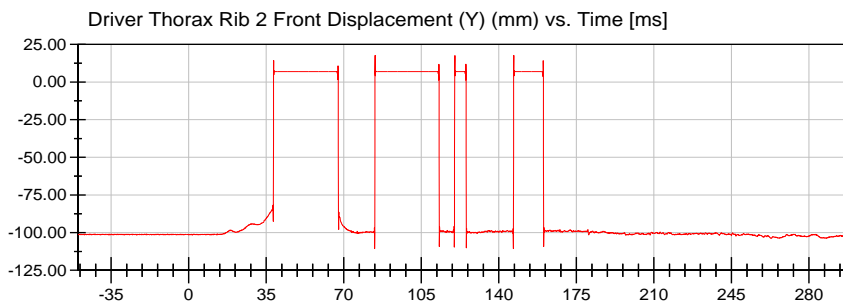
<Max>

66.08 mm at 38.15 ms

<Min>

-3.04 mm at 67.45 ms

Unfiltered



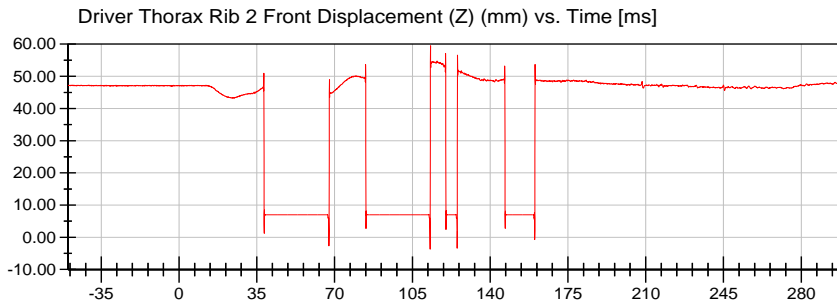
<Max>

17.74 mm at 84.15 ms

<Min>

-110.61 mm at 83.95 ms

Unfiltered



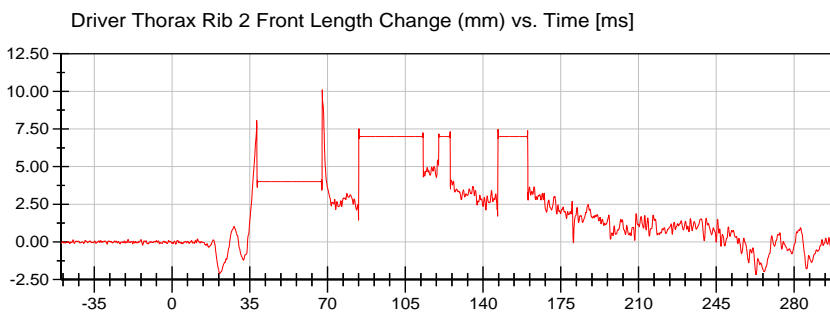
<Max>

59.49 mm at 113.15 ms

<Min>

-3.67 mm at 112.95 ms

Unfiltered



<Max>

10.09 mm at 67.65 ms

<Min>

-2.17 mm at 262.90 ms

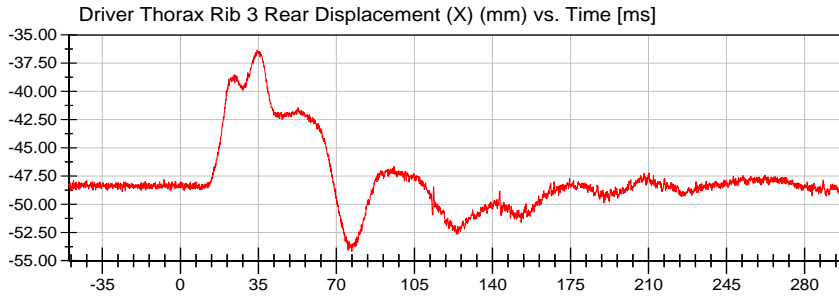
CFC_600



VRTC

Test Lab: CTF
Test Number: 200925 ()

Test Date: 09/25/2020



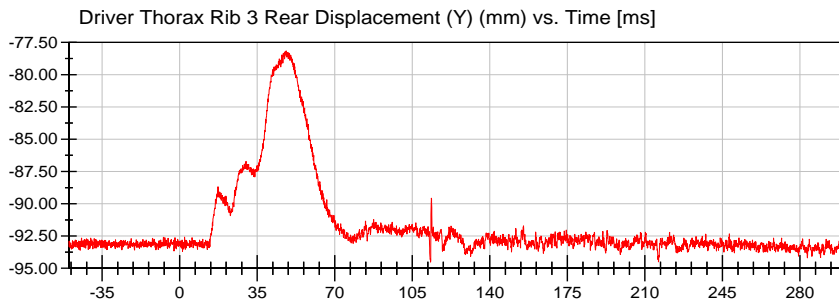
<Max>

-36.35 mm at 34.40 ms

<Min>

-54.17 mm at 76.90 ms

Unfiltered



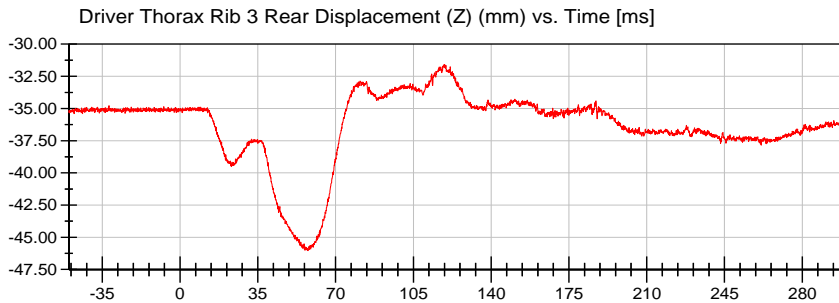
<Max>

-78.16 mm at 48.05 ms

<Min>

-94.52 mm at 113.25 ms

Unfiltered



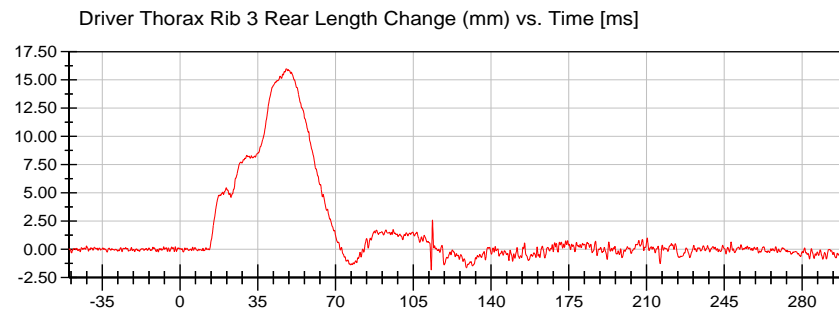
<Max>

-31.58 mm at 119.00 ms

<Min>

-46.03 mm at 57.55 ms

Unfiltered



<Max>

15.99 mm at 47.90 ms

<Min>

-1.81 mm at 113.10 ms

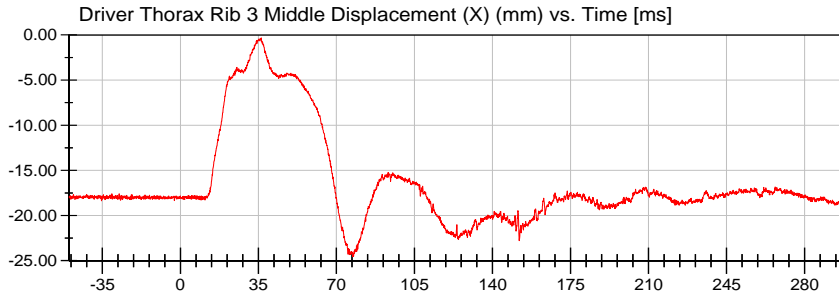
CFC_600



VRTC

Test Lab: CTF
Test Number: 200925 ()

Test Date: 09/25/2020



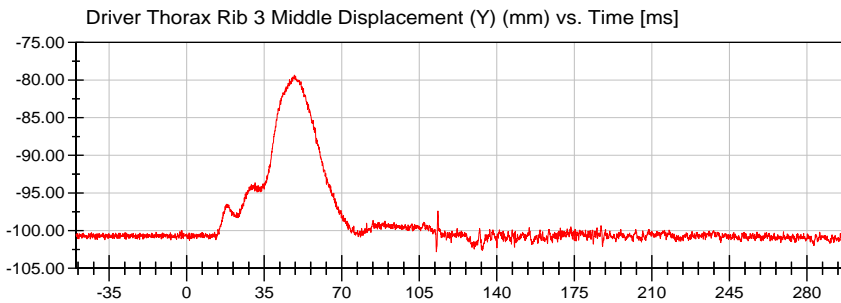
<Max>

-0.33 mm at 36.30 ms

<Min>

-24.55 mm at 77.65 ms

Unfiltered



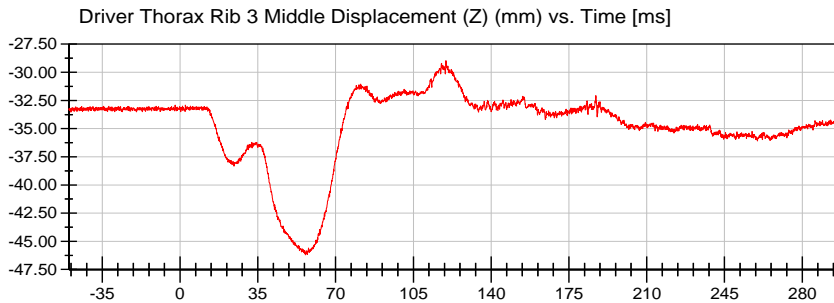
<Max>

-79.34 mm at 48.60 ms

<Min>

-102.81 mm at 112.70 ms

Unfiltered



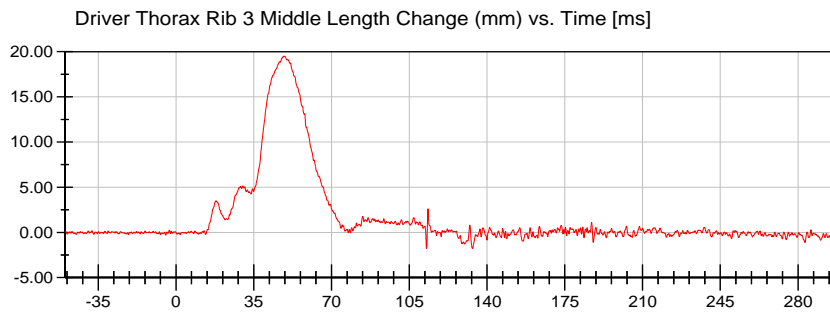
<Max>

-28.97 mm at 119.70 ms

<Min>

-46.20 mm at 56.45 ms

Unfiltered



<Max>

19.52 mm at 48.60 ms

<Min>

-1.77 mm at 133.45 ms

CFC_600

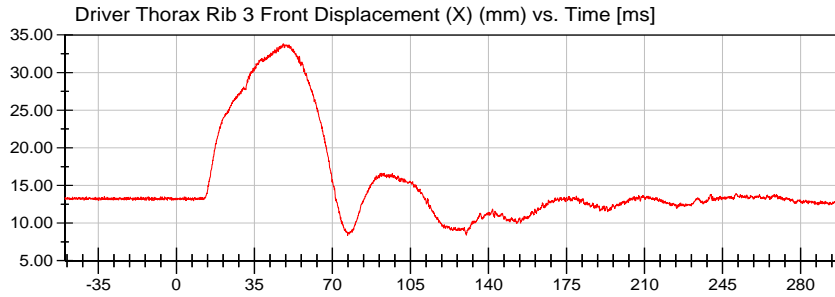


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



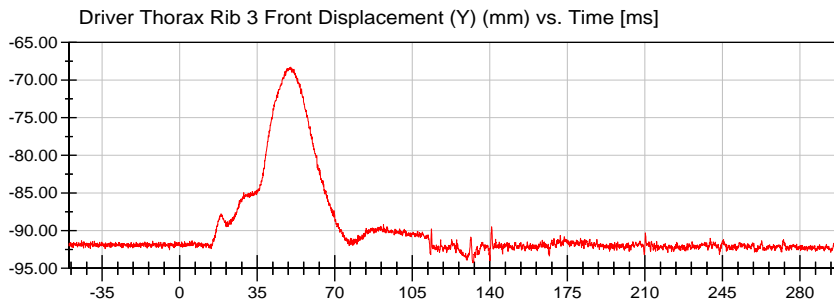
<Max>

33.81 mm at 47.90 ms

<Min>

8.34 mm at 76.80 ms

Unfiltered



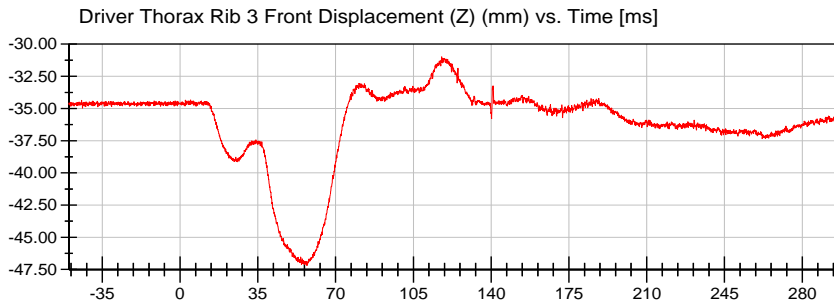
<Max>

-68.29 mm at 50.10 ms

<Min>

-94.29 mm at 132.40 ms

Unfiltered



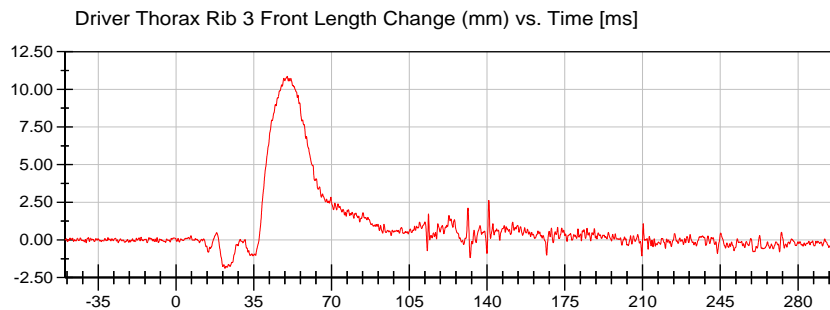
<Max>

-30.98 mm at 117.75 ms

<Min>

-47.19 mm at 57.30 ms

Unfiltered



<Max>

10.86 mm at 50.05 ms

<Min>

-1.89 mm at 22.00 ms

CFC_600

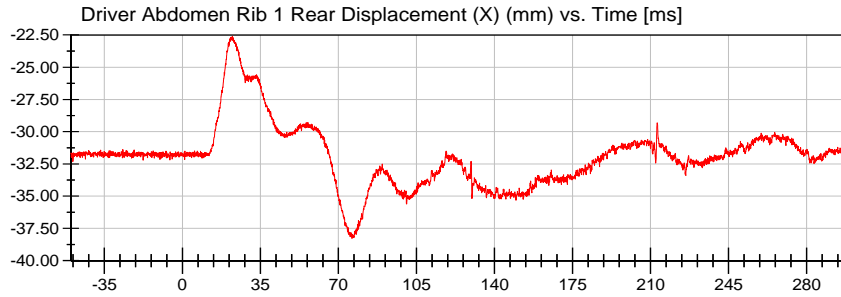


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



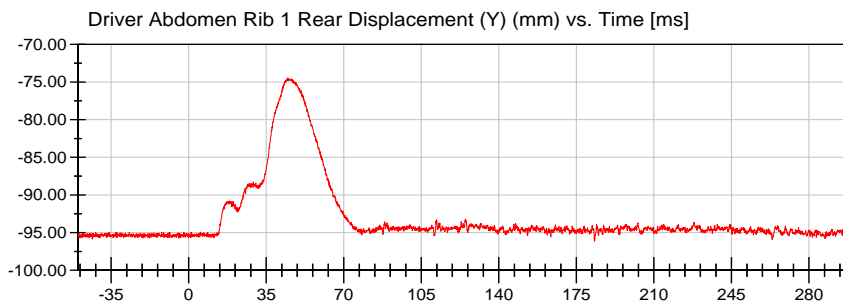
<Max>

-22.61 mm at 22.40 ms

<Min>

-38.27 mm at 76.10 ms

Unfiltered



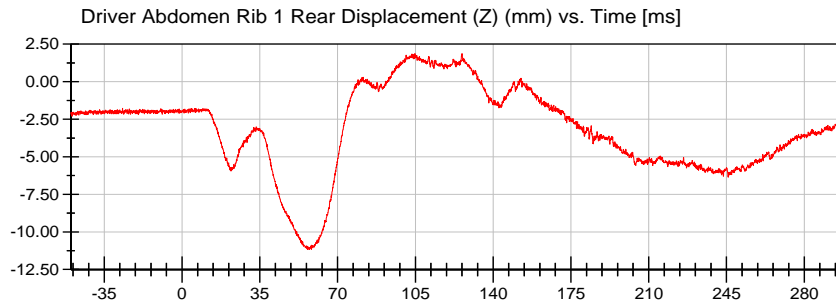
<Max>

-74.47 mm at 44.55 ms

<Min>

-96.28 mm at 300.00 ms

Unfiltered



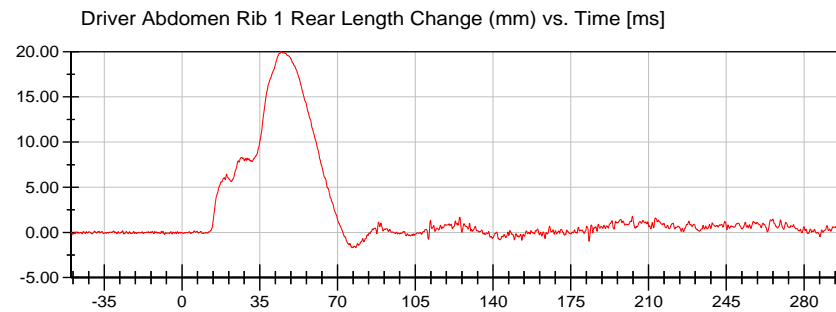
<Max>

1.87 mm at 126.00 ms

<Min>

-11.17 mm at 57.25 ms

Unfiltered



<Max>

20.00 mm at 44.55 ms

<Min>

-1.70 mm at 78.20 ms

CFC_600

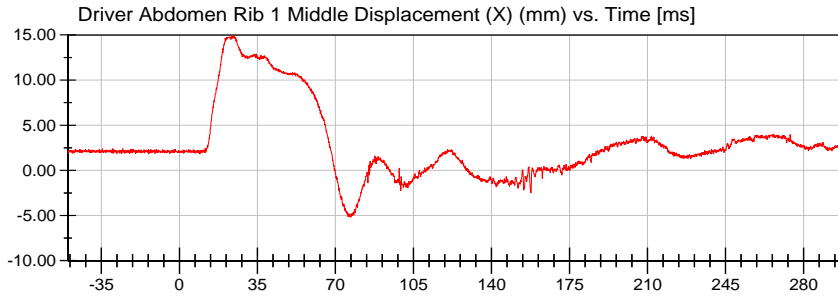


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



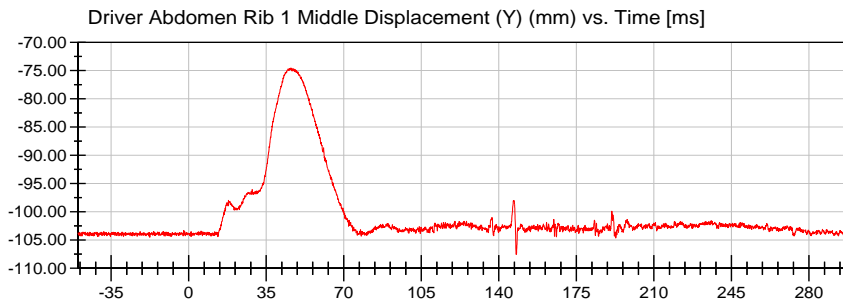
<Max>

14.96 mm at 24.20 ms

<Min>

-5.19 mm at 76.80 ms

Unfiltered



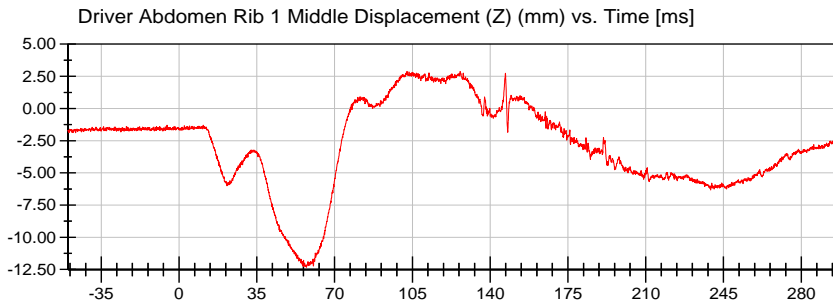
<Max>

-74.56 mm at 46.20 ms

<Min>

-107.56 mm at 147.85 ms

Unfiltered



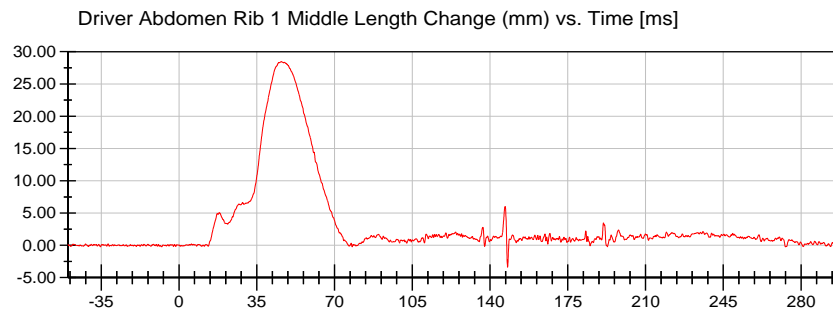
<Max>

2.88 mm at 102.60 ms

<Min>

-12.33 mm at 57.35 ms

Unfiltered



<Max>

28.48 mm at 45.95 ms

<Min>

-3.39 mm at 147.90 ms

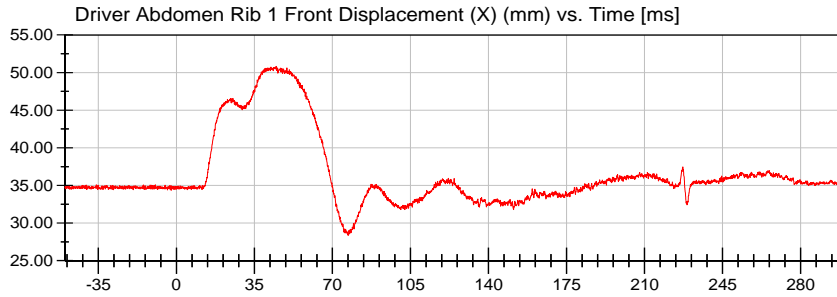
CFC_600



VRTC

Test Lab: CTF
Test Number: 200925 ()

Test Date: 09/25/2020



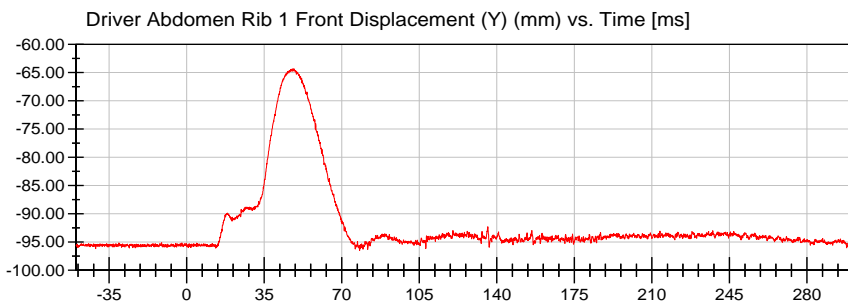
<Max>

50.84 mm at 44.70 ms

<Min>

28.35 mm at 77.10 ms

Unfiltered



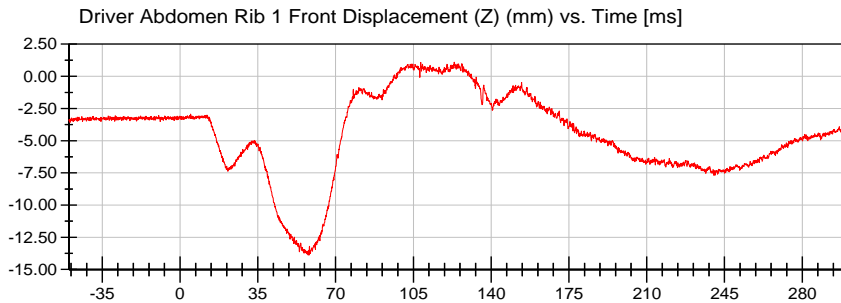
<Max>

-64.31 mm at 48.40 ms

<Min>

-96.51 mm at 78.00 ms

Unfiltered



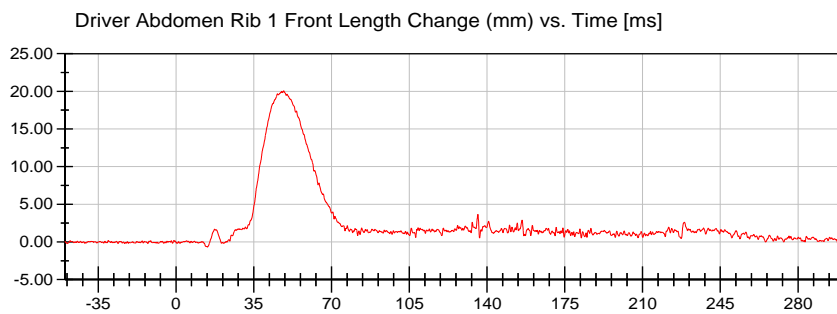
<Max>

1.09 mm at 123.40 ms

<Min>

-13.88 mm at 57.60 ms

Unfiltered



<Max>

20.07 mm at 48.50 ms

<Min>

-0.68 mm at 14.15 ms

CFC_600

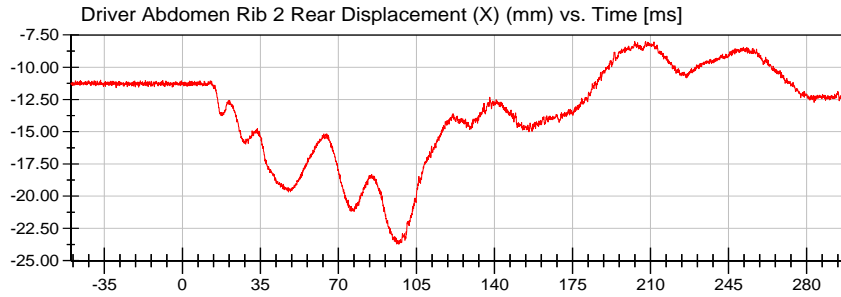


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



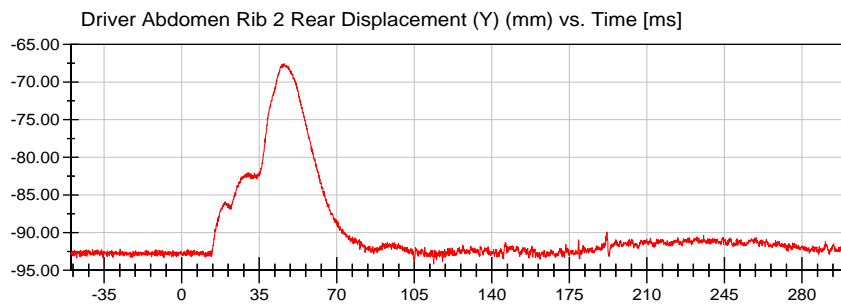
<Max>

-8.00 mm at 207.80 ms

<Min>

-23.73 mm at 96.95 ms

Unfiltered



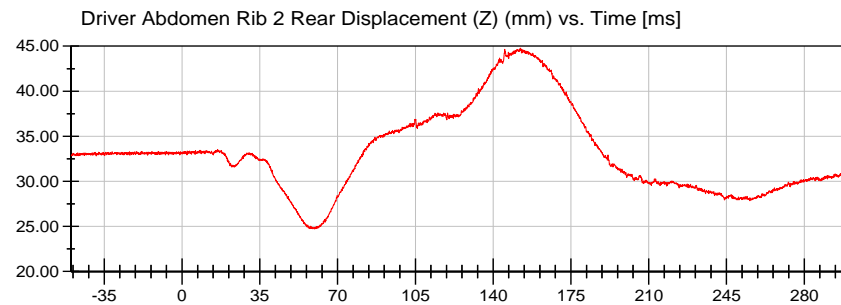
<Max>

-67.56 mm at 46.20 ms

<Min>

-94.18 mm at 113.70 ms

Unfiltered



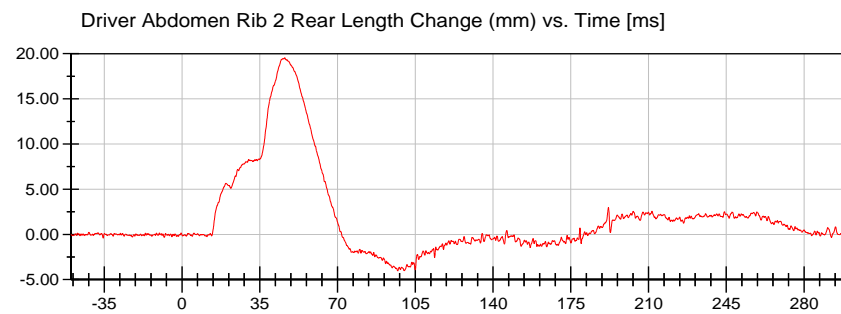
<Max>

44.78 mm at 152.25 ms

<Min>

24.72 mm at 59.50 ms

Unfiltered



<Max>

19.54 mm at 46.25 ms

<Min>

-4.03 mm at 97.10 ms

CFC_600

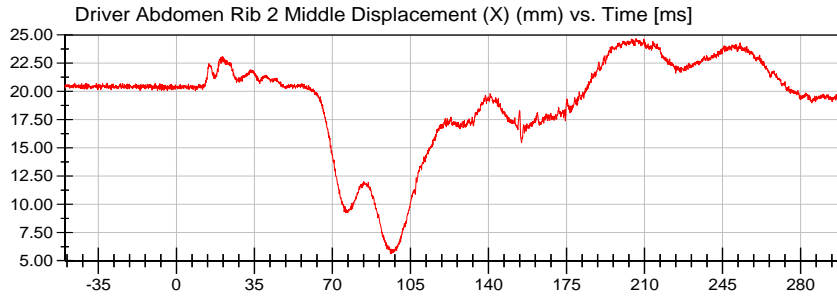


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



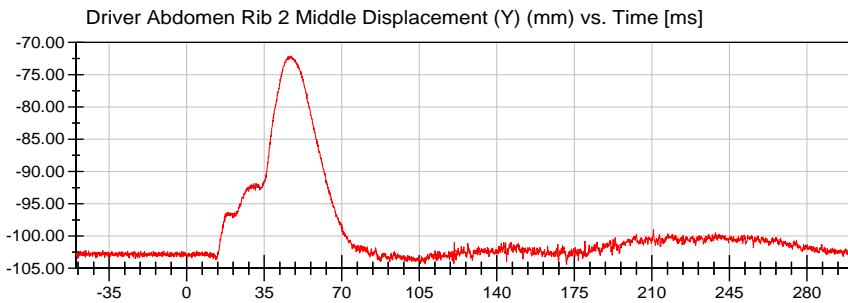
<Max>

24.68 mm at 206.20 ms

<Min>

5.62 mm at 96.20 ms

Unfiltered



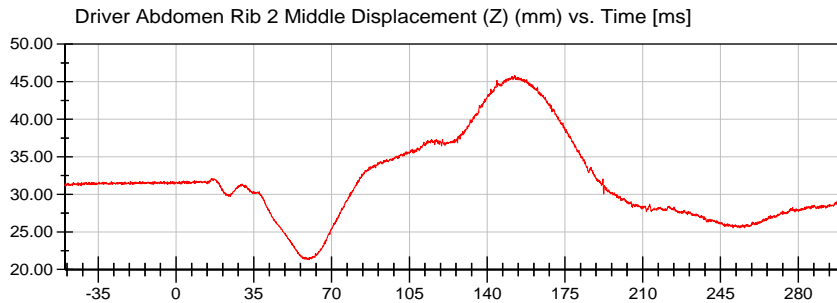
<Max>

-72.12 mm at 47.20 ms

<Min>

-104.42 mm at 171.50 ms

Unfiltered



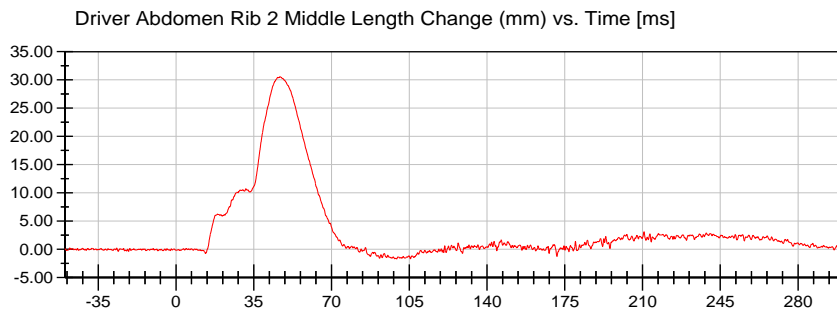
<Max>

45.80 mm at 152.50 ms

<Min>

21.27 mm at 59.80 ms

Unfiltered



<Max>

30.55 mm at 46.80 ms

<Min>

-1.70 mm at 99.35 ms

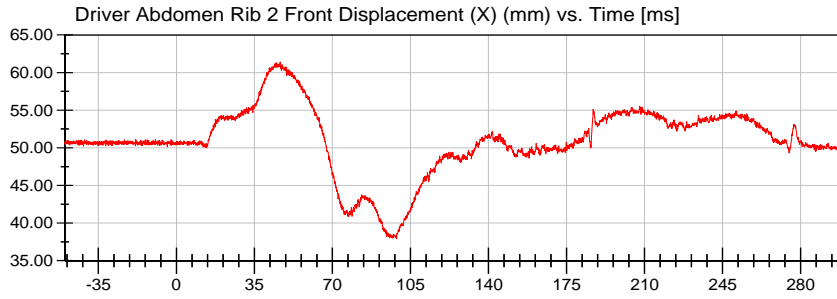
CFC_600



VRTC

Test Lab: CTF
Test Number: 200925 ()

Test Date: 09/25/2020



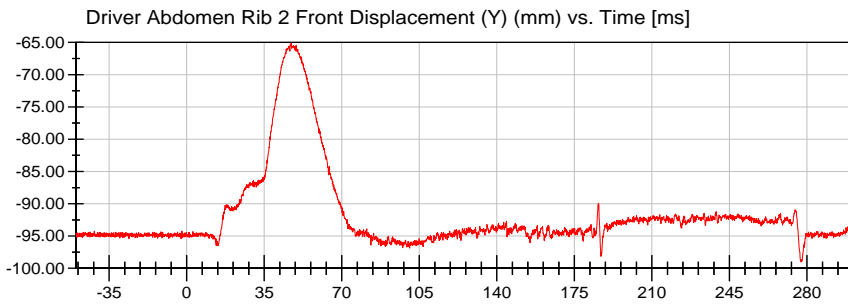
<Max>

61.40 mm at 46.60 ms

<Min>

37.91 mm at 98.80 ms

Unfiltered



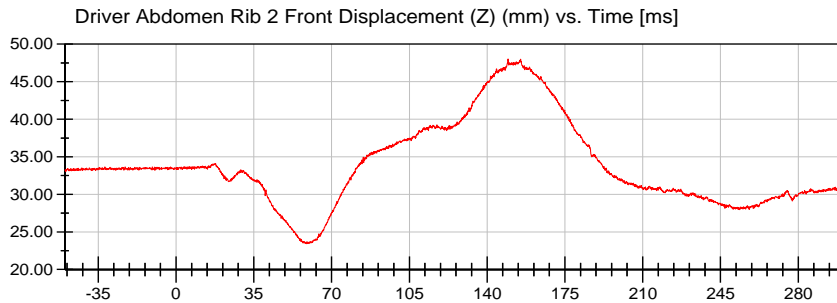
<Max>

-65.06 mm at 47.20 ms

<Min>

-99.01 mm at 277.35 ms

Unfiltered



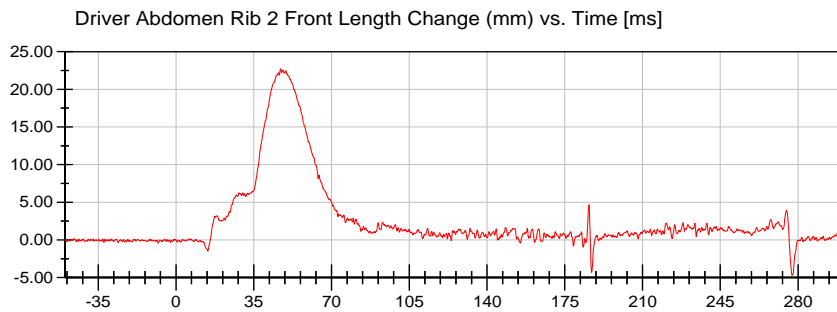
<Max>

48.03 mm at 149.40 ms

<Min>

23.42 mm at 58.80 ms

Unfiltered



<Max>

22.73 mm at 47.05 ms

<Min>

-4.67 mm at 277.35 ms

CFC_600

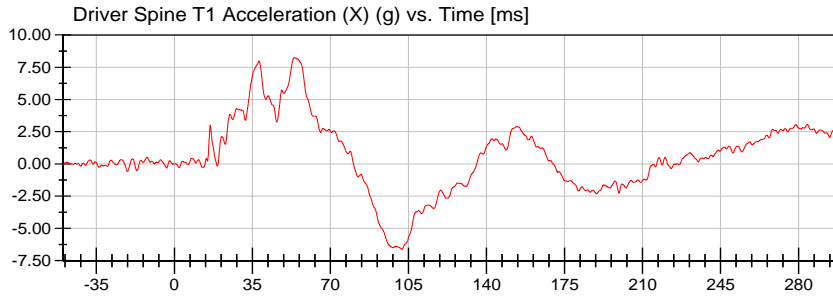


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



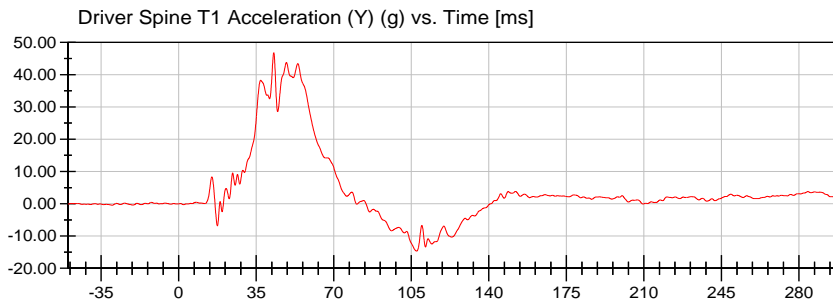
<Max>

8.25 g at 53.85 ms

<Min>

-6.62 g at 102.10 ms

CFC_180



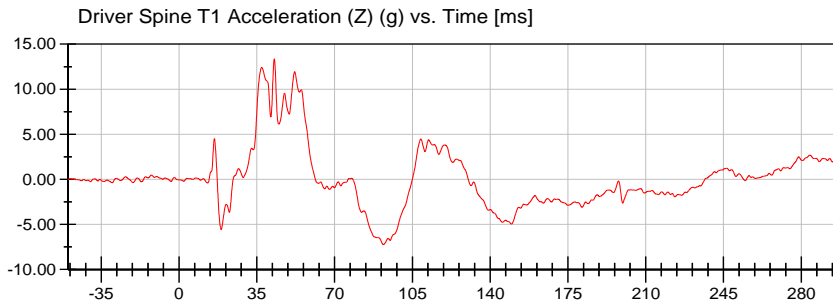
<Max>

46.78 g at 42.95 ms

<Min>

-14.64 g at 107.40 ms

CFC_180



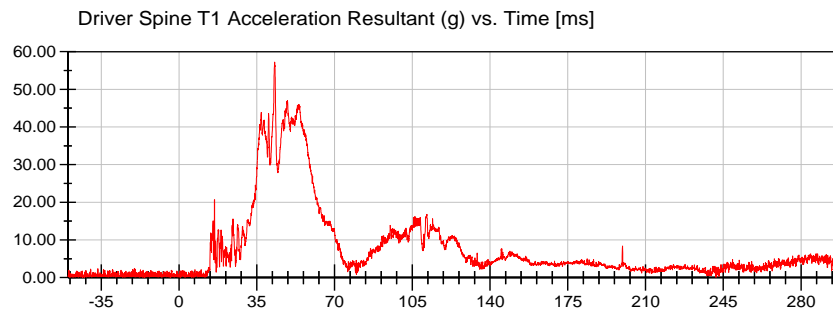
<Max>

13.36 g at 42.85 ms

<Min>

-7.23 g at 91.95 ms

CFC_180



<Max>

57.25 g at 43.05 ms

<Min>

0.08 g at -42.45 ms

Prefiltered_> CFC 1000

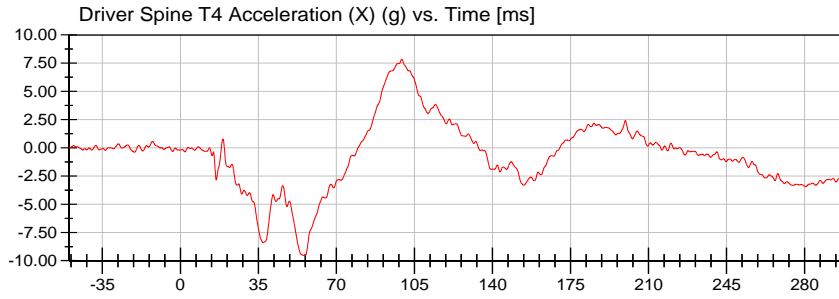


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



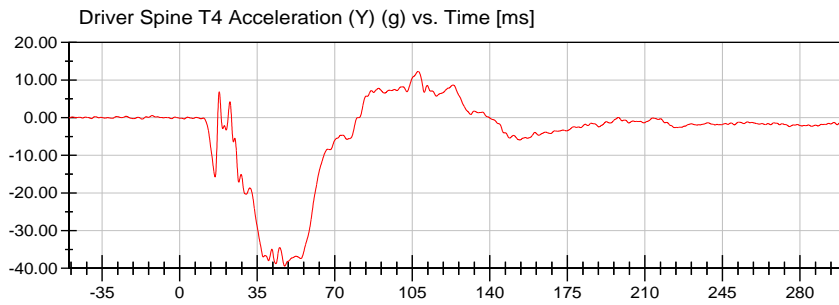
<Max>

7.84 g at 99.35 ms

<Min>

-9.55 g at 55.85 ms

CFC_180



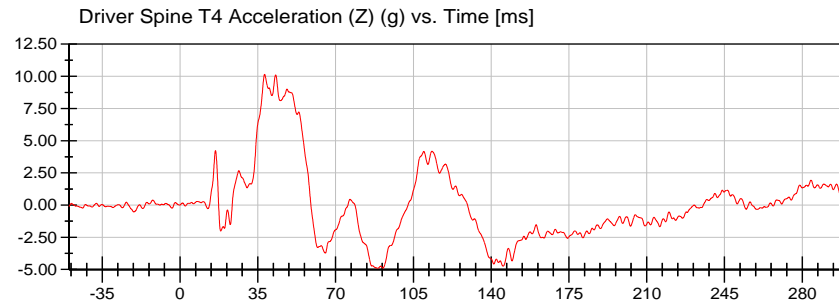
<Max>

12.29 g at 107.65 ms

<Min>

-39.40 g at 47.40 ms

CFC_180



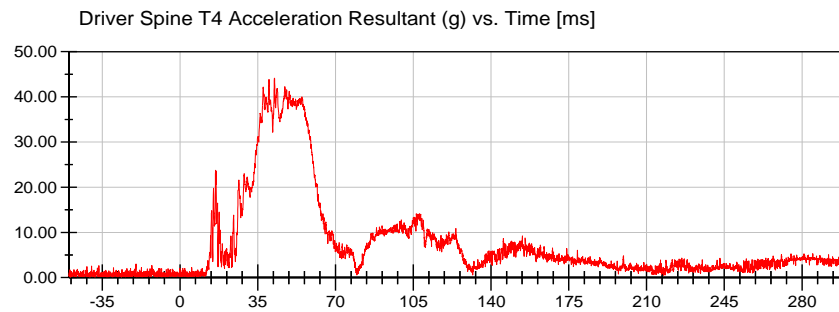
<Max>

10.16 g at 38.05 ms

<Min>

-4.91 g at 88.85 ms

CFC_180



<Max>

44.15 g at 42.50 ms

<Min>

0.09 g at -40.55 ms

Prefiltered_> CFC 1000

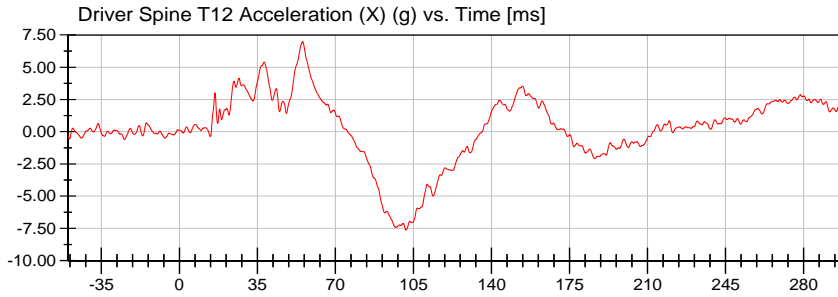


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



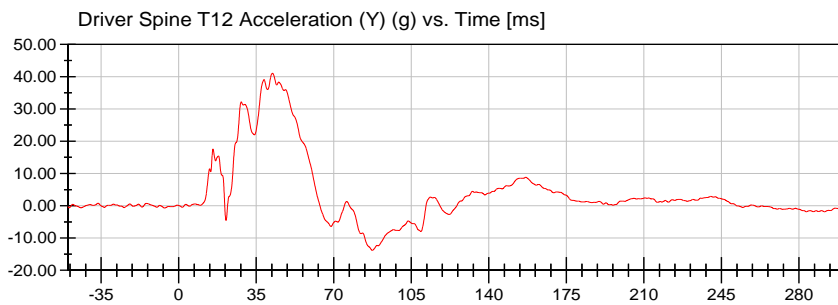
<Max>

6.98 g at 55.25 ms

<Min>

-7.64 g at 101.65 ms

CFC_180



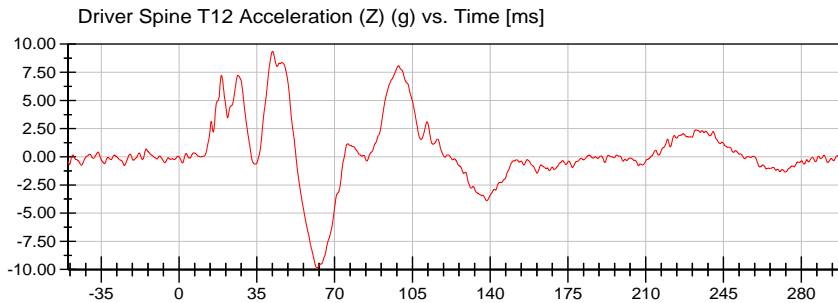
<Max>

41.05 g at 42.35 ms

<Min>

-13.83 g at 87.40 ms

CFC_180



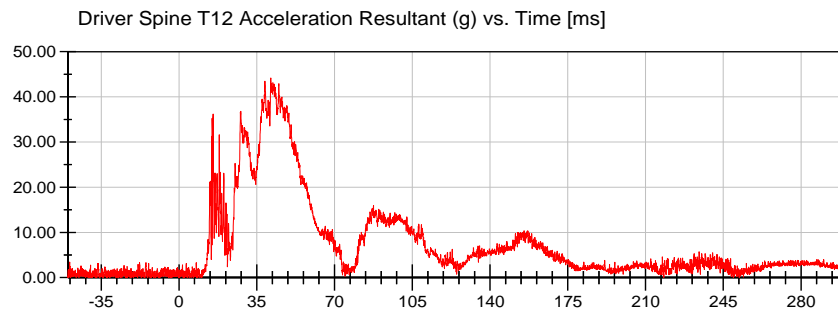
<Max>

9.37 g at 42.05 ms

<Min>

-9.84 g at 62.10 ms

CFC_180



<Max>

44.20 g at 41.30 ms

<Min>

0.04 g at -49.95 ms

Prefiltered_> CFC 1000

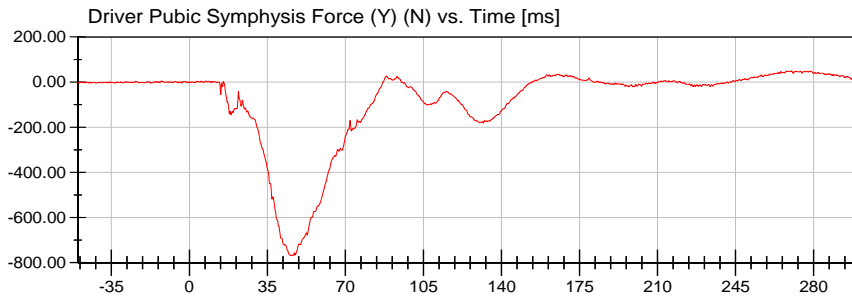


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



<Max>

49.57 N at 270.20 ms

<Min>

-768.95 N at 45.85 ms

CFC_600

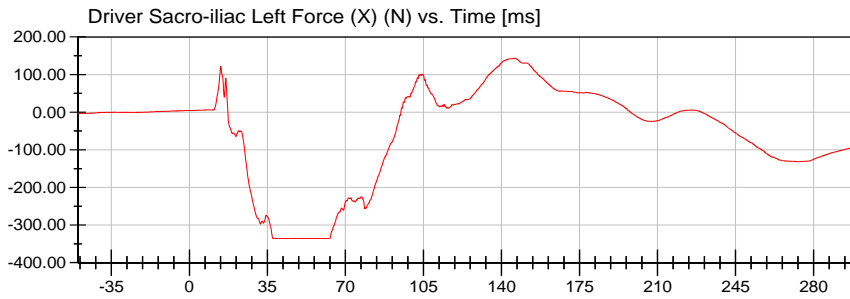


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



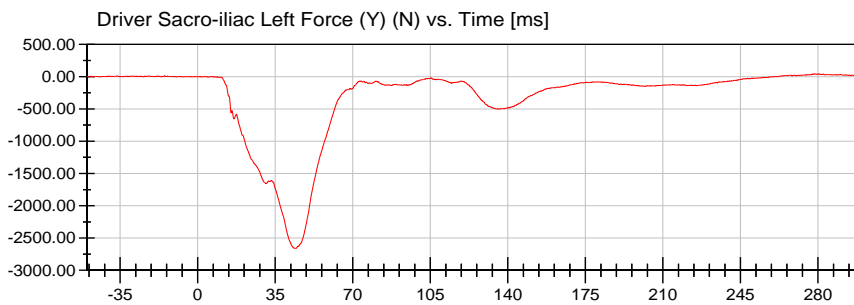
<Max>

143.54 N at 145.50 ms

<Min>

-336.01 N at 62.90 ms

CFC_600



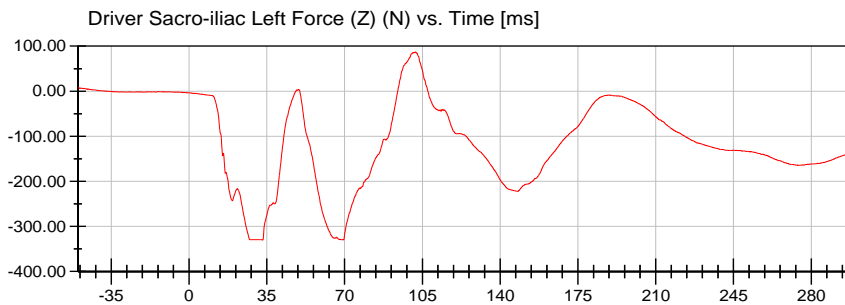
<Max>

44.94 N at 278.55 ms

<Min>

-2,662.21 N at 44.15 ms

CFC_600



<Max>

87.24 N at 101.85 ms

<Min>

-330.51 N at 33.15 ms

CFC_600

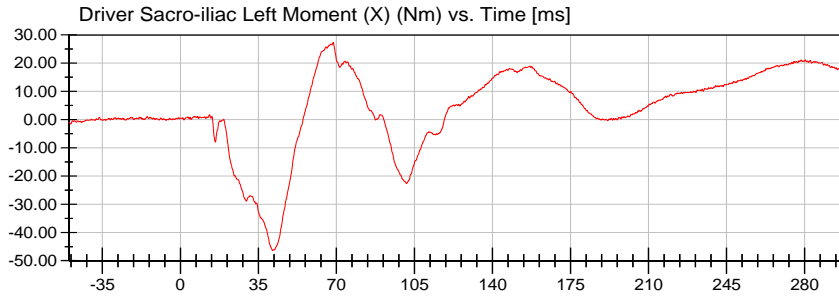


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



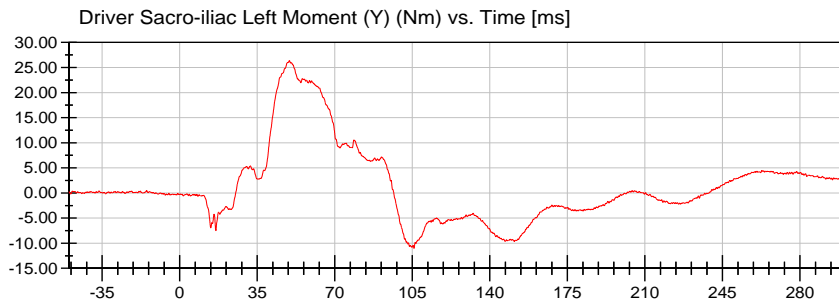
<Max>

27.35 Nm at 68.50 ms

<Min>

-46.40 Nm at 41.40 ms

CFC_600



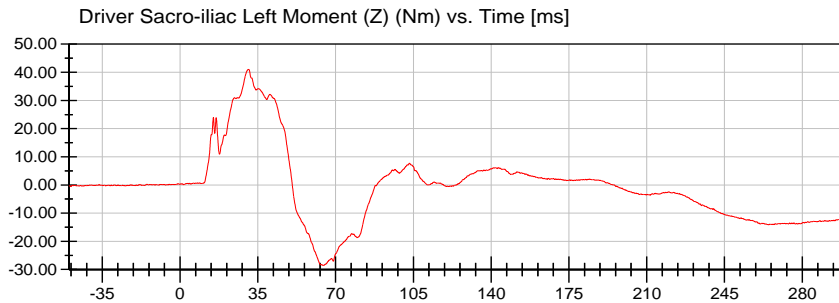
<Max>

26.35 Nm at 49.50 ms

<Min>

-11.02 Nm at 105.75 ms

CFC_600



<Max>

41.03 Nm at 30.85 ms

<Min>

-28.58 Nm at 64.55 ms

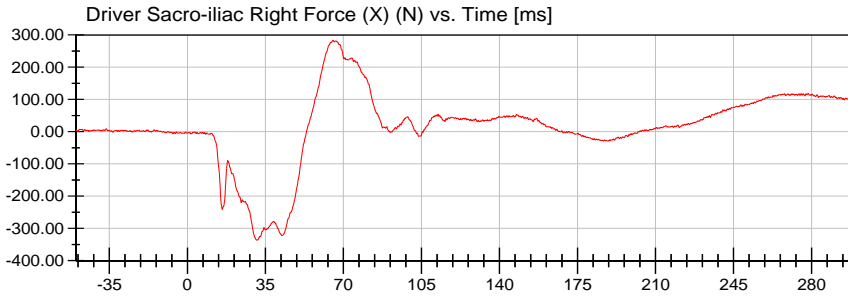
CFC_600



VRTC

Test Lab: CTF
Test Number: 200925 ()

Test Date: 09/25/2020



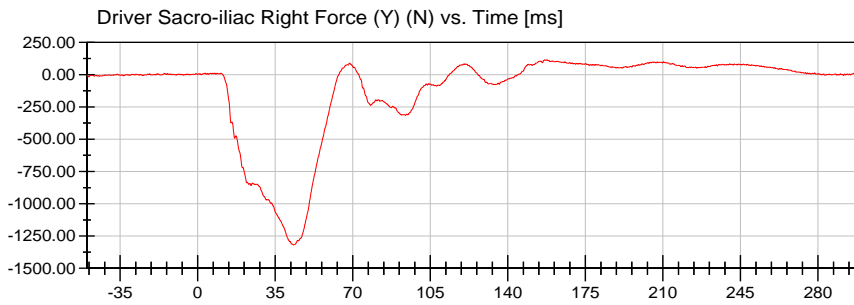
<Max>

283.32 N at 65.35 ms

<Min>

-336.44 N at 31.35 ms

CFC_600



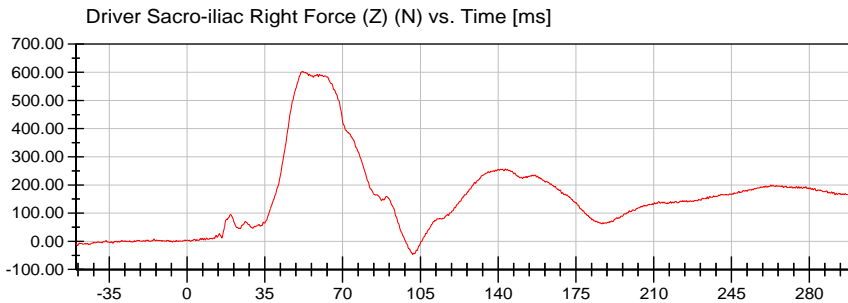
<Max>

115.11 N at 156.75 ms

<Min>

-1,318.86 N at 43.15 ms

CFC_600



<Max>

603.25 N at 52.00 ms

<Min>

-46.70 N at 101.55 ms

CFC_600

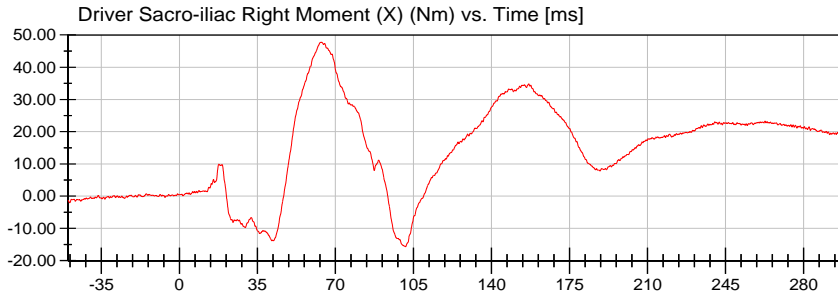


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



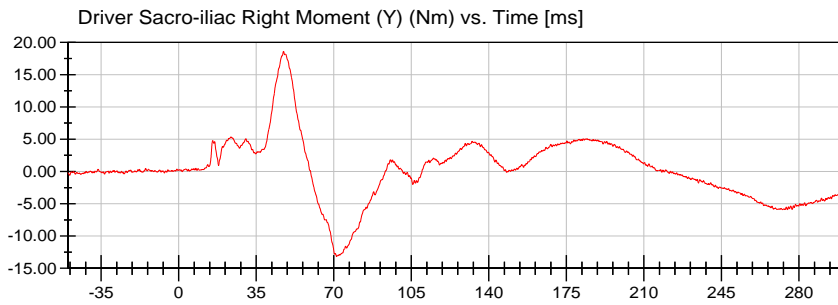
<Max>

47.73 Nm at 63.75 ms

<Min>

-15.67 Nm at 101.45 ms

CFC_600



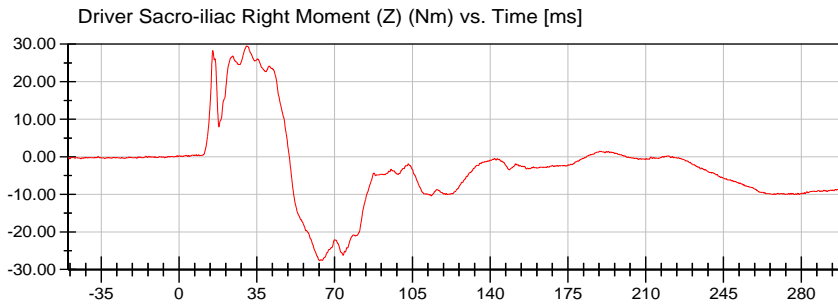
<Max>

18.59 Nm at 47.30 ms

<Min>

-13.18 Nm at 71.30 ms

CFC_600



<Max>

29.50 Nm at 30.45 ms

<Min>

-27.64 Nm at 63.30 ms

CFC_600

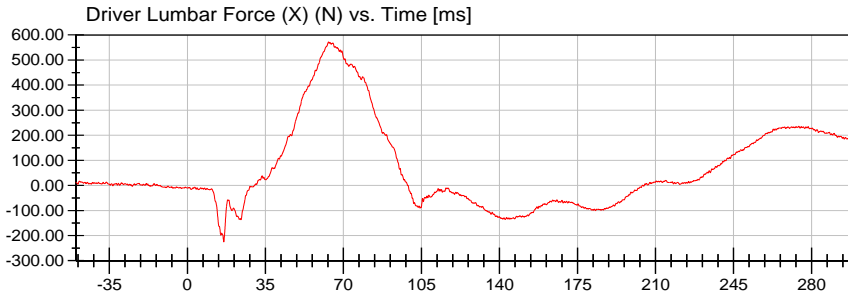


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



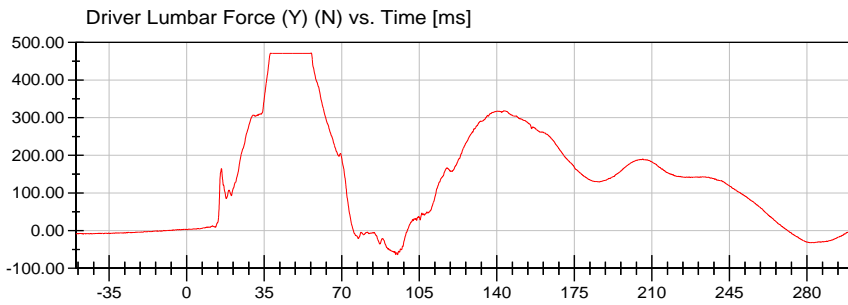
<Max>

572.14 N at 63.30 ms

<Min>

-225.36 N at 16.35 ms

CFC_600



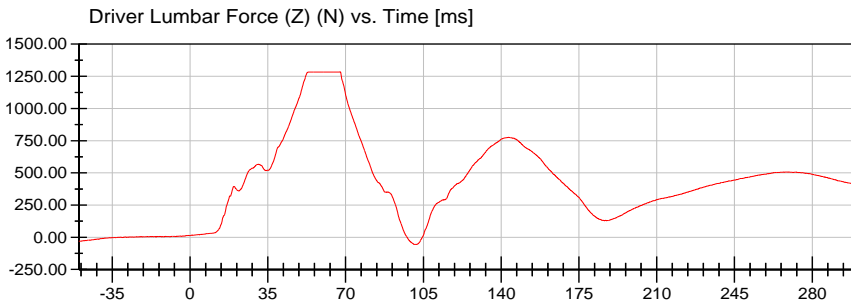
<Max>

471.77 N at 56.20 ms

<Min>

-63.74 N at 95.20 ms

CFC_600



<Max>

1,284.37 N at 67.60 ms

<Min>

-55.63 N at 101.00 ms

CFC_600

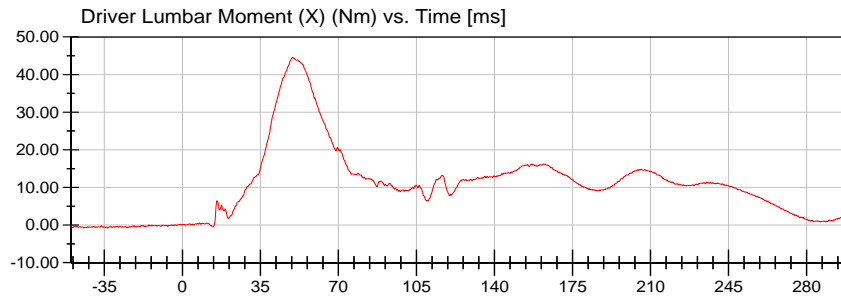


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



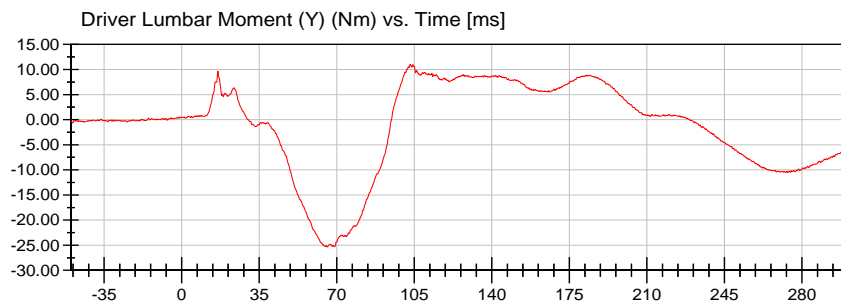
<Max>

44.56 Nm at 49.55 ms

<Min>

-0.79 Nm at -33.40 ms

CFC_600



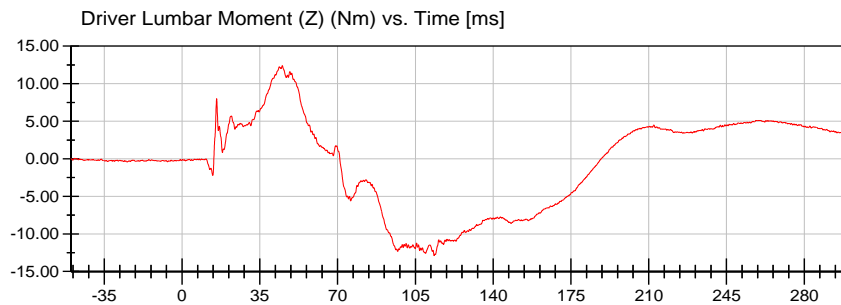
<Max>

11.03 Nm at 103.15 ms

<Min>

-25.36 Nm at 65.70 ms

CFC_600



<Max>

12.40 Nm at 45.10 ms

<Min>

-12.90 Nm at 113.45 ms

CFC_600

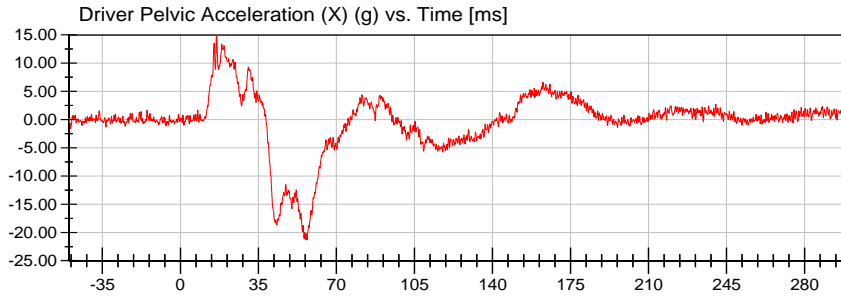


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



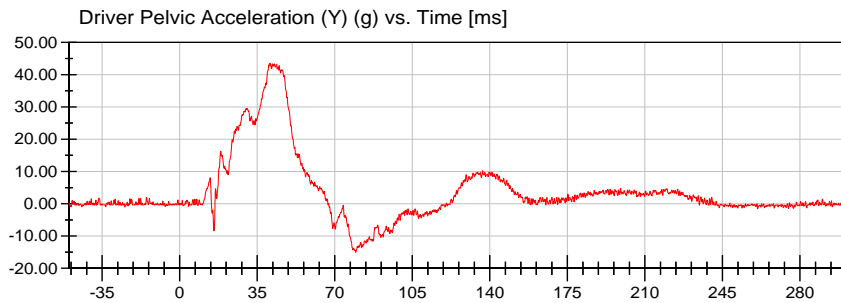
<Max>

14.95 g at 16.20 ms

<Min>

-21.32 g at 56.80 ms

CFC_1000



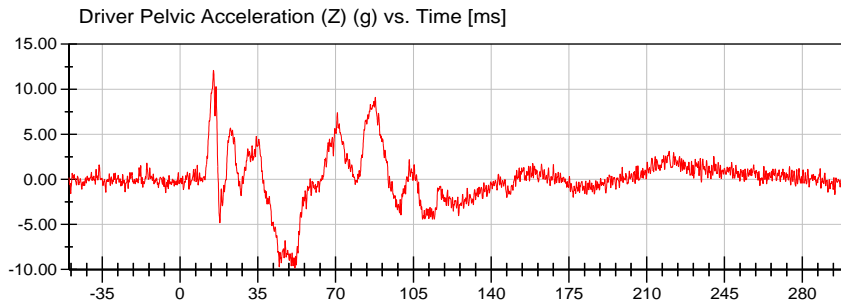
<Max>

43.53 g at 40.65 ms

<Min>

-15.07 g at 79.50 ms

CFC_1000



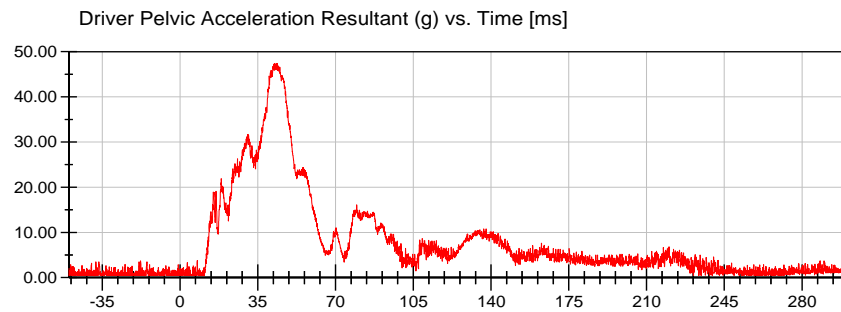
<Max>

12.09 g at 15.05 ms

<Min>

-9.84 g at 51.65 ms

CFC_1000



<Max>

47.41 g at 43.55 ms

<Min>

0.37 g at -38.60 ms

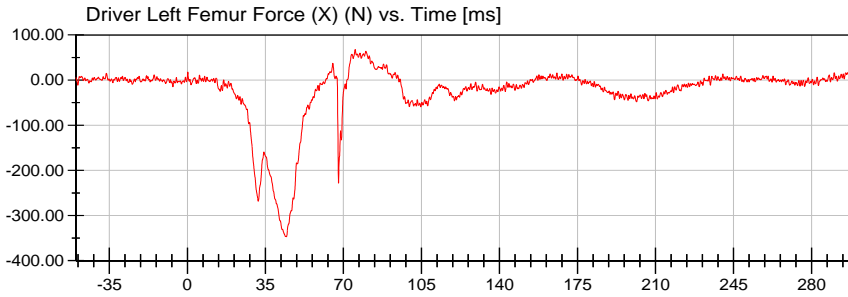
Prefiltered_> CFC 1000



VRTC

Test Lab: CTF
Test Number: 200925 ()

Test Date: 09/25/2020



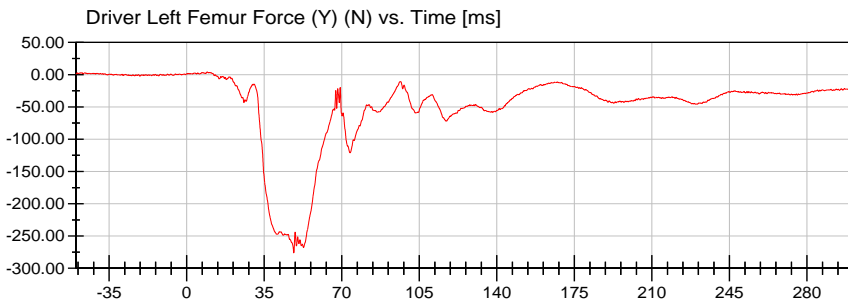
<Max>

67.53 N at 75.25 ms

<Min>

-347.06 N at 44.40 ms

CFC_600



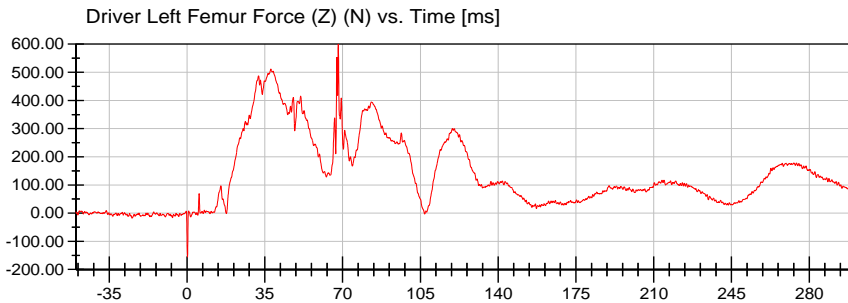
<Max>

4.21 N at 9.25 ms

<Min>

-276.13 N at 48.35 ms

CFC_600



<Max>

599.69 N at 68.05 ms

<Min>

-155.56 N at 0.20 ms

CFC_600

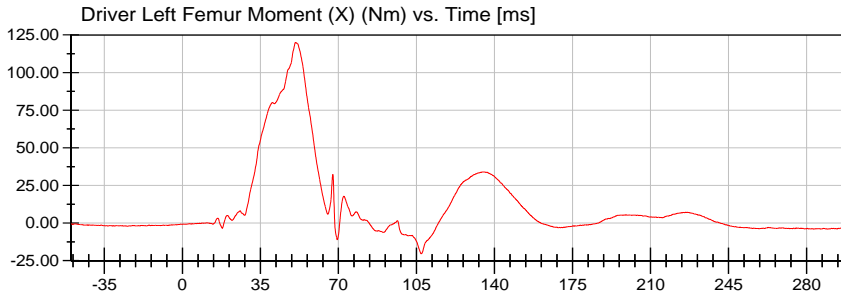


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



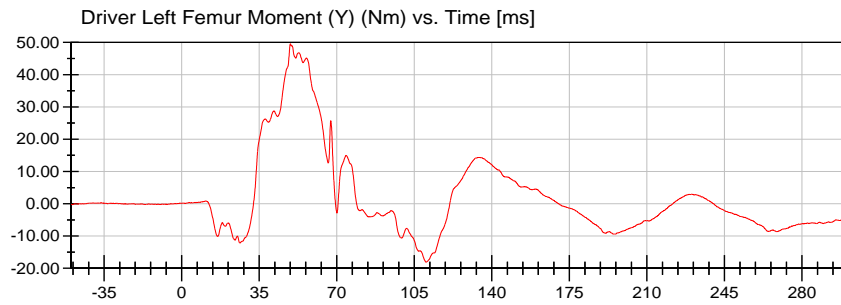
<Max>

119.97 Nm at 50.75 ms

<Min>

-20.42 Nm at 107.15 ms

CFC_600



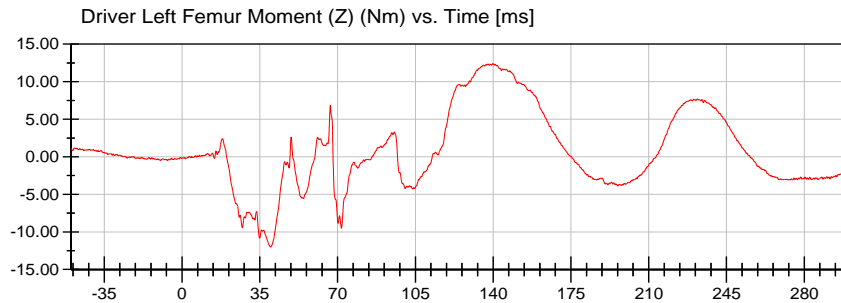
<Max>

49.54 Nm at 49.05 ms

<Min>

-18.09 Nm at 110.35 ms

CFC_600



<Max>

12.40 Nm at 139.90 ms

<Min>

-12.02 Nm at 39.90 ms

CFC_600

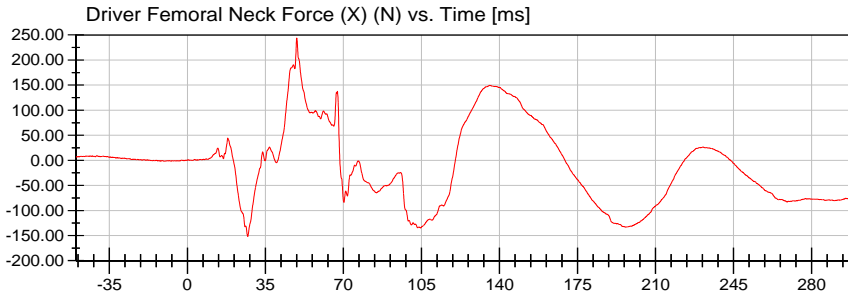


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



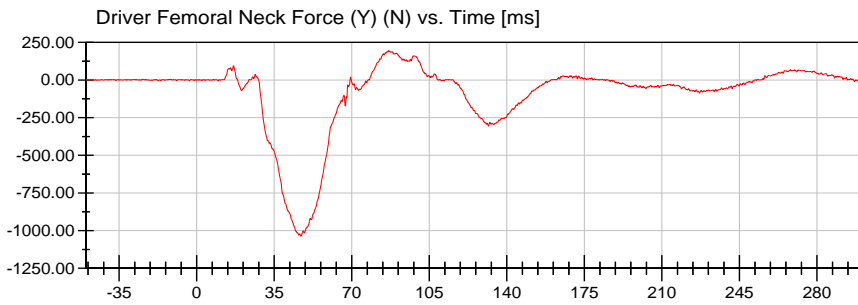
<Max>

243.77 N at 49.05 ms

<Min>

-151.90 N at 27.05 ms

CFC_600



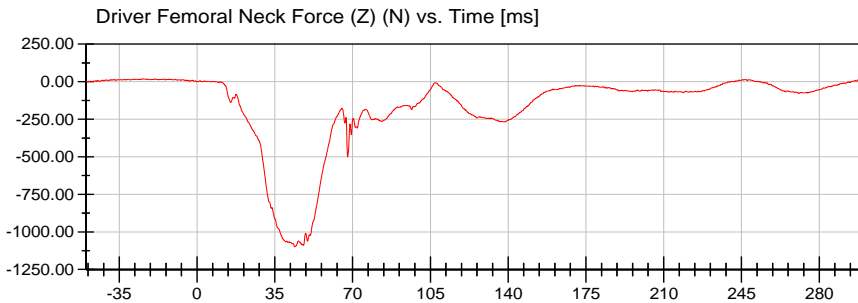
<Max>

194.81 N at 86.75 ms

<Min>

-1,036.18 N at 47.05 ms

CFC_600



<Max>

24.95 N at 300.00 ms

<Min>

-1,098.11 N at 44.05 ms

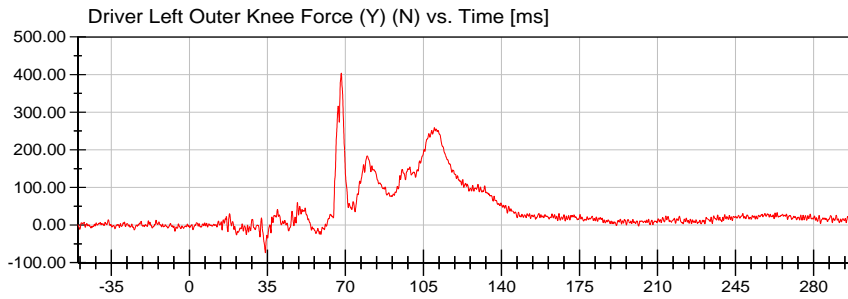
CFC_600



VRTC

Test Lab: CTF
Test Number: 200925 ()

Test Date: 09/25/2020



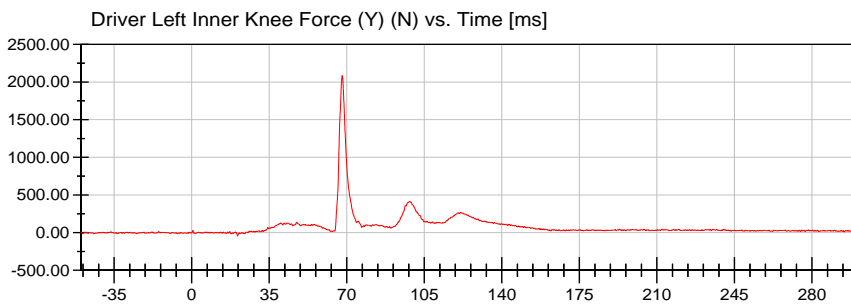
<Max>

404.12 N at 68.15 ms

<Min>

-73.76 N at 34.10 ms

CFC_600



<Max>

2,086.66 N at 67.95 ms

<Min>

-45.02 N at 20.70 ms

CFC_600

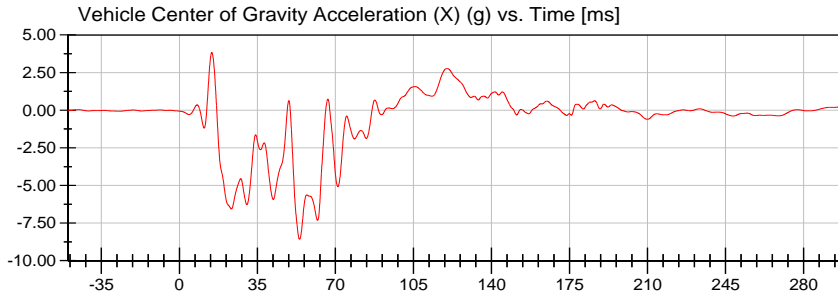


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



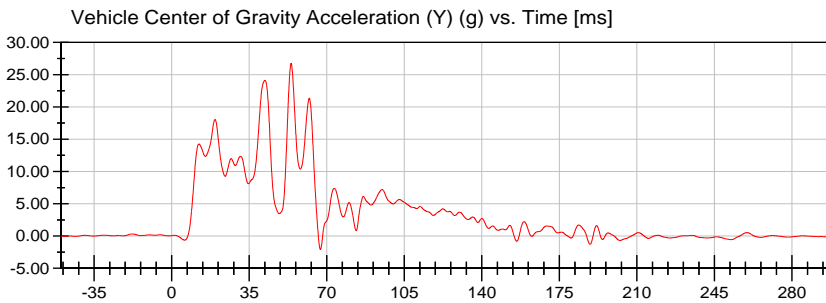
<Max>

3.84 g at 14.55 ms

<Min>

-8.58 g at 53.90 ms

CFC_60



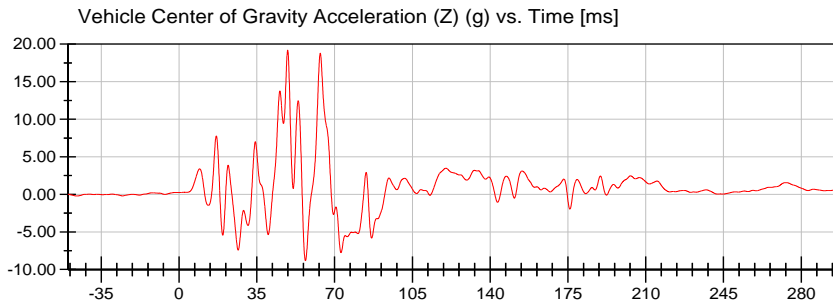
<Max>

26.75 g at 53.90 ms

<Min>

-2.08 g at 67.15 ms

CFC_60



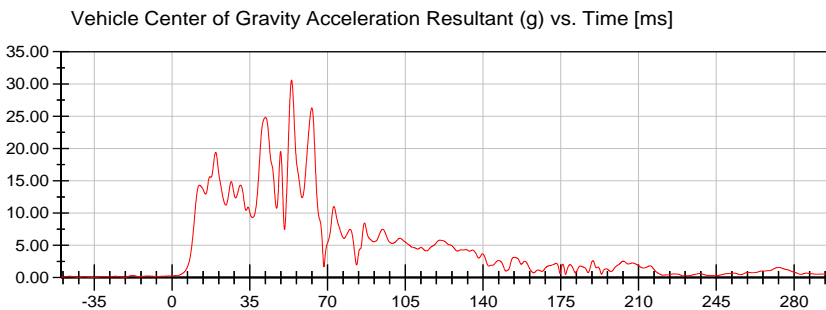
<Max>

19.20 g at 48.90 ms

<Min>

-8.83 g at 56.90 ms

CFC_60



<Max>

30.62 g at 53.80 ms

<Min>

0.03 g at -36.10 ms

CFC_60

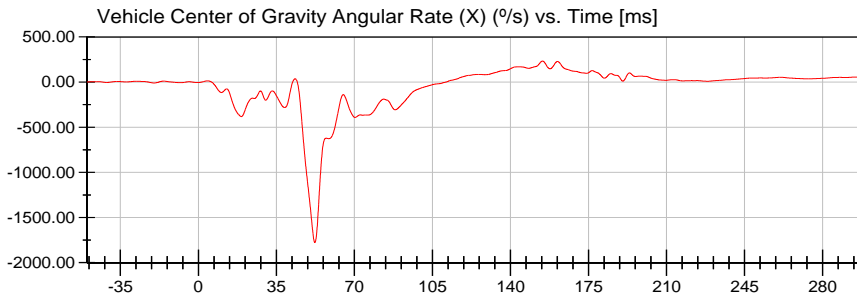


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



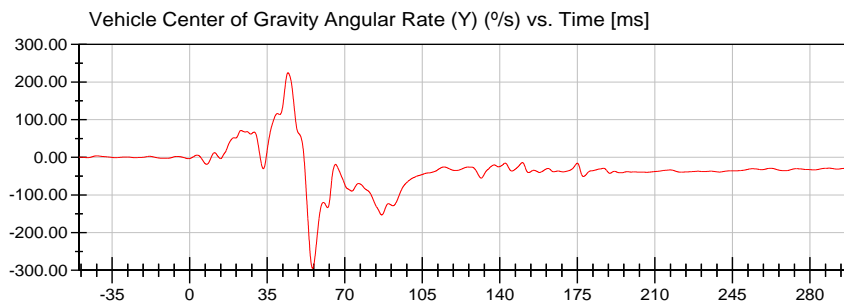
<Max>

232.96 °/s at 154.35 ms

<Min>

-1,777.39 °/s at 52.25 ms

CFC_60



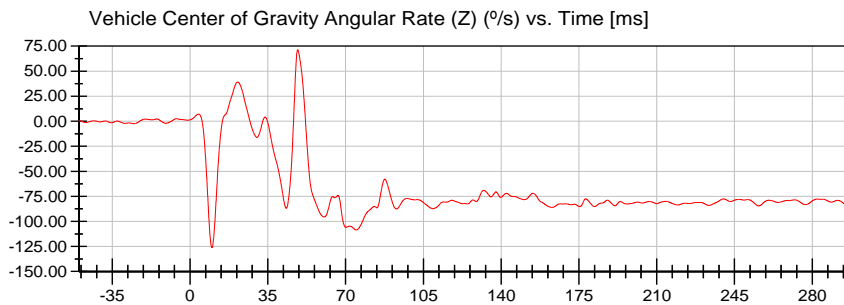
<Max>

224.79 °/s at 44.35 ms

<Min>

-294.89 °/s at 55.45 ms

CFC_60



<Max>

71.34 °/s at 48.45 ms

<Min>

-126.21 °/s at 9.85 ms

CFC_60

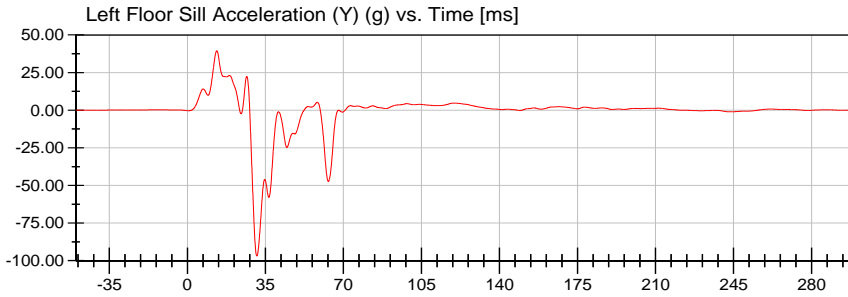


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



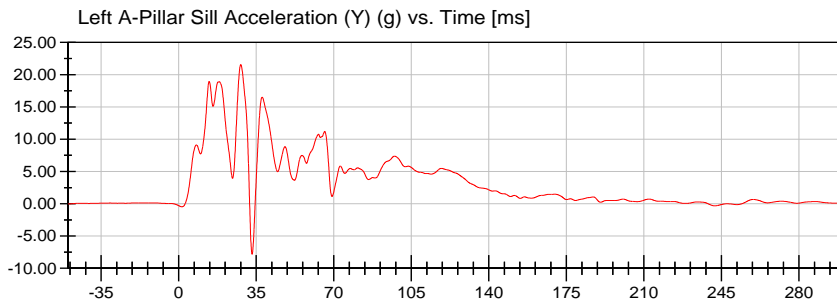
<Max>

39.47 g at 13.20 ms

<Min>

-96.90 g at 31.15 ms

CFC_60



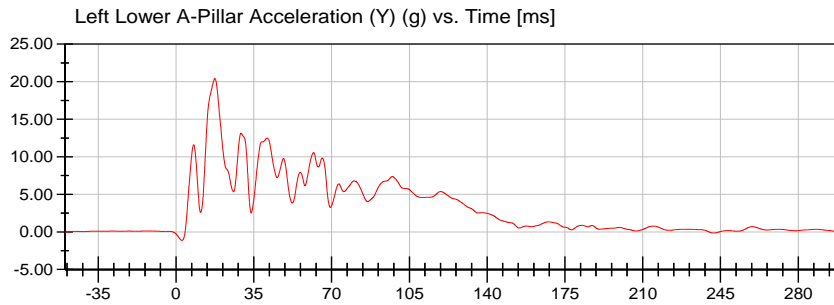
<Max>

21.56 g at 28.00 ms

<Min>

-7.82 g at 33.15 ms

CFC_60



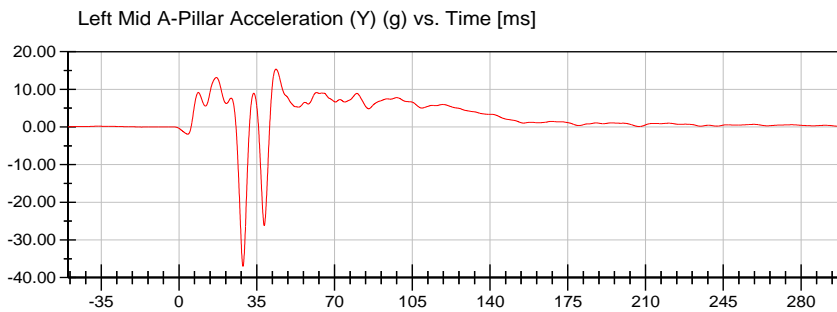
<Max>

20.41 g at 17.45 ms

<Min>

-1.12 g at 2.65 ms

CFC_60



<Max>

15.36 g at 43.65 ms

<Min>

-37.00 g at 28.80 ms

CFC_60

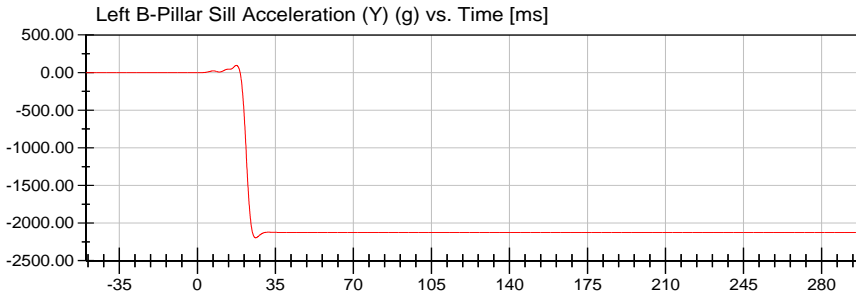


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



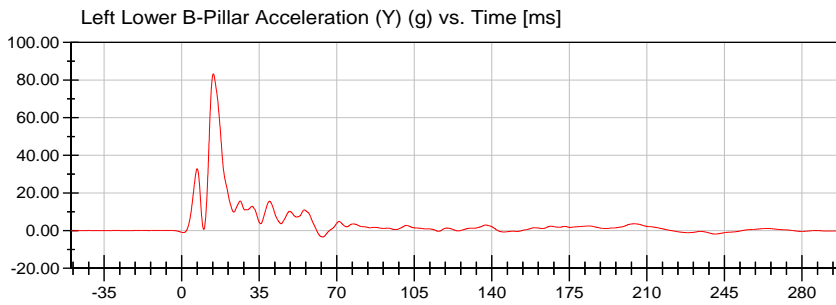
<Max>

94.47 g at 17.50 ms

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-2,196.23 g at 26.15 ms

CFC_60



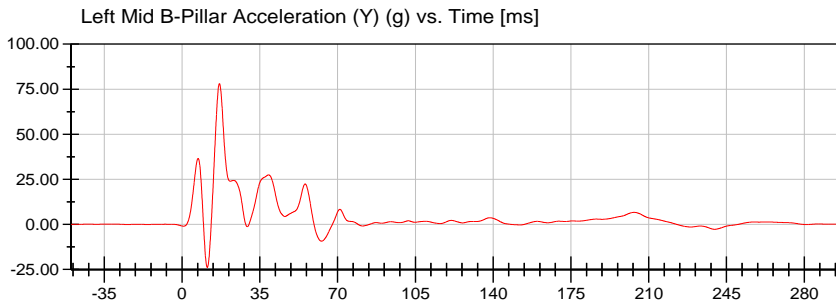
<Max>

83.31 g at 14.25 ms

<Min>

-3.39 g at 63.70 ms

CFC_60



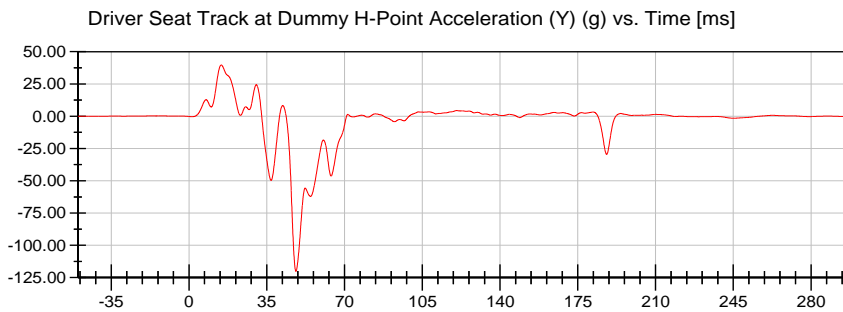
<Max>

78.09 g at 16.80 ms

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-23.86 g at 11.35 ms

CFC_60



<Max>

39.77 g at 14.50 ms

<Min>

-120.16 g at 48.15 ms

CFC_60

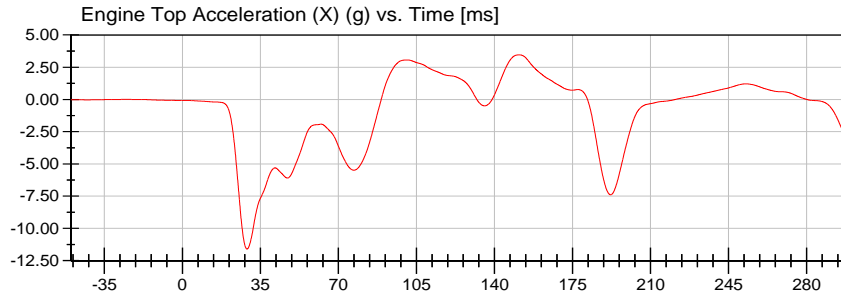


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



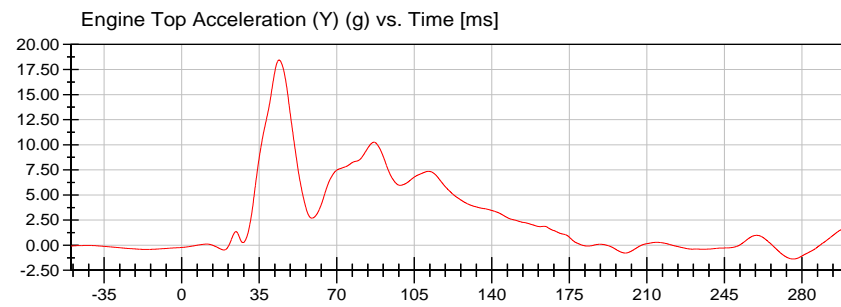
<Max>

3.46 g at 151.10 ms

<Min>

-11.60 g at 29.00 ms

CFC_60



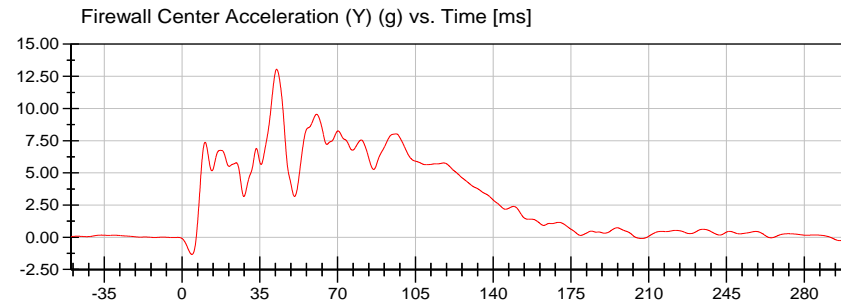
<Max>

18.45 g at 43.95 ms

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-1.38 g at 276.10 ms

CFC_60



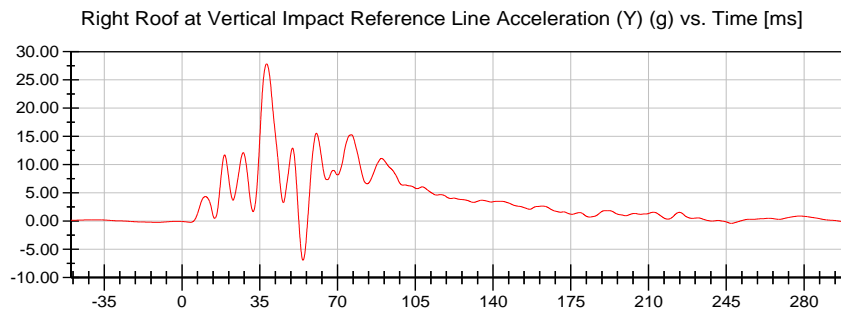
<Max>

13.05 g at 42.55 ms

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-1.34 g at 4.45 ms

CFC_60



<Max>

27.84 g at 38.05 ms

<Min>

-6.91 g at 54.45 ms

CFC_60

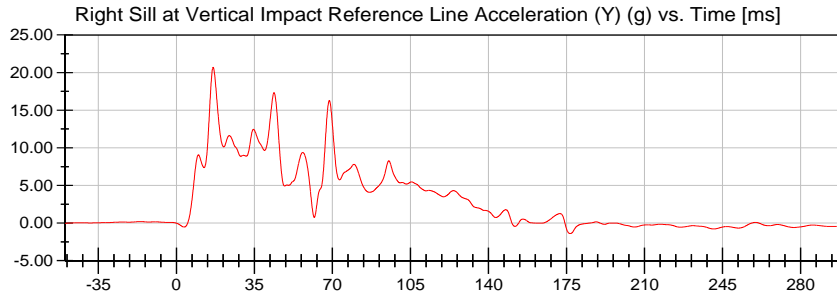


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



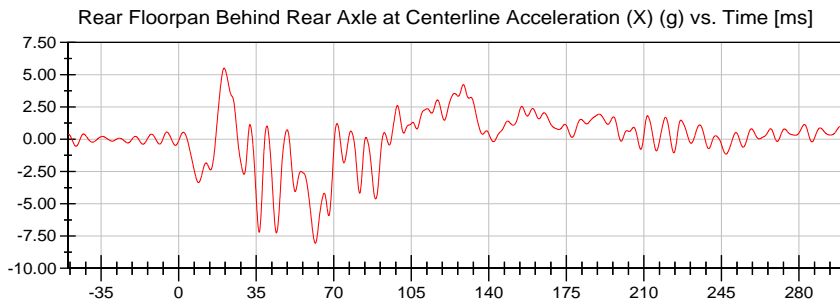
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20.69 g at 16.50 ms

<Min>

-1.39 g at 176.65 ms

CFC_60



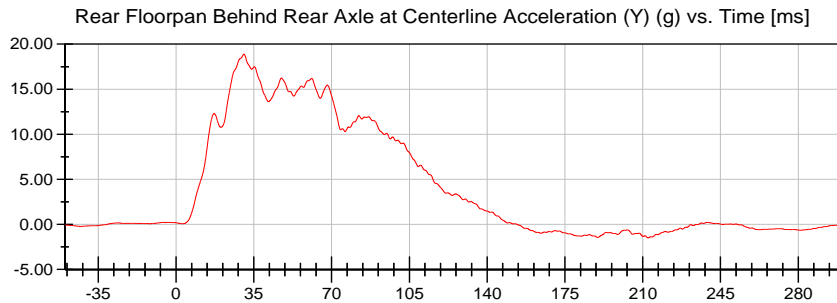
<Max>

5.51 g at 20.50 ms

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-8.05 g at 61.65 ms

CFC_60



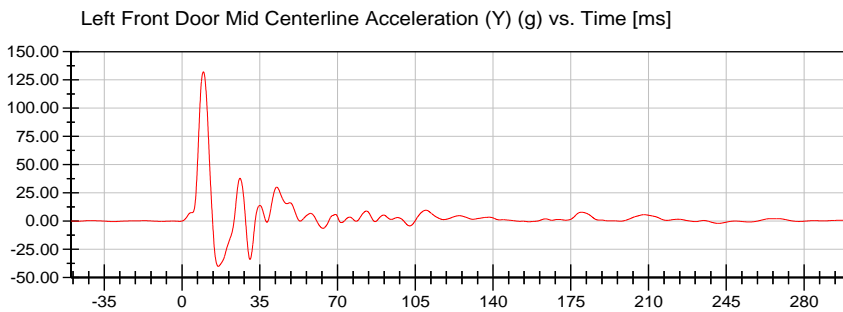
<Max>

18.89 g at 30.55 ms

<Min>

-1.49 g at 212.45 ms

CFC_60



<Max>

132.13 g at 9.60 ms

<Min>

-40.09 g at 16.35 ms

CFC_60

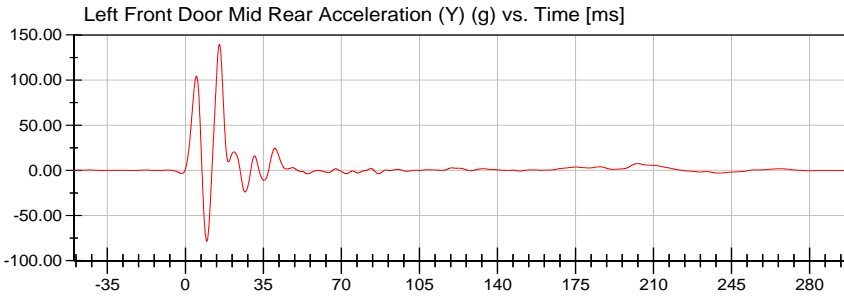


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



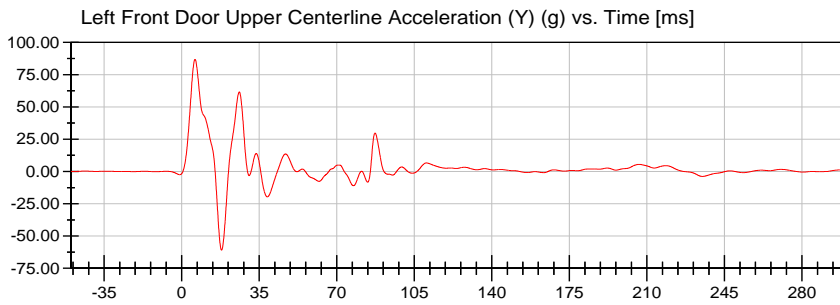
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139.62 g at 15.25 ms

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-78.50 g at 9.60 ms

CFC_60



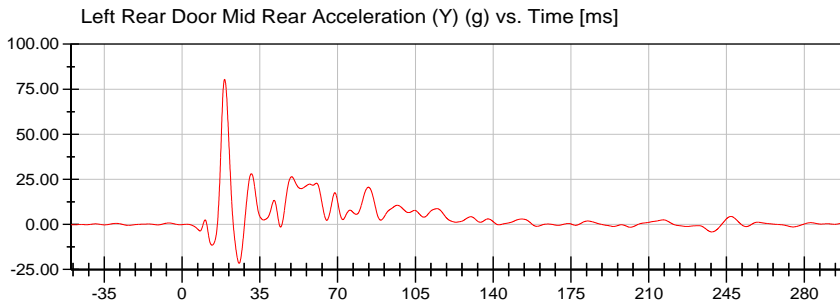
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86.84 g at 6.00 ms

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-60.93 g at 18.00 ms

CFC_60



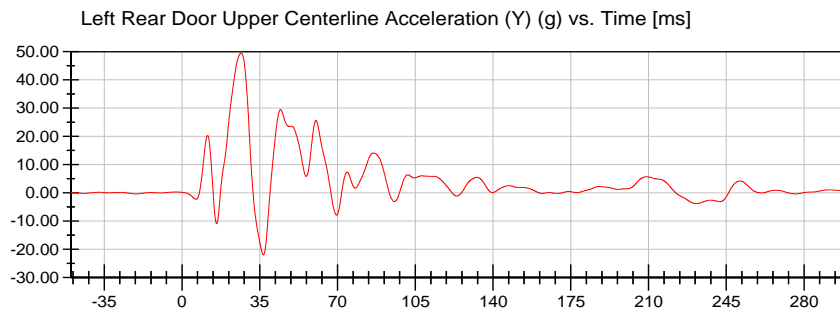
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80.44 g at 19.15 ms

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-21.61 g at 25.70 ms

CFC_60



<Max>

49.50 g at 26.60 ms

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-21.96 g at 36.65 ms

CFC_60

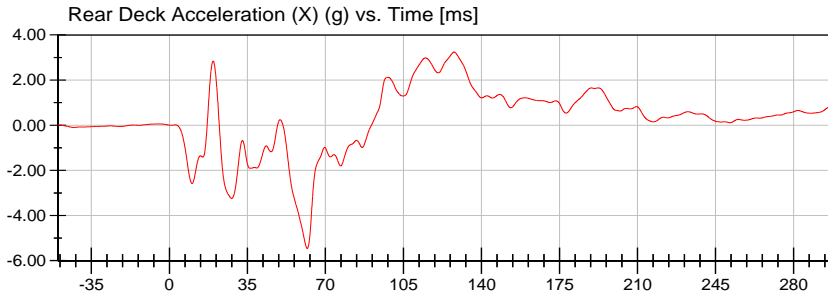


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



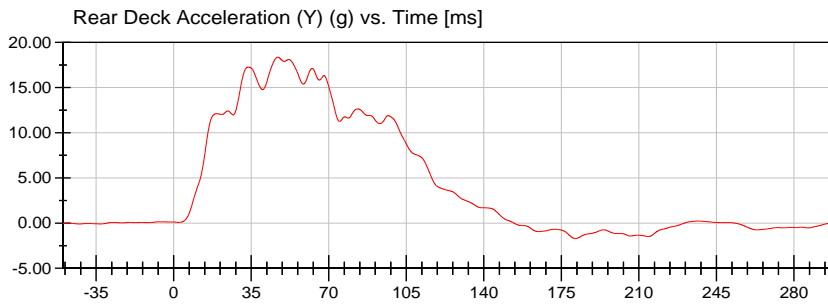
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3.24 g at 127.70 ms

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-5.46 g at 61.85 ms

CFC_60



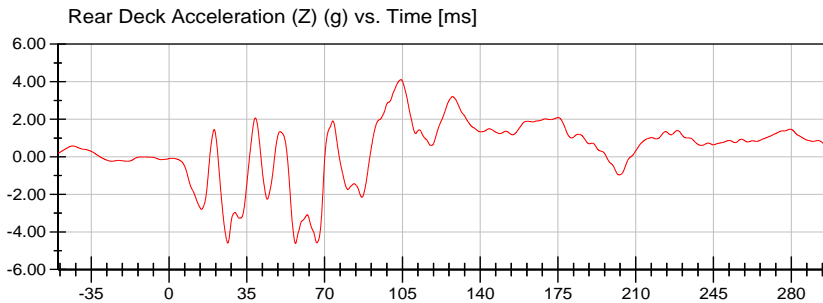
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18.37 g at 47.00 ms

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-1.70 g at 181.35 ms

CFC_60



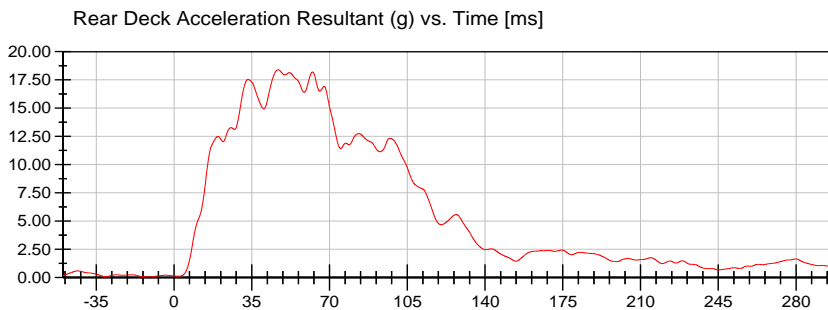
<Max>

4.11 g at 104.35 ms

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-4.62 g at 56.90 ms

CFC_60



<Max>

18.40 g at 46.80 ms

<Min>

0.06 g at -11.30 ms

CFC_60

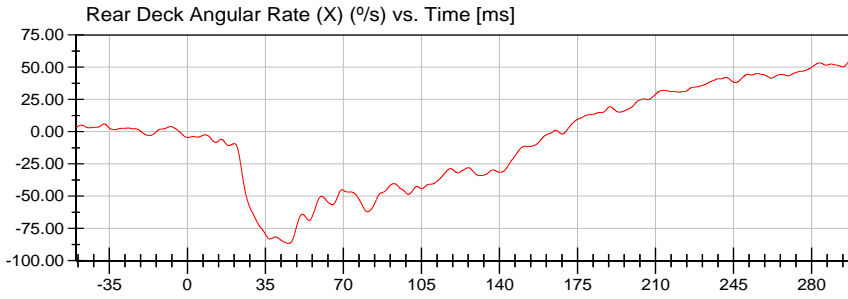


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



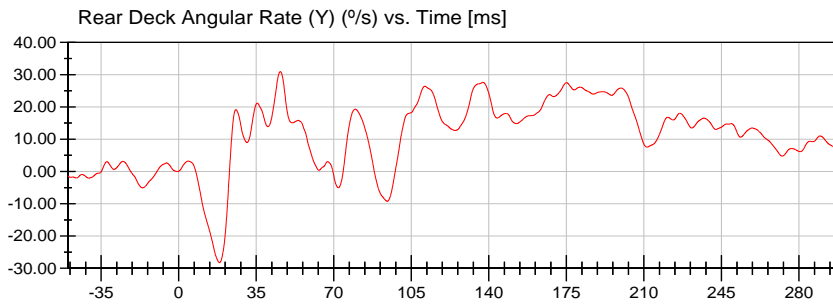
<Max>

56.52 °/s at 300.00 ms

<Min>

-86.61 °/s at 45.35 ms

CFC_60



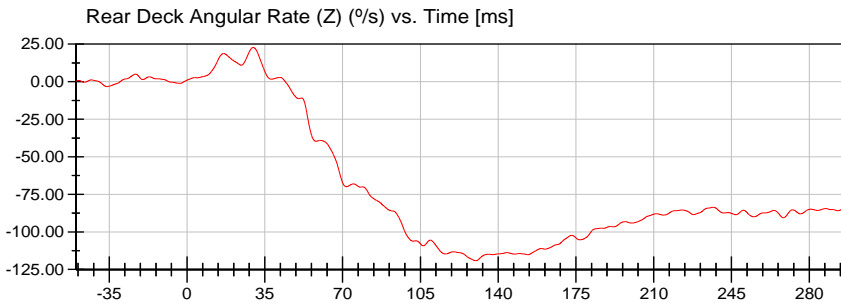
<Max>

30.92 °/s at 45.85 ms

<Min>

-28.26 °/s at 18.45 ms

CFC_60



<Max>

22.76 °/s at 29.80 ms

<Min>

-119.15 °/s at 129.90 ms

CFC_60

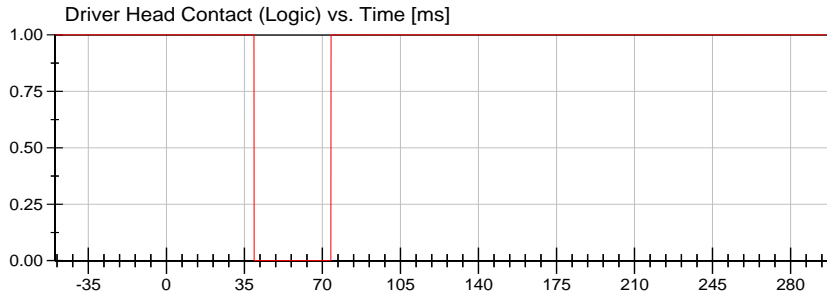


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



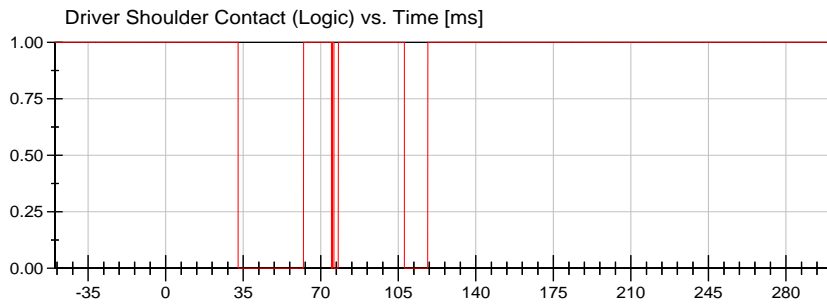
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1.00 Logic at -50.00 ms

<Min>

0.00 Logic at 39.35 ms

Unfiltered



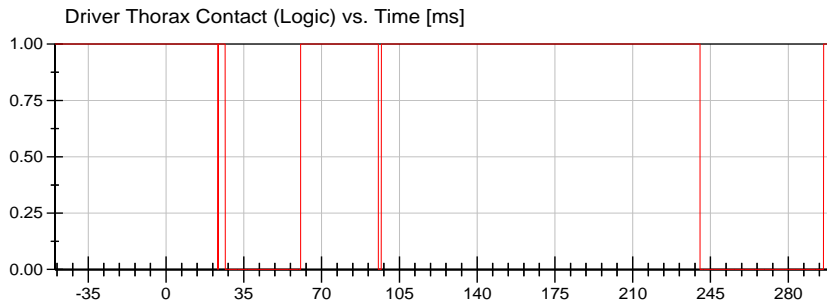
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1.00 Logic at -50.00 ms

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0.00 Logic at 32.70 ms

Unfiltered



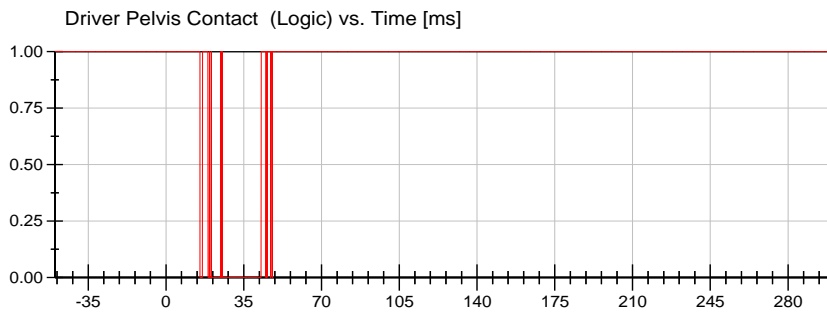
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1.00 Logic at -50.00 ms

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0.00 Logic at 23.40 ms

Unfiltered



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0.00 Logic at 15.30 ms

Unfiltered

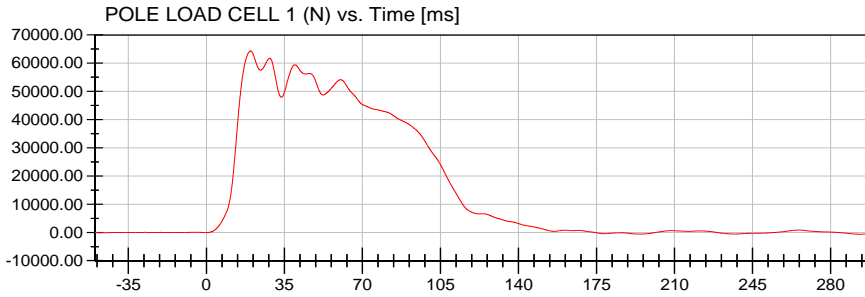


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



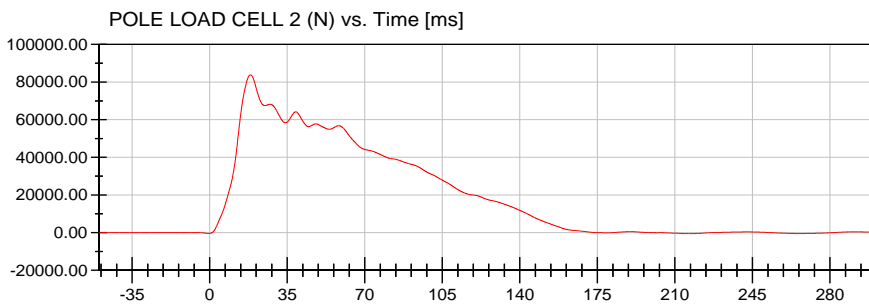
<Max>

64,331.20 N at 19.85 ms

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-615.91 N at 293.10 ms

CFC_60



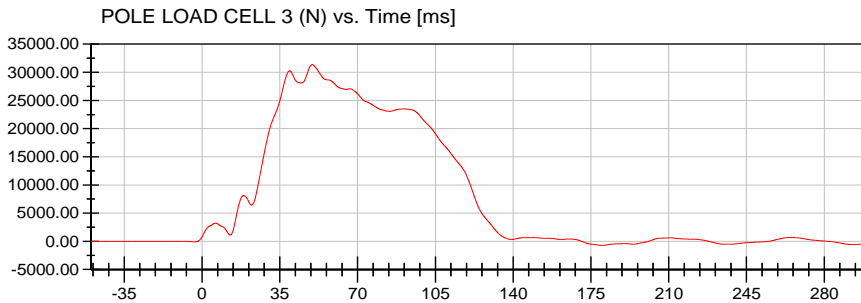
<Max>

83,820.97 N at 18.40 ms

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-496.31 N at 215.65 ms

CFC_60



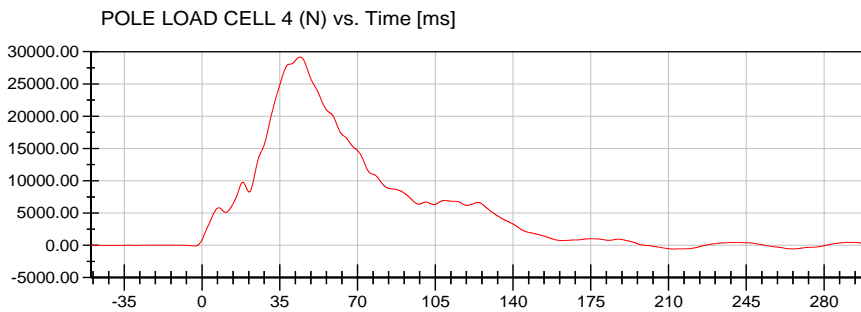
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31,364.34 N at 49.60 ms

<Min>

-719.03 N at 180.00 ms

CFC_60



<Max>

29,172.10 N at 44.05 ms

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-578.44 N at 212.05 ms

CFC_60

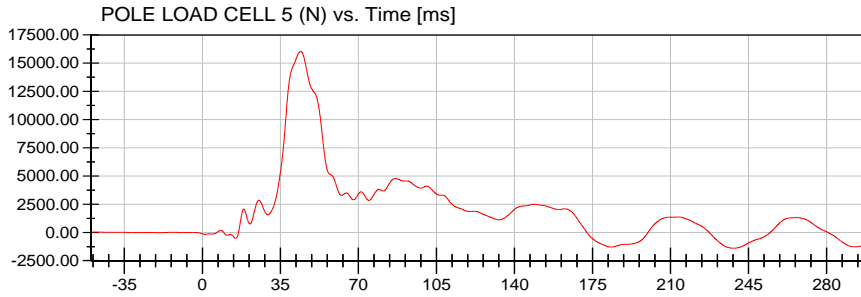


VRTC

Test Date: 09/25/2020

Test Lab: CTF

Test Number: 200925 ()



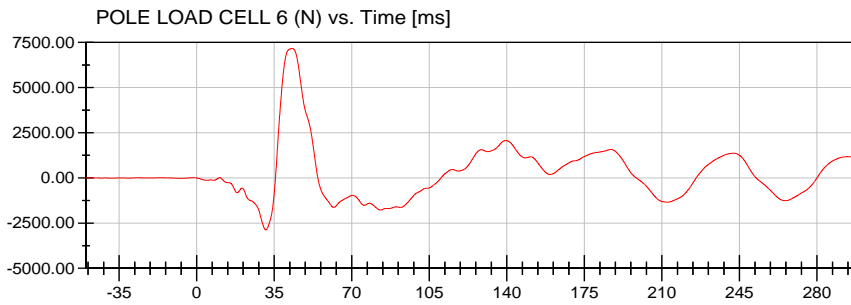
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16,041.00 N at 44.10 ms

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-1,399.11 N at 238.45 ms

CFC_60



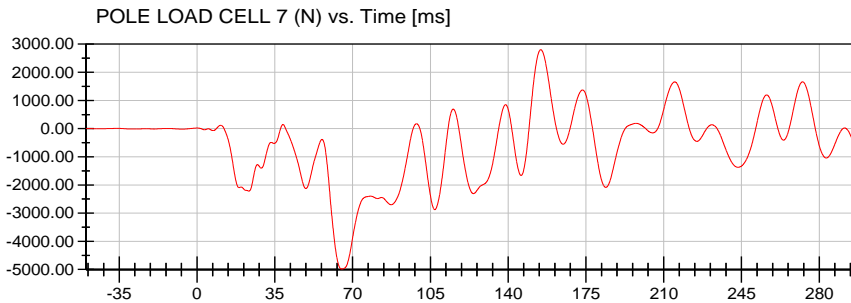
<Max>

7,161.66 N at 43.10 ms

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-2,875.37 N at 31.25 ms

CFC_60



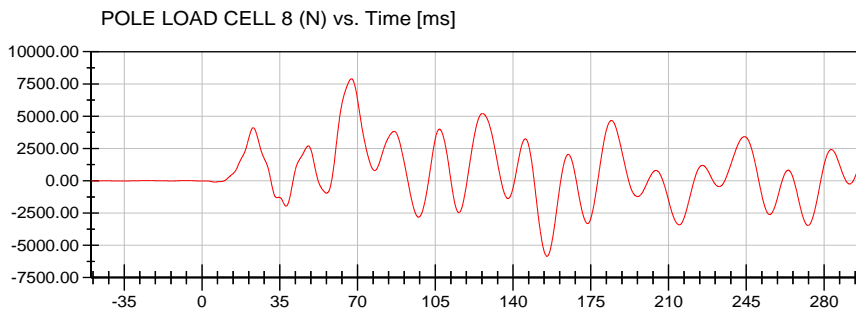
<Max>

2,802.97 N at 154.70 ms

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-4,983.34 N at 65.20 ms

CFC_60



<Max>

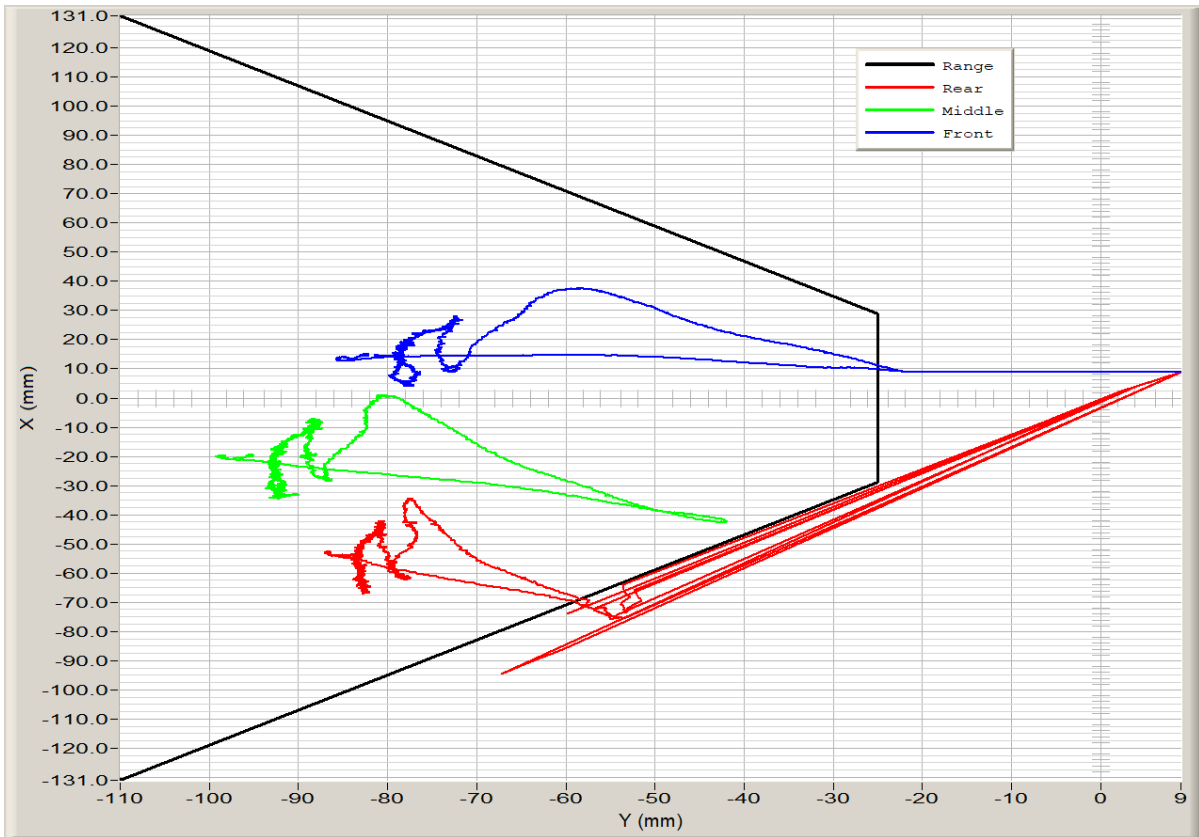
7,898.02 N at 67.25 ms

<Min>

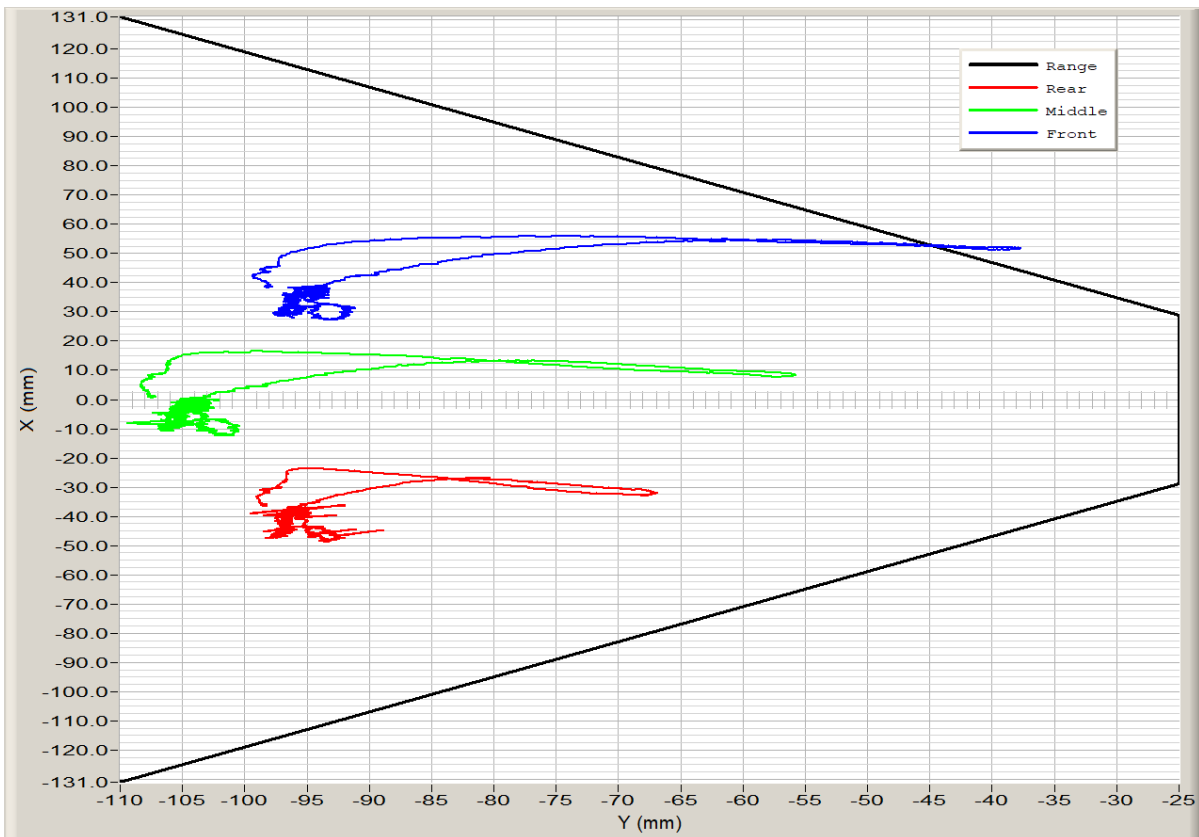
-5,850.56 N at 155.30 ms

CFC_60

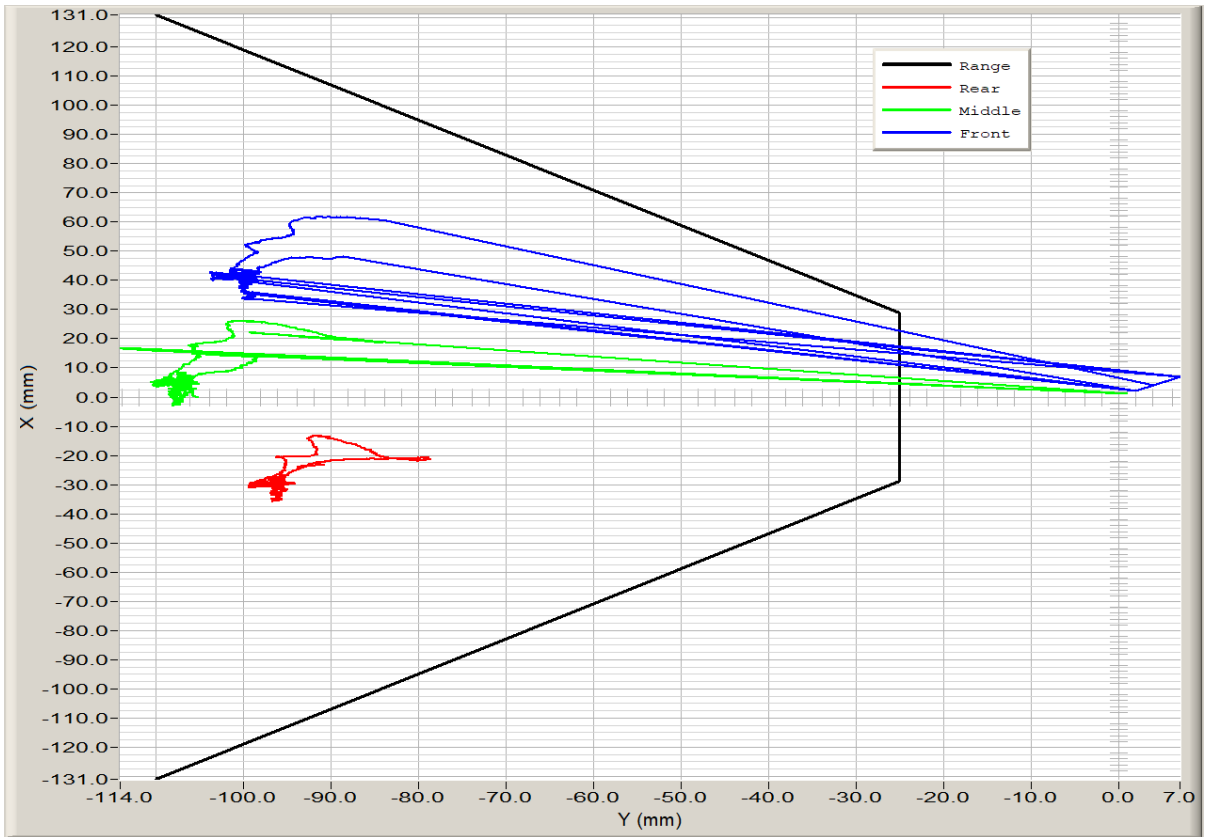




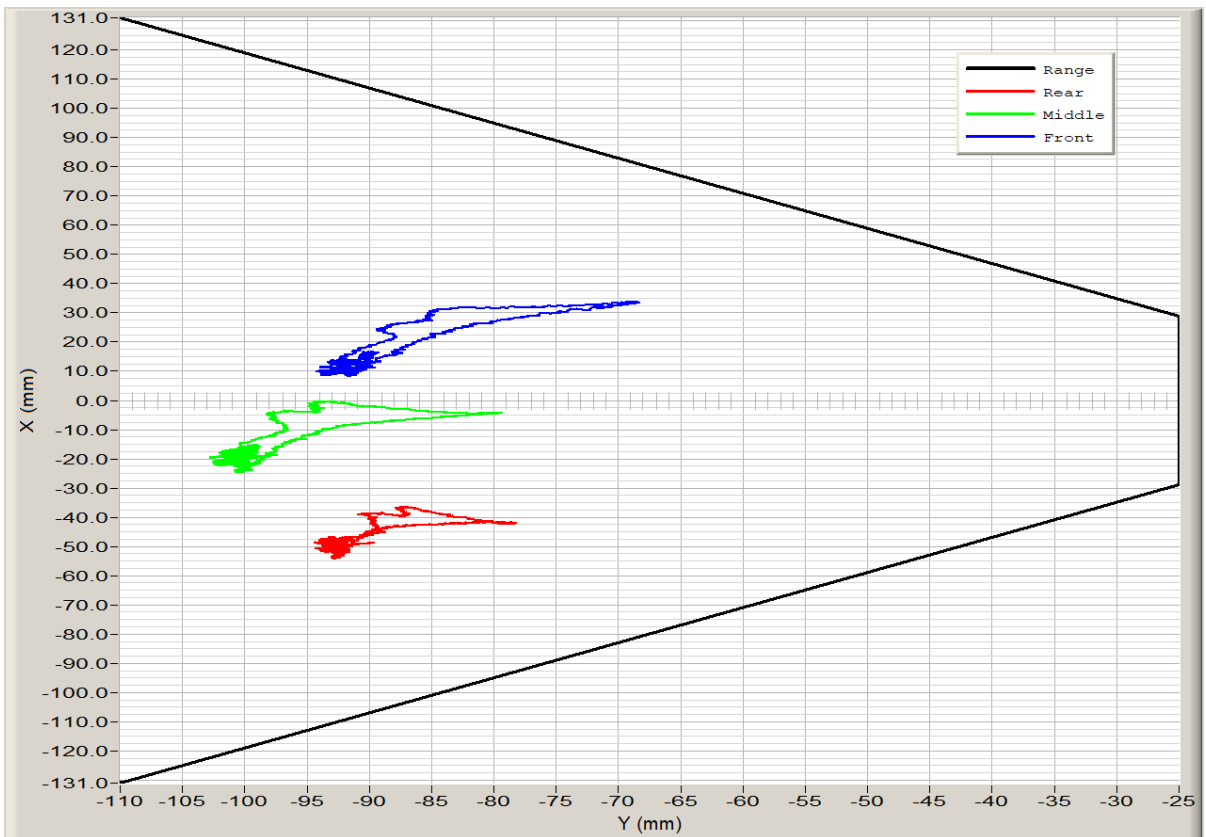
Shoulder_XY



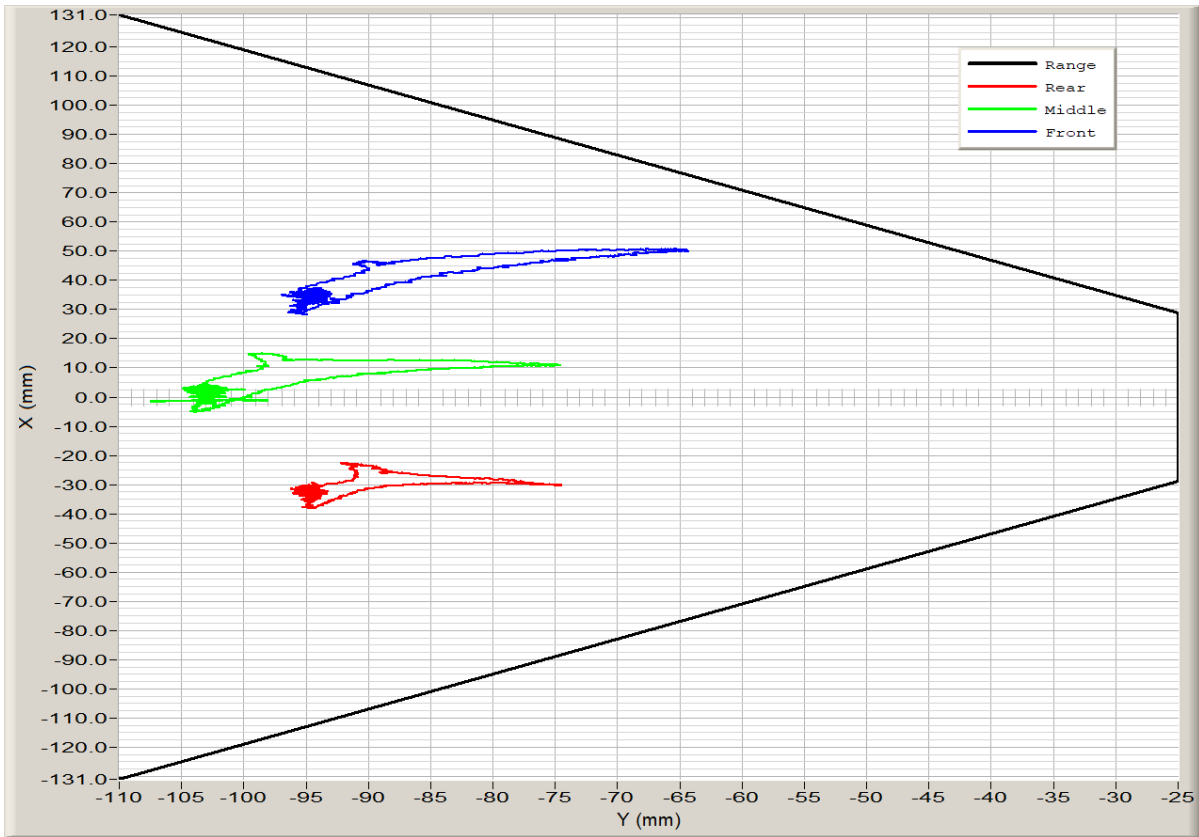
Thorax_1_XY



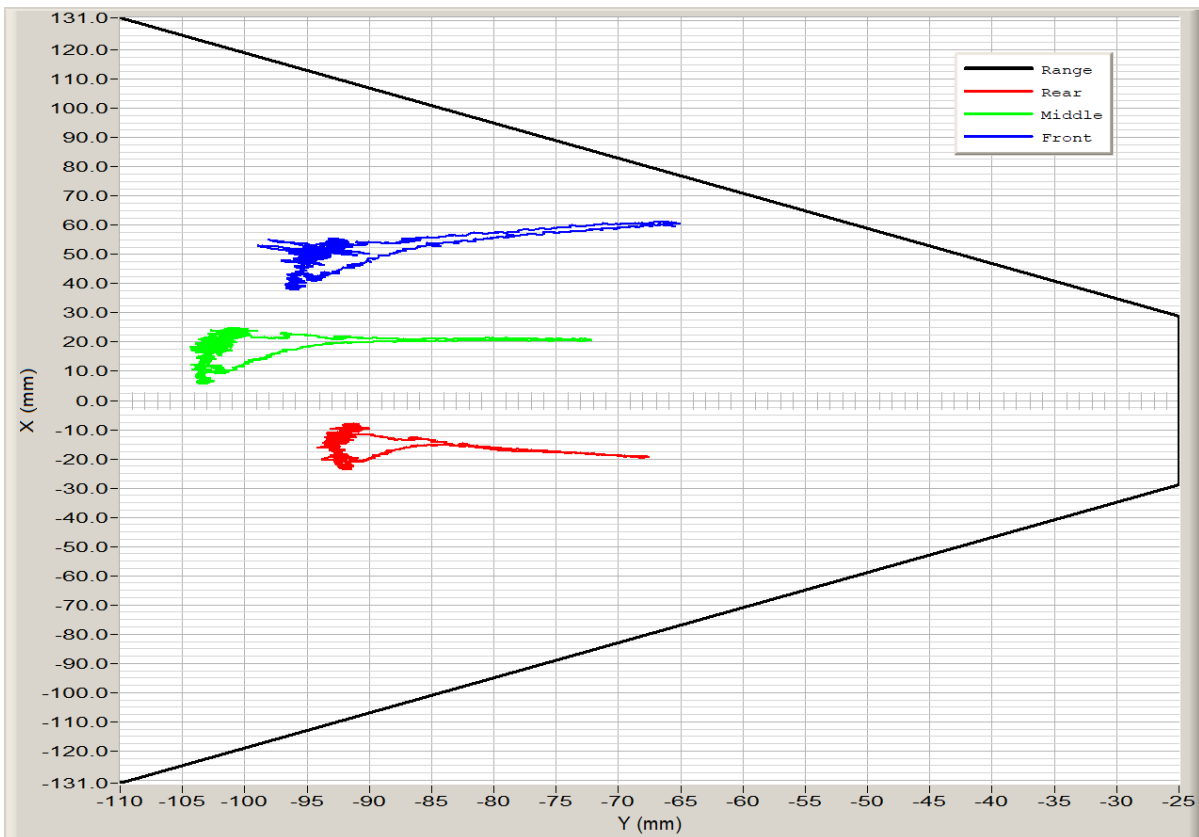
Thorax_2_XY



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

**WorldSID-50M Head Front Qualification
Test Results Summary**

Dummy Serial Number: EB8888

Tested Components
Head: EG2845

Test ID: 200903-9
Test Date: 9/3/2020
Test Time: 10:24 AM

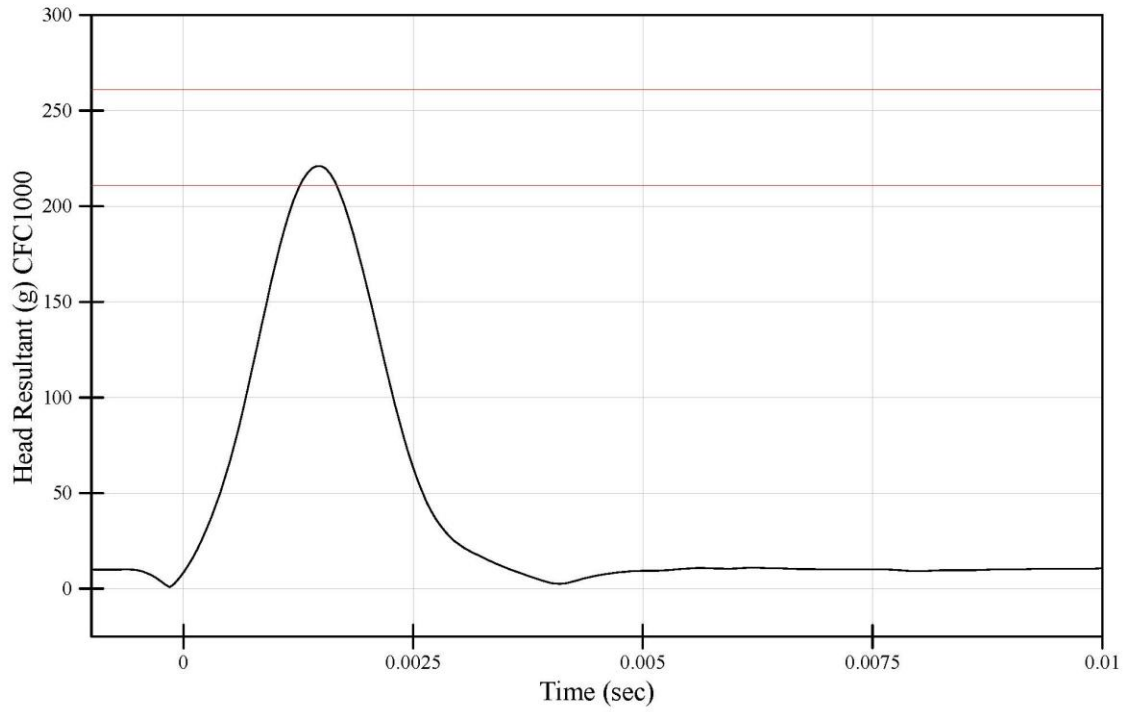
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.7	Pass
Test Humidity (%)	10 - 70	64	Pass
Peak Resultant Acceleration (g)	211.0 - 261.0	221.1	Pass
Peak Acceleration, y-axis (g)	-15.00 - 15.00	3.19	Pass
Oscillations occurring after the main acceleration pulse (%)	-10.0 - 10.0	4.95	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 200903-9 processed

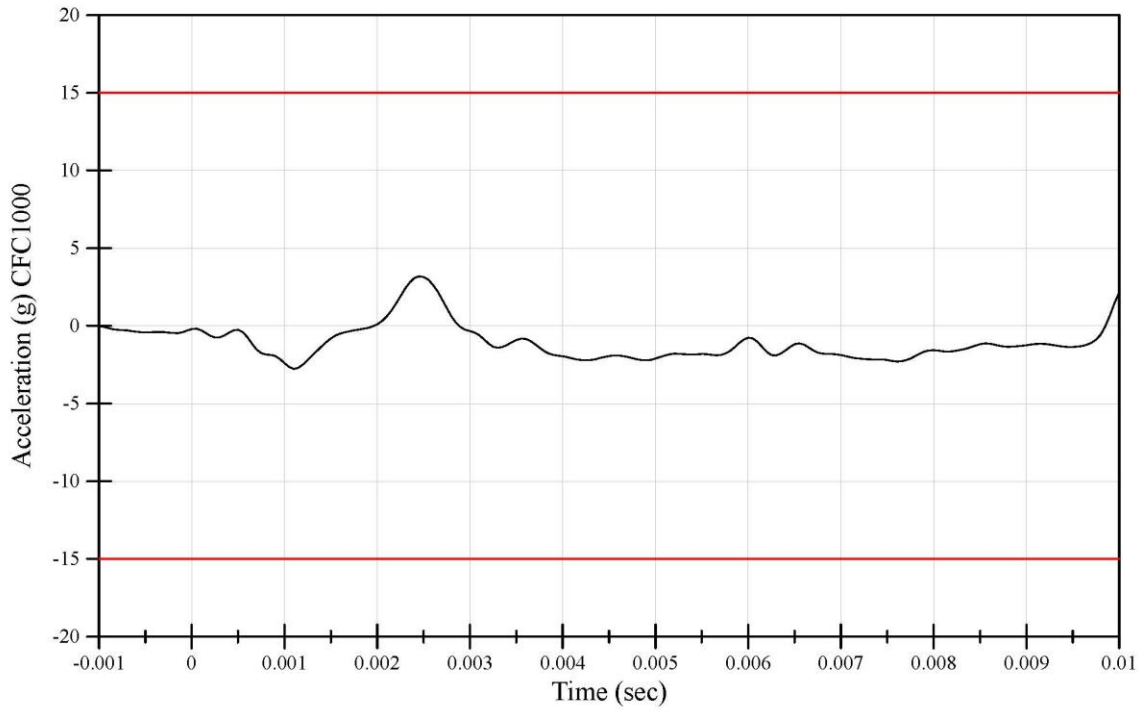
WorldSID-50M Head Front Qualification
Peak Resultant Acceleration
Head Serial Number: EG2845



File Name: 200903-9 processed

9/3/2020 10:24 AM

WorldSID-50M Head Front Qualification
Peak Lateral Y Acceleration
Head Serial Number: EG2845



File Name: 200903-9 processed

9/3/2020 10:24 AM

**WorldSID-50M Head Left Lateral Qualification
Test Results Summary**

Dummy Serial Number: EB8888

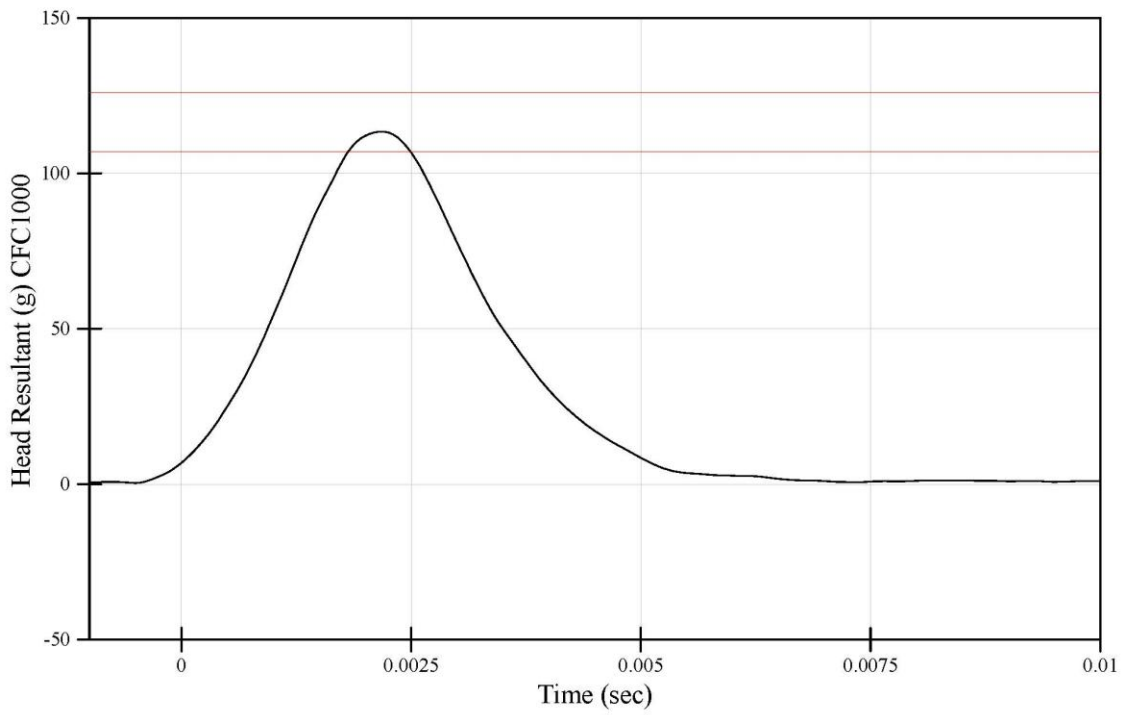
<u>Tested Components</u> Head: EG2845	Test ID: 200903-2 Test Date: 9/3/2020 Test Time: 6:08 AM
--	--

Test Results			
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	20.8	Pass
Test Humidity (%)	10 - 70	69	Pass
Peak Resultant Acceleration (g)	107.0 - 126.0	113.5	Pass
Peak Acceleration, x-axis (g)	-15.00 - 15.00	-1.48	Pass
Oscillations occurring after the main acceleration pulse (%)	-10.0 - 10.0	1.03	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 200903-2 processed

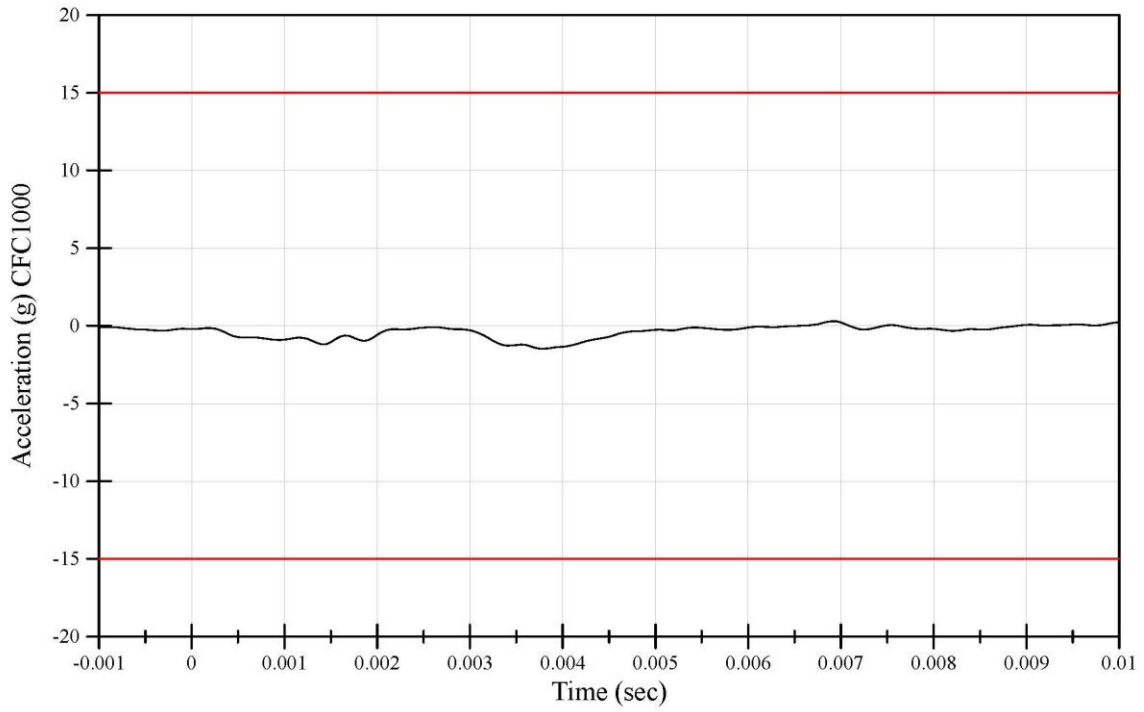
WorldSID-50M Head Left Lateral Qualification
Peak Resultant Acceleration
Head Serial Number: EG2845



File Name: 200903-2 processed

9/3/2020 6:08 AM

WorldSID-50M Head Left Lateral Qualification
Peak Lateral X Acceleration
Head Serial Number: EG2845



File Name: 200903-2 processed

9/3/2020 6:08 AM

**WorldSID-50M Head Right Lateral Qualification
Test Results Summary**

Dummy Serial Number: EB8888

Tested Components
Head: EG2845

Test ID: 200903-6
Test Date: 9/3/2020
Test Time: 8:19 AM

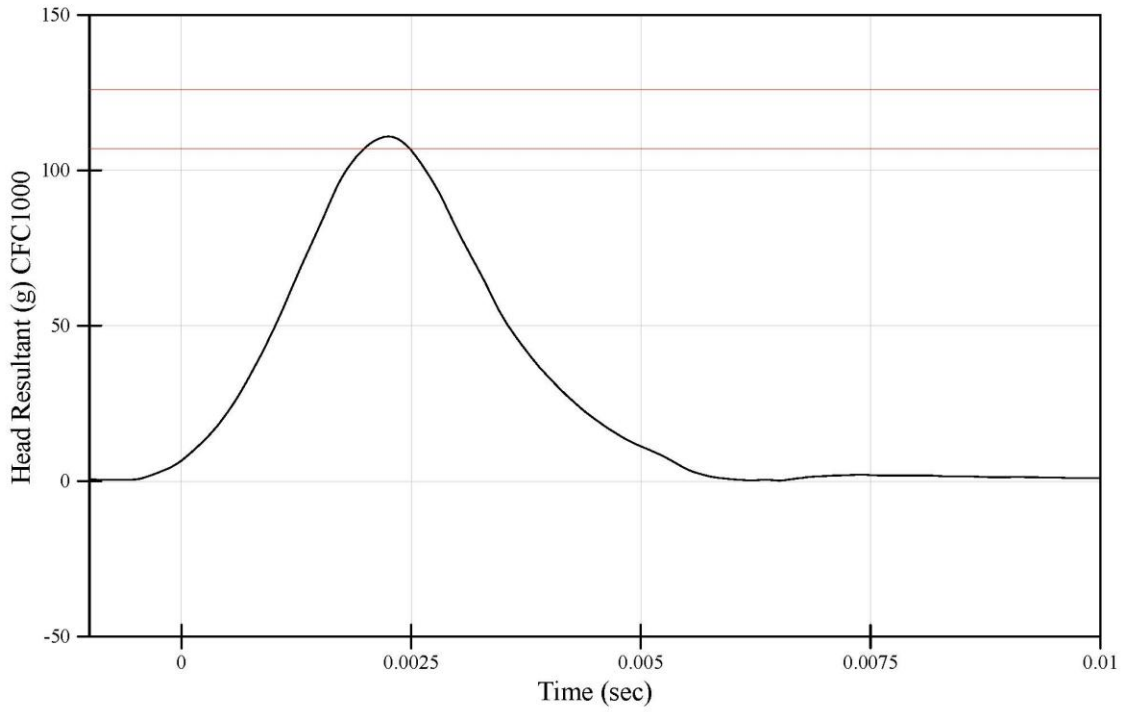
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.7	Pass
Test Humidity (%)	10 - 70	70	Pass
Peak Resultant Acceleration (g)	107.0 - 126.0	110.9	Pass
Peak Acceleration, x-axis (g)	-15.00 - 15.00	1.32	Pass
Oscillations occurring after the main acceleration pulse (%)	-10.0 - 10.0	1.84	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 200903-6 processed

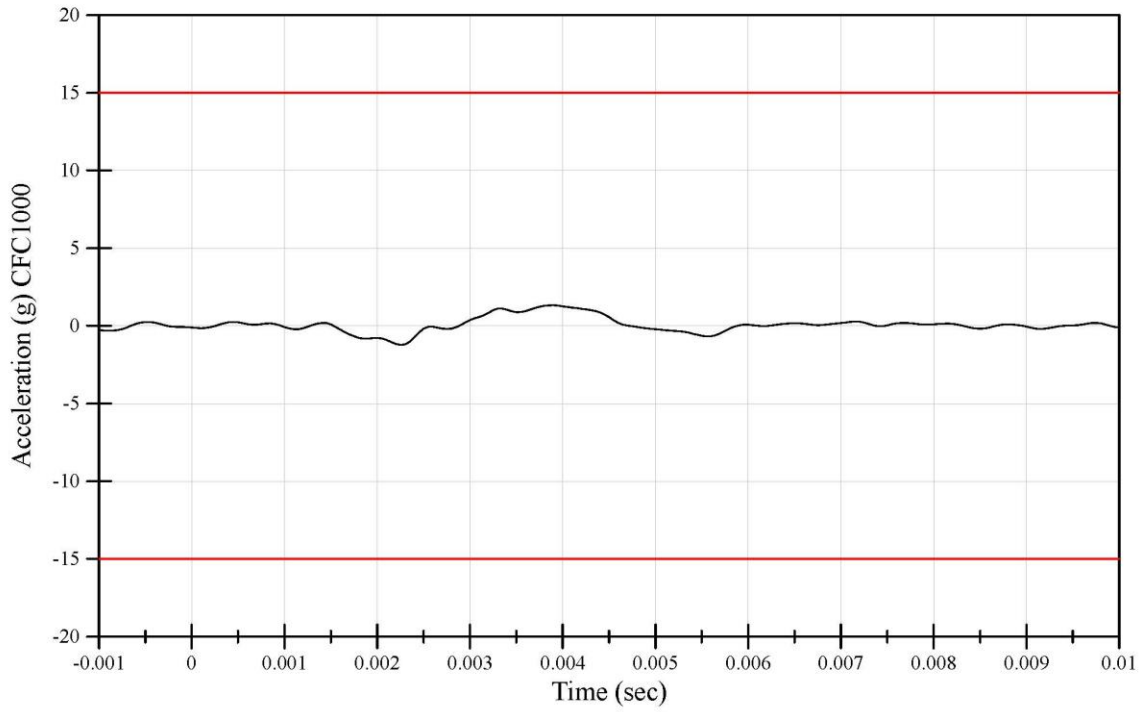
WorldSID-50M Head Right Lateral Qualification
Peak Resultant Acceleration
Head Serial Number: EG2845



File Name: 200903-6 processed

9/3/2020 8:19 AM

WorldSID-50M Head Right Lateral Qualification
Peak Lateral Y Acceleration
Head Serial Number: EG2845



File Name: 200903-6 processed

9/3/2020 8:19 AM

**WorldSID-50M Neck Left Lateral Qualification
Test Results Summary**

Dummy Serial Number: EB8888

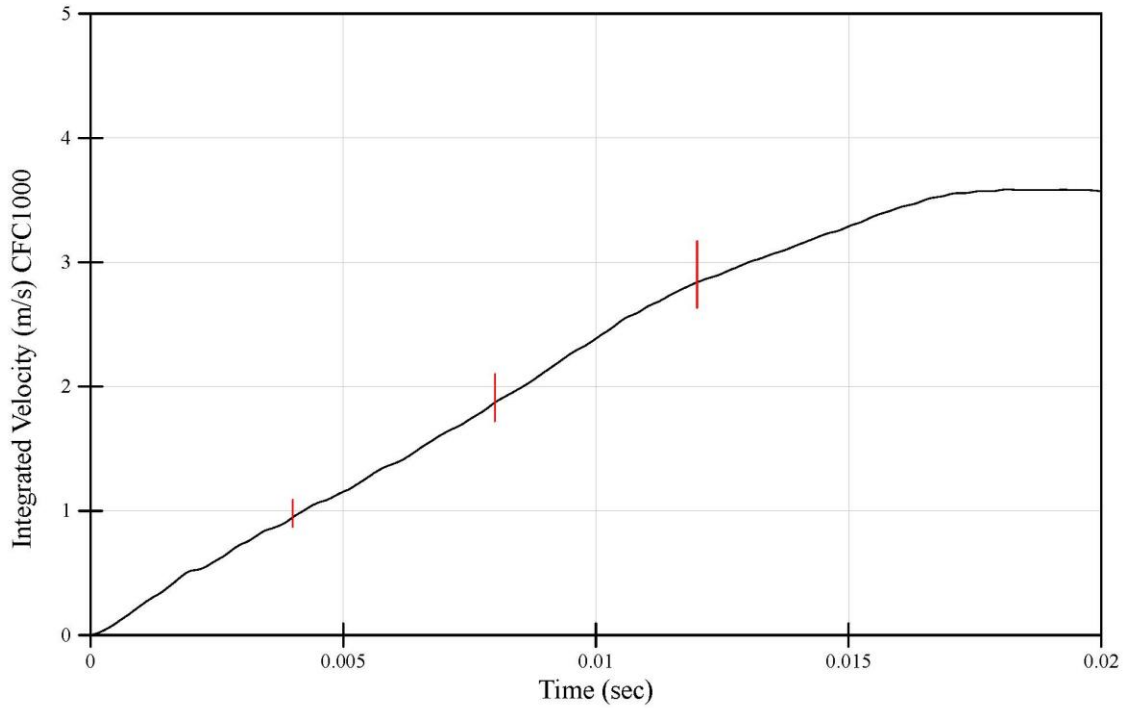
<u>Tested Components</u> Neck: EE8804	Test ID: 200902-1 Test Date: 9/2/2020 Test Time: 10:09 AM
--	---

Test Results			
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.7	Pass
Test Humidity (%)	10 - 70	67	Pass
Test Velocity (m/s)	3.30 - 3.50	3.391	Pass
Pendulum Velocity at 4 ms after T0 (m/s)	0.87 - 1.09	0.95	Pass
Pendulum Velocity at 8 ms after T0 (m/s)	1.72 - 2.10	1.87	Pass
Pendulum Velocity at 12 ms after T0 (m/s)	2.63 - 3.17	2.84	Pass
Peak Headform Flexion Angle (deg)	-61.0 - (-50.0)	-57.28	Pass
Peak Headform Flexion Angle Decay Time to 0 degrees (ms)	58.0 - 72.0	64.55	Pass
Peak X-Axis Moment at Occipital Condyle (Nm)	54.0 - 67.0	62.07	Pass
Peak X-Axis Moment at Occipital Condyle Decay Time to 0 Nm (ms)	71.0 - 87.0	75.70	Pass
Peak Headform X-Axis Angular Rate (deg/sec)	-2503 - (-2047)	-2307.12	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 200902-1 processed

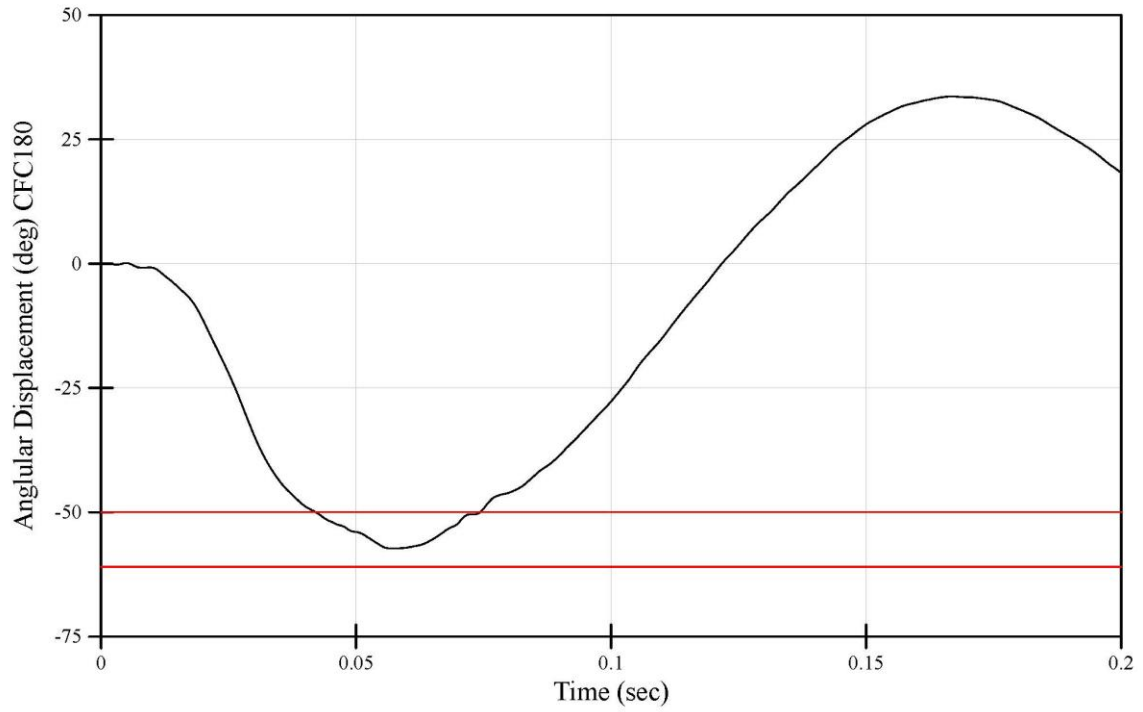
WorldSID-50M Neck Left Lateral Qualification
Probe Acceleration
Neck Serial Number: EE8804



File Name: 200902-1 processed

9/2/2020 10:09 AM

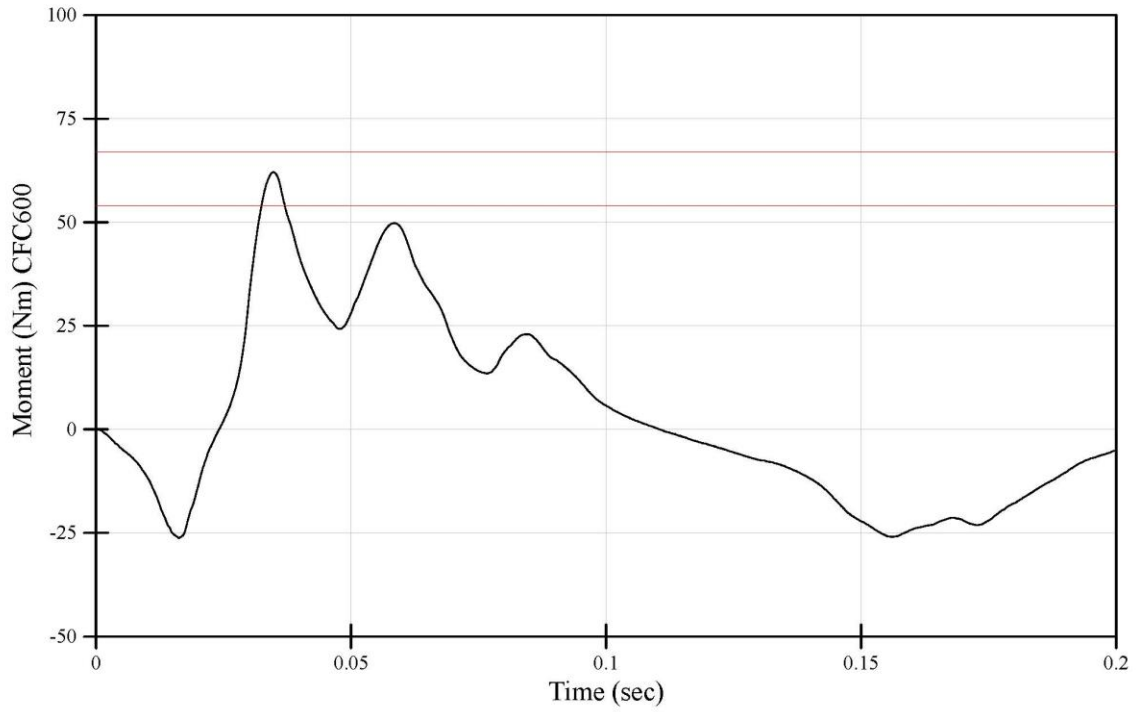
WorldSID-50M Neck Left Lateral Qualification
Peak Headform Flexion Angle
Neck Serial Number: EE8804



File Name: 200902-1 processed

9/2/2020 10:09 AM

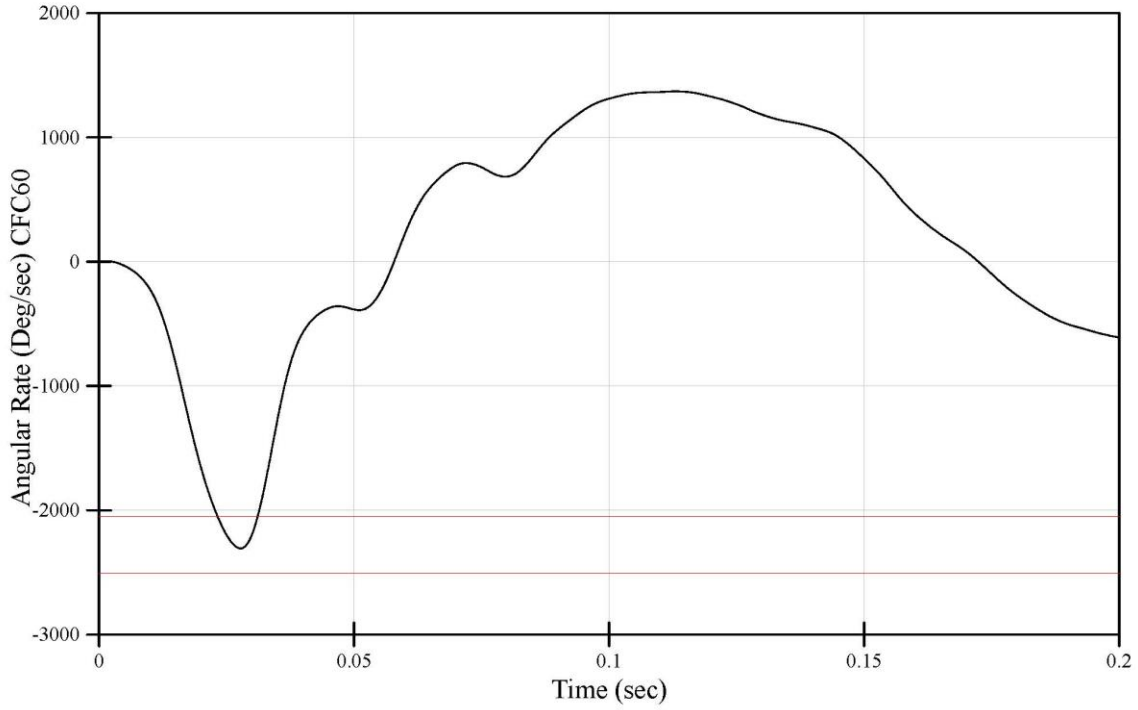
WorldSID-50M Neck Left Lateral Qualification
Peak Moment at Occipital Condyle
Neck Serial Number: EE8804



File Name: 200902-1 processed

9/2/2020 10:09 AM

WorldSID-50M Neck Left Lateral Qualification
Peak Headform X Angular Rate
Neck Serial Number: EE8804



File Name: 200902-1 processed

9/2/2020 10:09 AM

**WorldSID-50M Neck Right Lateral Qualification
Test Results Summary**

Dummy Serial Number: EB8888

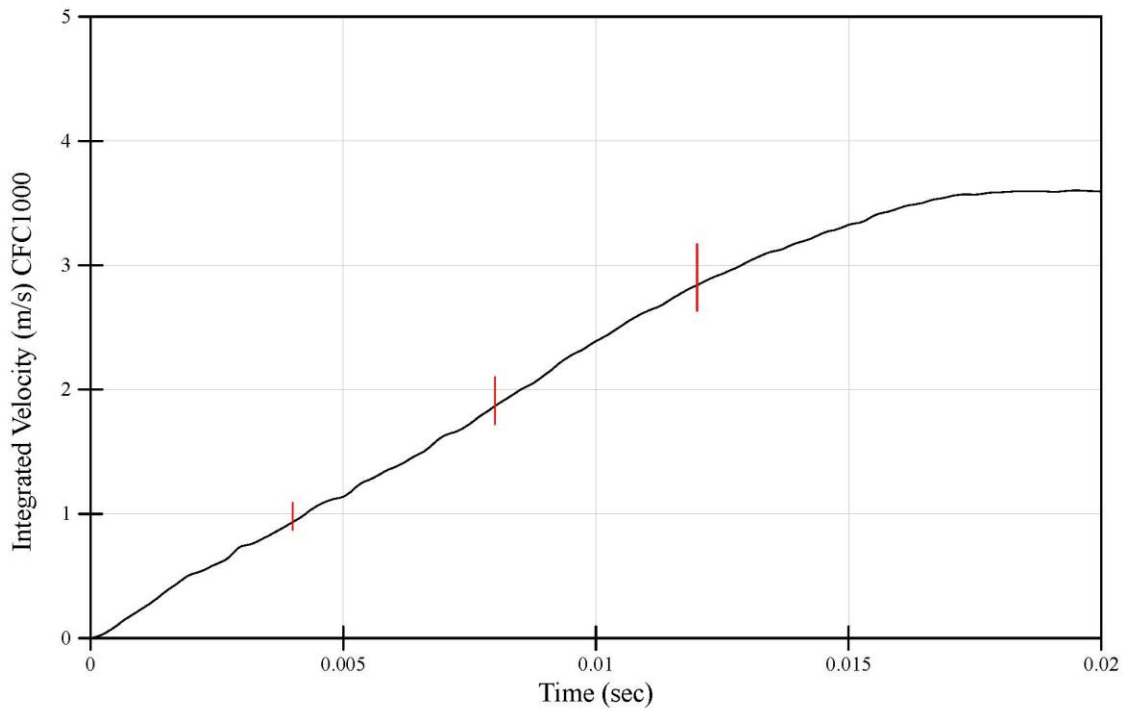
<u>Tested Components</u> Neck: EE8804	Test ID: 200902-3 Test Date: 9/2/2020 Test Time: 12:18 PM
--	---

Test Results			
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.6	Pass
Test Humidity (%)	10 - 70	60	Pass
Test Velocity (m/s)	3.30 - 3.50	3.391	Pass
Pendulum Velocity at 4 ms after T0 (m/s)	0.87 - 1.09	0.93	Pass
Pendulum Velocity at 8 ms after T0 (m/s)	1.72 - 2.10	1.87	Pass
Pendulum Velocity at 12 ms after T0 (m/s)	2.63 - 3.17	2.84	Pass
Peak Headform Flexion Angle (deg)	50.0 - 61.0	55.82	Pass
Peak Headform Flexion Angle Decay Time to 0 degrees (ms)	58.0 - 72.0	62.55	Pass
Peak X-Axis Moment at Occipital Condyle (Nm)	-67.0 - (-54.0)	-63.78	Pass
Peak X-Axis Moment at Occipital Condyle Decay Time to 0 Nm (ms)	71.0 - 87.0	76.70	Pass
Peak Headform X-Axis Angular Rate (deg/sec)	2047 - 2503	2304.48	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 200902-3 processed

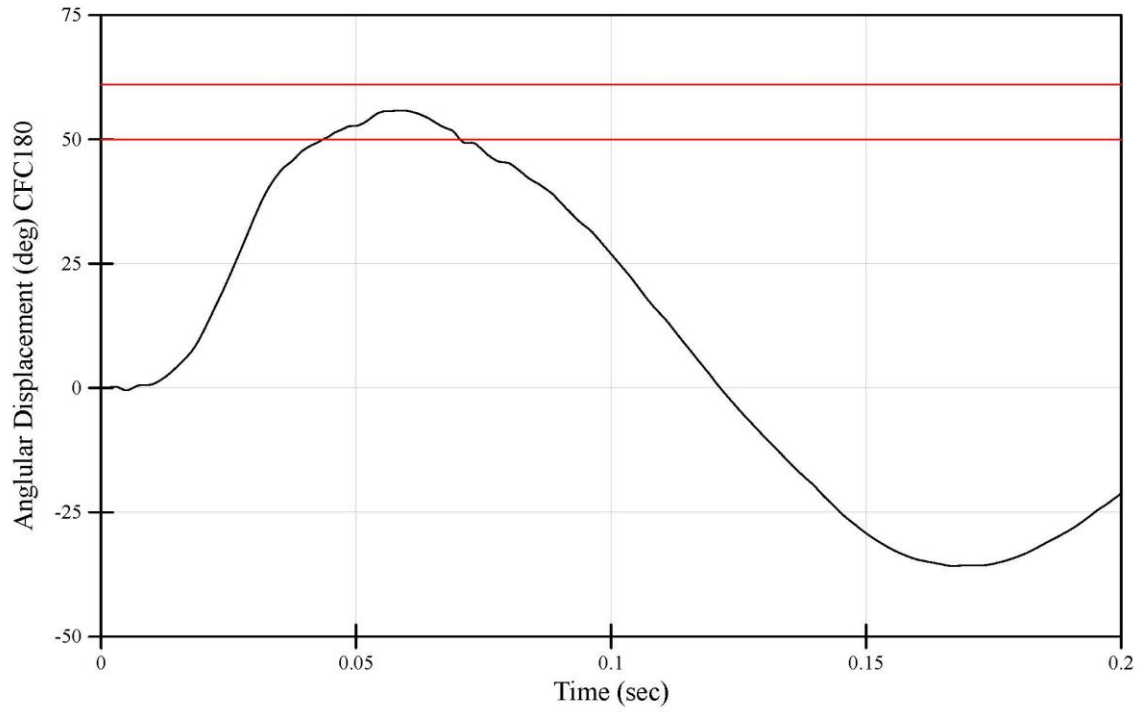
WorldSID-50M Neck Right Lateral Qualification
Probe Acceleration
Neck Serial Number: EE8804



File Name: 200902-3 processed

9/2/2020 12:18 PM

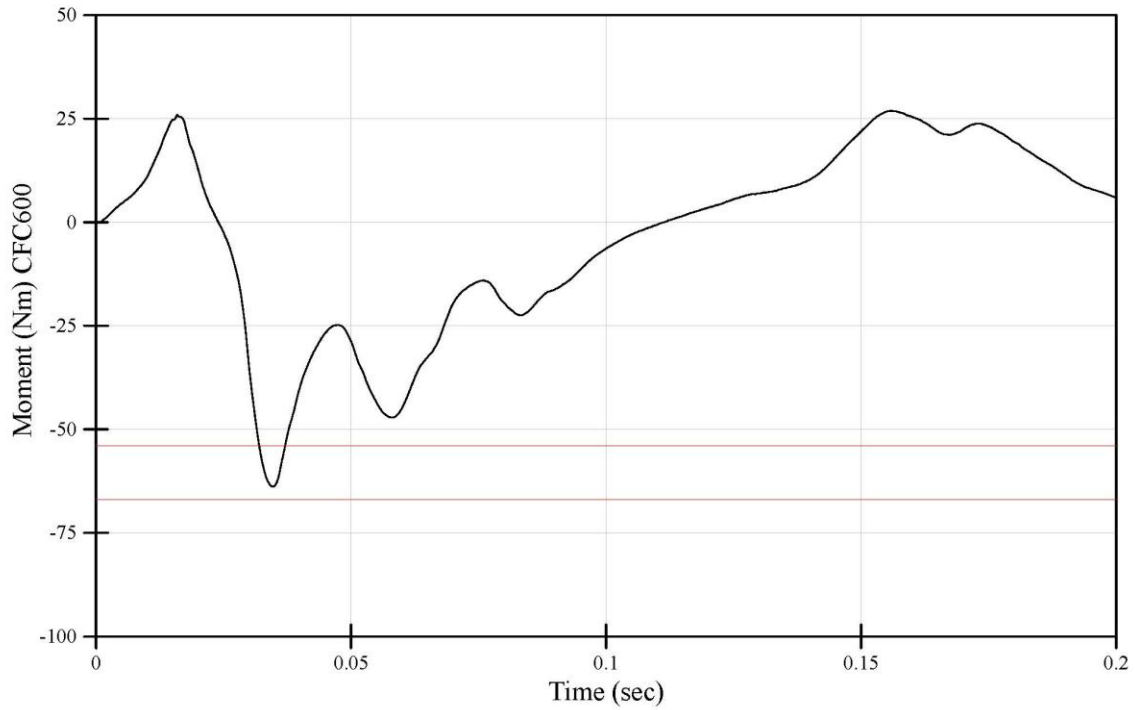
WorldSID-50M Neck Right Lateral Qualification
Peak Headform Flexion Angle
Neck Serial Number: EE8804



File Name: 200902-3 processed

9/2/2020 12:18 PM

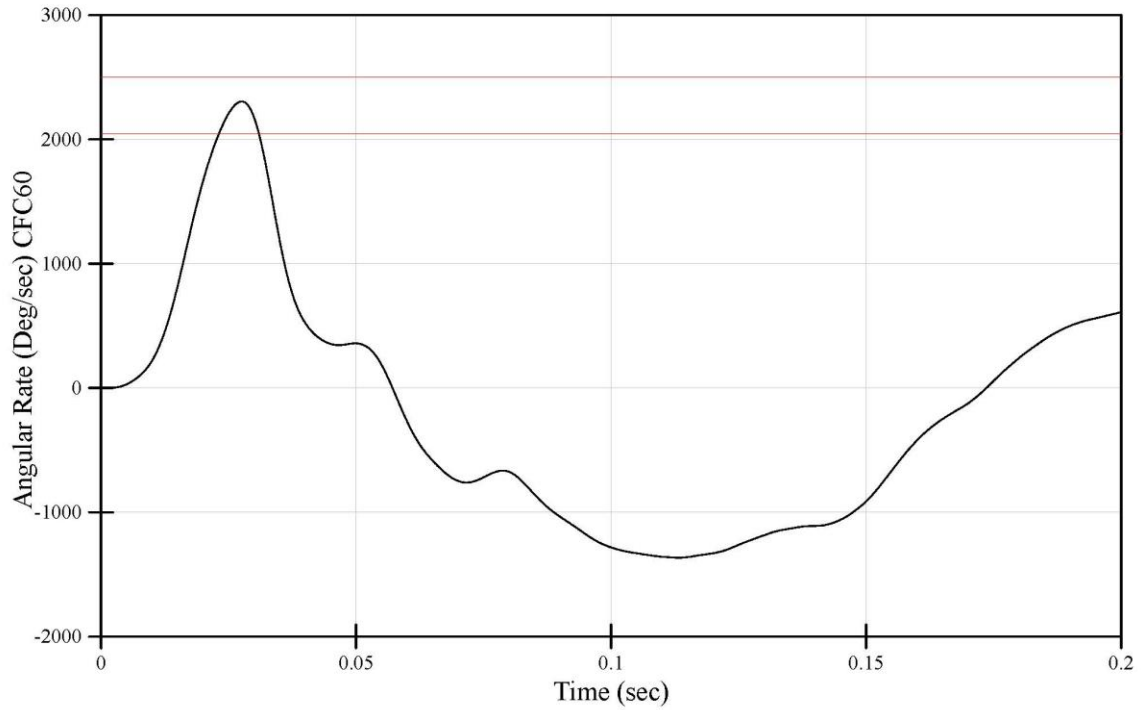
WorldSID-50M Neck Right Lateral Qualification
Peak Moment at Occipital Condyle
Neck Serial Number: EE8804



File Name: 200902-3 processed

9/2/2020 12:18 PM

WorldSID-50M Neck Right Lateral Qualification
Peak Headform X Angular Rate
Neck Serial Number: EE8804



File Name: 200902-3 processed

9/2/2020 12:18 PM

**WorldSID-50M Neck Left Torsion Qualification
Test Results Summary**

Dummy Serial Number: EB8888

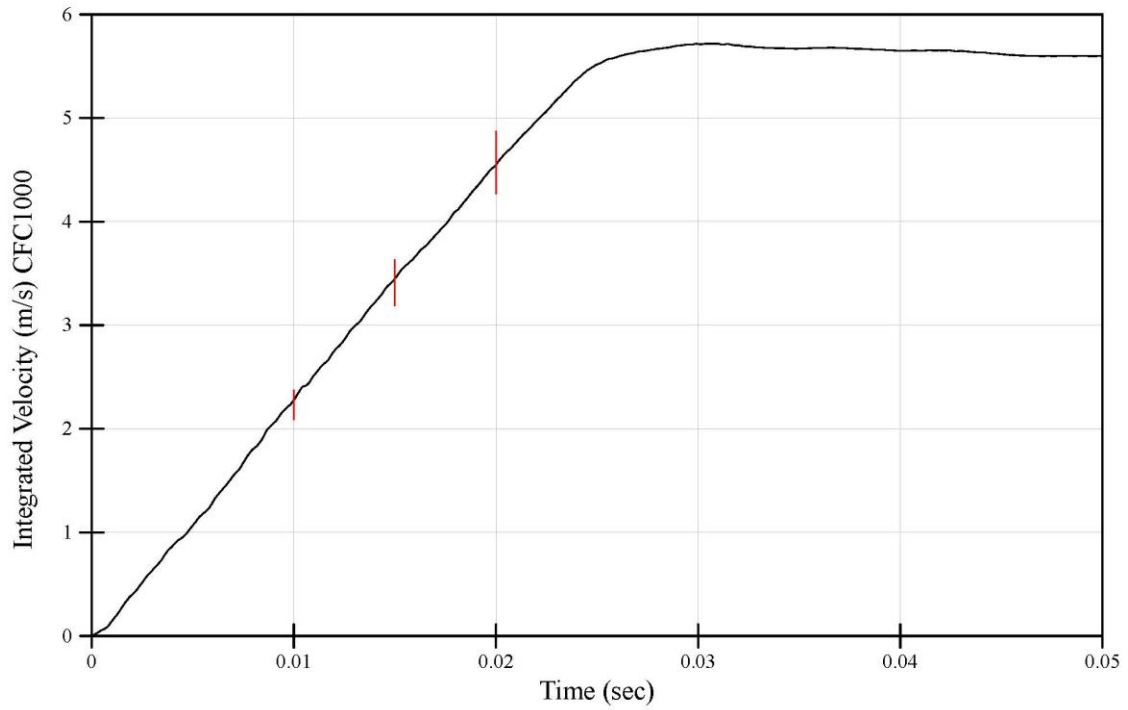
Tested Components Neck: EE8804	Test ID: 200901-19 Test Date: 9/1/2020 Test Time: 12:50 PM
-----------------------------------	--

Test Results			
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	20.6	Pass
Test Humidity (%)	10 - 70	65	Pass
Test Velocity (m/s)	5.10 - 5.30	5.180	Pass
Pendulum Velocity at 10 ms after T0 (m/s)	2.09 - 2.37	2.28	Pass
Pendulum Velocity at 15 ms after T0 (m/s)	3.19 - 3.63	3.45	Pass
Pendulum Velocity at 20 ms after T0 (m/s)	4.27 - 4.87	4.55	Pass
Peak Torsion Fixture Rotation (deg)	-51.0 - (-41.5)	-47.11	Pass
Torsion Fixture Rotation Decay Time to 0 degrees (ms)	35.0 - 43.0	39.40	Pass
Peak Fixture Angular Rate, Z-Axis (deg/sec)	-1655 - (-1345)	-1506.32	Pass
Peak Lower Neck MZ (Nm)	34.0 - 42.0	38.41	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 200901-19 processed

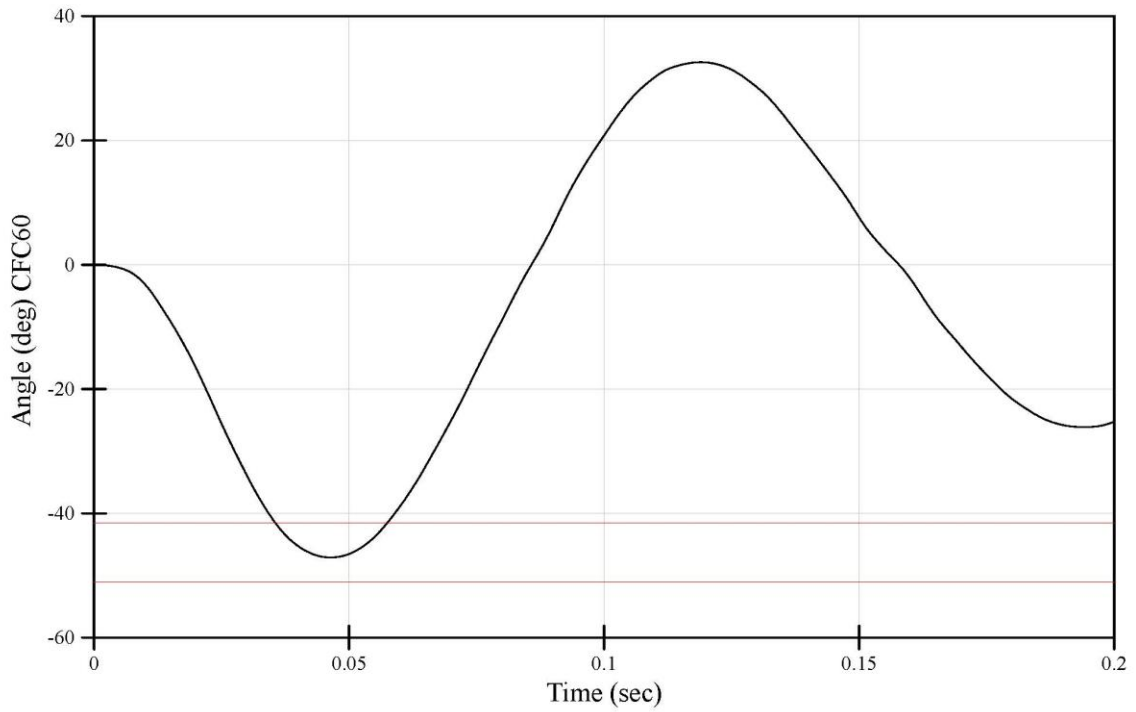
WorldSID-50M Neck Left Torsion Qualification
Probe Acceleration
Neck Serial Number: EE8804



File Name: 200901-19 processed

9/1/2020 12:50 PM

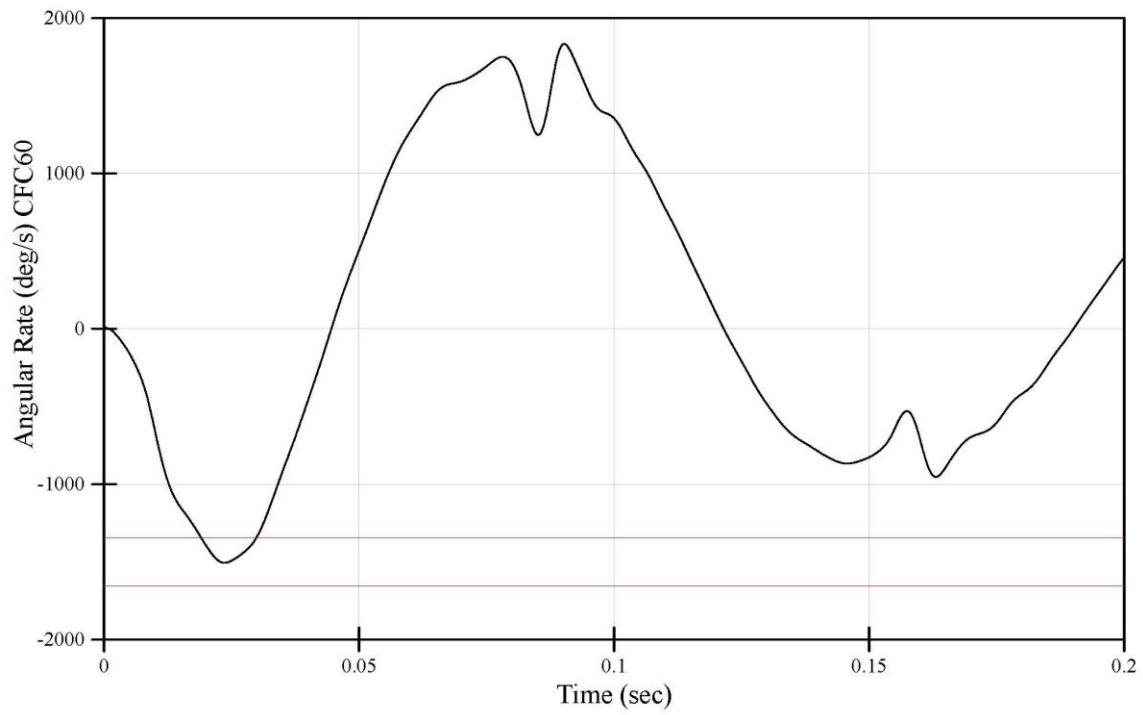
WorldSID-50M Neck Left Torsion Qualification
Neck Fixture Rotation
Neck Serial Number: EE8804



File Name: 200901-19 processed

9/1/2020 12:50 PM

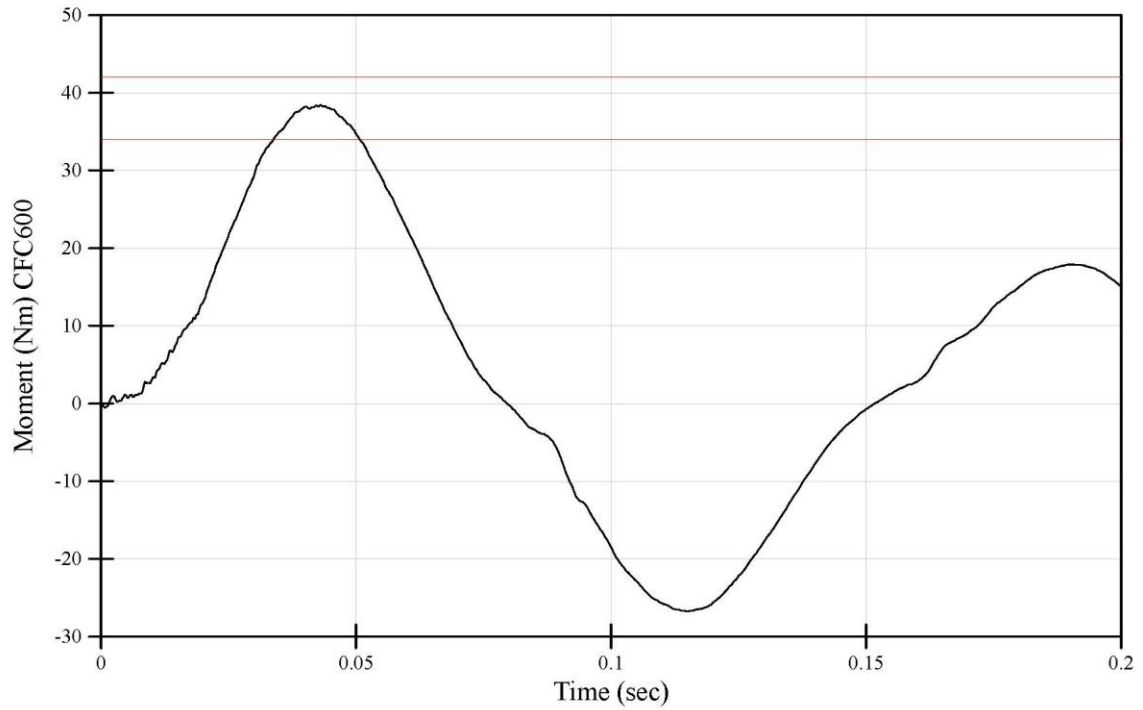
WorldSID-50M Neck Left Torsion Qualification
Peak Angular Rate
Neck Serial Number: EE8804



File Name: 200901-19 processed

9/1/2020 12:50 PM

WorldSID-50M Neck Left Torsion Qualification
Z-Moment as Measured
Neck Serial Number: EE8804



File Name: 200901-19 processed

9/1/2020 12:50 PM

**WorldSID-50M Neck Right Torsion Qualification
Test Results Summary**

Dummy Serial Number: EB8888

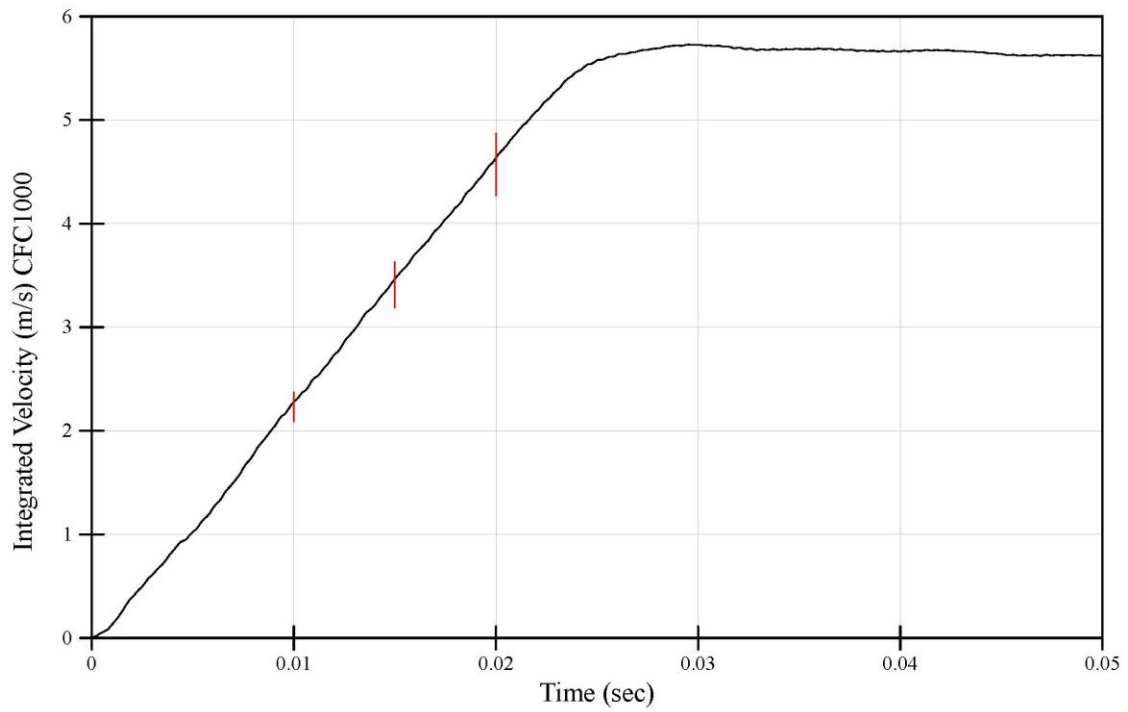
Tested Components Neck: EE8804	Test ID: 200901-20 Test Date: 9/1/2020 Test Time: 1:36 PM
-----------------------------------	---

Test Results			
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	20.8	Pass
Test Humidity (%)	10 - 70	68	Pass
Test Velocity (m/s)	5.10 - 5.30	5.228	Pass
Pendulum Velocity at 10 ms after T0 (m/s)	2.09 - 2.37	2.28	Pass
Pendulum Velocity at 15 ms after T0 (m/s)	3.19 - 3.63	3.47	Pass
Pendulum Velocity at 20 ms after T0 (m/s)	4.27 - 4.87	4.64	Pass
Peak Torsion Fixture Rotation (deg)	41.5 - 51.0	46.37	Pass
Torsion Fixture Rotation Decay Time to 0 degrees (ms)	35.0 - 43.0	39.75	Pass
Peak Fixture Angular Rate, Z-Axis (deg/sec)	1345 - 1655	1533.25	Pass
Peak Lower Neck MZ (Nm)	-42.0 - (-34.0)	-38.82	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 200901-20 processed

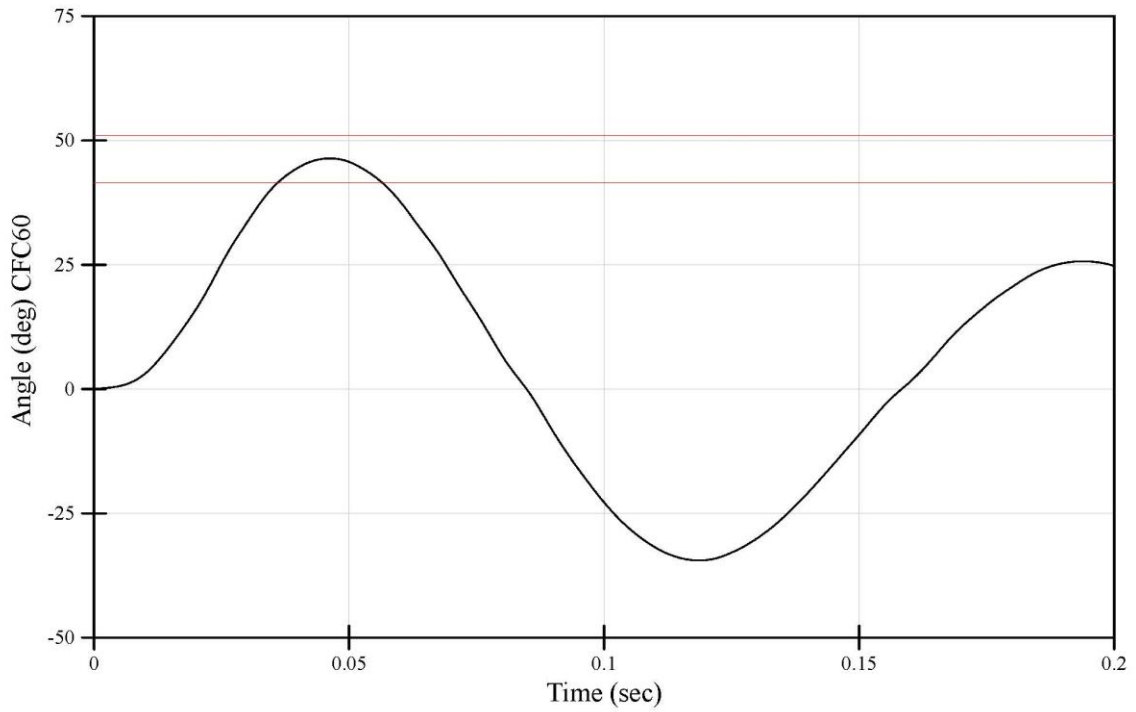
WorldSID-50M Neck Right Torsion Qualification
Probe Acceleration
Neck Serial Number: EE8804



File Name: 200901-20 processed

9/1/2020 1:36 PM

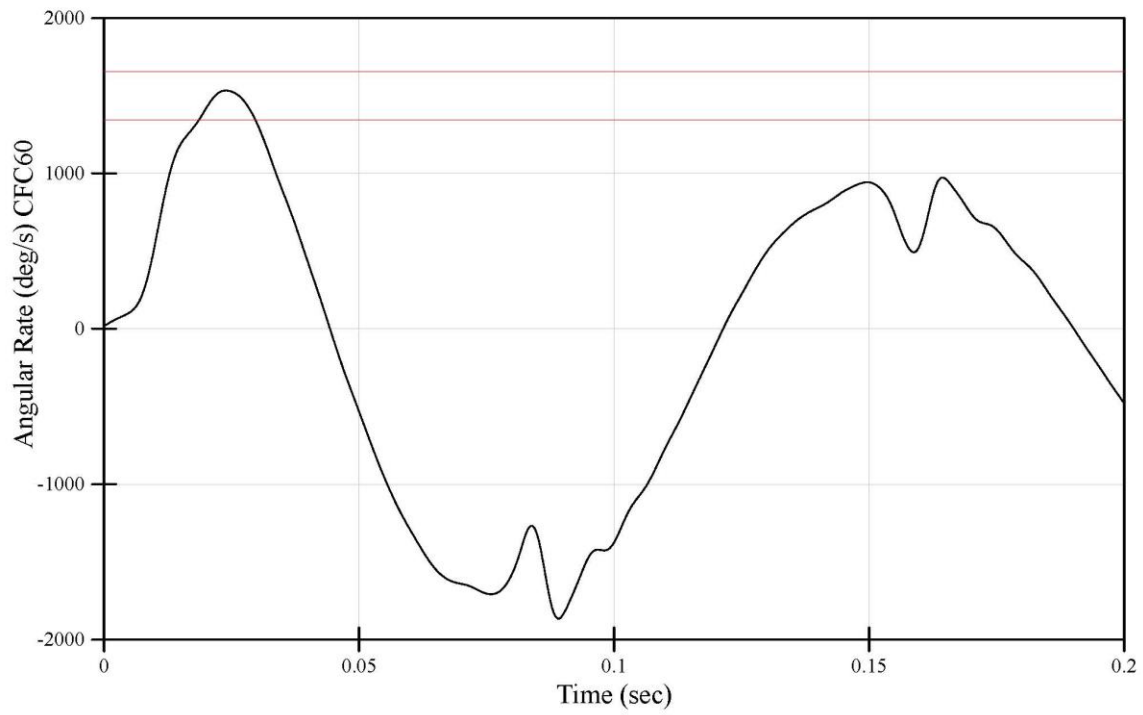
WorldSID-50M Neck Right Torsion Qualification
Neck Fixture Rotation
Neck Serial Number: EE8804



File Name: 200901-20 processed

9/1/2020 1:36 PM

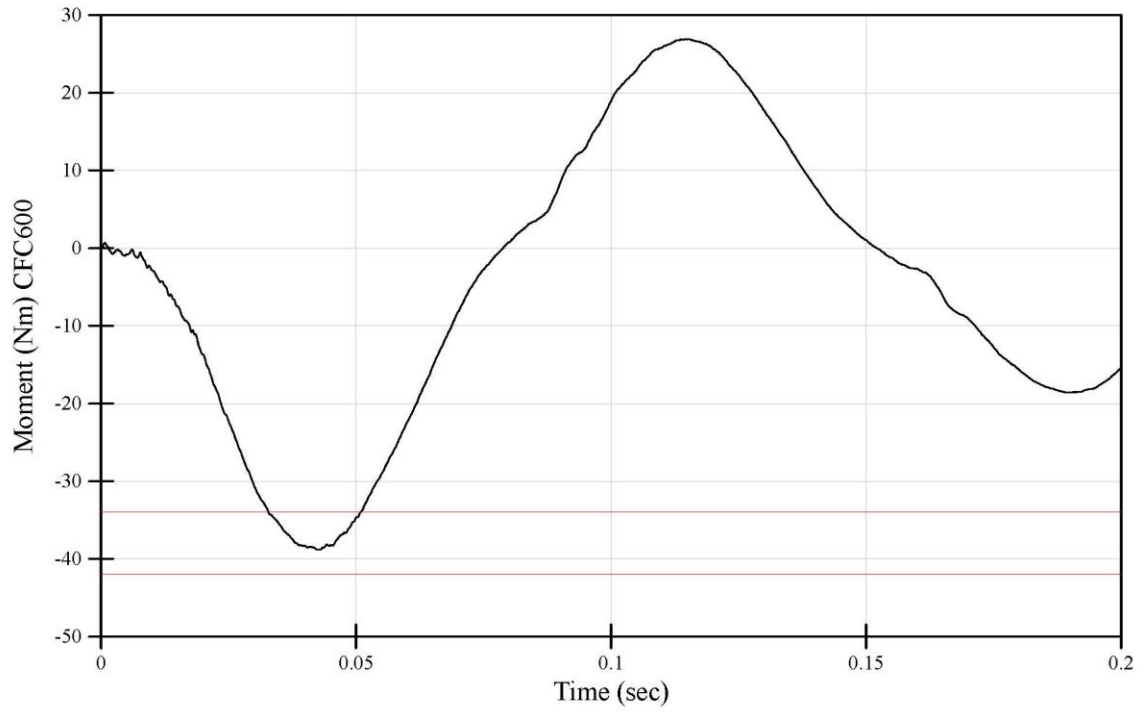
WorldSID-50M Neck Right Torsion Qualification
Peak Angular Rate
Neck Serial Number: EE8804



File Name: 200901-20 processed

9/1/2020 1:36 PM

WorldSID-50M Neck Right Torsion Qualification
Z-Moment as Measured
Neck Serial Number: EE8804



File Name: 200901-20 processed

9/1/2020 1:36 PM

**WorldSID-50M Shoulder Qualification
Test Results Summary**

Dummy Serial Number: EB8888

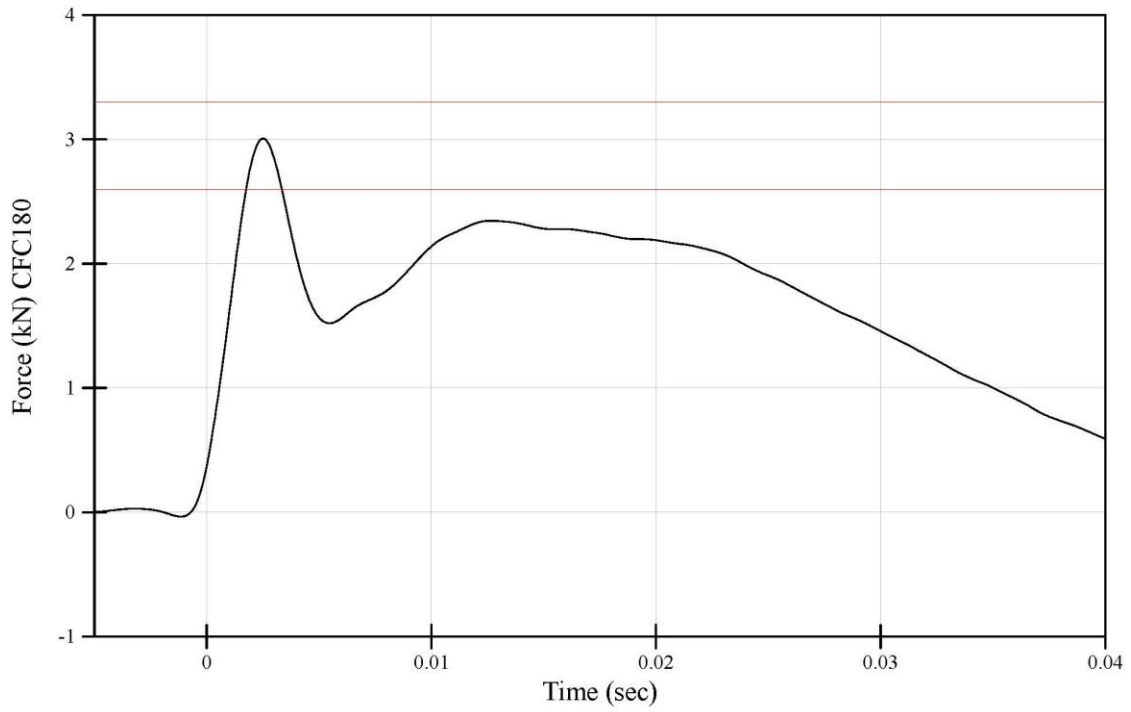
<u>Tested Components</u>		Test ID: 200902-4
Shoulder Rib: DW1913	Abdomen Rib 1: DY5252	Test Date: 9/2/2020
Thorax Rib 1: EB5400	Abdomen Rib 2: DY5254	Test Time: 1:34 PM
Thorax Rib 2: EB5401	RibEye: 124	
Thorax Rib 3: EB5402	Impacted Arm: EC3799	

<u>Test Results</u>			
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.7	Pass
Test Humidity (%)	10 - 70	64	Pass
Test Velocity (m/s)	4.20 - 4.40	4.314	Pass
Thorax Rib Temperature Sensor (°C)	20.6 - 23.8	22.6	Pass
Peak Probe Force (kN)	2.60 - 3.30	3.01	Pass
Peak Shoulder Fy (kN)	-1.80 - (-1.47)	-1.64	Pass
Peak Shoulder Rib Length Change (mm)	37.0 - 46.0	42.29	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 200902-4 processed

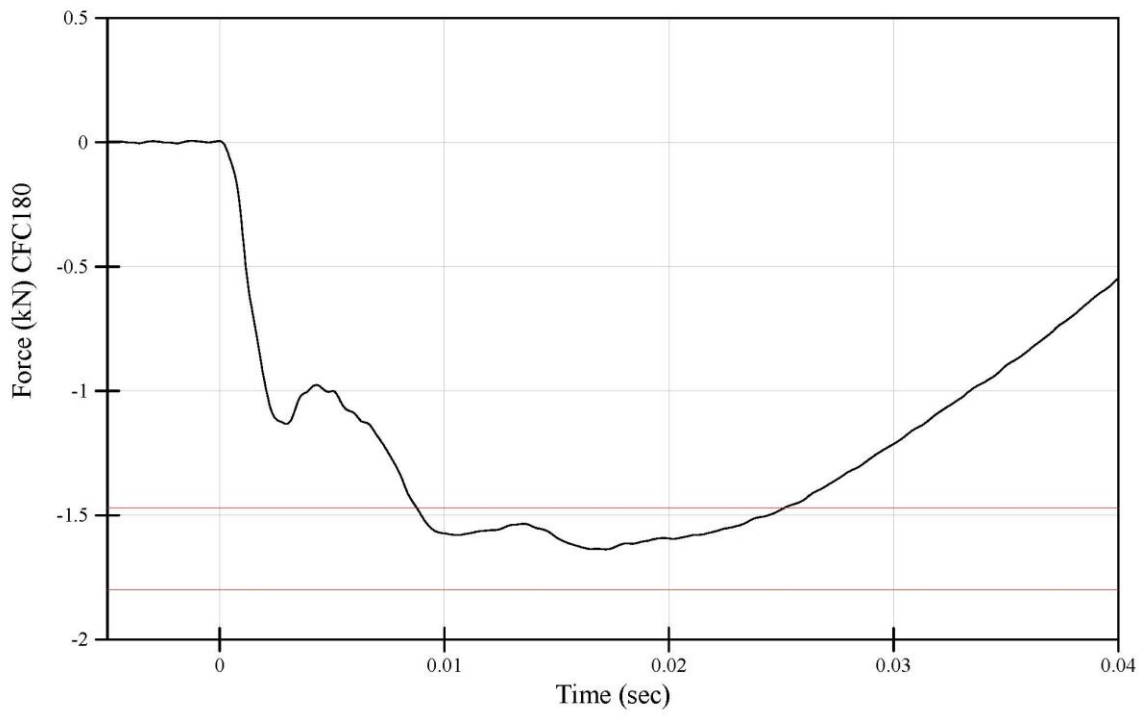
WorldSID-50M Shoulder Qualification
Peak Pendulum Force
Dummy Serial Number: EB8888



File Name: 200902-4 processed

9/2/2020 1:34 PM

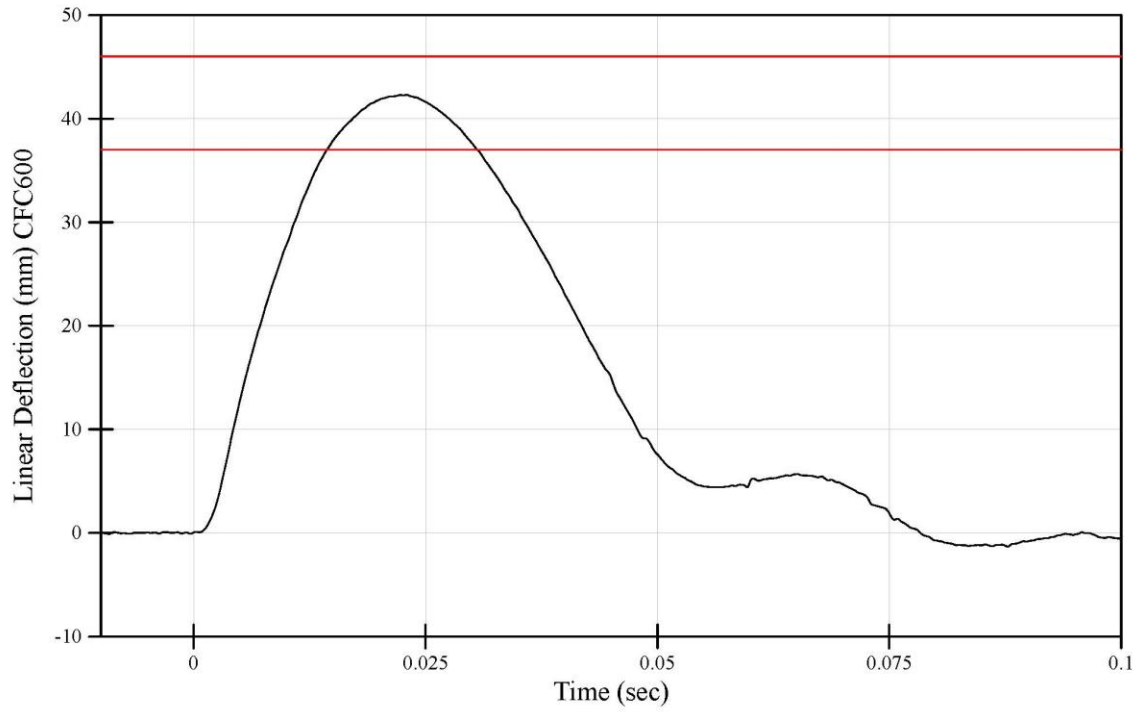
WorldSID-50M Shoulder Qualification
Peak Shoulder Y Force
Dummy Serial Number: EB8888



File Name: 200902-4 processed

9/2/2020 1:34 PM

WorldSID-50M Shoulder Qualification
Maximum Shoulder Y Deflection
Dummy Serial Number: EB8888



File Name: 200902-4 processed

9/2/2020 1:34 PM

WorldSID-50M Left Thorax with Arm Qualification Test Results Summary

Dummy Serial Number: EB8888

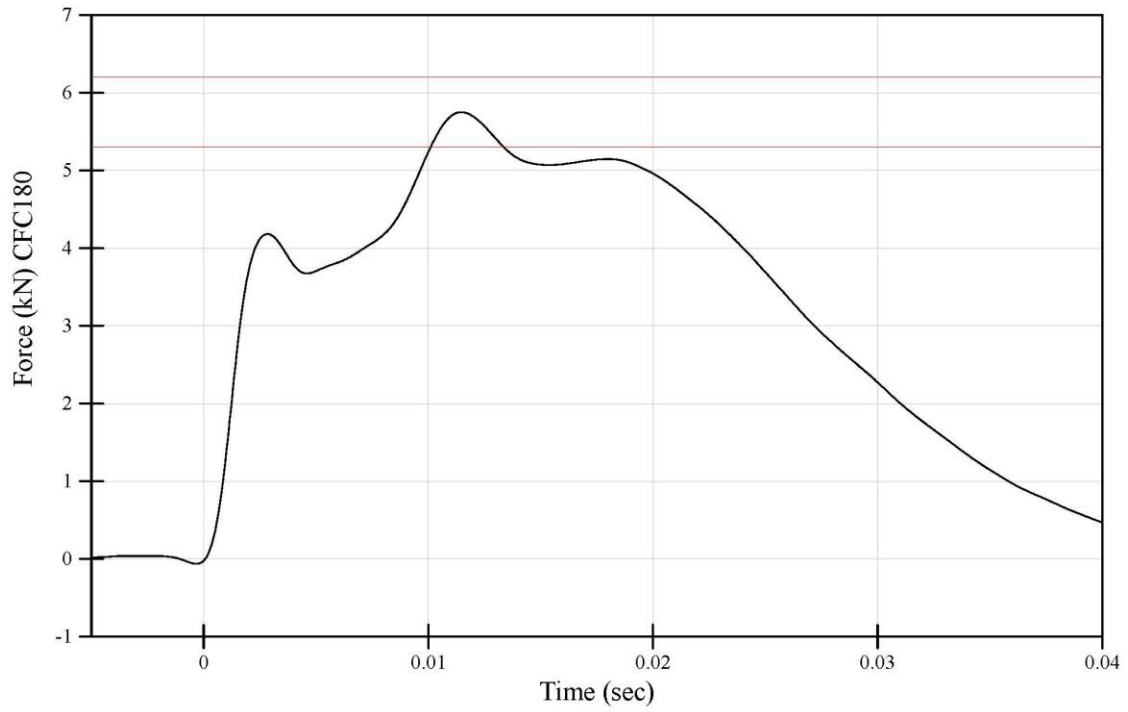
Tested Components		Test ID: 200903-5
Shoulder Rib: DW1913	Abdomen Rib 1: DY5252	Test Date: 9/3/2020
Thorax Rib 1: EB5400	Abdomen Rib 2: DY5254	Test Time: 7:56 AM
Thorax Rib 2: EB5401	RibEye: 124	
Thorax Rib 3: EB5402	Impacted Arm: EC3799	

Test Results			
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.6	Pass
Test Humidity (%)	10 - 70	69	Pass
Test Velocity (m/s)	6.60 - 6.80	6.698	Pass
Thorax Rib Temperature Sensor (°C)	20.6 - 23.8	21.3	Pass
Peak Probe Force (kN)	5.30 - 6.20	5.75	Pass
Peak Thorax Rib 1 Length Change (mm)	35.0 - 47.0	40.96	Pass
Peak Thorax Rib 2 Length Change (mm)	46.0 - 56.0	46.88	Pass
Peak Thorax Rib 3 Length Change (mm)	33.5 - 40.5	34.80	Pass
Peak T4 Acceleration (g)	28.0 - 37.0	31.84	Pass
Peak T12 Acceleration (g)	22.0 - 28.0	22.37	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 200903-5 processed

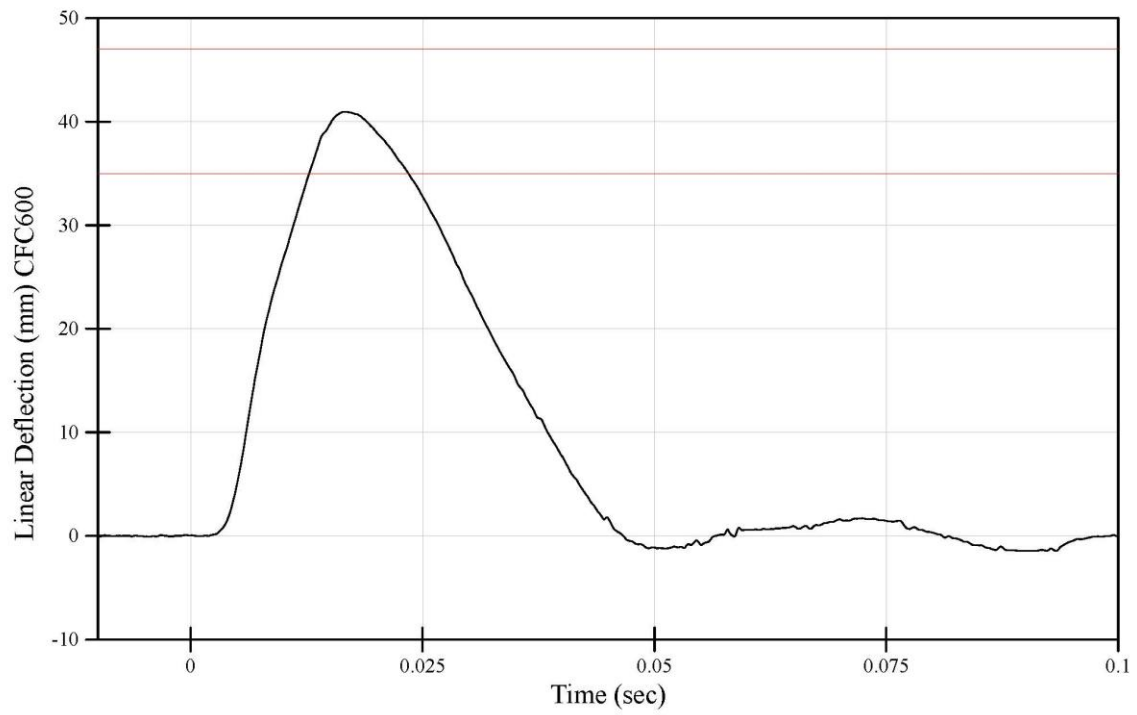
WorldSID-50M Left Thorax with Arm Qualification
Peak Pendulum Force
Dummy Serial Number: EB8888



File Name: 200903-5 processed

9/3/2020 7:56 AM

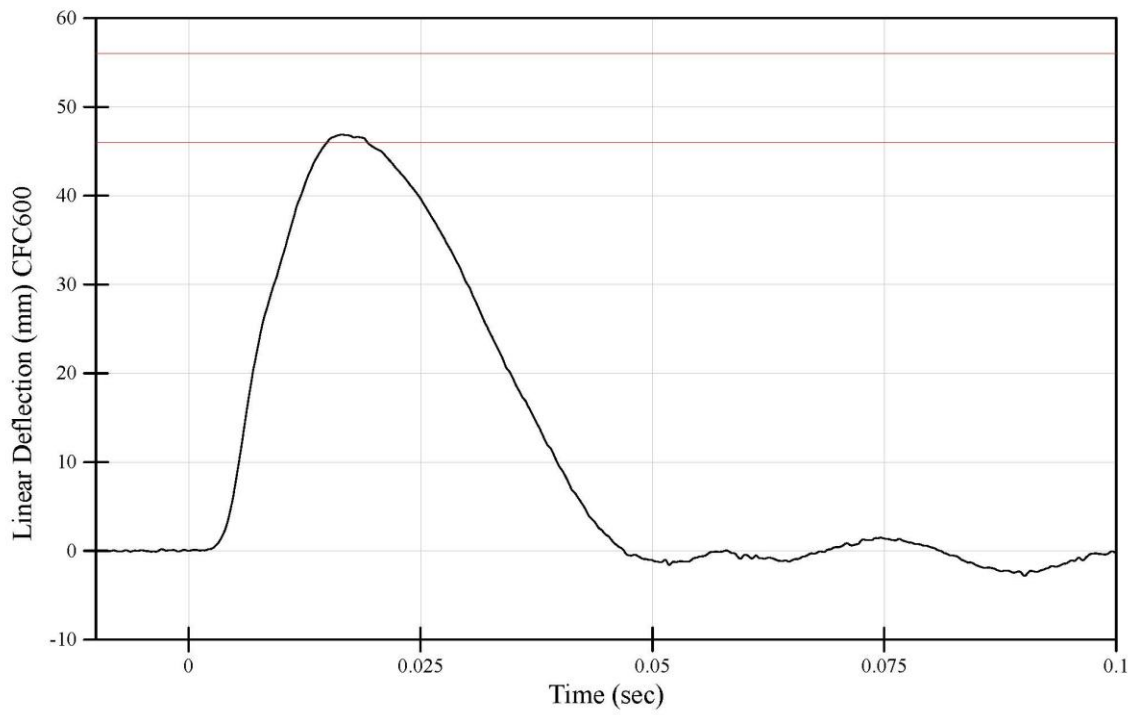
WorldSID-50M Left Thorax with Arm Qualification
Max Thorax Rib 1 Y Deflection
Dummy Serial Number: EB8888



File Name: 200903-5 processed

9/3/2020 7:56 AM

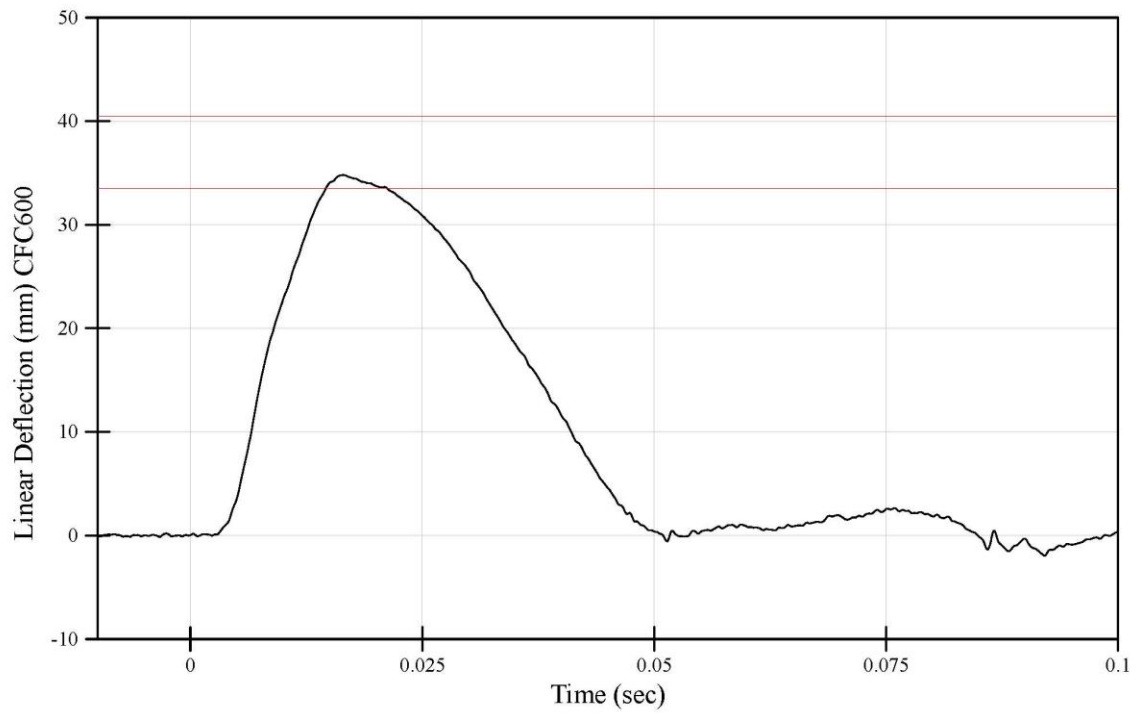
WorldSID-50M Left Thorax with Arm Qualification
Max Thorax Rib 2 Y Deflection
Dummy Serial Number: EB8888



File Name: 200903-5 processed

9/3/2020 7:56 AM

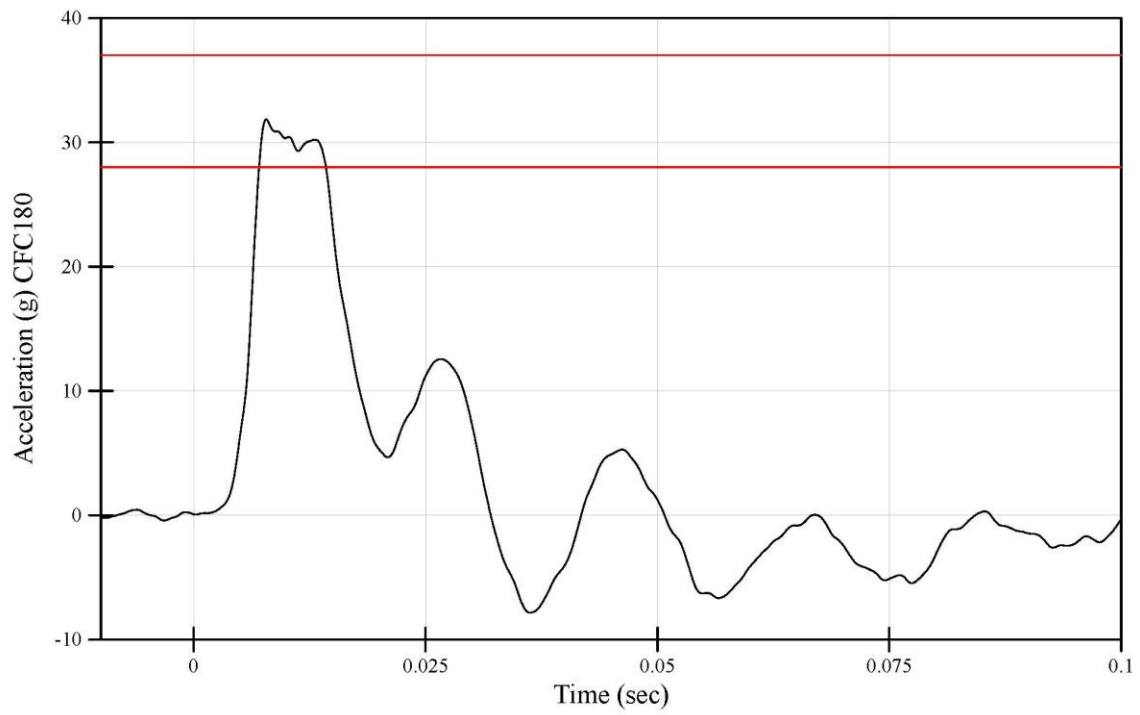
WorldSID-50M Left Thorax with Arm Qualification
Max Thorax Rib 3 Y Deflection
Dummy Serial Number: EB8888



File Name: 200903-5 processed

9/3/2020 7:56 AM

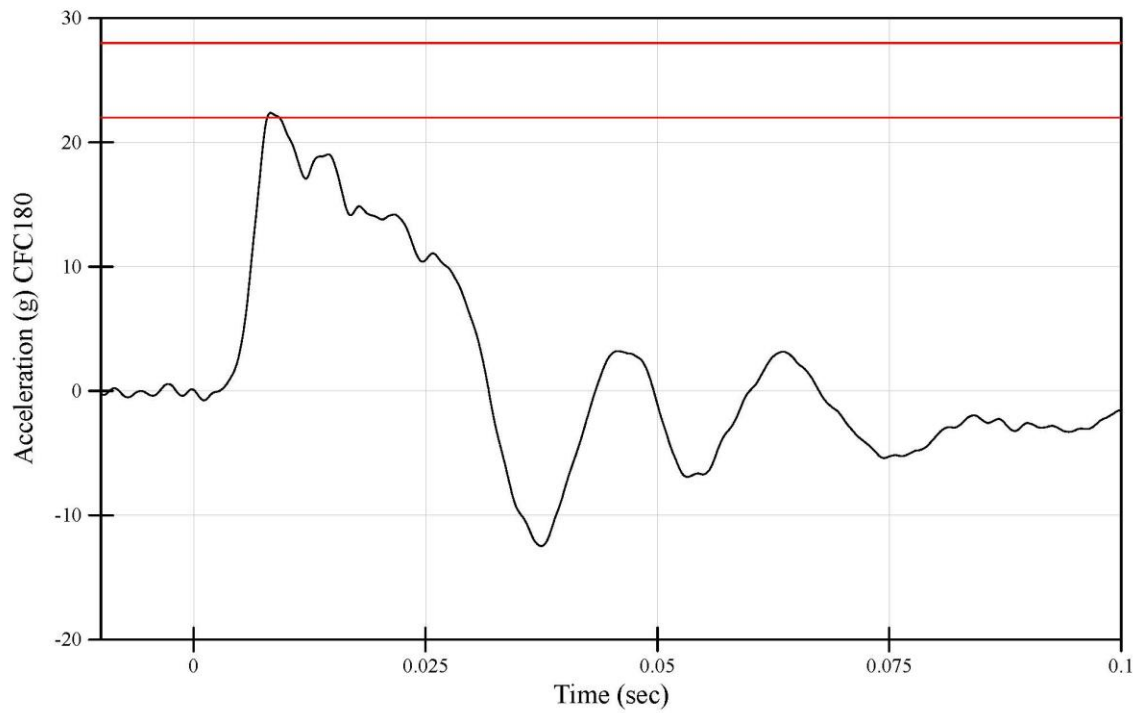
WorldSID-50M Left Thorax with Arm Qualification
Peak T4 Y Axis Acceleration
Dummy Serial Number: EB8888



File Name: 200903-5 processed

9/3/2020 7:56 AM

WorldSID-50M Left Thorax with Arm Qualification
Peak T12 Y Axis Acceleration
Dummy Serial Number: EB8888



File Name: 200903-5 processed

9/3/2020 7:56 AM

**WorldSID-50M Left Thorax without Arm Qualification
Test Results Summary**

Dummy Serial Number: EB8888

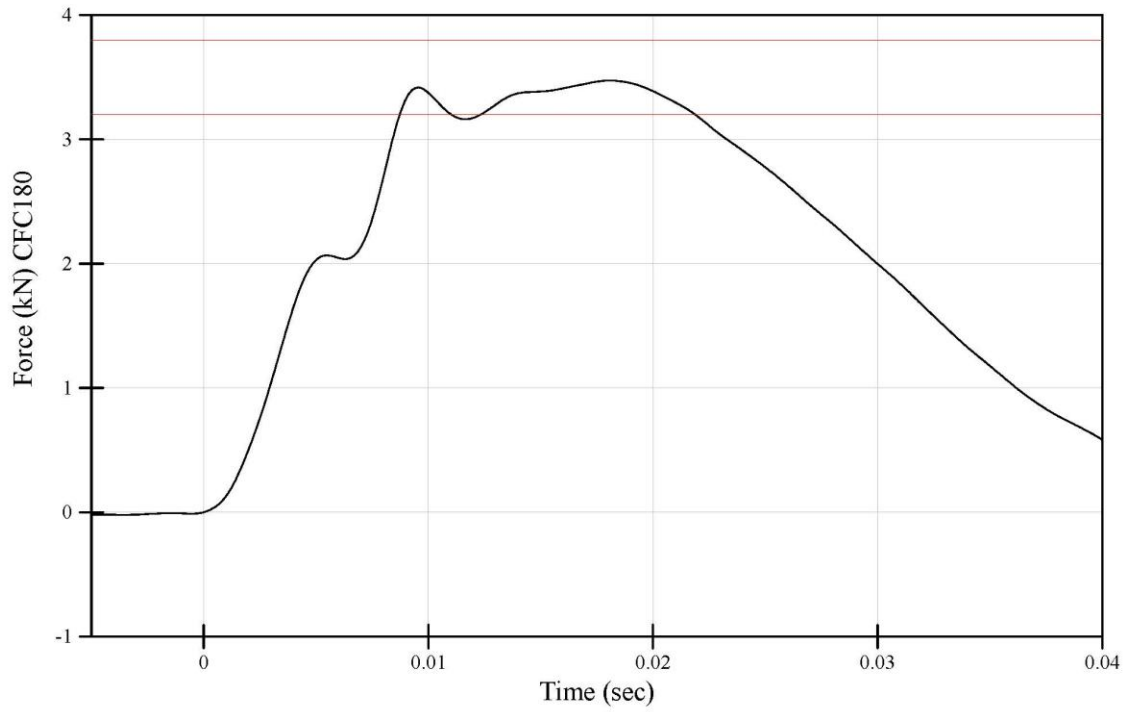
<u>Tested Components</u>		Test ID: 200903-1
Shoulder Rib: DW1913	Abdomen Rib 1: DY5252	Test Date: 9/3/2020
Thorax Rib 1: EB5400	Abdomen Rib 2: DY5254	Test Time: 6:36 AM
Thorax Rib 2: EB5401	RibEye: 124	
Thorax Rib 3: EB5402		

Test Results			
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.0	Pass
Test Humidity (%)	10 - 70	69	Pass
Test Velocity (m/s)	4.20 - 4.40	4.312	Pass
Thorax Rib Temperature Sensor (°C)	20.6 - 23.8	22.3	Pass
Peak Probe Force (kN)	3.20 - 3.80	3.47	Pass
Peak Thorax Rib 1 Length Change (mm)	33.0 - 43.0	35.28	Pass
Peak Thorax Rib 2 Length Change (mm)	35.0 - 43.0	38.08	Pass
Peak Thorax Rib 3 Length Change (mm)	32.0 - 40.0	33.95	Pass
Peak T4 Acceleration (g)	14.0 - 20.0	15.46	Pass
Peak T12 Acceleration (g)	14.0 - 22.0	17.12	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 200903-1 processed

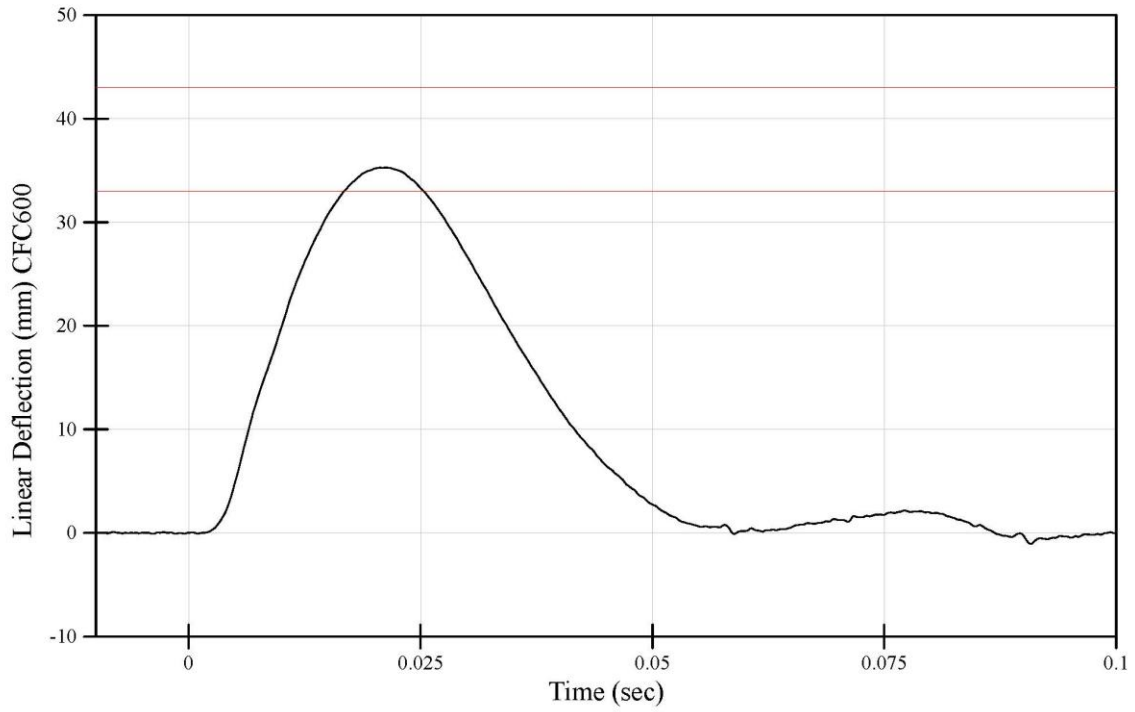
WorldSID-50M Left Thorax without Arm Qualification
Peak Pendulum Force
Dummy Serial Number: EB8888



File Name: 200903-1 processed

9/3/2020 6:36 AM

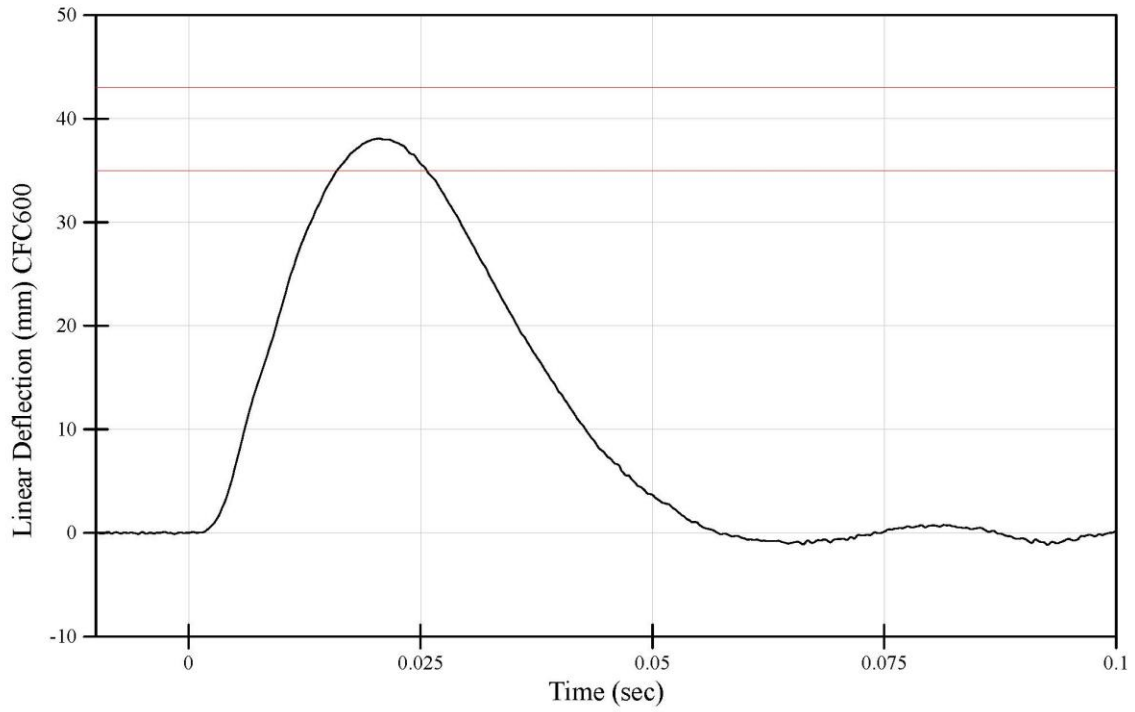
WorldSID-50M Left Thorax without Arm Qualification
Max Thorax Rib 1 Y Deflection
Dummy Serial Number: EB8888



File Name: 200903-1 processed

9/3/2020 6:36 AM

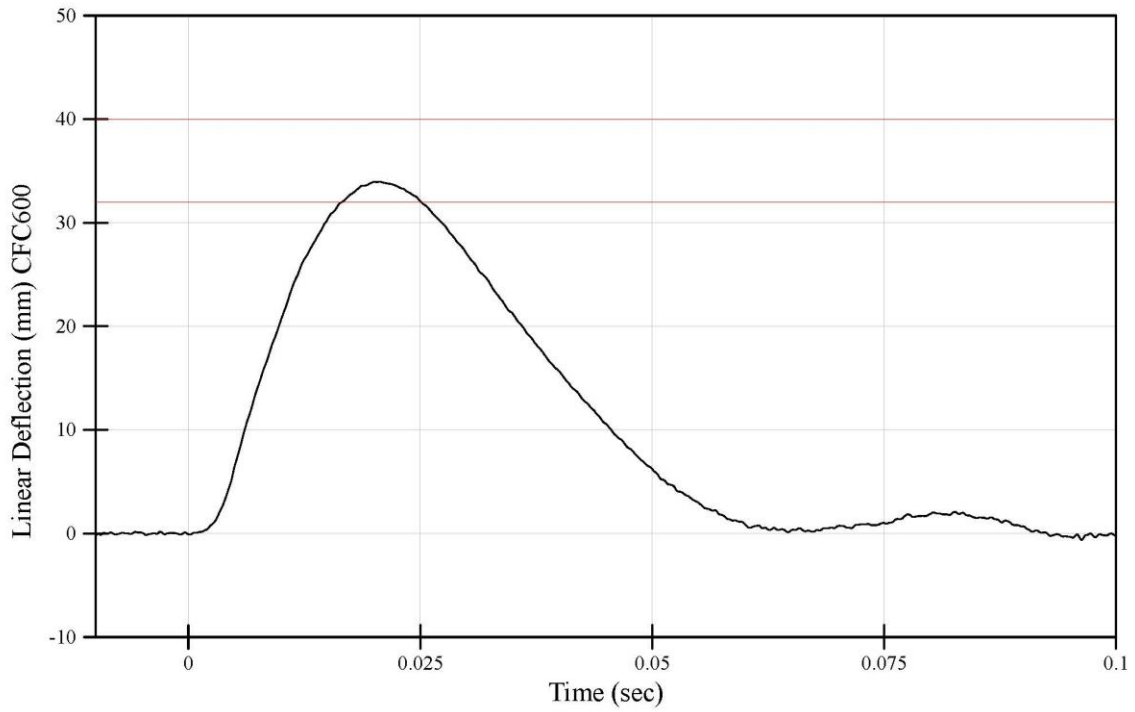
WorldSID-50M Left Thorax without Arm Qualification
Max Thorax Rib 2 Y Deflection
Dummy Serial Number: EB8888



File Name: 200903-1 processed

9/3/2020 6:36 AM

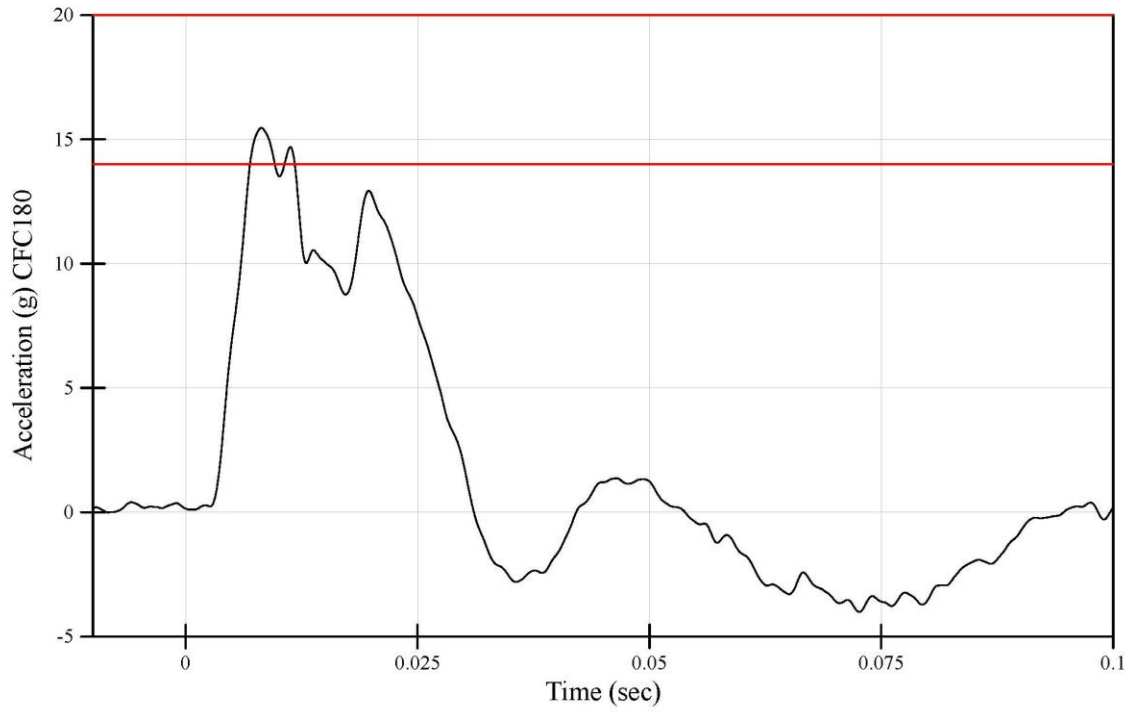
WorldSID-50M Left Thorax without Arm Qualification
Max Thorax Rib 3 Y Deflection
Dummy Serial Number: EB8888



File Name: 200903-1 processed

9/3/2020 6:36 AM

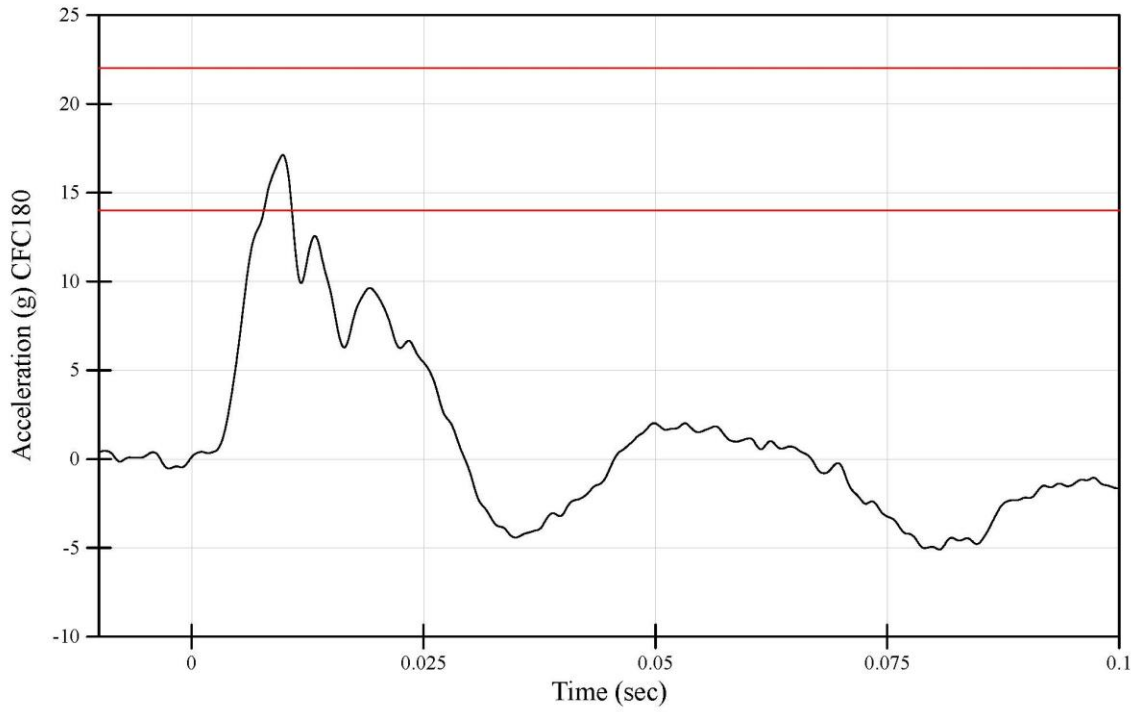
WorldSID-50M Left Thorax without Arm Qualification
Peak T4 Y Axis Acceleration
Dummy Serial Number: EB8888



File Name: 200903-1 processed

9/3/2020 6:36 AM

WorldSID-50M Left Thorax without Arm Qualification
Peak T12 Y Axis Acceleration
Dummy Serial Number: EB8888



File Name: 200903-1 processed

9/3/2020 6:36 AM

**WorldSID-50M Left Abdomen Qualification
Test Results Summary**

Dummy Serial Number: EB8888

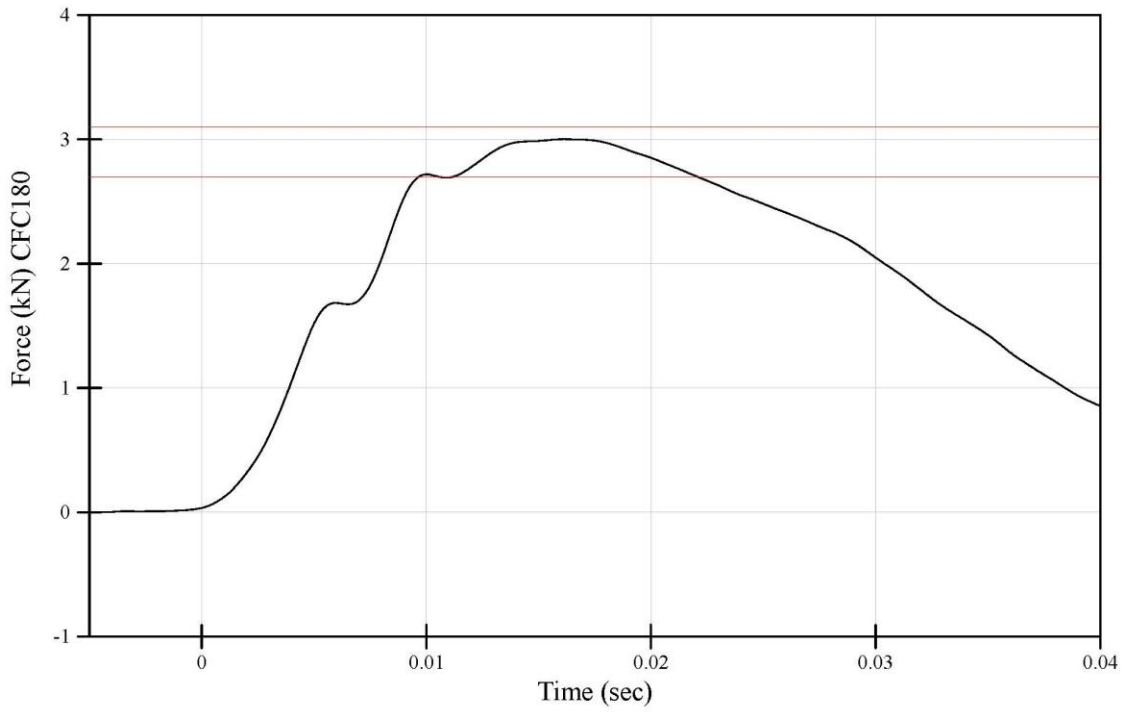
<u>Tested Components</u>		Test ID: 200903-10
Shoulder Rib: DW1913	Abdomen Rib 1: DY5252	Test Date: 9/3/2020
Thorax Rib 1: EB5400	Abdomen Rib 2: DY5254	Test Time: 11:43 AM
Thorax Rib 2: EB5401	RibEye: 124	
Thorax Rib 3: EB5402		

<u>Test Results</u>			
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	22.0	Pass
Test Humidity (%)	10 - 70	63	Pass
Test Velocity (m/s)	4.20 - 4.40	4.314	Pass
Thorax Rib Temperature Sensor (°C)	20.6 - 23.8	23.8	Pass
Peak Probe Force (kN)	2.70 - 3.10	3.00	Pass
Peak Abdomen Rib 1 Length Change (mm)	32.5 - 39.5	35.05	Pass
Peak Abdomen Rib 2 Length Change (mm)	32.0 - 38.0	35.20	Pass
Peak T12 Acceleration (g)	14.5 - 19.5	17.73	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 200903-10 processed

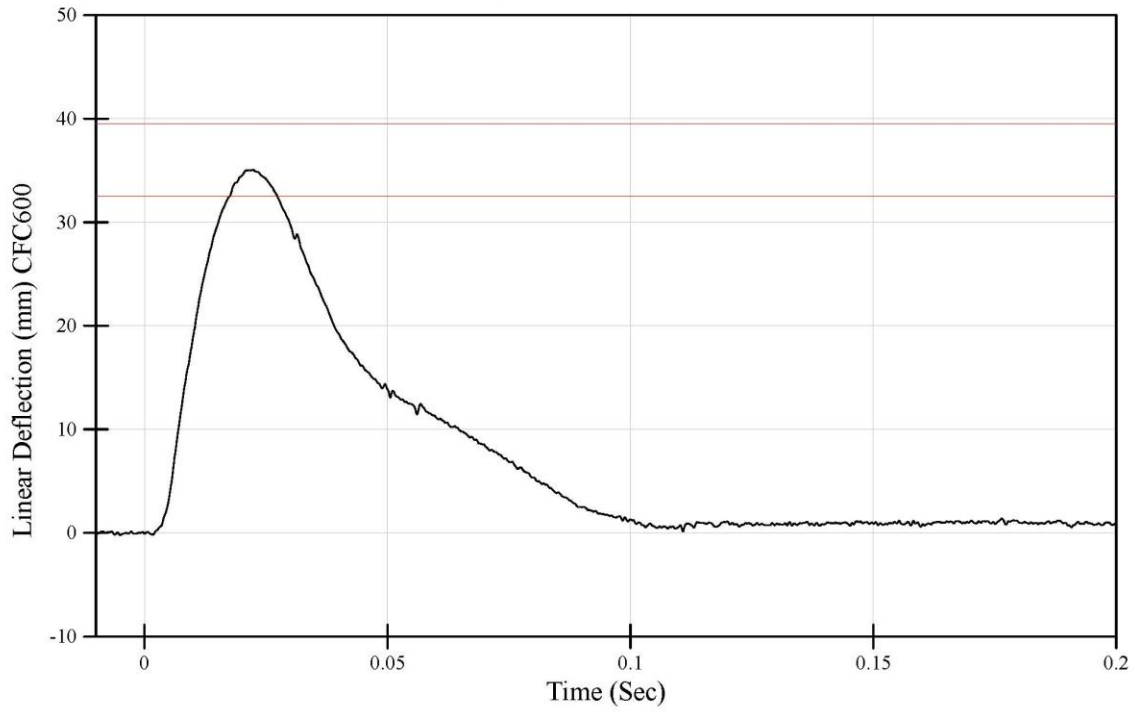
WorldSID-50M Left Abdomen Qualification
Peak Pendulum Force
Dummy Serial Number: EB8888



File Name: 200903-10 processed

9/3/2020 11:43 AM

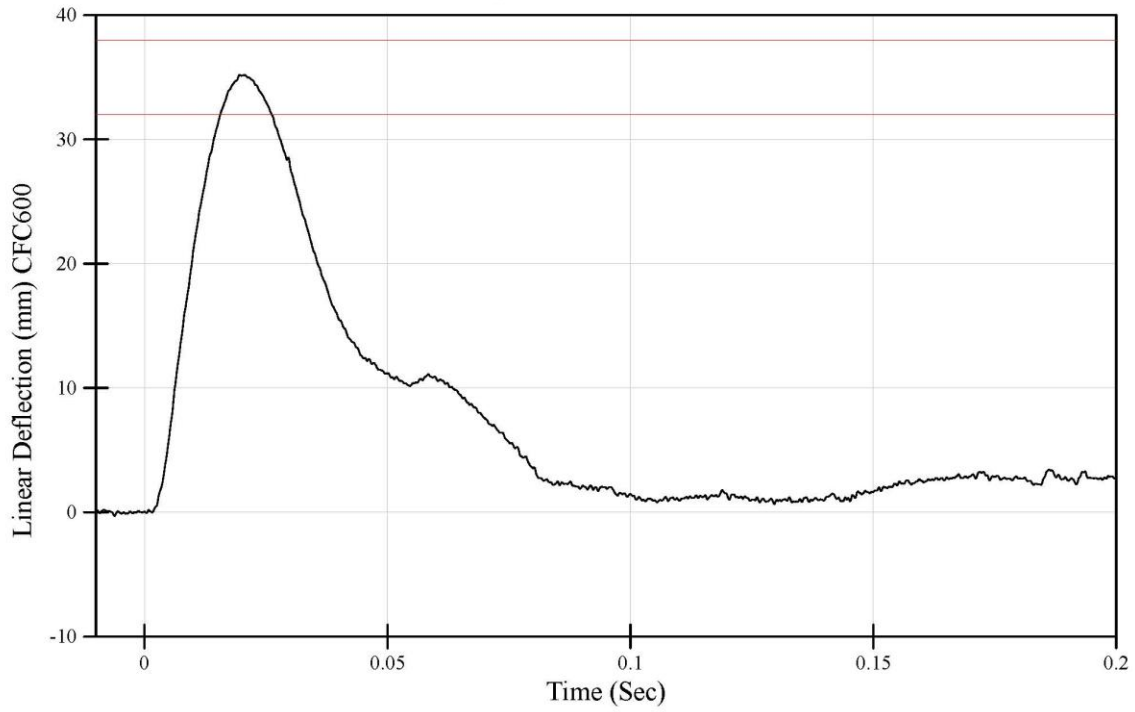
WorldSID-50M Left Abdomen Qualification
Max Abdomen Rib 1 Y Deflection
Dummy Serial Number: EB8888



File Name: 200903-10 processed

9/3/2020 11:43 AM

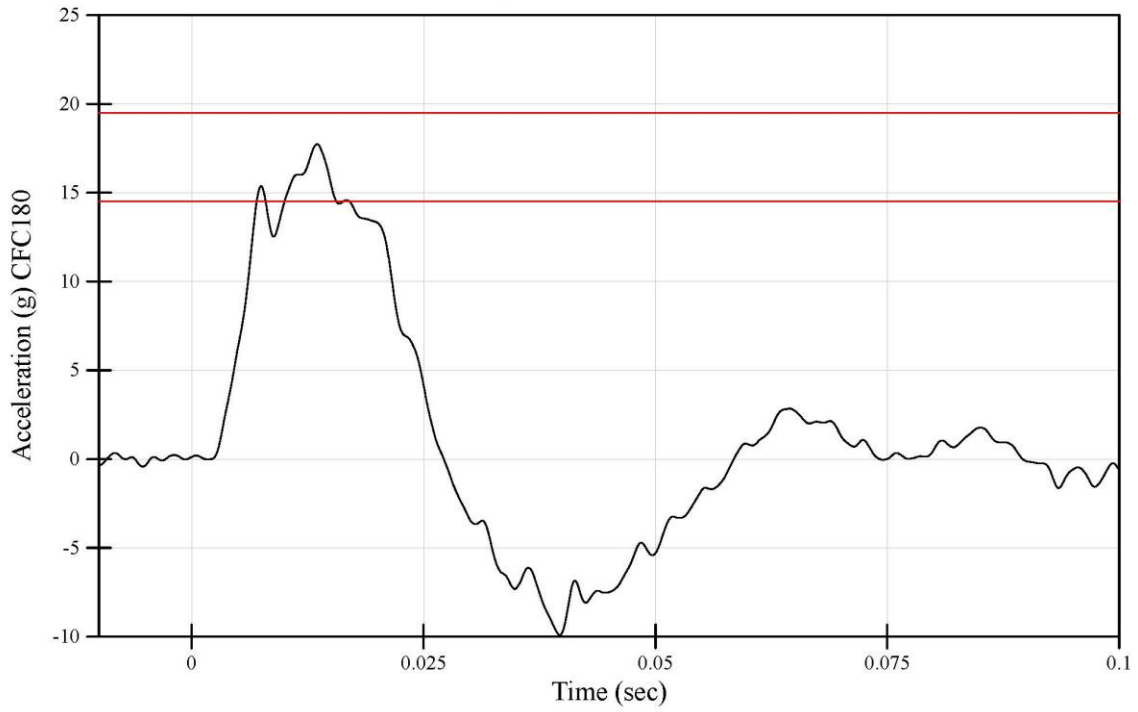
WorldSID-50M Left Abdomen Qualification
Max Abdomen Rib 2 Y Deflection
Dummy Serial Number: EB8888



File Name: 200903-10 processed

9/3/2020 11:43 AM

WorldSID-50M Left Abdomen Qualification
T12 Acceleration along Y axis
Dummy Serial Number: EB8888



File Name: 200903-10 processed

9/3/2020 11:43 AM

**WorldSID-50M Left Pelvis Qualification
Test Results Summary**

Dummy Serial Number: EB8888

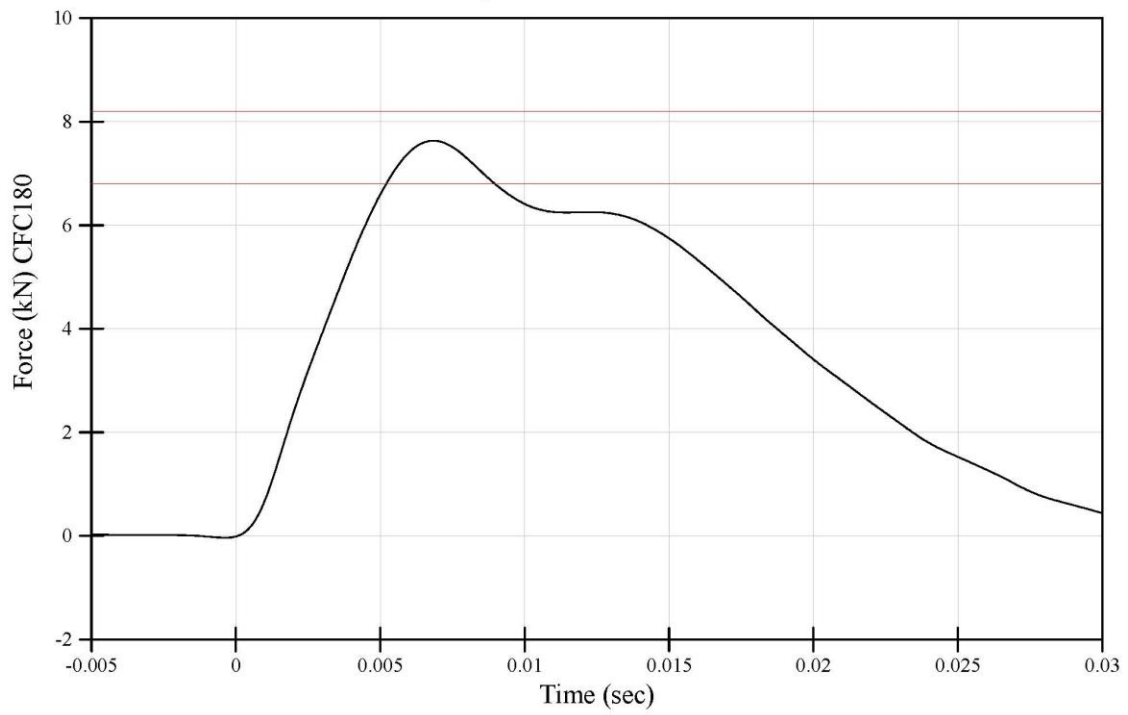
<u>Tested Components</u> Pelvis Bone:	Test ID: 200910-1 Test Date: 9/10/2020 Test Time: 10:01 AM
--	--

Test Results			
<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	20.6	Pass
Test Humidity (%)	10 - 70	63	Pass
Test Velocity (m/s)	6.60 - 6.80	6.800	Pass
Thorax Rib Temperature Sensor (°C)	20.6 - 23.8	23.8	Pass
Peak Probe Force (kN)	6.80 - 8.20	7.63	Pass
Peak Pubic Force FY (kN)	-1.6 - (-1.3)	-1.33	Pass
Peak Sacroiliac Force FY (kN)	-2.3 - (-1.9)	-2.08	Pass
Peak T12 Acceleration (g)	10.0 - 14.0	12.07	Pass
Peak Pelvis Acceleration (g)	38.5 - 48.5	41.64	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 200910-1 processed

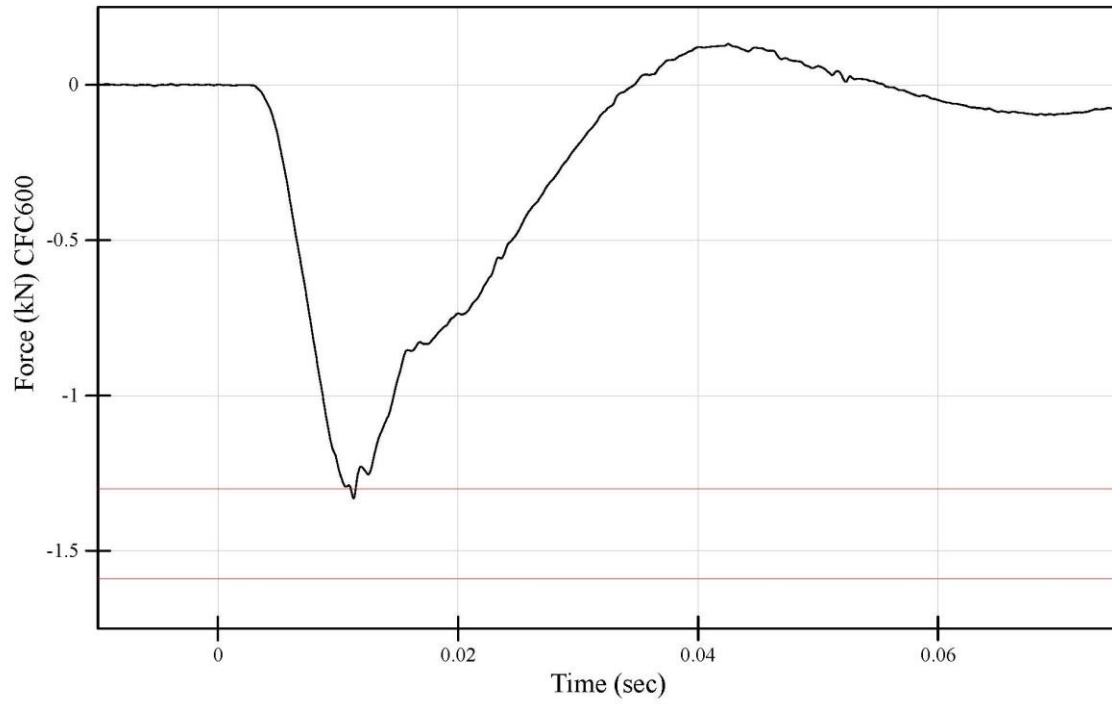
WorldSID-50M Left Pelvis Qualification
Peak Pendulum Force
Dummy Serial Number: EB8888



File Name: 200910-1 processed

9/10/2020 10:01 AM

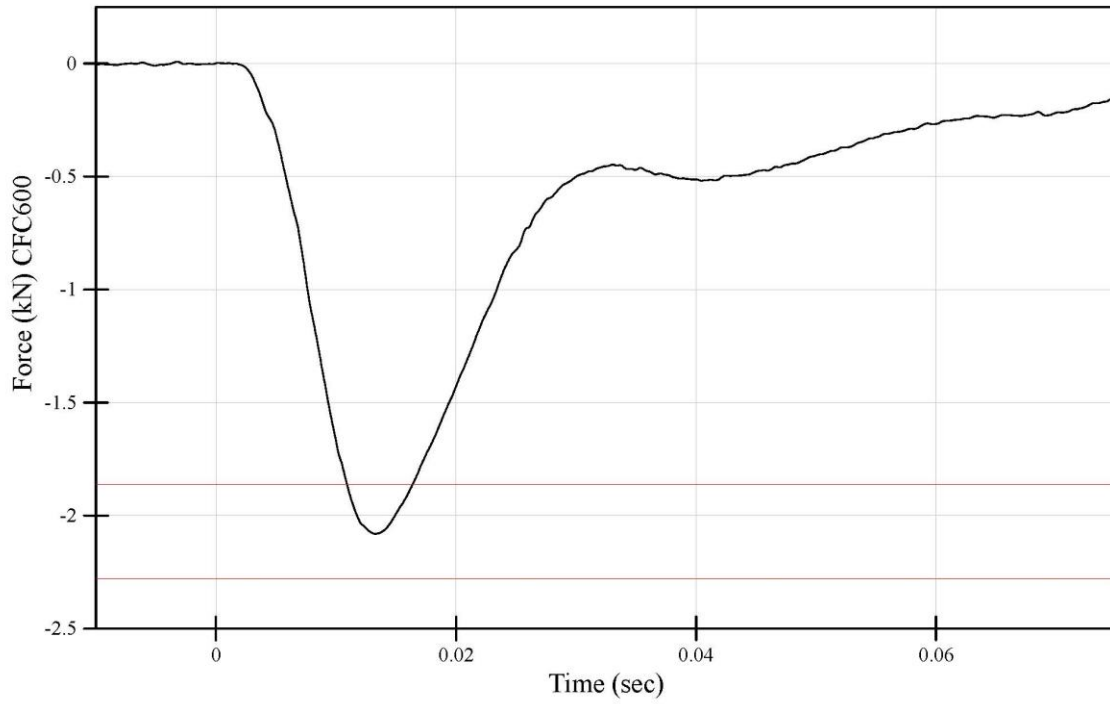
WorldSID-50M Left Pelvis Qualification
Peak Pubic Y axis Force
Dummy Serial Number: EB8888



File Name: 200910-1 processed

9/10/2020 10:01 AM

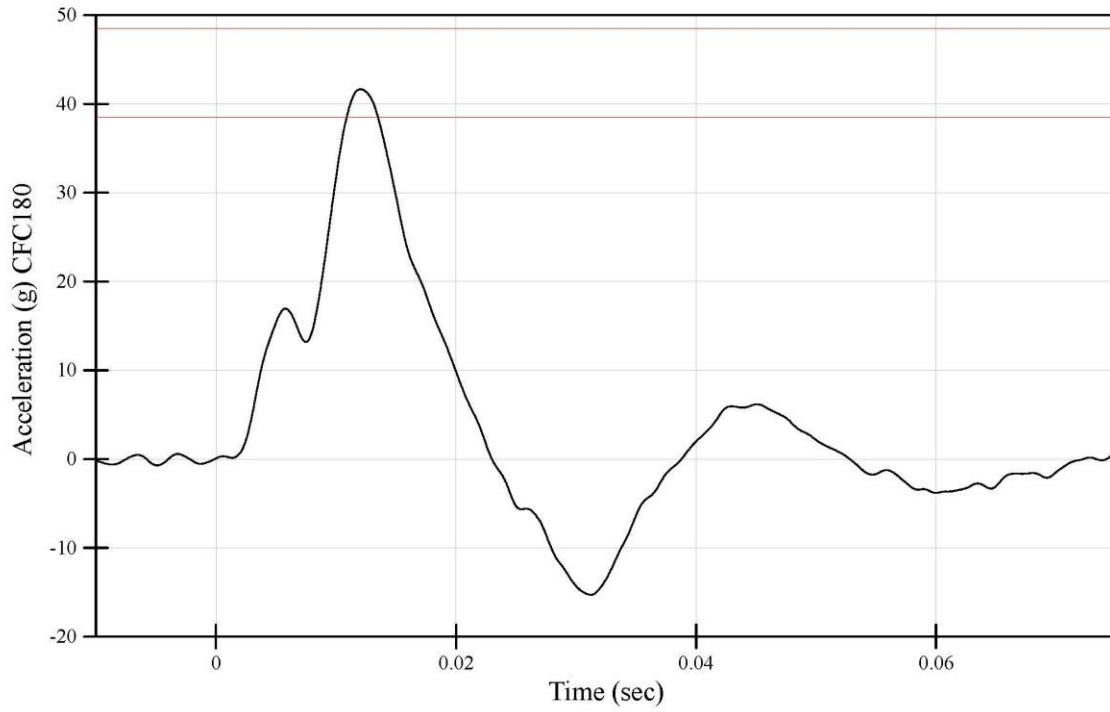
WorldSID-50M Left Pelvis Qualification
Peak Sacro-Iliac Y axis Force
Dummy Serial Number: EB8888



File Name: 200910-1 processed

9/10/2020 10:01 AM

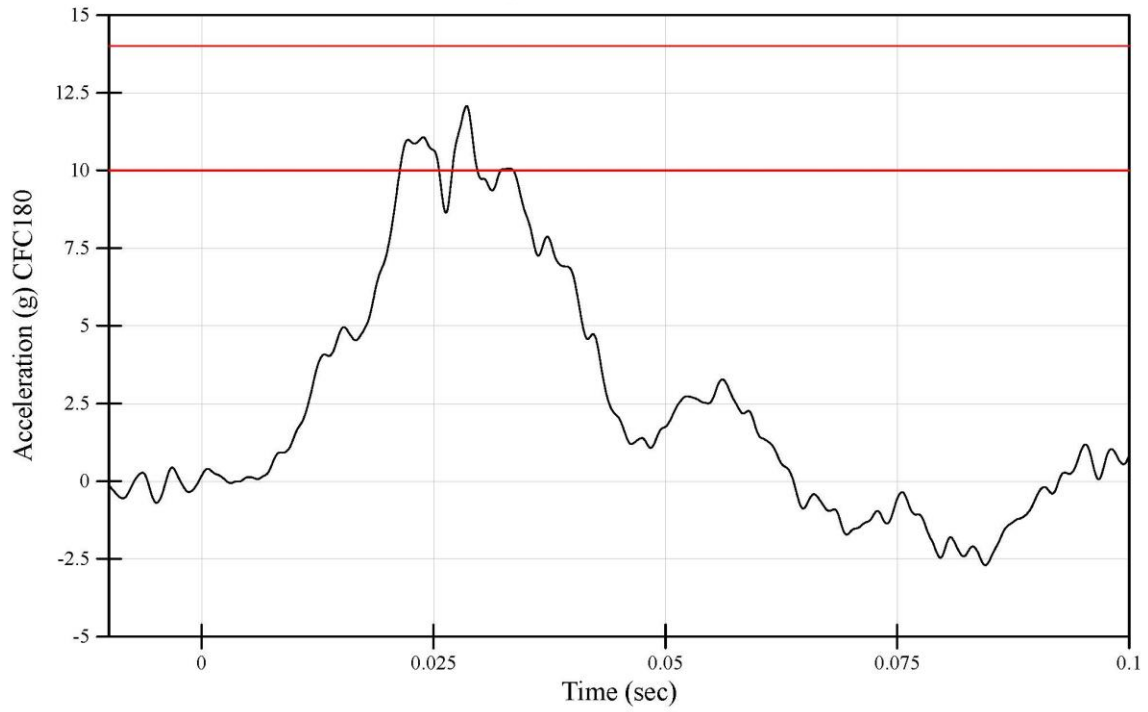
WorldSID-50M Left Pelvis Qualification
Peak Pelvis Y Axis Acceleration
Dummy Serial Number: EB8888



File Name: 200910-1 processed

9/10/2020 10:01 AM

WorldSID-50M Left Pelvis Qualification
Peak T12 Y Axis Acceleration
Dummy Serial Number: EB8888



File Name: 200910-1 processed

9/10/2020 10:01 AM

Post-Test Calibration Sheets
Driver S/N EB8888

Transportation Research Center Inc.
WorldSID-50M
External Measurements
Serial No. EB8888 Certification No. 04

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	32.8	33.7

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	176
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. 4-1

Test Date: 10/28/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	42 %	Yes
Peak Head Resultant Acceleration	211 - 261 g	230.0 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	4.3 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	1.48 %	Yes

Test meets specifications.

Condition: Used

Comments:

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

Report Number: EB8888_WSH04

Page 10 of 44

11.29.2020 14:55:46 952

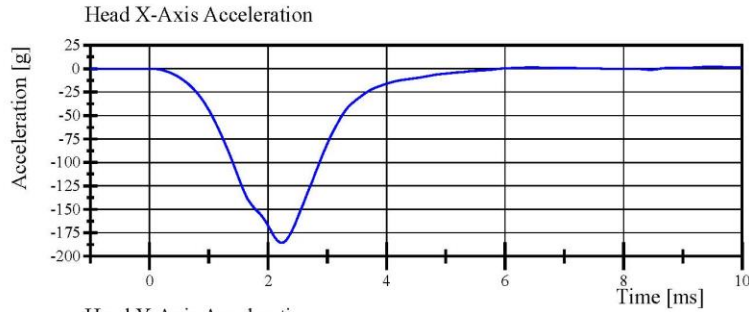


Transportation Research Center Inc.

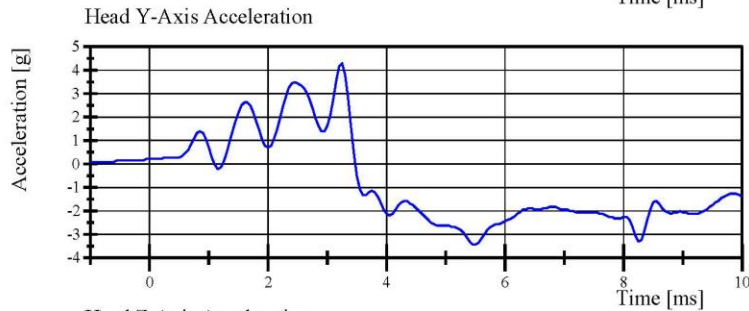
Front Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 4-1

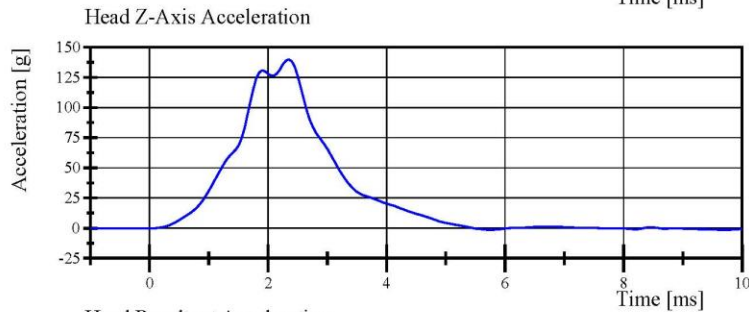
Test Date: 10/28/2020



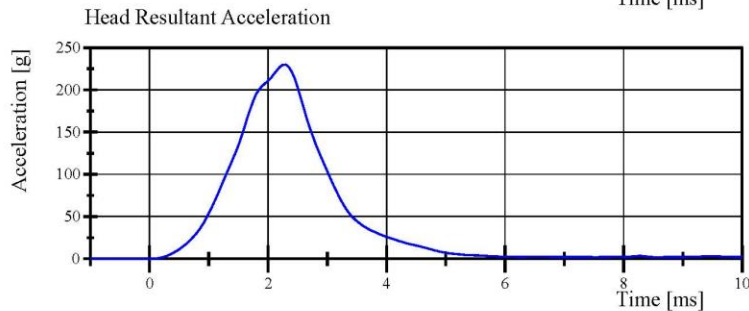
Filter Class: CFC_1000
Max: 2.2 g at 9.5 ms
Min: -185.6 g at 2.3 ms



Filter Class: CFC_1000
Max: 4.3 g at 3.3 ms
Min: -3.4 g at 5.5 ms



Filter Class: CFC_1000
Max: 140.1 g at 2.4 ms
Min: -1.4 g at 5.8 ms



Filter Class: CFC_1000
Max: 230.0 g at 2.3 ms
Min: 0.1 g at -1.0 ms

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

11.29.2020 15:05:52 952



Transportation Research Center Inc.

Left Lateral Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 4-1

Test Date: 10/28/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	42 %	Yes
Peak Head Resultant Acceleration	107 - 126 g	117.4 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-2.8 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	1.89 %	Yes

Test meets specifications.

Condition: Used

Comments:

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

Report Number: EB8888_WSH04

Page 12 of 44

11.29.2020 15:09:47 946

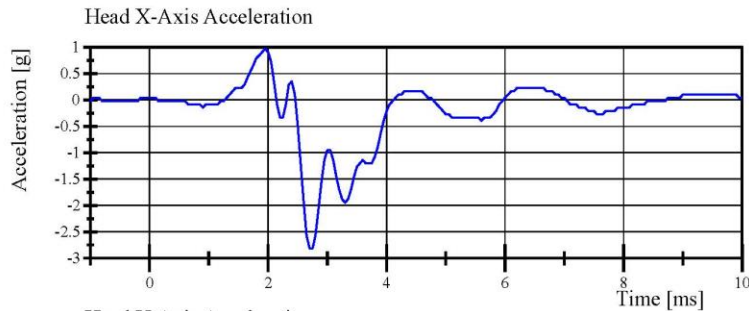


Transportation Research Center Inc.

Left Lateral Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 4-1

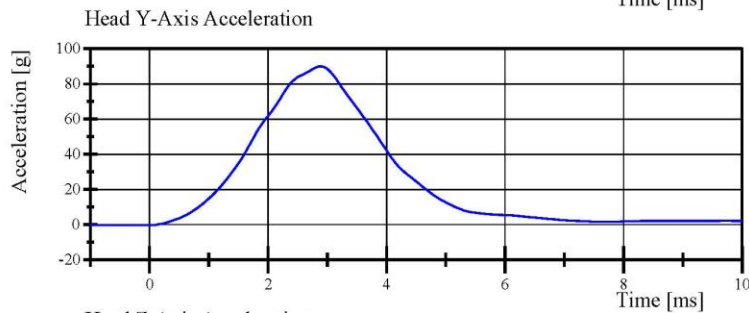
Test Date: 10/28/2020



Filter Class: CFC_1000

Max: 1.0 g at 2.0 ms

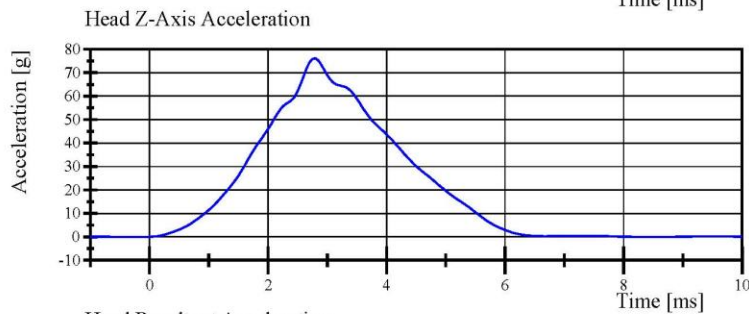
Min: -2.8 g at 2.7 ms



Filter Class: CFC_1000

Max: 90.0 g at 2.9 ms

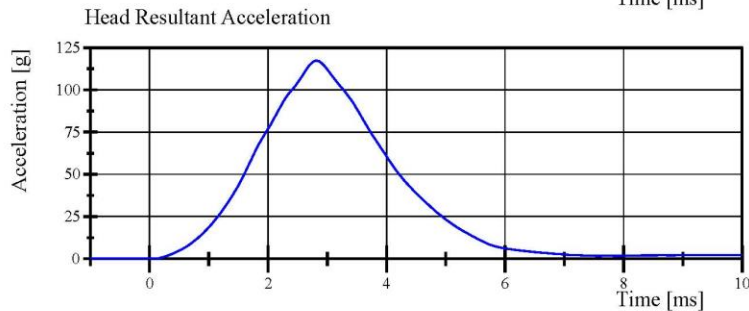
Min: -0.3 g at -0.8 ms



Filter Class: CFC_1000

Max: 76.1 g at 2.8 ms

Min: -0.1 g at 8.5 ms



Filter Class: CFC_1000

Max: 117.4 g at 2.8 ms

Min: 0.2 g at -0.5 ms

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

11.29.2020 15:10:01 946



Report Number: EB8888_WSH04

Page 13 of 44

Transportation Research Center Inc.

Right Lateral Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 4-1

Test Date: 10/28/2020

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	112.3 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-3.9 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	1.88 %	Yes

Test meets specifications.

Condition: Used

Comments:

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

Report Number: EB8888_WSH04

Page 14 of 44

11.29.2020 15:14:24 944

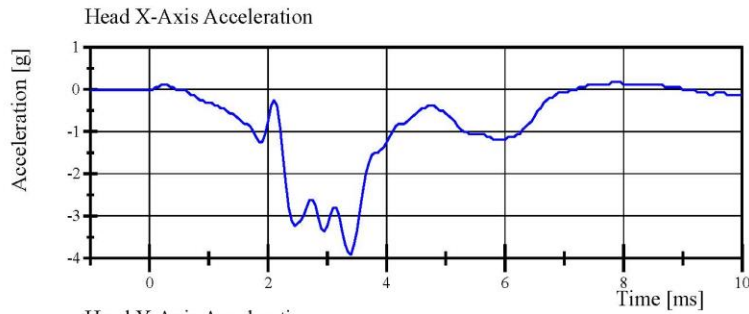


Transportation Research Center Inc.

Right Lateral Head Drop

WorldSID 50th Serial No. EB8888 Certification No. 4-1

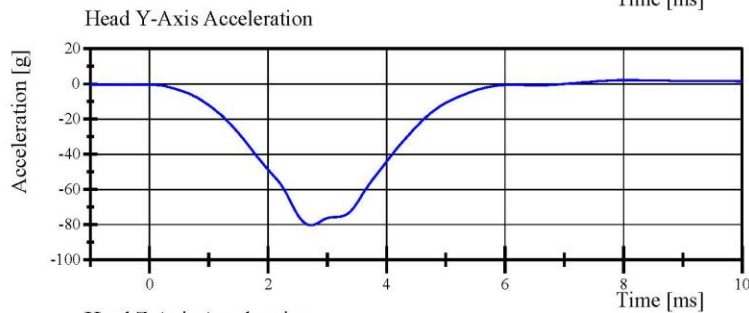
Test Date: 10/28/2020



Filter Class: CFC_1000

Max: 0.2 g at 7.8 ms

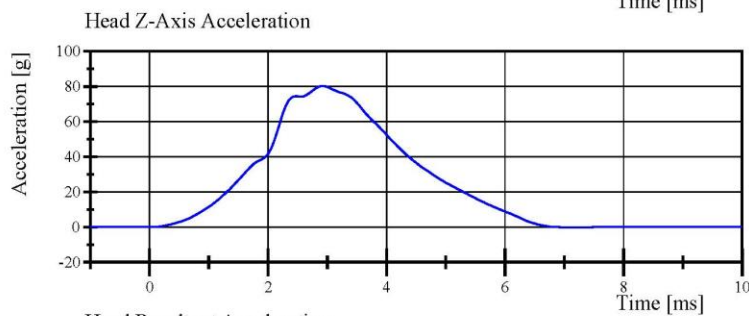
Min: -3.9 g at 3.4 ms



Filter Class: CFC_1000

Max: 2.1 g at 8.0 ms

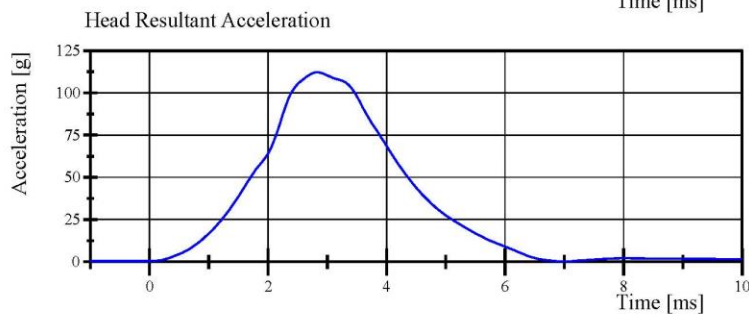
Min: -80.3 g at 2.7 ms



Filter Class: CFC_1000

Max: 80.3 g at 2.9 ms

Min: -0.2 g at 7.2 ms



Filter Class: CFC_1000

Max: 112.3 g at 2.9 ms

Min: 0.2 g at 7.0 ms

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

11.29.2020 15:14:39 944



Report Number: EB8888_WSH04

Page 15 of 44

Transportation Research Center Inc.

Left Lateral Neck

WorldSID 50th Serial No. EB8888 Certification No. 4-5

Test Date: 11/6/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	40 %	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	0.999 m/s	Yes
Change at 8 ms	1.72 - 2.1 m/s	2.003 m/s	Yes
Change at 12 ms	2.63 - 3.17 m/s	3.001 m/s	Yes
Maximum Headform Flexion	(-50) - (-61) deg	-55.3 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	60.8 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	71 - 87 ms	77.4 ms	Yes
Maximum Forward Pot Rotation			
Peak	(-32) - (-39) °	-35.9 °	Yes
Time of Peak	56 - 68 ms	62.2 ms	Yes
Maximum Rear Pot Rotation			
Peak	(-29) - (-36) °	-32.0 °	Yes
Time of Peak	56 - 68 ms	64.0 ms	Yes
Maximum Headform Angular Rate	(-2,047) - (-2,503) °/s	-2,307.3 °/s	Yes

Test meets specifications.

Condition: Used

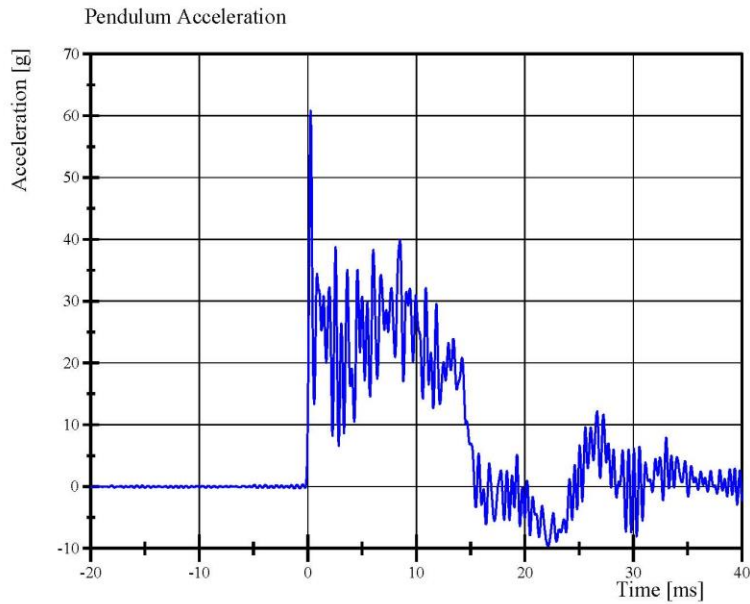
Comments:

Transportation Research Center Inc.

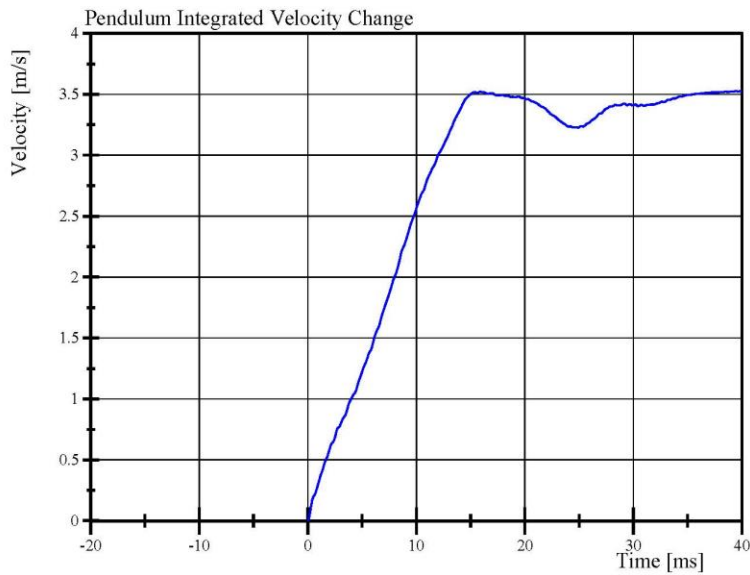
Left Lateral Neck

WorldSID 50th Serial No. EB8888 Certification No. 4-5

Test Date: 11/6/2020



Filter Class: CFC_1000
Max: 60.8 g at 0.3 ms
Min: -9.6 g at 22.2 ms



Filter Class: CFC_1000
Max: 3.5 m/s at 39.5 ms
Min: 0.0 m/s at -0.0 ms

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

11.29.2020 16:40:38 4010



Report Number: EB8888_WSH04

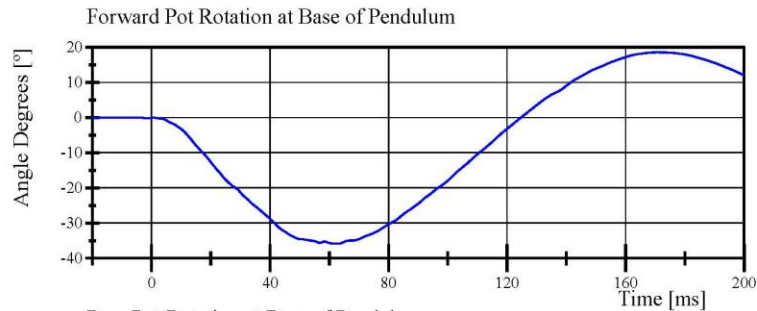
Page 17 of 44

Transportation Research Center Inc.

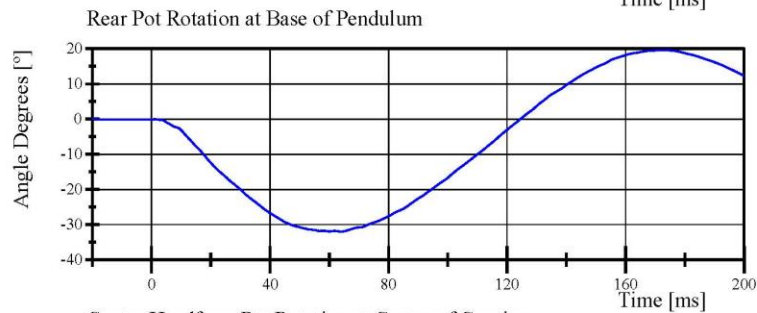
Left Lateral Neck

WorldSID 50th Serial No. EB8888 Certification No. 4-5

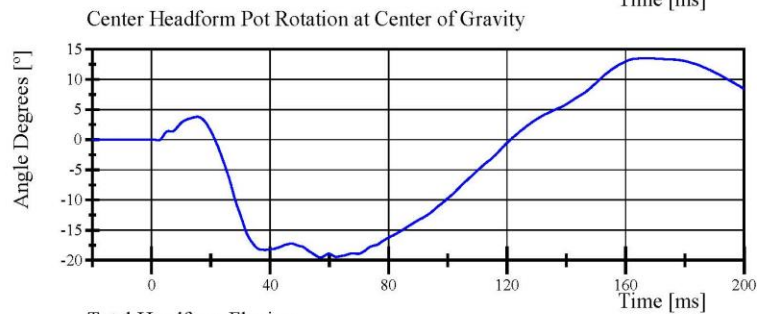
Test Date: 11/6/2020



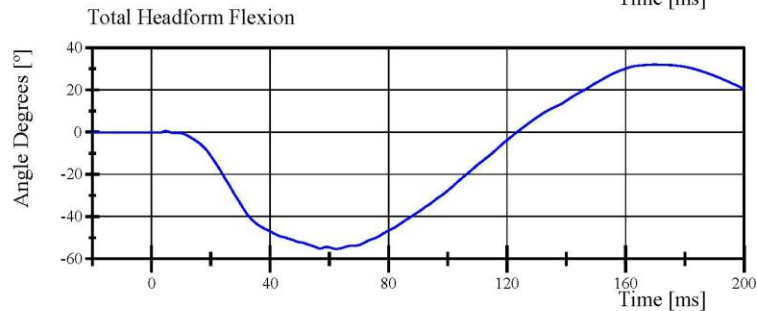
Filter Class: CFC_180
Max: 18.6 ° at 170.7 ms
Min: -35.9 ° at 62.2 ms



Filter Class: CFC_180
Max: 19.6 ° at 172.9 ms
Min: -32.0 ° at 64.0 ms



Filter Class: CFC_180
Max: 13.5 ° at 168.6 ms
Min: -19.5 ° at 57.0 ms



Filter Class: CFC_180
Max: 32.0 ° at 169.7 ms
Min: -55.3 ° at 62.3 ms

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

11.29.2020 16:40:38 4010

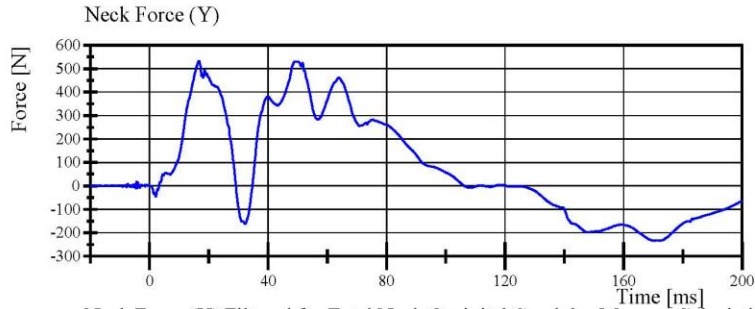


Transportation Research Center Inc.

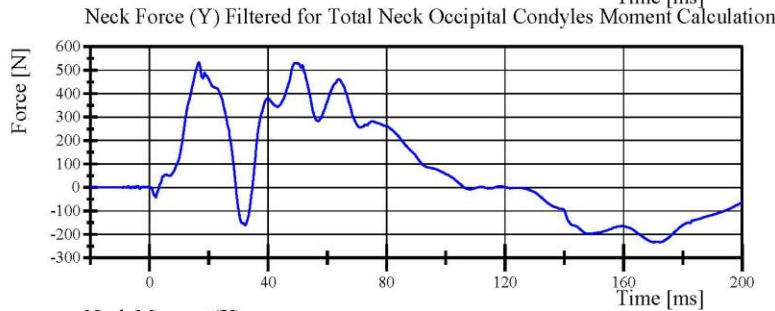
Left Lateral Neck

WorldSID 50th Serial No. EB8888 Certification No. 4-5

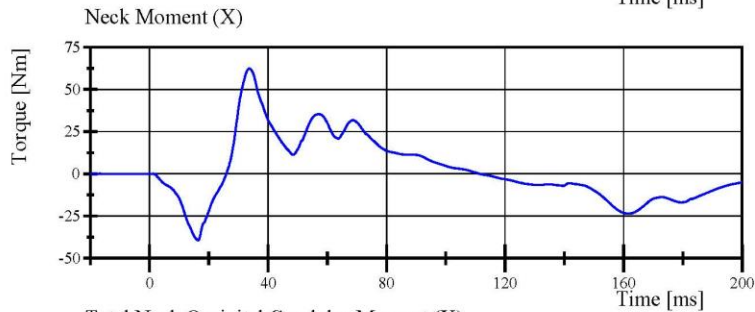
Test Date: 11/6/2020



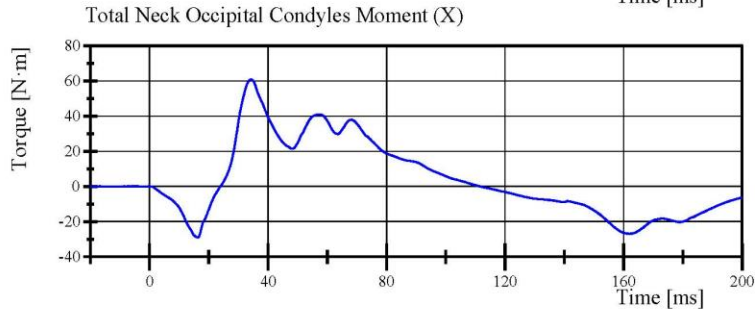
Filter Class: CFC_1000
Max: 532.9 N at 16.7 ms
Min: -233.8 N at 172.2 ms



Filter Class: CFC_600
Max: 532.4 N at 16.7 ms
Min: -233.4 N at 172.2 ms



Filter Class: CFC_600
Max: 62.4 Nm at 33.7 ms
Min: -39.2 Nm at 16.4 ms



Filter Class: Without_(Consta
Max: 60.8 N·m at 34.2 ms
Min: -29.0 N·m at 16.3 ms

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

11.29.2020 16:40:38 4010



Report Number: EB8888_WSH04

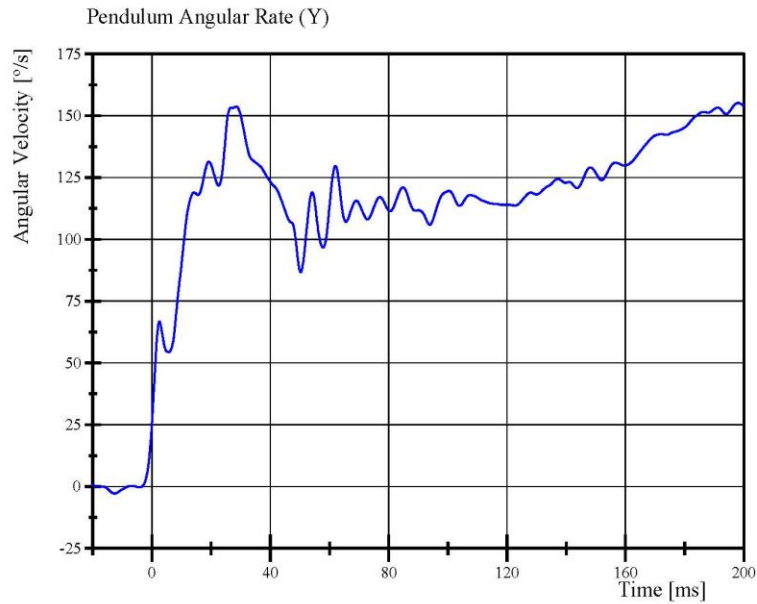
Page 19 of 44

Transportation Research Center Inc.

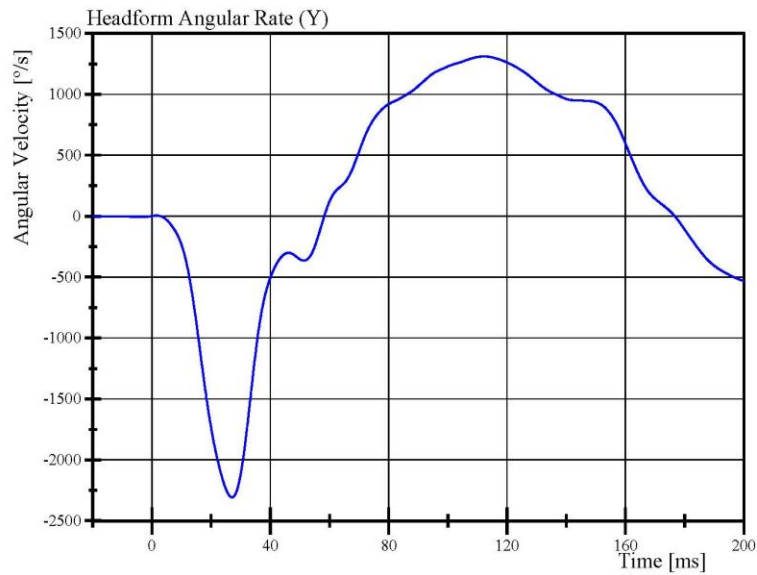
Left Lateral Neck

WorldSID 50th Serial No. EB8888 Certification No. 4-5

Test Date: 11/6/2020



Filter Class: CFC_60
Max: 155.1 °/s at 198.1 ms
Min: -2.8 °/s at -12.6 ms



Filter Class: CFC_60
Max: 1,311.0 °/s at 112.2 ms
Min: -2,307.3 °/s at 27.1 ms

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

11.29.2020 16:40:38 4010

Report Number: EB8888_WSH04

Page 20 of 44



Transportation Research Center Inc.

Right Lateral Neck
 WorldSID 50th Serial No. EB8888 Certification No. 4-2
 Test Date: 11/5/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Pendulum Velocity	3.30 - 3.50 m/s	3.322 m/s	Yes
Pendulum Integrated Velocity Change at 4 ms	(-0.87) - (-1.09) m/s	-0.984 m/s	Yes
Change at 8 ms	(-1.72) - (-2.1) m/s	-1.948 m/s	Yes
Change at 12 ms	(-2.63) - (-3.17) m/s	-2.941 m/s	Yes
Maximum Headform Flexion	50 - 61 deg	52.9 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	-61.5 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	71 - 87 ms	77.1 ms	Yes
Maximum Forward Pot Rotation			
Peak	32 - 39 °	34.2 °	Yes
Time of Peak	56 - 68 ms	62.3 ms	Yes
Maximum Rear Pot Rotation			
Peak	29 - 36 °	30.6 °	Yes
Time of Peak	56 - 68 ms	60.4 ms	Yes
Maximum Headform Angular Rate	2,047 - 2,503 %/s	2,257.1 %/s	Yes

Test meets specifications.

Condition: Used

Comments:

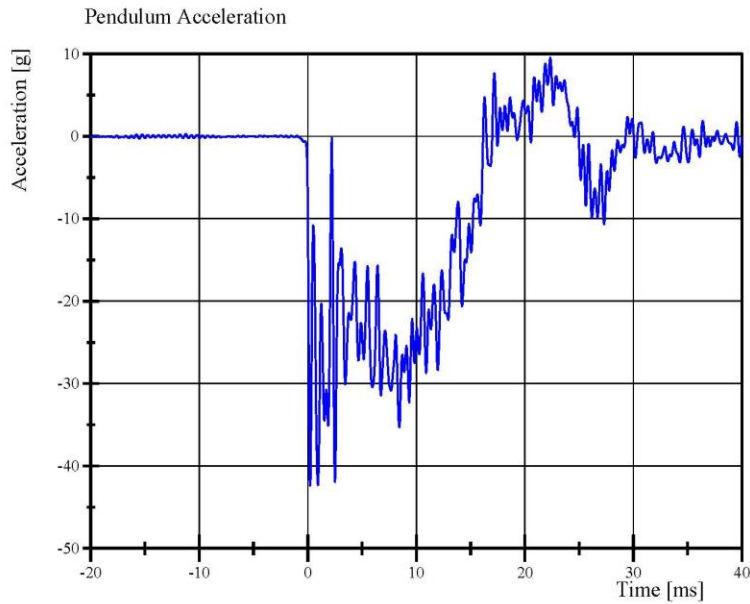


Transportation Research Center Inc.

Right Lateral Neck

WorldSID 50th Serial No. EB8888 Certification No. 4-2

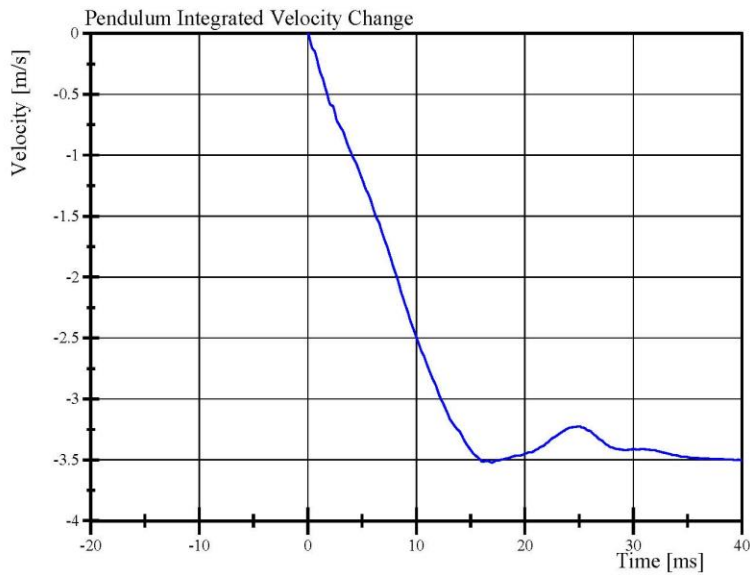
Test Date: 11/5/2020



Filter Class: CFC_1000

Max: 9.5 g at 22.4 ms

Min: -42.4 g at 0.2 ms



Filter Class: CFC_1000

Max: 0.0 m/s at 0.0 ms

Min: -3.5 m/s at 17.0 ms

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

11.29.2020 16:48:09 4021



Report Number: EB8888_WSH04

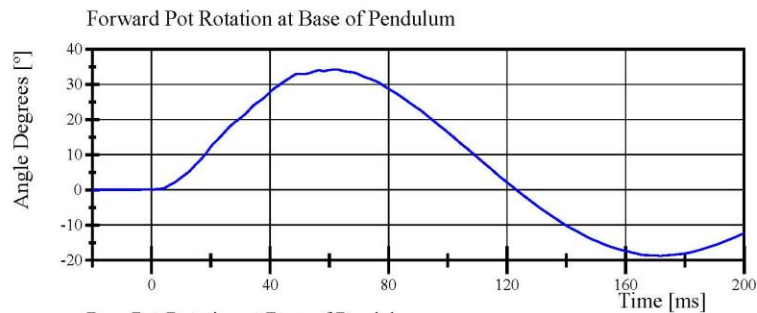
Page 22 of 44

Transportation Research Center Inc.

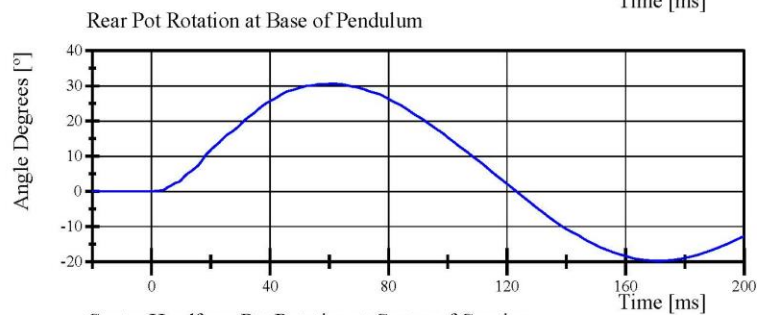
Right Lateral Neck

WorldSID 50th Serial No. EB8888 Certification No. 4-2

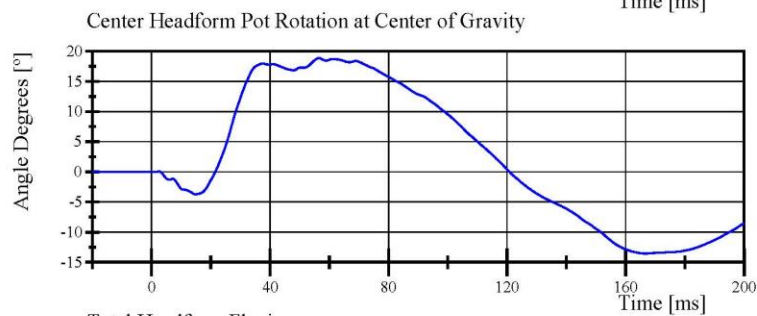
Test Date: 11/5/2020



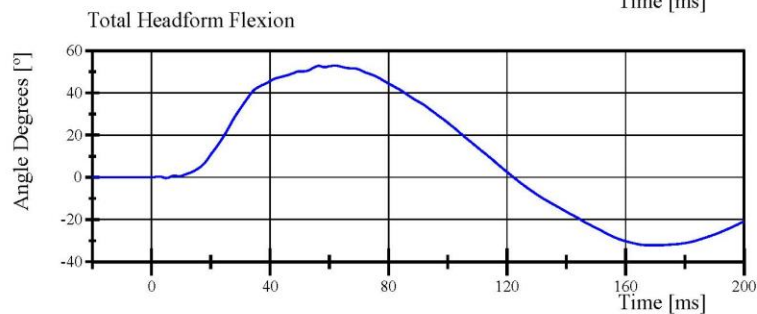
Filter Class: CFC_180
Max: 34.2 ° at 62.3 ms
Min: -18.7 ° at 171.8 ms



Filter Class: CFC_180
Max: 30.6 ° at 60.4 ms
Min: -19.8 ° at 170.8 ms



Filter Class: CFC_180
Max: 18.9 ° at 56.5 ms
Min: -13.5 ° at 166.7 ms



Filter Class: CFC_180
Max: 52.9 ° at 62.1 ms
Min: -32.1 ° at 167.5 ms

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

11.29.2020 16:48:10 4021



Report Number: EB8888_WSH04

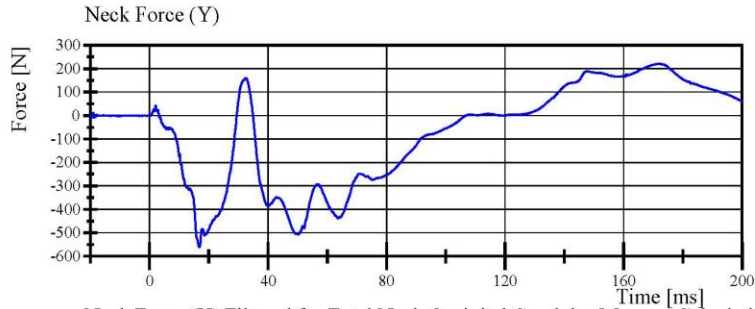
Page 23 of 44

Transportation Research Center Inc.

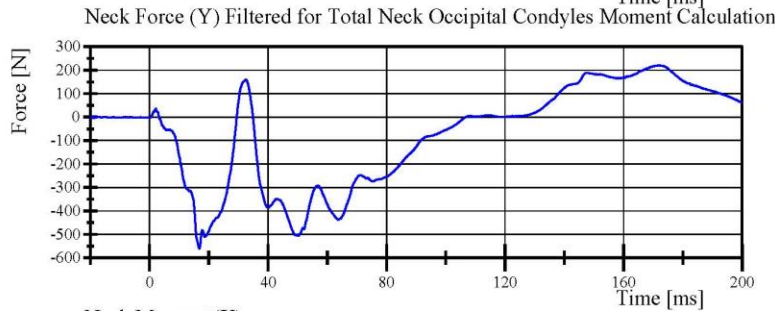
Right Lateral Neck

WorldSID 50th Serial No. EB8888 Certification No. 4-2

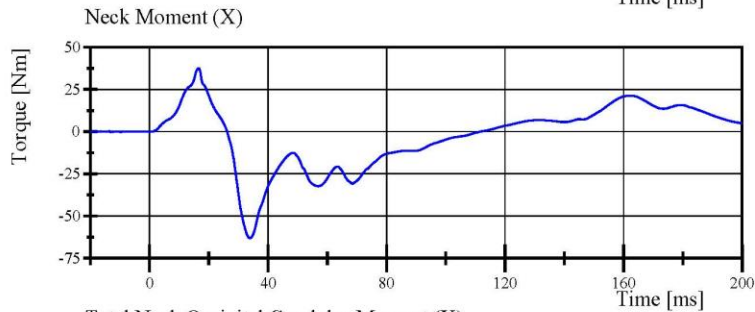
Test Date: 11/5/2020



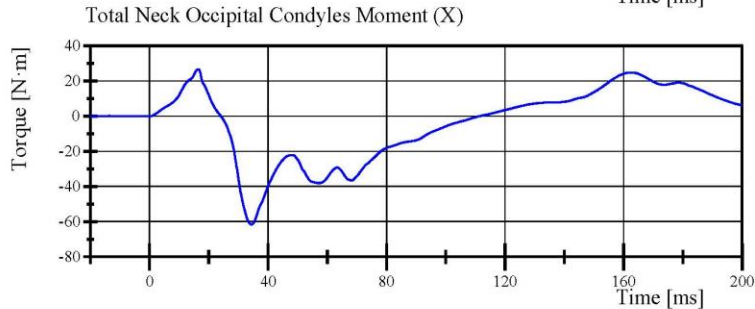
Filter Class: CFC_1000
Max: 221.4 N at 172.0 ms
Min: -560.9 N at 16.8 ms



Filter Class: CFC_600
Max: 220.9 N at 172.0 ms
Min: -560.9 N at 16.8 ms



Filter Class: CFC_600
Max: 37.5 Nm at 16.6 ms
Min: -63.0 Nm at 33.9 ms



Filter Class: Without_(Consta
Max: 26.7 N·m at 16.5 ms
Min: -61.5 N·m at 34.4 ms

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

11.29.2020 16:48:10 4021



Report Number: EB8888_WSH04

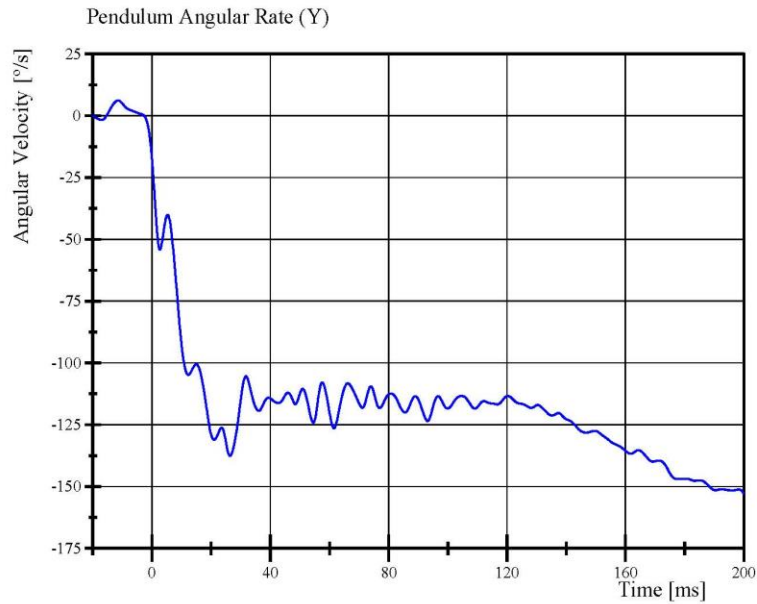
Page 24 of 44

Transportation Research Center Inc.

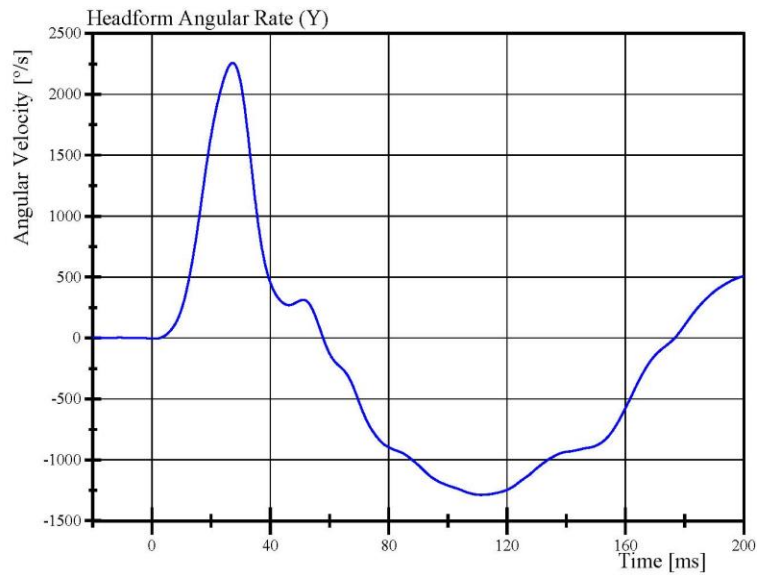
Right Lateral Neck

WorldSID 50th Serial No. EB8888 Certification No. 4-2

Test Date: 11/5/2020



Filter Class: CFC_60
Max: 6.2 °/s at -11.5 ms
Min: -152.9 °/s at 200.0 ms



Filter Class: CFC_60
Max: 2,257.1 °/s at 27.3 ms
Min: -1,287.4 °/s at 111.2 ms

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

11.29.2020 16:48:10 4021

Report Number: EB8888_WSH04

Page 25 of 44



Transportation Research Center Inc.

Left Neck Torsion
WorldSID 50th Serial No. EB8888 Certification No. 4-3
Test Date:10/30/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	40 %	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	2.261 m/s	Yes
Change at 15 ms	3.19 - 3.63 m/s	3.436 m/s	Yes
Change at 20 ms	4.27 - 4.87 m/s	4.575 m/s	Yes
Peak Fixture Rotation	(-41.5) - (-51) °	-47.83 °	Yes
Decay Time to 0 deg from Peak Angle	35 - 43 ms	39.7 ms	Yes
Peak Head Angular Velocity Z-axis	(-1,345) - (-1,655) %/s	-1,548.3 %/s	Yes
Peak Lower Neck Moment Z-axis	34 - 42 N·m	38.5 N·m	Yes

Test meets specifications.

Condition: Used

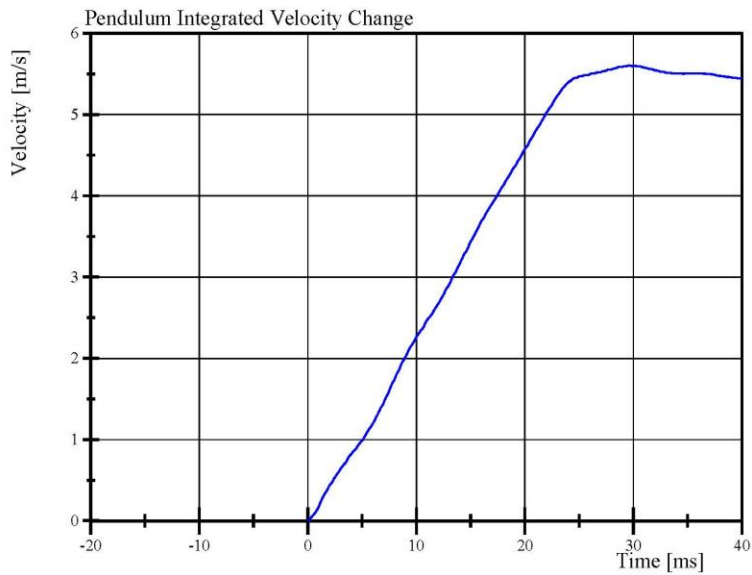
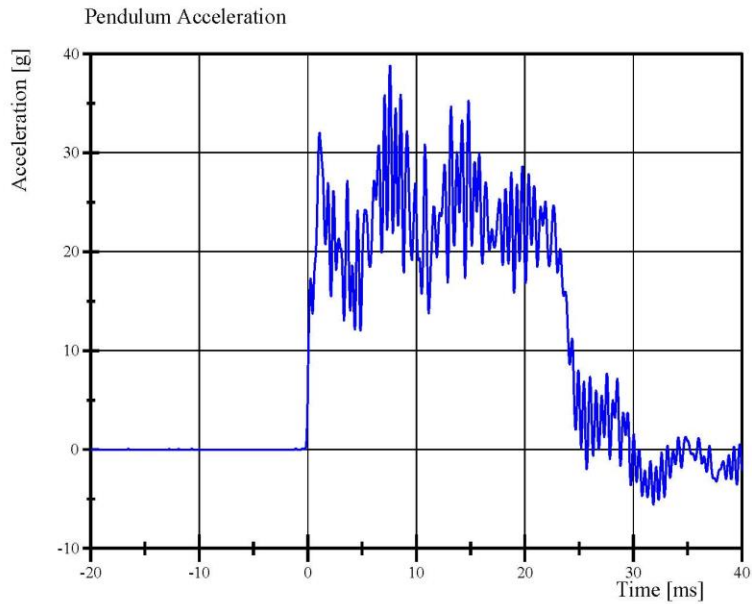
Comments:

Transportation Research Center Inc.

Left Lateral

WorldSID 50th Serial No. EB8888 Certification No. 4-3

Test Date: 10/30/2020



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

11.29.2020 17:10:40 4008



Report Number: EB8888_WSH04

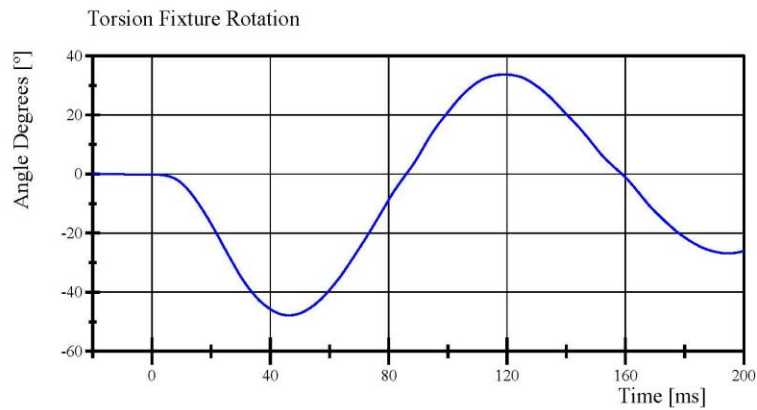
Page 27 of 44

Transportation Research Center Inc.

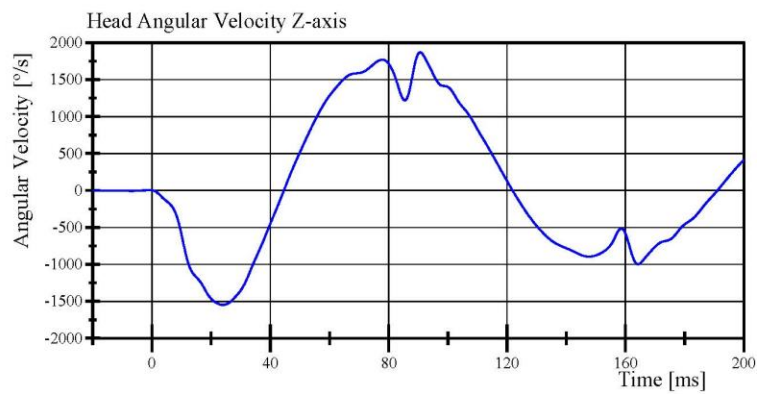
Left Lateral

WorldSID 50th Serial No. EB8888 Certification No. 4-3

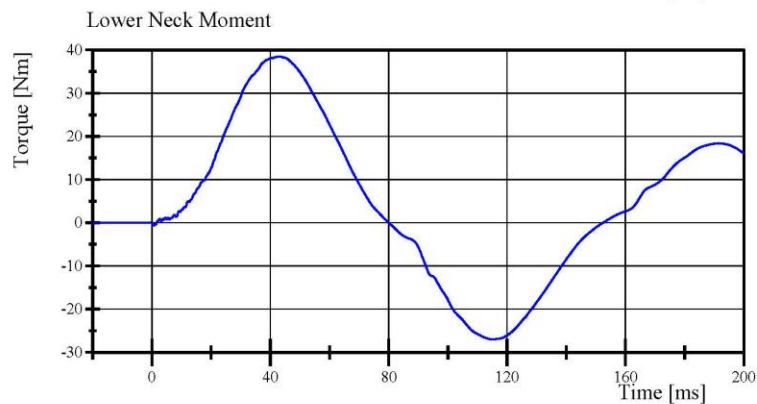
Test Date: 10/30/2020



Filter Class: CFC_60
Max: 33.7 ° at 119.1 ms
Min: -47.8 ° at 46.3 ms



Filter Class: CFC_60
Max: 1,868.8 °/s at 90.6 ms
Min: -1,548.3 °/s at 24.0 ms



Filter Class: CFC_600
Max: 38.5 Nm at 43.3 ms
Min: -26.9 Nm at 115.3 ms

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

11.29.2020 17:10:40 4008



Report Number: EB8888_WSH04

Page 28 of 44

Transportation Research Center Inc.

Right Neck Torsion
WorldSID 50th Serial No. EB8888 Certification No. 4-6
Test Date:11/4/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Pendulum Velocity	5.1 - 5.3 m/s	5.19 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.09 - 2.37 m/s	2.239 m/s	Yes
Change at 15 ms	3.19 - 3.63 m/s	3.386 m/s	Yes
Change at 20 ms	4.27 - 4.87 m/s	4.544 m/s	Yes
Peak Fixture Rotation	41.5 - 51 °	46.80 °	Yes
Decay Time to 0 deg from Peak Angle	35 - 43 ms	39.2 ms	Yes
Peak Head Angular Velocity Z-axis	1,345 - 1,655 %/s	1,557.8 %/s	Yes
Peak Lower Neck Moment Z-axis	(-34) - (-42) N·m	-38.7 N·m	Yes

Test meets specifications.

Condition: Used

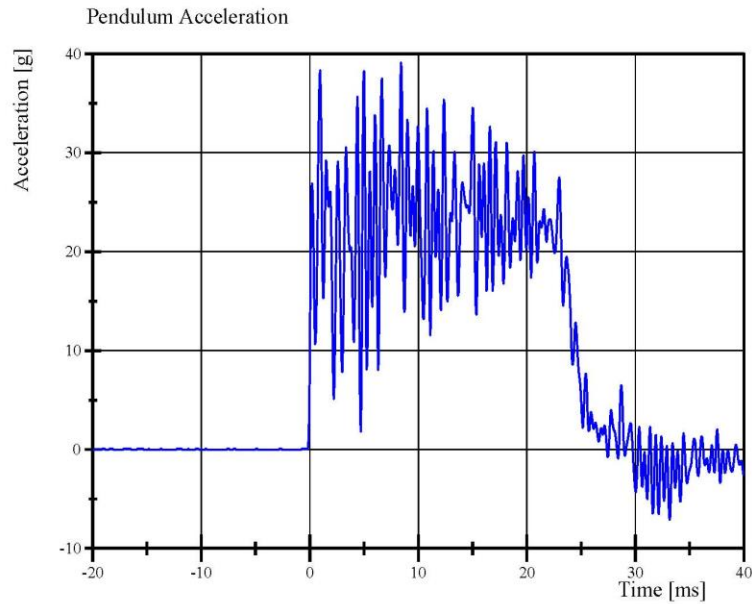
Comments:

Transportation Research Center Inc.

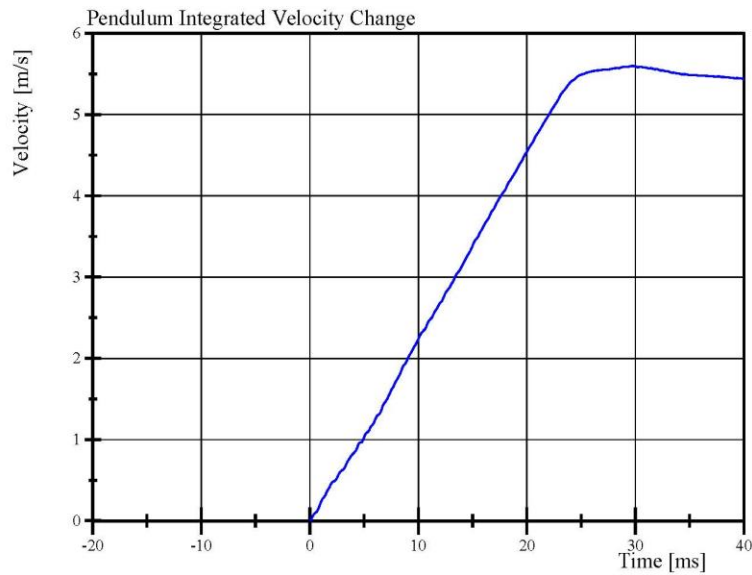
Right Lateral

WorldSID 50th Serial No. EB8888 Certification No. 4-6

Test Date: 11/4/2020



Filter Class: CFC_1000
Max: 39.1 g at 8.4 ms
Min: -7.1 g at 33.2 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: WorldSID 50th(WS) VRTC Nov 2020.xlsx
WorldSID 50th_Qalification Manual 11_09_2020

11.29.2020 17:31:07 4008



Report Number: EB8888_WSH04

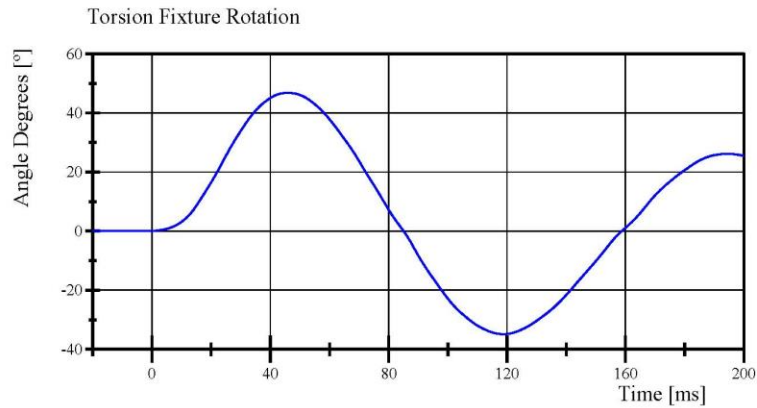
Page 30 of 44

Transportation Research Center Inc.

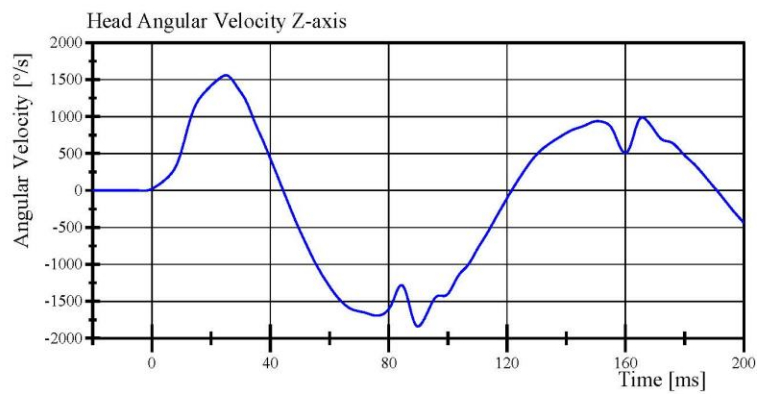
Right Lateral

WorldSID 50th Serial No. EB8888 Certification No. 4-6

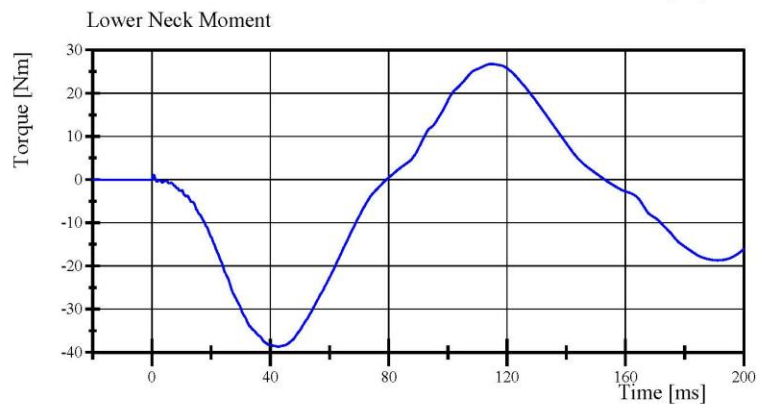
Test Date: 11/4/2020



Filter Class: CFC_60
Max: 46.8 ° at 45.9 ms
Min: -34.9 ° at 118.8 ms



Filter Class: CFC_60
Max: 1,557.8 °/s at 25.0 ms
Min: -1,840.1 °/s at 89.9 ms



Filter Class: CFC_600
Max: 26.7 Nm at 114.9 ms
Min: -38.7 Nm at 42.7 ms

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

11.29.2020 17:31:07 4008



Report Number: EB8888_WSH04

Page 31 of 44

Transportation Research Center Inc.

Left Lateral Shoulder
WorldSID 50th Serial No. EB8888 Certification No. 4-2
Test Date: 10/27/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.31 m/s	Yes
Impactor Force	2,600 - 3,300 N	3,090.7 N	Yes
Shoulder Force	(-1,470) - (-1,800) N	-1,553.9 N	Yes
S1 RibEye Max	37 - 46 mm	43.6 mm	Yes

Test meet specifications.

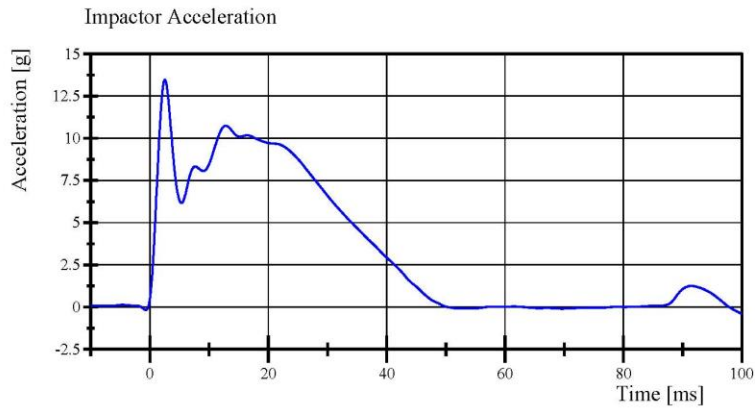
Condition: Used

Comments:

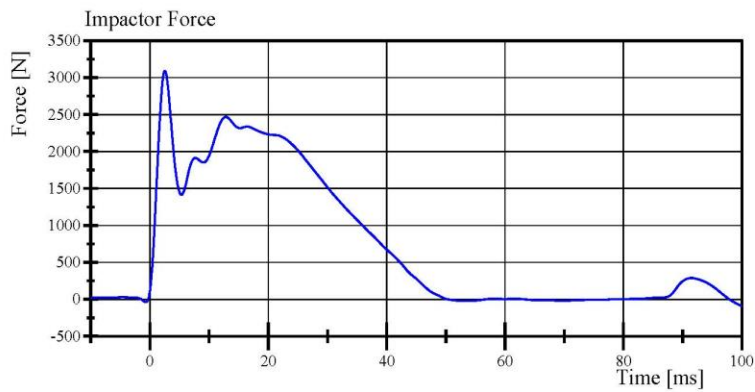
Internal Temp: 22.1°C

Transportation Research Center Inc.

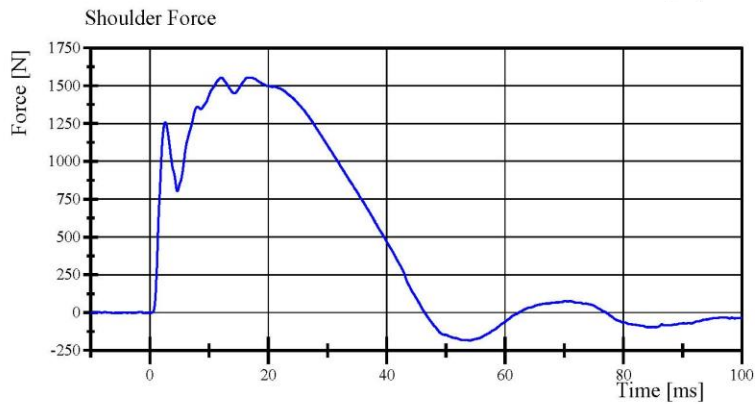
Left Lateral Shoulder
WorldSID 50th Serial No. EB8888 Certification No. 4-2
Test Date: 10/27/2020



Filter Class: CFC_180
Max: 13.5 g at 2.6 ms
Min: -0.4 g at 100.1 ms



Filter Class: CFC_180
Max: 3,090.7 N at 2.6 ms
Min: -95.9 N at 100.1 ms



Filter Class: CFC_600
Max: 1,553.9 N at 16.6 ms
Min: -184.3 N at 54.1 ms

Transportation Research Center Inc.

Left Lateral Thorax with Arm

WorldSID 50th Serial No. EB8888 Certification No. 4-3

Test Date: 10/28/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Impactor Velocity	6.6 - 6.8 m/s	6.69 m/s	Yes
Impactor Force	5,300 - 6,200 N	5,743.0 N	Yes
Upper Thorax Rib Displacement	35 - 47 mm	39.4 mm	Yes
Center Thorax Rib Displacement	46 - 56 mm	48.5 mm	Yes
Lower Thorax Rib Displacement	33.5 - 40.5 mm	33.93 mm	Yes
Upper Spine Lateral Acceleration	28 - 37 g	33.8 g	Yes
Lower Spine Lateral Acceleration	22 - 28 g	24.9 g	Yes

Test meets specifications.

Condition: Used

Comments:

Internal Temp: 21.1°C

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

Report Number: EB8888_WSH04

Page 34 of 44

11.29.2020 17:57:53 1000

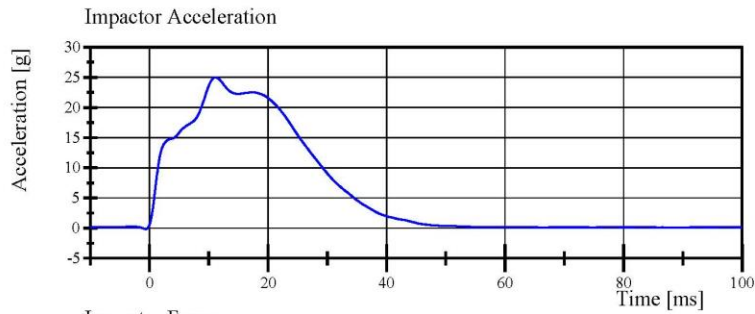


Transportation Research Center Inc.

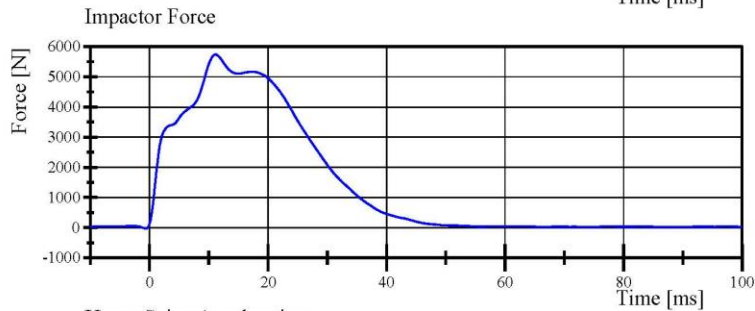
Left Lateral Thorax with Arm

WorldSID 50th Serial No. EB8888 Certification No. 4-3

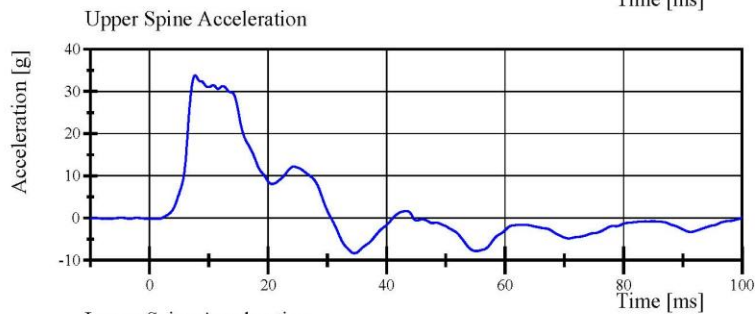
Test Date: 10/28/2020



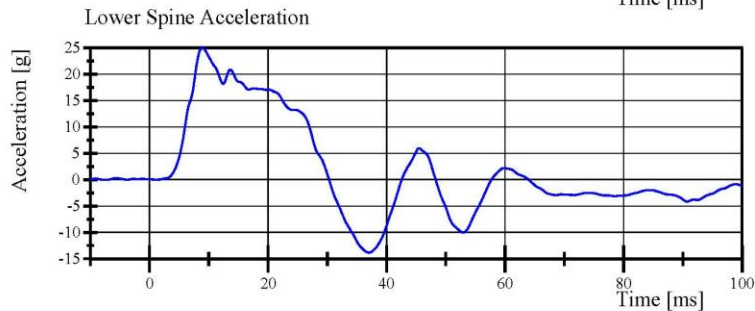
Filter Class: CFC_180
Max: 25.0 g at 11.1 ms
Min: -0.1 g at -0.6 ms



Filter Class: CFC_180
Max: 5,743.0 N at 11.1 ms
Min: -31.8 N at -0.6 ms



Filter Class: CFC_180
Max: 33.8 g at 7.7 ms
Min: -8.3 g at 34.6 ms



Filter Class: CFC_180
Max: 24.9 g at 8.9 ms
Min: -13.8 g at 37.1 ms

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

11.29.2020 17:58:31 1000



Transportation Research Center Inc.

Left Lateral Thorax without Arm
WorldSID 50th Serial No. EB8888 Certification No. 4-2
Test Date: 10/26/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.30 m/s	Yes
Impactor Force	3,200 - 3,800 N	3,482.4 N	Yes
Upper Thorax Rib Displacement	33 - 43 mm	37.2 mm	Yes
Center Thorax Rib Displacement	35 - 43 mm	39.6 mm	Yes
Lower Thorax Rib Displacement	32 - 40 mm	33.9 mm	Yes
Upper Spine Lateral Acceleration	14 - 20 g	14.9 g	Yes
Lower Spine Lateral Acceleration	14 - 22 g	14.6 g	Yes

Test meets specifications.

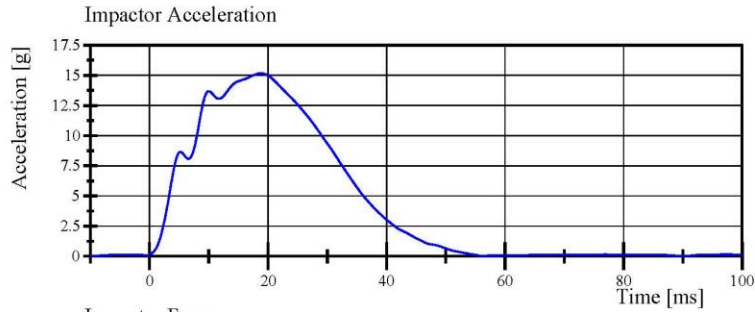
Condition: Used

Comments:

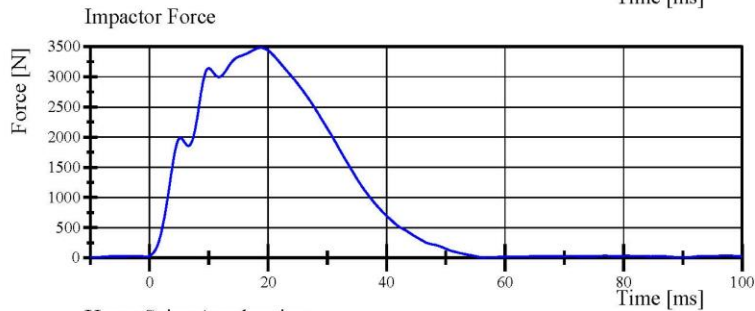
Internal Temp: 23.9°C

Transportation Research Center Inc.

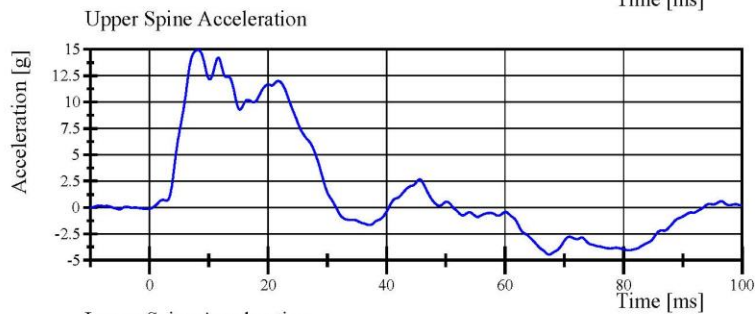
Left Lateral Thorax without Arm
WorldSID 50th Serial No. EB8888 Certification No. 4-2
Test Date: 10/26/2020



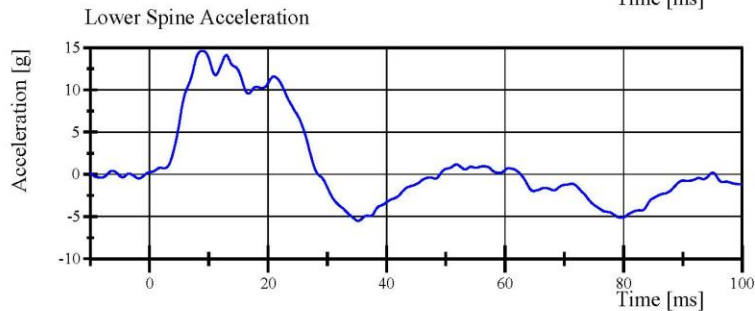
Filter Class: CFC_180
Max: 15.2 g at 18.8 ms
Min: 0.0 g at 56.3 ms



Filter Class: CFC_180
Max: 3,482.4 N at 18.8 ms
Min: 4.7 N at 56.3 ms



Filter Class: CFC_180
Max: 14.9 g at 8.2 ms
Min: -4.5 g at 67.4 ms



Filter Class: CFC_180
Max: 14.6 g at 8.9 ms
Min: -5.5 g at 35.2 ms



Transportation Research Center Inc.

Left Lateral Abdomen
WorldSID 50th Serial No. EB8888 Certification No. 4-1
Test Date: 10/27/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.33 m/s	Yes
Impactor Force	2,700 - 3,100 N	2,996.5 N	Yes
Upper Abdominal Rib Displacement	32.5 - 39.5 mm	33.82 mm	Yes
Lower Abdominal Rib Displacement	32 - 38 mm	33.1 mm	Yes
Lower Spine Lateral Acceleration	14.5 - 19.5 g	17.99 g	Yes

Test meets specifications.

Condition: Used

Comments:

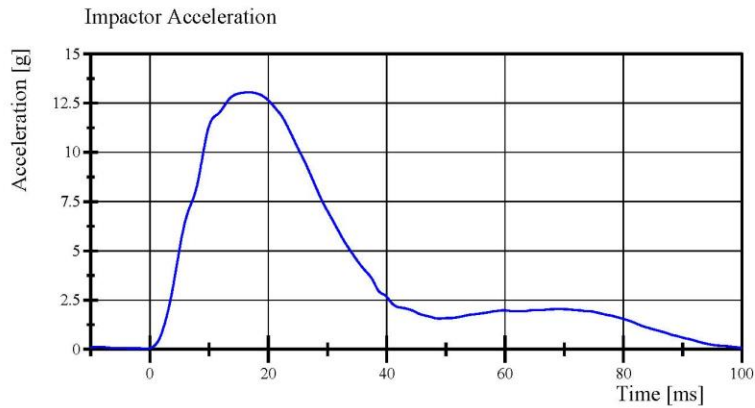
Internal Temp: 21°C

Transportation Research Center Inc.

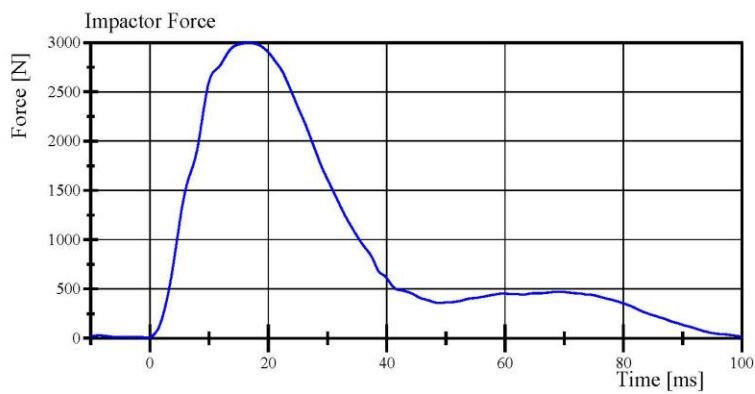
Left Lateral Abdomen

WorldSID 50th Serial No. EB8888 Certification No. 4-1

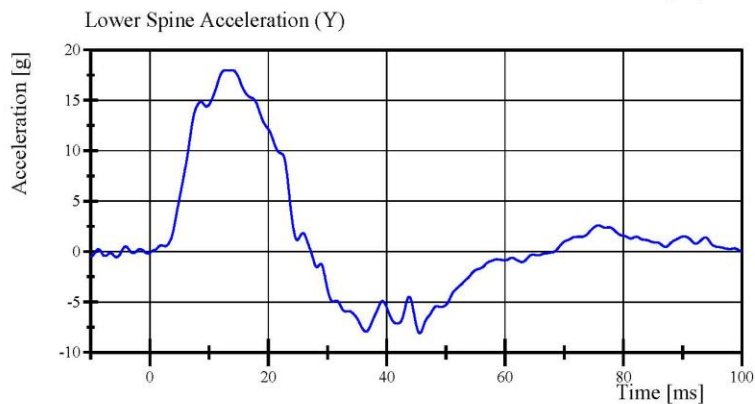
Test Date: 10/27/2020



Filter Class: CFC_180
Max: 13.1 g at 16.7 ms
Min: 0.0 g at -0.5 ms



Filter Class: CFC_180
Max: 2,996.5 N at 16.7 ms
Min: 7.8 N at -0.5 ms



Filter Class: CFC_180
Max: 18.0 g at 14.0 ms
Min: -8.1 g at 45.6 ms

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

11.29.2020 14:52:20 1001



Report Number: EB8888_WSH04

Page 39 of 44

Transportation Research Center Inc.

Left Lateral Pelvis

WorldSID 50th Serial No. EB8888 Certification No. 4-1

Test Date: 10/27/2020

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Impactor Velocity	6.6 - 6.8 m/s	6.71 m/s	Yes
Impactor Force	6,800 - 8,200 N	7,329.8 N	Yes
Pelvis Lateral Acceleration	38.5 - 48.5 g	40.75 g	Yes
Lower Spine Lateral Acceleration	10 - 14 g	12.0 g	Yes
Pubic Lateral Force	(-1,300) - (-1,590) N	-1,361.4 N	Yes
Sacroiliac Lateral Force	(-1,860) - (-2,280) N	-2,051.1 N	Yes

Test meets specifications.

Condition: Used

Comments:

Intenal Temp: 24.5°C

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

Report Number: EB8888_WSH04

Page 40 of 44

11.29.2020 17:35:04 999

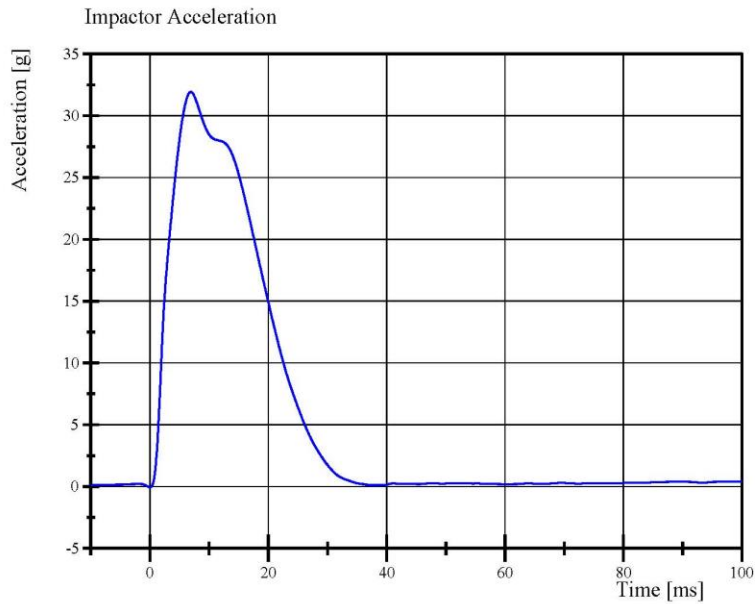


Transportation Research Center Inc.

Left Lateral Pelvis

WorldSID 50th Serial No. EB8888 Certification No. 4-1

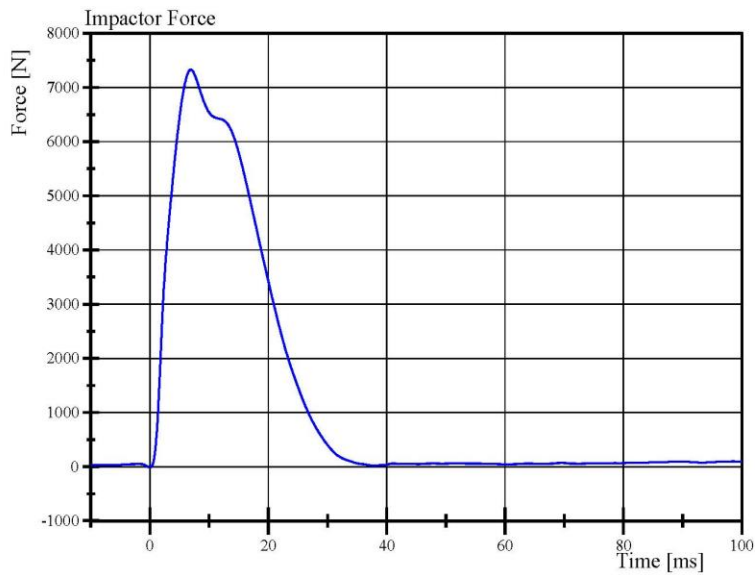
Test Date: 10/27/2020



Filter Class: CFC_180

Max: 31.9 g at 6.9 ms

Min: -0.1 g at 0.0 ms



Filter Class: CFC_180

Max: 7,329.8 N at 6.9 ms

Min: -13.1 N at 0.0 ms

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

11.29.2020 17:35:41 999



Report Number: EB8888_WSH04

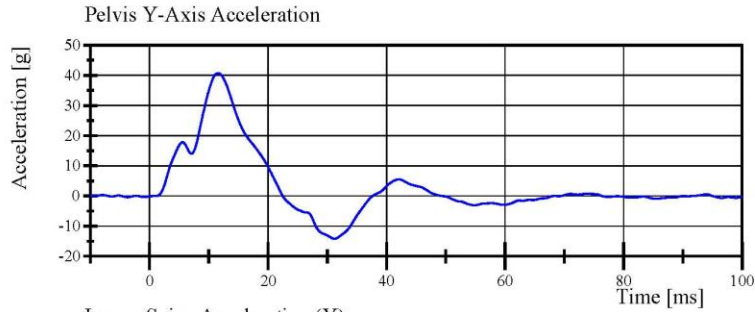
Page 41 of 44

Transportation Research Center Inc.

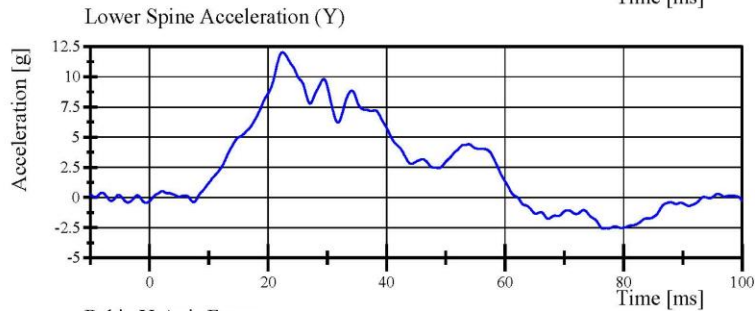
Left Lateral Pelvis

WorldSID 50th Serial No. EB8888 Certification No. 4-1

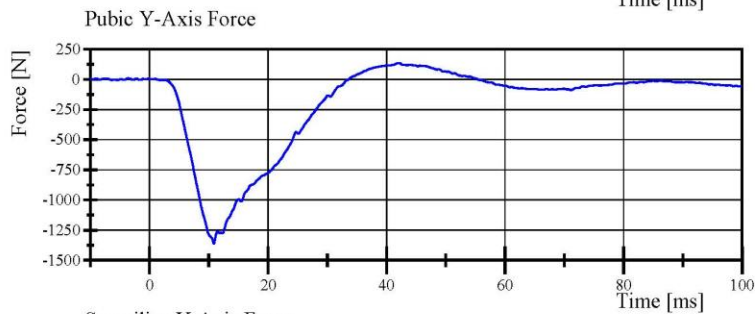
Test Date: 10/27/2020



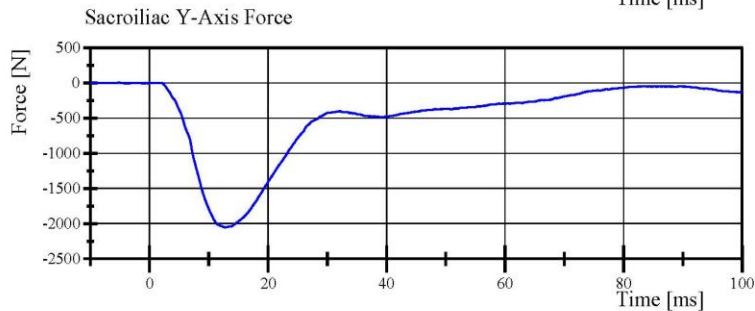
Filter Class: CFC_180
Max: 40.8 g at 11.6 ms
Min: -14.2 g at 31.3 ms



Filter Class: CFC_180
Max: 12.0 g at 22.5 ms
Min: -2.6 g at 76.6 ms



Filter Class: CFC_600
Max: 136.2 N at 42.1 ms
Min: -1,361.4 N at 10.9 ms



Filter Class: CFC_600
Max: 3.9 N at -5.2 ms
Min: -2,051.1 N at 12.8 ms

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

11.29.2020 17:35:42 999



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	ARS15840	DTS	4-Aug-2020
	Z	ARS15095	DTS	4-Aug-2020
Upper Neck Force (N)	X	DO9753	Humanetics	23-Jul-2020
	Y	DO9753	Humanetics	23-Jul-2020
	Z	DO9753	Humanetics	23-Jul-2020
Upper Neck Moment (Nm)	X	DO9753	Humanetics	23-Jul-2020
	Y	DO9753	Humanetics	23-Jul-2020
	Z	DO9753	Humanetics	23-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	23-Jul-2020
	Y	EC1630	Humanetics	23-Jul-2020
	Z	EC1630	Humanetics	23-Jul-2020
Upper Spine Accelerometers (T1) (g)	X	12037-3	Endevco	22-Jul-2020
	Y	12037-2	Endevco	22-Jul-2020
	Z	12037-1	Endevco	22-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	23-Jul-2020
Sacro-Iliac Left Force (N)	X	EG4066	Humanetics	23-Jul-2020
	Y	EG4066	Humanetics	23-Jul-2020
	Z	EG4066	Humanetics	23-Jul-2020
Sacro-Iliac Left Moment (Nm)	X	EG4066	Humanetics	23-Jul-2020
	Y	EG4066	Humanetics	23-Jul-2020
	Z	EG4066	Humanetics	23-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	23-Jul-2020
	Y	EG4066	Humanetics	23-Jul-2020
	Z	EG4066	Humanetics	23-Jul-2020
Sacro-Iliac Right Moment (Nm)	X	EG4066	Humanetics	23-Jul-2020
	Y	EG4066	Humanetics	23-Jul-2020
	Z	EG4066	Humanetics	23-Jul-2020
Lumbar Force (N)	X	EC2349	Humanetics	23-Jul-2020
	Y	EC2349	Humanetics	23-Jul-2020
	Z	EC2349	Humanetics	23-Jul-2020
Lumbar Moment (Nm)	X	EC2349	Humanetics	23-Jul-2020
	Y	EC2349	Humanetics	23-Jul-2020
	Z	EC2349	Humanetics	23-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	23-Jul-2020
	Y	EB6234T	Humanetics	23-Jul-2020
	Z	EB6234T	Humanetics	23-Jul-2020
Driver Left Outer Knee Force (N)	Y	93	Humanetics	23-Jul-2020
Driver Left Inner Knee Force (N)	Y	95	Humanetics	23-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	3-Jun-2020
	Y	P50393	ENDEVCO	3-Jun-2020
	Z	P57803	ENDEVCO	3-Jun-2020
Vehicle Center of Gravity Angular Rate (deg/sec)	X	ARS12504	DTS	11-Sep-2020
	Y	ARS8813	DTS	11-Sep-2020
	Z	ARS8736	DTS	11-Sep-2020
Left Floor Sill (g)	Y	P73587	ENDEVCO	3-Aug-2020
Left A-Pillar Sill (g)	Y	P58472	ENDEVCO	27-Jul-2020
Left Lower A-Pillar (g)	Y	T23884	ENDEVCO	2-Jun-2020
Left Mid A-Pillar (g)	Y	T23824	ENDEVCO	2-Jun-2020
Left B-Pillar Sill (g)	Y	T23870	ENDEVCO	23-Jun-2020
Left Lower B-Pillar (g)	Y	T11871	ENDEVCO	27-Aug-2020
Left Mid B-Pillar (g)	Y	P87822	ENDEVCO	23-Jun-2020
Driver Seat Track at Dummy H-Point (g)	Y	T11804	ENDEVCO	27-Aug-2020
Engine Top (g)	X	P57946	ENDEVCO	3-Jun-2020
	Y	P88038	ENDEVCO	2-Jun-2020
Firewall Center (g)	Y	T23885	ENDEVCO	27-Aug-2020
Right Roof at Vertical Impact Reference Line (g)	Y	T11867	ENDEVCO	27-Aug-2020
Right Sill at Vertical Impact Reference Line (g)	Y	T11875	ENDEVCO	27-Aug-2020
Rear Floorpan Behind Rear Axle at Centerline (g)	X	P44288	ENDEVCO	23-Jun-2020
Rear Floorpan Behind Rear Axle at Centerline (g)	Y	T11449	ENDEVCO	23-Jun-2020
Left Front Door Mid Centerline (g)	Y	P58548	ENDEVCO	23-Jun-2020
Left Front Door Mid Rear (g)	Y	P83356	ENDEVCO	23-Jun-2020
Left Front Door Upper Centerline (g)	Y	P58530	ENDEVCO	23-Jun-2020
Left Rear Door Mid Rear (g)	Y	T16776	ENDEVCO	27-Aug-2020
Left Rear Door Upper Centerline (g)	Y	T11793	ENDEVCO	27-Aug-2020
Rear Deck (g)	X	P74456	ENDEVCO	3-Jun-2020
	Y	P58494	ENDEVCO	3-Jun-2020
	Z	P58537	ENDEVCO	3-Jun-2020
Rear Deck Angular Rate (deg/sec)	X	ARS8722	DTS	11-Sep-2020
	Y	ARS8714	DTS	11-Sep-2020
	Z	ARS9190	DTS	11-Sep-2020

TABLE 3 – POLE INSTRUMENTATION

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Pole Load Cell 1	DK7091S	Humanetics	13-Nov-2019
Pole Load Cell 2	DK7120S	Humanetics	13-Nov-2019
Pole Load Cell 3	DK7118S	Humanetics	13-Nov-2019
Pole Load Cell 4	DK7124S	Humanetics	13-Nov-2019
Pole Load Cell 5	DK7111S	Humanetics	13-Nov-2019
Pole Load Cell 6	DK7126S	Humanetics	13-Nov-2019
Pole Load Cell 7	DK7112S	Humanetics	13-Nov-2019
Pole Load Cell 8	DK7074S	Humanetics	13-Nov-2019

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	10000
10	11NECKUP00WSMOXP	Driver Upper Neck Moment (X)	600	+	yes	200
11	11NECKUP00WSMOYP	Driver Upper Neck Moment (Y)	600	+	yes	200
12	11NECKUP00WSMOZP	Driver Upper Neck Moment (Z)	600	+	yes	200
13	11NECKLO00WSFOXP	Driver Lower Neck Force (X)	1000	+	yes	200
14	11NECKLO00WSFOYP	Driver Lower Neck Force (Y)	1000	+	yes	200
15	11NECKLO00WSFOZP	Driver Lower Neck Force (Z)	1000	+	yes	200
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	300
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	200
22	11SHRI01REWSDSX0	Driver Shoulder Rear Displacement (X)	0	+	no	60
23	11SHRI01REWSDSY0	Driver Shoulder Rear Displacement (Y)	0	+	no	60
24	11SHRI01REWSDSZ0	Driver Shoulder Rear Displacement (Z)	0	+	no	60
25	11SHRI01REWSDSLB	Driver Shoulder Rear Length Change	600	+	no	60
26	11SHRI01MIWSDSX0	Driver Shoulder Middle Displacement (X)	0	+	no	60
27	11SHRI01MIWSDSY0	Driver Shoulder Middle Displacement (Y)	0	+	no	60
28	11SHRI01MIWSDSZ0	Driver Shoulder Middle Displacement (Z)	0	+	no	60
29	11SHRI01MIWSDSLB	Driver Shoulder Middle Length Change	600	+	no	60
30	11SHRI01FRWSDSX0	Driver Shoulder Front Displacement (X)	0	+	no	60
31	11SHRI01FRWSDSY0	Driver Shoulder Front Displacement (Y)	0	+	no	60
32	11SHRI01FRWSDSZ0	Driver Shoulder Front Displacement (Z)	0	+	no	60
33	11SHRI01FRWSDSLB	Driver Shoulder Front Length Change	600	+	no	60

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
34	11TRRI01REWSDSX0	Driver Thorax Rib 1 Rear Displacement (X)	0	+	no	60
35	11TRRI01REWSDSY0	Driver Thorax Rib 1 Rear Displacement (Y)	0	+	no	60
36	11TRRI01REWSDSZ0	Driver Thorax Rib 1 Rear Displacement (Z)	0	+	no	60
37	11TRRI01REWSDSLB	Driver Thorax Rib 1 Rear Length Change	600	+	no	60
38	11TRRI01MIWSDSX0	Driver Thorax Rib 1 Middle Displacement (X)	0	+	no	60
39	11TRRI01MIWSDSY0	Driver Thorax Rib 1 Middle Displacement (Y)	0	+	no	60
40	11TRRI01MIWSDSZ0	Driver Thorax Rib 1 Middle Displacement (Z)	0	+	no	60
41	11TRRI01MIWSDSLB	Driver Thorax Rib 1 Middle Length Change	600	+	no	60
42	11TRRI01FRWSDSX0	Driver Thorax Rib 1 Front Displacement (X)	0	+	no	60
43	11TRRI01FRWSDSY0	Driver Thorax Rib 1 Front Displacement (Y)	0	+	no	60
44	11TRRI01FRWSDSZ0	Driver Thorax Rib 1 Front Displacement (Z)	0	+	no	60
45	11TRRI01FRWSDSLB	Driver Thorax Rib 1 Front Length Change	600	+	no	60
46	11TRRI02REWSDSX0	Driver Thorax Rib 2 Rear Displacement (X)	0	+	no	60
47	11TRRI02REWSDSY0	Driver Thorax Rib 2 Rear Displacement (Y)	0	+	no	60
48	11TRRI02REWSDSZ0	Driver Thorax Rib 2 Rear Displacement (Z)	0	+	no	60
49	11TRRI02REWSDSLB	Driver Thorax Rib 2 Rear Length Change	600	+	no	60
50	11TRRI02MIWSDSX0	Driver Thorax Rib 2 Middle Displacement (X)	0	+	no	60
51	11TRRI02MIWSDSY0	Driver Thorax Rib 2 Middle Displacement (Y)	0	+	no	60
52	11TRRI02MIWSDSZ0	Driver Thorax Rib 2 Middle Displacement (Z)	0	+	no	60
53	11TRRI02MIWSDSLB	Driver Thorax Rib 2 Middle Length Change	600	+	no	60
54	11TRRI02FRWSDSX0	Driver Thorax Rib 2 Front Displacement (X)	0	+	no	60
55	11TRRI02FRWSDSY0	Driver Thorax Rib 2 Front Displacement (Y)	0	+	no	60
56	11TRRI02FRWSDSZ0	Driver Thorax Rib 2 Front Displacement (Z)	0	+	no	60
57	11TRRI02FRWSDSLB	Driver Thorax Rib 2 Front Length Change	600	+	no	60

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
58	11TRRI03REWSDSX0	Driver Thorax Rib 3 Rear Displacement (X)	0	+	no	60
59	11TRRI03REWSDSY0	Driver Thorax Rib 3 Rear Displacement (Y)	0	+	no	60
60	11TRRI03REWSDSZ0	Driver Thorax Rib 3 Rear Displacement (Z)	0	+	no	60
61	11TRRI03REWSDSLB	Driver Thorax Rib 3 Rear Length Change	600	+	no	60
62	11TRRI03MIWSDSX0	Driver Thorax Rib 3 Middle Displacement (X)	0	+	no	60
63	11TRRI03MIWSDSY0	Driver Thorax Rib 3 Middle Displacement (Y)	0	+	no	60
64	11TRRI03MIWSDSZ0	Driver Thorax Rib 3 Middle Displacement (Z)	0	+	no	60
65	11TRRI03MIWSDSLB	Driver Thorax Rib 3 Middle Length Change	600	+	no	60
66	11TRRI03FRWSDSX0	Driver Thorax Rib 3 Front Displacement (X)	0	+	no	60
67	11TRRI03FRWSDSY0	Driver Thorax Rib 3 Front Displacement (Y)	0	+	no	60
68	11TRRI03FRWSDSZ0	Driver Thorax Rib 3 Front Displacement (Z)	0	+	no	60
69	11TRRI03FRWSDSLB	Driver Thorax Rib 3 Front Length Change	600	+	no	60
70	11ABRI01REWSDSX0	Driver Abdomen Rib 1 Rear Displacement (X)	0	+	no	60
71	11ABRI01REWSDSY0	Driver Abdomen Rib 1 Rear Displacement (Y)	0	+	no	60
72	11ABRI01REWSDSZ0	Driver Abdomen Rib 1 Rear Displacement (Z)	0	+	no	60
73	11ABRI01REWSDSLB	Driver Abdomen Rib 1 Rear Length Change	600	+	no	60
74	11ABRI01MIWSDSX0	Driver Abdomen Rib 1 Middle Displacement (X)	0	+	no	60
75	11ABRI01MIWSDSY0	Driver Abdomen Rib 1 Middle Displacement (Y)	0	+	no	60
76	11ABRI01MIWSDSZ0	Driver Abdomen Rib 1 Middle Displacement (Z)	0	+	no	60
77	11ABRI01MIWSDSLB	Driver Abdomen Rib 1 Middle Length Change	600	+	no	60
78	11ABRI01FRWSDSX0	Driver Abdomen Rib 1 Front Displacement (X)	0	+	no	60
79	11ABRI01FRWSDSY0	Driver Abdomen Rib 1 Front Displacement (Y)	0	+	no	60
80	11ABRI01FRWSDSZ0	Driver Abdomen Rib 1 Front Displacement (Z)	0	+	no	60
81	11ABRI01FRWSDSLB	Driver Abdomen Rib 1 Front Length Change	600	+	no	60

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
82	11ABRI02REWSDSX0	Driver Abdomen Rib 2 Rear Displacement (X)	0	+	no	60
83	11ABRI02REWSDSY0	Driver Abdomen Rib 2 Rear Displacement (Y)	0	+	no	60
84	11ABRI02REWSDSZ0	Driver Abdomen Rib 2 Rear Displacement (Z)	0	+	no	60
85	11ABRI02REWSDSLB	Driver Abdomen Rib 2 Rear Length Change	600	+	no	60
86	11ABRI02MIWSDSX0	Driver Abdomen Rib 2 Middle Displacement (X)	0	+	no	60
87	11ABRI02MIWSDSY0	Driver Abdomen Rib 2 Middle Displacement (Y)	0	+	no	60
88	11ABRI02MIWSDSZ0	Driver Abdomen Rib 2 Middle Displacement (Z)	0	+	no	60
89	11ABRI02MIWSDSLB	Driver Abdomen Rib 2 Middle Length Change	600	+	no	60
90	11ABRI02FRWSDSX0	Driver Abdomen Rib 2 Front Displacement (X)	0	+	no	60
91	11ABRI02FRWSDSY0	Driver Abdomen Rib 2 Front Displacement (Y)	0	+	no	60
92	11ABRI02FRWSDSZ0	Driver Abdomen Rib 2 Front Displacement (Z)	0	+	no	60
93	11ABRI02FRWSDSLB	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	200
105	11SACRLE00WSFOYP	Driver Sacro-iliac Left Force (Y)	600	+	yes	12000
106	11SACRLE00WSFOZP	Driver Sacro-iliac Left Force (Z)	600	+	yes	200
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	200
118	11LUSP0000WSFOZP	Driver Lumbar Force (Z)	600	+	yes	200
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	200
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	200
130	11FEMRLE00WSMOZP	Driver Left Femur Moment (Z)	600	+	yes	300
131	11FEACLE00WSFOXP	Driver Femoral Neck Force (X)	600	+	yes	200
132	11FEACLE00WSFOYP	Driver Femoral Neck Force (Y)	600	+	yes	25000
133	11FEACLE00WSFOZP	Driver Femoral Neck Force (Z)	600	+	yes	10000
134	11KNEELE0UWSFOYP	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	13SILB000000ACYA	Right Sill at Vertical Impact Reference Line Acceleration (Y)	60	+	yes	2000
155	11FORA000000ACXA	Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)	60	+	yes	2000
156	11FORA000000ACYA	Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)	60	+	yes	2000
157	11DOORMIMI71ACYA	Left Front Door Mid Centerline Acceleration (Y)	60	+	yes	2000
158	11DOORMIRE71ACYA	Left Front Door Mid Rear Acceleration (Y)	60	+	yes	2000
159	11DOORMIUP71ACYA	Left Front Door Upper Centerline Acceleration (Y)	60	+	yes	2000
160	14DOORMIRE71ACYA	Left Rear Door Mid Rear Acceleration (Y)	60	+	yes	2000
161	14DOORMIUP71ACYA	Left Rear Door Upper Centerline Acceleration (Y)	60	+	yes	2000
162	10FORARD0000ACXA	Rear Deck Acceleration (X)	60	+	yes	2000
163	10FORARD0000ACYA	Rear Deck Acceleration (Y)	60	+	yes	2000
164	10FORARD0000ACZA	Rear Deck Acceleration (Z)	60	+	yes	2000
164A	10FORARD0000ACRA	Rear Deck Acceleration Resultant	60			
165	10FORARD0000AVXA	Rear Deck Angular Rate (X)	60	+	yes	8000
166	10FORARD0000AVYA	Rear Deck Angular Rate (Y)	60	+	yes	8000
167	10FORARD0000AVZA	Rear Deck Angular Rate (Z)	60	+	yes	8000
168	11HEADCONT00VO00	Driver Head Contact	0	+	no	1
169	11SHOUCONT00VO00	Driver Shoulder Contact	0	+	no	1
170	11THORCONT00VO00	Driver Thorax Contact	0	+	no	1
171	11PELVCONT00VO00	Driver Pelvis Contact	0	+	no	1
172	K0FBAR010000FOXA	POLE LOAD CELL 1	60	+	yes	400000
173	K0FBAR020000FOXA	POLE LOAD CELL 2	60	+	yes	400000
174	K0FBAR030000FOXA	POLE LOAD CELL 3	60	+	yes	400000
175	K0FBAR040000FOXA	POLE LOAD CELL 4	60	+	yes	400000
176	K0FBAR050000FOXA	POLE LOAD CELL 5	60	+	yes	400000
177	K0FBAR060000FOXA	POLE LOAD CELL 6	60	+	yes	400000
178	K0FBAR070000FOXA	POLE LOAD CELL 7	60	+	yes	400000
179	K0FBAR080000FOXA	POLE LOAD CELL 8	60	+	yes	400000

APPENDIX E
SEATING PROCEDURE WORKSHEETS AND PLOTS

Driver WSID 50th Seating Worksheet

Vehicle	2019 Chevrolet Malibu	Technician	
VIN #	1G1ZC5STOKF216863	Position	
ATD	WorldSID 50	Date	9/25/2020
Test #	200925		

SCRL Angle	Max	17.4	WSID 50th Tilt Sensors		X	Y	
	Min -	13		Head	0°±2	-0.4	-1.0
	Difference	4.4		T6	0°±2	1.8	0.5
	/2	2.2		Pelvis	0°±2	1.2	-0.9
	Min +	2.2					
	Mid Angle	15.2					

Seat Back Angle	W/Level °	25.4	HEAD REST POST		FINAL HEAD REST
Seat Pan Angle	W/Level °	16.9	ANGLE	12.9	POST ANGLE
					13.3

Pelvis Angle	WSID 50th 0° +/-2.5°	Manual Inclinometer	43.1	Tilt Sensor	
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Collected Points			
Name	Meas X	Meas Y	Meas Z
SBU -	-32.837	1.682	-13.330
SBL -	-28.073	1.397	22.321
STRIKER -	0.000	0.000	0.000
FOSB -	424.315	194.598	377.434
FISB -	423.719	641.478	376.038
ROSB -	29.865	194.845	407.823
RISB -	9.744	641.356	409.139
PCP - (Pedal Center Point)	1062.801	587.913	253.088
RHP - (Right Heel Point)	951.644	589.857	420.566
LHP - (Left Heel Point)	951.069	248.498	416.743
SO -	518.748	416.205	-208.008
TS -	587.635	413.054	-367.229
BS -	454.021	416.532	-44.715
SC1 -	724.823	327.634	-58.009
OSCAR H-POINT -	149.998	223.384	175.165
DR PROJECTED WSID H-POINT AT MID-POSITION -	170.000	183.158	155.000
DRIVER STP 15.27 MID-POSITION -	169.819	183.158	231.285
DRIVER STP STEP 18.6 TRIAL 1 -	149.733	183.036	232.583
DR PROJECTED WSID H-POINT STEP 18.6.2 TRIAL 1 -	150.000	182.916	157.000
DRIVER STP STEP 18.6 TRIAL 2 -	170.160	182.916	230.586
DR PROJECTED WSID H-POINT STEP 18.6.2 TRIAL 2 -	170.000	182.916	155.000
DRIVER STP STEP 18.6 TRIAL 3 -	170.000	182.916	155.000
DR PROJECTED WSID H-POINT STEP 18.6.2 TRIAL 3 -	170.000	182.916	155.000
RHDCG -	-15.849	498.716	-501.156
3DLHCG -	13.392	346.181	-506.642
LHDCG -	-8.434	341.439	-507.315
BON -	80.439	427.134	-507.927
TN -	77.219	425.965	-453.382
TC -	66.199	423.240	-384.911
SHLD R1 -	40.591	420.476	-279.625
THX R1 -	76.321	422.398	-203.105
THX R2 -	112.258	422.539	-139.286
THX R3 -	131.475	423.592	-94.182
ABD R1 -	152.931	429.230	-38.125
ABD R2 -	172.400	428.385	9.555
TPS -	208.129	420.544	36.240
C1 -	56.678	425.802	-245.574
C2 -	75.853	420.226	-211.199
C3 -	151.861	416.745	-44.441
SHT -	-16.204	192.917	-246.547
E1 -	183.275	183.147	-111.303
P1 -	123.956	190.361	102.743
H-POINT -	175.622	189.877	151.894
H-POINT 2 -	176.451	201.102	150.990

OK -	564.993	196.384	51.465
IK -	560.143	626.349	65.810
OA -	889.188	206.490	306.789
IA -	897.389	537.687	303.873
OH -	928.001	214.488	431.612
IH -	934.631	569.023	423.493
OP -	-242.235	334.452	-321.622
R -	80.480	427.901	-715.534
H -	489.944	426.623	-644.642
W1 -	822.617	426.940	-508.711
W1 - Outside	838.410	427.609	-508.931
W2 - Outside	1147.510	426.224	-348.034
D1 -	704.993	425.431	-334.864
D2 -	742.422	195.465	-37.828
D3 -	683.340	627.763	-51.642
HRP -	80.855	227.103	-610.042
HSP -	81.252	61.694	-506.923
ADP -	182.706	30.005	-111.757
HDP -	175.884	93.399	152.178

Calculated Measurements					
Name	Cal X	Cal Y	Cal Z	Cal 3D Distance	Deg
HZ -			208		
HH -				432	
HW -	742				
NR -				518	
CD -				654	
CS -	443				
CBS -	302				
IKD -				170	
OKD -				199	
HR -				225	
HS -		365			
AD -		153			
HD -		96			
HLHL -				355	
KK -				430	
SH -				300	
HRA -					12.9
H-POINT TOOL ANGLE -					43.6
TORSO ANGLE -					15.6
WINDSHIELD ANGLE -					62.5