

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

**BAYERISCHE MOTOREN WERKE AG
2019 Mini Cooper S Convertible**

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Report Date: October 20, 2021

FINAL REPORT

**PREPARED FOR:
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TRC TEST NUMBER: 210915

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Report Approved October 20, 2021:

Transportation Research Center Inc.

Final Report Accepted by:

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Project Engineer
Vehicle Research & Test Center

Date: _____

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.																												
4. Title and Subtitle Final Report of Research FMVSS 214 Rigid Pole Side Impact Testing of a 2019 Mini Cooper S Convertible		5. Report Date October 20, 2021																												
		6. Performing Organization Code TRC Inc.																												
7. Author(s) John Shultz, Project Manager		8. Performing Organization Report No. 210915																												
9. Performing Organization Name And Address Transportation Research Center Inc. 10820 State Route 347, East Liberty, OH 43319		10. Work Unit No.																												
		11. Contract Or Grant No. 693JJ918D000019																												
12. Sponsoring Agency Name And Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Research (NSR-210) 1200 New Jersey Ave, SE Washington, DC 20590		13. Type Of Report And Period Covered Final Test Report September 15, 2021 – October 20, 2021																												
		14. Sponsoring Agency Code NRS-210																												
15. Supplemental Notes																														
16. Abstract A 31.00 km/h, 285° Oblique Rigid Pole Research Side Impact Test was conducted on the subject 2019 Mini Cooper S Convertible 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 15, 2021. The impact velocity was 31.01 km/h, and the ambient temperature at the struck (passenger's) side of the target vehicle at the time of impact was 22.6°C. The test vehicle post-test maximum crush was 204 mm at level 3. The test vehicle's performance was as follows: <table border="1" data-bbox="371 1165 1294 1476"> <thead> <tr> <th></th><th colspan="2">Passenger ATD (WorldSID-50M)</th></tr> <tr> <th>Measurement Description</th><th>Units</th><th>Result</th></tr> </thead> <tbody> <tr> <td>Head Injury Criterion (HIC15)</td><td>N/A</td><td>86</td></tr> <tr> <td>Brain Injury Criterion (BrIC)</td><td>N/A</td><td>0.77</td></tr> <tr> <td>Peak Shoulder Force</td><td>N</td><td>-1692.9</td></tr> <tr> <td>Peak Thoracic Rib Deflection</td><td>mm</td><td>36.88</td></tr> <tr> <td>Peak Abdominal Rib Deflection</td><td>mm</td><td>25.43</td></tr> <tr> <td>Pubic Symphysis Force</td><td>N</td><td>-1149.88</td></tr> <tr> <td>Peak Resultant Sacro-Iliac Force</td><td>N</td><td>2902.09</td></tr> </tbody> </table> 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.					Passenger ATD (WorldSID-50M)		Measurement Description	Units	Result	Head Injury Criterion (HIC15)	N/A	86	Brain Injury Criterion (BrIC)	N/A	0.77	Peak Shoulder Force	N	-1692.9	Peak Thoracic Rib Deflection	mm	36.88	Peak Abdominal Rib Deflection	mm	25.43	Pubic Symphysis Force	N	-1149.88	Peak Resultant Sacro-Iliac Force	N	2902.09
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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																												
19. Security Classification of Report Unclassified	20. Security Classification of page Unclassified	21. Number of Pages 251	22. Price																											

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SECTION 1

PURPOSE AND TEST PROCEDURE

PURPOSE AND TEST PROCEDURE

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

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2019 Mini Cooper S Convertible. The subject vehicle was towed into the rigid pole at an angle of 285° and a velocity of 31.01 km/h. The test was conducted by the Transportation Research Center Inc. in East Liberty, Ohio, on September 15, 2021. Pre-test and post test photographs of the test vehicle and side impact dummy (WorldSID-50M with RibEye) are included in APPENDIX A of this report.

The test setup was conducted following the FMVSS 214 test procedure dated September 2012, including instrumentation and camera placement. One WorldSID-50M with RibEye dummy was placed in the passenger 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	Passenger ATD (WorldSID-50M)	
	Units	Result
Head Injury Criterion (HIC15)	N/A	86
Brain Injury Criterion (BrIC)	N/A	0.77
Peak Shoulder Force	N	-1692.9
Peak Thoracic Rib Deflection	mm	36.88
Peak Abdominal Rib Deflection	mm	25.43
Pubic Symphysis Force	N	-1149.88
Peak Resultant Sacro-Iliac Force	N	2902.09

Supplemental restraint information is given below:

Restraint Type	Right Front (Passenger) Occupant Location 3	
	Mounted	Deployed
Frontal Airbag	Yes	No
Side Curtain Airbag	No	N/A
Side Torso/Pelvis Airbag	No	N/A
Side Pelvis Airbag	Yes	Yes
Knee Airbag	Yes	No
Seat Belt Pretensioner	Yes	Yes
Seat Belt Load Limiter	Yes	Yes
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

Vehicle Center of Gravity Y-Axis Acceleration: Channel failed at 48.0 ms

Vehicle Center of Gravity Z-Axis Acceleration: Channel failed at 48.0 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*

Passenger Shoulder Rear Displacement: Error code 9 at 39.6-68.1 ms

Passenger Shoulder Middle Displacement: Error code 2 at 50.5-57.8 ms

Passenger Thorax Rib 2 Middle Displacement: Error code 1 at 34.0-64.1 ms

Passenger Thorax Rib 2 Front Displacement: Error code 1 at 37.4-63.9 ms

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

TEST VEHICLE INFORMATION AND OPTIONS

Model Year	2019
Make	Mini
Model	Cooper S
Body Style	Passenger Car
VIN	WMWWG9C54K3E40130
Body Color	Pepper White
Odometer Reading (km/mi)	2924 mi.
Engine Displacement (L)	2.0
Type/No. Cylinders	Gas/4
Engine Placement	Straight Transverse
Transmission Type	Automatic
Transmission Speeds	6
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	No
Driver Head/Torso Airbag	Yes
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	No
Driver Pelvis Airbag	No
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	No
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	No

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	BAYERISCHE MOTOREN WERKE AG
Date of Manufacturer	06/18
Vehicle Type	Passenger Car

GWR (kg)	1764
GAWR Front (kg)	975
GAWR Rear (kg)	812

VEHICLE SEATING AND WEIGHT CAPACITY DATA

	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	2	N/A	4
Vehicle Capacity Weight (VCW) (kg)				354.0
DSC X 68.04 kg				272.2
Rated Cargo and Luggage Weight (RCLW) (kg)				81.8

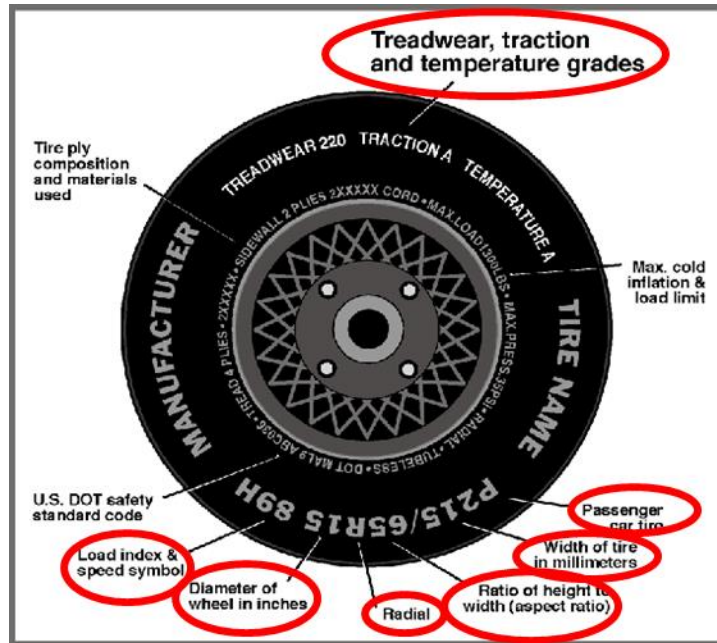
VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	Yes	N/A	N/A		N/A	Yes	N/A
Rear or Second Row Seat	N/A	N/A	Yes	Yes	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 Mini Cooper S Convertible
 Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	340	340
Cold Pressure (kPa)	260	260
Recommended Tire Size	195/55R16	195/55R16
Tire Size on Vehicle	205/45R17	205/45R17
Tire Manufacturer	Hankook	Hankook
Tire Model	Optimo	Optimo
Treadwear	400	400
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	4	4
Load Index/Speed Symbol	88V	88V
Tire Material	Steel, Rayon, Nylon	Steel, Rayon, Nylon
DOT Safety Code Left	3XAA D2H 0618	3XAA D2H 0618
DOT Safety Code Right	3XAA D2H 0618	3XAA D2H 0618

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

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	241	241	228	234
Tire Placard	kPa	260	260	240	240
Owner's Manual	kPa	260	260	240	240
As Tested	kPa	260	260	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	423.6	263.4		444.8	297.0		420.6	313.2	
Right	kg	422.4	257.0		467.8	306.6		463.4	326.0	
Ratio	%	61.9	38.1		60.2	39.8		58.0	42.0	
Totals	kg	846.0	520.4	1366.4	912.6	603.6	1516.2	884.0	639.2	1523.2

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1366.4	(A)
Actual Weight of 1 WorldSID-50M with RibEye Dummy Used	kg	75.0	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	81.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1523.2	(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.	-1.6	-1.3	-0.6	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg.	-1.9	-1.1	-2.1	Yes
Front Bumper-Line Angle (left-to-right)**	Deg.	-0.6	-0.4	-0.4	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg.	-0.1	0.0	+0.2	Yes
Vehicle CG (Aft of Front Axle)	mm	951	994	1048	
Vehicle CG (Left (+) / Right (-) from longitudinal Centerline)	mm	+4	-16	-27	

*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 Mini Cooper S Convertible
Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Ballast: 1x large metal plate; 1x small metal plate	81.6
Components removed: None	0.0

DATA SHEET NO. 2

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

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL(°)		
	Max.	Min.	Mid
Driver Seat	25.4	20.3	22.8
Front Passenger Seat	25.6	20.6	23.1
Front Center Seat*	N/A	N/A	N/A
Struck Side Rear Seat	N/A	N/A	16.2
Non-Struck Side Rear Seat	N/A	N/A	17.0
Rear Center Seat*	N/A	N/A	N/A

* 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	22.8	100	Max	117	127	138
			Mid	90	100	109
			Min	76	85	94
Front Passenger Seat	23.1	100	Max	117	126	136
			Mid	91	100	108
			Min	77	87	94
Front Center Seat*	N/A	N/A	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Struck Side Rear Seat	16.2	350	Max	N/A	N/A	N/A
			Mid	N/A	350	N/A
			Min	N/A	N/A	N/A
Non-Struck Side Rear Seat	17.0	345	Max	N/A	N/A	N/A
			Mid	N/A	345	N/A
			Min	N/A	N/A	N/A
Rear 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

* If applicable.

DATA SHEET NO. 2 (CONTINUED)

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

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

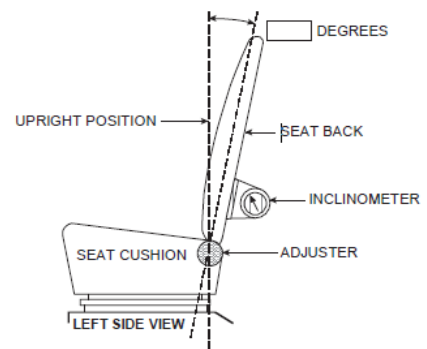
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	240	25	120	12
Front Passenger Seat	240	25	120	12
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	0	Fixed	0	Fixed
Non-Struck Side Rear Seat	0	Fixed	0	Fixed
Rear Center Seat*	N/A	N/A	N/A	N/A

* If applicable.

SEAT BACK ANGLE ADJUSTMENT

The passenger's seat back was positioned according to the manufacturer's information as provided on Form 1; resulting in a head rest post angle of 7.9° at the head rest post. The driver seat was set to match the front passenger seat.



FRONT SEAT ASSEMBLY

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detent*
Driver Seat	51.5	29	7.4	8
Front Passenger Seat w/ Seated Dummy	53.4	29	7.9	8
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	0	Fixed	0	Fixed
Non-Struck Side Rear Seat	0	Fixed	0	Fixed
Rear Center Seat*	N/A	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 Mini Cooper S ConvertibleTest Program: Rigid Pole Side ImpactTest Date: 9/15/2021**SEAT BELT ANCHORAGE ADJUSTMENT**

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

	Total # of Positions	Placed in Position #
Passenger 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 #
Passenger Seat	5	5

DATA SHEET NO. 2 (CONTINUED)

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

Test Vehicle: 2019 Mini Cooper S Convertible

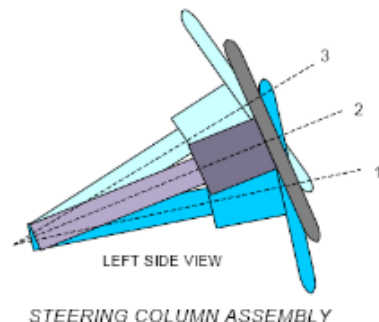
Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

STEERING COLUMN ADJUSTMENT

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

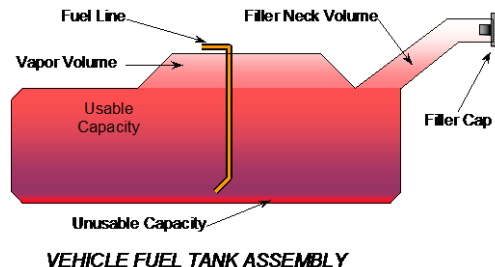
	Degrees	Fore/Aft Position, mm
Lowermost, Position No. 1	16.5	0
Geometric Center, Position No. 2	18.9	30
Uppermost, Position No. 3	21.3	60
Telescoping Steering Wheel Travel		60
Test Position	18.9	30



FUEL PUMP

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

Fuel pump starts when ignition is on. The fuel pump will operate for 5 seconds. After pressure has been built up the fuel pump switches to sleep mode until the engine will be started or the pressure decreases.



FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	43.9
Usable Capacity of "Optional" Tank (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner's Manual)	43.9
Usable Capacity of Optional Tank (see Owner's Manual)	N/A
93% of Usable Capacity	40.8
Actual Amount of Solvent Used in Test	40.8
1/3 of Usable Capacity	14.6

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 DATATest Vehicle: 2019 Mini Cooper S ConvertibleTest Program: Rigid Pole Side ImpactTest Date: 9/15/2021

Passenger Dummy Serial Number: EA7820

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Head Acceleration (g)	X	7.75	166.40	-17.65	55.70
	Y	4.52	22.35	-27.31	50.15
	Z	19.87	45.70	-8.13	94.20
	R	34.54	55.00		
Head Angular Rate (deg/sec)	X	1316.10	41.75	-368.35	168.95
	Y	903.30	143.95	-631.74	73.20
	Z	1533.22	64.95	-817.05	125.85
Upper Neck Force (N)	X	35.26	161.65	-303.50	95.10
	Y	216.27	54.60	-270.31	136.00
	Z	903.02	45.95	-272.85	104.10
Upper Neck Moment (Nm)	X	20.22	35.25	-23.08	125.80
	Y	26.85	108.05	-20.82	178.75
	Z	3.55	145.30	-24.51	74.80
Lower Neck Force (N)	X	83.30	163.15	-337.00	63.50
	Y	55.28	17.95	-478.62	35.85
	Z	1055.52	45.85	-548.49	91.80
Lower Neck Moment (Nm)	X	3.62	18.00	-66.43	139.75
	Y	57.19	93.60	-25.73	163.60
	Z	2.68	217.50	-22.22	76.35
Shoulder Force (N)	X	1083.49	19.40	-12.60	277.90
	Y	5.50	-5.60	-1692.90	24.20
	Z	569.67	39.70	-544.31	18.70
Shoulder Rear Ribeye Position (mm) ¹	X	9.00	39.60	-86.72	68.20
	Y	84.56	17.60	9.00	39.60
	Z	9.00	39.60	-52.15	-41.60
Length of Change (mm) ¹		9.89	29.30	-4.35	78.70
Shoulder Middle Ribeye Position (mm) ₁	X	2.00	50.50	-57.20	58.10
	Y	96.44	17.60	2.00	50.50
	Z	2.00	50.50	-53.39	-41.50
Length of Change (mm) ¹		37.31	42.30	-1.64	17.60
Shoulder Front Ribeye Position (mm)	X	28.38	137.00	-11.17	67.10
	Y	84.07	16.20	25.83	54.70
	Z	-39.17	38.80	-58.55	-38.60
Length of Change (mm)		63.05	55.20	-0.25	14.90

¹See data acquisition explanation

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA (CONTINUED)Test Vehicle: 2019 Mini Cooper S ConvertibleTest Program: Rigid Pole Side ImpactTest Date: 9/15/2021

Passenger Dummy Serial Number: EA7820

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Thorax Rib 1 Rear Ribeye Position (mm)	X	-26.74	32.70	-40.57	53.60
	Y	106.29	150.10	76.31	42.50
	Z	29.45	38.20	9.87	24.00
Length of Change (mm)		27.57	42.40	-0.89	260.10
Thorax Rib 1 Middle Ribeye Position (mm)	X	13.88	33.60	-2.99	73.10
	Y	115.34	265.60	74.45	42.20
	Z	33.43	38.00	11.23	24.00
Length of Change (mm)		36.88	52.80	-3.47	265.70
Thorax Rib 1 Front Ribeye Position (mm) ¹	X	53.95	34.60	33.80	73.90
	Y	105.92	126.30	64.96	53.90
	Z	28.85	37.70	7.84	24.00
Length of Change (mm)		35.60	53.90	-1.91	125.70
Thorax Rib 2 Rear Ribeye Position (mm)	X	-16.87	25.80	-28.51	74.00
	Y	103.50	259.40	88.19	41.80
	Z	48.52	37.70	33.18	68.80
Length of Change (mm)		14.79	41.50	-2.14	259.40
Thorax Rib 2 Middle Ribeye Position (mm) ¹	X	22.16	33.90	1.00	34.00
	Y	112.01	202.30	1.00	34.00
	Z	47.77	33.70	1.00	34.00
Length of Change (mm) ¹		12.09	33.30	-2.12	230.70
Thorax Rib 2 Front Ribeye Position (mm) ¹	X	63.12	37.10	1.00	37.45
	Y	105.97	152.30	1.00	37.45
	Z	54.32	37.30	1.00	37.45
Length of Change (mm) ¹		8.42	65.60	-4.93	37.20
Thorax Rib 3 Rear Ribeye Position (mm)	X	-44.03	25.30	-52.88	73.50
	Y	93.28	-27.80	78.94	41.30
	Z	-27.78	36.70	-45.70	62.80
Length of Change (mm)		15.02	42.10	-0.30	-29.80
Thorax Rib 3 Middle Ribeye Position (mm)	X	-6.76	41.20	-20.68	1.80
	Y	102.15	159.90	84.40	47.00
	Z	-25.65	37.00	-44.78	61.00
Length of Change (mm)		15.97	47.50	-0.44	157.70

¹See data acquisition explanation

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA (CONTINUED)Test Vehicle: 2019 Mini Cooper S ConvertibleTest Program: Rigid Pole Side ImpactTest Date: 9/15/2021

Passenger Dummy Serial Number: EA7820

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Thorax Rib 3 Front Ribeye Position (mm)	X	28.61	41.10	11.32	-16.80
	Y	93.43	146.30	75.39	47.00
	Z	-27.11	36.70	-44.88	64.10
Length of Change (mm)		8.91	47.10	-1.14	146.30
Abdomen Rib 1 Rear Ribeye Position (mm)	X	-28.73	26.30	-36.30	216.00
	Y	98.72	216.00	75.55	48.40
	Z	8.93	36.80	-9.87	62.40
Length of Change (mm)		19.27	48.40	-3.51	215.90
Abdomen Rib 1 Middle Ribeye Position (mm)	X	9.93	42.60	-3.24	284.90
	Y	105.89	245.20	77.35	47.10
	Z	9.88	36.80	-11.12	62.40
Length of Change (mm)		25.43	47.10	-1.67	245.20
Abdomen Rib 1 Front Ribeye Position (mm)	X	46.28	45.70	28.31	286.70
	Y	98.54	269.60	70.78	48.40
	Z	9.69	37.00	-10.54	61.00
Length of Change (mm)		16.38	48.50	-1.66	269.90
Abdomen Rib 2 Rear Ribeye Position (mm)	X	-12.49	60.50	-21.33	31.70
	Y	93.22	291.50	73.03	47.80
	Z	42.08	37.00	22.72	93.60
Length of Change (mm)		15.05	49.90	-2.88	291.50
Abdomen Rib 2 Middle Ribeye Position (mm)	X	23.02	58.00	10.37	179.10
	Y	104.31	224.80	78.63	48.60
	Z	41.94	37.20	18.84	94.30
Length of Change (mm)		23.19	49.10	-2.41	224.70
Abdomen Rib 2 Front Ribeye Position (mm)	X	58.08	57.40	41.08	180.50
	Y	95.46	288.50	69.97	50.00
	Z	42.51	35.90	20.93	92.00
Length of Change (mm)		18.39	49.00	-0.51	288.80
T1 Acceleration (g)	X	4.61	126.10	-12.31	56.75
	Y	2.21	101.65	-33.50	53.45
	Z	10.29	41.05	-14.01	91.60
	R	36.58	53.40		

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA (CONTINUED)Test Vehicle: 2019 Mini Cooper S ConvertibleTest Program: Rigid Pole Side ImpactTest Date: 9/15/2021

Passenger Dummy Serial Number: EA7820

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
T4 Acceleration (g)	X	3.83	124.05	-8.30	46.80
	Y	6.51	100.85	-37.89	52.55
	Z	9.13	41.30	-14.41	91.60
	R	39.42	52.50		
T12 Acceleration (g)	X	8.67	60.75	-11.69	23.35
	Y	11.51	24.80	-45.83	32.75
	Z	8.56	35.60	-11.16	92.70
	R	47.35	32.80		
Pubic Symphysis (N)	Y	87.76	74.75	-1149.88	42.80
Left Sacro-Iliac Force (N)	X	243.55	34.30	-429.02	58.00
	Y	155.49	64.35	-1550.62	42.70
	Z	742.62	94.50	-498.88	52.10
Left Sacro-Iliac Moment (Nm)	X	41.44	61.30	-57.29	93.70
	Y	21.65	65.80	-12.26	46.90
	Z	39.25	37.70	-26.16	58.00
Right Sacro-Iliac Force (N)	X	334.47	75.60	-98.93	18.75
	Y	138.69	94.60	-2890.96	43.15
	Z	399.13	60.90	-450.67	93.75
Right Sacro-Iliac Moment (Nm)	X	22.42	60.65	-45.26	93.80
	Y	7.01	94.50	-32.89	50.85
	Z	45.77	34.70	-29.55	61.05
Lumbar Force (N)	X	553.13	61.15	-210.22	19.25
	Y	128.36	83.20	-597.28	44.10
	Z	1042.90	60.35	-1446.05	93.55
Lumbar Moment (Nm)	X	21.32	94.60	-29.53	51.80
	Y	18.73	91.20	-22.92	61.00
	Z	4.66	68.40	-12.40	98.90
Pelvis Acceleration (g)	X	10.74	76.20	-14.03	32.90
	Y	16.92	78.30	-58.89	42.50
	Z	14.04	30.45	-13.88	54.10
	R	60.07	42.55		

TABLE 1 WORLDSID-50M INSTRUMENTATION DATA (CONTINUED)Test Vehicle: 2019 Mini Cooper S ConvertibleTest Program: Rigid Pole Side ImpactTest Date: 9/15/2021

Passenger Dummy Serial Number: EA7820

Location		Positive Direction		Negative Direction	
		Max.	Time (ms)	Max.	Time (ms)
Femur Force (N)	X	49.06	160.55	-211.56	88.30
	Y	318.36	30.15	-123.49	52.45
	Z	748.96	42.00	-200.33	59.05
Femur Moment (Nm)	X	35.08	107.45	-162.33	46.25
	Y	74.91	47.30	-56.42	97.95
	Z	31.63	108.40	-47.35	46.90
Femoral Neck Force (N)	X	552.67	101.20	-746.03	45.25
	Y	401.16	81.45	-1775.80	43.70
	Z	1807.98	41.75	-22.04	149.95
Outer Knee Force (N)	Y	3475.20	57.20	-17.92	43.55
Inner Knee Force (N)	Y	6054.68	59.45	-159.11	22.80

Positive Direction

Longitudinal Forward
 Lateral Rightward
 Vertical Downward

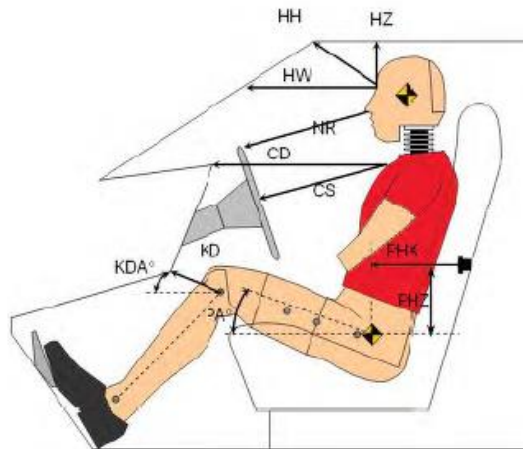
Negative Direction

Longitudinal Rearward
 Lateral Leftward
 Vertical Upward

DATA SHEET NO. 3 DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Mini Cooper S Convertible
Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021



Code	Measurement Description	Passenger WorldSID-50M SN # EA7820	
		Length (mm)	Angle
HH	Header to Header	658	
HW	Header to Windshield	819	
HZ	Head to Roof Liner	220	
NR	Nose to Rim/Seat Back		
CD	Chest to Dash/Seat Back	707	
CS	Chest to Steering Wheel		
KD(L)/KDA(L)°	Left Knee to Dash/Seat Back	171	27.0
KD(R)/KDA(R)°	Right Knee to Dash/Seat Back	187	30.6
PAX°	Pelvic Tilt Angle X		-0.3
PAY°	Pelvic Tilt Angle Y		-0.4
PHX	Hip Point to Striker (X-Axis)	351	
PHZ	Hip Point to Striker (Z-Axis)	189	
HAX°	Head Tilt Angle X		-0.7
HAY ^{1o}	Head Tilt Angle Y		-1.1
TAX°	Thorax Tilt Angle X		-1.3
TAY°	Thorax Tilt Angle Y		0.5
	Head Rest Angle		7.9
	H-Point Tool Angle		42.9
	Torso Angle		14.5
	Windshield Angle		50.5

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.

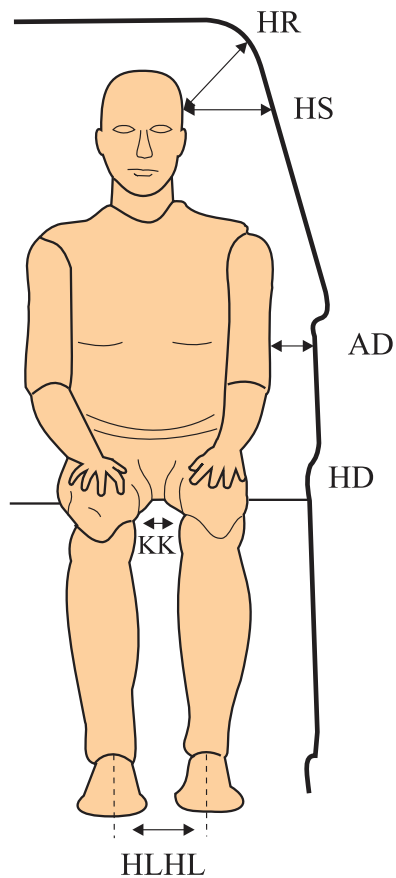
All tilt sensor angles are recorded digitally

WorldSID-50M neck was adjusted 0 notches

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Mini Cooper S Convertible
 Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021



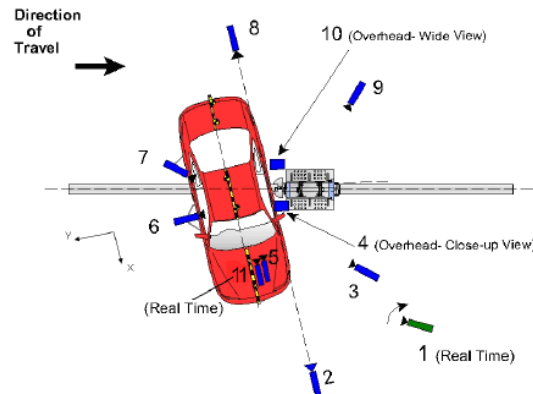
Code	Measurement Description	Passenger WorldSID-50M SN # EA7820
HR	Head to Side Header	232
HS	Head to Side Window	320
AD	Arm to Door	125
HD	Hip Point to Door	100
KK	Knee to Knee	393
HLHL	Heel to Heel	238

Note: All measurements are in millimeters.

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 Mini Cooper S Convertible
Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021



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

CAMERA LOCATIONS AND DATA

Camera No.	View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real time (24-30 fps) pan view of impact				Zoom	30
2	Front ground level – impact view	-3336	-1325	-1705	20	1000
3	Impact side 45° – forward pole view	-5732	-1028	-1705	20	1000
4	Overhead Close-up view of impact	0	-58	-5450	28	1000
5	Onboard – dummy front view				25	1000
6	Onboard – dummy side view				8.5	1000
7	Onboard – dummy rear oblique view				8.5	1000
8	Rear ground level – impact view	6249	3358	-1548	20	1000
9	Impact side 45° – rearward pole view	3541	-1208	-1535	20	1000
10	Overhead wide – view of impact	0	375	-5450	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 285° angle to the rigid pole.

The Diagram depicts a left side impact; however the setup for this test was mirrored to impact the right side of the vehicle

If applicable, explain why camera(s) did not operate as intended: Camera 11 failed to

Record the event

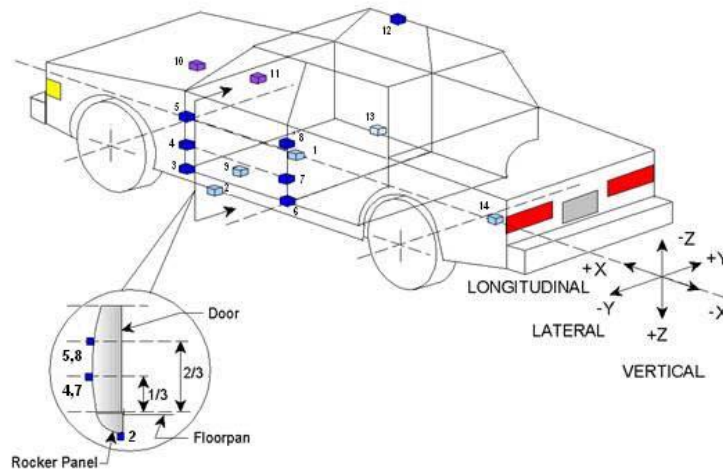
INSTRUMENTATION

Driver Dummy	135
Vehicle Structure	35
Pole Load Cells	8
Contact Channels	4
TOTAL	182

DATA SHEET NO. 6
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2019 Mini Cooper S Convertible
Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021



Location		Coordinates (mm)			Positive Direction		Negative Direction	
		X	Y	Z	Max	Time (ms)	Max	Time (ms)
1	Vehicle CG	1915	-55	4				
	Longitudinal (g)				14.65	11.85	-23.71	17.90
	Lateral (g)				--- ¹	--- ¹	--- ¹	--- ¹
	Vertical (g)				--- ¹	--- ¹	--- ¹	--- ¹
	Resultant (g)				--- ¹	--- ¹		
2	Vehicle CG ARS	1929	1	1				
	Longitudinal (deg/s)				43.88	47.45	-9.64	16.85
	Lateral (deg/s)				290.55	16.05	-63.30	59.55
	Vertical (deg/s)				175.91	78.60	-15.25	19.55
3	Right Floor Sill Acceleration	2246	647	119				
	Lateral (g)				0.48	2.55	-49.26	11.95
4	Right A-Pillar Sill Acceleration	2459	667	97				
	Lateral (g)				0.42	2.05	-27.10	24.20
5	Right Lower A-Pillar Acceleration	2463	674	-64				
	Lateral (g)				0.51	1.50	-29.56	24.35
6	Right Mid A-Pillar Acceleration	2463	714	-488				
	Lateral (g)				0.15	-43.35	-25.07	25.40
7	Left Mid B-Pillar Acceleration	1373	-672	-471				
	Lateral (g)				1.43	176.35	-30.60	14.80
8	Right Lower B-Pillar Acceleration	1366	669	-155				
	Lateral (g)				32.01	260.25	-41.37	11.05
9	Right Mid B-Pillar Acceleration	1371	669	-477				
	Lateral (g)				15.70	29.20	-28.30	13.45

¹See data acquisition explanation

DATA SHEET NO. 6 (CONTINUED)
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

Location		Coordinates (mm)			Positive Direction		Negative Direction	
		X	Y	Z	Max	Time (ms)	Max	Time (ms)
10	Passenger Seat Track at Dummy H-Point Acceleration	1700	586	127				
	Lateral (g)				436.77	28.65	-63.73	21.10
11	Engine Top Acceleration	3259	16	-380				
	Longitudinal (g)				5.69	41.95	-24.46	31.10
	Lateral (g)				4.86	30.70	-13.06	38.55
12	Firewall Center Acceleration	3003	-23	-396				
	Lateral (g)				1.53	5.05	-12.21	29.75
13	Left Roof at Vertical Impact Reference Line Acceleration	1698	-554	-934				
	Lateral (g)				19.02	73.20	-55.32	40.20
14	Left Sill at Vertical Impact Reference Line Acceleration	2202	-651	115				
	Longitudinal (g)				5.55	33.80	-4.15	21.65
	Lateral (g)				1.12	140.55	-27.60	13.65
	Vertical (g)				5.96	92.30	-11.13	16.70
	Resultant (g)				29.16	13.75		
15	Right Sill at Rear Seat Acceleration	1563	649	98				
	Longitudinal (g)				3.59	30.10	-19.31	22.90
	Lateral (g)				0.56	2.10	-67.40	11.25
	Vertical (g)				19.75	11.55	-11.85	64.00
	Resultant (g)				70.80	11.30		
16	Rear Floorpan Behind Rear Axle at Centerline Acceleration	731	22	-104				
	Longitudinal (g)				3.61	83.05	-9.32	45.90
	Lateral (g)				0.59	127.90	-26.13	28.45
17	Right Front Door Mid Centerline Acceleration	1917	731	-261				
	Lateral (g)				36.40	29.95	-78.05	10.15
18	Right Front Door Mid Rear Acceleration	1515	696	-270				
	Lateral (g)				119.16	26.90	-212.95	19.25
19	Right Front Door Upper Centerline Acceleration	1897	681	-483				
	Lateral (g)				19.98	26.40	-73.39	21.45

DATA SHEET NO. 6 (CONTINUED)
VEHICLE ACCELEROMETER DATA

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

Location		Coordinates (mm)			Positive Direction		Negative Direction	
		X	Y	Z	Max	Time (ms)	Max	Time (ms)
20	Rear Deck Acceleration	162	50	-194				
	Longitudinal (g)				6.16	81.45	-8.10	25.80
	Lateral (g)				0.79	122.70	-30.07	41.05
	Vertical (g)				11.25	61.85	-11.41	41.05
	Resultant (g)				32.72	41.25		
21	Rear Deck ARS	163	-71	-194				
	Longitudinal (deg/s)				249.82	65.05	-33.55	280.05
	Lateral (deg/s)				64.08	131.25	-104.98	56.30
	Vertical (deg/s)				30.82	18.05	-187.24	76.65

*0,0,0 located at rear bumper

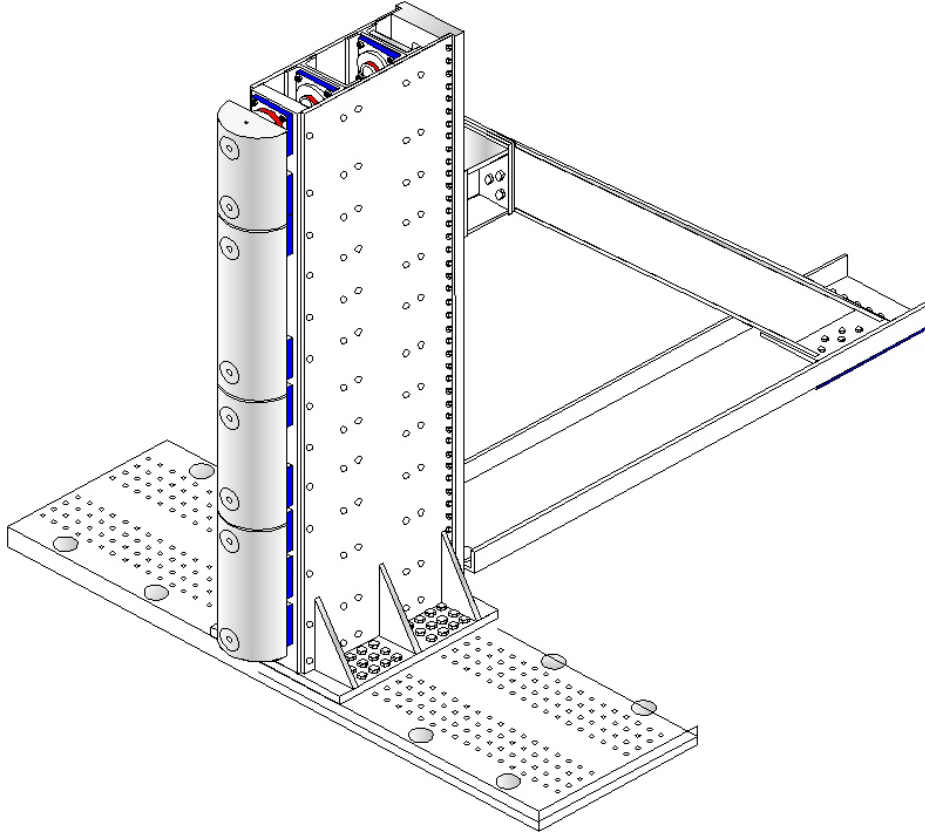
DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

FOIL 300K RIGID POLE



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

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

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Passenger WorldSID-50M Dummy
Face	SAB
Top of Head	SAB
Left Side of Head	SAB
Back of head	Headrest
Left Shoulder	SAB
Upper Torso	Seat Bolster; SAB
Lower Torso	Seat Bolster; SAB
Left Hip	None
Left Knee	Armrest; Speaker

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/ Other Door
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	N/A	Yes	N/A	Yes
Total Separation from Vehicle at Hinges or Latches	No	N/A	No	N/A	No
Latch or Hinge Systems Pulled Out of Their Anchorages	No	N/A	No	N/A	No
Disengaged from Latched Position	No	N/A	No	N/A	No
Latch Separated from Striker	No	N/A	No	N/A	No
Jammed Shut	Yes	N/A	No	N/A	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	N/A	No	N/A
Seat Back Collapse	No	N/A	No	N/A

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Good
Sill Separation	None
Windshield Damage	None
Side Window Damage	Blown out
Other Notable Effects	None

DATA SHEET NO. 8 (CONTINUED)
POST TEST OBSERVATIONS

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

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

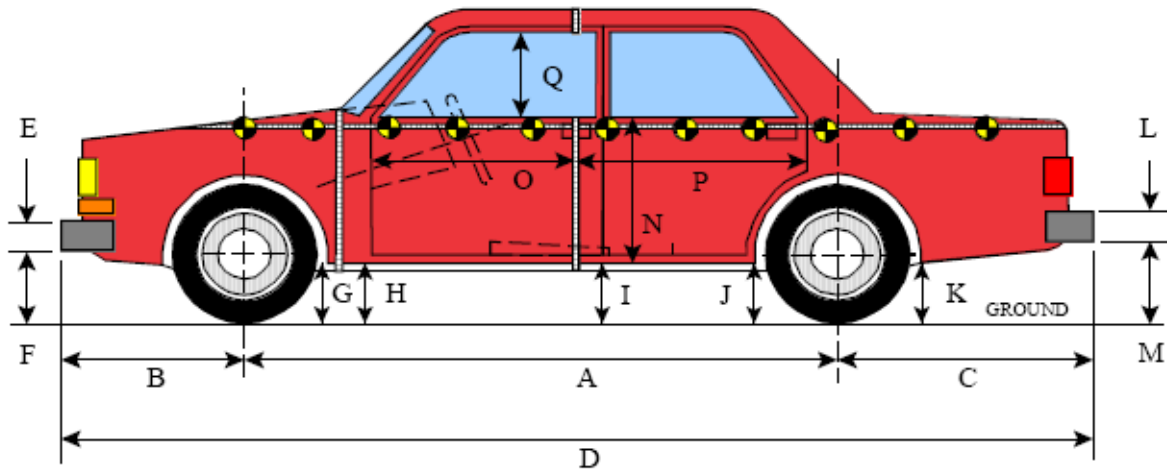
Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1405
Actual Impact Point (Aft of Front Axle)	mm		1405
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 of Intended Impact Point	0
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	Degrees	285 +/- 3	285
Trap No. 1 Velocity (Primary)	km/h	30.1 to 31.9	31.01
Trap No. 2 Velocity (Redundant)	km/h	30.1 to 31.9	31.00

DATA SHEET NO. 9
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021



LEFT SIDE VIEW

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

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2500	2465	35
B	Front Axle to FSOV	757	757	0
C	Rear Axle to RSOV	603	603	0
D	Total Length at Centerline	3860	3830	30
E	Front Bumper Thickness	116	116	0
F	Front Bumper Bottom to Ground	418	445	-27
G	Sill Height at Front Wheel Well	262	275	-13
H	Sill Height at Front Door Leading Edge	260	277	-17
I	Sill Height at B Pillar	274	294	-20
J1	Sill Height at Rear Wheel Well	283	310	-27
J2	Pinch Weld Height at Rear Wheel Well	142	148	-6
K	Sill Height Aft of Rear Wheel Well	396	415	-19
L	Rear Bumper Thickness	97	97	0
M	Rear Bumper Bottom to Ground	437	455	-18
N	Sill Height to Bottom of Front Window Sill	702	693	9
O	Front Door Leading Edge to Impact CL	870	865	5
P	Rear Door Trailing Edge to Impact CL	397	290	107
Q	Front Window Opening	385	370	15
R	Right Side Length	3575	3550	25
S	Left Side Length	3575	3580	-5
T	Maximum Vehicle Width at B-Pillars	1690	1690	0
U	Maximum Vehicle Width	1715	1715	0

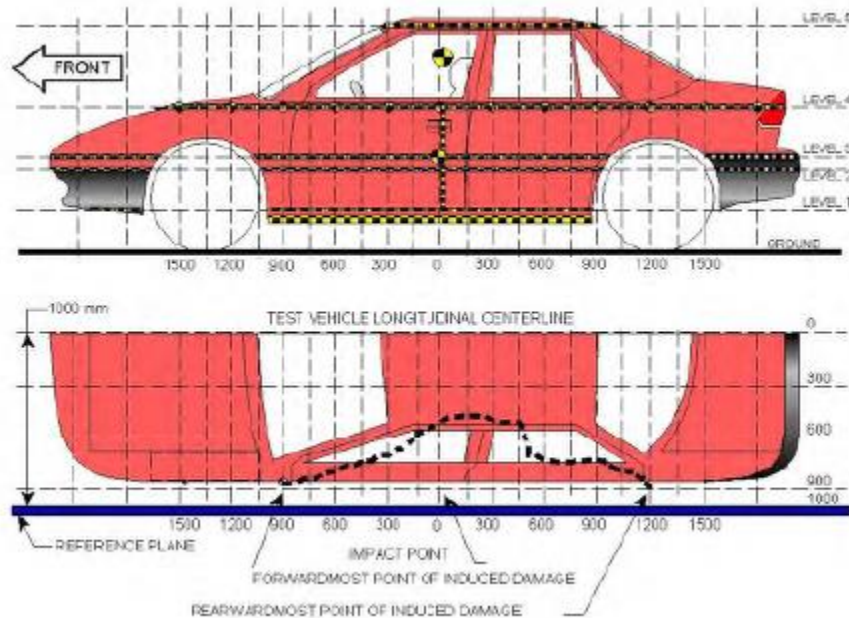
**All Dimensions in mm

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	230	134	0
2	Occupant H-Point	532	187	0
3	Mid-Door	437	204	0
4	Window Sill	945	156	0
5	Window Top	1336	18	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 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1050			841					860					-19		
-900	801	835	838	718		815	849	853	732		-14	-14	-15	-14	
-750	802	833	839	730		800	836	833	748		2	-3	6	-18	
-600	805	834	841	744		787	805	797	730		18	29	44	14	
-450	807	836	842	754		772	766	764	707		35	70	78	47	
-300	809	837	843	763	556	756	731	730	683	554	53	106	113	80	2
-150	810	837	845	770	563	732	695	687	660	553	78	142	158	110	10
0	810	837	845	775	570	676	650	641	619	556	134	187	204	156	14
150	809	836	845	781	571	748	719	711	686	553	61	117	134	95	18
300	807	837	845	785	569	782	775	786	768	555	25	62	59	17	14
450	804	837	844	785	566	797	783	803	767	560	7	54	41	18	6
600	802	840	845	786	538	803	824	810	775	534	-1	16	35	11	4
750			849	787	500			840	781	506			9	6	-6
900				786	516				783	527				3	-11

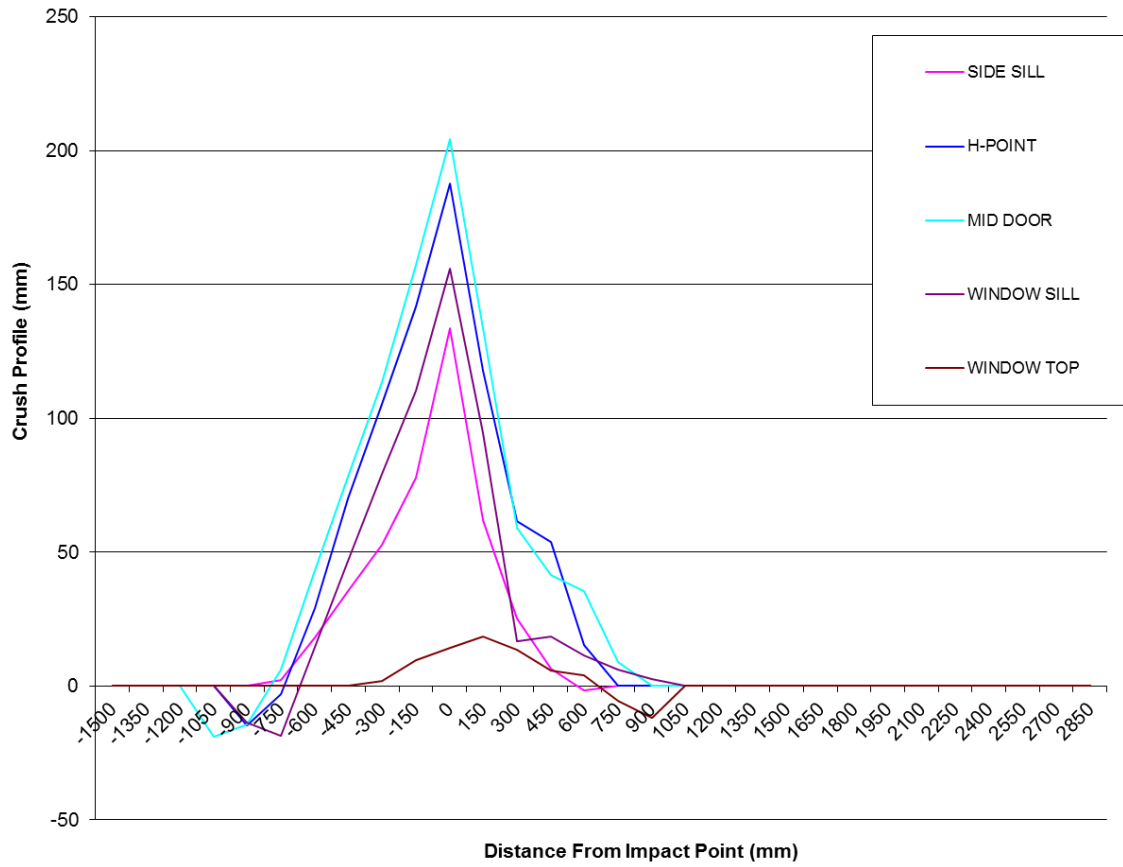
NOTE: Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point. The vertical impact reference line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

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

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

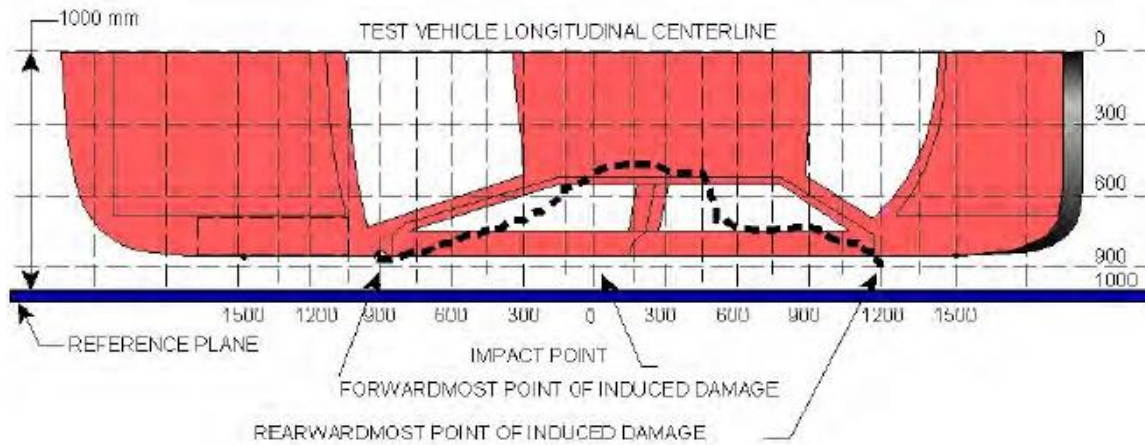


DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 Mini Cooper S Convertible

Test Program: Rigid Pole Side Impact

Test Date: 9/15/2021

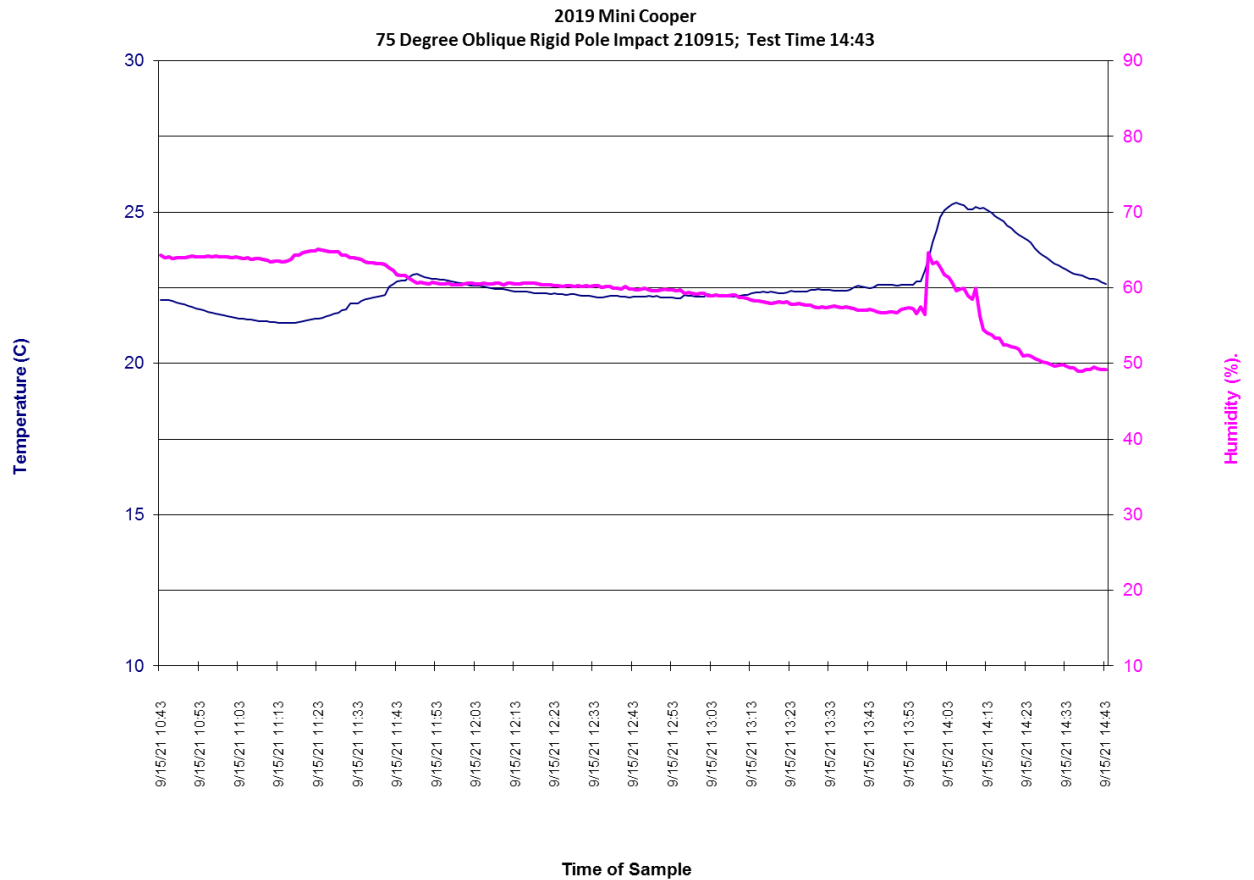


VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	900	4	783	786	3
2	600	3	810	845	35
3	300	2	775	837	62
4	-150	3	687	845	158
5	-450	3	764	842	78
6 ¹	-750	3	833	839	0

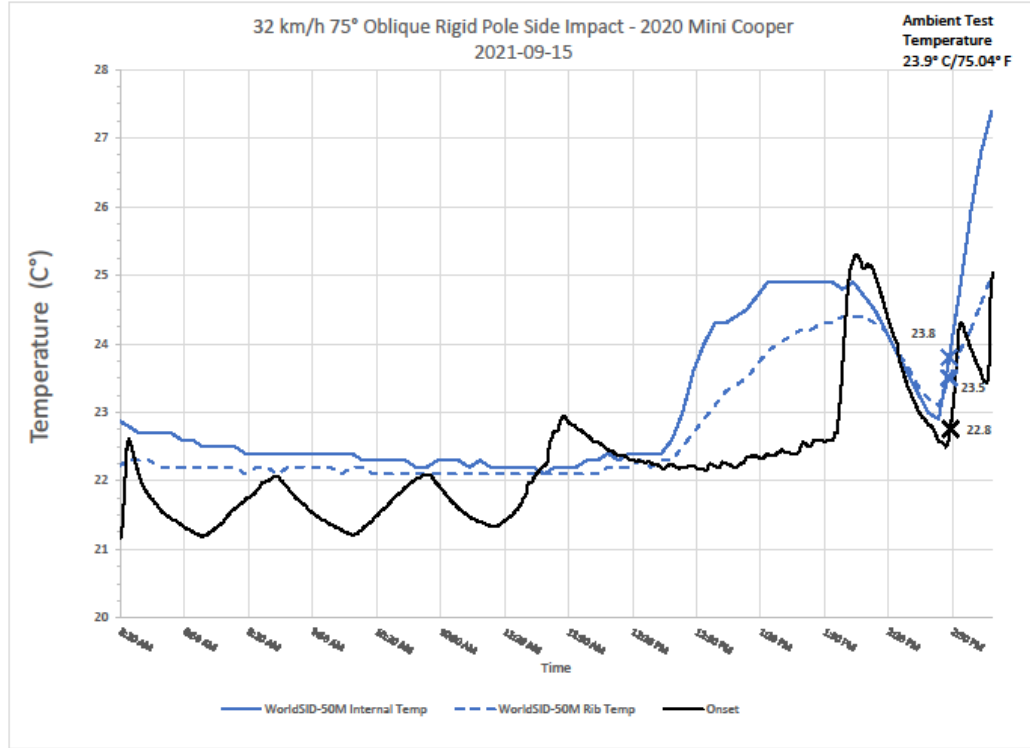
¹DPD 6 is defined as zero since it doesn't extend to the end of the vehicle

DATA SHEET NO. 12
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA
 Test Vehicle: 2019 Mini Cooper S Convertible
 Test Program: Rigid Pole Side Impact Test Date: 9/15/2021



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

Test Vehicle: 2019 Mini Cooper S Convertible
 Test Program: Rigid Pole Side Impact Test Date: 9/15/2021



APPENDIX A
PHOTOGRAPHS

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20	Post-Test Close-Up View of Impact Point Target Showing Impact Location	A-13
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62	Pre-Test Ballast View	A-36
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No. 001 As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



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



No. 003 Pre-Test Frontal View of Test Vehicle



No. 004 Post-Test Frontal View of Test Vehicle



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



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



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



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



No. 009 Pre-Test Right Rear $\frac{3}{4}$ View of Test Vehicle



No. 010 Post-Test Right Rear $\frac{3}{4}$ View of Test Vehicle



No. 011 Pre-Test Rear View of Test Vehicle



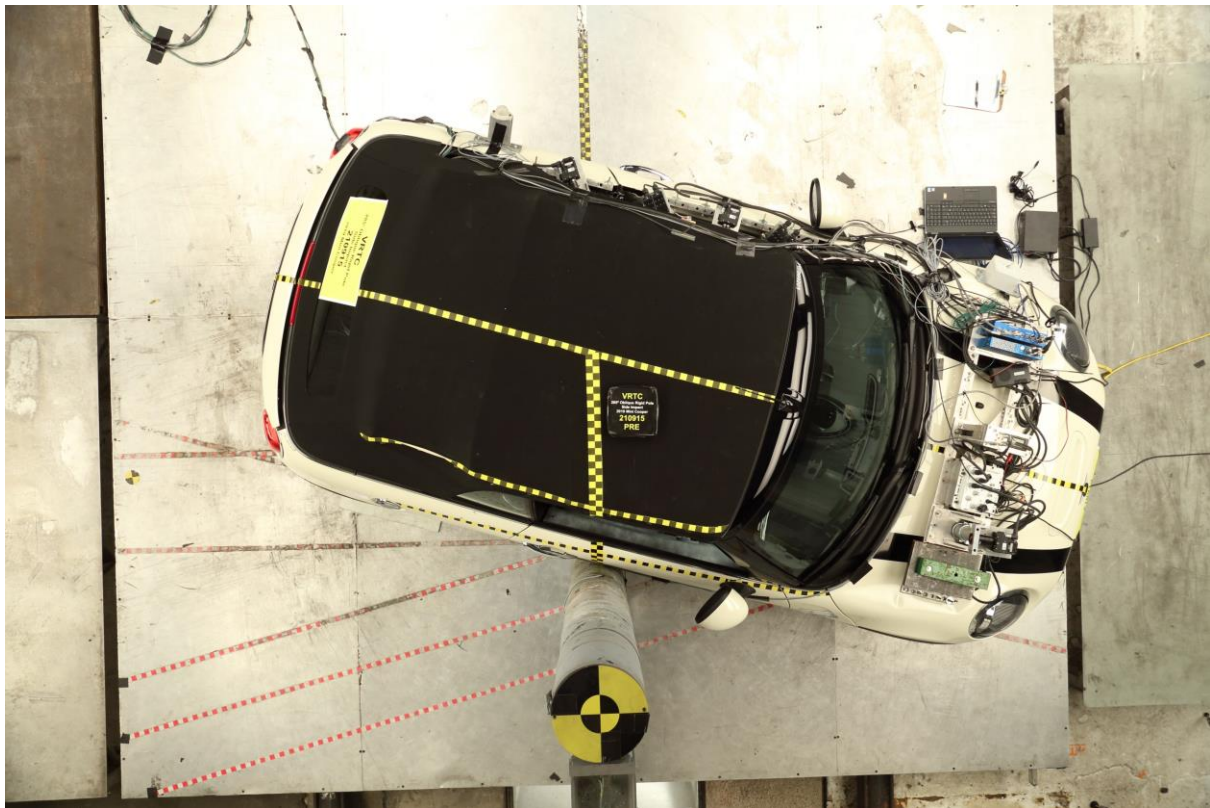
No. 012 Post-Test Rear View of Test Vehicle



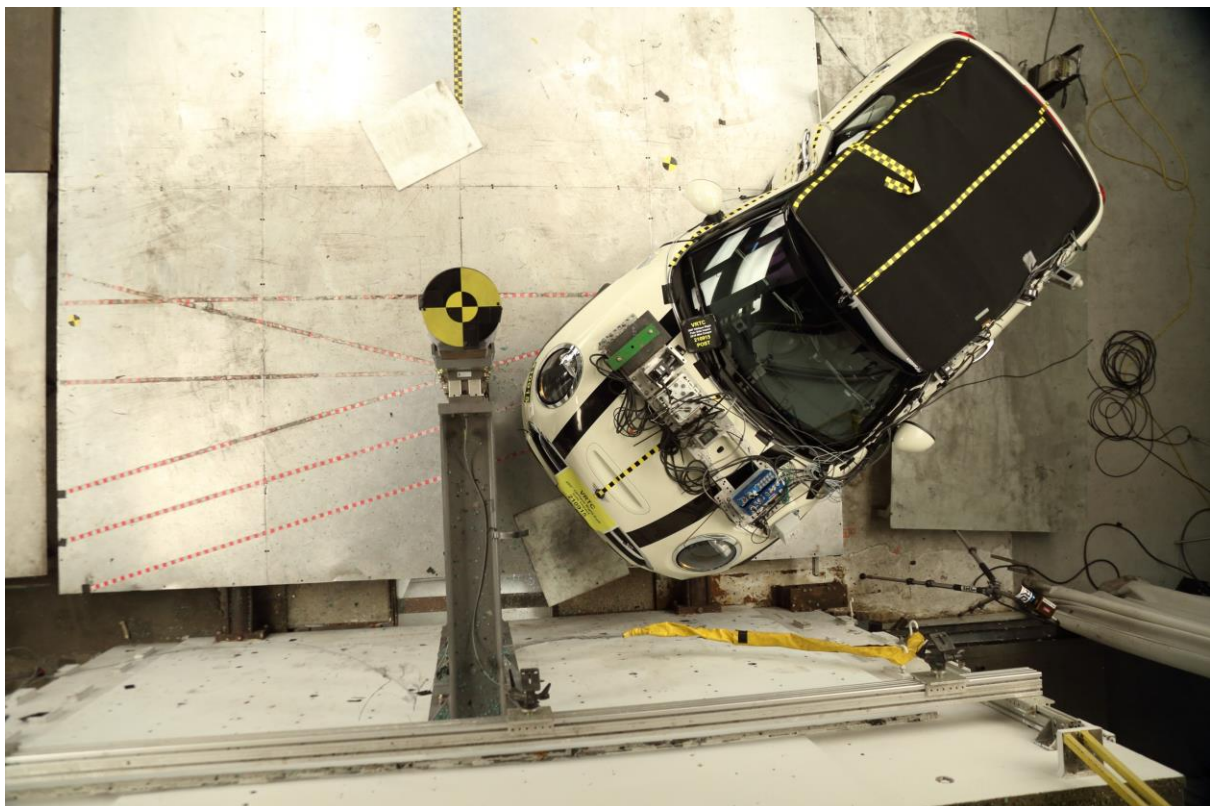
No. 013 Pre-Test Left Side View of Test Vehicle



No. 014 Post-Test Left 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

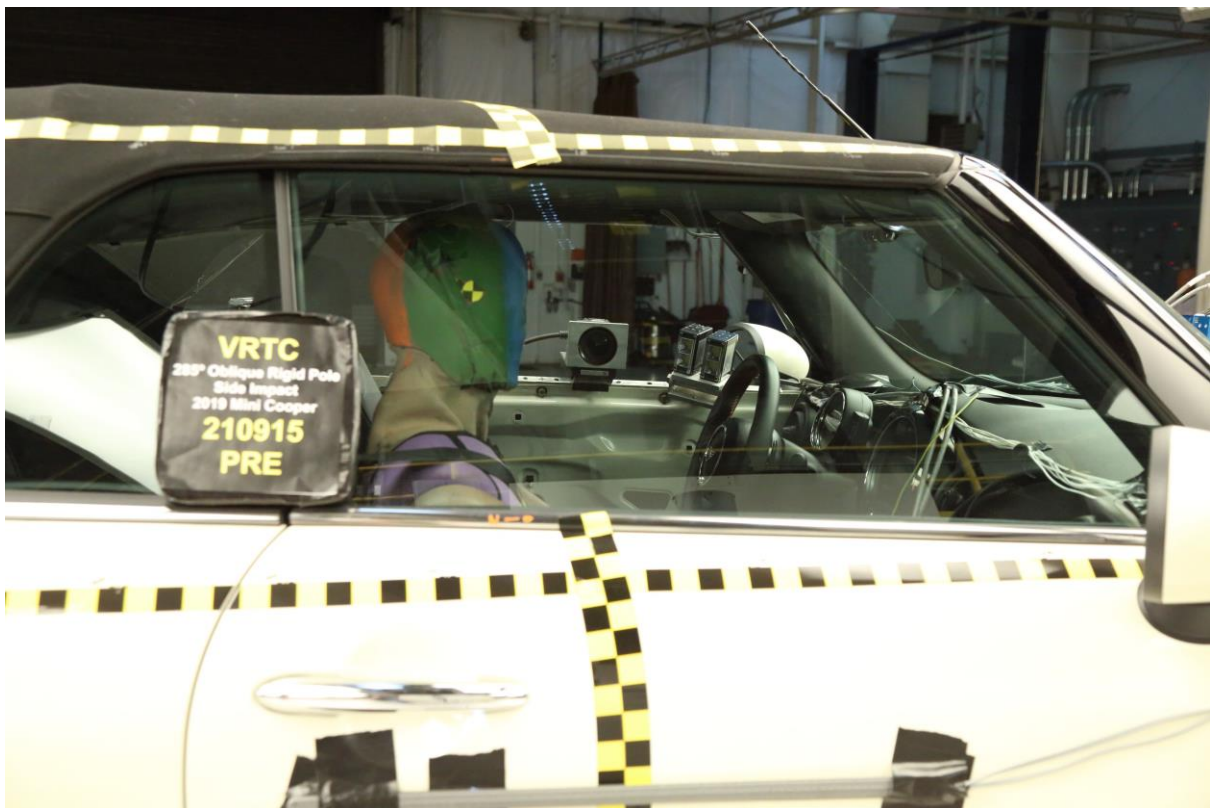


No. 022 Post-Test Front Close-Up View of Dummy



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

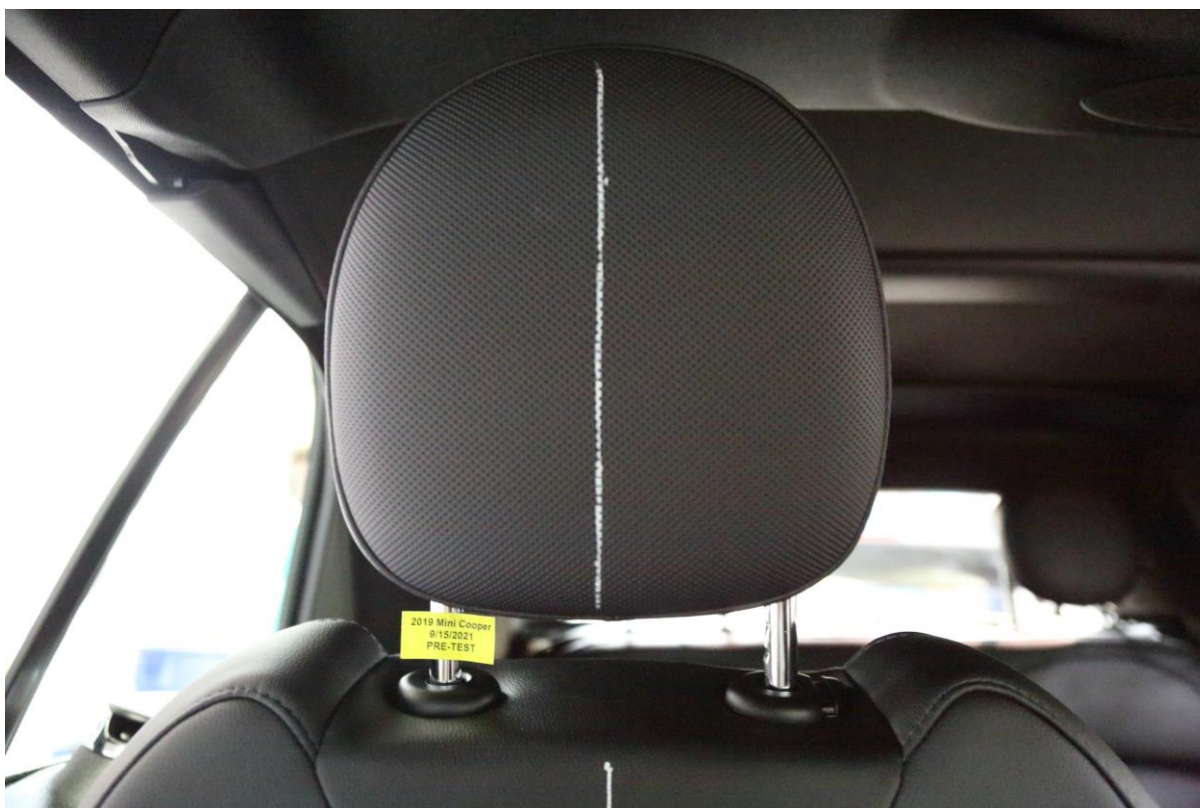
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No. 024 Pre-Test Right Side View of Dummy Shoulder and Door Top View



No. 025 Post-Test Right 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



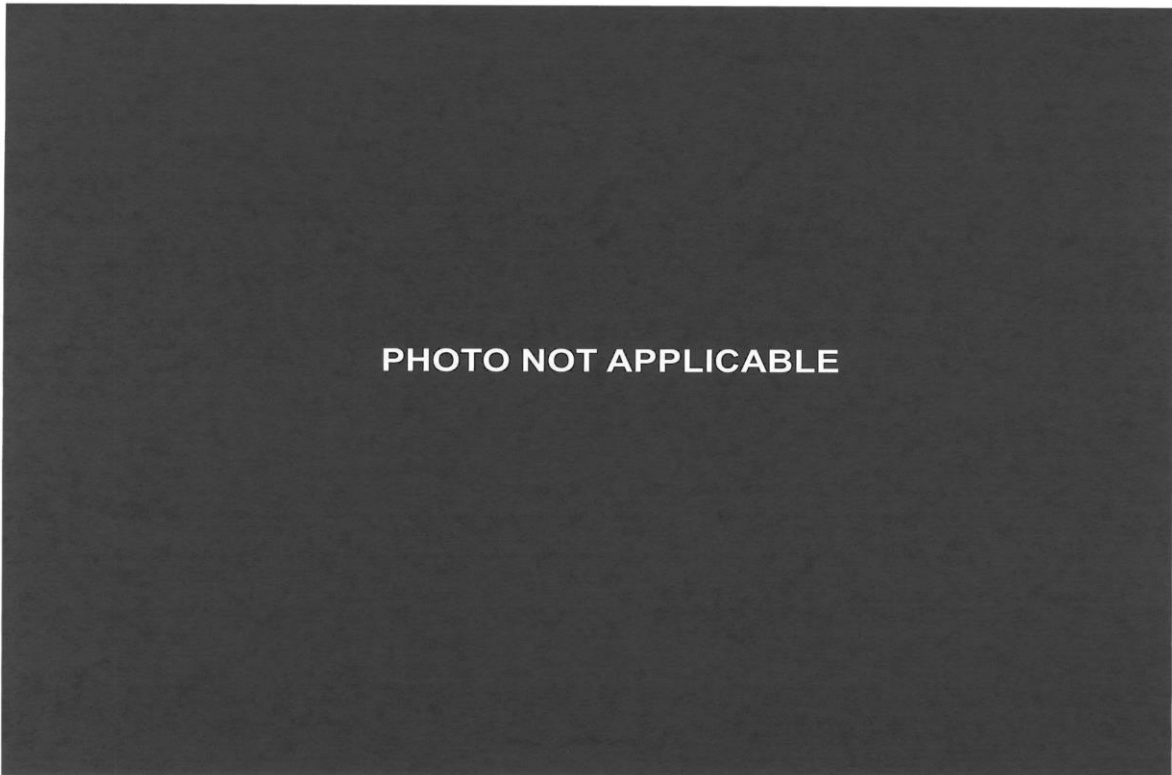
No. 028 Pre-Test Front View of Seat Pan Prior to Dummy Positioning



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



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



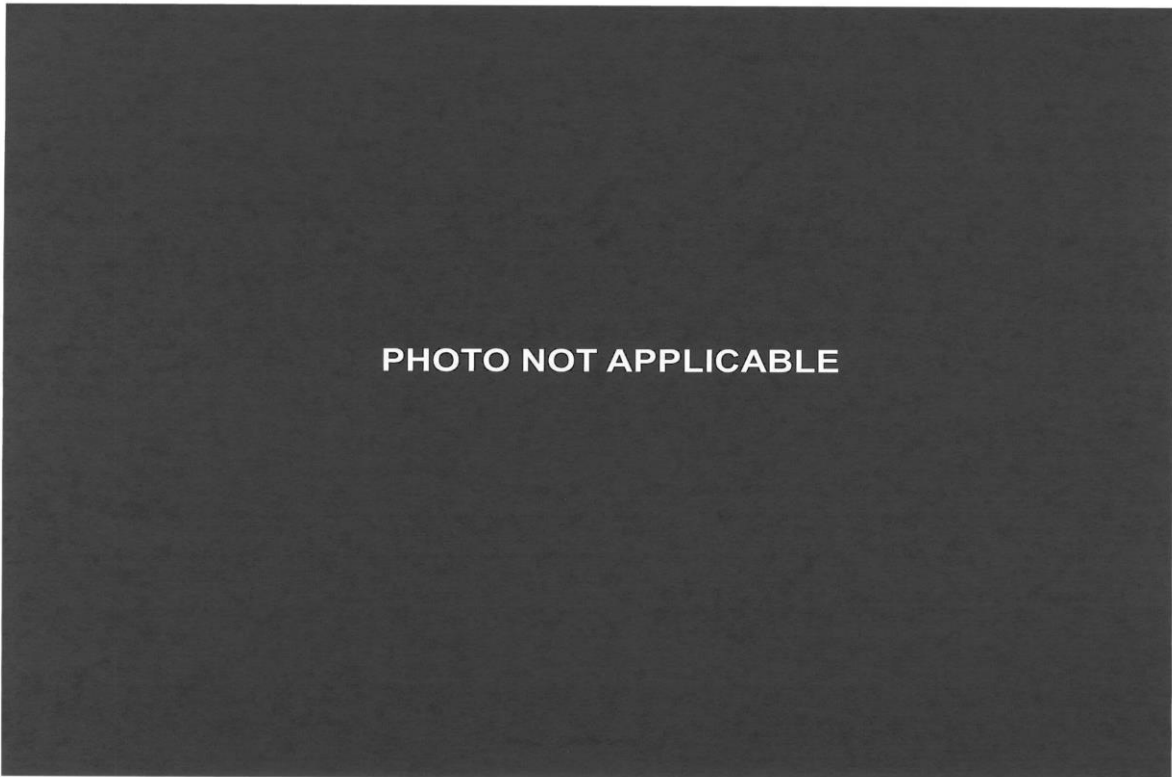
No. 031 Pre-Test Right Side View of Dummy Head Showing Dummy Head is Level



No. 032 Pre-Test Placement of Dummy Feet



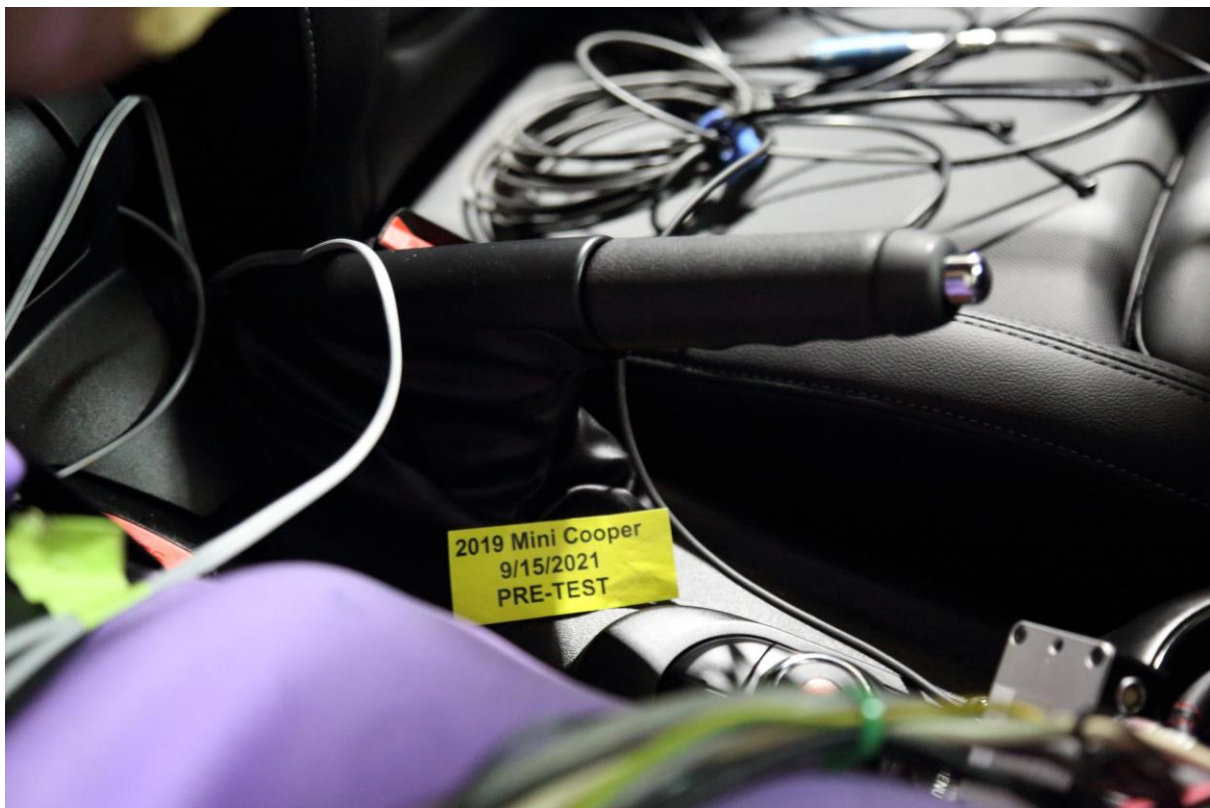
No. 033 Pre-Test View of Belt Anchorage for Dummy



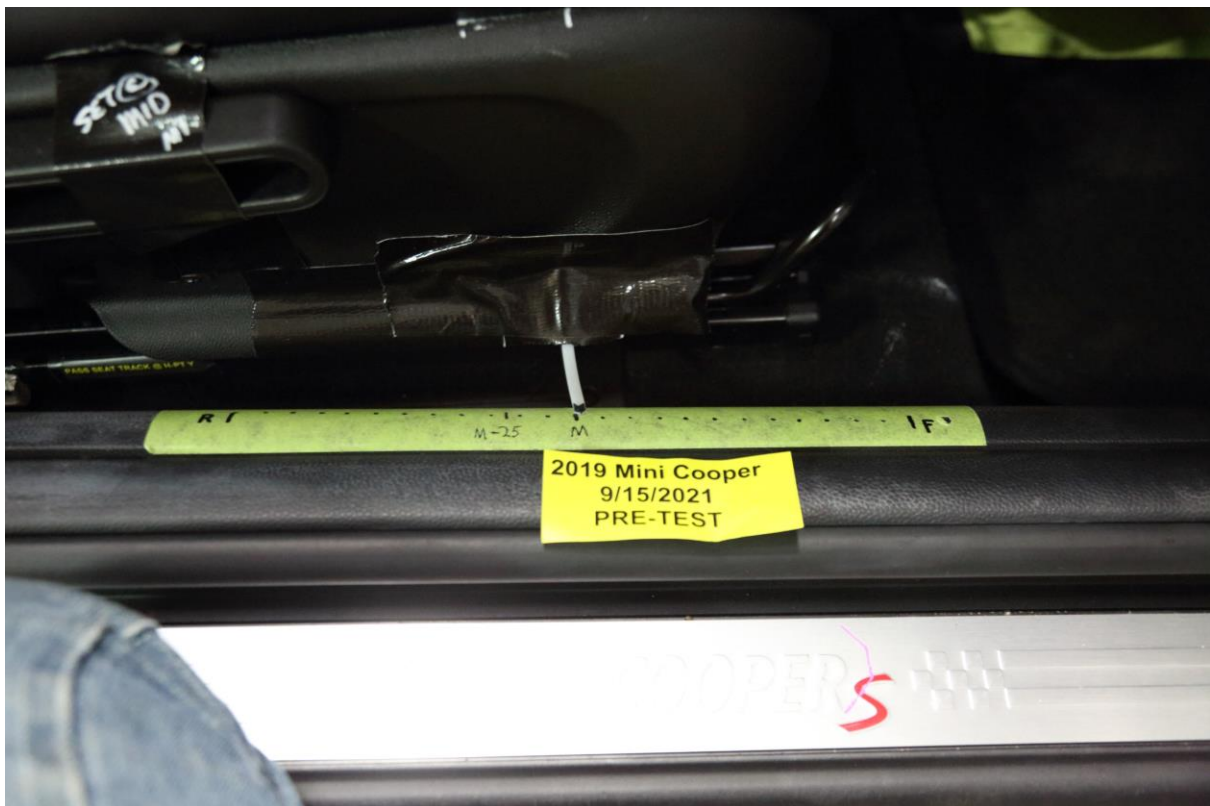
No. 034 Pre-Test Left Side View of Steering Wheel



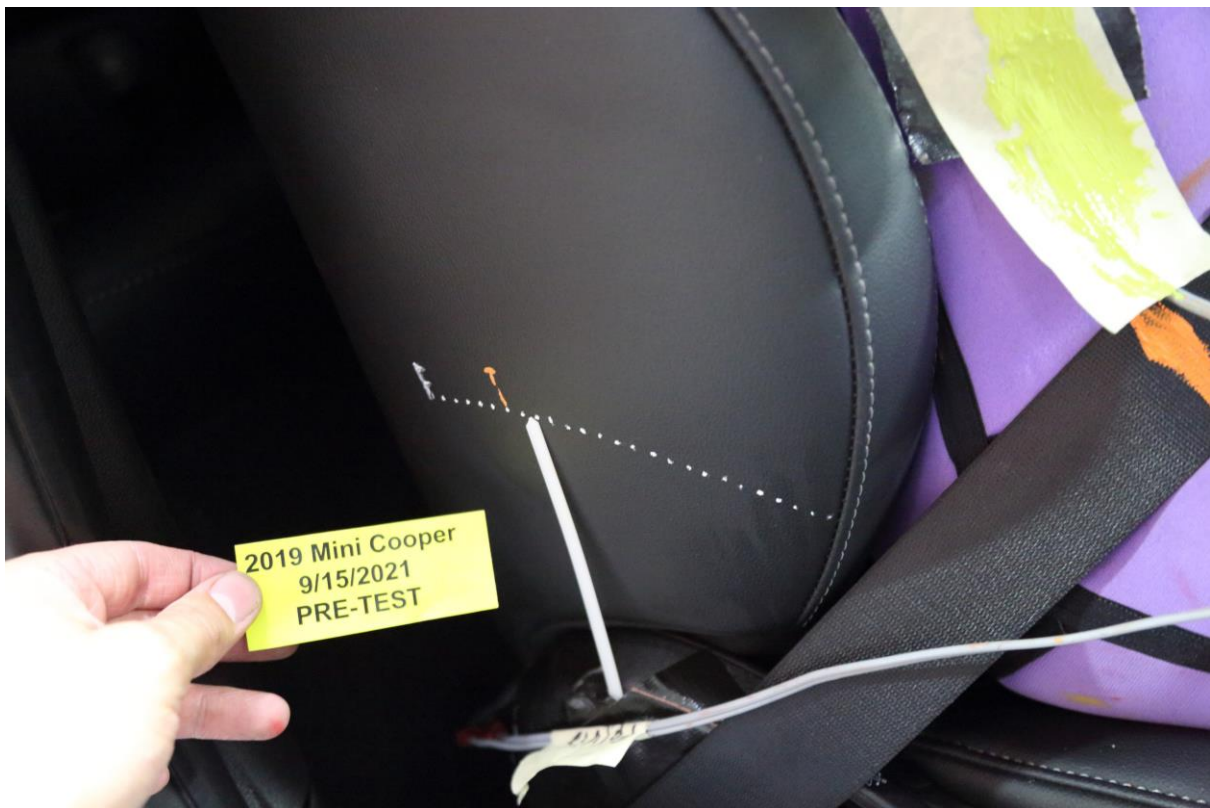
No. 035 Pre-Test View of Disengaged Parking Brake



No. 036 Pre-Test View of Parking Brake



No. 037 Pre-Test Close-Up Right Side View of Passenger Seat Track



No. 038 Pre-Test Close-Up Right Side View of Passenger Seat Back



No. 039 Pre-Test Close-Up View of Passenger 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 Left Side View of Dummy and Front Seat of Occupant Compartment



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



No. 044 Pre-Test Inner Door Panel View

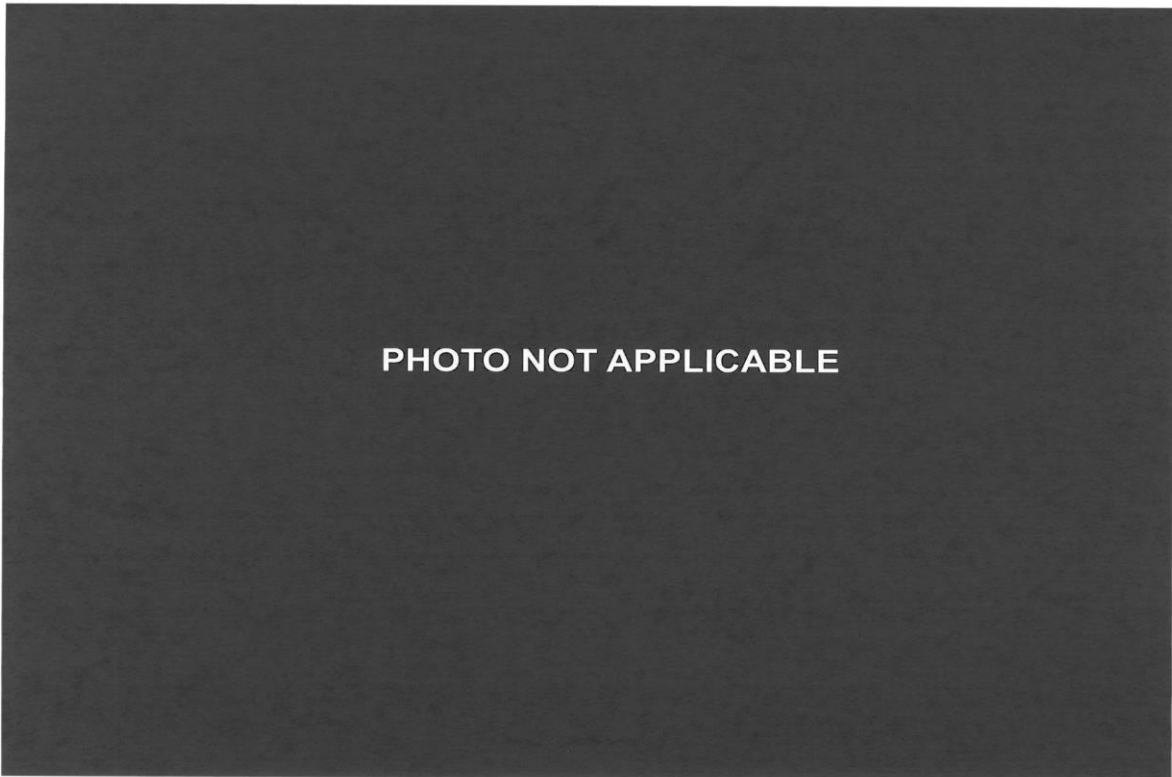


No. 045 Post-Test Inner Door Panel View Showing Dummy Contact Location



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

PHOTO NOT APPLICABLE

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 APPLICABLE

No. 053 Post-Test Left 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



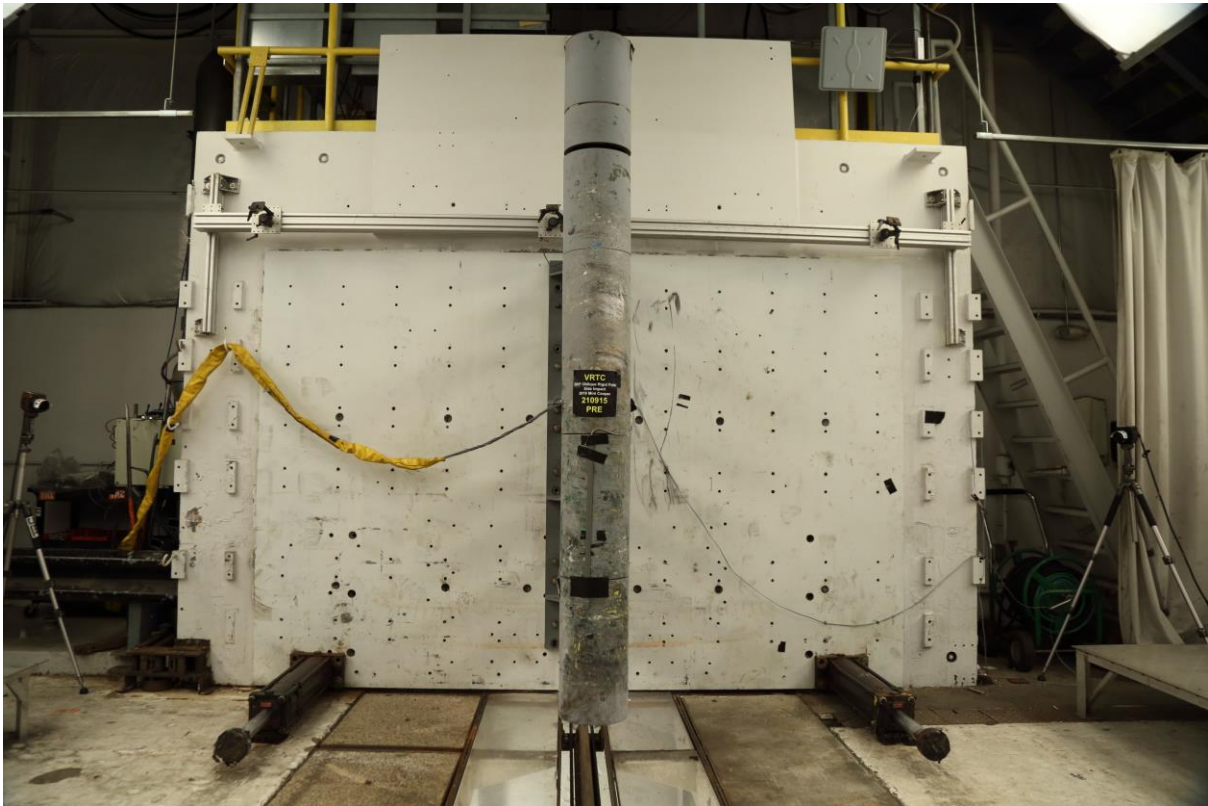
No. 055 Post-Test View of Fuel Filler Cap or Fuel Filler Neck



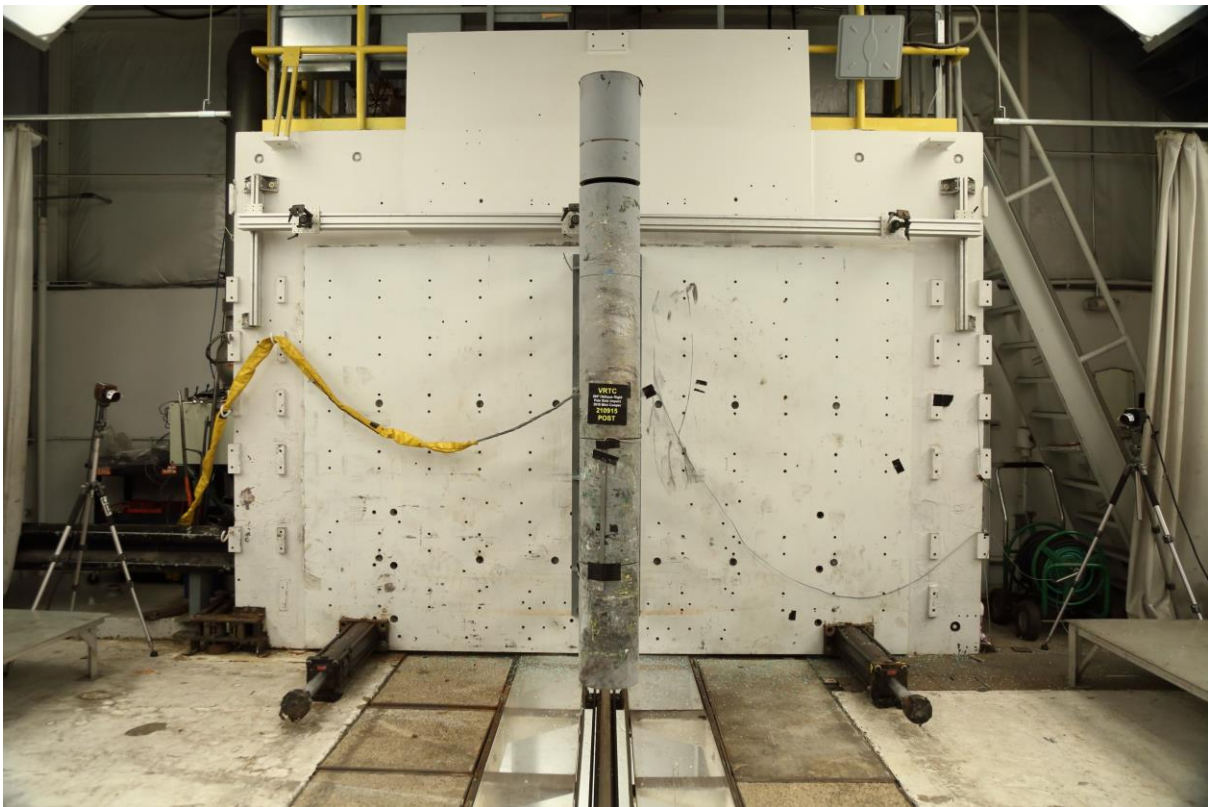
No. 056 Close-Up View of Vehicle Certification Label



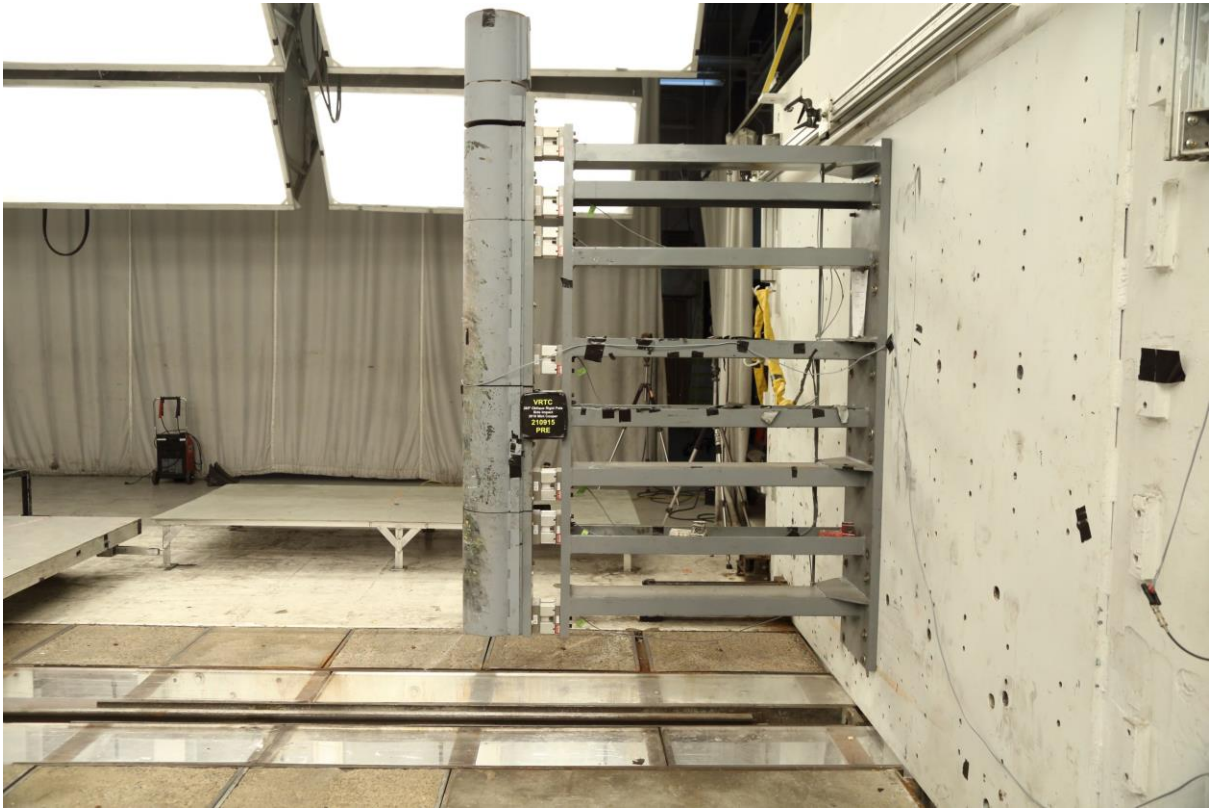
No. 057 Close-Up View of Vehicle Tire Information Placard or Label



No. 058 Pre-Test Pole Barrier Front View



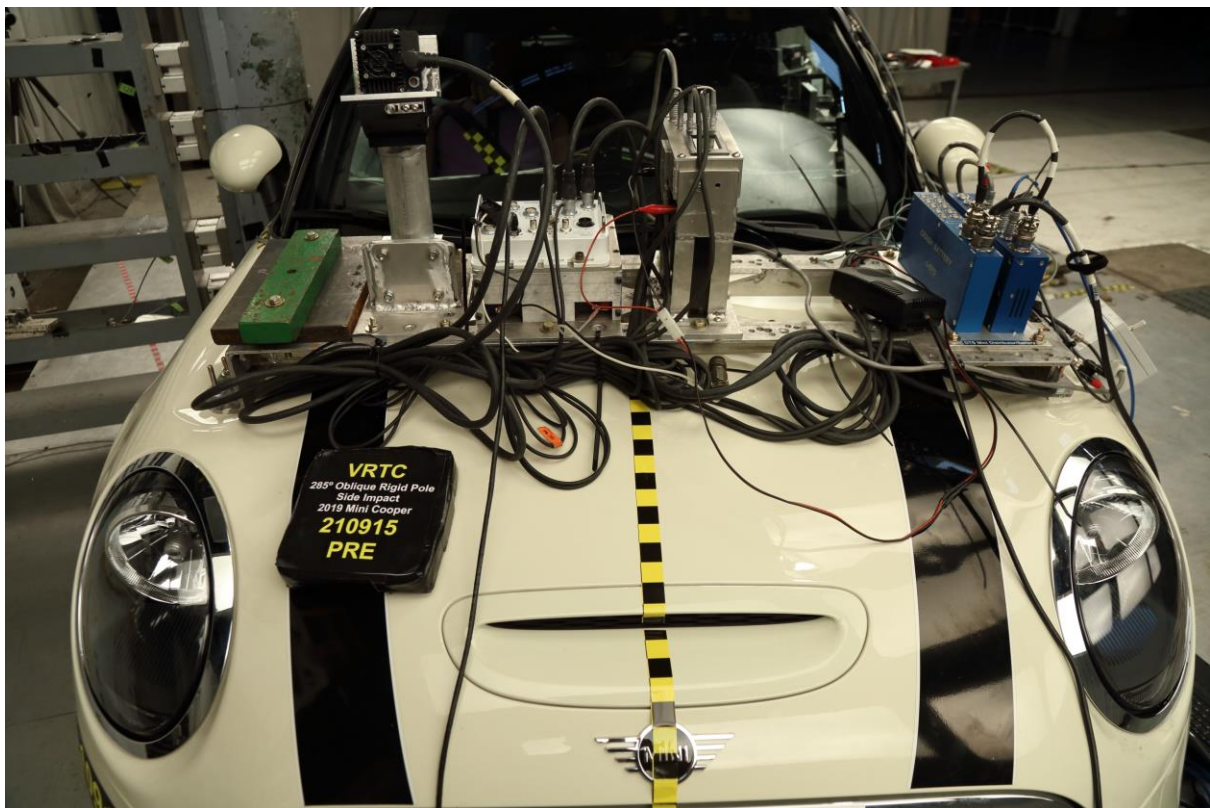
No. 059 Post-Test Pole Barrier Front View



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

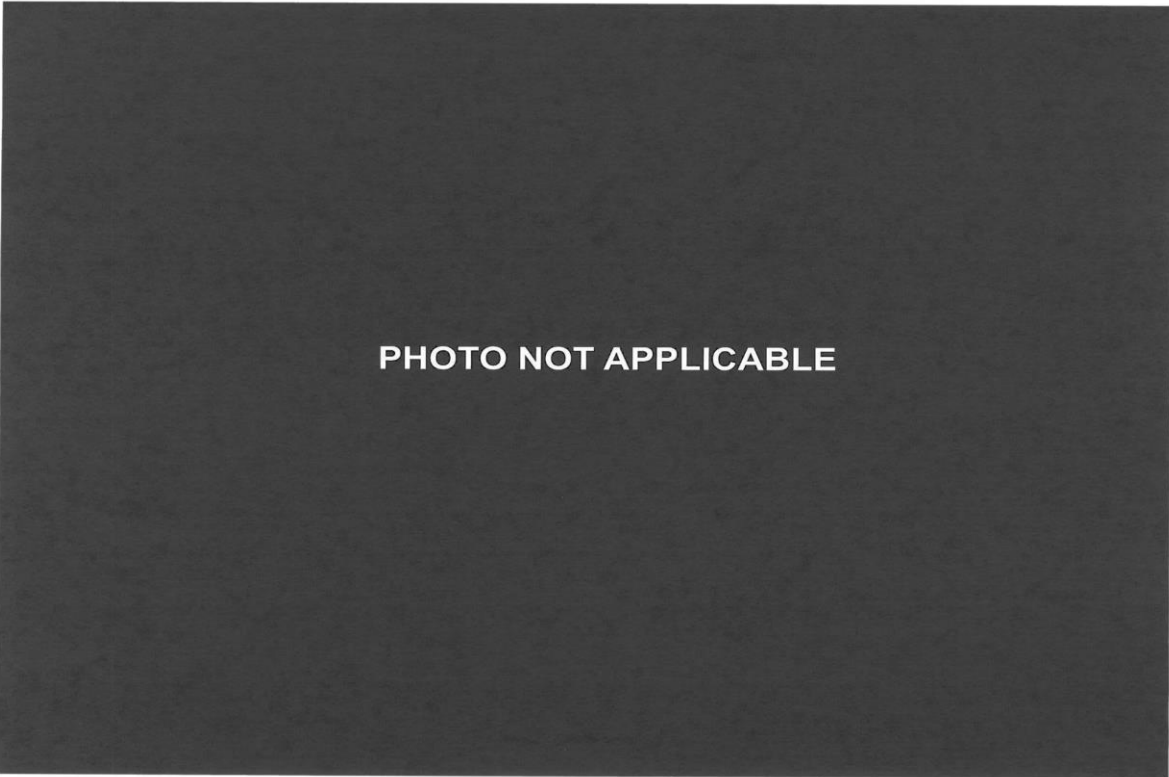


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No. 064 FMVSS No. 301 Static Rollover 0 Degrees

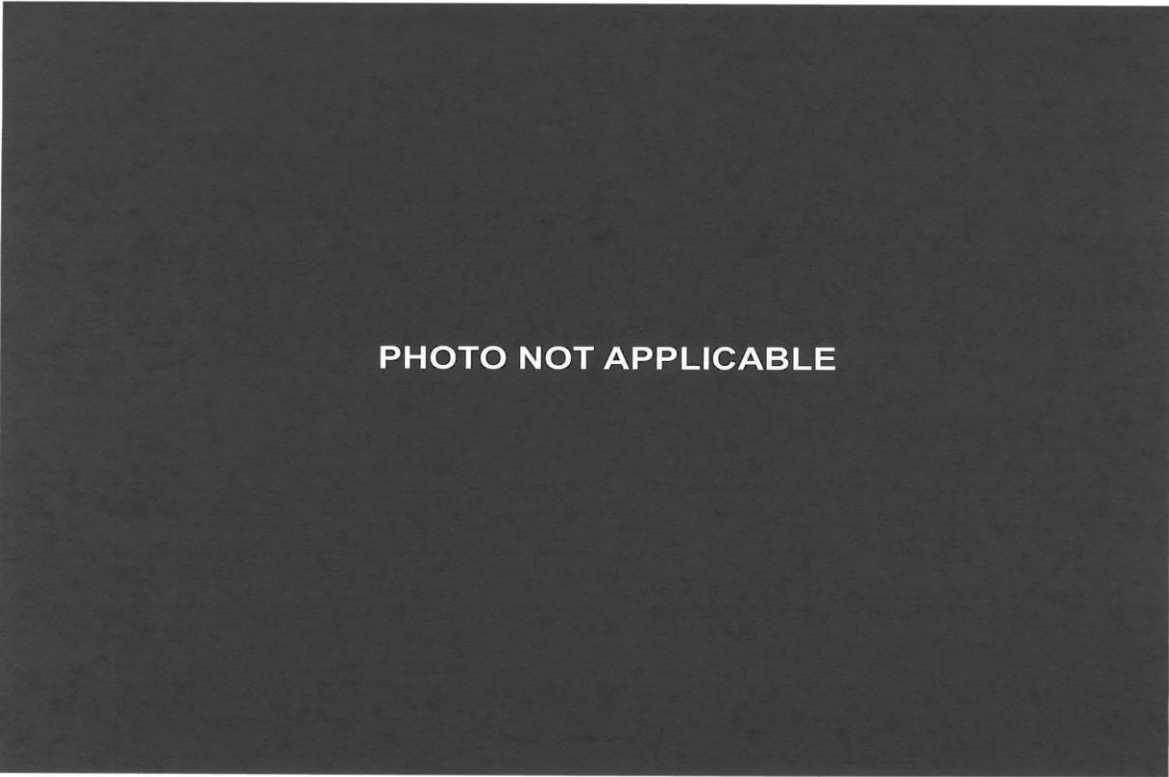


PHOTO NOT APPLICABLE

No. 065 FMVSS No. 301 Static Rollover 90 Degrees

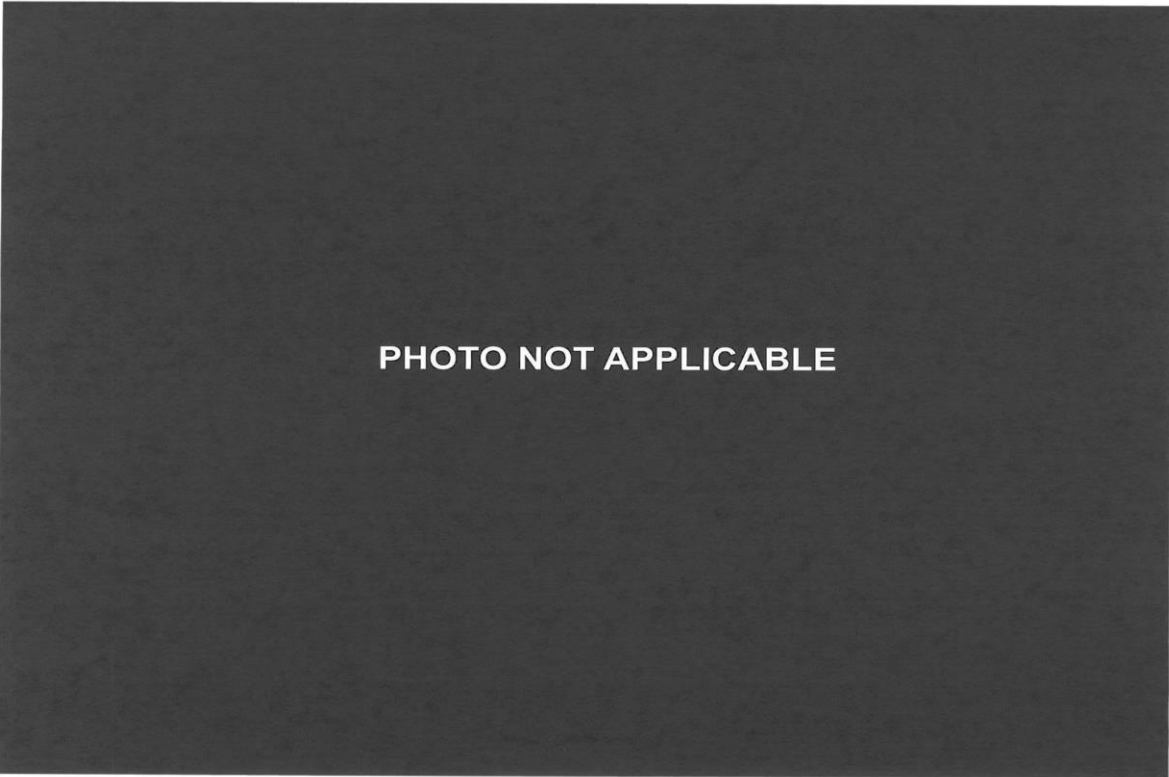


PHOTO NOT APPLICABLE

No. 066 FMVSS No. 301 Static Rollover 180 Degrees

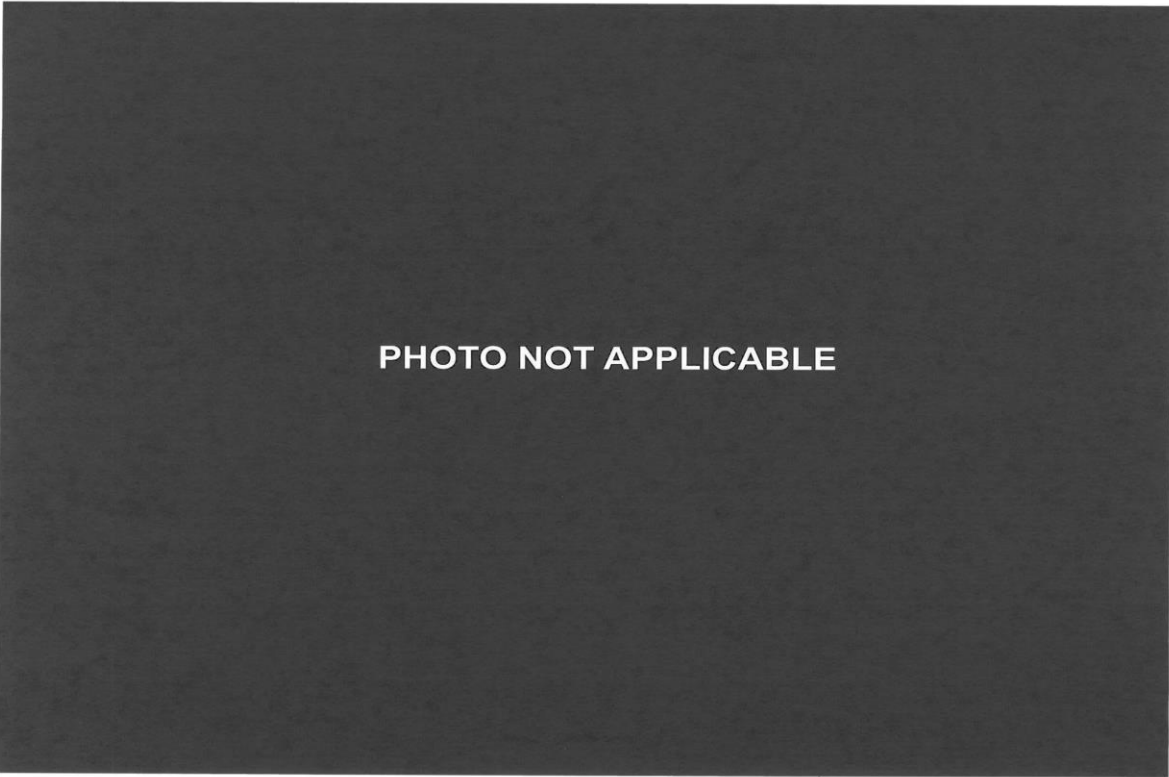


PHOTO NOT APPLICABLE

No. 067 FMVSS No. 301 Static Rollover 270 Degrees

PHOTO NOT APPLICABLE

No. 068 FMVSS No. 301 Static Rollover 360 Degrees



No. 069 Impact Event

PHOTO NOT APPLICABLE

No. 70 Monroney Label

CONTROLS

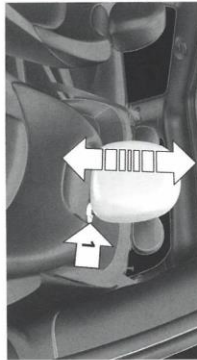
Seats, mirrors, and steering wheel

- Only use accessories that have been determined to be safe for attachment to a head restraint.
- Do not use any accessories, for instance pillows, while driving.

Adjusting the height: John Cooper Works sport seat

The height of the head restraints cannot be adjusted.

Adjusting the height



- To lower: press the button, arrow 1, and push the head restraint down.
- To raise: push the head restraint up.

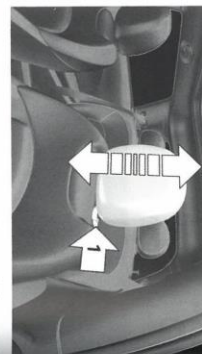
After setting the height, move the head restraint up or down slightly, making sure it engages properly.

Removing: John Cooper Works sport seat

The head restraints cannot be removed.

Removing

Only remove the head restraint if no one will be sitting in the seat in question.



1. Fold the seat backrest forward if needed.
2. Pull head restraint up as far as possible.
3. Press the button, arrow 1, and pull the head restraint out completely.

Installing

Proceed in the reverse order to install the head restraint.

Rear head restraints

Safety information

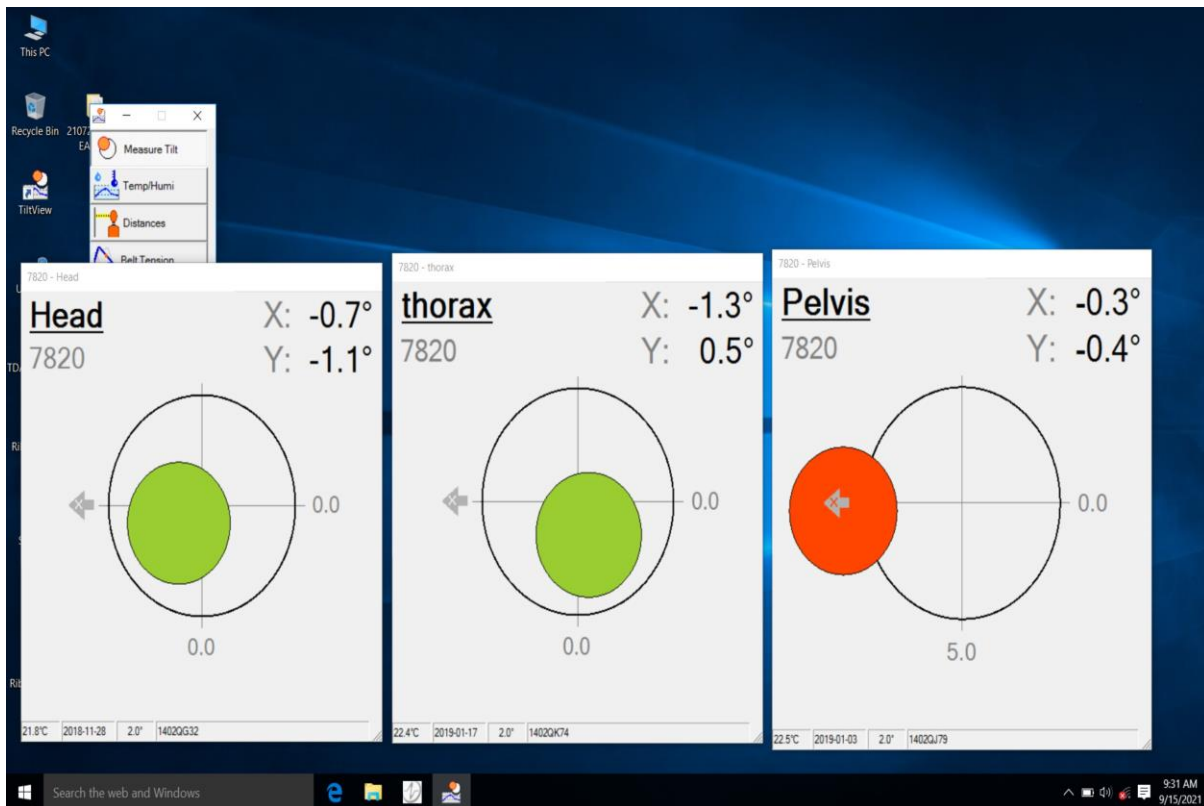
WARNING

A missing protective effect due to removed or not correctly adjusted head restraints can cause injuries in the head and neck area. There is a risk of injury.

- Before driving, install the removed head restraints on the occupied seats.
- Adjust the head restraint so its center supports the back of the head at as close to eye level as possible.
- Adjust the distance so that the head restraint is as close as possible to the back of the head. Adjust the distance via the backrest tilt as needed.

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

Passenger Dummy & Vehicle Instrumentation Plots

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2	Passenger Head Acceleration (Y)	B-8
3	Passenger Head Acceleration (Z)	B-8
4	Passenger Head Resultant Acceleration	B-8
5	Passenger Head Angular Rate (X)	B-9
6	Passenger Head Angular Rate (Y)	B-9
7	Passenger Head Angular Rate (Z)	B-9
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9	Passenger Upper Neck Force (Y)	B-10
10	Passenger Upper Neck Force (Z)	B-10
11	Passenger Upper Neck Moment (X)	B-11
12	Passenger Upper Neck Moment (Y)	B-11
13	Passenger Upper Neck Moment (Z)	B-11
14	Passenger Lower Neck Force (X)	B-12
15	Passenger Lower Neck Force (Y)	B-12
16	Passenger Lower Neck Force (Z)	B-12
17	Passenger Lower Neck Moment (X)	B-13
18	Passenger Lower Neck Moment (Y)	B-13
19	Passenger Lower Neck Moment (Z)	B-13
20	Passenger Shoulder Force (X)	B-14
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25	Passenger Shoulder Rear Displacement (Z)	B-15
26	Passenger Shoulder Rear Length Change	B-15
27	Passenger Shoulder Middle Displacement (X)	B-16
28	Passenger Shoulder Middle Displacement (Y)	B-16
29	Passenger Shoulder Middle Displacement (Z)	B-16
30	Passenger Shoulder Middle Length Change	B-16
31	Passenger Shoulder Front Displacement (X)	B-17
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34	Passenger Shoulder Front Length Change	B-17

TABLE OF DATA PLOTS, CONTINUED

Passenger Dummy & Vehicle Instrumentation Plots

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37	Passenger Thorax Rib 1 Rear Displacement (Z)	B-18
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49	Passenger Thorax Rib 2 Rear Displacement (Z)	B-21
50	Passenger Thorax Rib 2 Rear Length Change	B-21
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52	Passenger Thorax Rib 2 Middle Displacement (Y)	B-22
53	Passenger Thorax Rib 2 Middle Displacement (Z)	B-22
54	Passenger Thorax Rib 2 Middle Length Change	B-22
55	Passenger Thorax Rib 2 Front Displacement (X)	B-23
56	Passenger Thorax Rib 2 Front Displacement (Y)	B-23
57	Passenger Thorax Rib 2 Front Displacement (Z)	B-23
58	Passenger Thorax Rib 2 Front Length Change	B-23
59	Passenger Thorax Rib 3 Rear Displacement (X)	B-24
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Passenger Dummy & Vehicle Instrumentation Plots

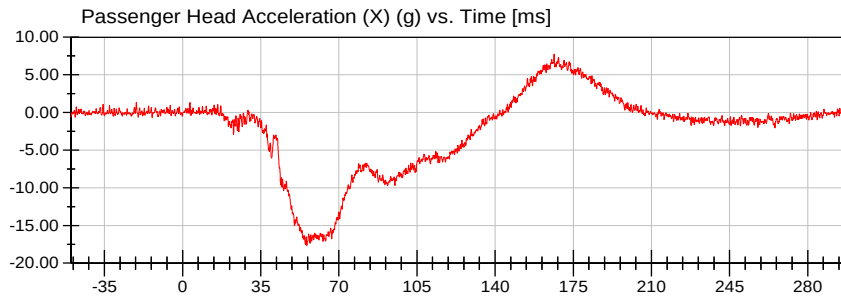
No.	Description	Page
168	Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)	B-55
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VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



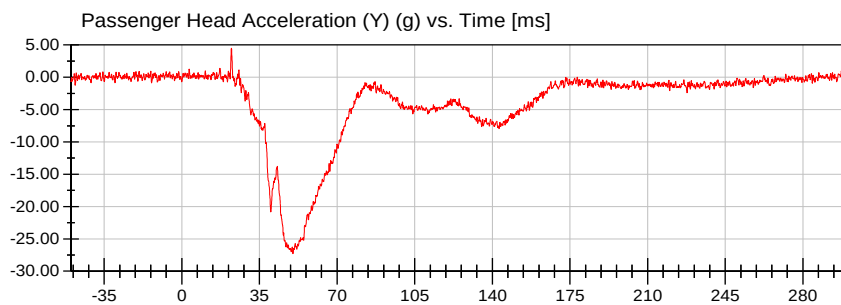
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7.75 g at 166.40 ms

<Min>

-17.65 g at 55.70 ms

CFC_1000



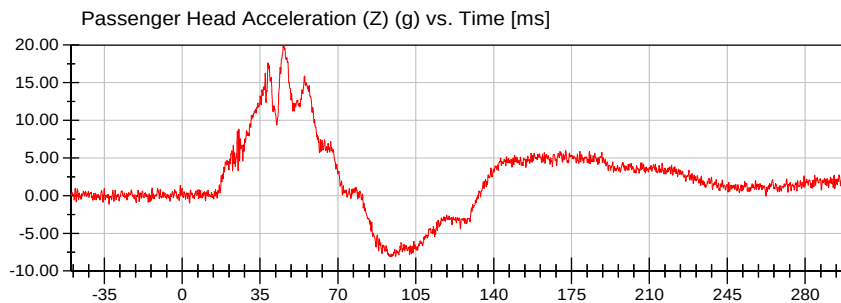
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4.52 g at 22.35 ms

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-27.31 g at 50.15 ms

CFC_1000



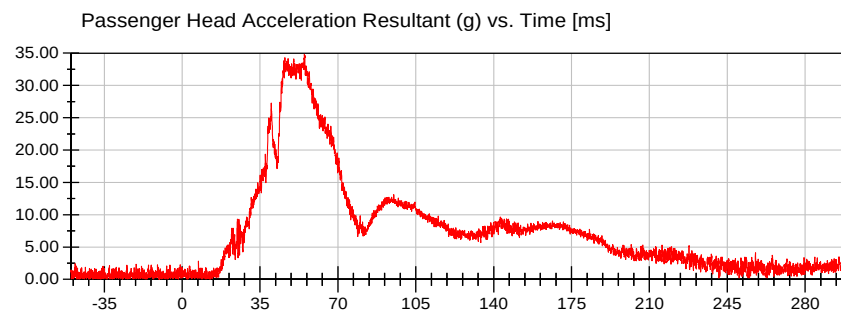
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19.87 g at 45.70 ms

<Min>

-8.12 g at 94.20 ms

CFC_1000



<Max>

34.81 g at 54.95 ms

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0.04 g at -10.35 ms

Prefiltered_> CFC 1000

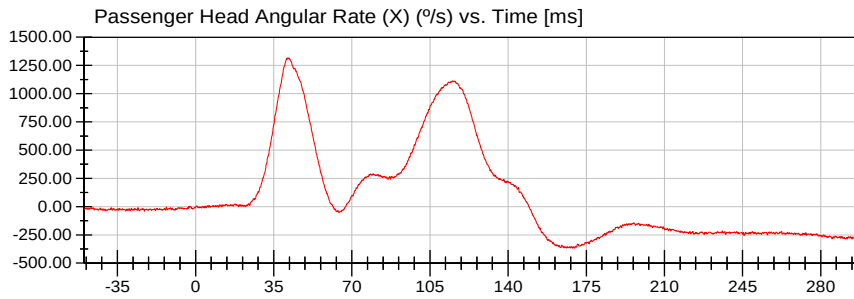


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



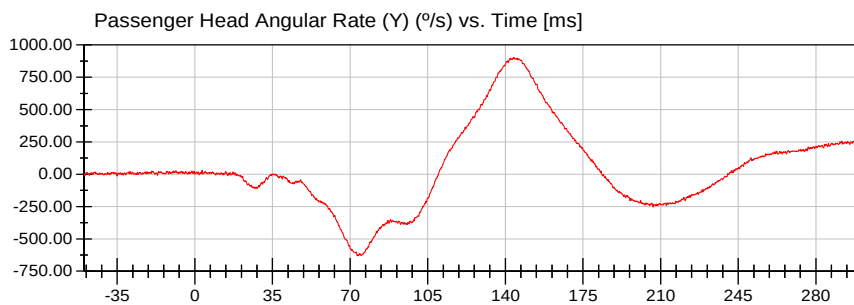
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-368.35 °/s at 168.95 ms

CFC_1000



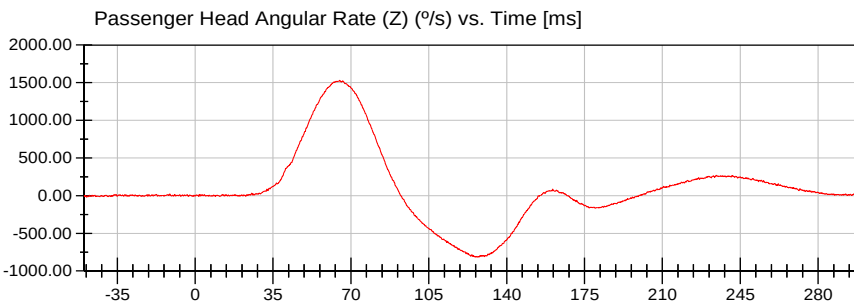
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903.30 °/s at 143.95 ms

<Min>

-631.74 °/s at 73.20 ms

CFC_1000



<Max>

1,533.22 °/s at 64.95 ms

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-817.05 °/s at 125.85 ms

CFC_1000

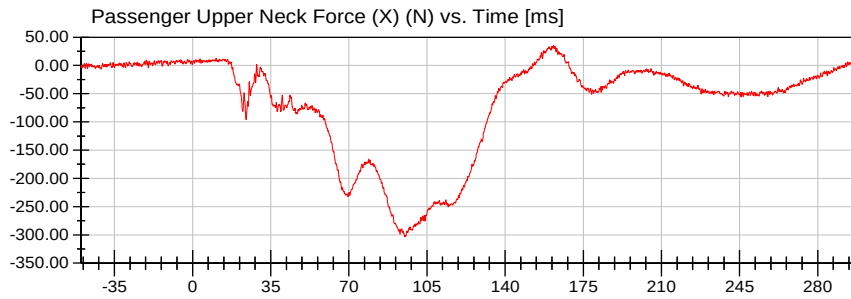


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



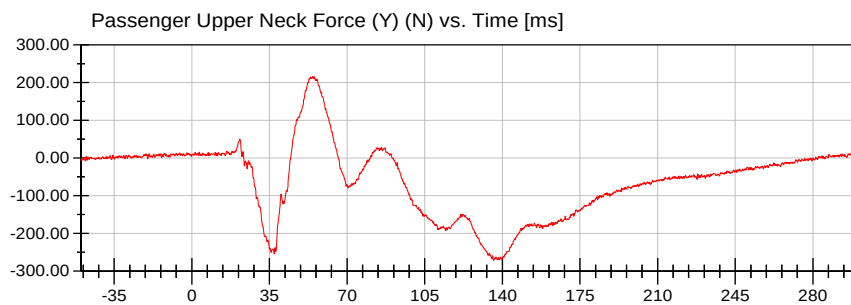
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35.26 N at 161.65 ms

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-303.50 N at 95.10 ms

CFC_1000



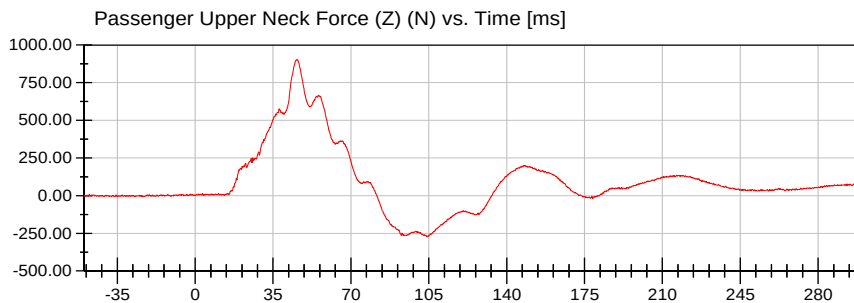
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216.27 N at 54.60 ms

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-270.31 N at 136.00 ms

CFC_1000



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903.02 N at 45.95 ms

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-272.85 N at 104.10 ms

CFC_1000

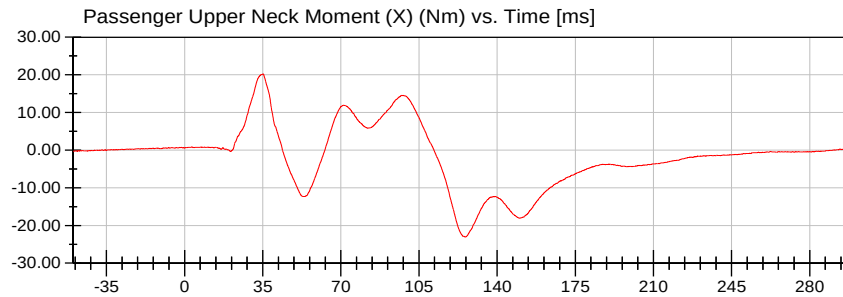


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



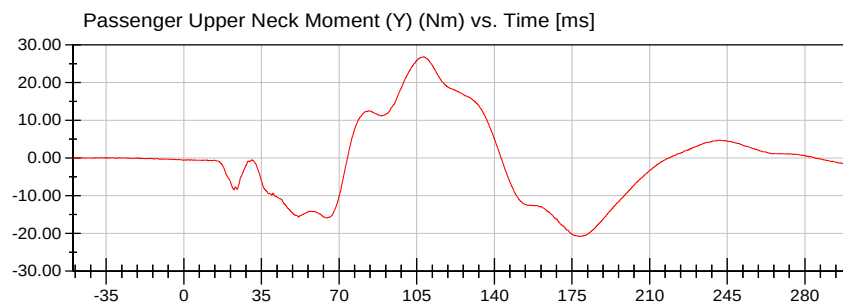
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-23.08 Nm at 125.80 ms

CFC_600



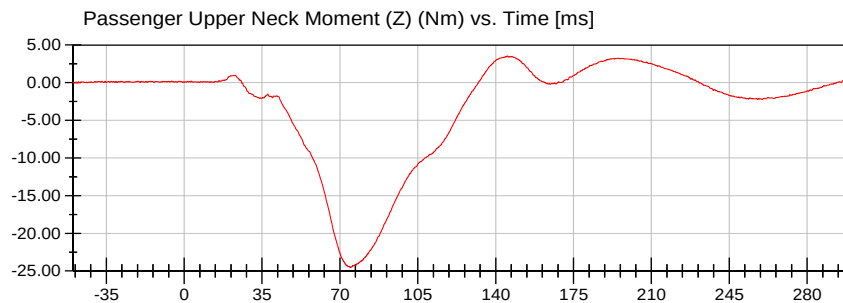
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26.85 Nm at 108.05 ms

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-20.82 Nm at 178.75 ms

CFC_600



<Max>

3.55 Nm at 145.30 ms

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-24.51 Nm at 74.80 ms

CFC_600

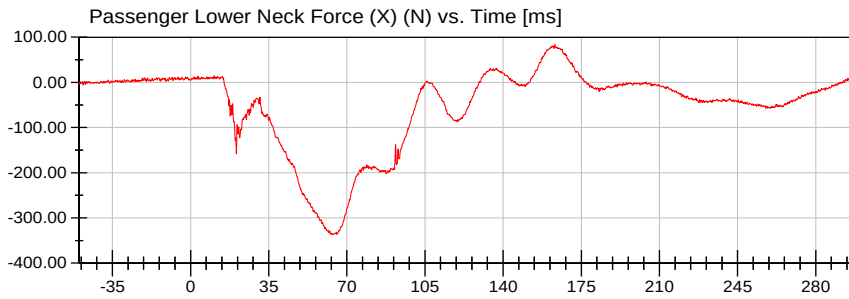


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



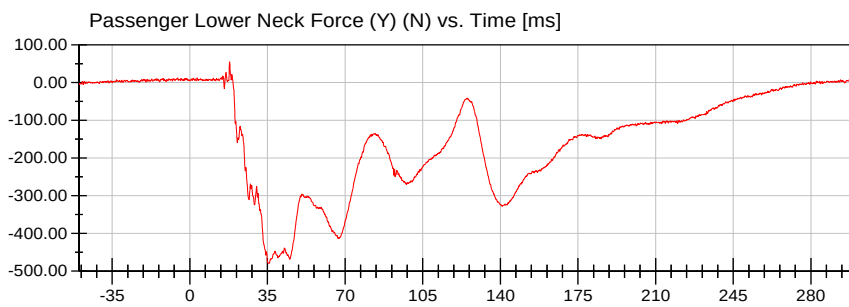
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83.30 N at 163.15 ms

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-337.00 N at 63.50 ms

CFC_1000



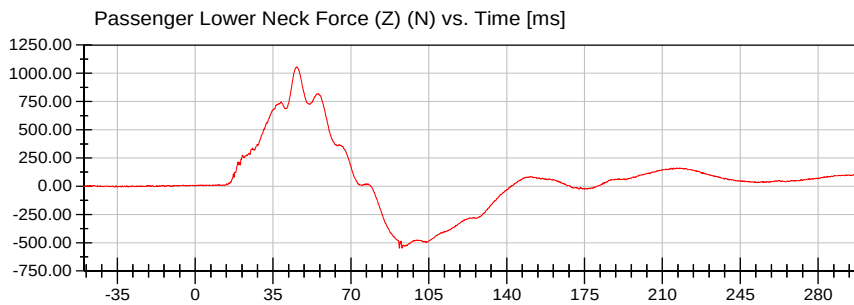
<Max>

55.28 N at 17.95 ms

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-478.62 N at 35.85 ms

CFC_1000



<Max>

1,055.52 N at 45.85 ms

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-548.49 N at 91.80 ms

CFC_1000

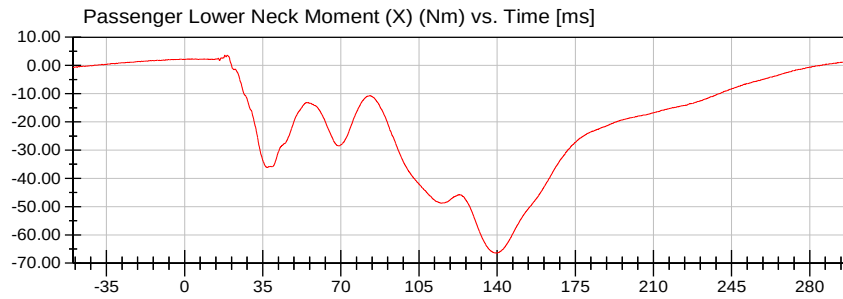


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



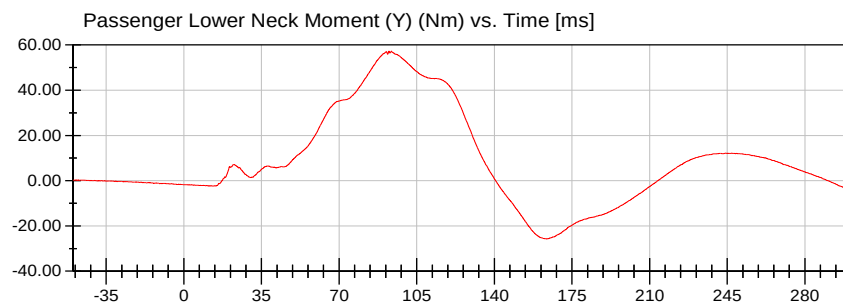
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3.62 Nm at 18.00 ms

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-66.43 Nm at 139.75 ms

CFC_600



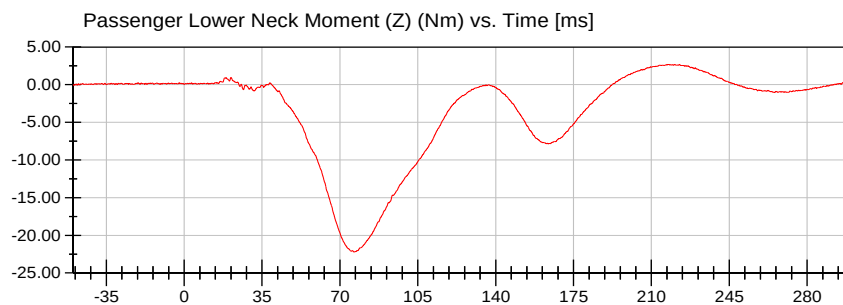
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57.19 Nm at 93.60 ms

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-25.73 Nm at 163.60 ms

CFC_600



<Max>

2.68 Nm at 217.50 ms

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-22.22 Nm at 76.35 ms

CFC_600

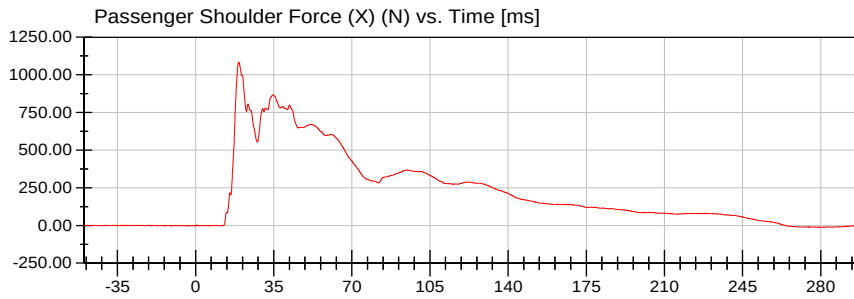


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



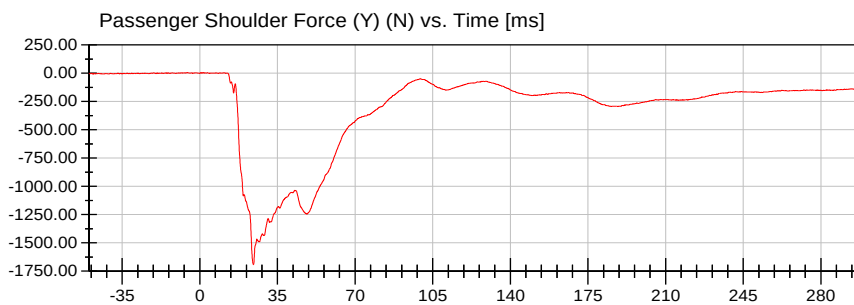
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1,083.49 N at 19.40 ms

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-12.60 N at 277.90 ms

CFC_600



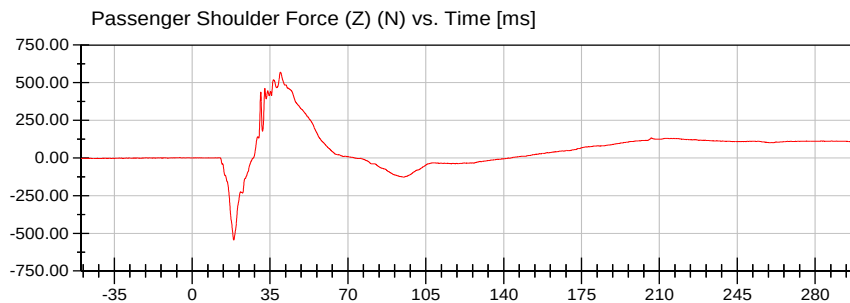
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5.50 N at -5.60 ms

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-1,692.90 N at 24.20 ms

CFC_600



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569.67 N at 39.70 ms

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-544.31 N at 18.70 ms

CFC_600

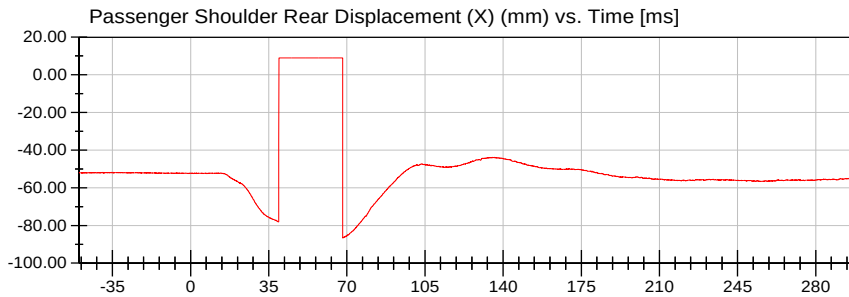


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



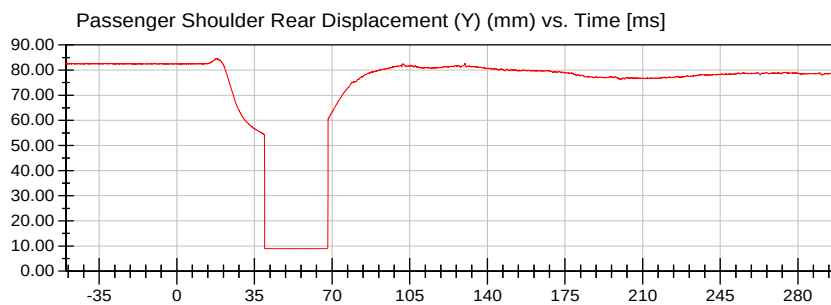
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9.00 mm at 39.60 ms

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-86.72 mm at 68.20 ms

Unfiltered



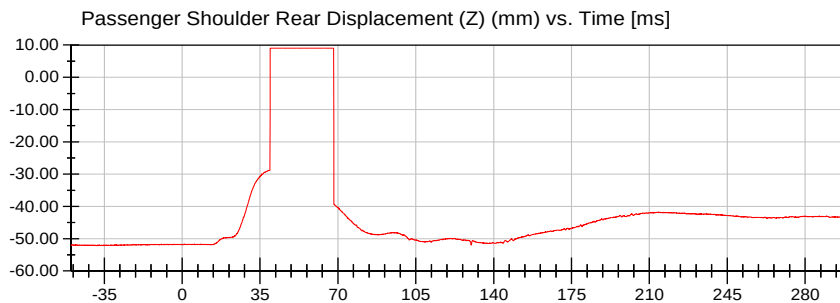
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84.56 mm at 17.60 ms

<Min>

9.00 mm at 39.60 ms

Unfiltered



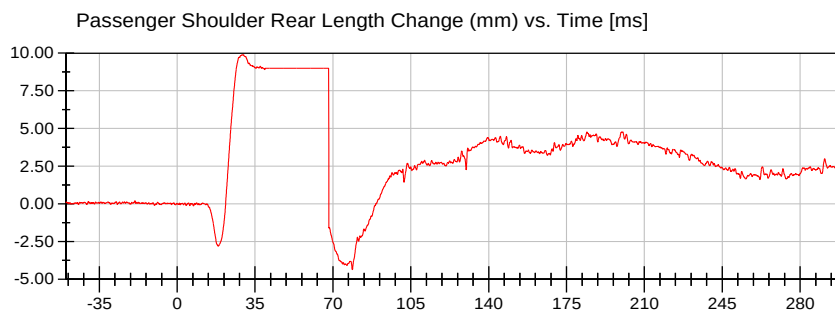
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9.00 mm at 39.60 ms

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-52.15 mm at -41.60 ms

Unfiltered



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9.89 mm at 29.30 ms

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-4.35 mm at 78.70 ms

CFC_600

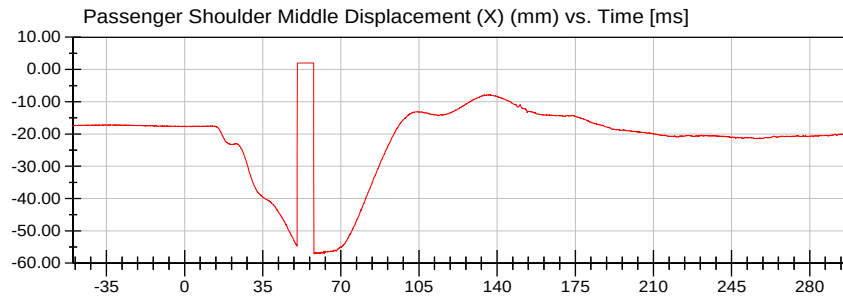


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



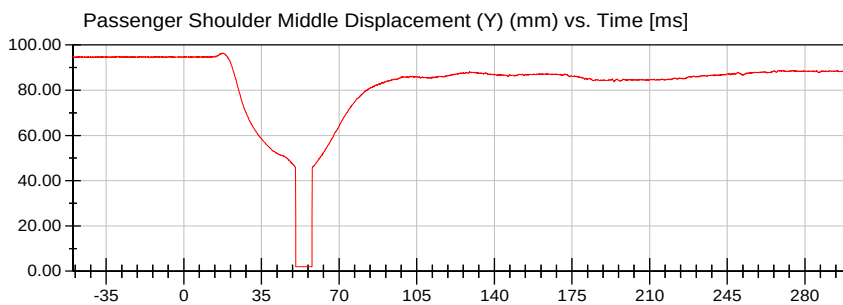
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-57.20 mm at 58.10 ms

Unfiltered



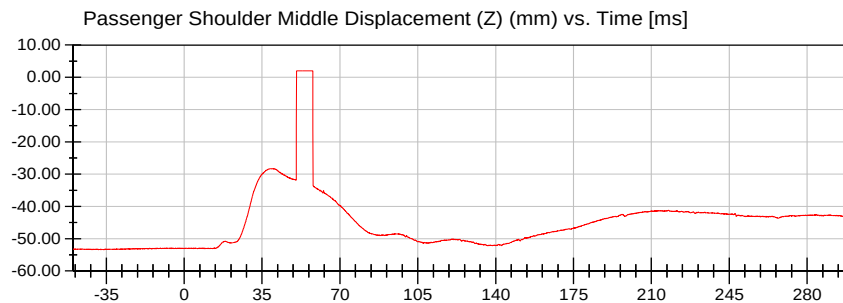
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96.44 mm at 17.60 ms

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2.00 mm at 50.50 ms

Unfiltered



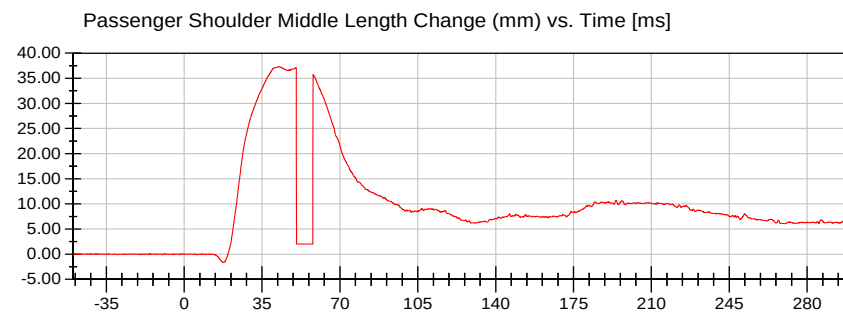
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2.00 mm at 50.50 ms

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-53.39 mm at -41.50 ms

Unfiltered



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37.31 mm at 42.30 ms

<Min>

-1.64 mm at 17.60 ms

CFC_600

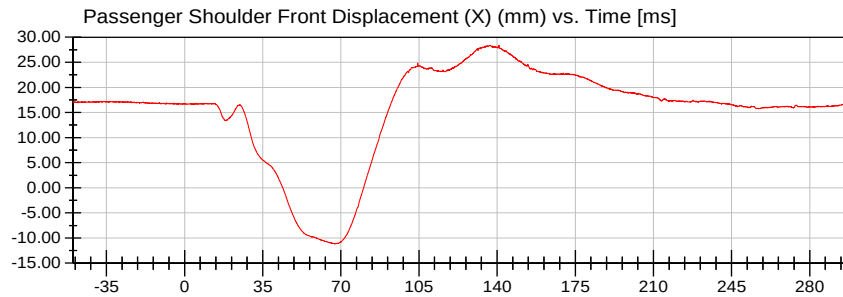


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



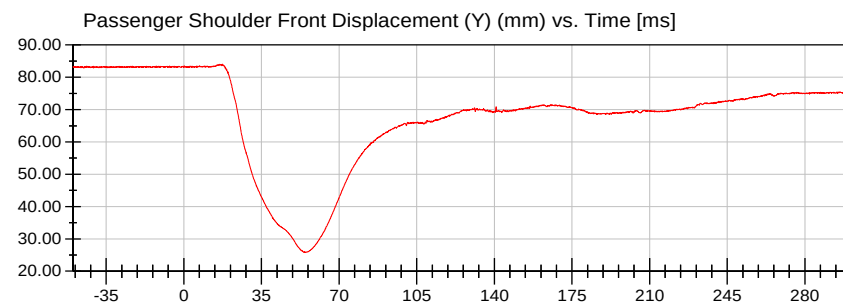
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28.38 mm at 137.00 ms

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-11.17 mm at 67.10 ms

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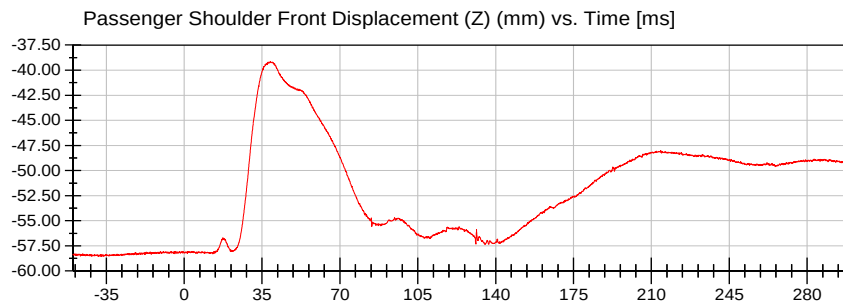
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84.07 mm at 16.20 ms

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25.83 mm at 54.70 ms

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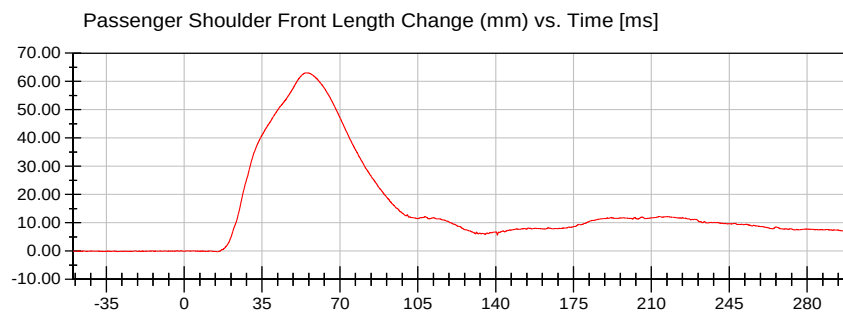
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-39.17 mm at 38.80 ms

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-58.55 mm at -38.60 ms

Unfiltered



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63.05 mm at 55.20 ms

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-0.25 mm at 14.90 ms

CFC_600

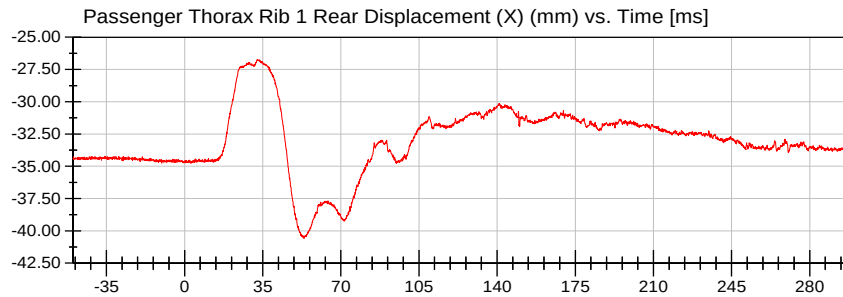


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



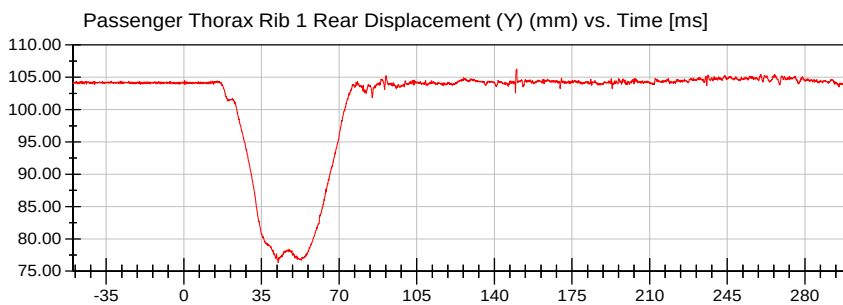
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-40.57 mm at 53.60 ms

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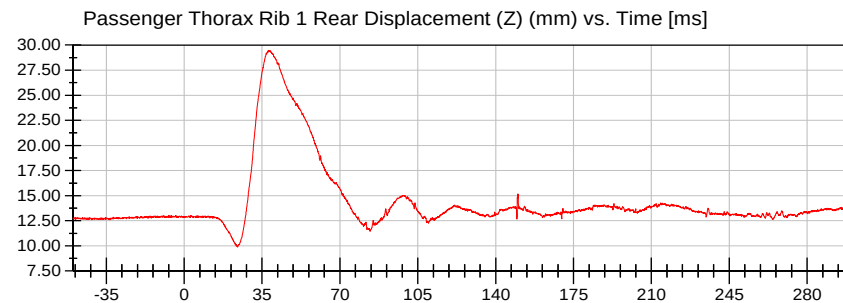
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106.29 mm at 150.10 ms

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76.31 mm at 42.50 ms

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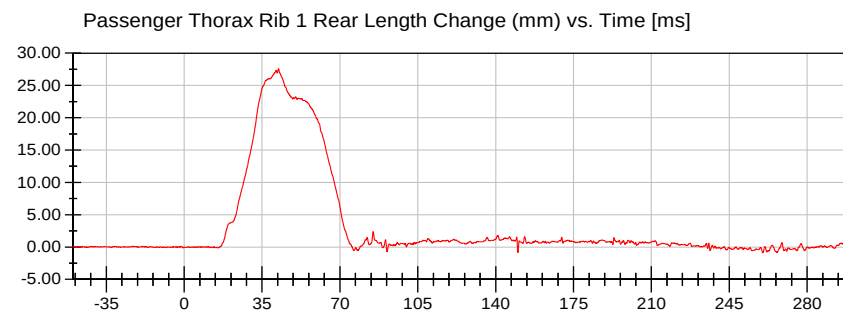
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29.45 mm at 38.20 ms

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9.87 mm at 24.00 ms

Unfiltered



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-0.89 mm at 260.10 ms

CFC_600

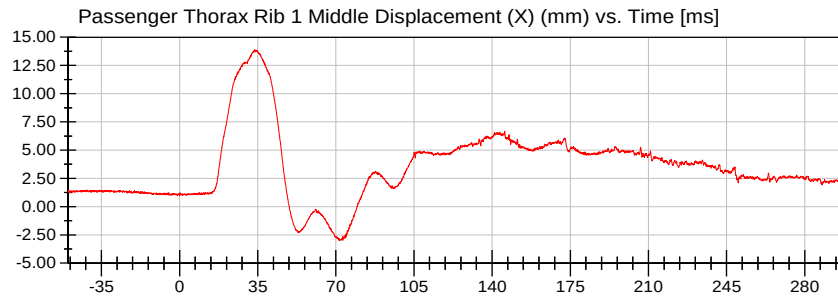


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



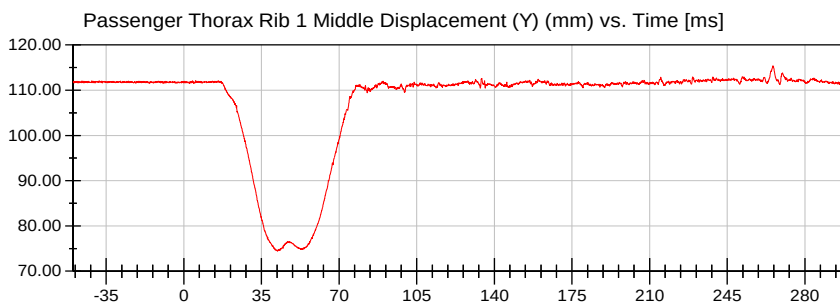
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13.88 mm at 33.60 ms

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-2.99 mm at 73.10 ms

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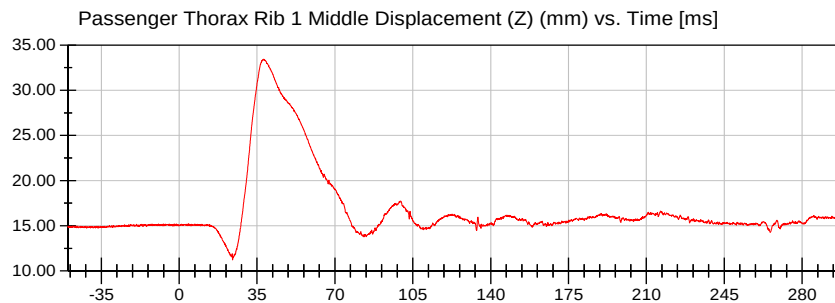
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115.34 mm at 265.60 ms

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74.45 mm at 42.20 ms

Unfiltered



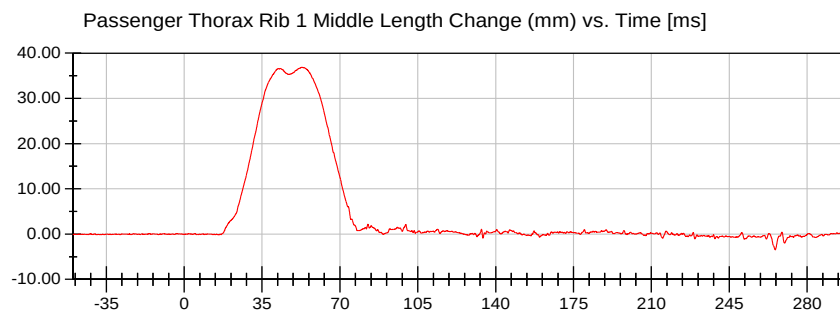
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33.43 mm at 38.00 ms

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11.23 mm at 24.00 ms

Unfiltered



<Max>

36.88 mm at 52.80 ms

<Min>

-3.47 mm at 265.70 ms

CFC_600

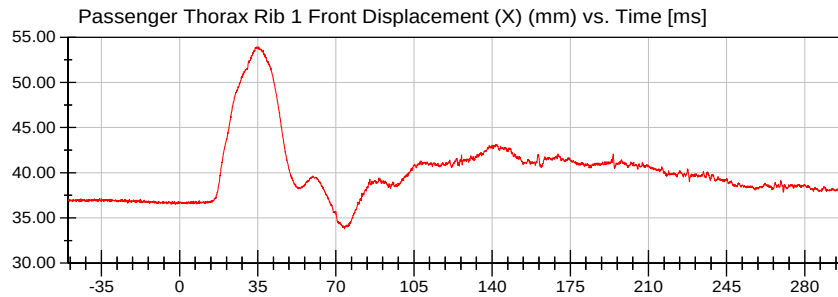


VRTC

Test Date: 09/15/2021

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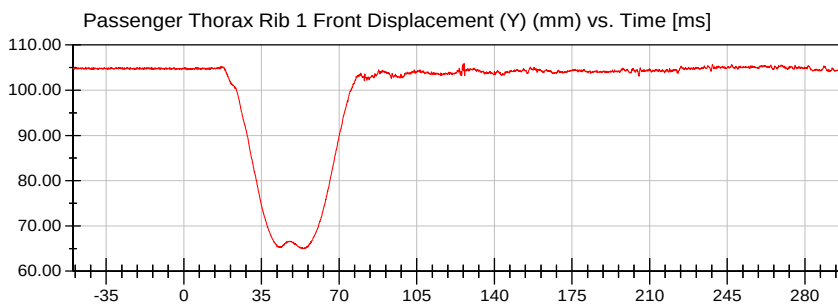
<Max>

53.95 mm at 34.60 ms

<Min>

33.80 mm at 73.90 ms

Unfiltered



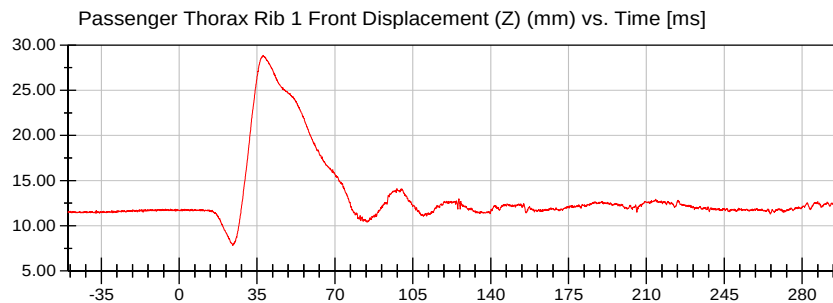
<Max>

105.92 mm at 126.30 ms

<Min>

64.96 mm at 53.90 ms

Unfiltered



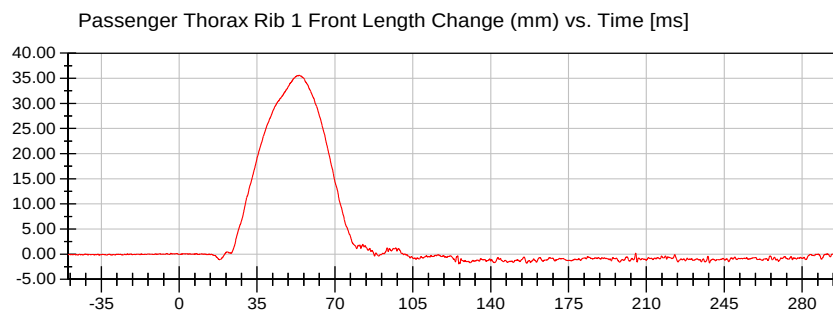
<Max>

28.85 mm at 37.70 ms

<Min>

7.84 mm at 24.00 ms

Unfiltered



<Max>

35.60 mm at 53.90 ms

<Min>

-1.91 mm at 125.70 ms

CFC_600



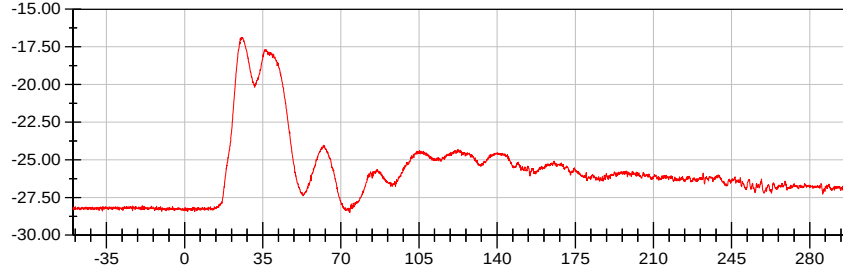
VRTC

Test Lab: CTF

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Test Date: 09/15/2021

Passenger Thorax Rib 2 Rear Displacement (X) (mm) vs. Time [ms]



<Max>

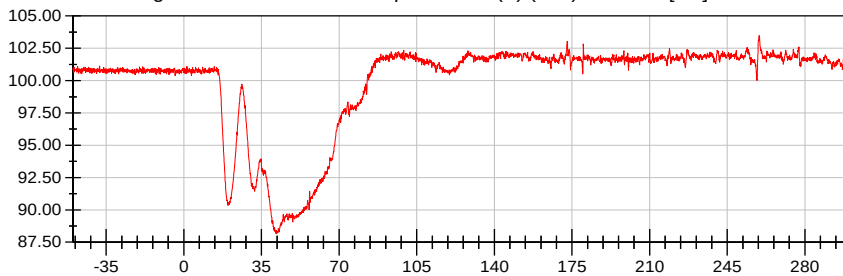
-16.87 mm at 25.80 ms

<Min>

-28.51 mm at 74.00 ms

Unfiltered

Passenger Thorax Rib 2 Rear Displacement (Y) (mm) vs. Time [ms]



<Max>

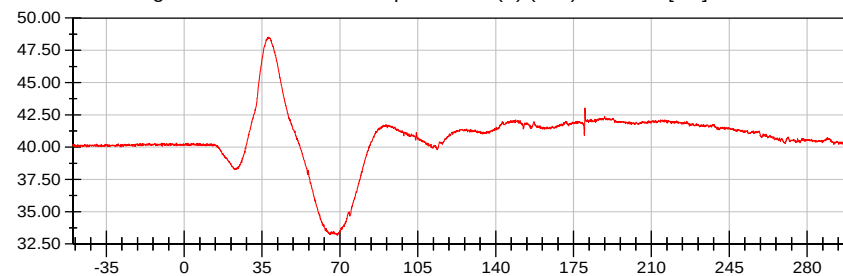
103.50 mm at 259.40 ms

<Min>

88.19 mm at 41.80 ms

Unfiltered

Passenger Thorax Rib 2 Rear Displacement (Z) (mm) vs. Time [ms]



<Max>

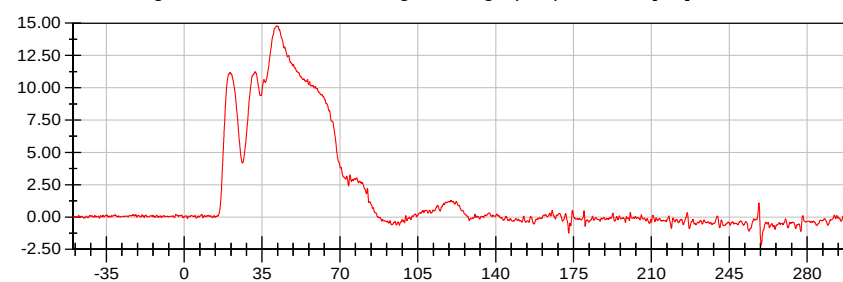
48.52 mm at 37.70 ms

<Min>

33.18 mm at 68.80 ms

Unfiltered

Passenger Thorax Rib 2 Rear Length Change (mm) vs. Time [ms]



<Max>

14.79 mm at 41.50 ms

<Min>

-2.14 mm at 259.40 ms

CFC_600

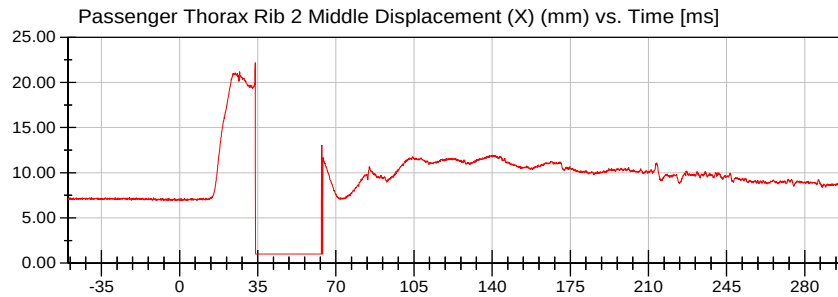


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



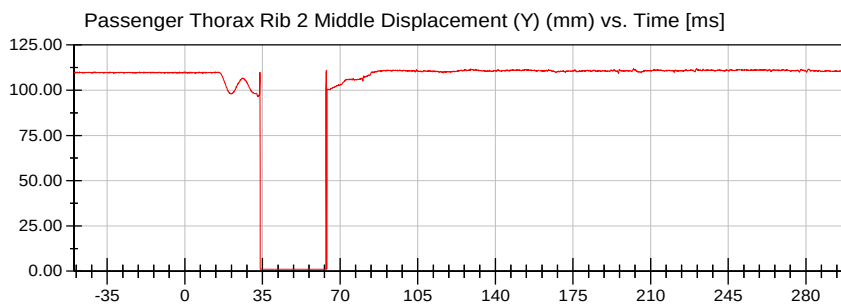
<Max>

22.16 mm at 33.90 ms

<Min>

1.00 mm at 34.00 ms

Unfiltered



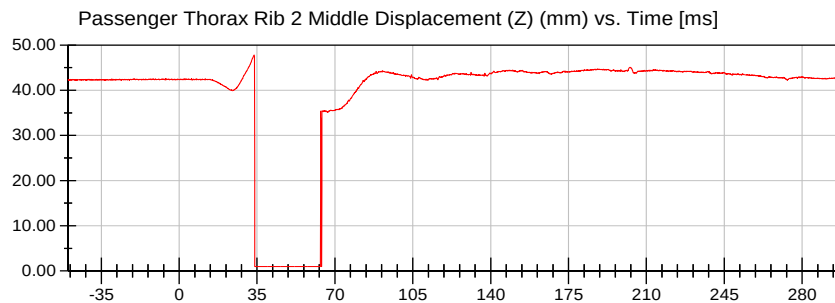
<Max>

112.01 mm at 202.30 ms

<Min>

1.00 mm at 34.00 ms

Unfiltered



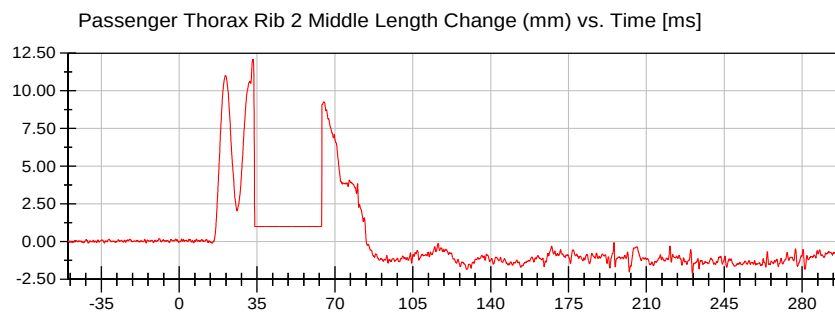
<Max>

47.77 mm at 33.70 ms

<Min>

1.00 mm at 34.00 ms

Unfiltered



<Max>

12.09 mm at 33.30 ms

<Min>

-2.12 mm at 230.70 ms

CFC_600

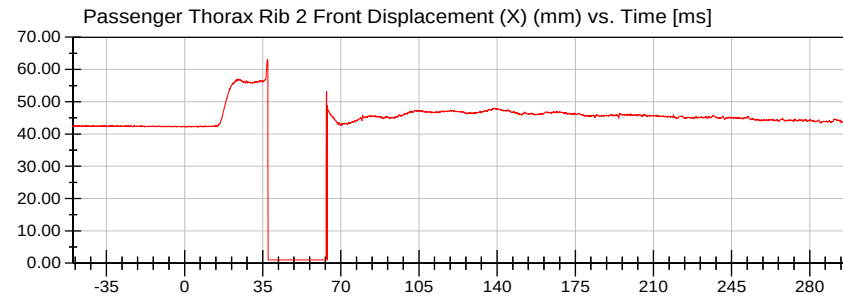


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



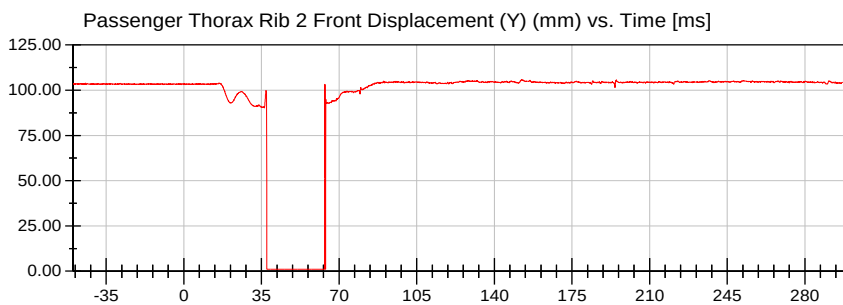
<Max>

63.12 mm at 37.10 ms

<Min>

1.00 mm at 37.45 ms

Unfiltered



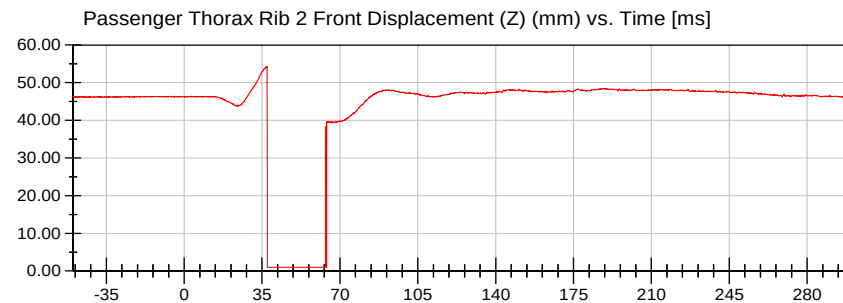
<Max>

105.97 mm at 152.30 ms

<Min>

1.00 mm at 37.45 ms

Unfiltered



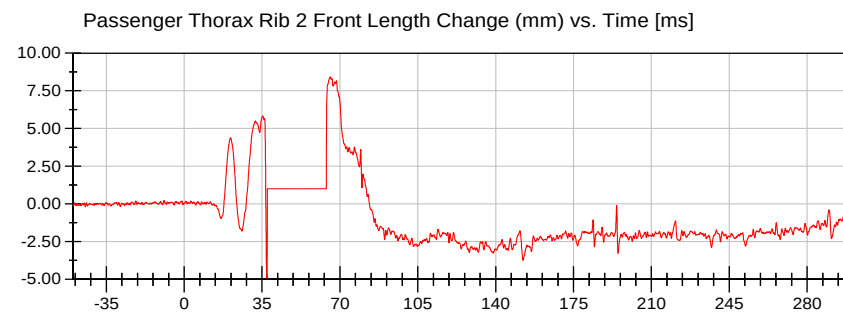
<Max>

54.32 mm at 37.30 ms

<Min>

1.00 mm at 37.45 ms

Unfiltered



<Max>

8.42 mm at 65.60 ms

<Min>

-4.93 mm at 37.20 ms

CFC_600



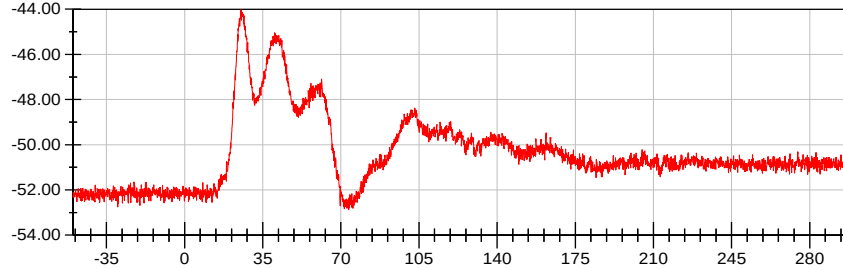
VRTC

Test Lab: CTF

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Test Date: 09/15/2021

Passenger Thorax Rib 3 Rear Displacement (X) (mm) vs. Time [ms]



<Max>

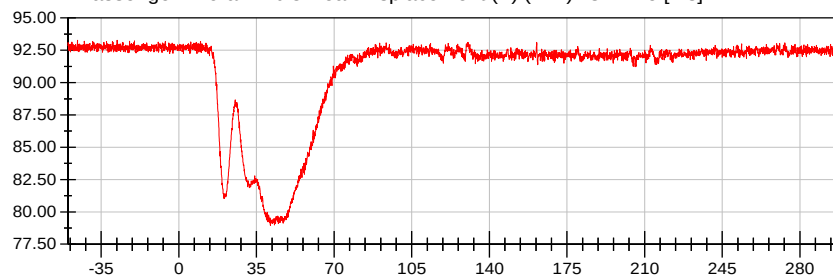
-44.03 mm at 25.30 ms

<Min>

-52.88 mm at 73.50 ms

Unfiltered

Passenger Thorax Rib 3 Rear Displacement (Y) (mm) vs. Time [ms]



<Max>

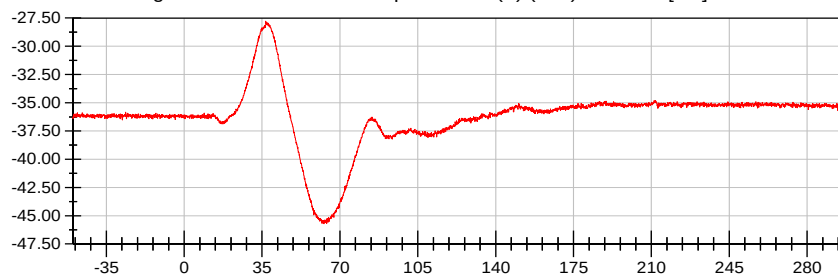
93.28 mm at -27.80 ms

<Min>

78.94 mm at 41.30 ms

Unfiltered

Passenger Thorax Rib 3 Rear Displacement (Z) (mm) vs. Time [ms]



<Max>

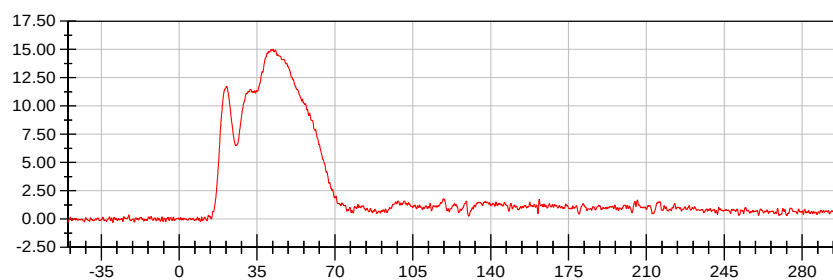
-27.78 mm at 36.70 ms

<Min>

-45.70 mm at 62.80 ms

Unfiltered

Passenger Thorax Rib 3 Rear Length Change (mm) vs. Time [ms]



<Max>

15.02 mm at 42.10 ms

<Min>

-0.30 mm at -29.80 ms

CFC_600

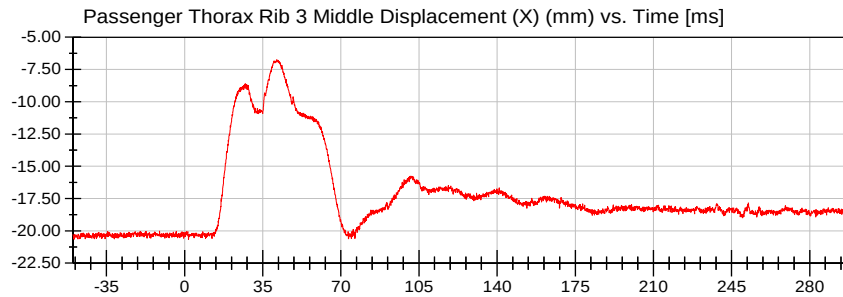


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



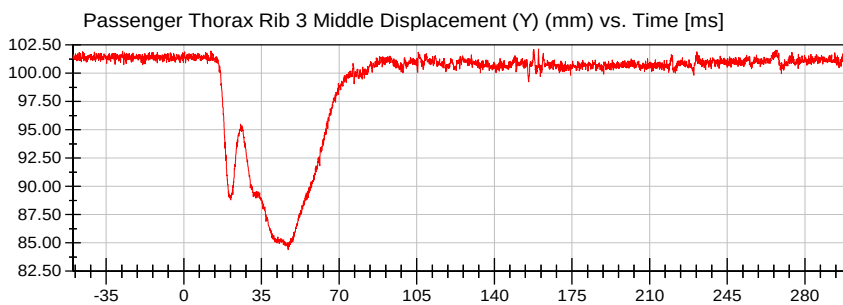
<Max>

-6.76 mm at 41.20 ms

<Min>

-20.68 mm at 1.80 ms

Unfiltered



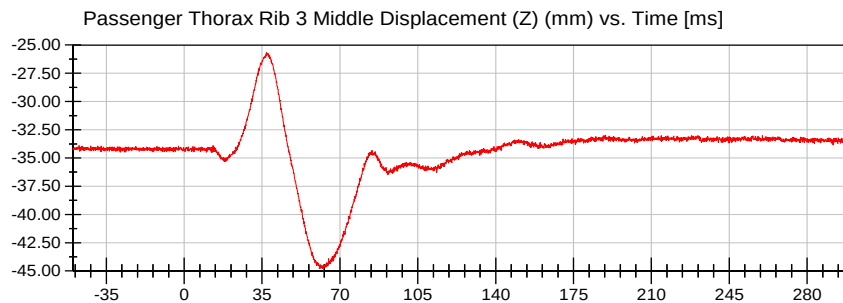
<Max>

102.14 mm at 159.90 ms

<Min>

84.40 mm at 47.00 ms

Unfiltered



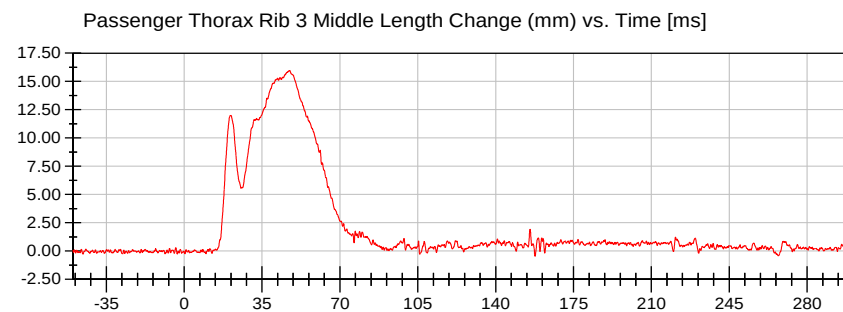
<Max>

-25.65 mm at 37.00 ms

<Min>

-44.78 mm at 61.00 ms

Unfiltered



<Max>

15.97 mm at 47.50 ms

<Min>

-0.44 mm at 157.70 ms

CFC_600



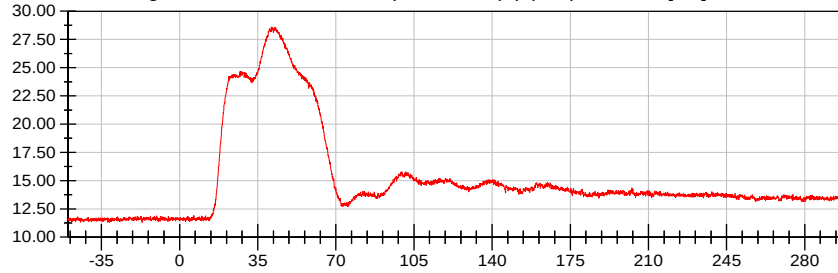
VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021

Passenger Thorax Rib 3 Front Displacement (X) (mm) vs. Time [ms]



<Max>

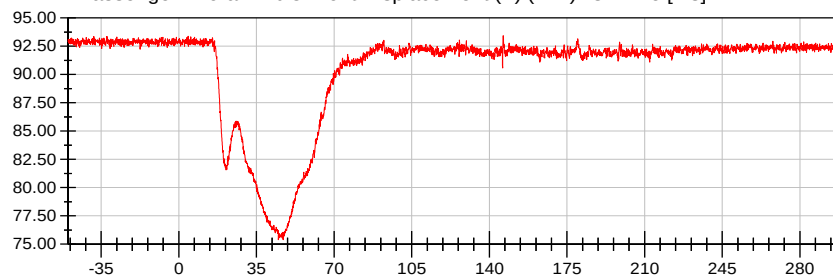
28.61 mm at 41.10 ms

<Min>

11.32 mm at -16.80 ms

Unfiltered

Passenger Thorax Rib 3 Front Displacement (Y) (mm) vs. Time [ms]



<Max>

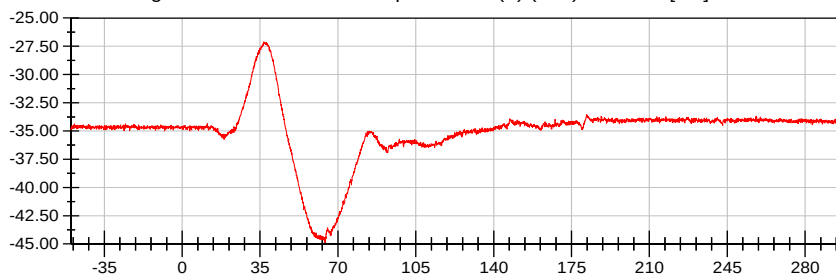
93.43 mm at 146.30 ms

<Min>

75.39 mm at 47.00 ms

Unfiltered

Passenger Thorax Rib 3 Front Displacement (Z) (mm) vs. Time [ms]



<Max>

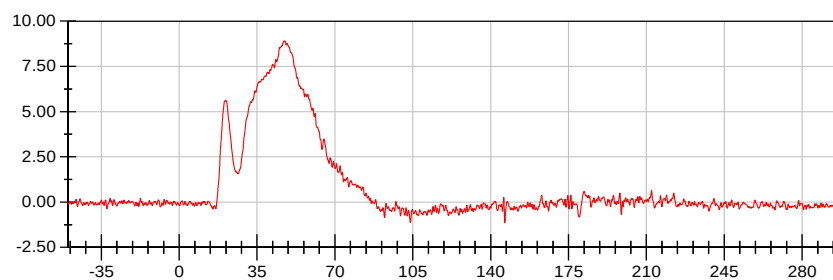
-27.11 mm at 36.70 ms

<Min>

-44.88 mm at 64.10 ms

Unfiltered

Passenger Thorax Rib 3 Front Length Change (mm) vs. Time [ms]



<Max>

8.91 mm at 47.10 ms

<Min>

-1.14 mm at 146.30 ms

CFC_600

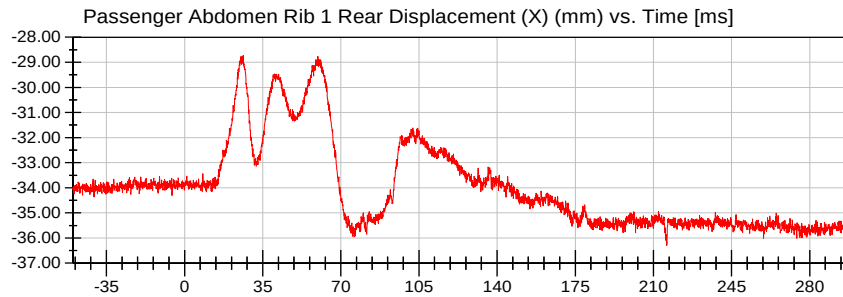


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



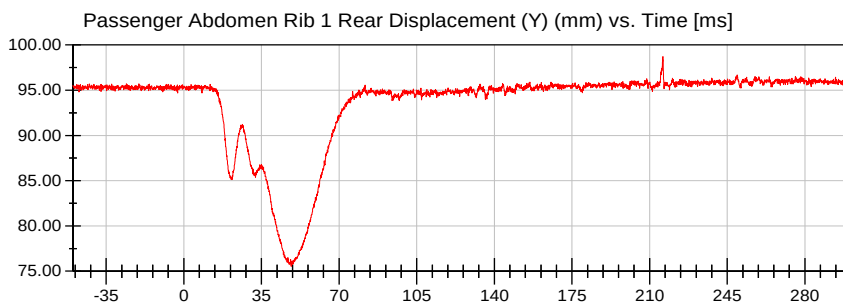
<Max>

-28.73 mm at 26.30 ms

<Min>

-36.30 mm at 216.00 ms

Unfiltered



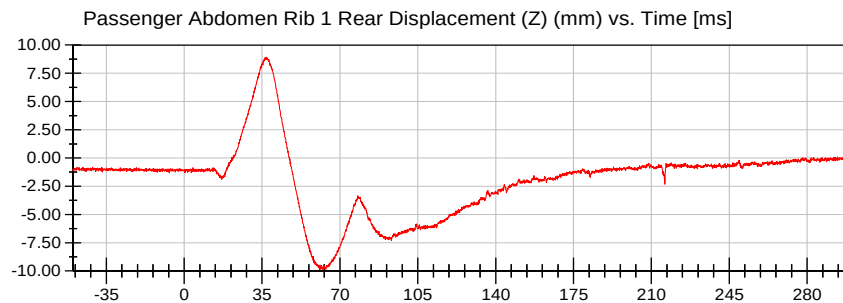
<Max>

98.72 mm at 216.00 ms

<Min>

75.55 mm at 48.40 ms

Unfiltered



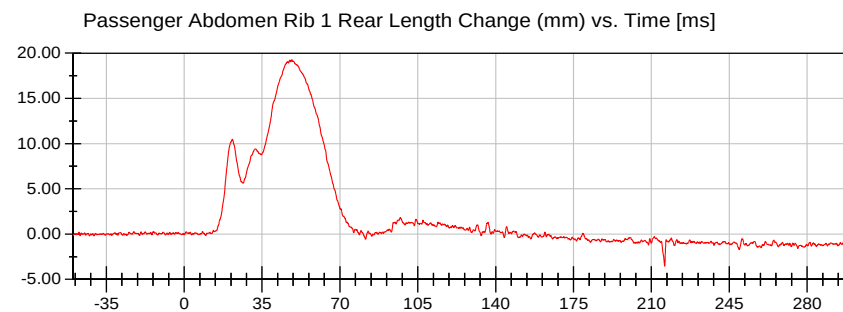
<Max>

8.93 mm at 36.80 ms

<Min>

-9.87 mm at 62.40 ms

Unfiltered



<Max>

19.27 mm at 48.40 ms

<Min>

-3.51 mm at 215.90 ms

CFC_600

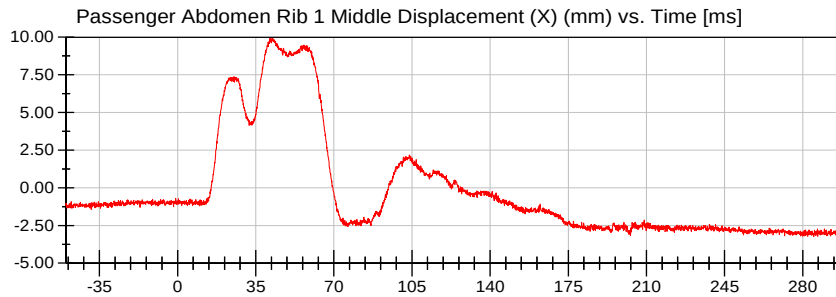


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



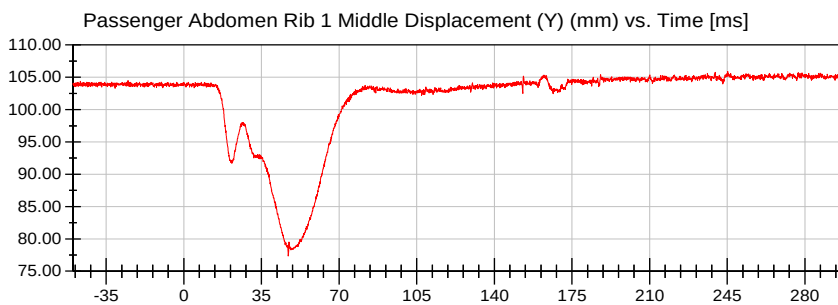
<Max>

9.93 mm at 42.60 ms

<Min>

-3.24 mm at 284.90 ms

Unfiltered



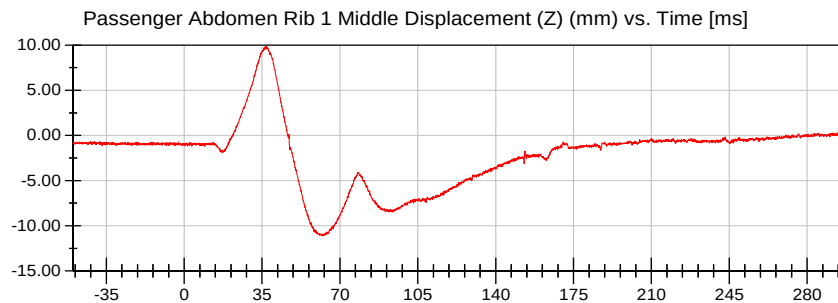
<Max>

105.89 mm at 245.20 ms

<Min>

77.35 mm at 47.10 ms

Unfiltered



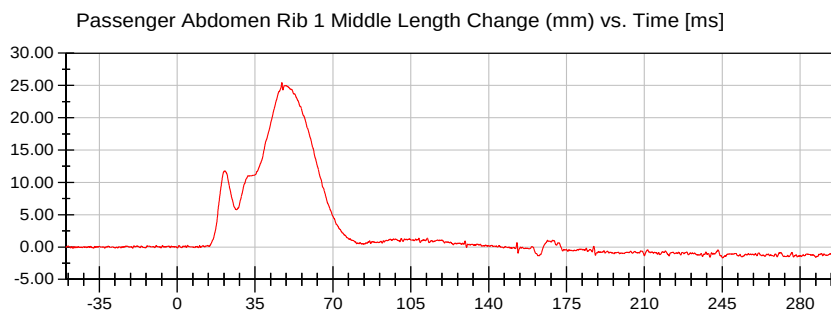
<Max>

9.88 mm at 36.80 ms

<Min>

-11.11 mm at 62.40 ms

Unfiltered



<Max>

25.43 mm at 47.10 ms

<Min>

-1.67 mm at 245.20 ms

CFC_600

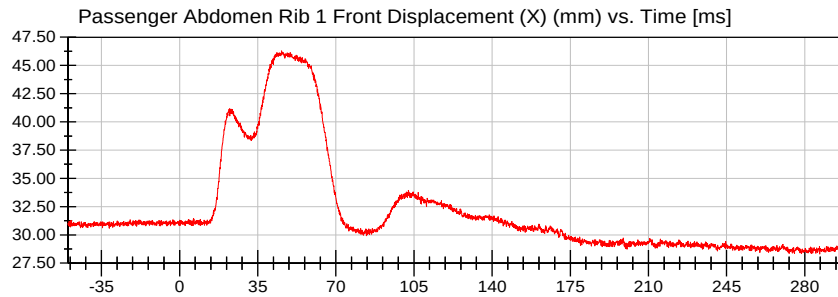


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



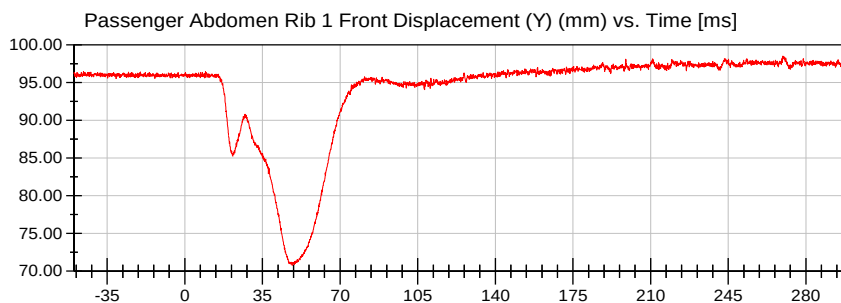
<Max>

46.27 mm at 45.70 ms

<Min>

28.31 mm at 286.70 ms

Unfiltered



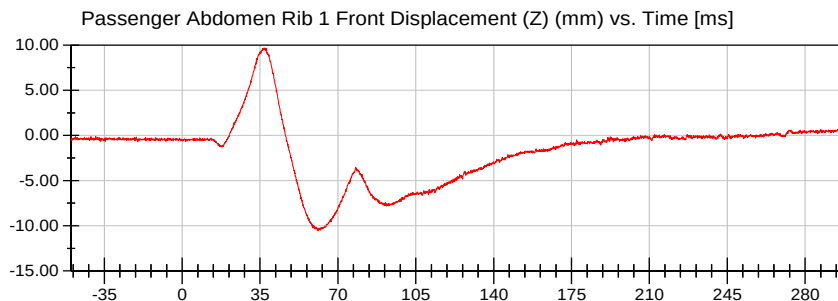
<Max>

98.53 mm at 269.60 ms

<Min>

70.78 mm at 48.40 ms

Unfiltered



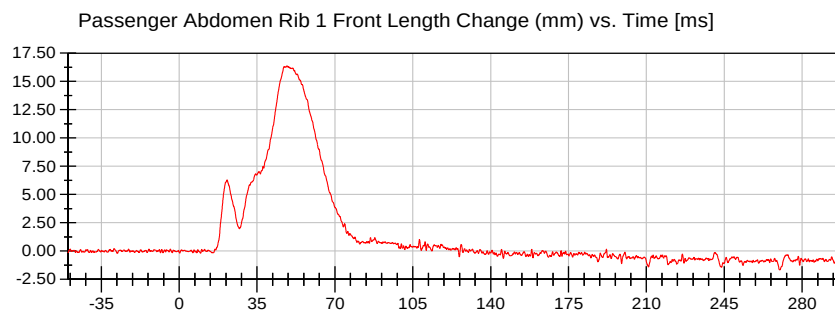
<Max>

9.69 mm at 37.00 ms

<Min>

-10.54 mm at 61.00 ms

Unfiltered



<Max>

16.38 mm at 48.50 ms

<Min>

-1.66 mm at 269.90 ms

CFC_600

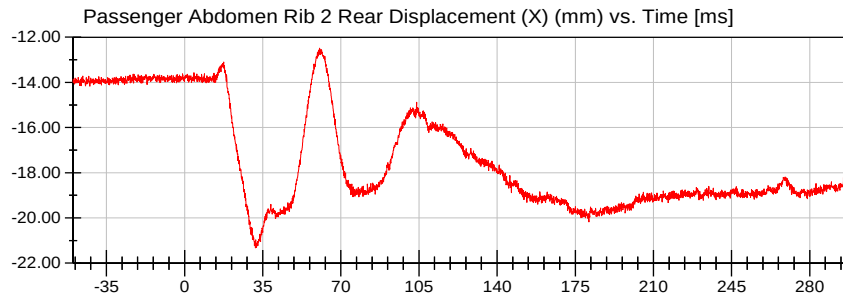


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



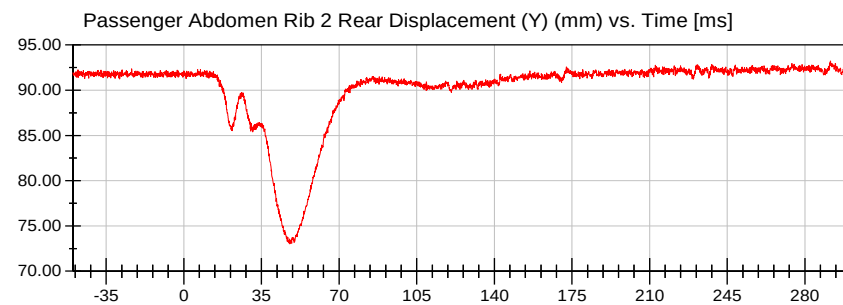
<Max>

-12.49 mm at 60.50 ms

<Min>

-21.33 mm at 31.70 ms

Unfiltered



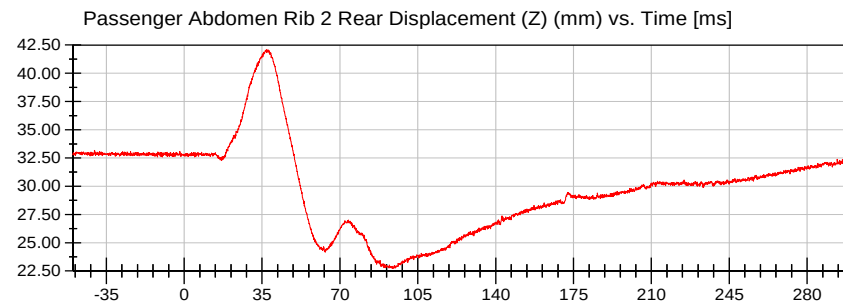
<Max>

93.22 mm at 291.50 ms

<Min>

73.03 mm at 47.80 ms

Unfiltered



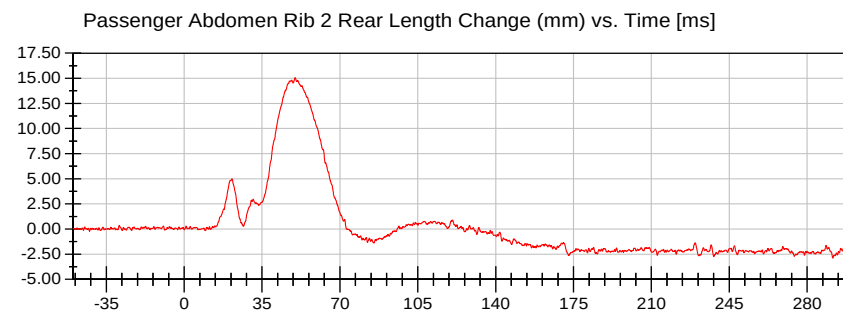
<Max>

42.07 mm at 37.00 ms

<Min>

22.72 mm at 93.60 ms

Unfiltered



<Max>

15.05 mm at 49.90 ms

<Min>

-2.87 mm at 291.50 ms

CFC_600

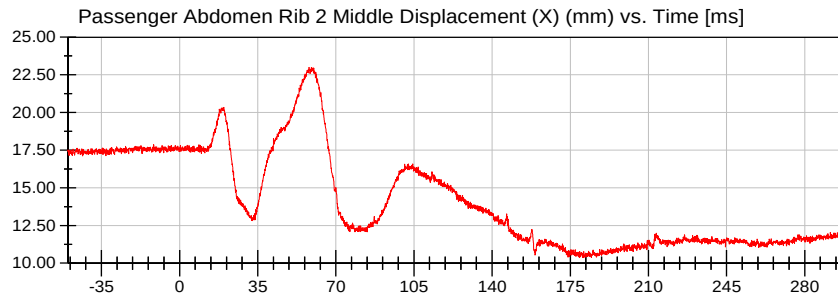


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



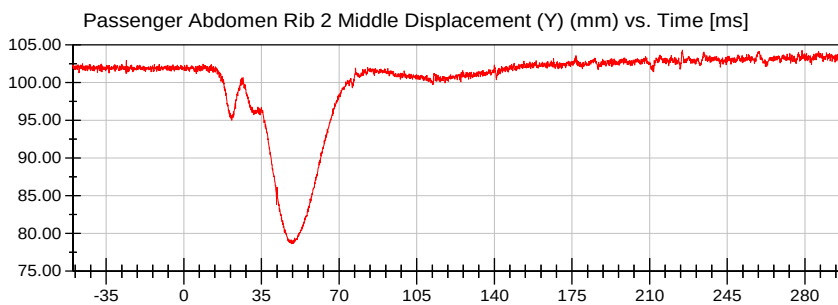
<Max>

23.02 mm at 58.00 ms

<Min>

10.37 mm at 179.10 ms

Unfiltered



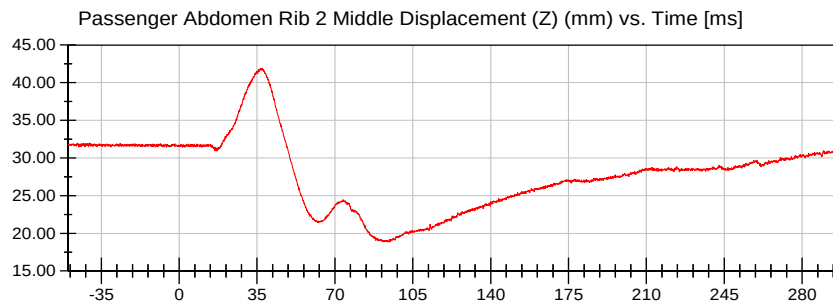
<Max>

104.31 mm at 224.80 ms

<Min>

78.63 mm at 48.60 ms

Unfiltered



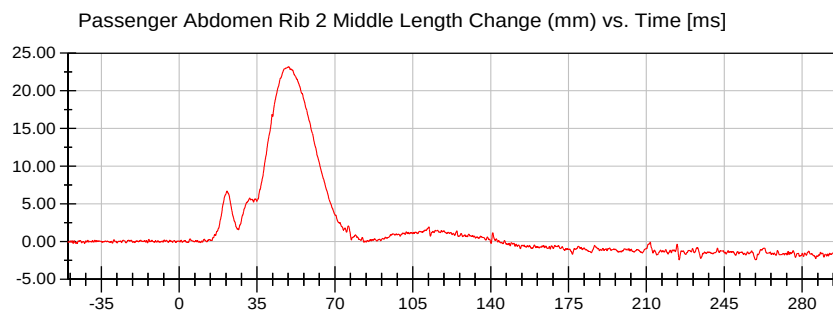
<Max>

41.94 mm at 37.20 ms

<Min>

18.84 mm at 94.30 ms

Unfiltered



<Max>

23.19 mm at 49.10 ms

<Min>

-2.41 mm at 224.70 ms

CFC_600

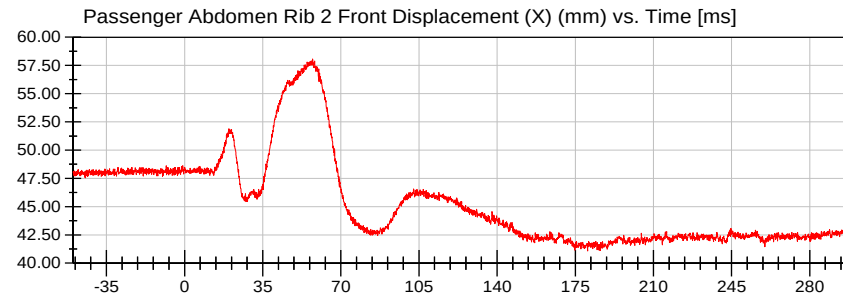


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



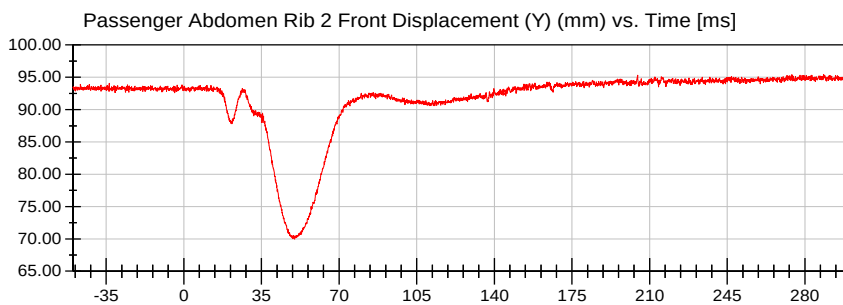
<Max>

58.08 mm at 57.40 ms

<Min>

41.08 mm at 180.50 ms

Unfiltered



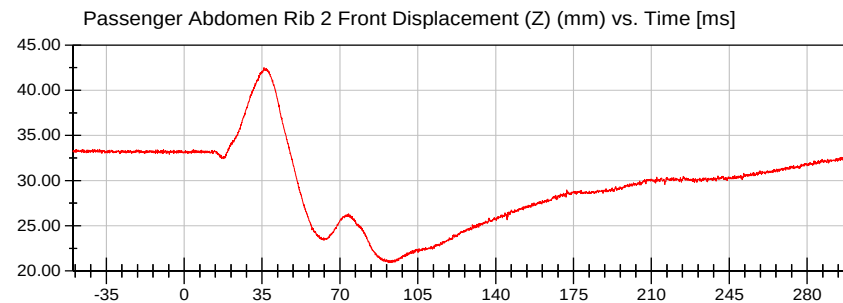
<Max>

95.46 mm at 288.50 ms

<Min>

69.97 mm at 50.00 ms

Unfiltered



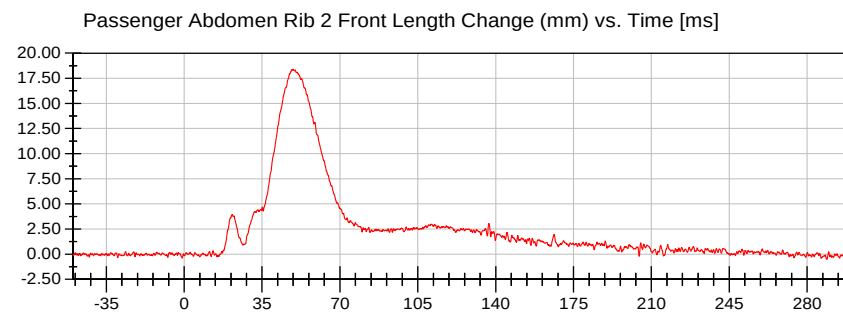
<Max>

42.51 mm at 35.90 ms

<Min>

20.93 mm at 92.00 ms

Unfiltered



<Max>

18.39 mm at 49.00 ms

<Min>

-0.51 mm at 288.80 ms

CFC_600

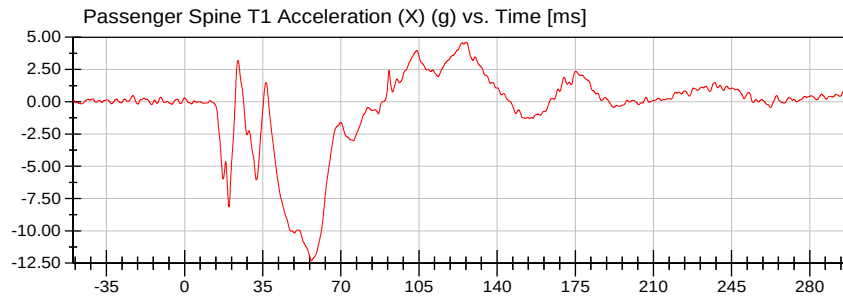


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



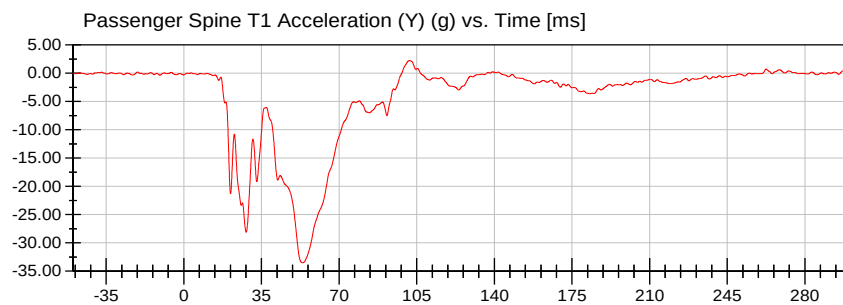
<Max>

4.61 g at 126.10 ms

<Min>

-12.31 g at 56.75 ms

CFC_180



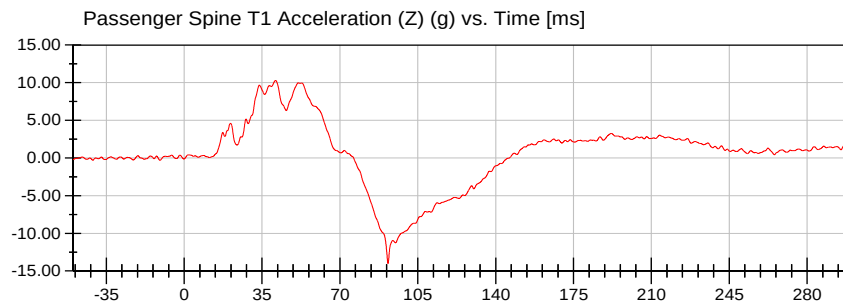
<Max>

2.21 g at 101.65 ms

<Min>

-33.50 g at 53.45 ms

CFC_180



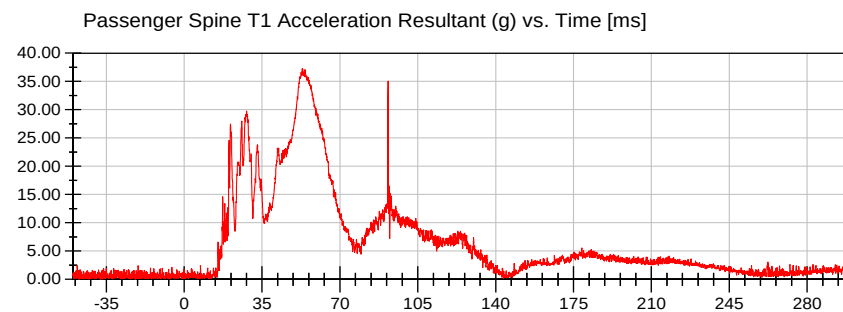
<Max>

10.29 g at 41.05 ms

<Min>

-14.01 g at 91.60 ms

CFC_180



<Max>

37.27 g at 53.05 ms

<Min>

0.04 g at -47.20 ms

Prefiltered_> CFC 1000

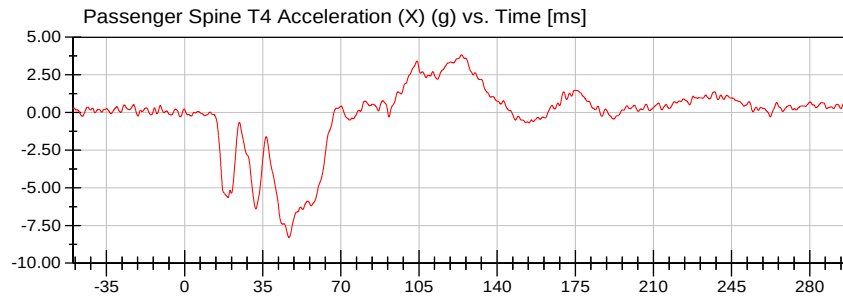


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



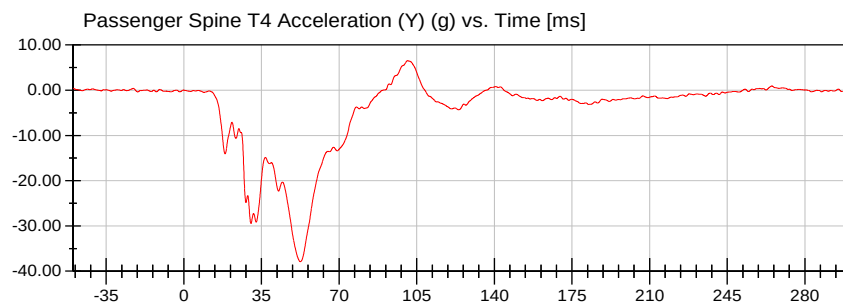
<Max>

3.83 g at 124.05 ms

<Min>

-8.30 g at 46.80 ms

CFC_180



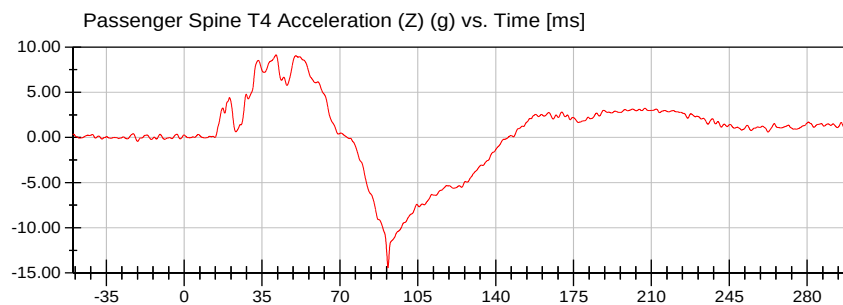
<Max>

6.51 g at 100.85 ms

<Min>

-37.89 g at 52.55 ms

CFC_180



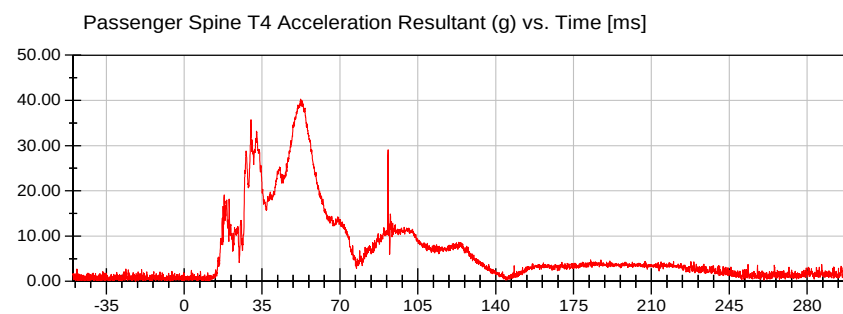
<Max>

9.13 g at 41.30 ms

<Min>

-14.41 g at 91.60 ms

CFC_180



<Max>

40.30 g at 52.30 ms

<Min>

0.04 g at -21.85 ms

Prefiltered_> CFC 1000

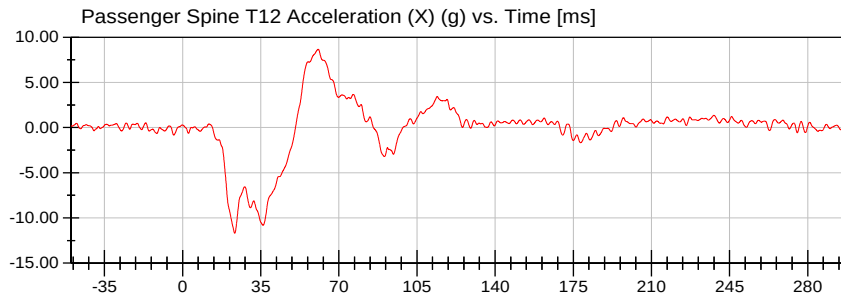


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



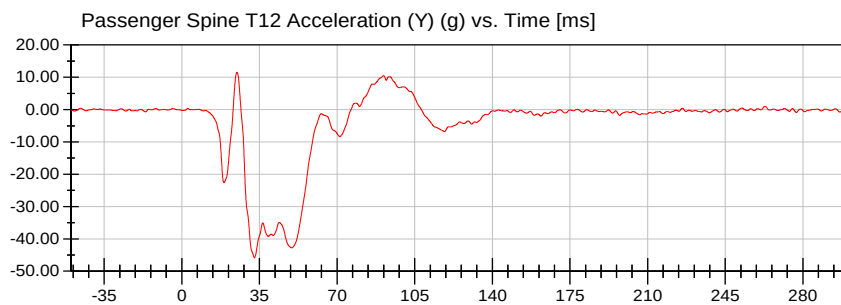
<Max>

8.67 g at 60.75 ms

<Min>

-11.69 g at 23.35 ms

CFC_180



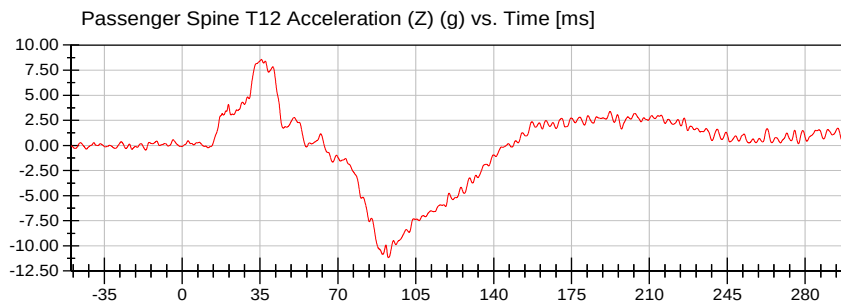
<Max>

11.51 g at 24.80 ms

<Min>

-45.83 g at 32.75 ms

CFC_180



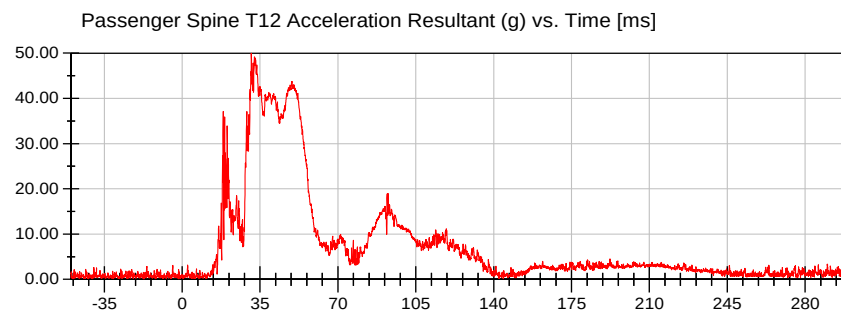
<Max>

8.56 g at 35.60 ms

<Min>

-11.16 g at 92.70 ms

CFC_180



<Max>

50.00 g at 31.10 ms

<Min>

0.08 g at -17.15 ms

Prefiltered_> CFC 1000

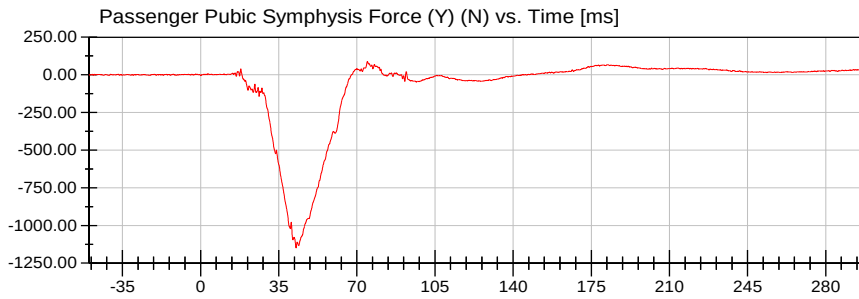


VRTC

Test Lab: CTF

Test Number: 210915 ()

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<Max>

87.76 N at 74.75 ms

<Min>

-1,149.88 N at 42.80 ms

CFC_600

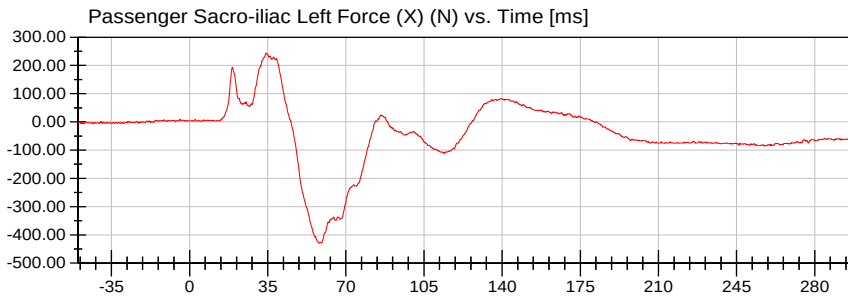


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



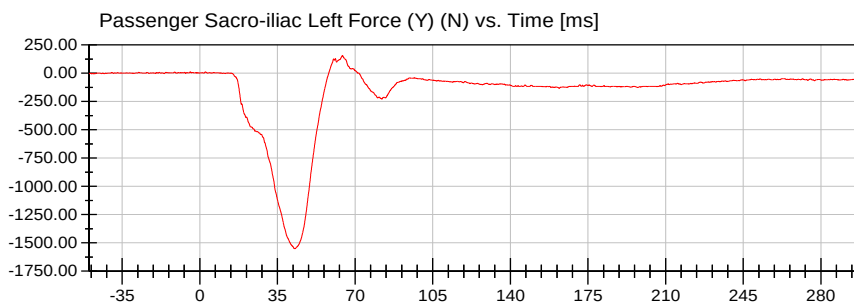
<Max>

243.55 N at 34.30 ms

<Min>

-429.02 N at 58.00 ms

CFC_600



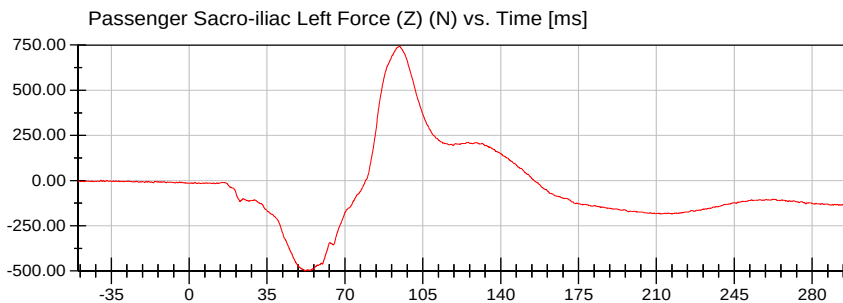
<Max>

155.49 N at 64.35 ms

<Min>

-1,550.62 N at 42.70 ms

CFC_600



<Max>

742.62 N at 94.50 ms

<Min>

-498.88 N at 52.10 ms

CFC_600

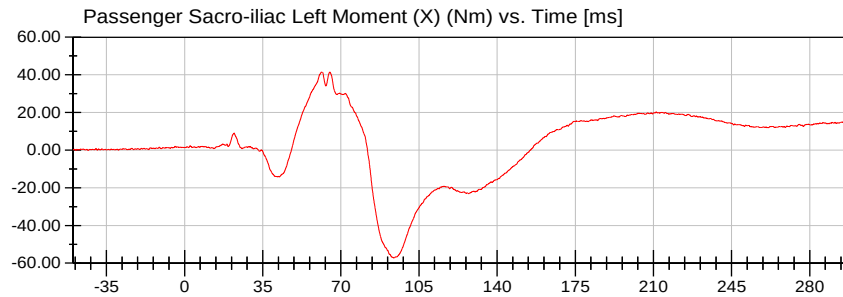


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



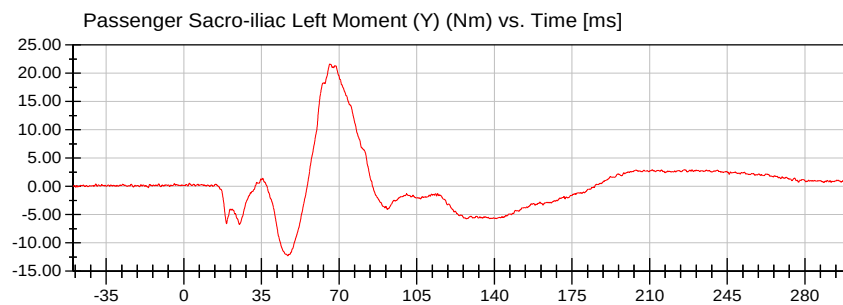
<Max>

41.44 Nm at 61.30 ms

<Min>

-57.29 Nm at 93.70 ms

CFC_600



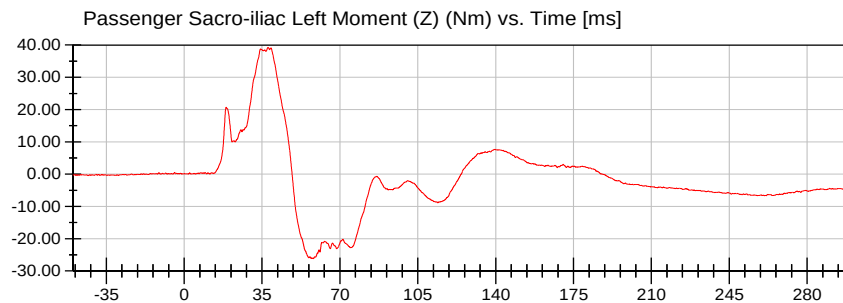
<Max>

21.65 Nm at 65.80 ms

<Min>

-12.26 Nm at 46.90 ms

CFC_600



<Max>

39.25 Nm at 37.70 ms

<Min>

-26.16 Nm at 58.00 ms

CFC_600

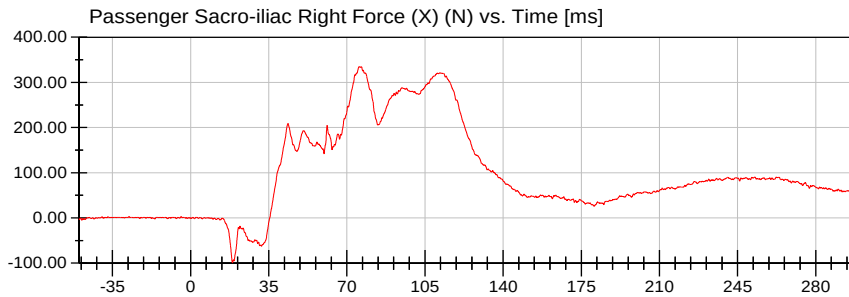
TRC

VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



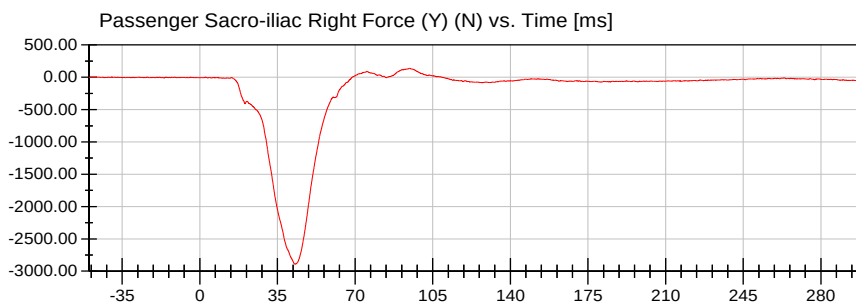
<Max>

334.47 N at 75.60 ms

<Min>

-98.93 N at 18.75 ms

CFC_600



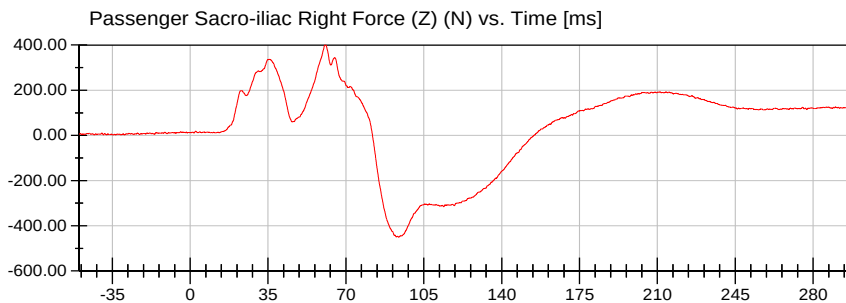
<Max>

138.69 N at 94.60 ms

<Min>

-2,890.96 N at 43.15 ms

CFC_600



<Max>

399.13 N at 60.90 ms

<Min>

-450.67 N at 93.75 ms

CFC_600

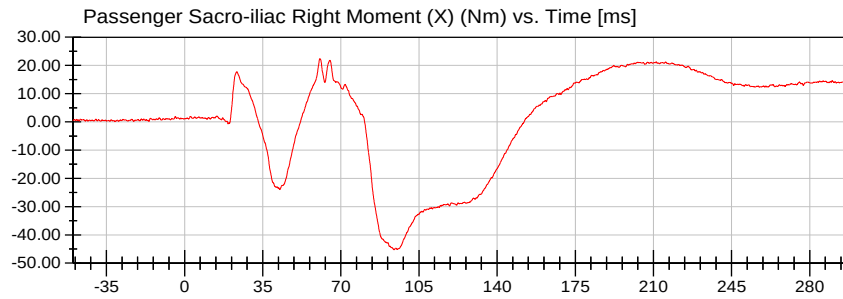


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



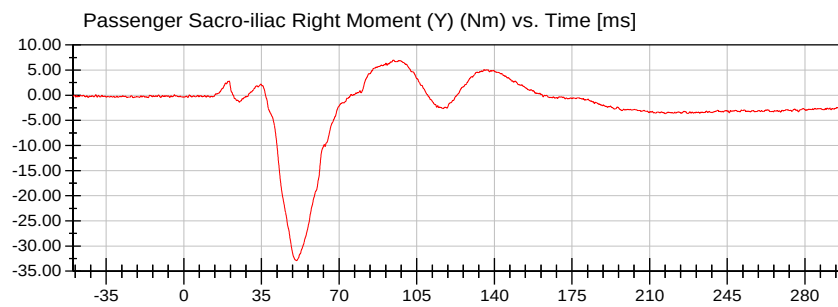
<Max>

22.42 Nm at 60.65 ms

<Min>

-45.26 Nm at 93.80 ms

CFC_600



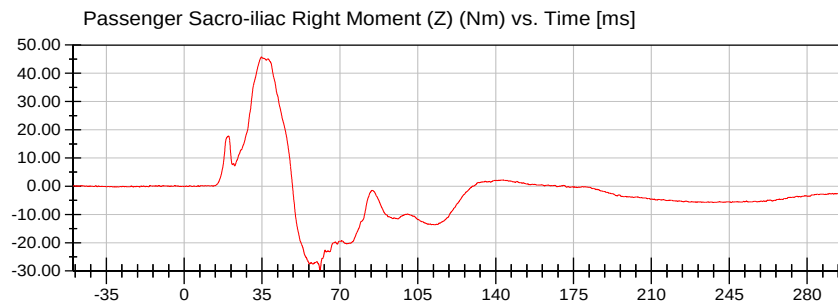
<Max>

7.01 Nm at 94.50 ms

<Min>

-32.89 Nm at 50.85 ms

CFC_600



<Max>

45.77 Nm at 34.70 ms

<Min>

-29.55 Nm at 61.05 ms

CFC_600

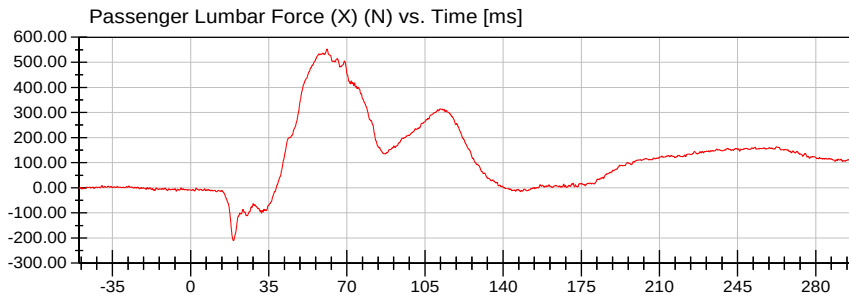
TRC

VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



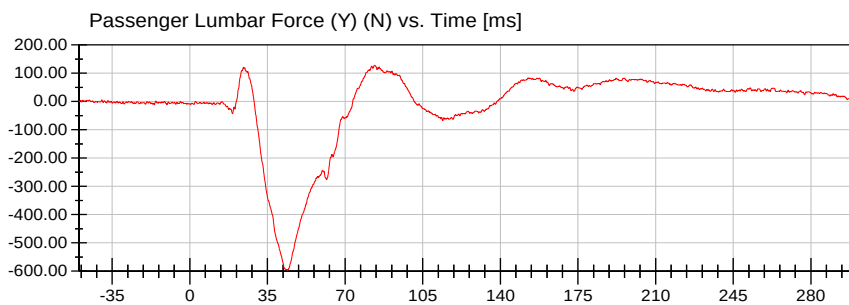
<Max>

553.13 N at 61.15 ms

<Min>

-210.21 N at 19.25 ms

CFC_600



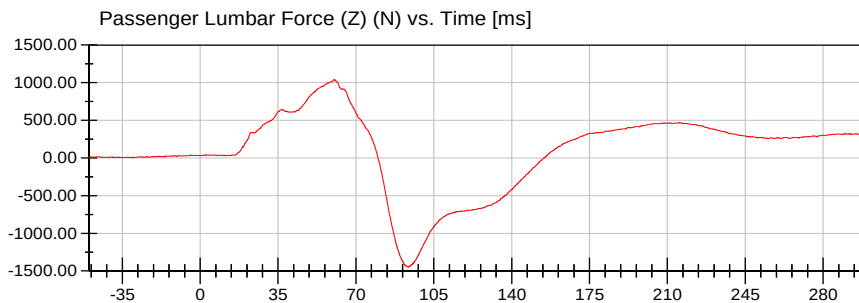
<Max>

128.36 N at 83.20 ms

<Min>

-597.27 N at 44.10 ms

CFC_600



<Max>

1,042.90 N at 60.35 ms

<Min>

-1,446.05 N at 93.55 ms

CFC_600

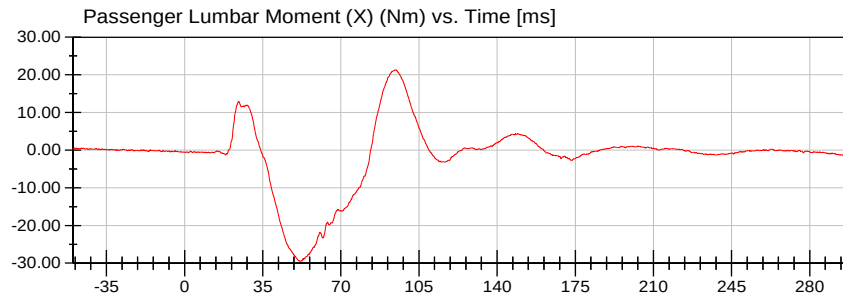


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



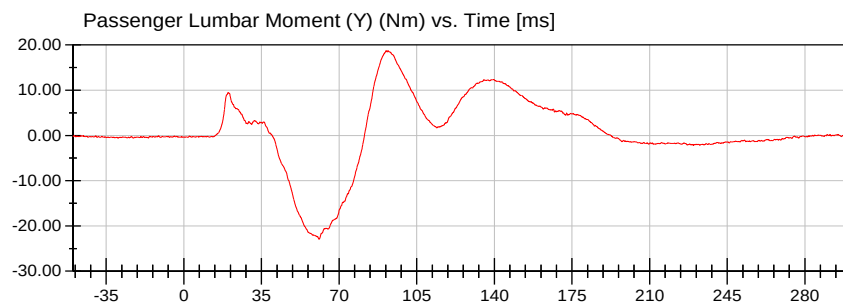
<Max>

21.32 Nm at 94.60 ms

<Min>

-29.53 Nm at 51.80 ms

CFC_600



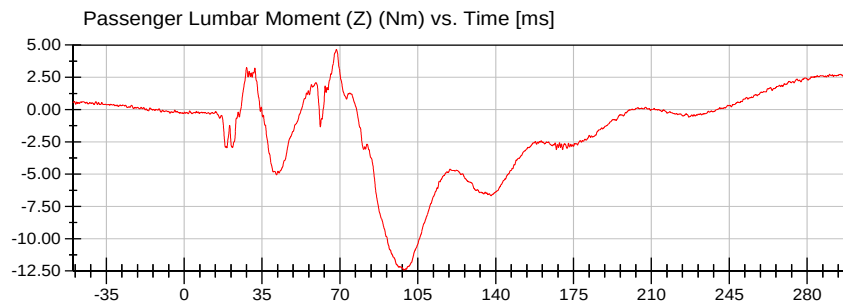
<Max>

18.73 Nm at 91.20 ms

<Min>

-22.92 Nm at 61.00 ms

CFC_600



<Max>

4.66 Nm at 68.40 ms

<Min>

-12.40 Nm at 98.90 ms

CFC_600

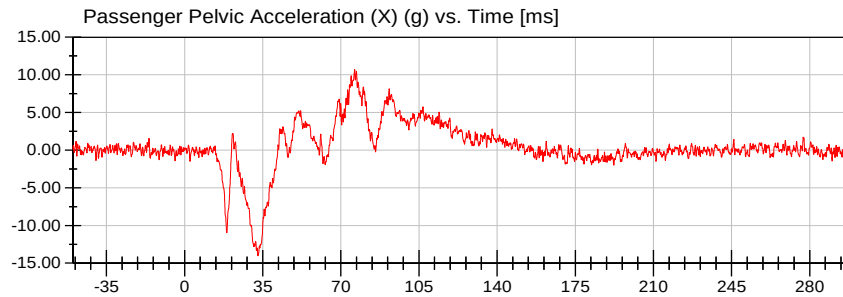
TRC

VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



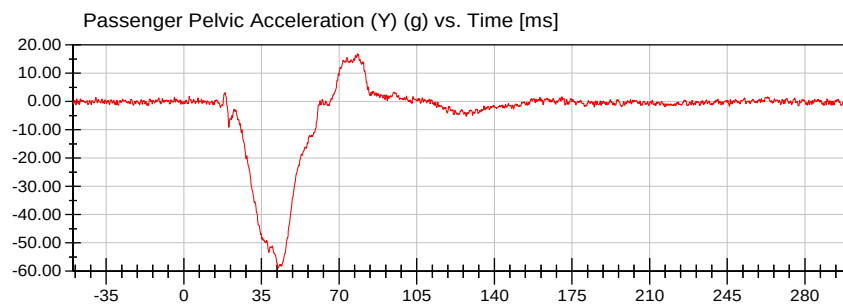
<Max>

10.74 g at 76.20 ms

<Min>

-14.03 g at 32.90 ms

CFC_1000



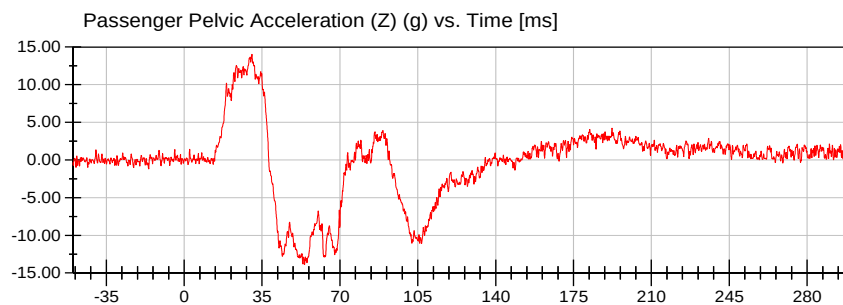
<Max>

16.92 g at 78.30 ms

<Min>

-58.89 g at 42.50 ms

CFC_1000



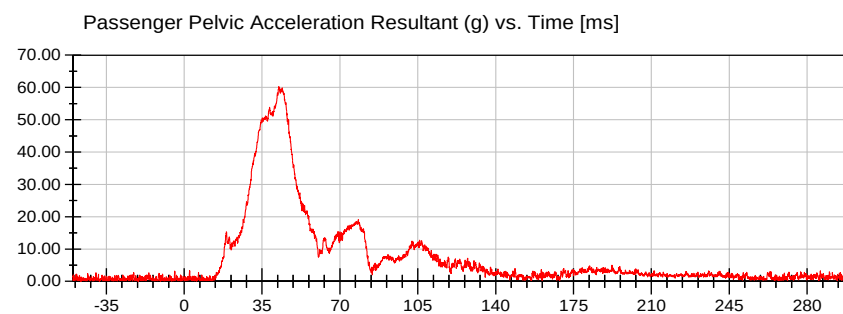
<Max>

14.04 g at 30.45 ms

<Min>

-13.88 g at 54.10 ms

CFC_1000



<Max>

60.27 g at 42.55 ms

<Min>

0.06 g at -46.40 ms

Prefiltered_> CFC 1000

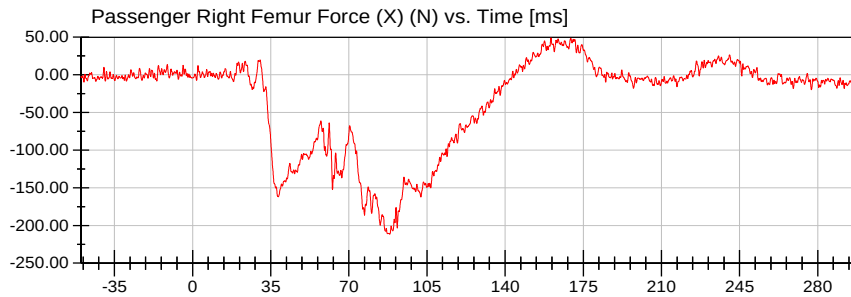


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



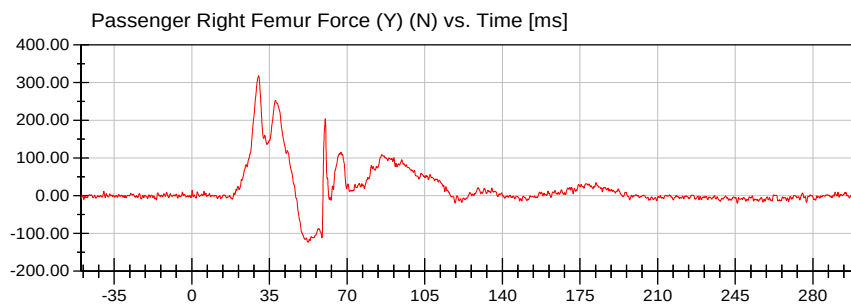
<Max>

49.06 N at 160.55 ms

<Min>

-211.56 N at 88.30 ms

CFC_600



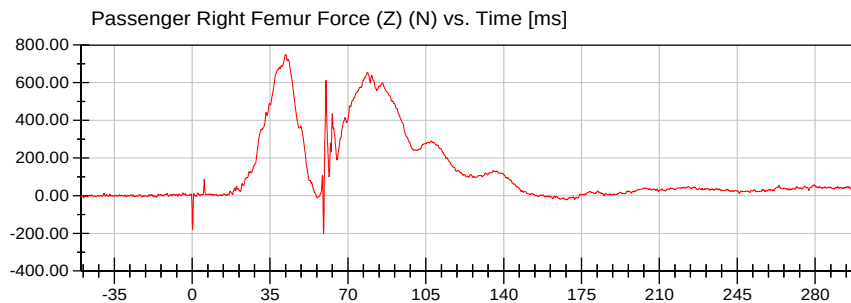
<Max>

318.36 N at 30.15 ms

<Min>

-123.49 N at 52.45 ms

CFC_600



<Max>

748.96 N at 42.00 ms

<Min>

-200.33 N at 59.05 ms

CFC_600



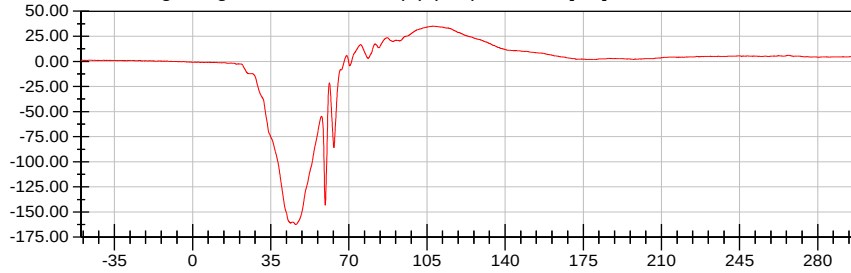
VRTC

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Test Lab: CTF

Test Number: 210915 ()

Passenger Right Femur Moment (X) (Nm) vs. Time [ms]



<Max>

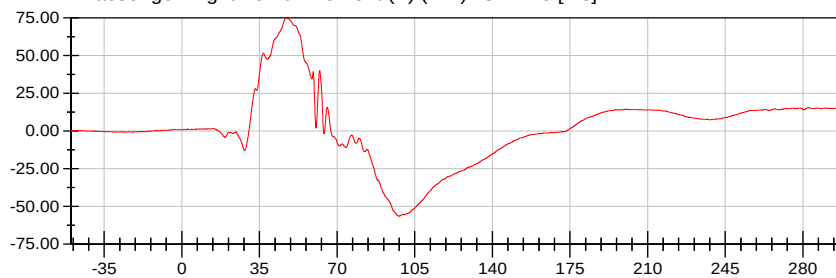
35.08 Nm at 107.45 ms

<Min>

-162.33 Nm at 46.25 ms

CFC_600

Passenger Right Femur Moment (Y) (Nm) vs. Time [ms]



<Max>

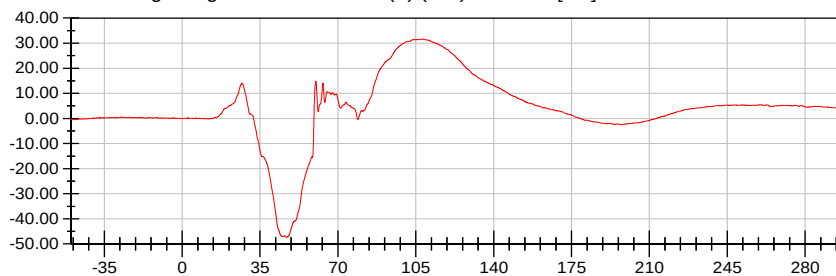
74.91 Nm at 47.30 ms

<Min>

-56.42 Nm at 97.95 ms

CFC_600

Passenger Right Femur Moment (Z) (Nm) vs. Time [ms]



<Max>

31.63 Nm at 108.40 ms

<Min>

-47.35 Nm at 46.90 ms

CFC_600

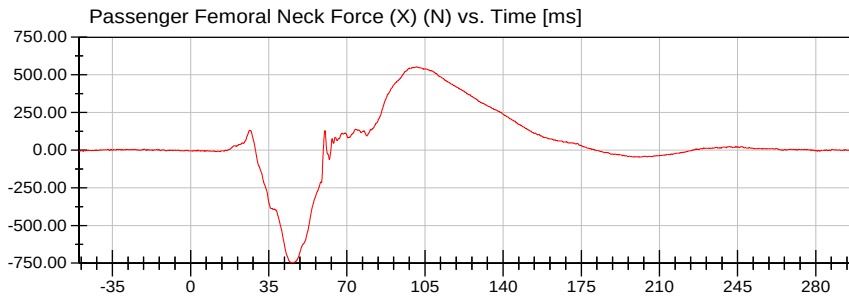


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



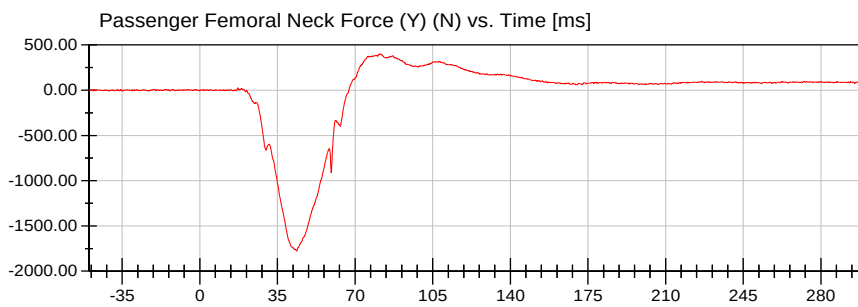
<Max>

552.67 N at 101.20 ms

<Min>

-746.03 N at 45.25 ms

CFC_600



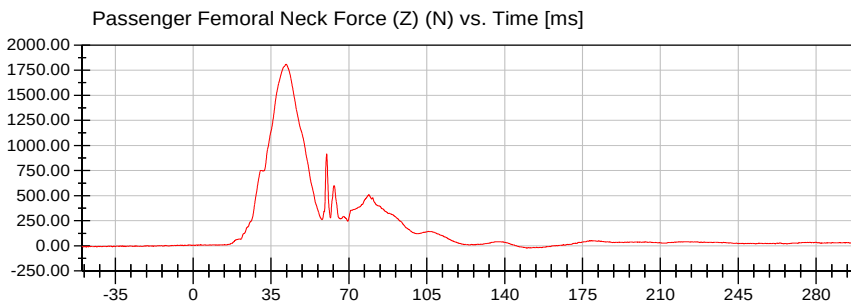
<Max>

401.16 N at 81.45 ms

<Min>

-1,775.80 N at 43.70 ms

CFC_600



<Max>

1,807.97 N at 41.75 ms

<Min>

-22.04 N at 149.95 ms

CFC_600

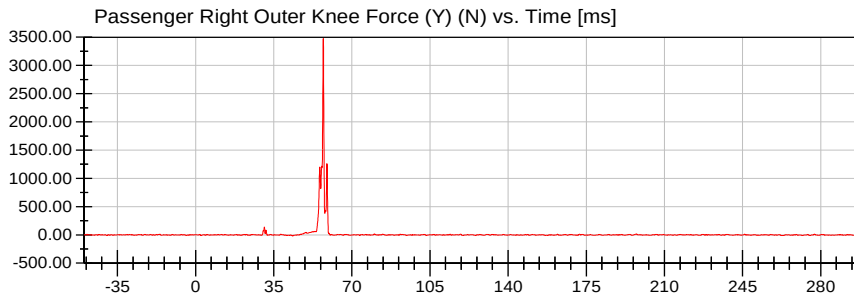


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



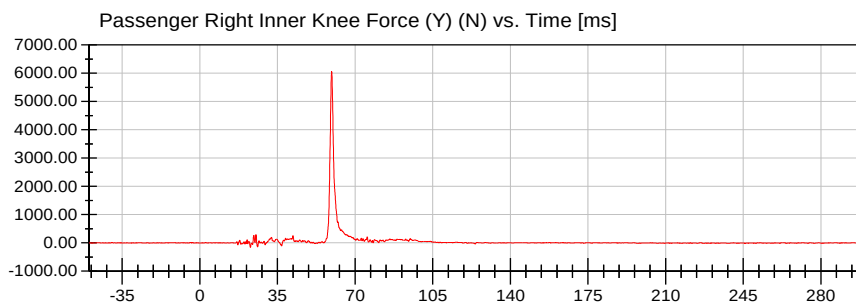
<Max>

3,475.20 N at 57.20 ms

<Min>

-17.92 N at 43.55 ms

CFC_600



<Max>

6,054.68 N at 59.45 ms

<Min>

-159.11 N at 22.80 ms

CFC_600

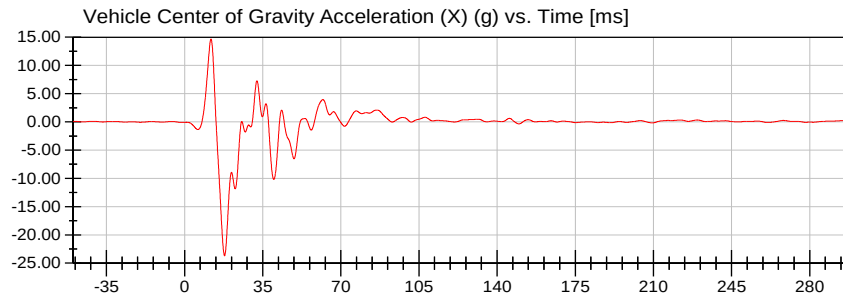


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



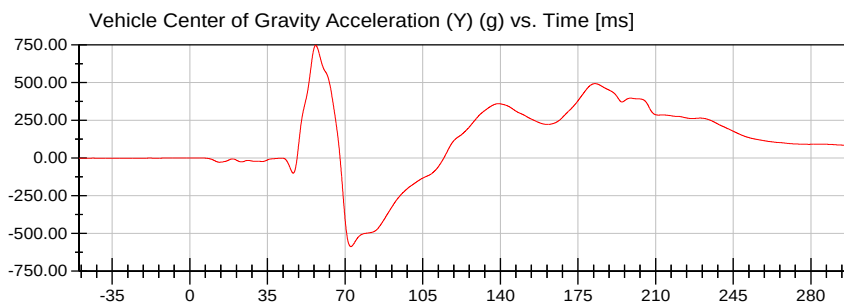
<Max>

14.65 g at 11.85 ms

<Min>

-23.71 g at 17.90 ms

CFC_60



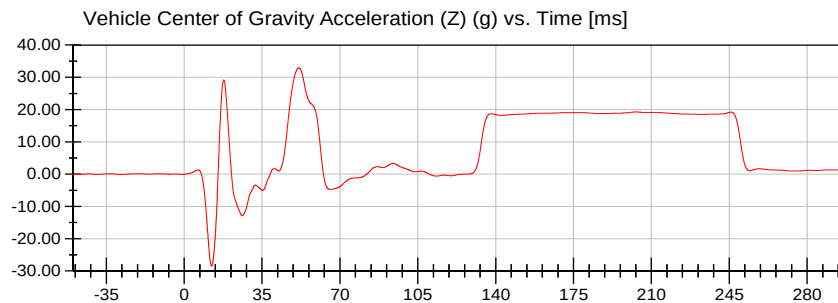
<Max>

747.93 g at 56.75 ms

<Min>

-586.51 g at 72.60 ms

CFC_60



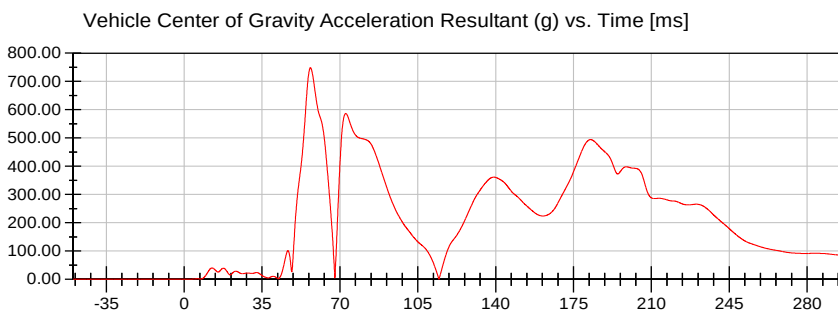
<Max>

32.92 g at 51.55 ms

<Min>

-28.44 g at 12.35 ms

CFC_60



<Max>

748.26 g at 56.75 ms

<Min>

0.02 g at -44.65 ms

CFC_60

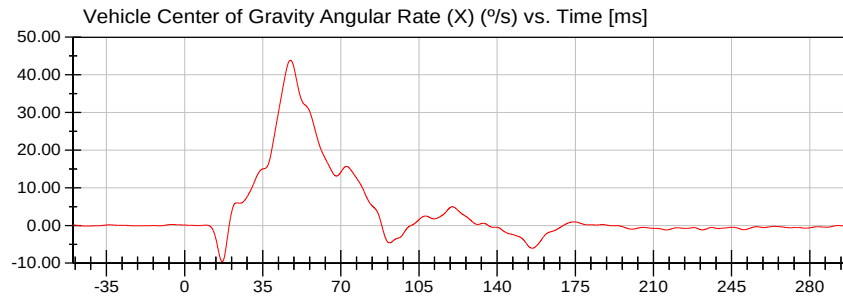


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



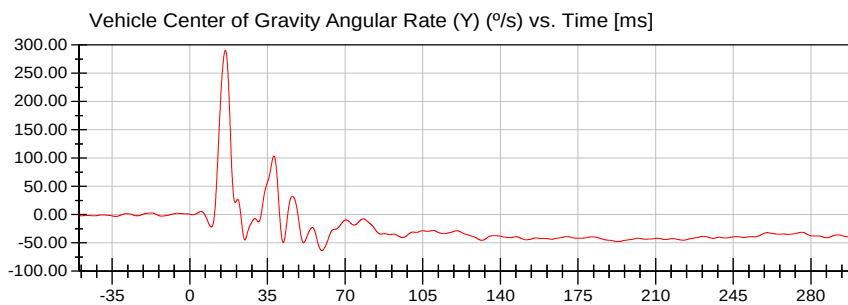
<Max>

43.88 °/s at 47.45 ms

<Min>

-9.64 °/s at 16.85 ms

CFC_60



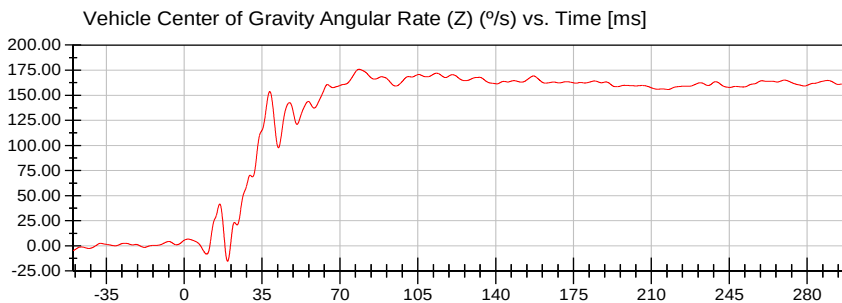
<Max>

290.55 °/s at 16.05 ms

<Min>

-63.30 °/s at 59.55 ms

CFC_60



<Max>

175.91 °/s at 78.60 ms

<Min>

-15.25 °/s at 19.55 ms

CFC_60

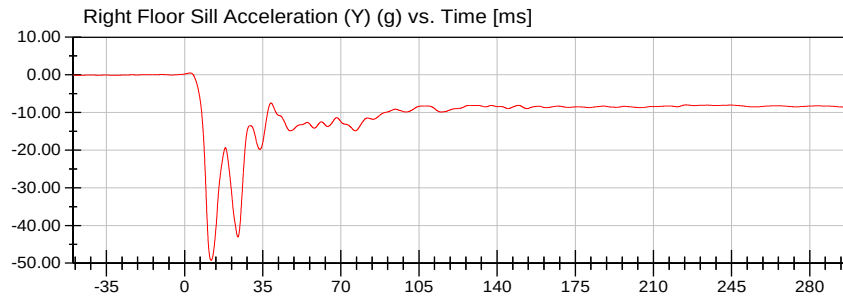


VRTC

Test Date: 09/15/2021

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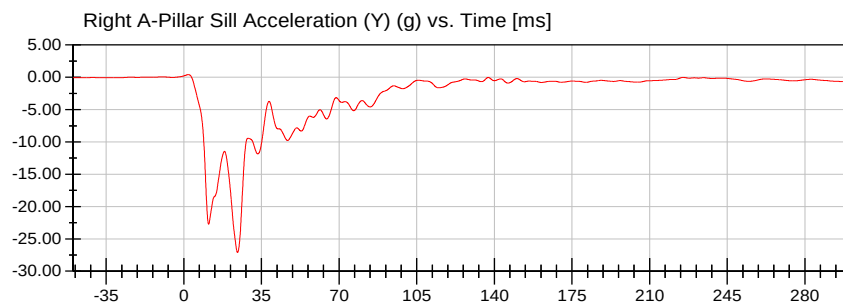
<Max>

0.48 g at 2.55 ms

<Min>

-49.26 g at 11.95 ms

CFC_60



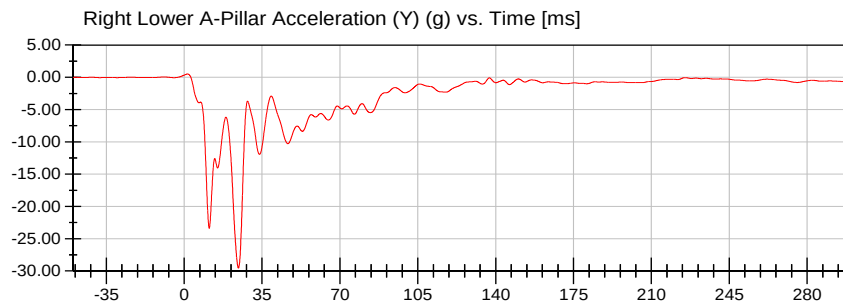
<Max>

0.42 g at 2.05 ms

<Min>

-27.10 g at 24.20 ms

CFC_60



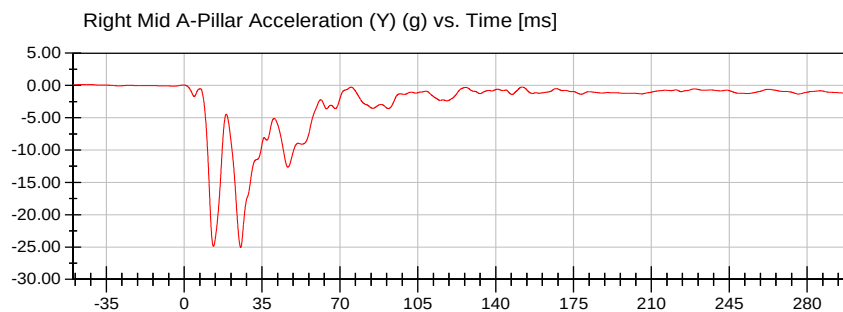
<Max>

0.51 g at 1.50 ms

<Min>

-29.56 g at 24.35 ms

CFC_60



<Max>

0.15 g at -43.35 ms

<Min>

-25.07 g at 25.40 ms

CFC_60

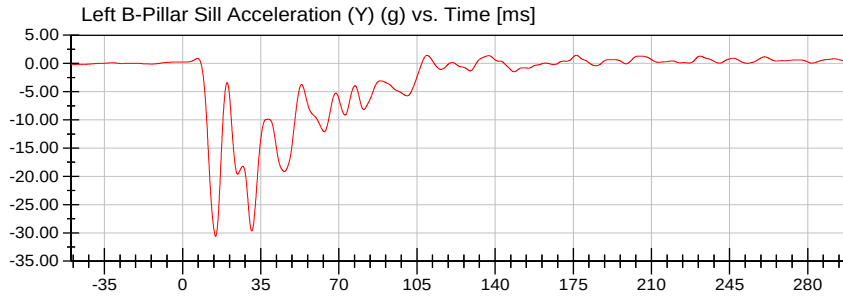


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



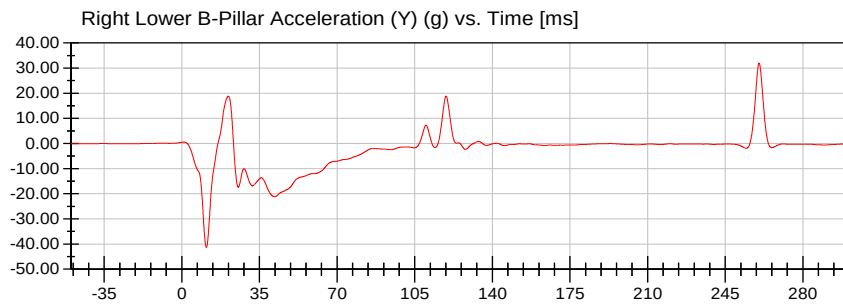
<Max>

1.43 g at 176.35 ms

<Min>

-30.60 g at 14.80 ms

CFC_60



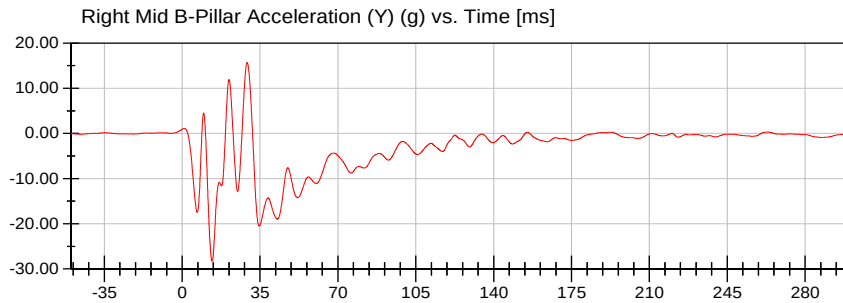
<Max>

32.01 g at 260.25 ms

<Min>

-41.37 g at 11.05 ms

CFC_60



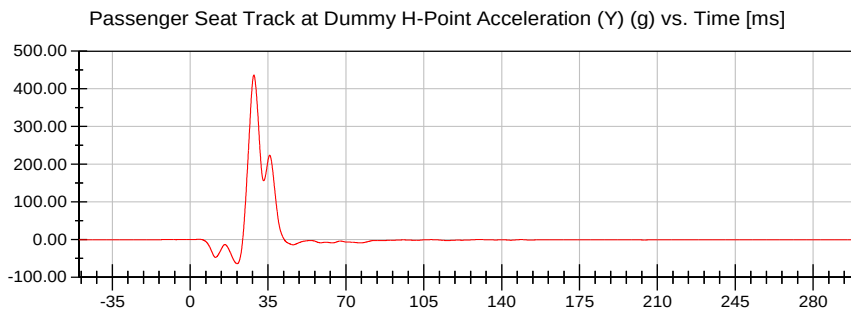
<Max>

15.70 g at 29.20 ms

<Min>

-28.30 g at 13.45 ms

CFC_60



<Max>

436.77 g at 28.65 ms

<Min>

-63.73 g at 21.10 ms

CFC_60

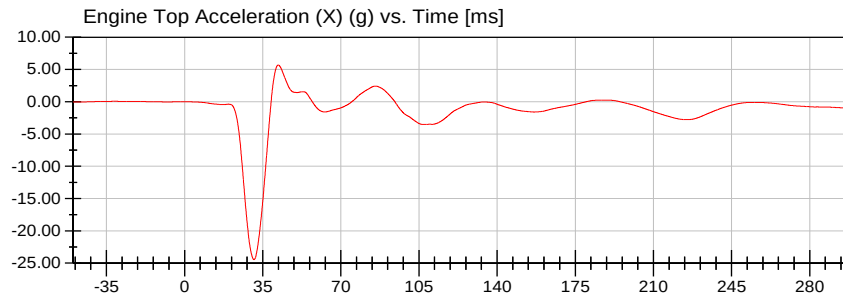


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



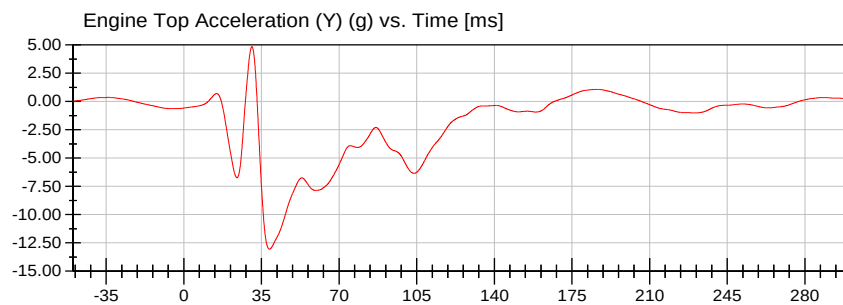
<Max>

5.69 g at 41.95 ms

<Min>

-24.46 g at 31.10 ms

CFC_60



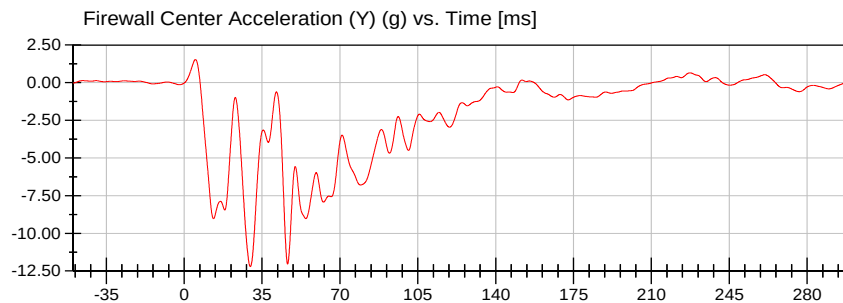
<Max>

4.86 g at 30.70 ms

<Min>

-13.05 g at 38.55 ms

CFC_60



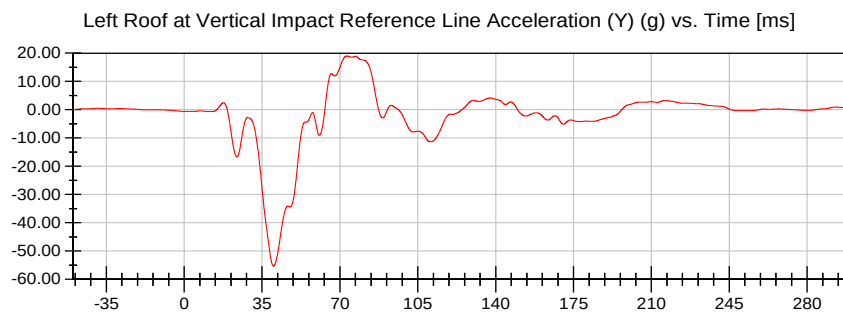
<Max>

1.53 g at 5.05 ms

<Min>

-12.21 g at 29.75 ms

CFC_60



<Max>

19.02 g at 73.20 ms

<Min>

-55.32 g at 40.20 ms

CFC_60

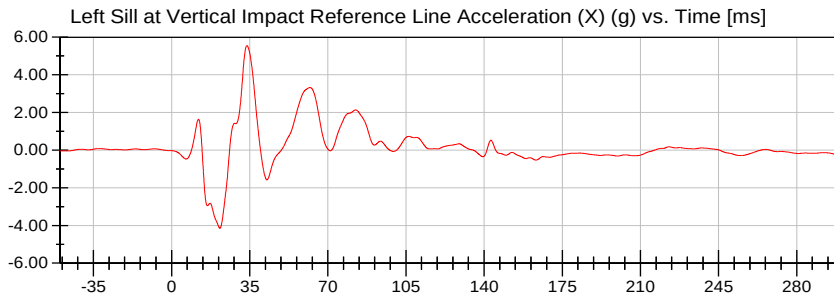


VRTC

Test Date: 09/15/2021

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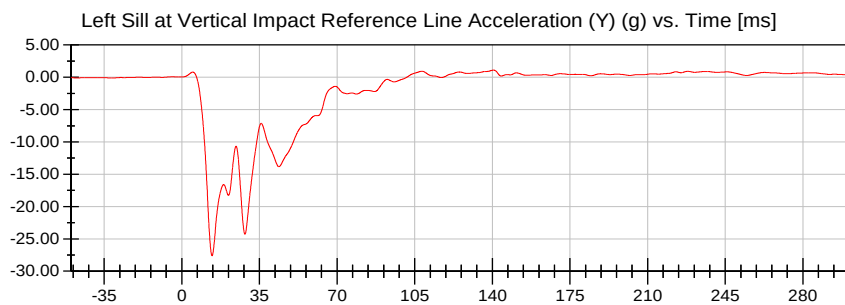
<Max>

5.55 g at 33.80 ms

<Min>

-4.15 g at 21.65 ms

CFC_60



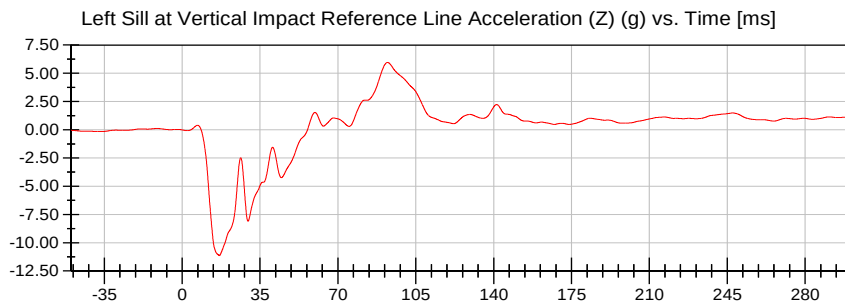
<Max>

1.12 g at 140.55 ms

<Min>

-27.60 g at 13.65 ms

CFC_60



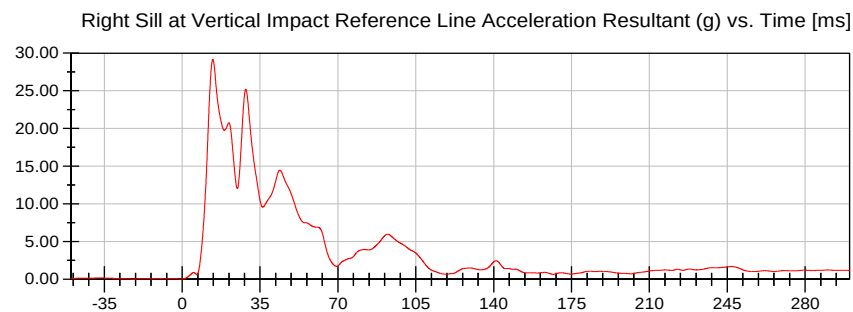
<Max>

5.96 g at 92.30 ms

<Min>

-11.13 g at 16.70 ms

CFC_60



<Max>

29.16 g at 13.75 ms

<Min>

0.03 g at -21.70 ms

CFC_60

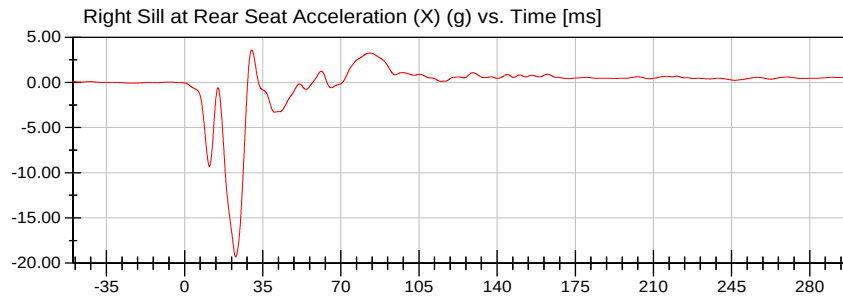


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



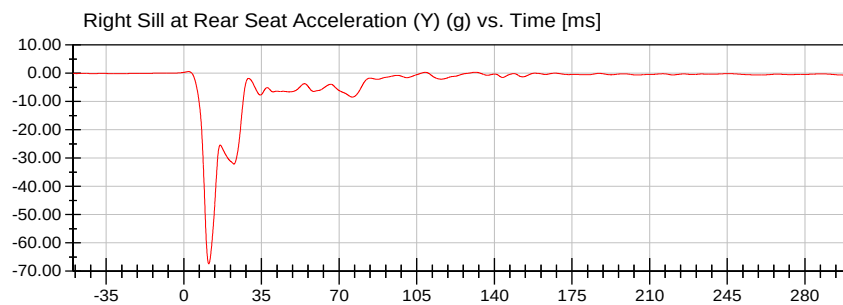
<Max>

3.59 g at 30.10 ms

<Min>

-19.31 g at 22.90 ms

CFC_60



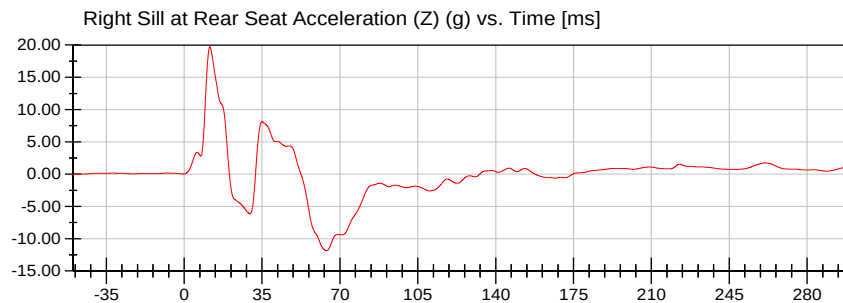
<Max>

0.56 g at 2.10 ms

<Min>

-67.40 g at 11.25 ms

CFC_60



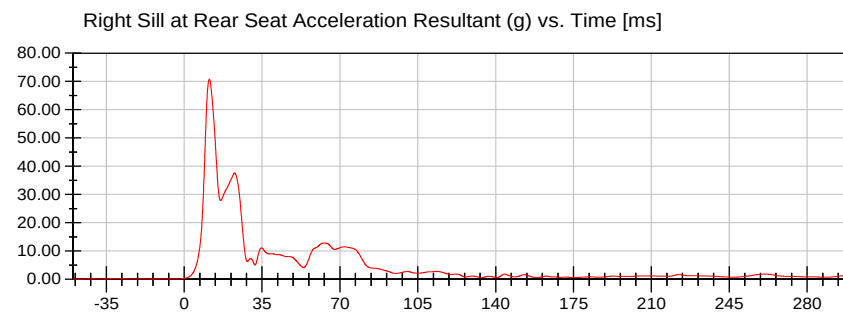
<Max>

19.74 g at 11.55 ms

<Min>

-11.85 g at 64.00 ms

CFC_60



<Max>

70.80 g at 11.30 ms

<Min>

0.09 g at -14.05 ms

CFC_60

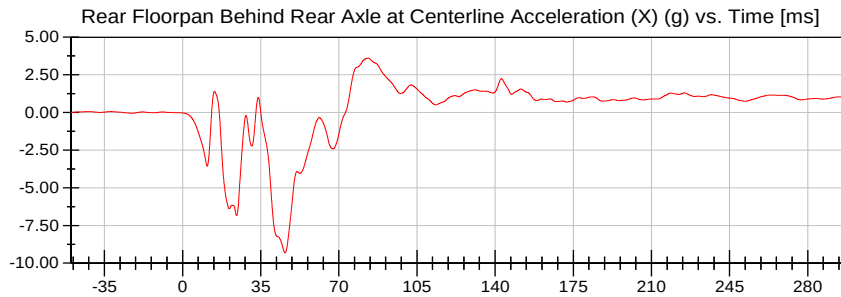


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



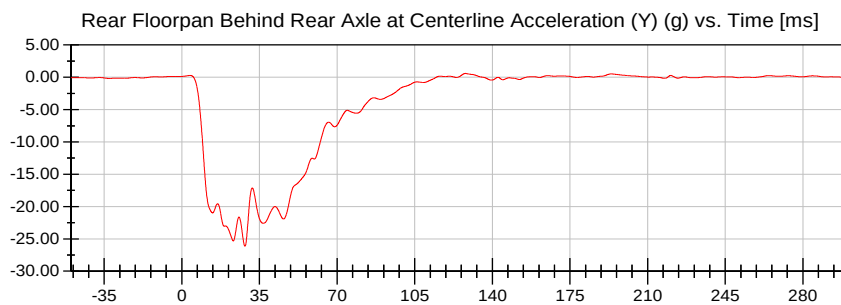
<Max>

3.61 g at 83.05 ms

<Min>

-9.32 g at 45.90 ms

CFC_60



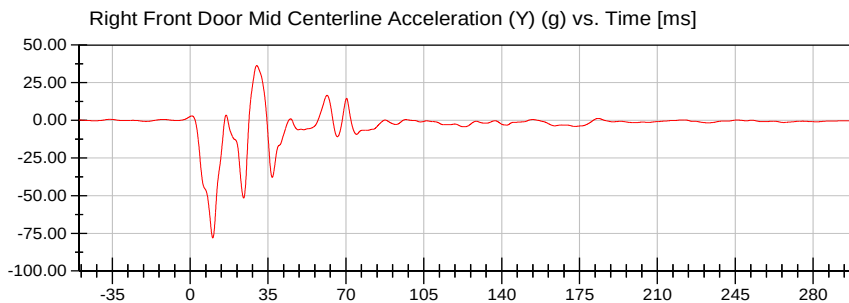
<Max>

0.59 g at 127.90 ms

<Min>

-26.13 g at 28.45 ms

CFC_60



<Max>

36.40 g at 29.95 ms

<Min>

-78.05 g at 10.15 ms

CFC_60

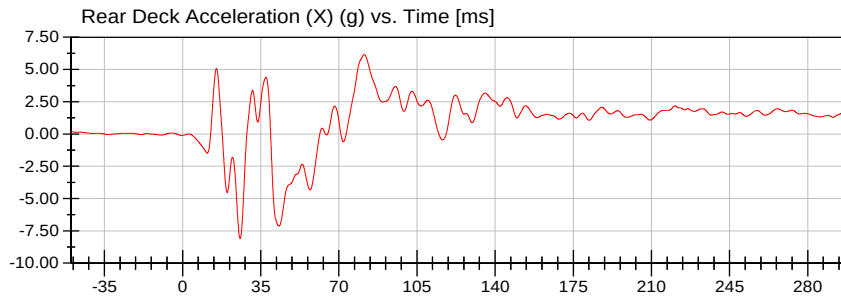


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



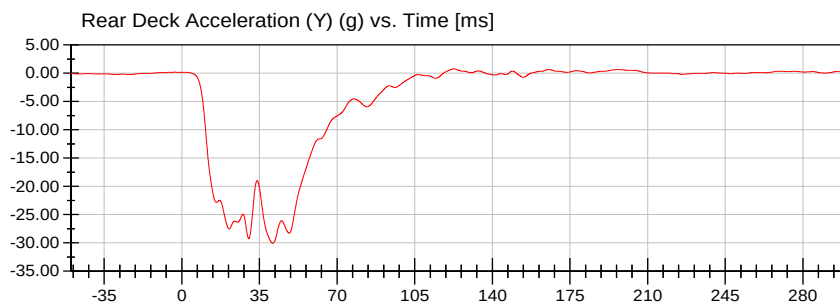
<Max>

6.16 g at 81.45 ms

<Min>

-8.10 g at 25.80 ms

CFC_60



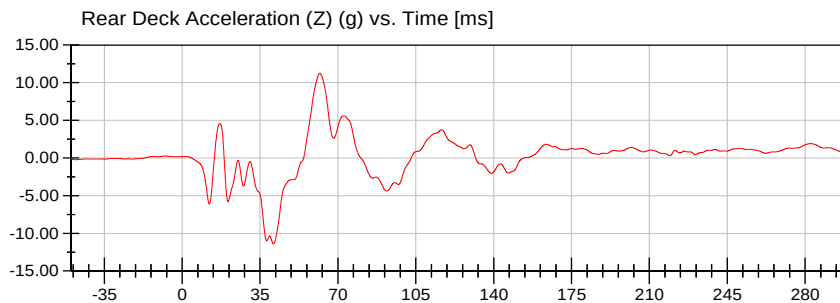
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0.79 g at 122.70 ms

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-30.07 g at 41.05 ms

CFC_60



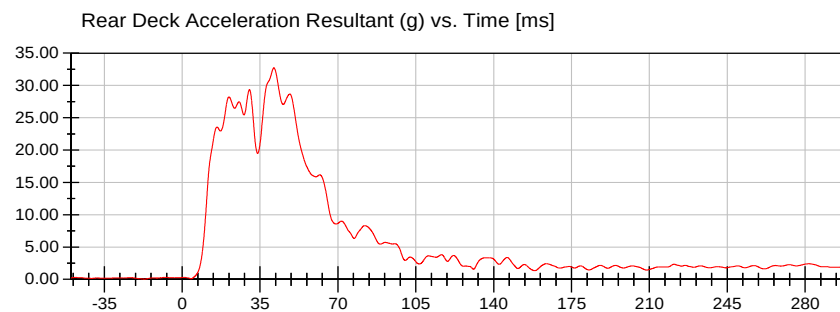
<Max>

11.25 g at 61.85 ms

<Min>

-11.41 g at 41.05 ms

CFC_60



<Max>

32.72 g at 41.25 ms

<Min>

0.03 g at -16.85 ms

CFC_60

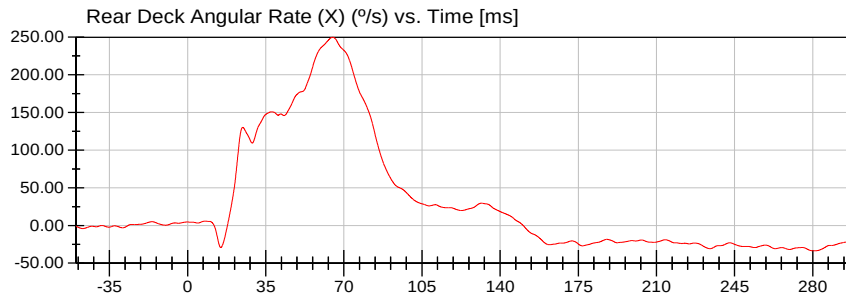


VRTC

Test Date: 09/15/2021

Test Lab: CTF

Test Number: 210915 ()



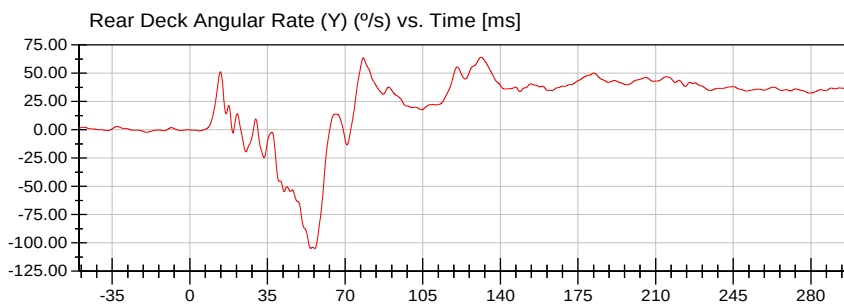
<Max>

249.82 °/s at 65.05 ms

<Min>

-33.55 °/s at 280.05 ms

CFC_60



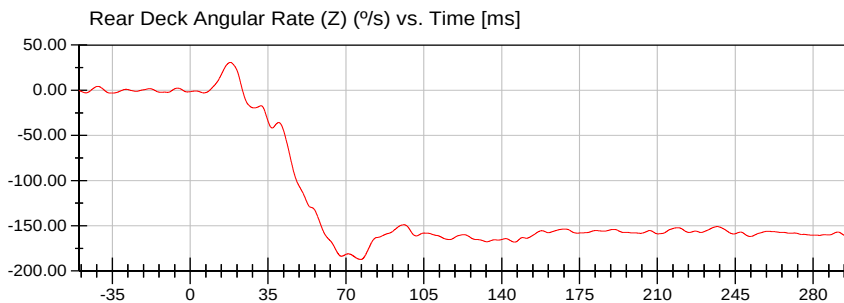
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64.08 °/s at 131.25 ms

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-104.97 °/s at 56.30 ms

CFC_60



<Max>

30.82 °/s at 18.05 ms

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-187.24 °/s at 76.65 ms

CFC_60

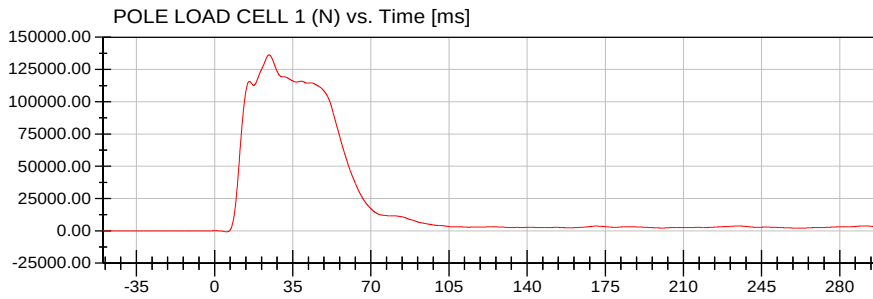


VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021



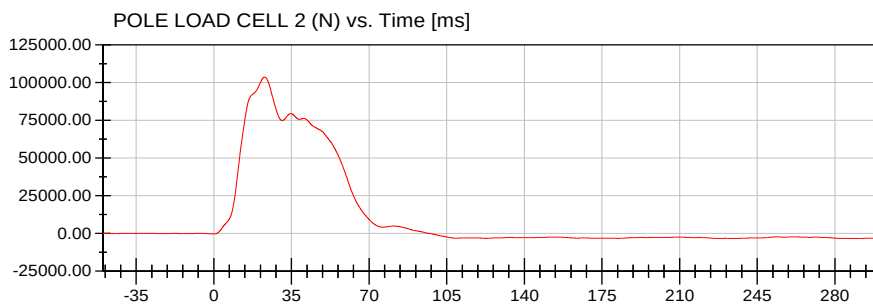
<Max>

136,305.58 N at 24.45 ms

<Min>

-770.16 N at 5.45 ms

CFC_60



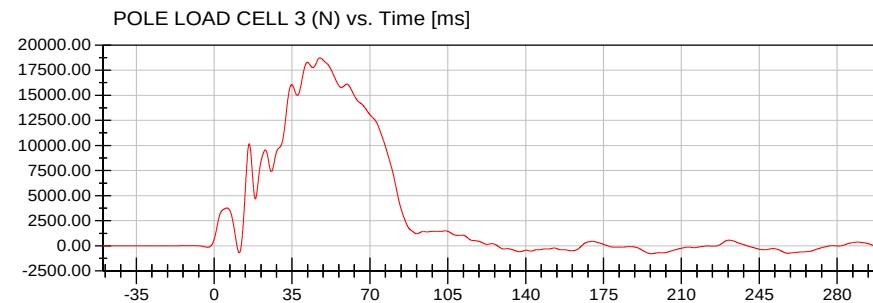
<Max>

103,701.89 N at 22.90 ms

<Min>

-3,371.95 N at 288.65 ms

CFC_60



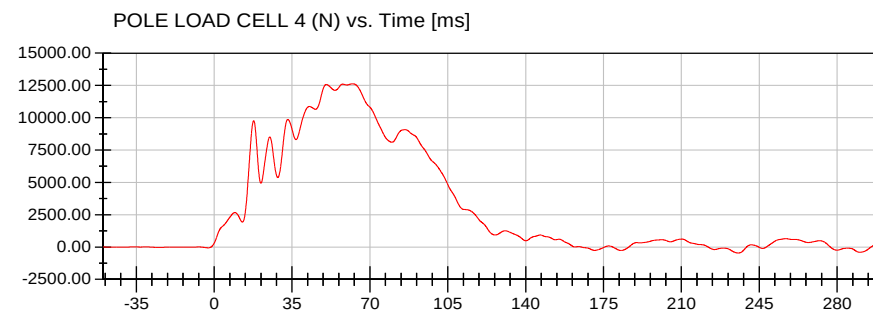
<Max>

18,727.89 N at 47.55 ms

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-780.31 N at 196.40 ms

CFC_60



<Max>

12,630.59 N at 62.25 ms

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-459.07 N at 235.60 ms

CFC_60



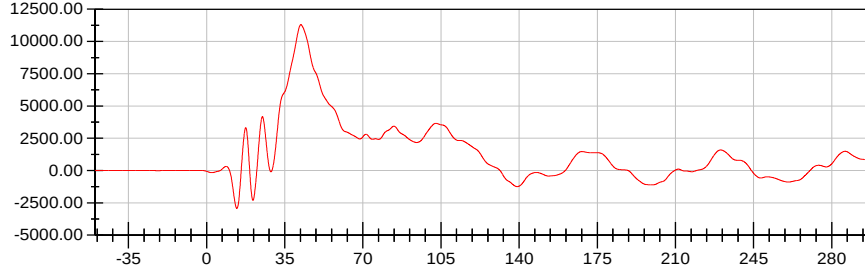
VRTC

Test Lab: CTF

Test Number: 210915 ()

Test Date: 09/15/2021

POLE LOAD CELL 5 (N) vs. Time [ms]



<Max>

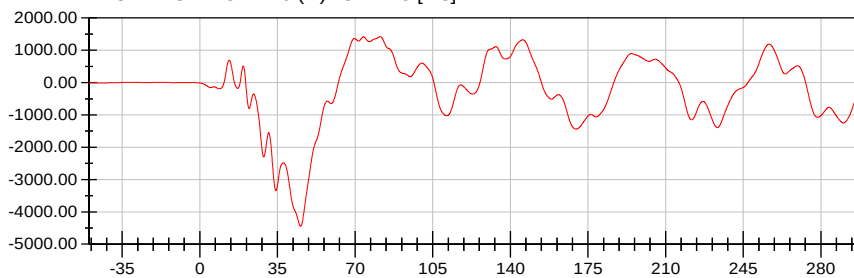
11,298.75 N at 42.25 ms

<Min>

-2,931.59 N at 13.55 ms

CFC_60

POLE LOAD CELL 6 (N) vs. Time [ms]



<Max>

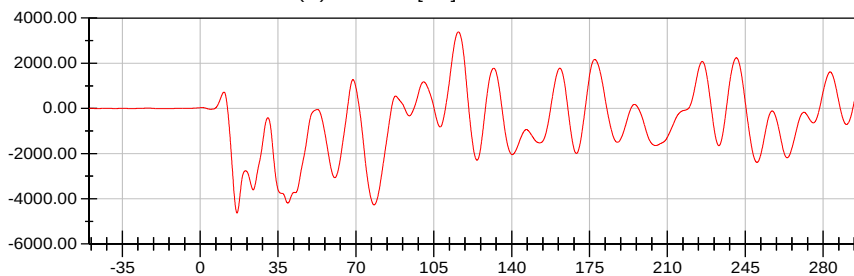
1,423.37 N at 81.30 ms

<Min>

-4,445.38 N at 45.40 ms

CFC_60

POLE LOAD CELL 7 (N) vs. Time [ms]



<Max>

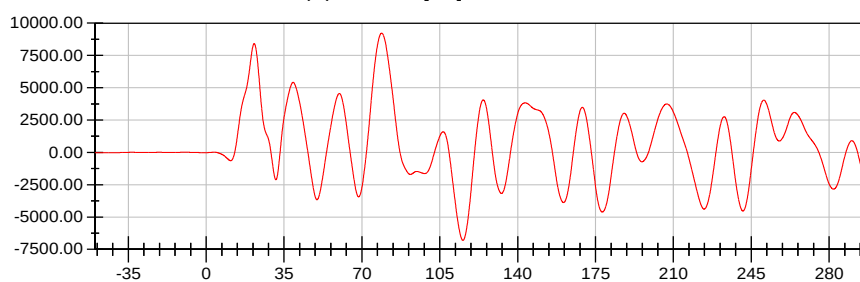
3,385.69 N at 116.05 ms

<Min>

-4,631.91 N at 16.55 ms

CFC_60

POLE LOAD CELL 8 (N) vs. Time [ms]



<Max>

9,224.30 N at 78.85 ms

<Min>

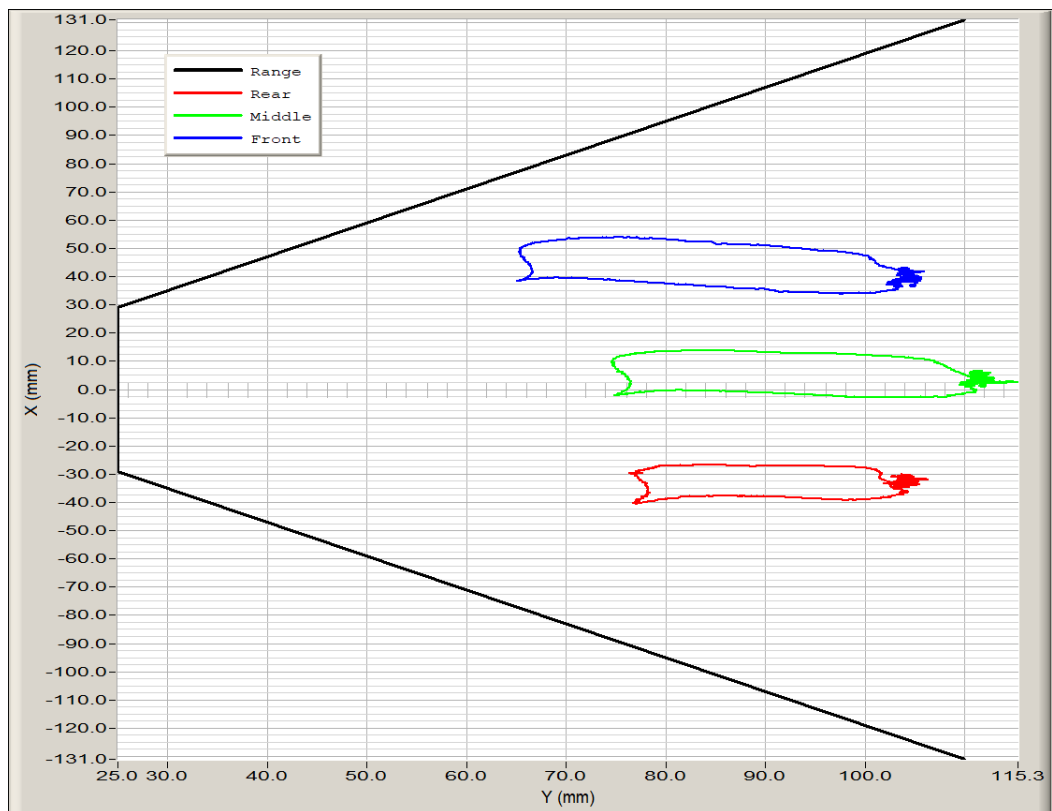
-6,805.68 N at 115.40 ms

CFC_60

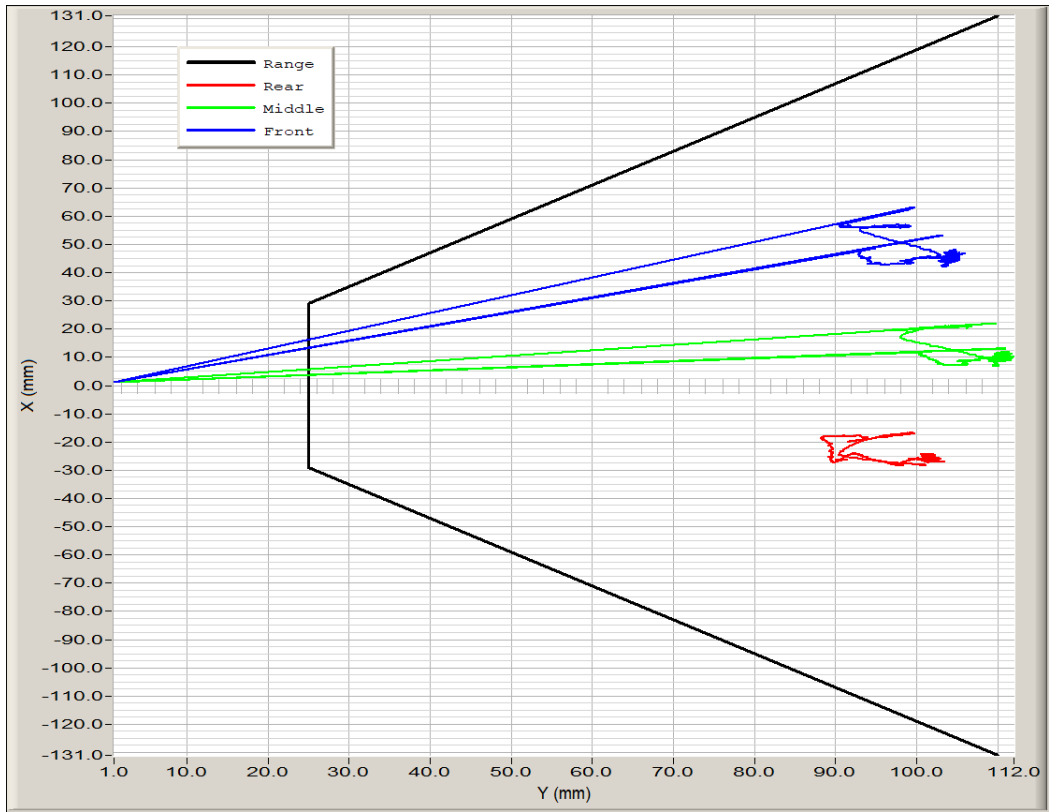




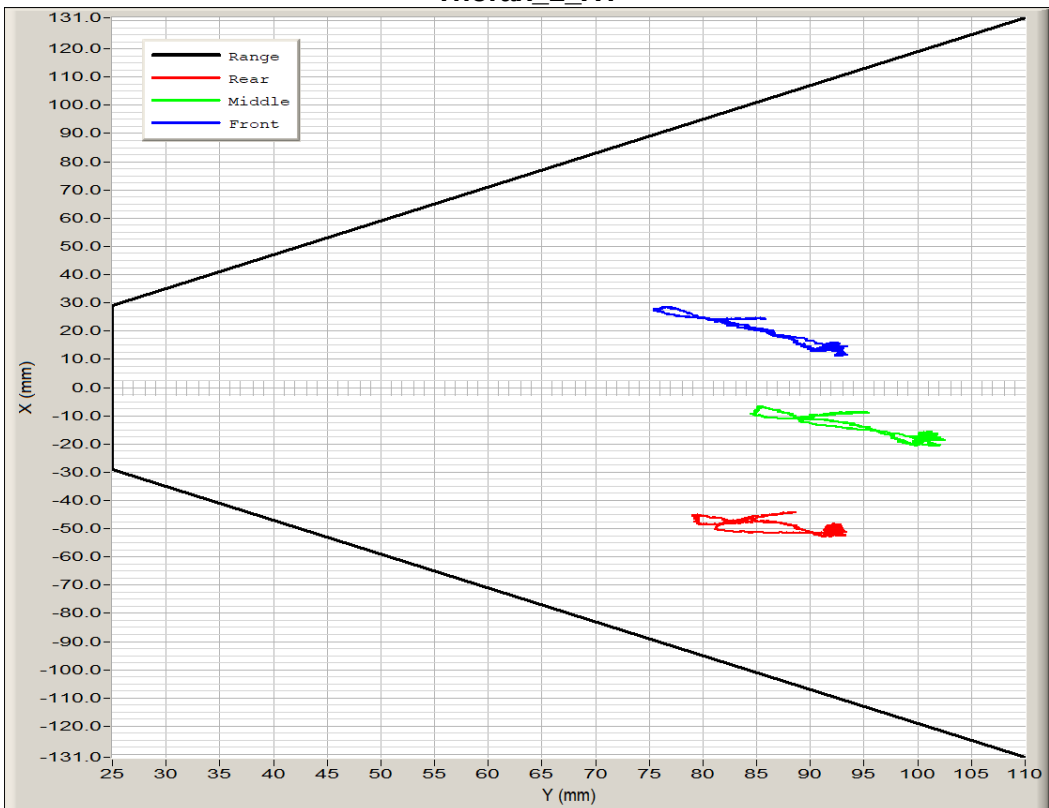
Shoulder_XY



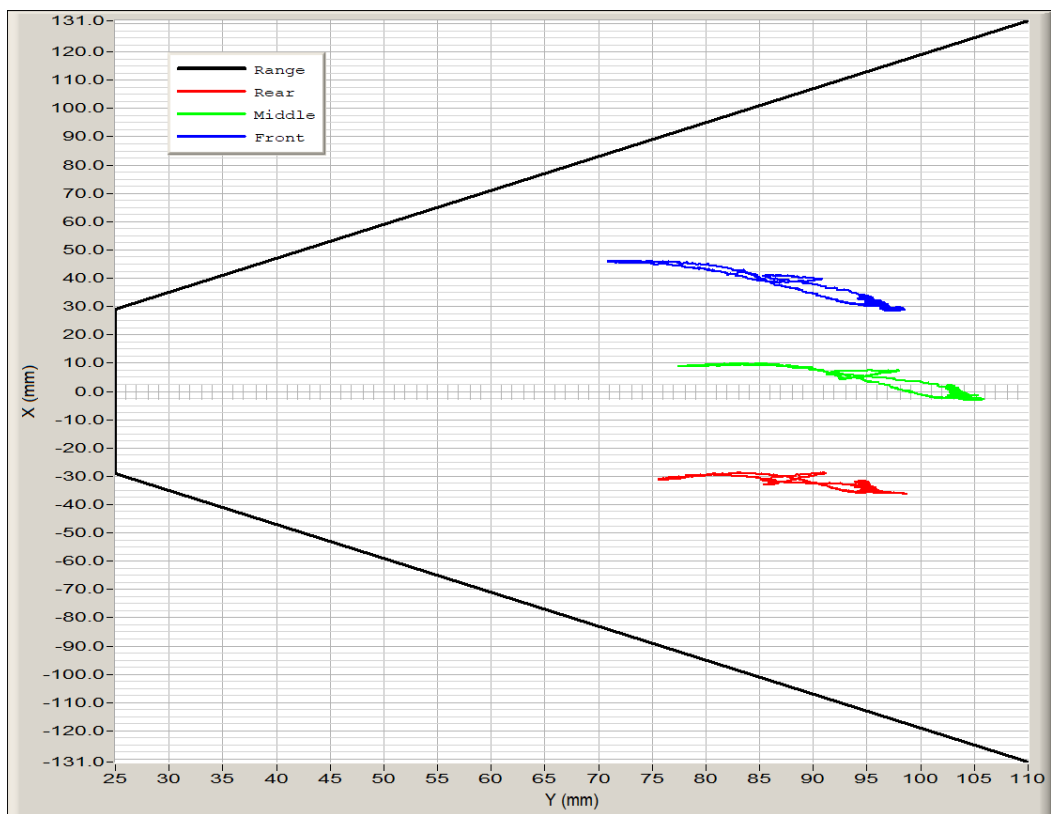
Thorax_1_XY



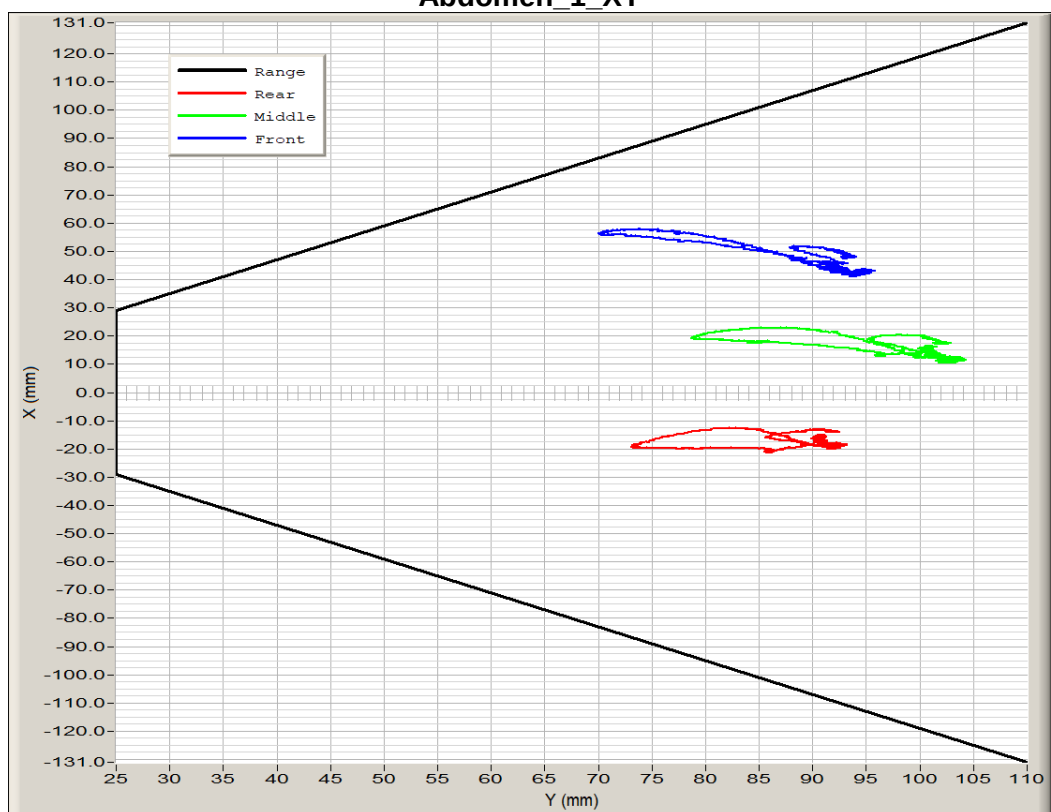
Thorax_2_XY



Thorax_3_XY



Abdomen_1_XY



Abdomen_2_XY

APPENDIX C
DUMMY PERFORMANCE QUALIFICATION TEST DATA

TABLE OF QUALIFICATION MEASUREMENTS AND PLOTS

WorldSID-50M (Passenger) 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 (Passenger) 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 EA7820

Transportation Research Center Inc.
WorldSID-50M
External Measurements
Serial No. EA7820 Qualification No. 03

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. EA7820 Certification No. 3-1

Test Date: 5/5/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Peak Head Resultant Acceleration	211 - 261 g	229.7 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-12.8 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	1.67 %	Yes

Test meets specifications.

Condition: Used

Comments:

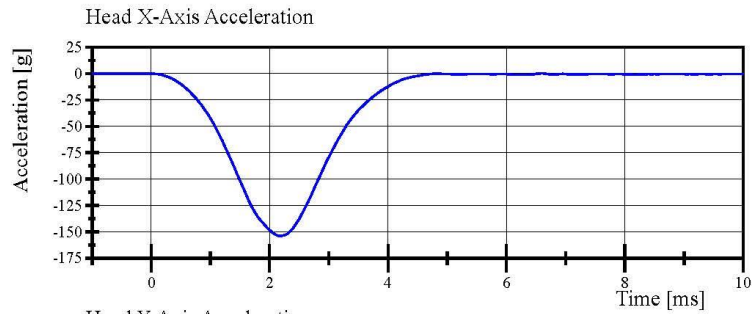
Head Skin S/N: EE8693

Transportation Research Center Inc.

Front Head Drop

WorldSID 50th Serial No. EA7820 Certification No. 3-1

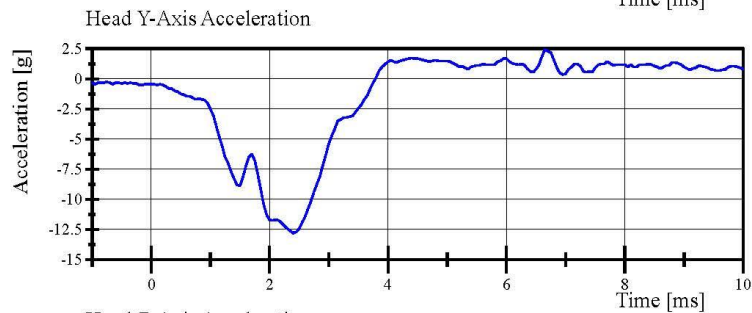
Test Date: 5/5/2021



Filter Class: CFC_1000

Max: 0.3 g at 6.6 ms

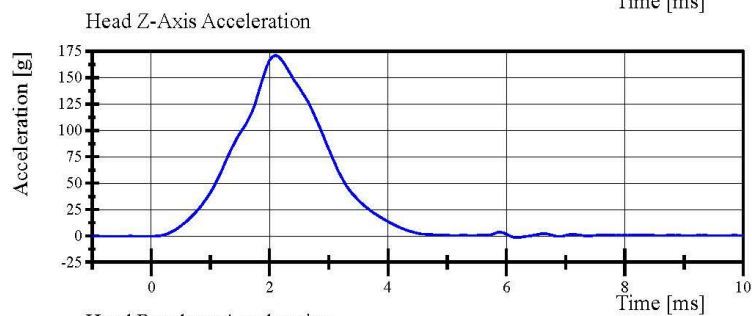
Min: -153.9 g at 2.2 ms



Filter Class: CFC_1000

Max: 2.4 g at 6.7 ms

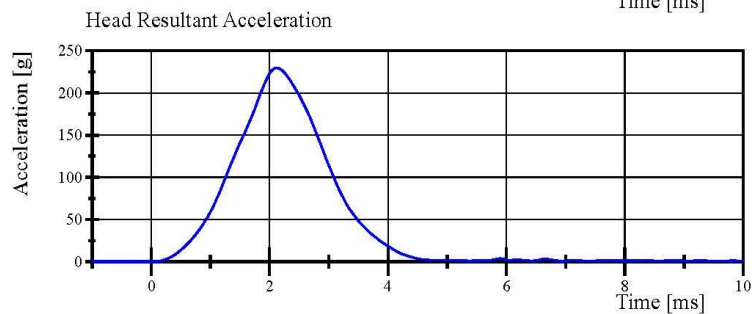
Min: -12.8 g at 2.4 ms



Filter Class: CFC_1000

Max: 171.1 g at 2.1 ms

Min: -1.7 g at 6.2 ms



Filter Class: CFC_1000

Max: 229.7 g at 2.1 ms

Min: 0.4 g at -0.5 ms

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

Report Number: EA7820_WSH03

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Transportation Research Center Inc.

Left Lateral Head Drop

WorldSID 50th Serial No. EA7820 Certification No. 3-1

Test Date: 5/5/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	42 %	Yes
Peak Head Resultant Acceleration	107 - 126 g	121.9 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-2.5 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	1.42 %	Yes

Test meets specifications.

Condition: Used

Comments:

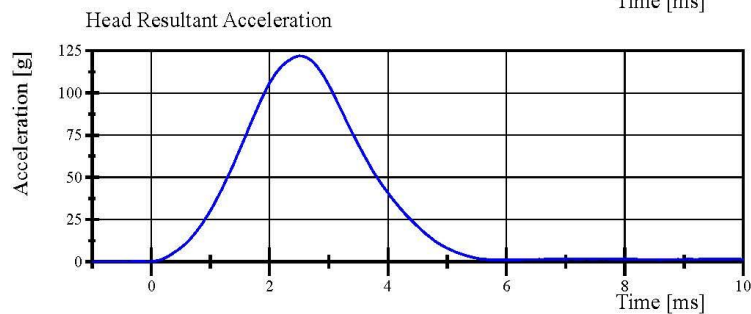
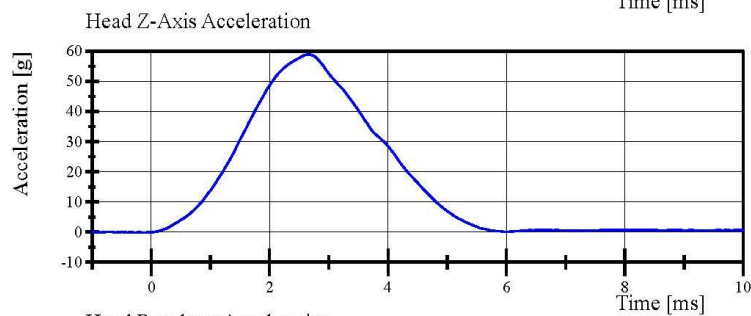
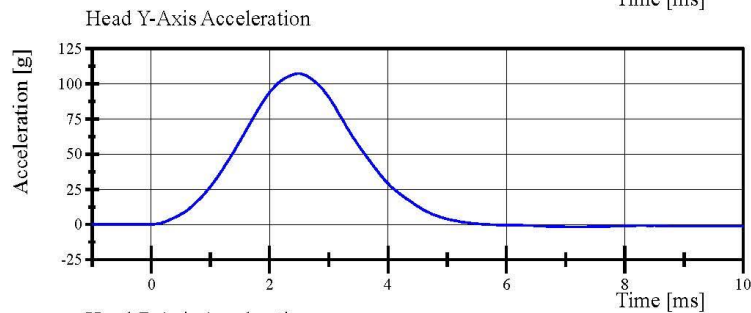
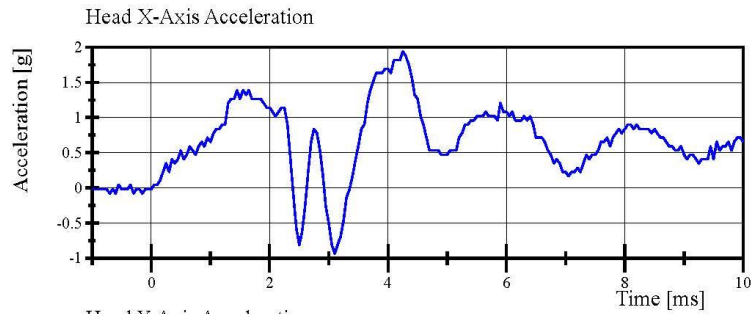
Head Skin S/N: EE8693

Transportation Research Center Inc.

Left Lateral Head Drop

WorldSID 50th Serial No. EA7820 Certification No. 3-1

Test Date: 5/5/2021



Transportation Research Center Inc.

Right Lateral Head Drop
WorldSID 50th Serial No. EA7820 Certification No. 3-1
Test Date: 5/5/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Peak Head Resultant Acceleration	107 - 126 g	121.2 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-5.4 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	2.86 %	Yes

Test meets specifications.

Condition: Used

Comments:

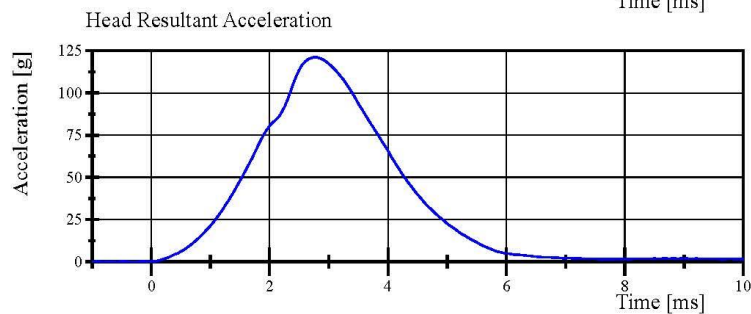
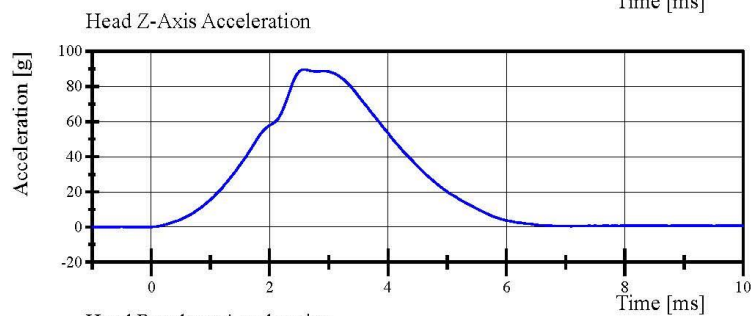
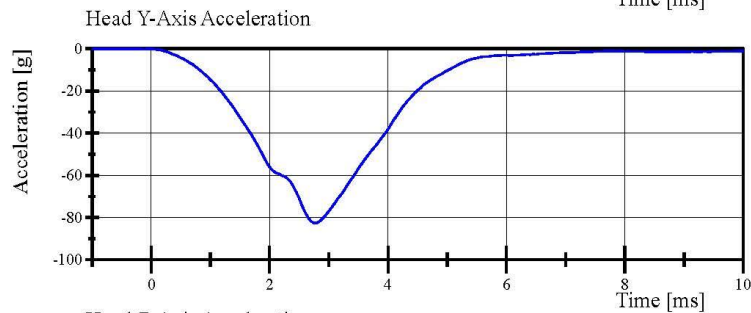
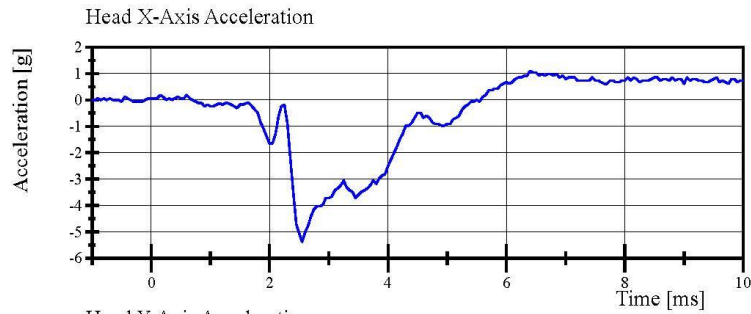
Head Skin S/N: EE8693

Transportation Research Center Inc.

Right Lateral Head Drop

WorldSID 50th Serial No. EA7820 Certification No. 3-1

Test Date: 5/5/2021



Transportation Research Center Inc.

Left Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 3-1

Test Date: 5/7/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	(-3.30) - (-3.50) m/s	-3.324 m/s	Yes
Pendulum Integrated Velocity Change at 4 ms	0.87 - 1.09 m/s	0.952 m/s	Yes
Change at 8 ms	1.72 - 2.1 m/s	1.853 m/s	Yes
Change at 12 ms	2.63 - 3.17 m/s	2.796 m/s	Yes
Maximum Headform Flexion	(-50) - (-61) deg	-52.9 deg	Yes
Headform Flexion Decay - from Peak to Zero Degrees	58 - 72 ms	60.7 ms	Yes
Total Neck Occipital Condyles Moment	54 - 67 N·m	61.1 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	71 - 87 ms	77.0 ms	Yes
Maximum Forward Pot Rotation			
Peak	(-32) - (-39) °	-34.3 °	Yes
Time of Peak	56 - 68 ms	60.4 ms	Yes
Maximum Rear Pot Rotation			
Peak	(-29) - (-36) °	-30.8 °	Yes
Time of Peak	56 - 68 ms	61.4 ms	Yes
Maximum Headform Angular Rate	(-2,047) - (-2,503) °/s	-2,235.4 °/s	Yes

Test meets specifications.

Condition: Used

Comments:

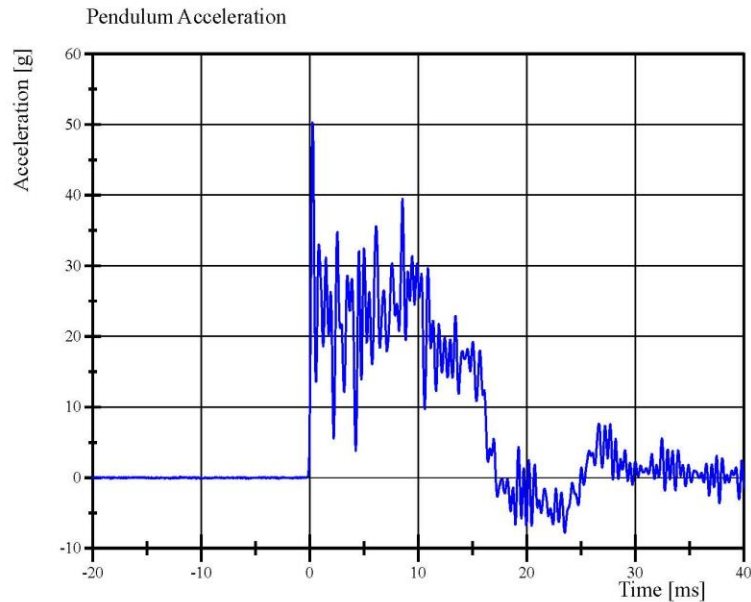
Neck S/N: DW6607

Transportation Research Center Inc.

Left Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 3-1

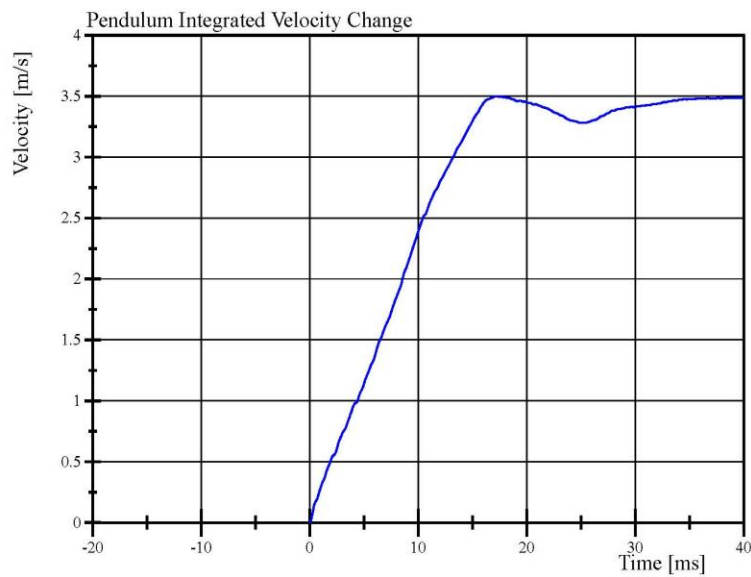
Test Date: 5/7/2021



Filter Class: CFC_1000

Max: 50.3 g at 0.3 ms

Min: -7.8 g at 23.5 ms



Filter Class: CFC_1000

Max: 3.5 m/s at 17.2 ms

Min: 0.0 m/s at -0.0 ms

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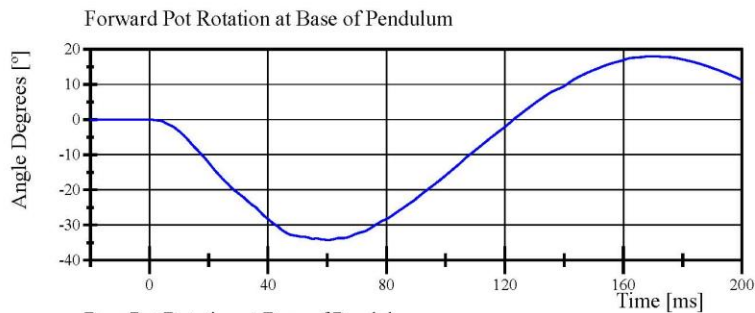


Transportation Research Center Inc.

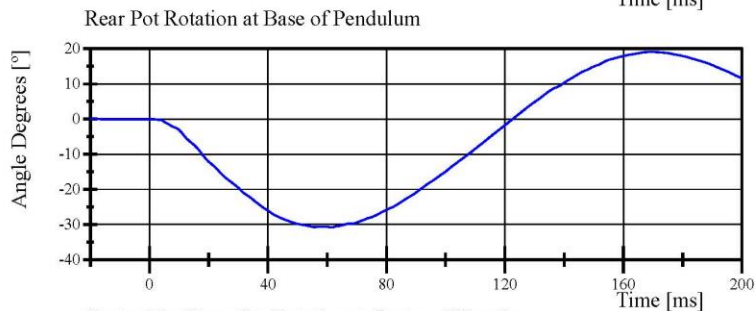
Left Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 3-1

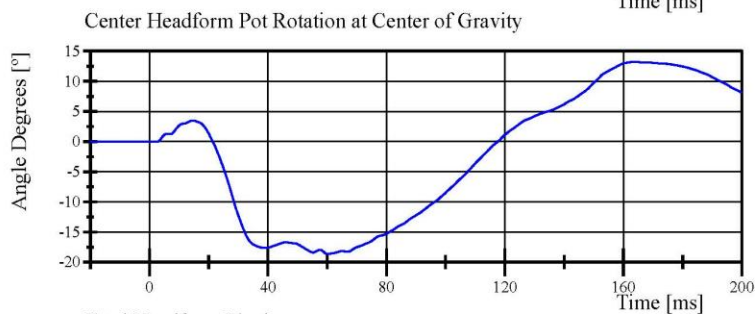
Test Date: 5/7/2021



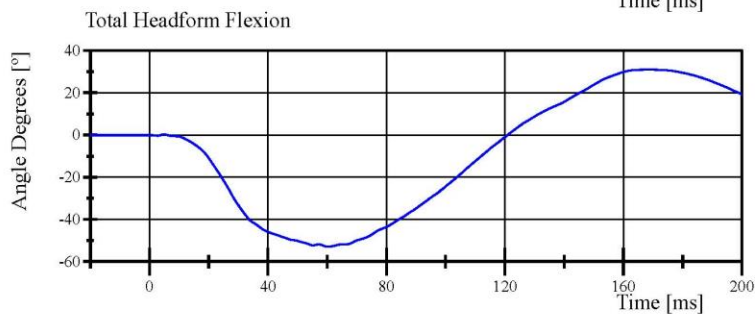
Filter Class: CFC_180
Max: 18.0 ° at 169.2 ms
Min: -34.3 ° at 60.4 ms



Filter Class: CFC_180
Max: 19.1 ° at 169.9 ms
Min: -30.8 ° at 61.4 ms



Filter Class: CFC_180
Max: 13.2 ° at 163.3 ms
Min: -18.7 ° at 60.1 ms



Filter Class: CFC_180
Max: 31.1 ° at 168.4 ms
Min: -52.9 ° at 60.2 ms

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

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Report Number: EA7820_WSH03

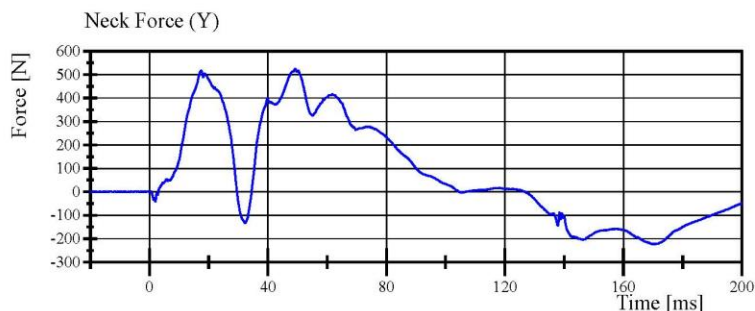
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Transportation Research Center Inc.

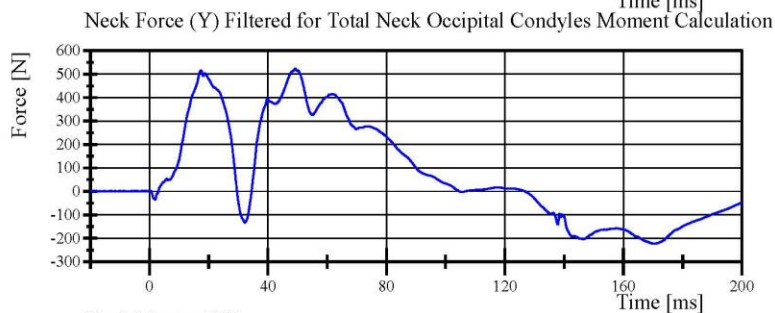
Left Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 3-1

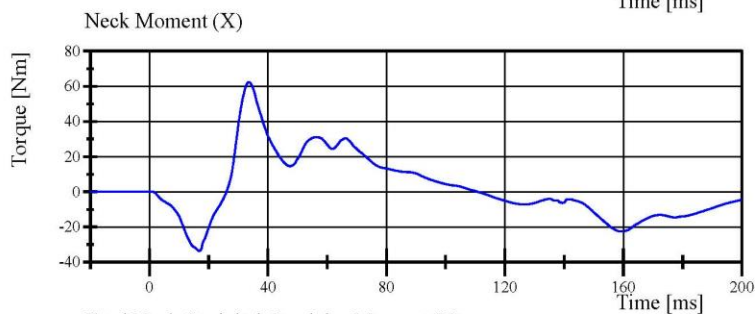
Test Date: 5/7/2021



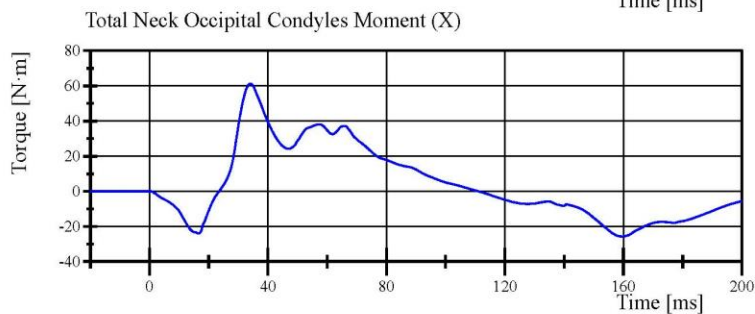
Filter Class: CFC_1000
Max: 524.0 N at 49.2 ms
Min: -223.1 N at 170.5 ms



Filter Class: CFC_600
Max: 523.2 N at 49.2 ms
Min: -222.6 N at 170.5 ms



Filter Class: CFC_600
Max: 62.4 Nm at 33.6 ms
Min: -33.6 Nm at 16.8 ms



Filter Class: Without_(Constar
Max: 61.1 N·m at 34.1 ms
Min: -25.7 N·m at 159.5 ms

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

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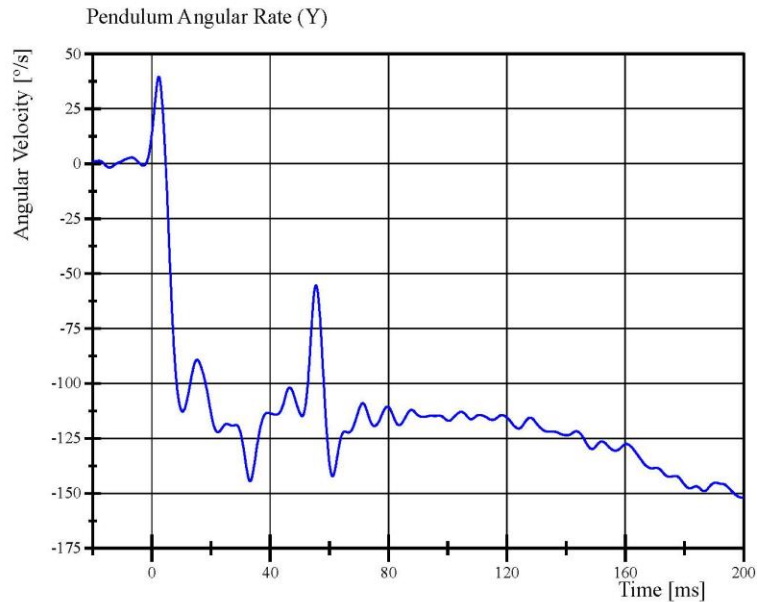


Transportation Research Center Inc.

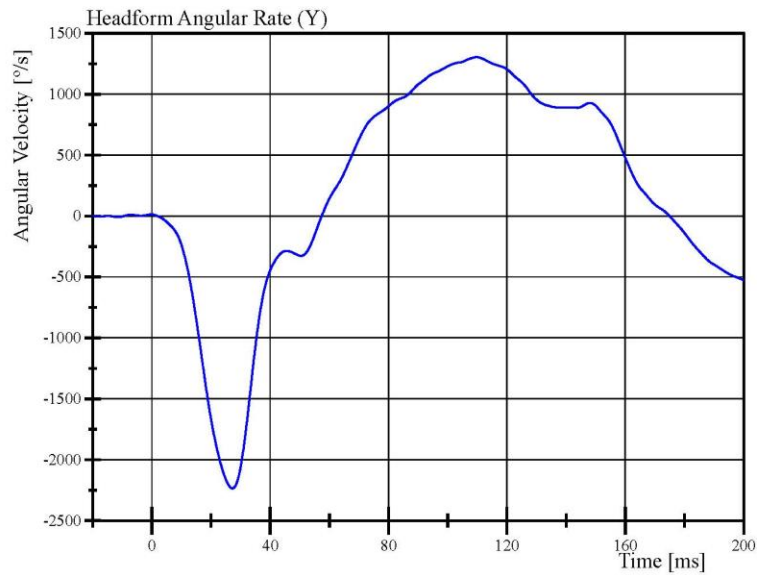
Left Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 3-1

Test Date: 5/7/2021



Filter Class: CFC_60
Max: 39.7 °/s at 2.4 ms
Min: -151.9 °/s at 199.5 ms



Filter Class: CFC_60
Max: 1,304.5 °/s at 109.8 ms
Min: -2,235.4 °/s at 27.2 ms

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

Report Number: EA7820_WSH03

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Transportation Research Center Inc.

Right Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 3-1

Test Date: 5/7/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	3.30 - 3.50 m/s	3.320 m/s	Yes
Pendulum Integrated Velocity Change at 4 ms	(-0.87) - (-1.09) m/s	-1.001 m/s	Yes
Change at 8 ms	(-1.72) - (-2.1) m/s	-2.000 m/s	Yes
Change at 12 ms	(-2.63) - (-3.17) m/s	-3.026 m/s	Yes
Maximum Headform Flexion	50 - 61 deg	52.7 deg	Yes
Headform Flexion Decay - from Peak to Zero Degrees	58 - 72 ms	61.7 ms	Yes
Total Neck Occipital Condyles Moment	(-54) - (-67) N·m	-63.5 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	71 - 87 ms	76.2 ms	Yes
Maximum Forward Pot Rotation			
Peak	32 - 39 °	34.1 °	Yes
Time of Peak	56 - 68 ms	59.7 ms	Yes
Maximum Rear Pot Rotation			
Peak	29 - 36 °	30.5 °	Yes
Time of Peak	56 - 68 ms	62.4 ms	Yes
Maximum Headform Angular Rate	2,047 - 2,503 °/s	2,314.7 °/s	Yes

Test meets specifications.

Condition: Used

Comments:

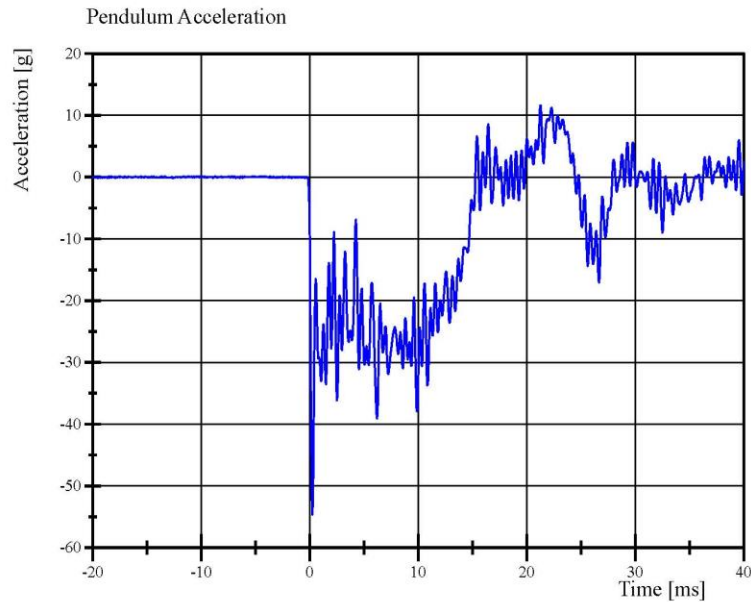
Neck S/N: DW6607

Transportation Research Center Inc.

Right Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 3-1

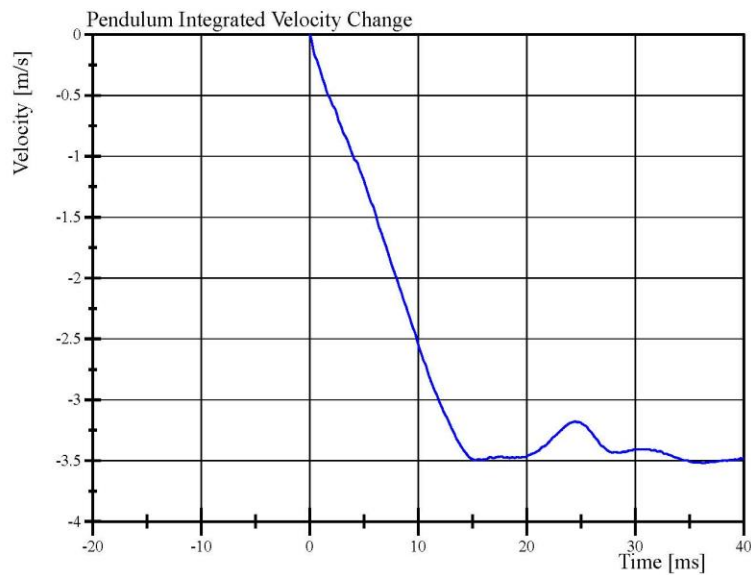
Test Date: 5/7/2021



Filter Class: CFC_1000

Max: 11.6 g at 21.3 ms

Min: -54.6 g at 0.3 ms



Filter Class: CFC_1000

Max: 0.0 m/s at 0.0 ms

Min: -3.5 m/s at 36.3 ms

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

Report Number: EA7820_WSH03

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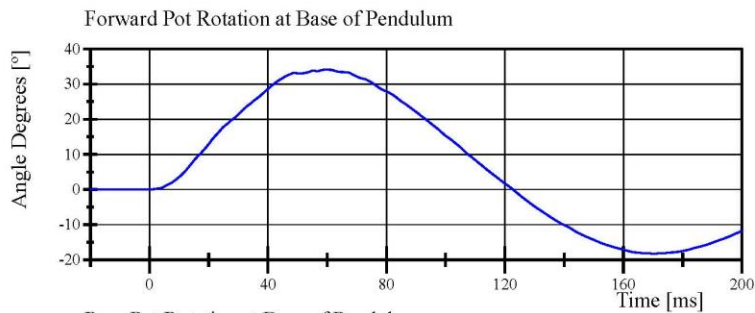


Transportation Research Center Inc.

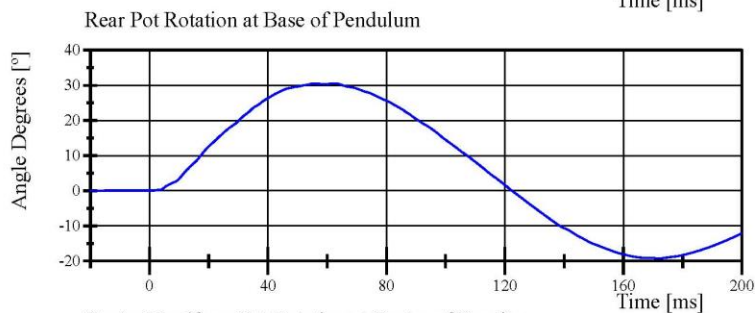
Right Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 3-1

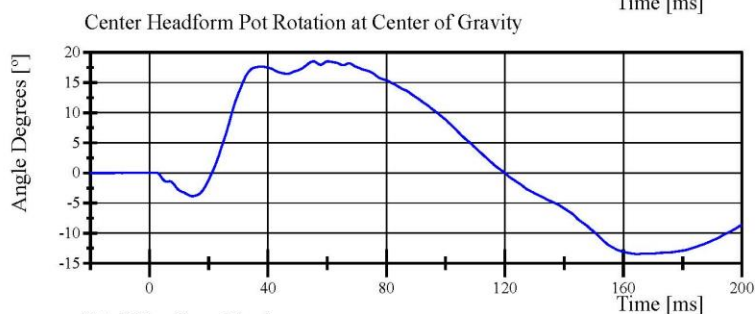
Test Date: 5/7/2021



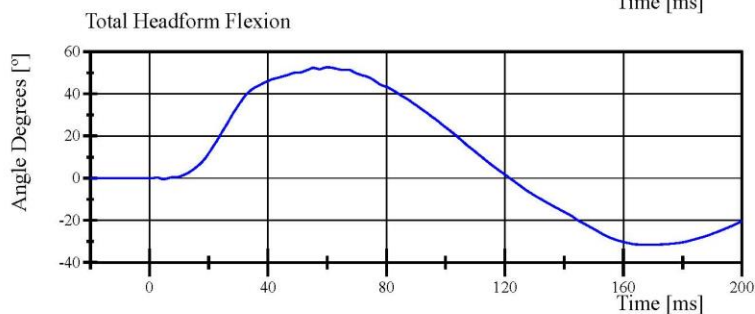
Filter Class: CFC_180
Max: 34.1 ° at 59.7 ms
Min: -18.2 ° at 170.4 ms



Filter Class: CFC_180
Max: 30.5 ° at 62.4 ms
Min: -19.2 ° at 172.2 ms



Filter Class: CFC_180
Max: 18.5 ° at 55.4 ms
Min: -13.5 ° at 164.7 ms



Filter Class: CFC_180
Max: 52.7 ° at 60.0 ms
Min: -31.6 ° at 170.0 ms

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

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Report Number: EA7820_WSH03

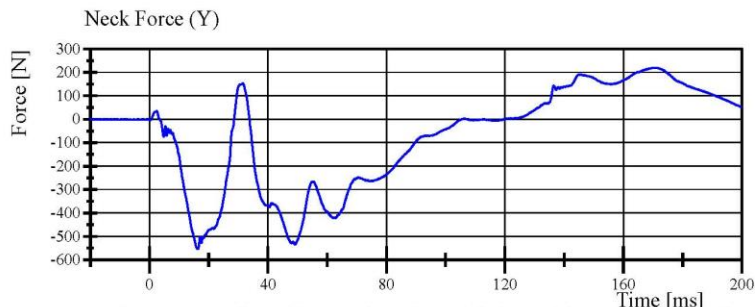
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Transportation Research Center Inc.

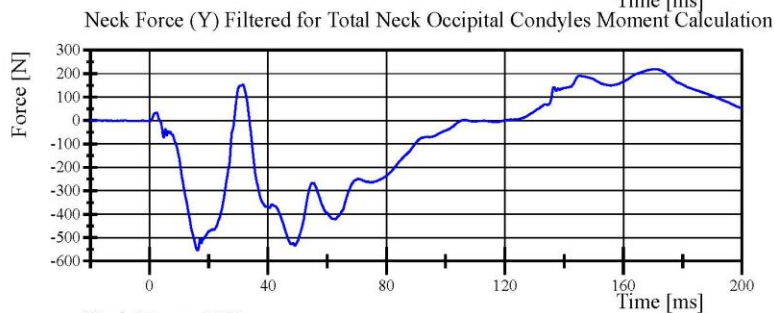
Right Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 3-1

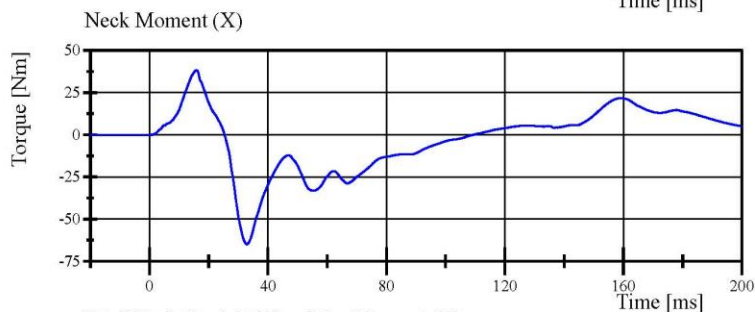
Test Date: 5/7/2021



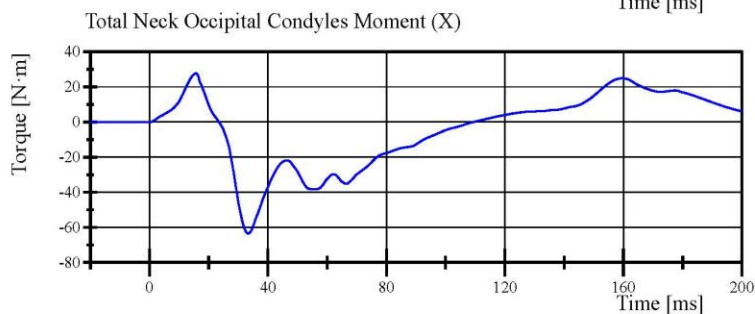
Filter Class: CFC_1000
Max: 220.1 N at 170.5 ms
Min: -553.9 N at 16.3 ms



Filter Class: CFC_600
Max: 219.4 N at 170.5 ms
Min: -554.1 N at 16.3 ms



Filter Class: CFC_600
Max: 38.2 Nm at 15.8 ms
Min: -64.9 Nm at 32.9 ms



Filter Class: Without_(Constar
Max: 27.6 N·m at 15.6 ms
Min: -63.5 N·m at 33.3 ms

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

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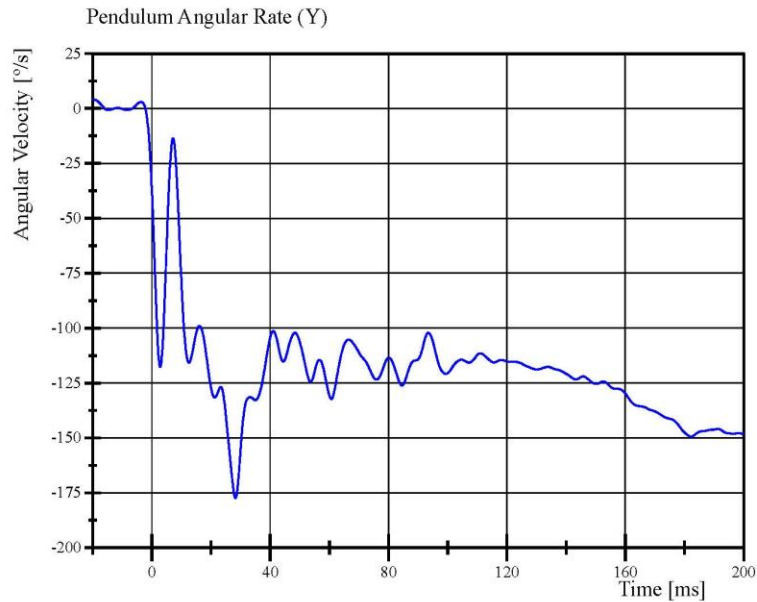


Transportation Research Center Inc.

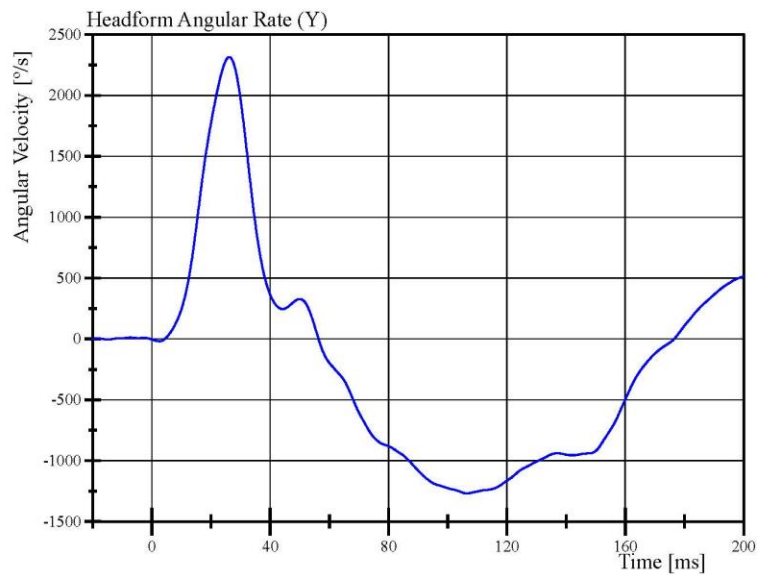
Right Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 3-1

Test Date: 5/7/2021



Filter Class: CFC_60
Max: 4.1 %/s at -19.6 ms
Min: -177.4 %/s at 28.3 ms



Filter Class: CFC_60
Max: 2,314.7 %/s at 26.2 ms
Min: -1,268.3 %/s at 106.4 ms

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

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Transportation Research Center Inc.

Left Lateral Torsion

WorldSID 50th Serial No. EA7820 Certification No. 3-2

Test Date: 5/7/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.1 °C	Yes
Relative Humidity	10 - 70 %	35 %	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	2.251 m/s	Yes
Change at 15 ms	3.19 - 3.63 m/s	3.376 m/s	Yes
Change at 20 ms	4.27 - 4.87 m/s	4.549 m/s	Yes
Peak Fixture Rotation	(-41.5) - (-51) °	-46.41 °	Yes
Decay Time to 0 deg from Peak Angle	35 - 43 ms	40.1 ms	Yes
Peak Head Angular Velocity Z-axis	(-1,345) - (-1,655) °/s	-1,574.8 °/s	Yes
Peak Lower Neck Moment Z-axis	34 - 42 N·m	38.5 N·m	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: DW6607

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

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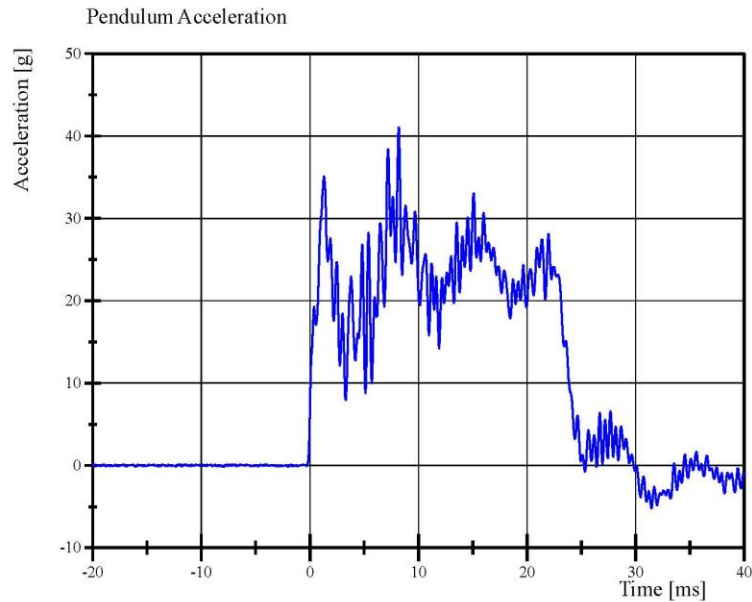


Transportation Research Center Inc.

Left Lateral Torsion

WorldSID 50th Serial No. EA7820 Certification No. 3-2

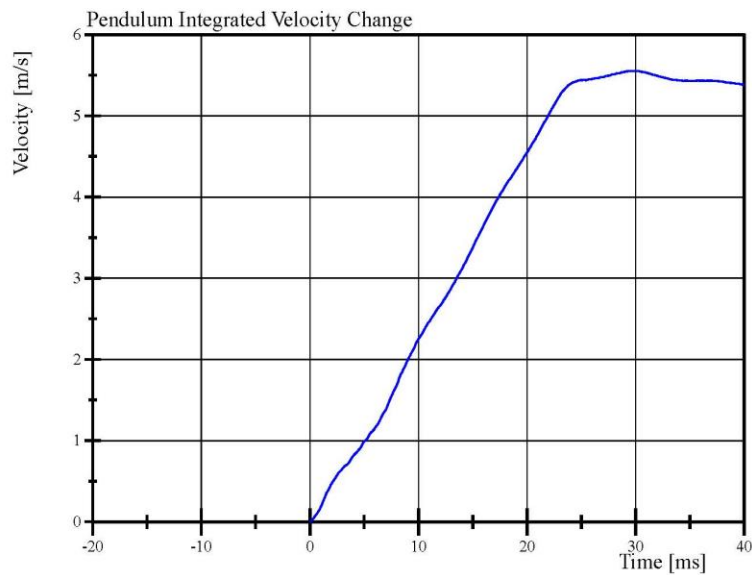
Test Date: 5/7/2021



Filter Class: CFC_1000

Max: 41.0 g at 8.2 ms

Min: -5.2 g at 31.5 ms



Filter Class: CFC_1000

Max: 5.6 m/s at 29.8 ms

Min: 0.0 m/s at 0.0 ms

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

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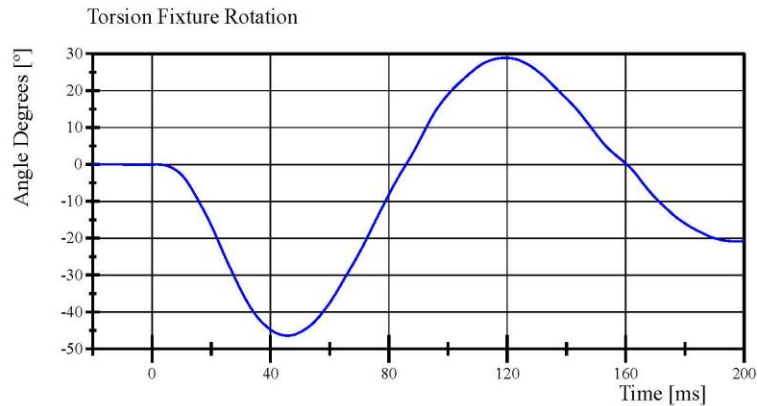


Transportation Research Center Inc.

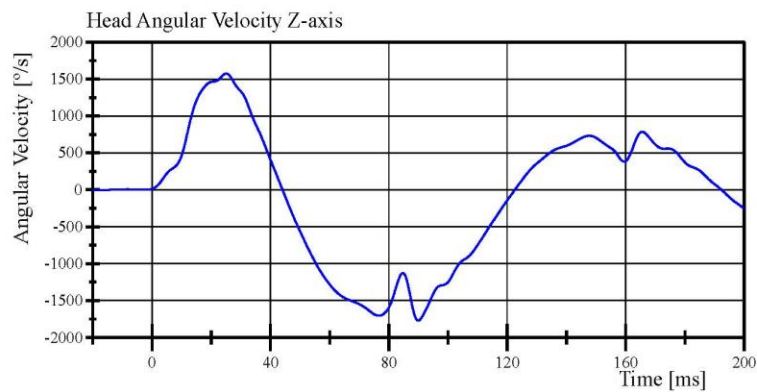
Left Lateral Torsion

WorldSID 50th Serial No. EA7820 Certification No. 3-2

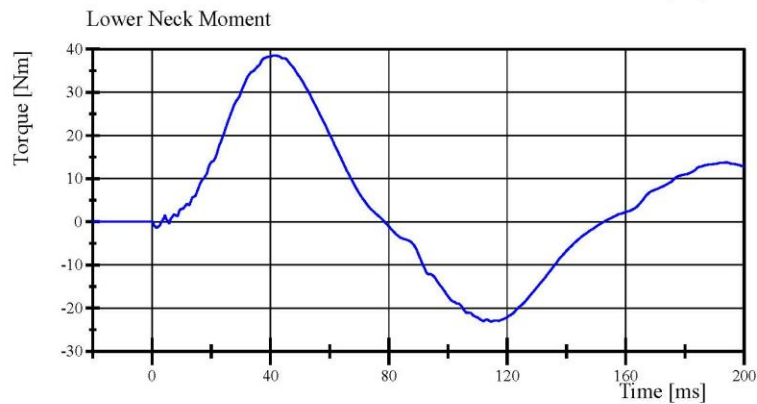
Test Date: 5/7/2021



Filter Class: CFC_60
Max: 28.9 ° at 119.3 ms
Min: -46.4 ° at 45.8 ms



Filter Class: CFC_60
Max: 1,574.8 °/s at 25.1 ms
Min: -1,771.5 °/s at 89.9 ms



Filter Class: CFC_600
Max: 38.5 Nm at 41.2 ms
Min: -23.1 Nm at 114.6 ms

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

Right Lateral Torsion

WorldSID 50th Serial No. EA7820 Certification No. 3-3

Test Date: 5/10/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	30 %	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	2.175 m/s	Yes
Change at 15 ms	3.19 - 3.63 m/s	3.302 m/s	Yes
Change at 20 ms	4.27 - 4.87 m/s	4.431 m/s	Yes
Peak Fixture Rotation	41.5 - 51 °	45.37 °	Yes
Decay Time to 0 deg from Peak Angle	35 - 43 ms	39.8 ms	Yes
Peak Head Angular Velocity Z-axis	1,345 - 1,655 °/s	1,554.1 °/s	Yes
Peak Lower Neck Moment Z-axis	(-34) - (-42) N·m	-37.8 N·m	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: DW6607

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

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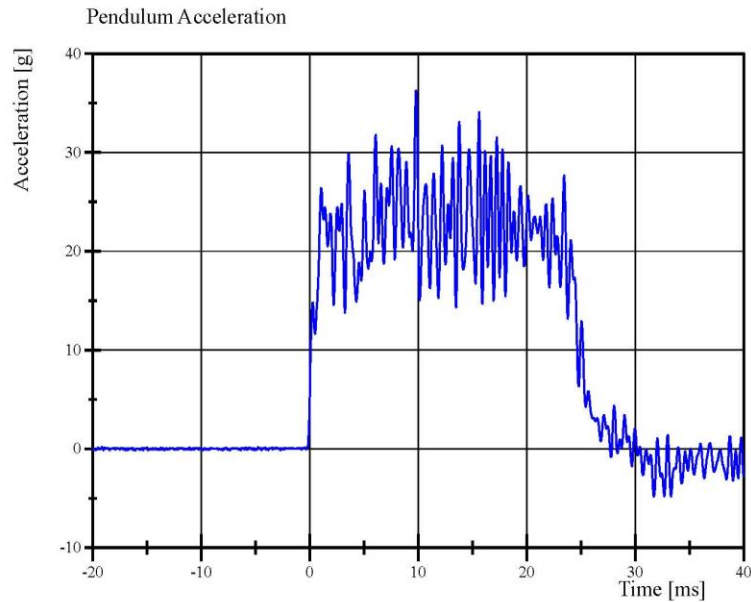


Transportation Research Center Inc.

Right Lateral Torsion

WorldSID 50th Serial No. EA7820 Certification No. 3-3

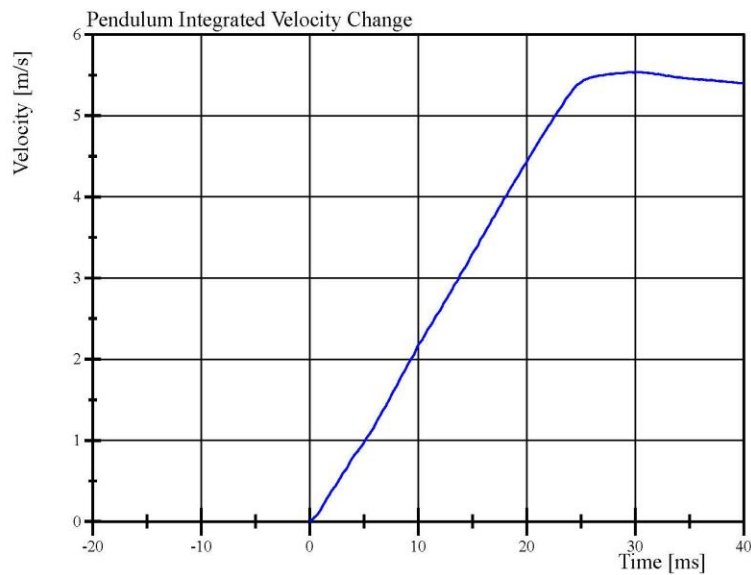
Test Date: 5/10/2021



Filter Class: CFC_1000

Max: 36.3 g at 9.8 ms

Min: -4.8 g at 31.7 ms



Filter Class: CFC_1000

Max: 5.5 m/s at 30.2 ms

Min: 0.0 m/s at 0.0 ms

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

Report Number: EA7820_WSH03

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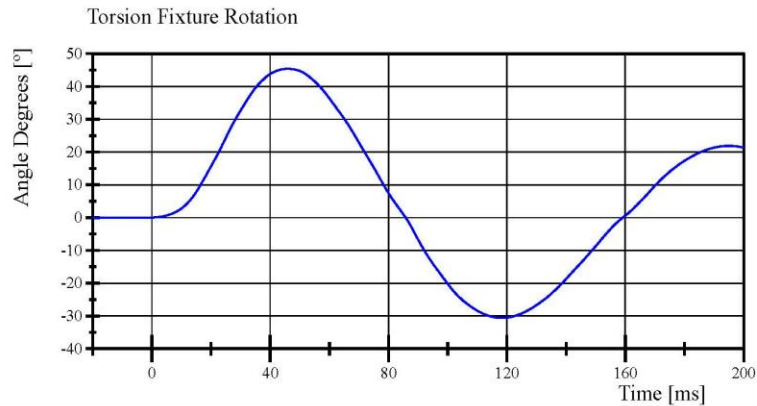


Transportation Research Center Inc.

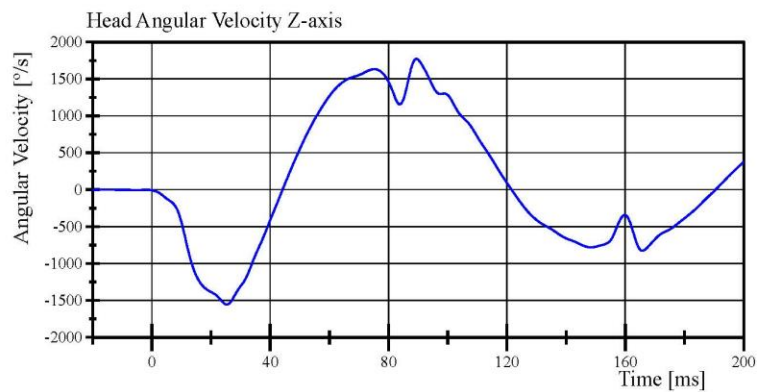
Right Lateral Torsion

WorldSID 50th Serial No. EA7820 Certification No. 3-3

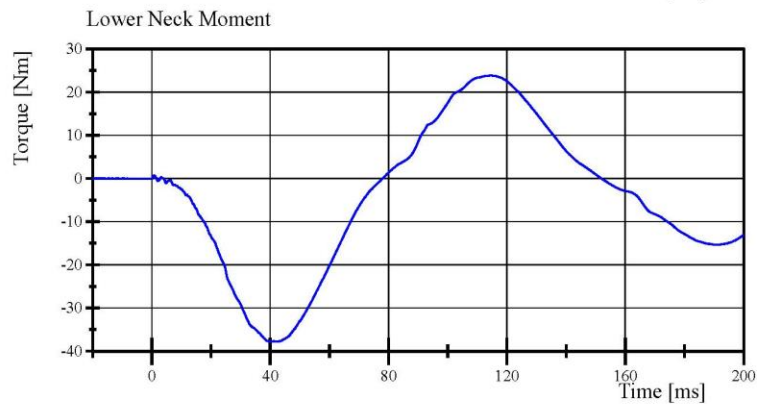
Test Date: 5/10/2021



Filter Class: CFC_60
Max: 45.4 ° at 46.0 ms
Min: -30.6 ° at 118.3 ms



Filter Class: CFC_60
Max: 1,771.4 °/s at 89.4 ms
Min: -1,554.1 °/s at 25.4 ms



Filter Class: CFC_600
Max: 23.8 Nm at 114.7 ms
Min: -37.8 Nm at 42.6 ms

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

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WorldSID-50M Right Shoulder Qualification Test Results Summary

Dummy Serial Number: EA7820

Tested Components

Shoulder Pad: EF9935 Thorax Rib 3: EI8148
Shoulder Rib: EG3270 RibEye: 160
Thorax Rib 1: EI6666 Impacted Arm: EE7908
Thorax Rib 2: EI8150

Test ID: 210901-6
Test Date: 9/1/2021
Test Time: 9:26 AM

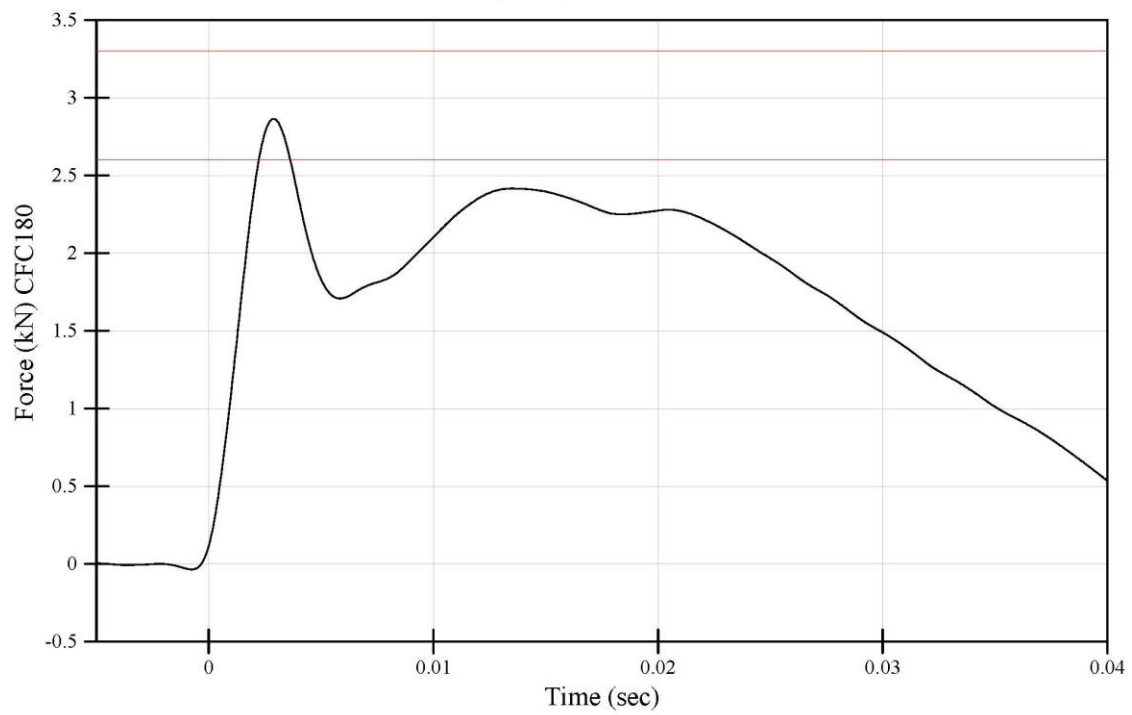
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.3	Pass
Test Humidity (%)	10 - 70	62	Pass
Test Velocity (m/s)	4.20 - 4.40	4.29	Pass
Thorax Rib Temperature Sensor (°C)	20.6 - 23.8	21.4	Pass
Peak Probe Force (kN)	2.60 - 3.30	2.86	Pass
Peak Shoulder Fy (kN)	-1.80 - (-1.47)	-1.70	Pass
Peak Shoulder Rib Length Change (mm)	37.0 - 46.0	40.5	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 210901-6 processed

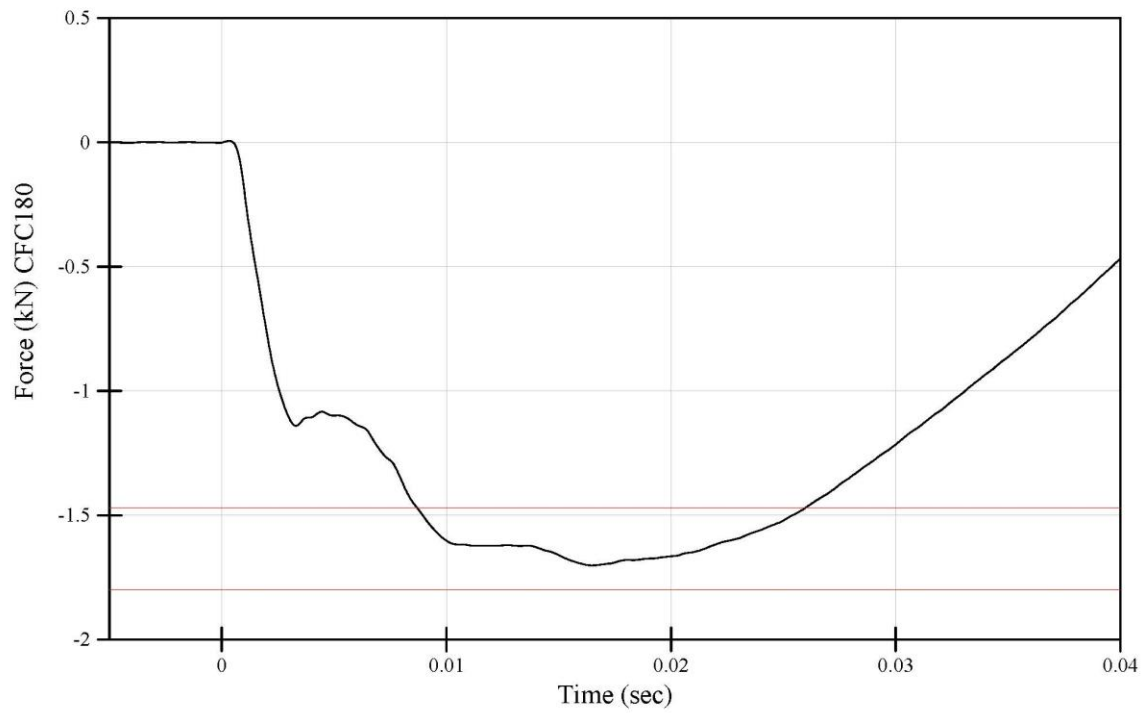
WorldSID-50M Right Shoulder Qualification
Peak Pendulum Force
Dummy Serial Number: EA7820



File Name: 210901-6 processed

9/1/2021 9:26 AM

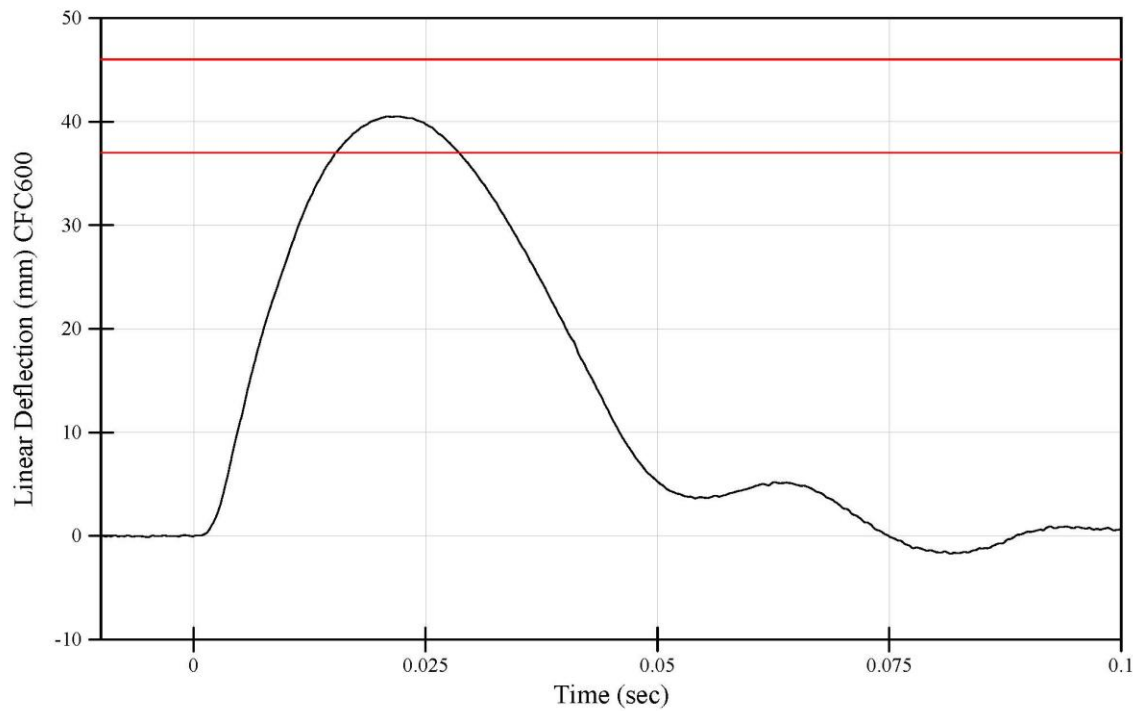
WorldSID-50M Right Shoulder Qualification
Peak Shoulder Y Force
Dummy Serial Number: EA7820



File Name: 210901-6 processed

9/1/2021 9:26 AM

WorldSID-50M Right Shoulder Qualification
Maximum Shoulder Y Deflection
Dummy Serial Number: EA7820



File Name: 210901-6 processed

9/1/2021 9:26 AM

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

Dummy Serial Number: EA7820

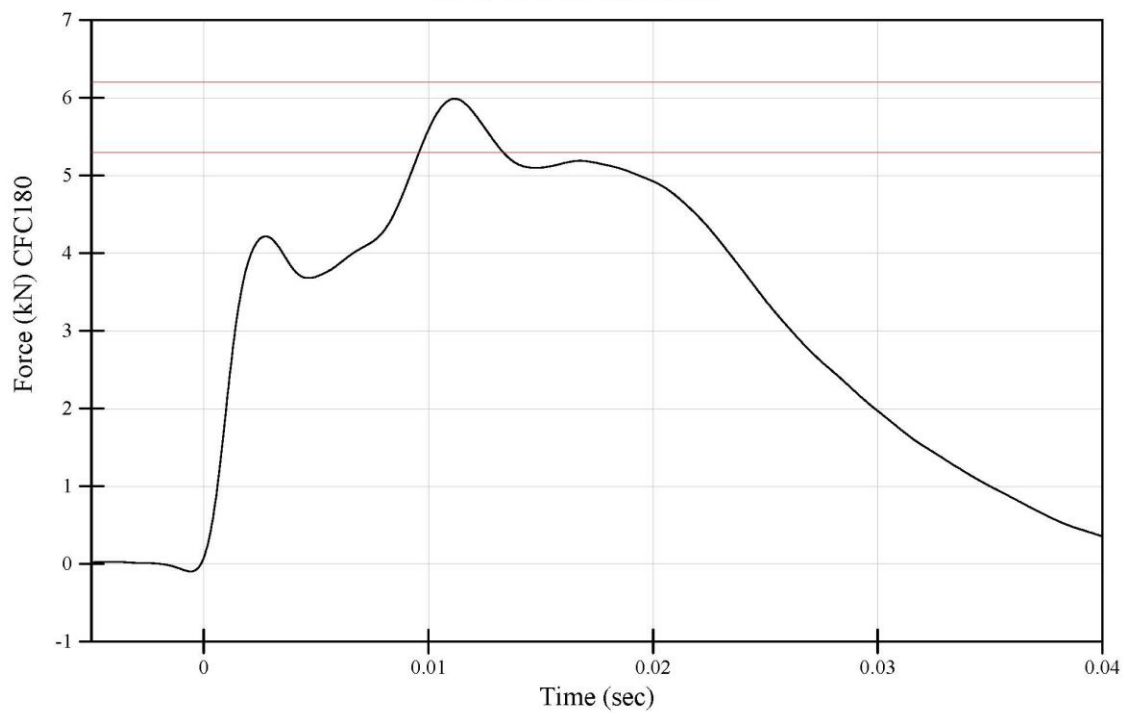
<u>Tested Components</u>		Test ID: 210831-9
Shoulder Rib: EF9935	RibEye: EE7908	Test Date: 8/31/2021
Thorax Rib 1: EG3270	Impacted Arm:	Test Time: 4:17 PM
Thorax Rib 2: EI6666		
Thorax Rib 3: EI8150		

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	67	Pass
Test Velocity (m/s)	6.60 - 6.80	6.72	Pass
Thorax Rib Temperature Sensor (°C)	20.6 - 23.8	20.8	Pass
Peak Probe Force (kN)	5.30 - 6.20	5.99	Pass
Peak Thorax Rib 1 Length Change (mm)	35.0 - 47.0	42.4	Pass
Peak Thorax Rib 2 Length Change (mm)	46.0 - 56.0	46.2	Pass
Peak Thorax Rib 3 Length Change (mm)	33.5 - 40.5	33.5	Pass
Peak T4 Acceleration (g)	-37.0 - (-28.0)	-33.2	Pass
Peak T12 Acceleration (g)	-28.0 - (-22.0)	-25.9	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 210831-9 processed

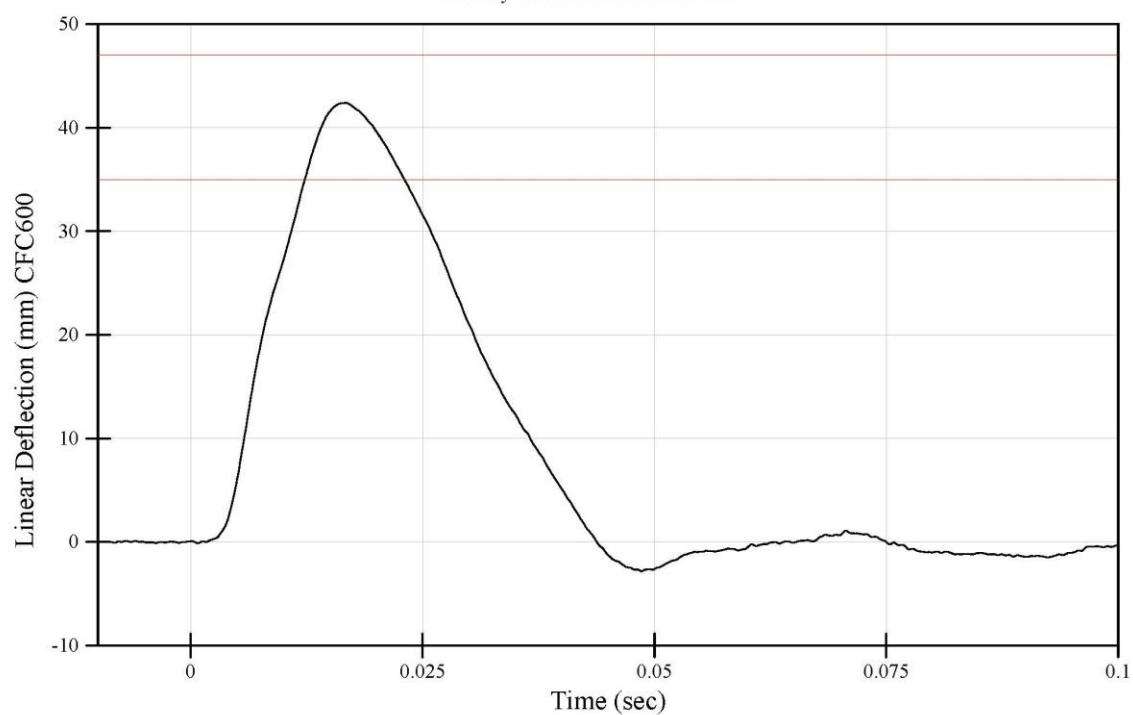
WorldSID-50M Left Thorax with Arm Qualification
Peak Pendulum Force
Dummy Serial Number: EA7820



File Name: 210831-9 processed

8/31/2021 4:17 PM

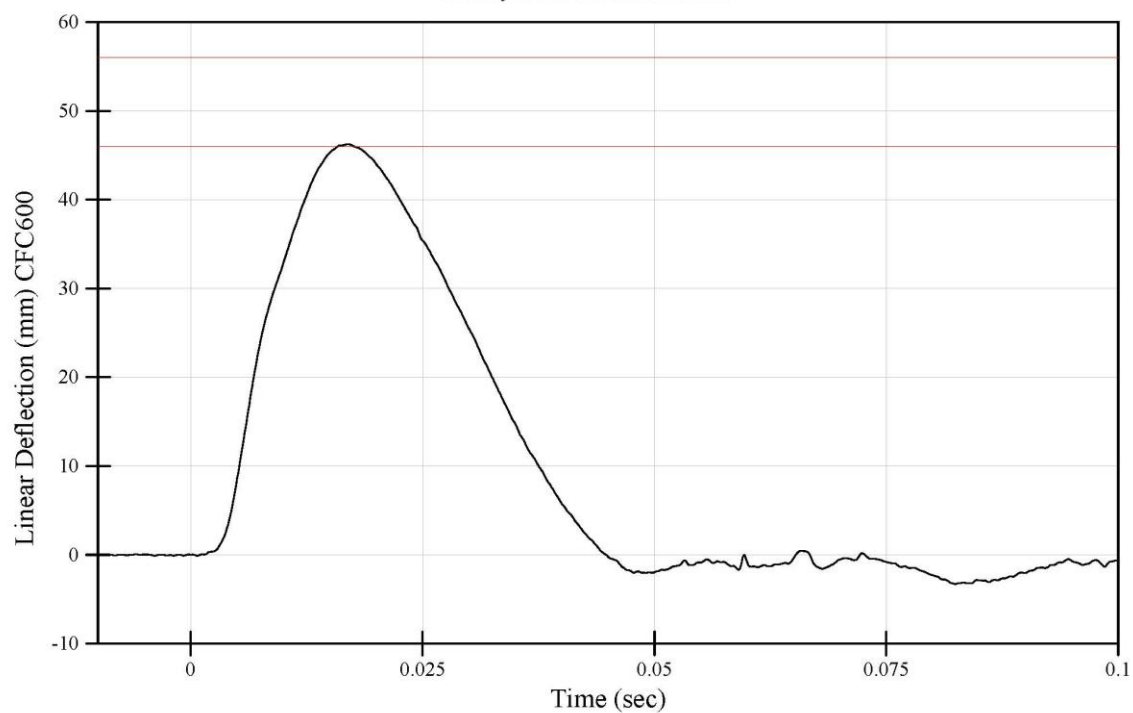
WorldSID-50M Left Thorax with Arm Qualification
Max Thorax Rib 1 Y Deflection
Dummy Serial Number: EA7820



File Name: 210831-9 processed

8/31/2021 4:17 PM

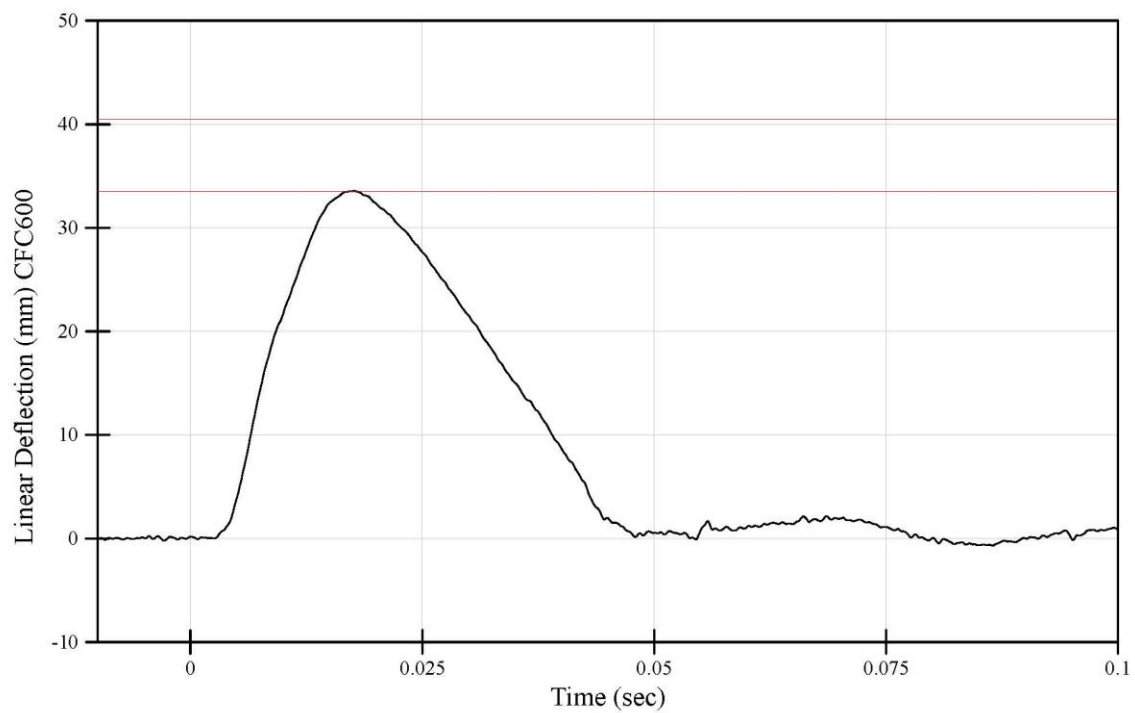
WorldSID-50M Left Thorax with Arm Qualification
Max Thorax Rib 2 Y Deflection
Dummy Serial Number: EA7820



File Name: 210831-9 processed

8/31/2021 4:17 PM

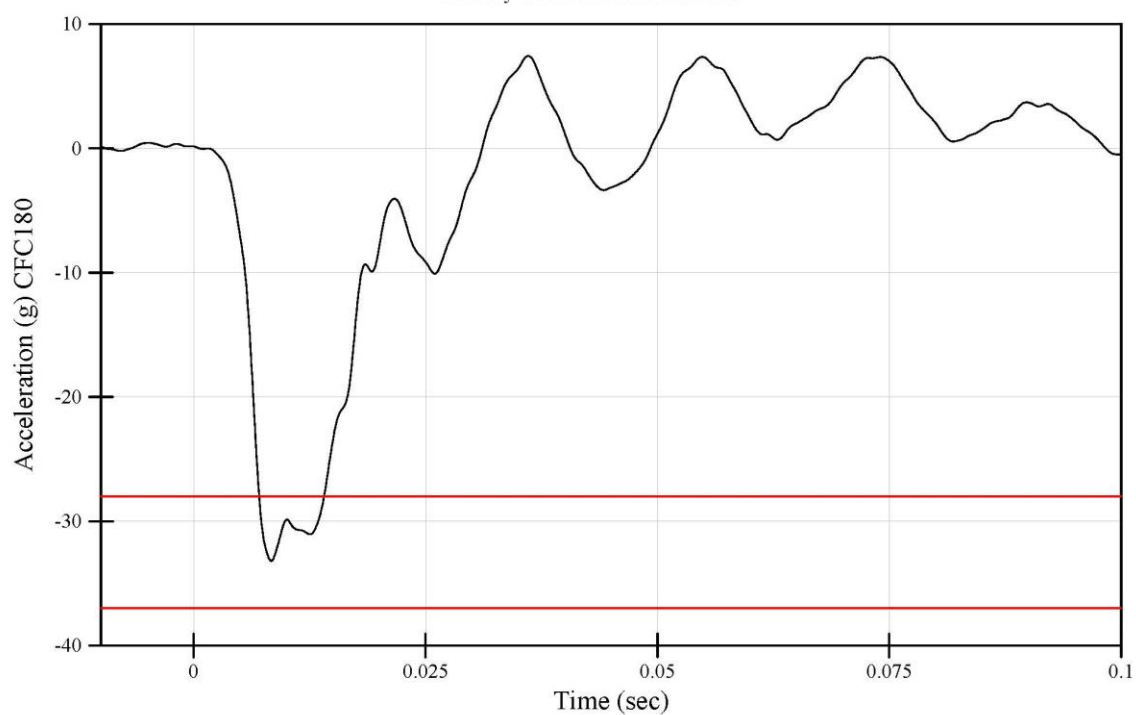
WorldSID-50M Left Thorax with Arm Qualification
Max Thorax Rib 3 Y Deflection
Dummy Serial Number: EA7820



File Name: 210831-9 processed

8/31/2021 4:17 PM

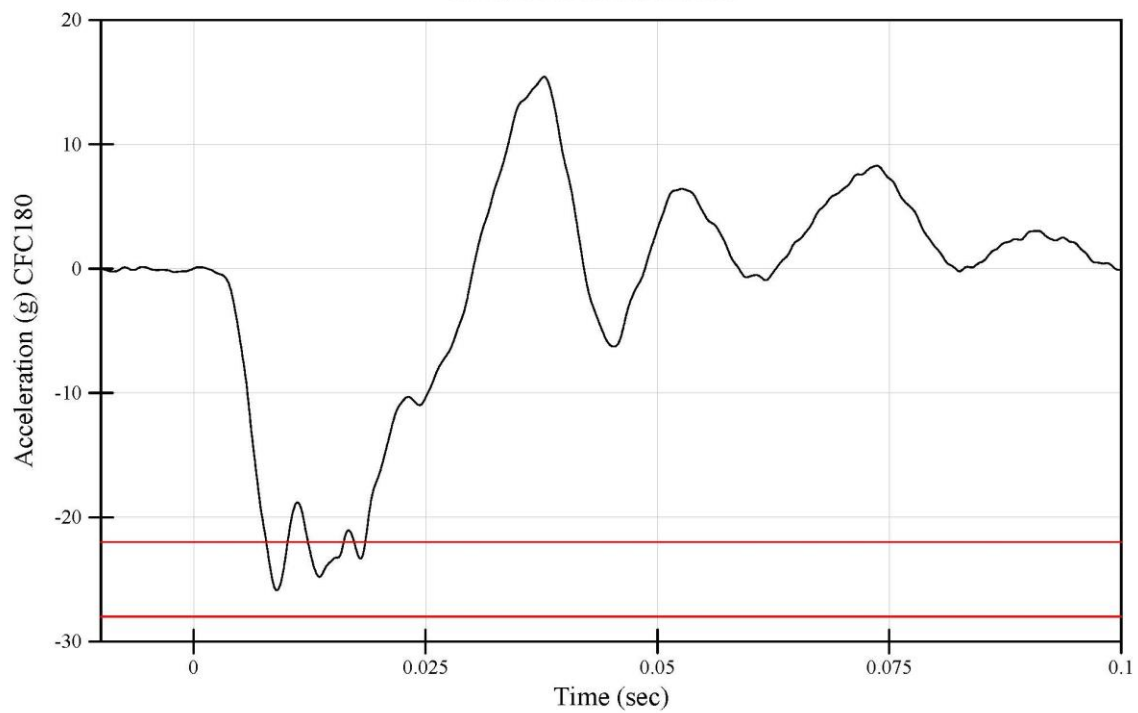
WorldSID-50M Left Thorax with Arm Qualification
Peak T4 Y Axis Acceleration
Dummy Serial Number: EA7820



File Name: 210831-9 processed

8/31/2021 4:17 PM

WorldSID-50M Left Thorax with Arm Qualification
Peak T12 Y Axis Acceleration
Dummy Serial Number: EA7820



File Name: 210831-9 processed

8/31/2021 4:17 PM

WorldSID-50M Right Thorax without Arm Qualification Test Results Summary

Dummy Serial Number: EA7820

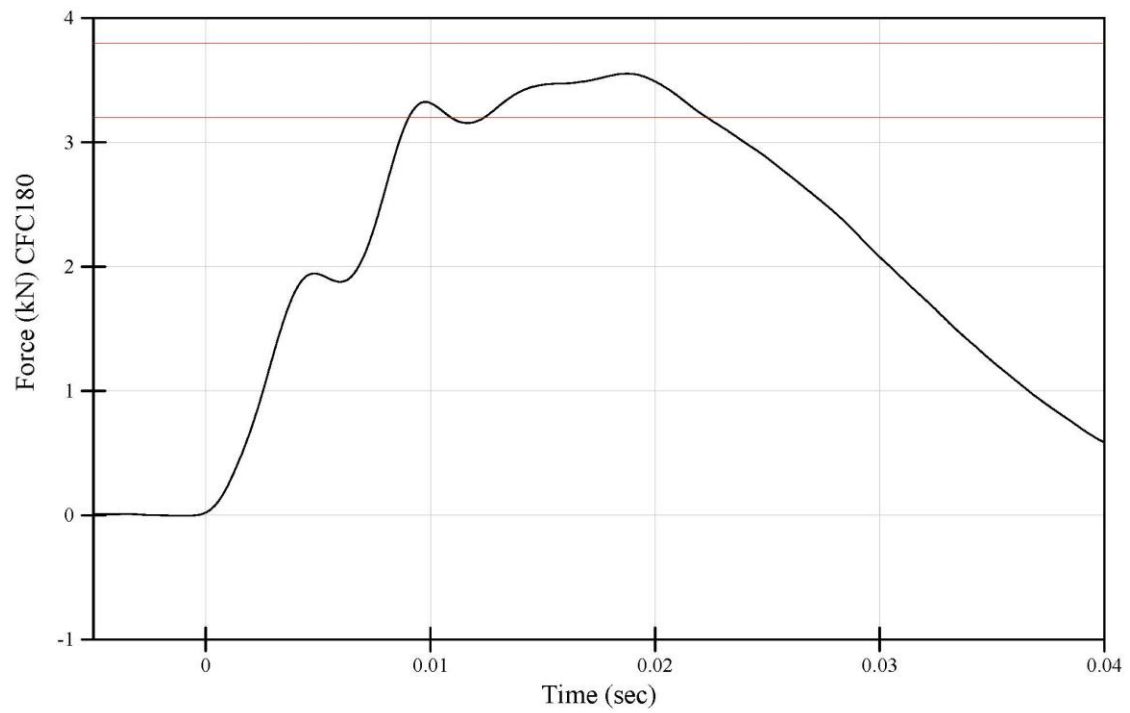
<u>Tested Components</u>		Test ID: 210901-1
Shoulder Rib: EF9935	Thorax Rib 3: EI8150	Test Date: 9/1/2021
Thorax Rib 1: EG3270	RibEye: EE7908	Test Time: 8:42 AM
Thorax Rib 2: EI6666		

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	66	Pass
Test Velocity (m/s)	4.20 - 4.40	4.28	Pass
Thorax Rib Temperature Sensor (°C)	20.6 - 23.8	22.0	Pass
Peak Probe Force (kN)	3.20 - 3.80	3.55	Pass
Peak Thorax Rib 1 Length Change (mm)	33.0 - 43.0	37.3	Pass
Peak Thorax Rib 2 Length Change (mm)	35.0 - 43.0	37.7	Pass
Peak Thorax Rib 3 Length Change (mm)	32.0 - 40.0	33.7	Pass
Peak T4 Acceleration (g)	-20.0 - (-14.0)	-14.8	Pass
Peak T12 Acceleration (g)	-22.0 - (-14.0)	-16.5	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 210901-1 processed

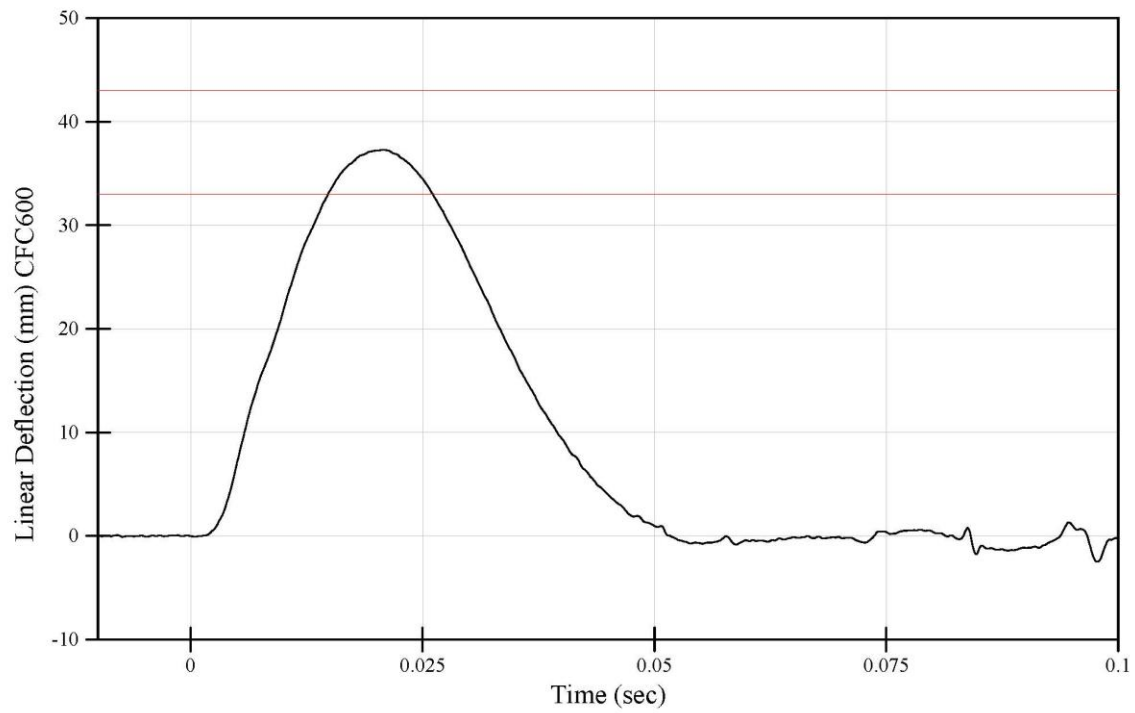
WorldSID-50M Right Thorax without Arm Qualification
Peak Pendulum Force
Dummy Serial Number: EA7820



File Name: 210901-1 processed

9/1/2021 8:42 AM

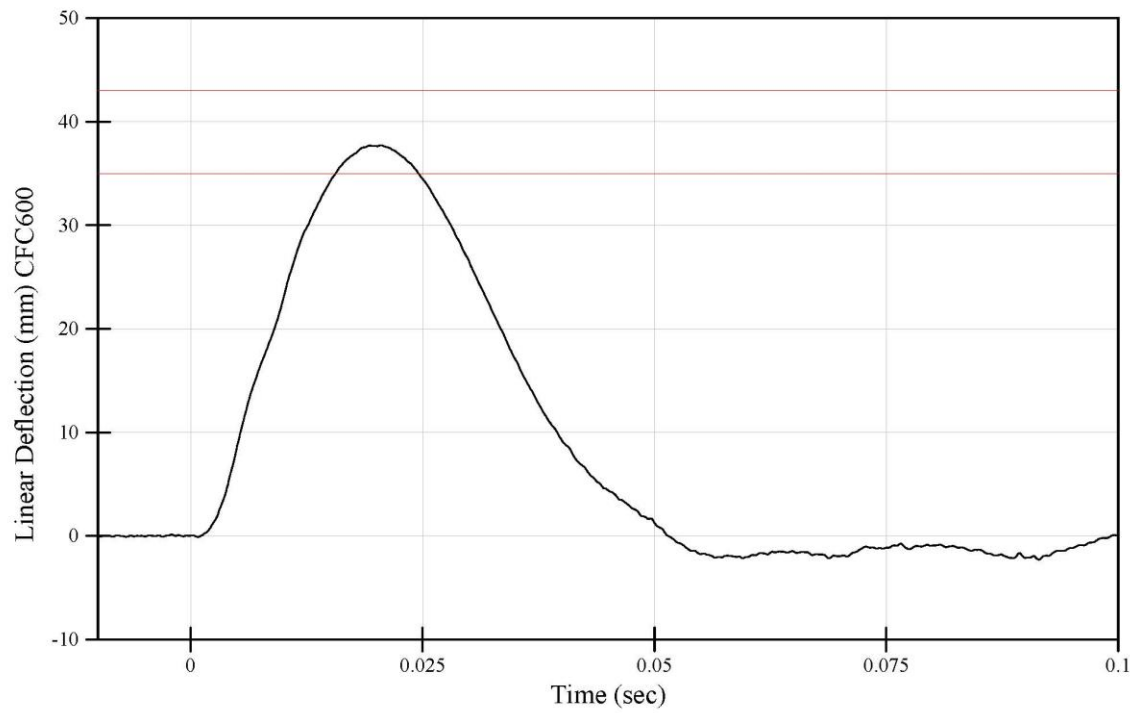
WorldSID-50M Right Thorax without Arm Qualification
Max Thorax Rib 1 Y Deflection
Dummy Serial Number: EA7820



File Name: 210901-1 processed

9/1/2021 8:42 AM

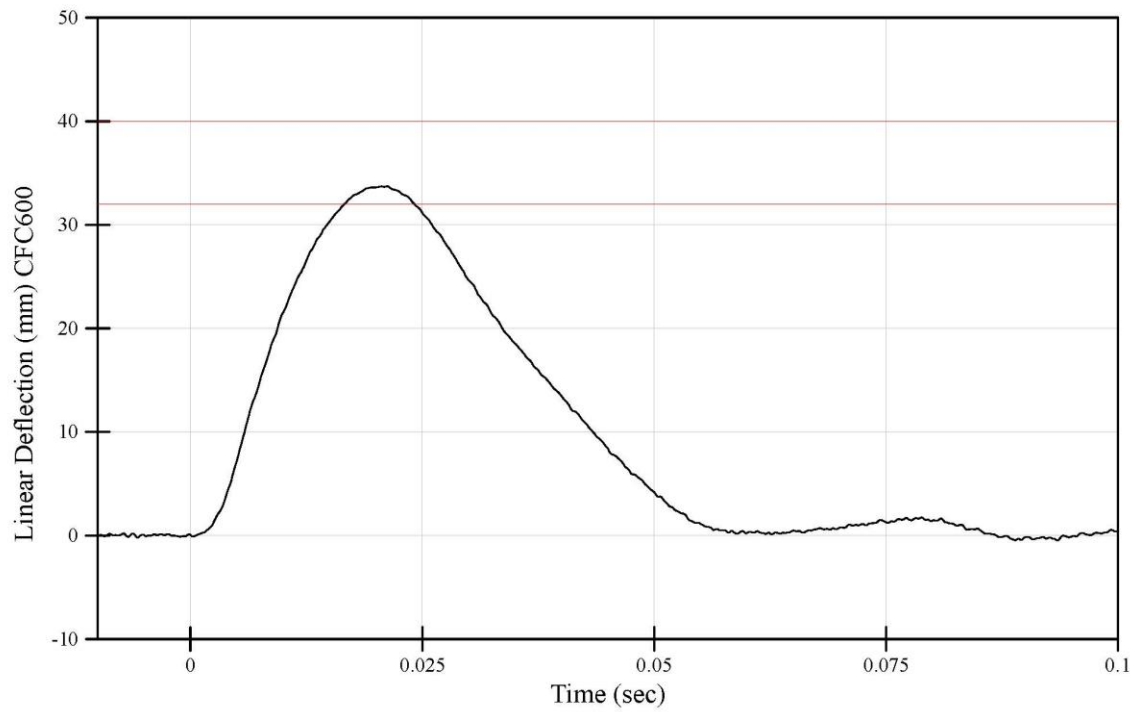
WorldSID-50M Right Thorax without Arm Qualification
Max Thorax Rib 2 Y Deflection
Dummy Serial Number: EA7820



File Name: 210901-1 processed

9/1/2021 8:42 AM

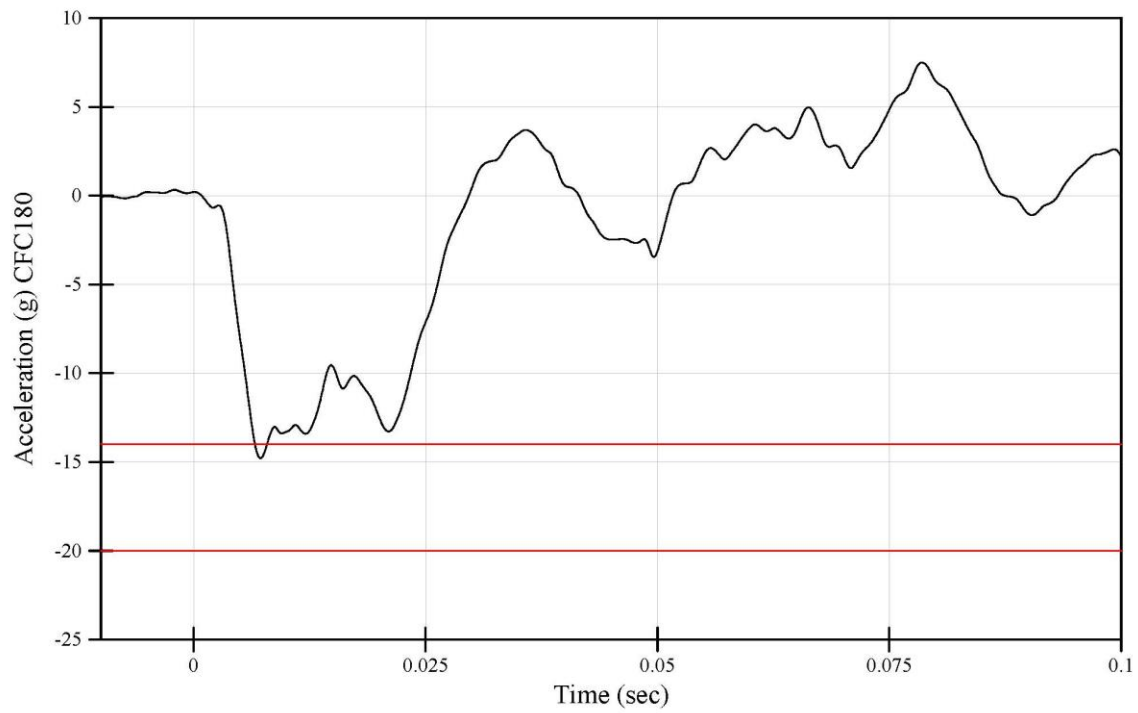
WorldSID-50M Right Thorax without Arm Qualification
Max Thorax Rib 3 Y Deflection
Dummy Serial Number: EA7820



File Name: 210901-1 processed

9/1/2021 8:42 AM

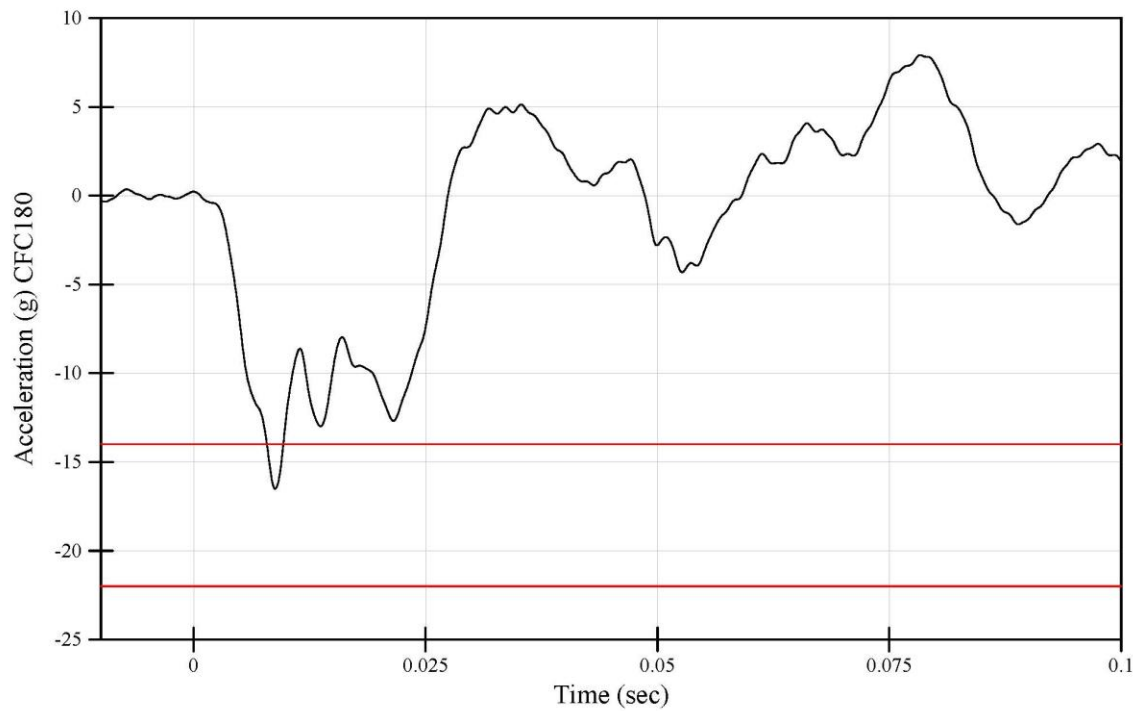
WorldSID-50M Right Thorax without Arm Qualification
Peak T4 Y Axis Acceleration
Dummy Serial Number: EA7820



File Name: 210901-1 processed

9/1/2021 8:42 AM

WorldSID-50M Right Thorax without Arm Qualification
Peak T12 Y Axis Acceleration
Dummy Serial Number: EA7820



File Name: 210901-1 processed

9/1/2021 8:42 AM

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

Dummy Serial Number: EA7820

Tested Components

Abdomen Rib 1: EF9935
Abdomen Rib 2: EG3270
RibEye: EI6666

Test ID: 210901-9
Test Date: 9/1/2021
Test Time: 10:08 AM

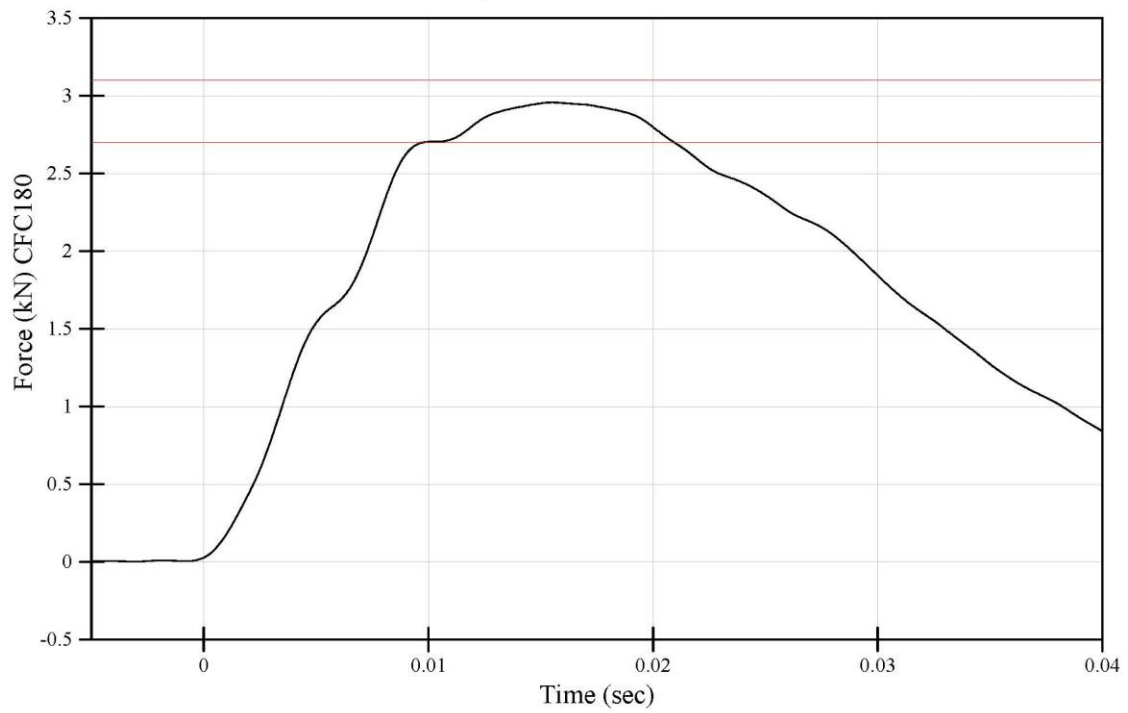
Test Results

<u>Test Parameter</u>	<u>Specification Range*</u>	<u>Result</u>	<u>Pass/Fail</u>
Test Temperature (°C)	20.6 - 22.2	21.8	Pass
Test Humidity (%)	10 - 70	62	Pass
Test Velocity (m/s)	4.20 - 4.40	4.29	Pass
Thorax Rib Temperature Sensor (°C)	20.6 - 23.8	22.0	Pass
Peak Probe Force (kN)	2.70 - 3.10	2.96	Pass
Peak Abdomen Rib 1 Length Change (mm)	32.5 - 39.5	35.6	Pass
Peak Abdomen Rib 2 Length Change (mm)	32.0 - 38.0	32.2	Pass
Peak T12 Acceleration (g)	-19.5 - (-14.5)	-17.2	Pass

* WorldSID-50M Qualification Manual - November 2020

File Name: 210901-9 processed

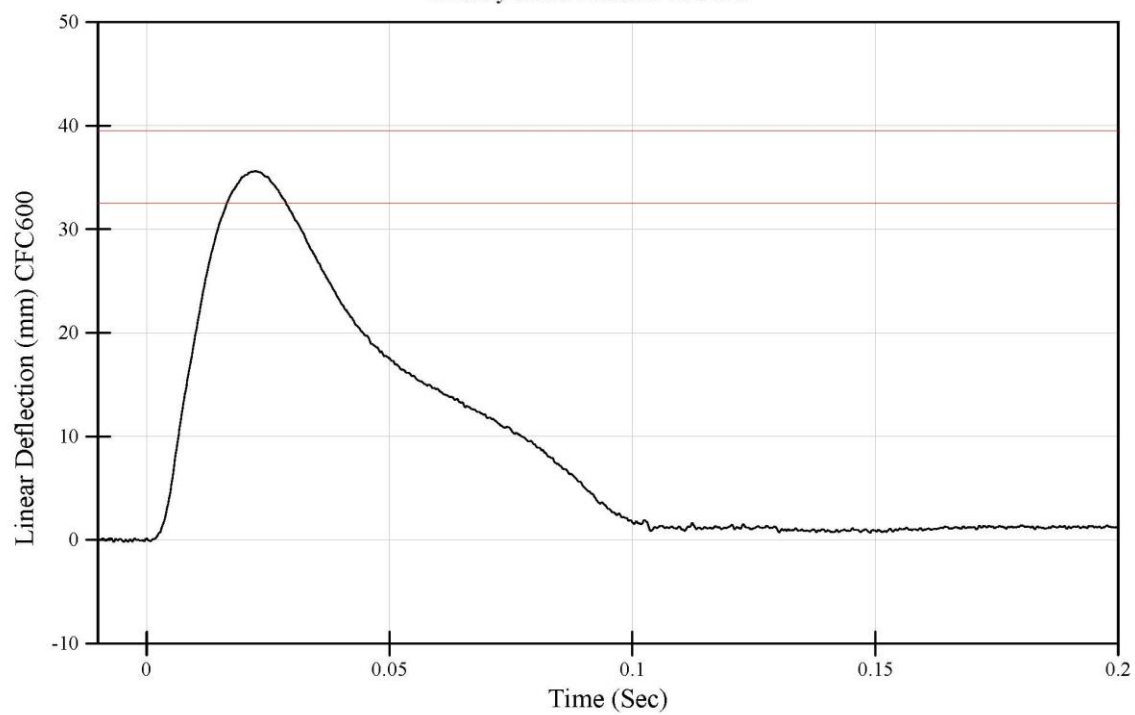
WorldSID-50M Right Abdomen Qualification
Peak Pendulum Force
Dummy Serial Number: EA7820



File Name: 210901-9 processed

9/1/2021 10:08 AM

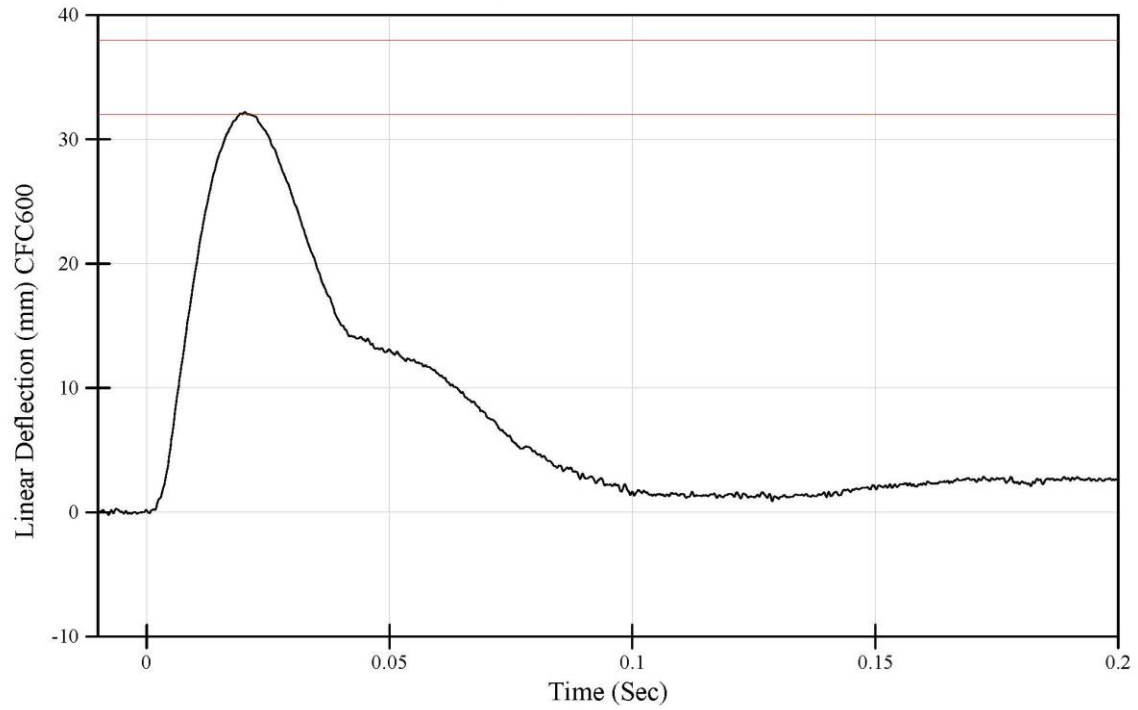
WorldSID-50M Right Abdomen Qualification
Max Abdomen Rib 1 Y Deflection
Dummy Serial Number: EA7820



File Name: 210901-9 processed

9/1/2021 10:08 AM

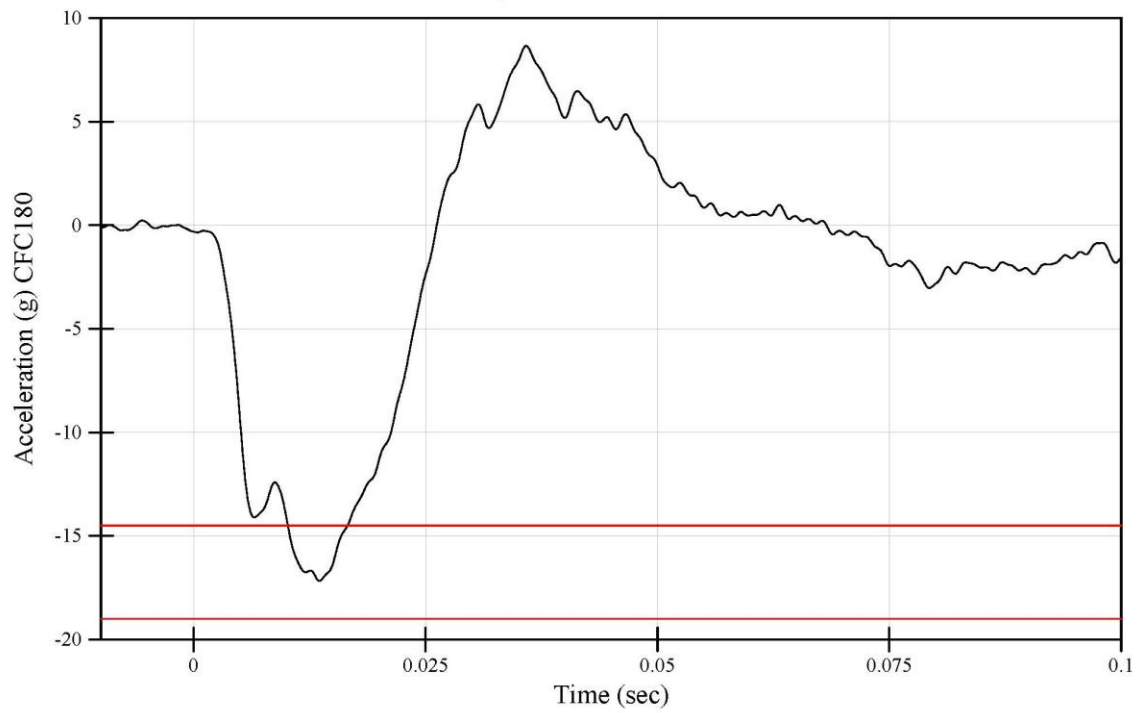
WorldSID-50M Right Abdomen Qualification
Max Abdomen Rib 2 Y Deflection
Dummy Serial Number: EA7820



File Name: 210901-9 processed

9/1/2021 10:08 AM

WorldSID-50M Right Abdomen Qualification
T12 Acceleration along Y axis
Dummy Serial Number: EA7820



File Name: 210901-9 processed

9/1/2021 10:08 AM

WorldSID-50M Right Pelvis Qualification Test Results Summary

Dummy Serial Number: EA7820

Tested Components

Pelvis Flesh: EF9935
Pelvic Bone: EF9807

Test ID: 210909-3

Test Date: 9/9/2021

Test Time: 3:29 PM

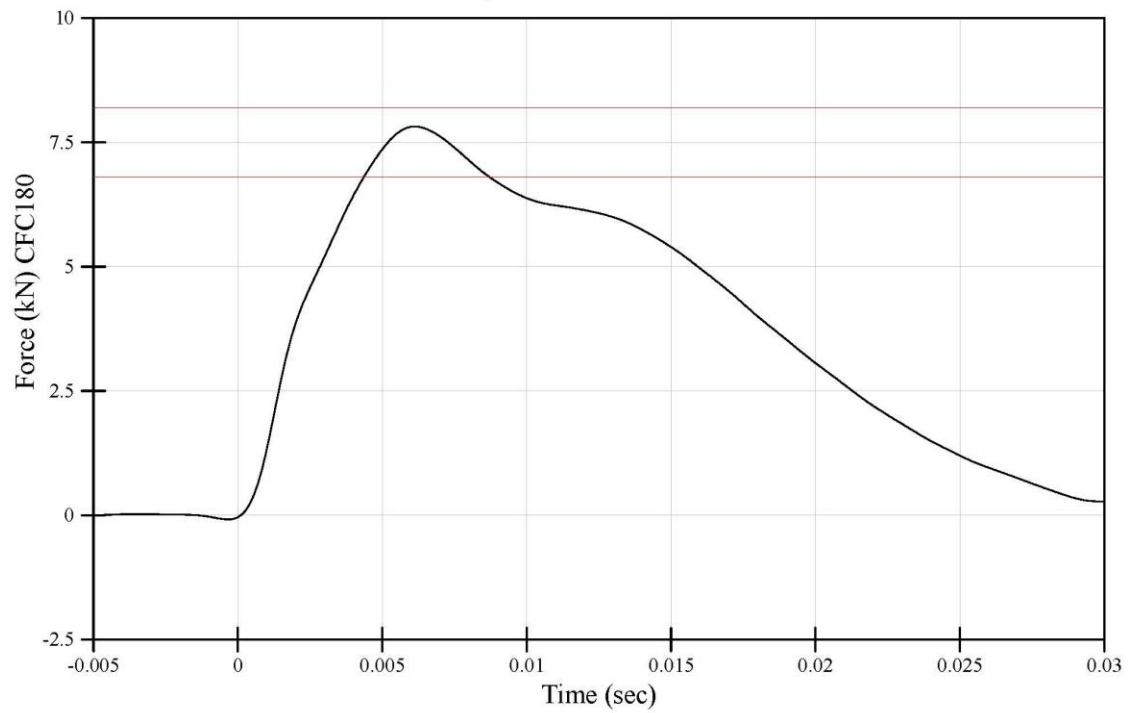
Test Results

<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	52	Pass
Test Velocity (m/s)	6.60 - 6.80	6.72	Pass
Peak Probe Force (kN)	6.80 - 8.20	7.82	Pass
Peak Pubic Force FY (kN)	-1.59 - (-1.30)	-1.26	Fail
Peak Sacroiliac Force FY (kN)	-2.28 - (-1.86)	-1.91	Pass
Peak T12 Acceleration (g)	-14.0 - (-10.0)	-13.0	Pass
Peak Pelvis Acceleration (g)	-48.5 - (-38.5)	-36.9	Fail

* WorldSID-50M Qualification Manual - November 2020

File Name: 210909-3 processed

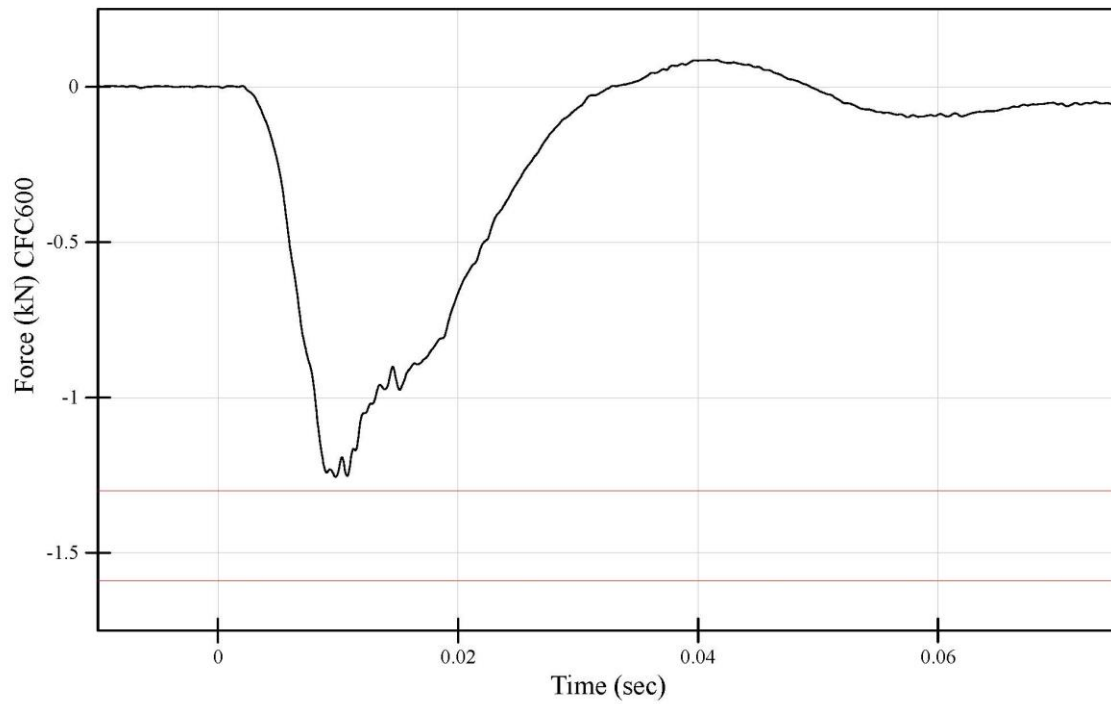
WorldSID-50M Right Pelvis Qualification
Peak Pendulum Force
Dummy Serial Number: EA7820



File Name: 210909-3 processed

9/9/2021 3:29 PM

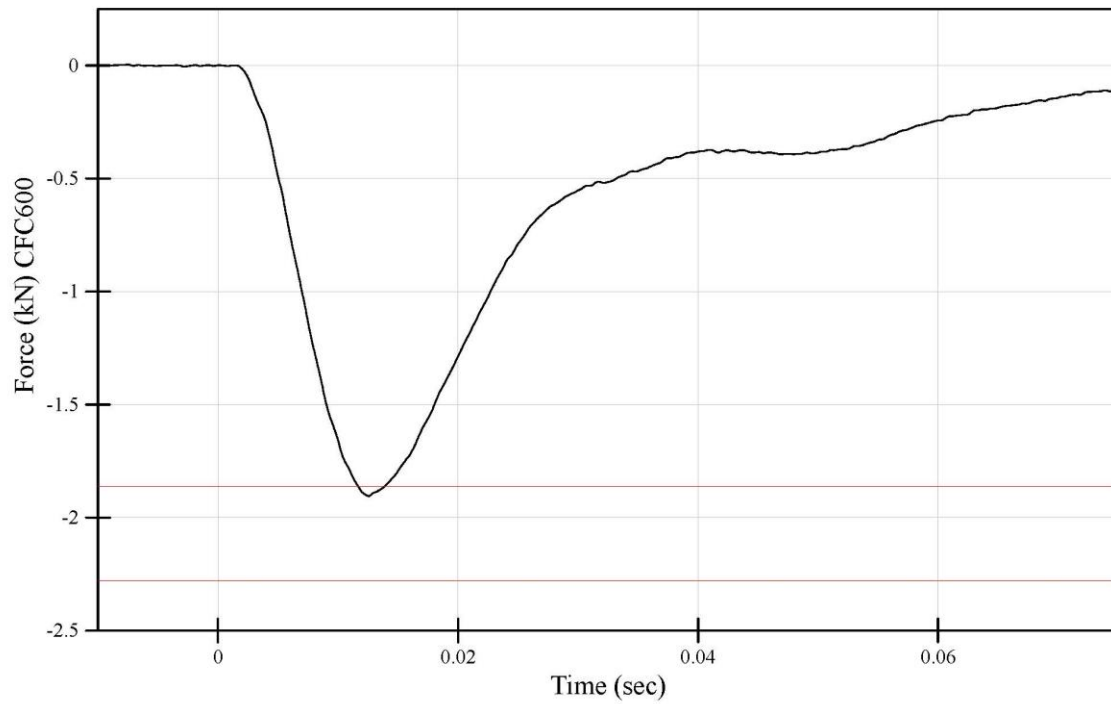
WorldSID-50M Right Pelvis Qualification
Peak Pubic Y axis Force
Dummy Serial Number: EA7820



File Name: 210909-3 processed

9/9/2021 3:29 PM

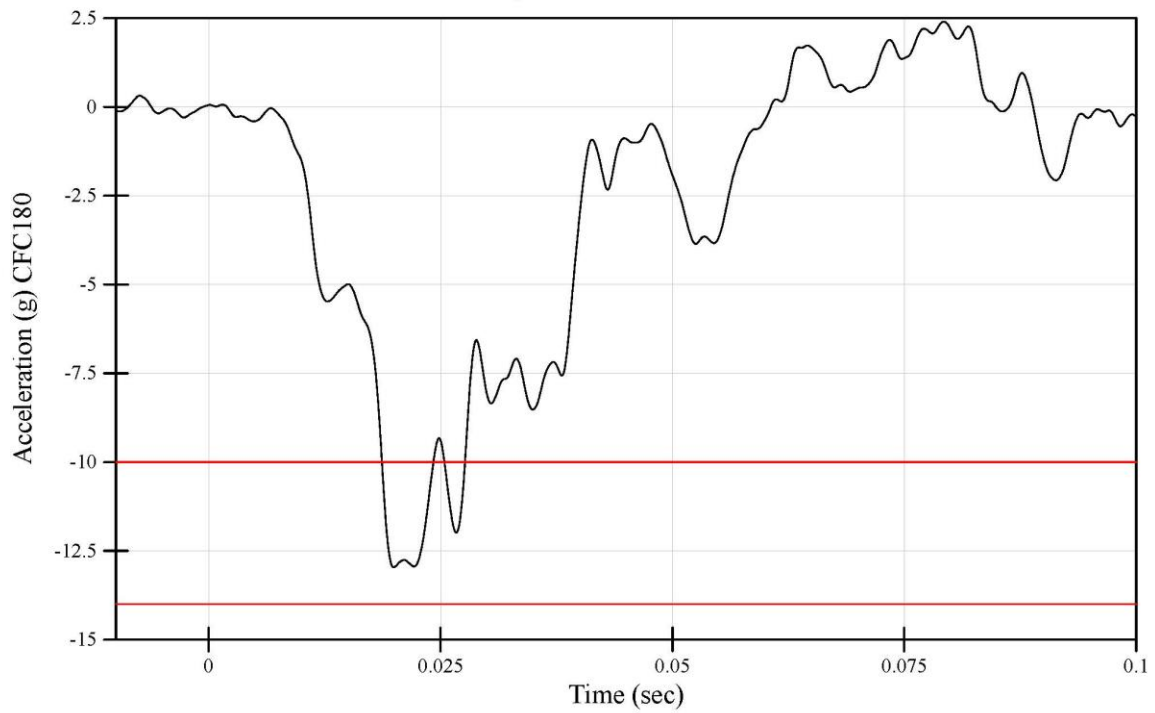
WorldSID-50M Right Pelvis Qualification
Peak Sacro-Iliac Y axis Force
Dummy Serial Number: EA7820



File Name: 210909-3 processed

9/9/2021 3:29 PM

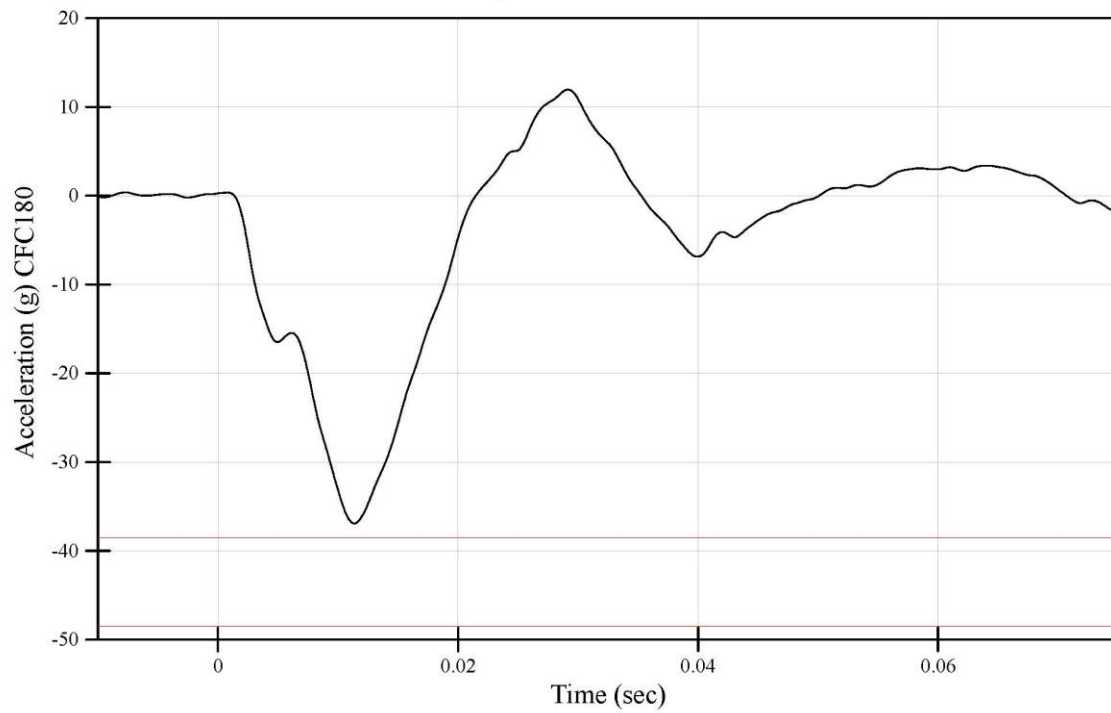
WorldSID-50M Right Pelvis Qualification
Peak T12 Y Axis Acceleration
Dummy Serial Number: EA7820



File Name: 210909-3 processed

9/9/2021 3:29 PM

WorldSID-50M Right Pelvis Qualification
Peak Pelvis Y Axis Acceleration
Dummy Serial Number: EA7820



File Name: 210909-3 processed

9/9/2021 3:29 PM

Post-Test Calibration Sheets
Driver S/N EA7820

Transportation Research Center Inc.
WorldSID-50M
External Measurements
Serial No. EA7820 Qualification 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. EA7820 Certification No. 4-1

Test Date: 10/1/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	44 %	Yes
Peak Head Resultant Acceleration	211 - 261 g	252.0 g	Yes
Peak Head Lateral Acceleration	(-15) - 15 g	-6.5 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	1.84 %	Yes

Test meets specifications.

Condition: Used

Comments:

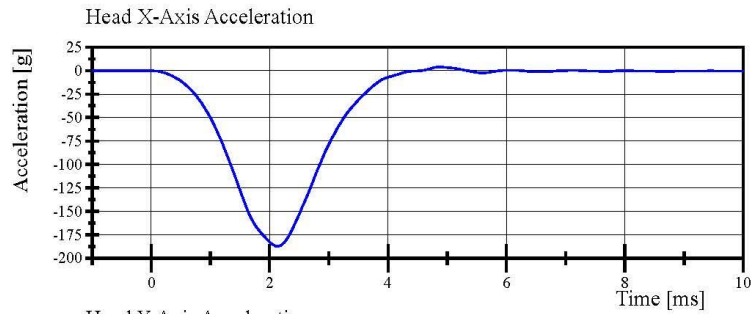
Head Skin S/N: EE8693

Transportation Research Center Inc.

Front Head Drop

WorldSID 50th Serial No. EA7820 Certification No. 4-1

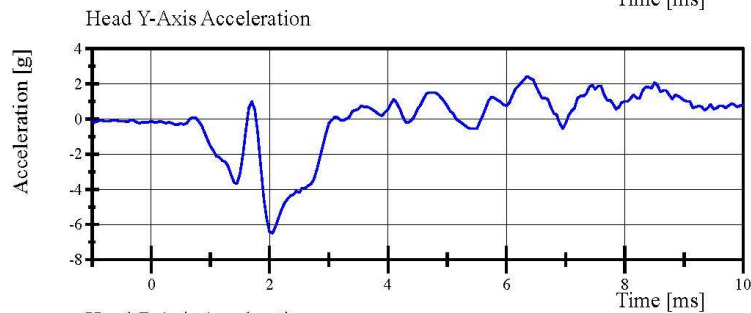
Test Date: 10/1/2021



Filter Class: CFC_1000

Max: 3.9 g at 4.9 ms

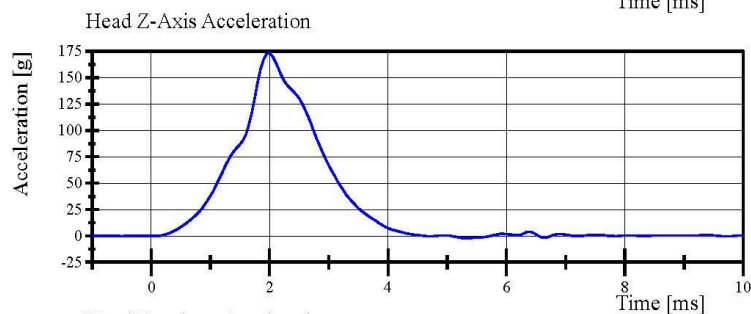
Min: -187.4 g at 2.2 ms



Filter Class: CFC_1000

Max: 2.4 g at 6.4 ms

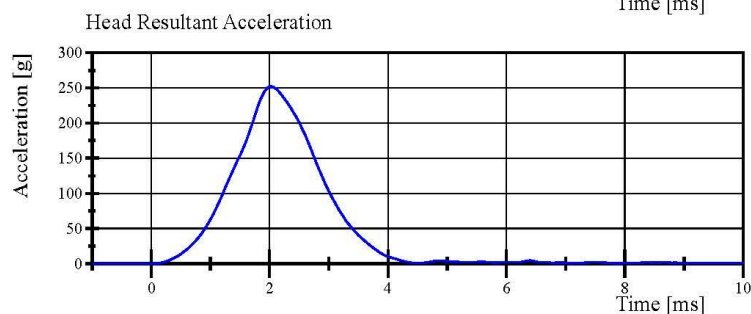
Min: -6.5 g at 2.1 ms



Filter Class: CFC_1000

Max: 173.4 g at 2.0 ms

Min: -2.3 g at 5.3 ms



Filter Class: CFC_1000

Max: 252.0 g at 2.0 ms

Min: 0.1 g at -0.3 ms

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

Report Number: EA7820_WHS04

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Transportation Research Center Inc.

Left Lateral Head Drop

WorldSID 50th Serial No. EA7820 Certification No. 4-1

Test Date: 10/1/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	44 %	Yes
Peak Head Resultant Acceleration	107 - 126 g	118.8 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	2.3 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	1.64 %	Yes

Test meets specifications.

Condition: Used

Comments:

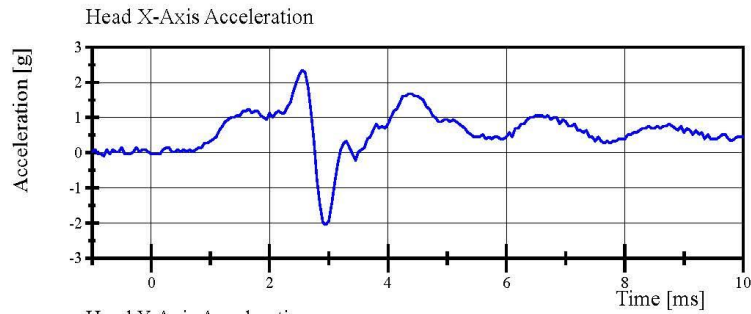
Head Skin S/N: EE8693

Transportation Research Center Inc.

Left Lateral Head Drop

WorldSID 50th Serial No. EA7820 Certification No. 4-1

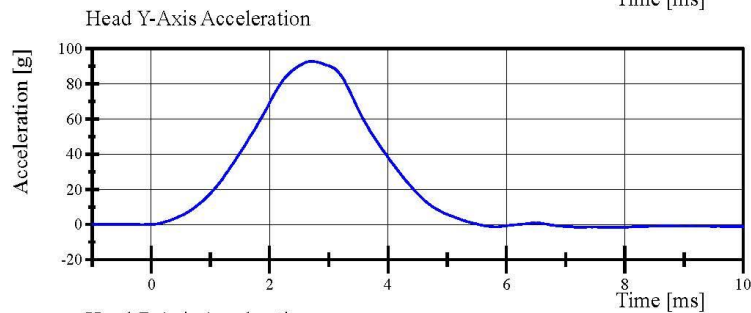
Test Date: 10/1/2021



Filter Class: CFC_1000

Max: 2.3 g at 2.6 ms

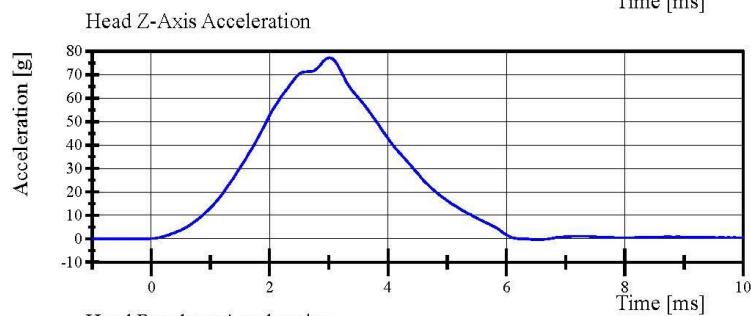
Min: -2.1 g at 3.0 ms



Filter Class: CFC_1000

Max: 92.9 g at 2.7 ms

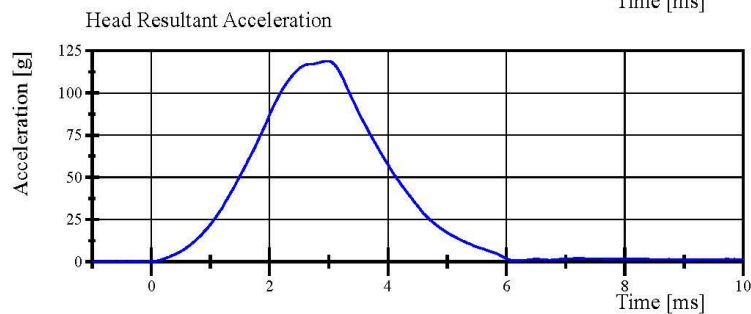
Min: -1.6 g at 7.9 ms



Filter Class: CFC_1000

Max: 77.2 g at 3.0 ms

Min: -0.5 g at 6.5 ms



Filter Class: CFC_1000

Max: 118.8 g at 3.0 ms

Min: 0.0 g at -0.3 ms

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

Report Number: EA7820_WHS04

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Transportation Research Center Inc.

Right Lateral Head Drop
WorldSID 50th Serial No. EA7820 Certification No. 4-1
Test Date: 10/1/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	44 %	Yes
Peak Head Resultant Acceleration	107 - 126 g	119.1 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-4.3 g	Yes
Is Acceleration Curve Unimodal within 10% of Peak?	< 10 %	3.00 %	Yes

Test meets specifications.

Condition: Used

Comments:

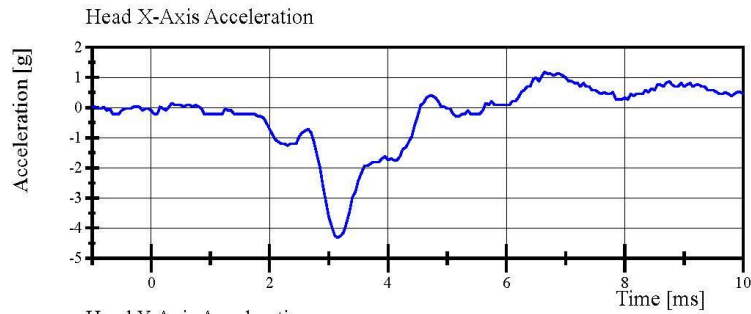
Head Skin S/N: EE8693

Transportation Research Center Inc.

Right Lateral Head Drop

WorldSID 50th Serial No. EA7820 Certification No. 4-1

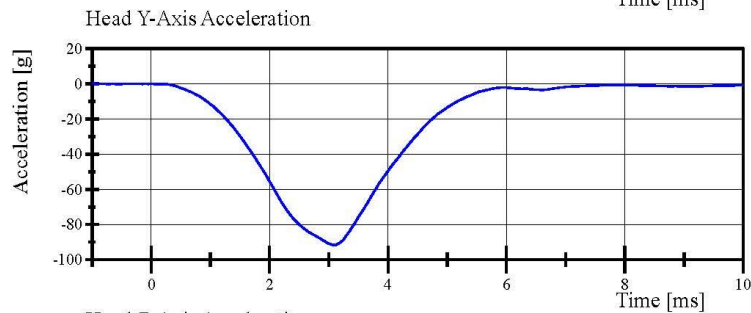
Test Date: 10/1/2021



Filter Class: CFC_1000

Max: 1.2 g at 6.7 ms

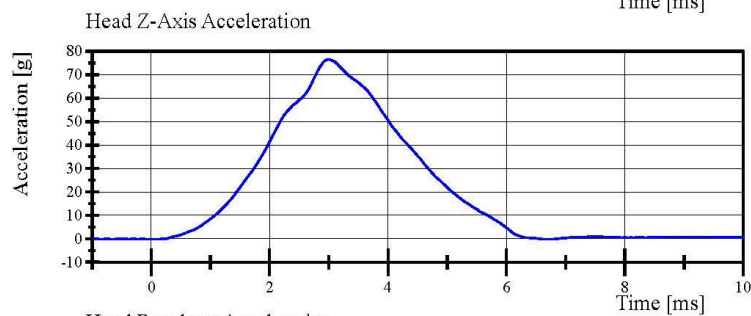
Min: -4.3 g at 3.2 ms



Filter Class: CFC_1000

Max: 0.2 g at 1.0 ms

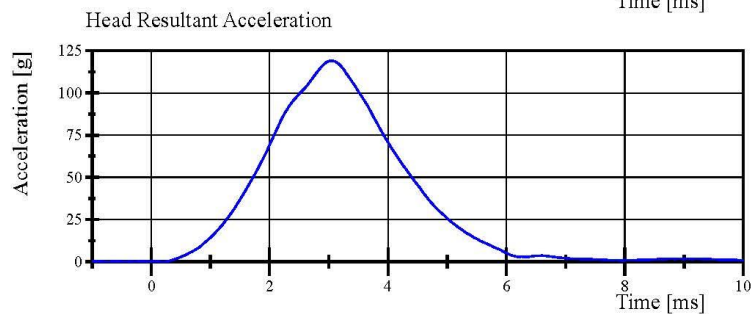
Min: -91.7 g at 3.1 ms



Filter Class: CFC_1000

Max: 76.5 g at 3.0 ms

Min: -0.3 g at 6.7 ms



Filter Class: CFC_1000

Max: 119.1 g at 3.1 ms

Min: 0.1 g at 0.2 ms

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

Report Number: EA7820_WHS04

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10.01.2021 10:32:46 975



Transportation Research Center Inc.

Left Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 4-1

Test Date: 10/4/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	67 %	Yes
Pendulum Velocity	(-3.30) - (-3.50) m/s	-3.398 m/s	Yes
Pendulum Integrated Velocity			
Change at 4 ms	0.87 - 1.09 m/s	0.976 m/s	Yes
Change at 8 ms	1.72 - 2.1 m/s	1.854 m/s	Yes
Change at 12 ms	2.63 - 3.17 m/s	2.731 m/s	Yes
Maximum Headform Flexion	(-50) - (-61) deg	-54.0 deg	Yes
Headform Flexion Decay			
- from Peak to Zero Degrees	58 - 72 ms	59.5 ms	Yes
Total Neck Occipital Condyles Moment	54 - 67 N·m	62.5 N·m	Yes
Total Neck Occipital Condyles Moment			
Decay Time to 0 N·m	71 - 87 ms	76.4 ms	Yes
Maximum Forward Pot Rotation			
Peak	(-32) - (-39) °	-34.8 °	Yes
Time of Peak	56 - 68 ms	62.1 ms	Yes
Maximum Rear Pot Rotation			
Peak	(-29) - (-36) °	-31.2 °	Yes
Time of Peak	56 - 68 ms	61.7 ms	Yes
Maximum Headform Angular Rate	(-2,047) - (-2,503) °/s	-1,912.7 °/s	No

Test does not meet specifications.

Condition: Used

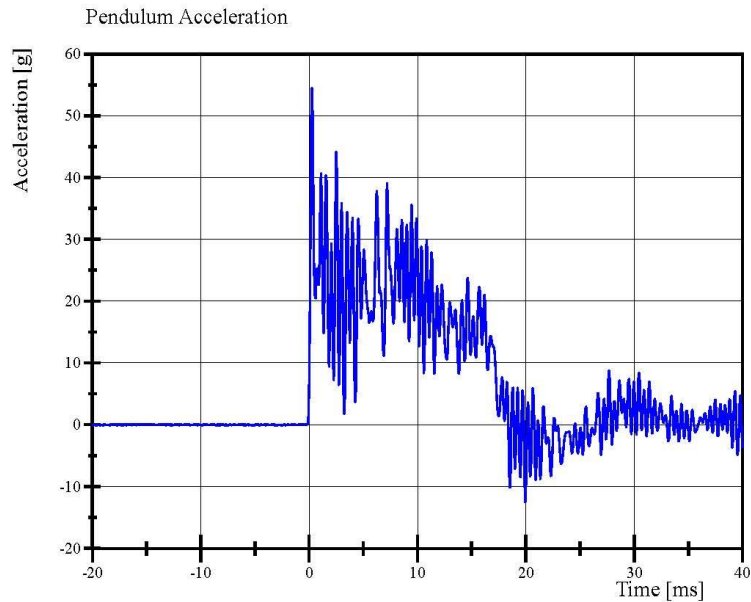
Comments:

Transportation Research Center Inc.

Left Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 4-1

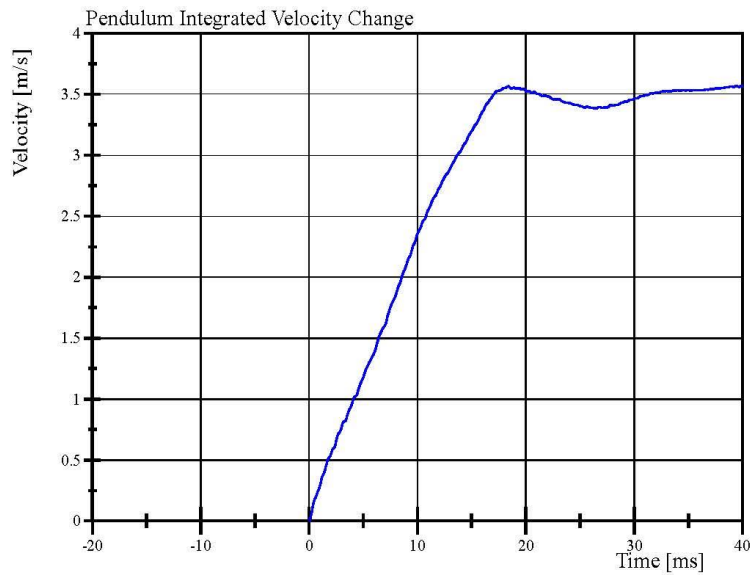
Test Date: 10/4/2021



Filter Class: CFC_1000

Max: 54.5 g at 0.3 ms

Min: -12.5 g at 20.0 ms



Filter Class: CFC_1000

Max: 3.6 m/s at 39.9 ms

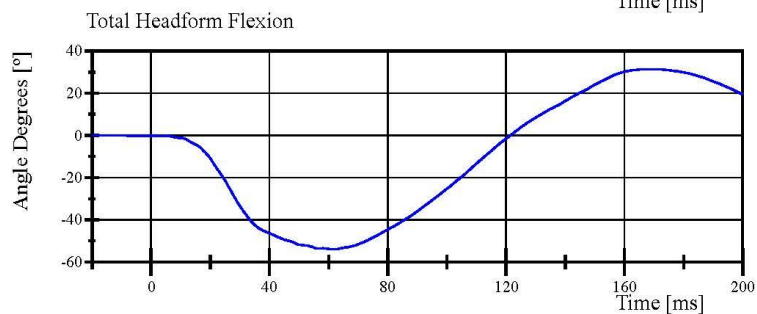
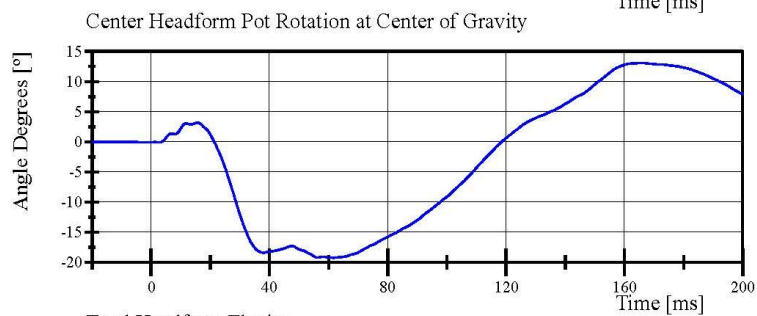
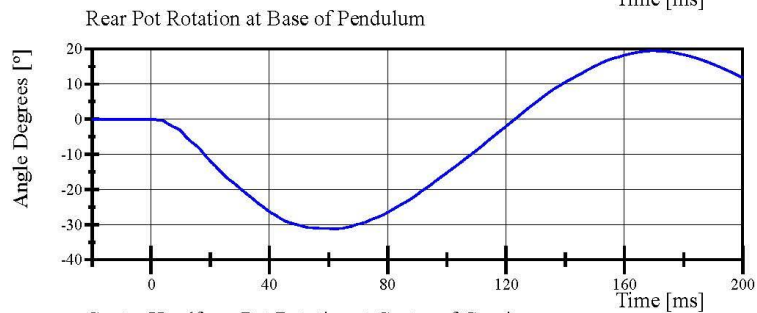
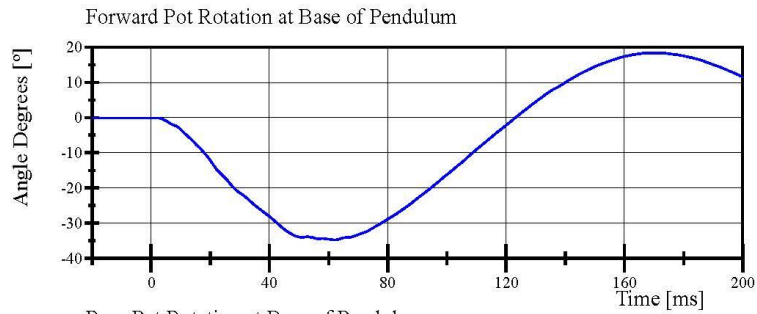
Min: 0.0 m/s at 0.0 ms

Transportation Research Center Inc.

Left Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 4-1

Test Date: 10/4/2021

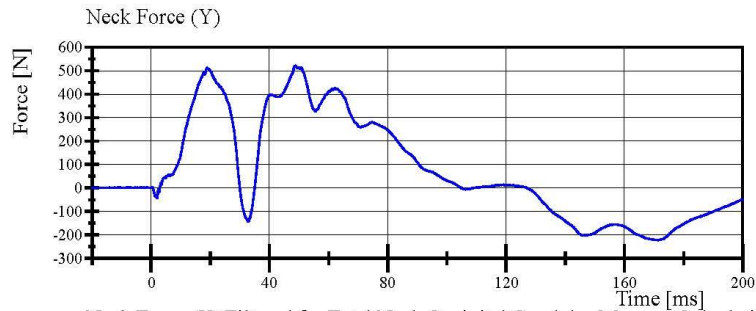


Transportation Research Center Inc.

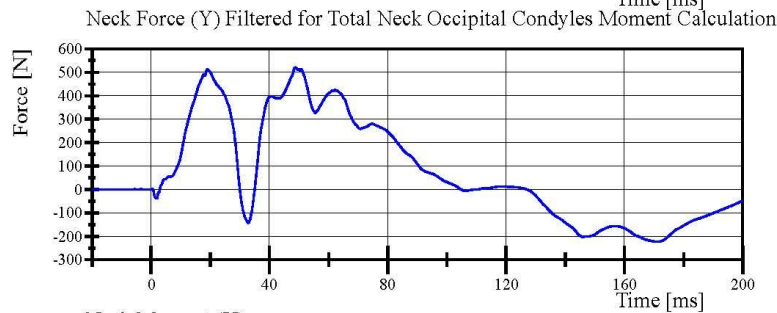
Left Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 4-1

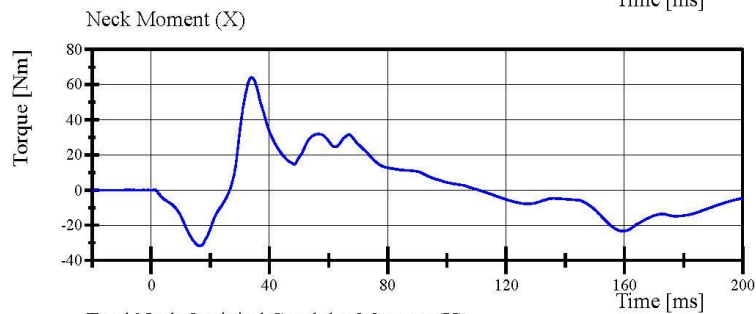
Test Date: 10/4/2021



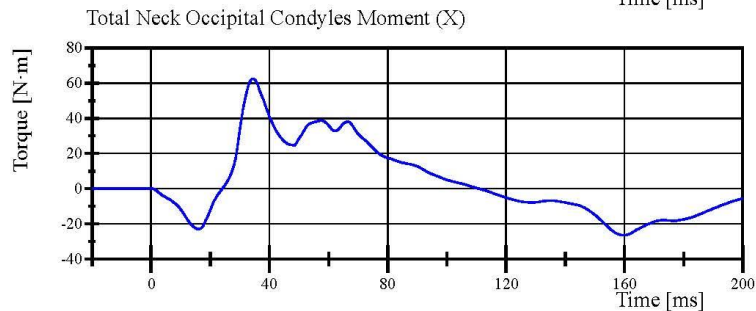
Filter Class: CFC_1000
Max: 521.4 N at 48.8 ms
Min: -223.2 N at 171.3 ms



Filter Class: CFC_600
Max: 520.9 N at 48.8 ms
Min: -222.5 N at 171.3 ms



Filter Class: CFC_600
Max: 64.1 Nm at 34.0 ms
Min: -31.7 Nm at 16.5 ms



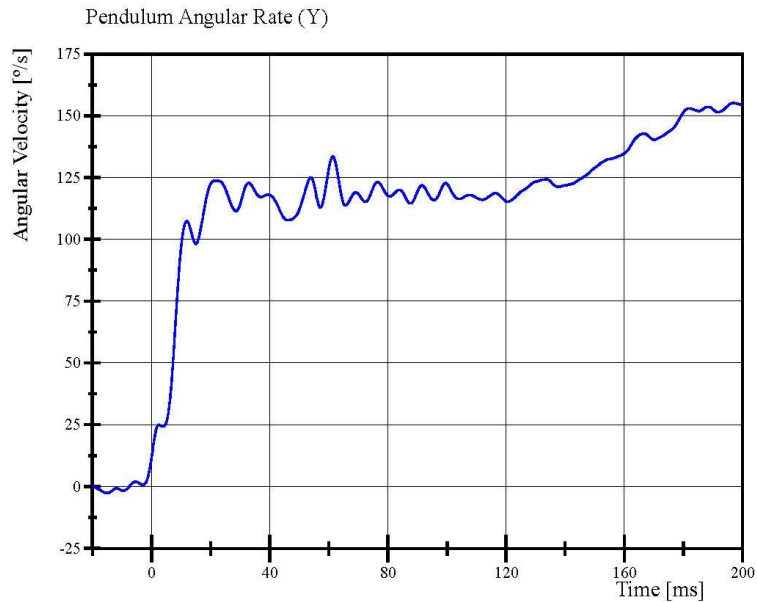
Filter Class: Without_(Constar
Max: 62.5 N.m at 34.4 ms
Min: -26.5 N.m at 159.6 ms

Transportation Research Center Inc.

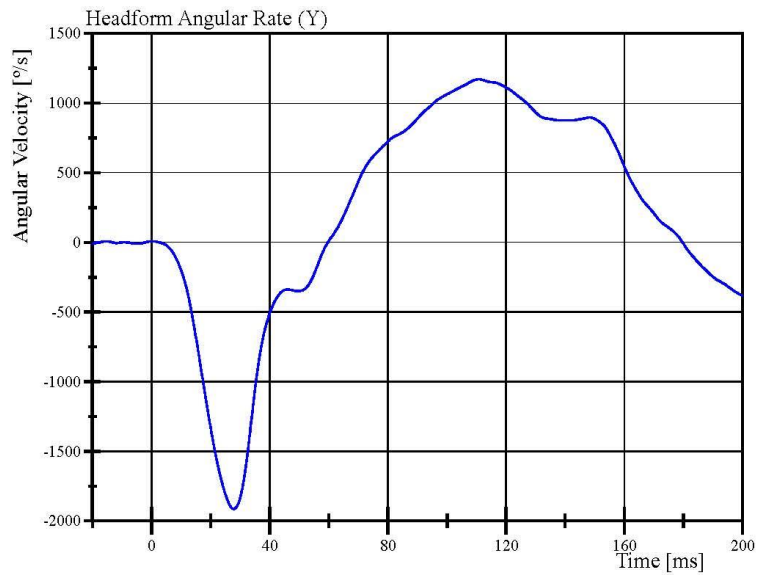
Left Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 4-1

Test Date: 10/4/2021



Filter Class: CFC_60
Max: 155.2 °/s at 196.8 ms
Min: -2.6 °/s at -15.1 ms



Filter Class: CFC_60
Max: 1,170.3 °/s at 110.8 ms
Min: -1,912.7 °/s at 27.9 ms

Transportation Research Center Inc.

Right Lateral Neck
WorldSID 50th Serial No. EA7820 Certification No. 4-1
Test Date: 10/5/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	62 %	Yes
Pendulum Velocity	3.30 - 3.50 m/s	3.324 m/s	Yes
Pendulum Integrated Velocity Change at 4 ms	(-0.87) - (-1.09) m/s	-1.000 m/s	Yes
Change at 8 ms	(-1.72) - (-2.1) m/s	-2.058 m/s	Yes
Change at 12 ms	(-2.63) - (-3.17) m/s	-3.160 m/s	Yes
Maximum Headform Flexion	50 - 61 deg	53.6 deg	Yes
Headform Flexion Decay - from Peak to Zero Degrees	58 - 72 ms	66.0 ms	Yes
Total Neck Occipital Condyles Moment	(-54) - (-67) N·m	-63.4 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	71 - 87 ms	76.4 ms	Yes
Maximum Forward Pot Rotation			
Peak	32 - 39 °	34.5 °	Yes
Time of Peak	56 - 68 ms	62.7 ms	Yes
Maximum Rear Pot Rotation			
Peak	29 - 36 °	31.0 °	Yes
Time of Peak	56 - 68 ms	62.4 ms	Yes
Maximum Headform Angular Rate	2,047 - 2,503 °/s	1,966.5 °/s	No

Test does not meet specifications.

Condition: Used

Comments:

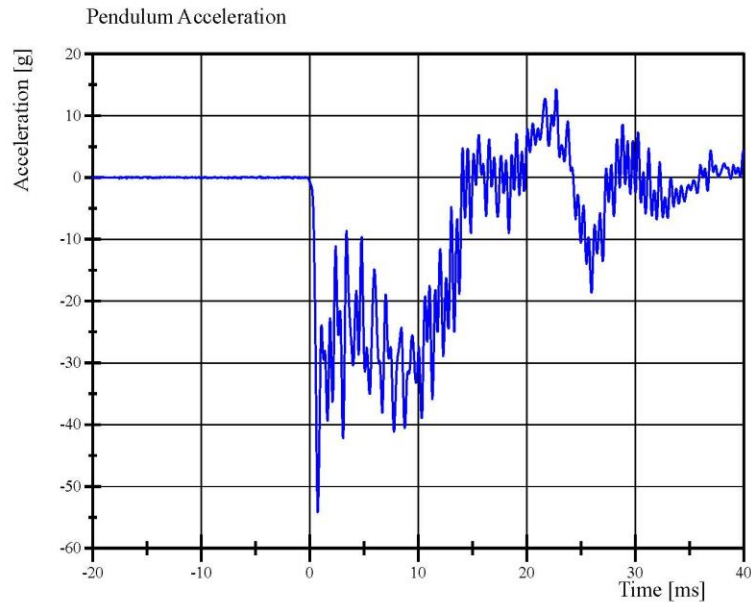
Neck S/N: DW6607

Transportation Research Center Inc.

Right Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 4-1

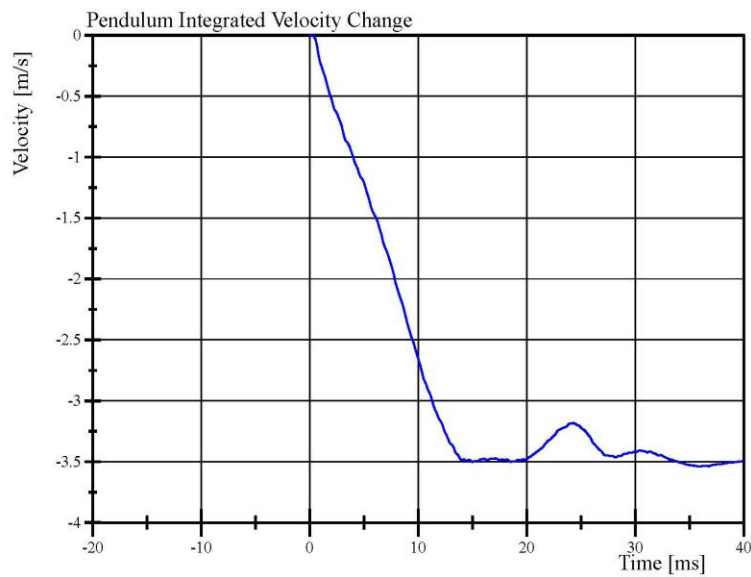
Test Date: 10/5/2021



Filter Class: CFC_1000

Max: 14.2 g at 22.7 ms

Min: -54.2 g at 0.8 ms



Filter Class: CFC_1000

Max: 0.0 m/s at -0.0 ms

Min: -3.5 m/s at 35.9 ms

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

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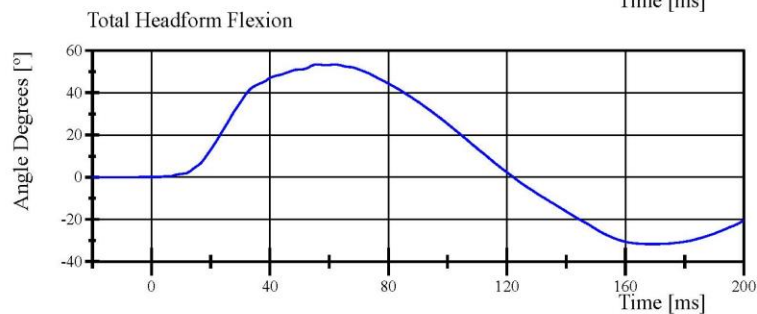
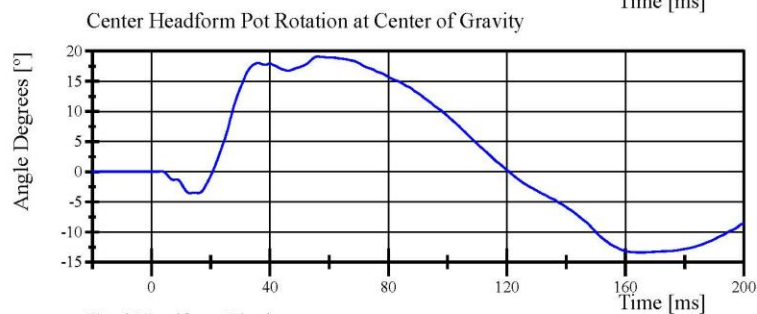
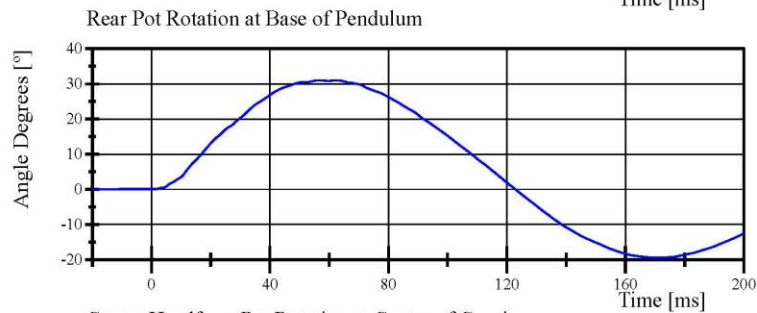
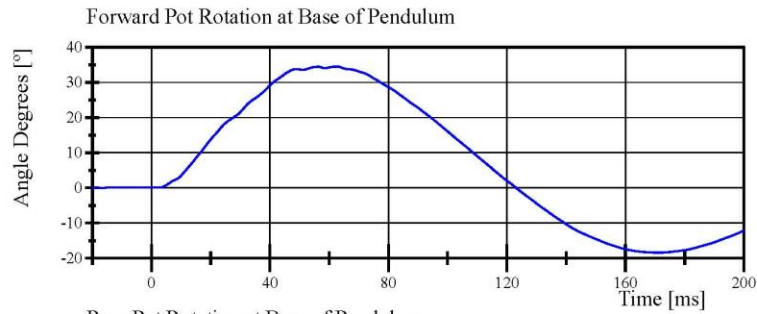


Transportation Research Center Inc.

Right Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 4-1

Test Date: 10/5/2021



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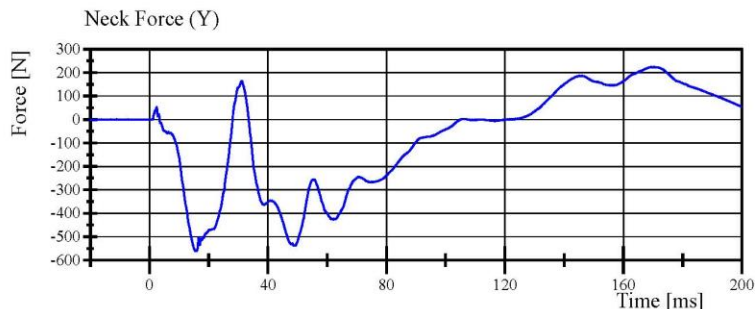


Transportation Research Center Inc.

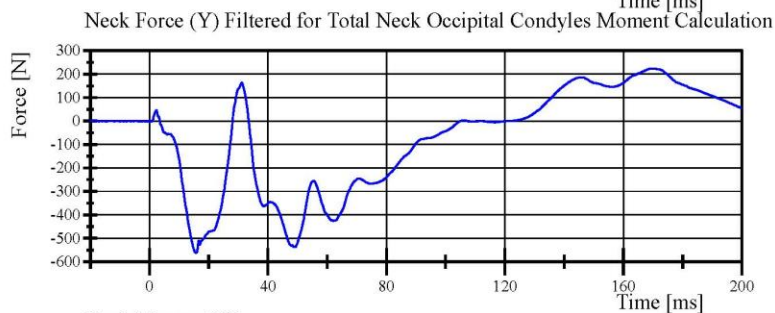
Right Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 4-1

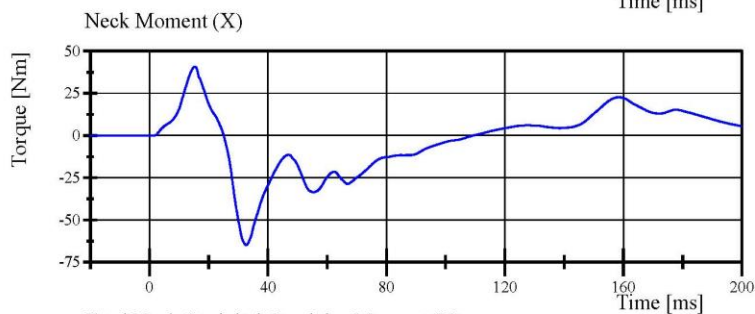
Test Date: 10/5/2021



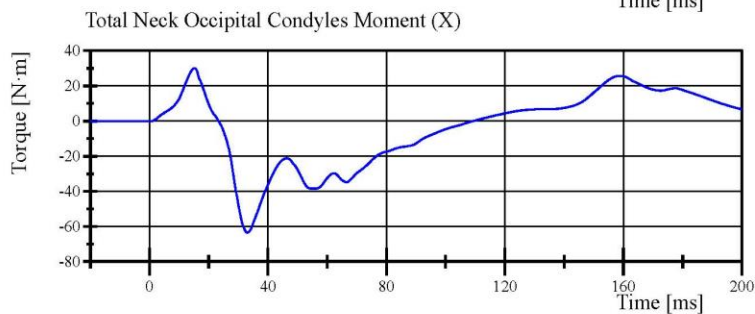
Filter Class: CFC_1000
Max: 223.8 N at 169.2 ms
Min: -561.3 N at 15.5 ms



Filter Class: CFC_600
Max: 223.3 N at 169.3 ms
Min: -561.6 N at 15.7 ms



Filter Class: CFC_600
Max: 40.8 Nm at 15.3 ms
Min: -64.9 Nm at 32.6 ms



Filter Class: Without_(Constar
Max: 29.9 N·m at 15.2 ms
Min: -63.4 N·m at 33.0 ms

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

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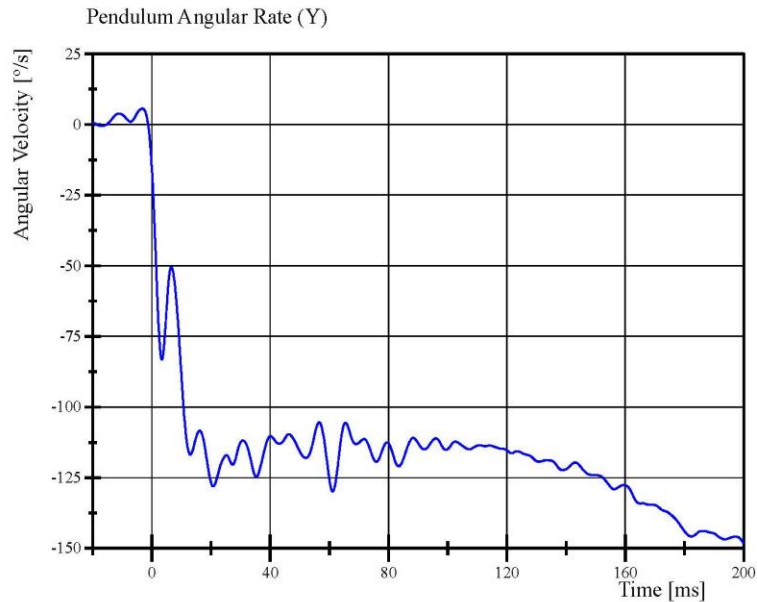


Transportation Research Center Inc.

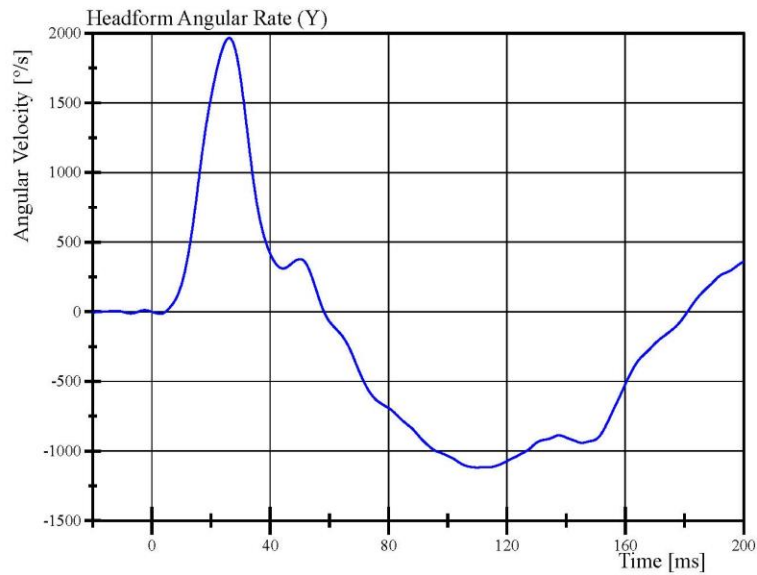
Right Lateral Neck

WorldSID 50th Serial No. EA7820 Certification No. 4-1

Test Date: 10/5/2021



Filter Class: CFC_60
Max: 5.6 °/s at -3.2 ms
Min: -148.2 °/s at 200.0 ms



Filter Class: CFC_60
Max: 1,966.5 °/s at 26.1 ms
Min: -1,118.5 °/s at 109.8 ms

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

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Transportation Research Center Inc.

Left Lateral Torsion

WorldSID 50th Serial No. EA7820 Certification No. 4-1

Test Date: 10/5/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	66 %	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	2.245 m/s	Yes
Change at 15 ms	3.19 - 3.63 m/s	3.439 m/s	Yes
Change at 20 ms	4.27 - 4.87 m/s	4.679 m/s	Yes
Peak Fixture Rotation	(-41.5) - (-51) °	-47.98 °	Yes
Decay Time to 0 deg from Peak Angle	35 - 43 ms	41.4 ms	Yes
Peak Head Angular Velocity Z-axis	(-1,345) - (-1,655) %/s	-1,635.4 %/s	Yes
Peak Lower Neck Moment Z-axis	34 - 42 N·m	38.5 N·m	Yes

Test meets specifications.

Condition: Used

Comments:

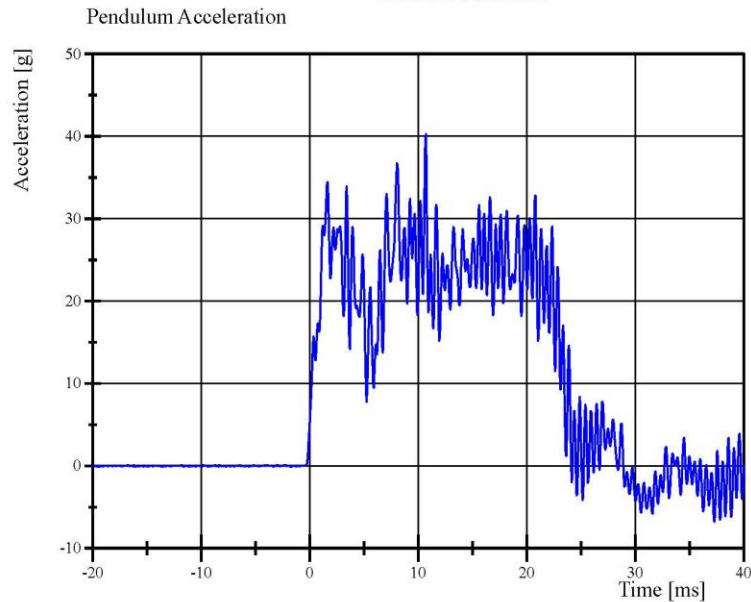
Neck S/N: DW6607

Transportation Research Center Inc.

Left Lateral Torsion

WorldSID 50th Serial No. EA7820 Certification No. 4-1

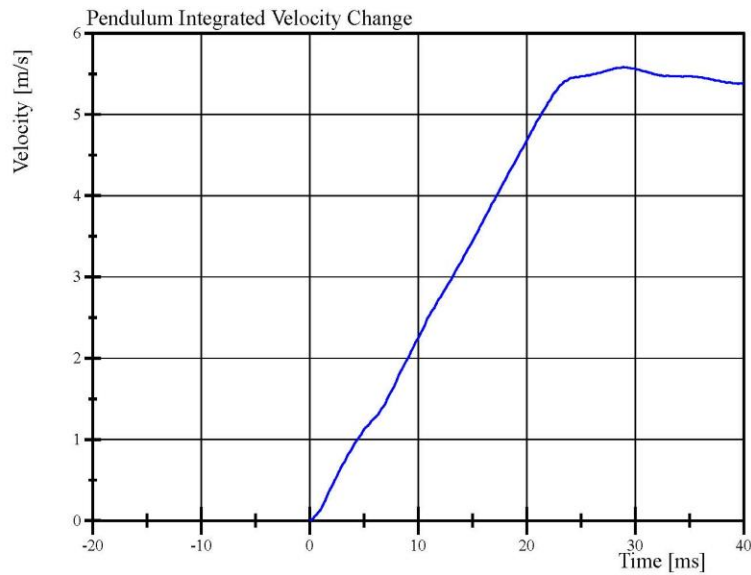
Test Date: 10/5/2021



Filter Class: CFC_1000

Max: 40.3 g at 10.7 ms

Min: -6.8 g at 37.3 ms



Filter Class: CFC_1000

Max: 5.6 m/s at 28.9 ms

Min: 0.0 m/s at 0.0 ms

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

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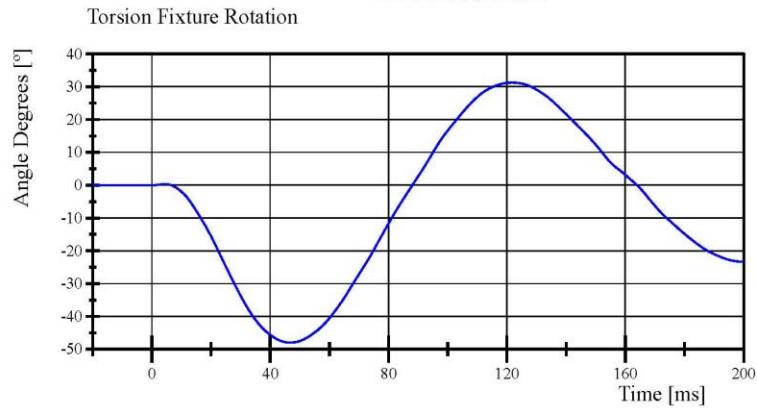


Transportation Research Center Inc.

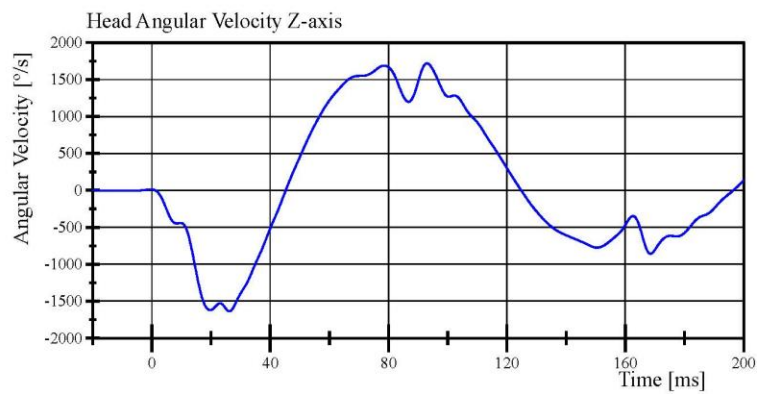
Left Lateral Torsion

WorldSID 50th Serial No. EA7820 Certification No. 4-1

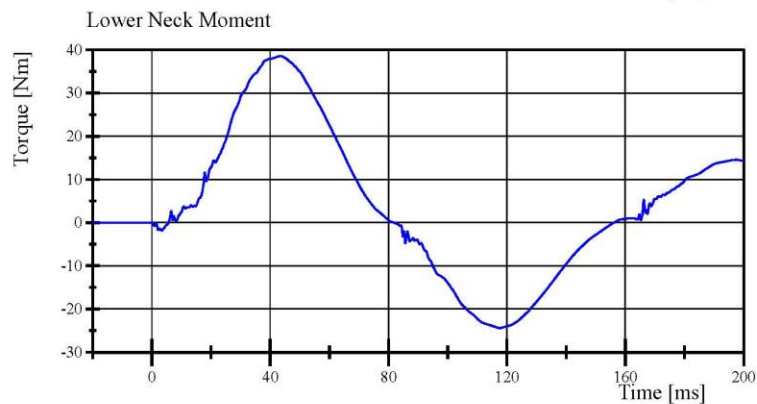
Test Date: 10/5/2021



Filter Class: CFC_60
Max: 31.3 ° at 121.8 ms
Min: -48.0 ° at 46.7 ms



Filter Class: CFC_60
Max: 1,719.1 °/s at 93.0 ms
Min: -1,635.4 °/s at 26.2 ms



Filter Class: CFC_600
Max: 38.5 Nm at 43.8 ms
Min: -24.4 Nm at 117.3 ms

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

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Transportation Research Center Inc.

Right Lateral Torsion

WorldSID 50th Serial No. EA7820 Certification No. 4-2

Test Date: 10/5/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	65 %	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	2.302 m/s	Yes
Change at 15 ms	3.19 - 3.63 m/s	3.513 m/s	Yes
Change at 20 ms	4.27 - 4.87 m/s	4.711 m/s	Yes
Peak Fixture Rotation	41.5 - 51 °	46.64 °	Yes
Decay Time to 0 deg from Peak Angle	35 - 43 ms	39.9 ms	Yes
Peak Head Angular Velocity Z-axis	1,345 - 1,655 %/s	1,602.2 %/s	Yes
Peak Lower Neck Moment Z-axis	(-34) - (-42) N·m	-38.7 N·m	Yes

Test meets specifications.

Condition: Used

Comments:

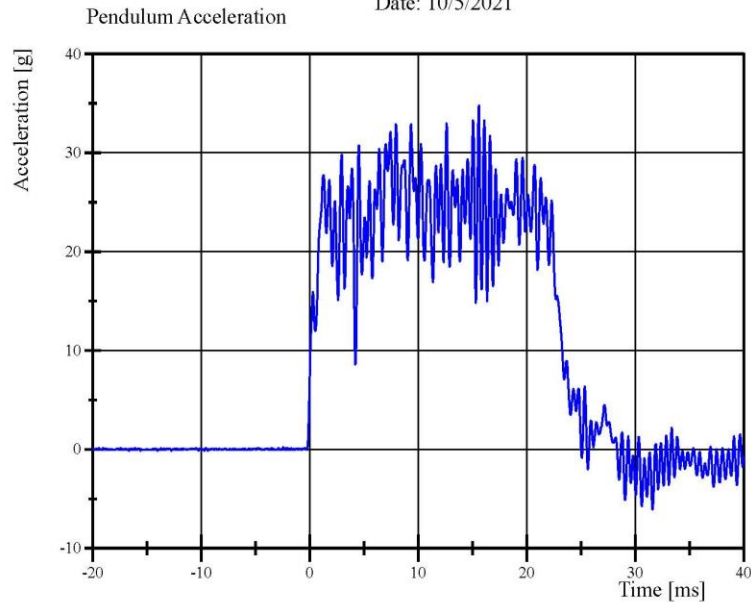
Neck S/N: DW6607

Transportation Research Center Inc.

Right Lateral Torsion

WorldSID 50th Serial No. EA7820 Certification No. 4-2 Test

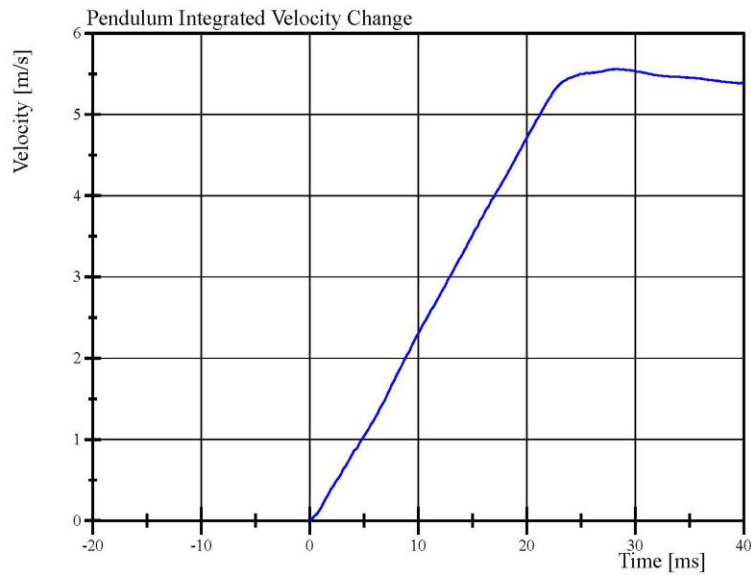
Date: 10/5/2021



Filter Class: CFC_1000

Max: 34.8 g at 15.6 ms

Min: -6.1 g at 31.6 ms



Filter Class: CFC_1000

Max: 5.6 m/s at 28.4 ms

Min: 0.0 m/s at 0.0 ms

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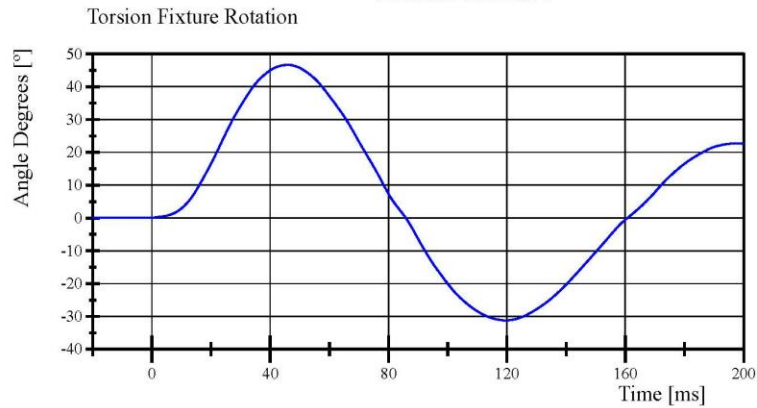


Transportation Research Center Inc.

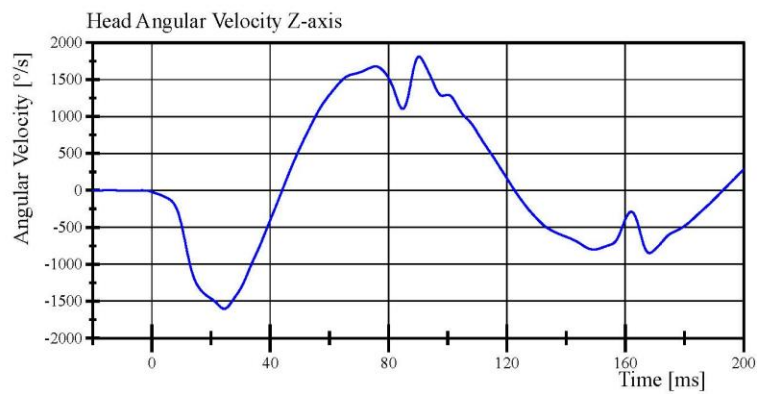
Right Lateral Torsion

WorldSID 50th Serial No. EA7820 Certification No. 4-2

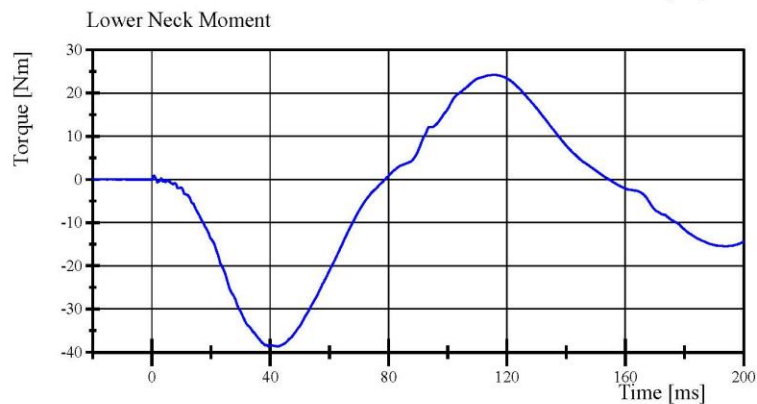
Test Date: 10/5/2021



Filter Class: CFC_60
Max: 46.6 ° at 46.0 ms
Min: -31.2 ° at 119.6 ms



Filter Class: CFC_60
Max: 1,809.7 °/s at 90.3 ms
Min: -1,602.2 °/s at 24.4 ms



Filter Class: CFC_600
Max: 24.2 Nm at 115.9 ms
Min: -38.7 Nm at 39.3 ms

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

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Transportation Research Center Inc.

Right Lateral Shoulder

WorldSID 50th Serial No. EA7820 Certification No. 4-1

Test Date: 9/29/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	46 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.36 m/s	Yes
Impactor Force	2,600 - 3,300 N	2,932.8 N	Yes
Shoulder Force	(-1,470) - (-1,800) N	-1,660.1 N	Yes
Shoulder Rib Length Change	37 - 46 mm	42.3 mm	Yes

Test meets specifications.

Condition: Used

Comments:

Arm S/N: EE7908

Shoulder Rib S/N: ED9644

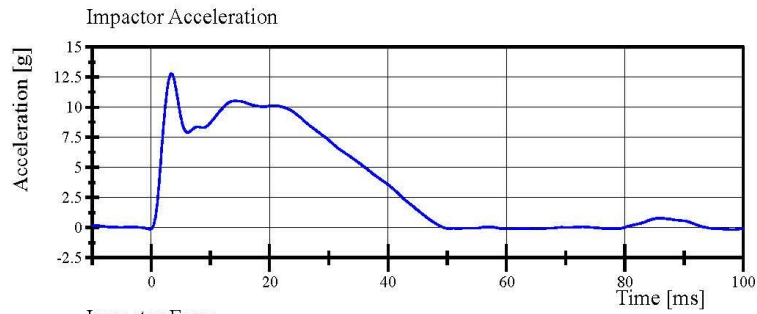
RibEye S/N: 160

Transportation Research Center Inc.

Right Lateral Shoulder

WorldSID 50th Serial No. EA7820 Certification No. 4-1

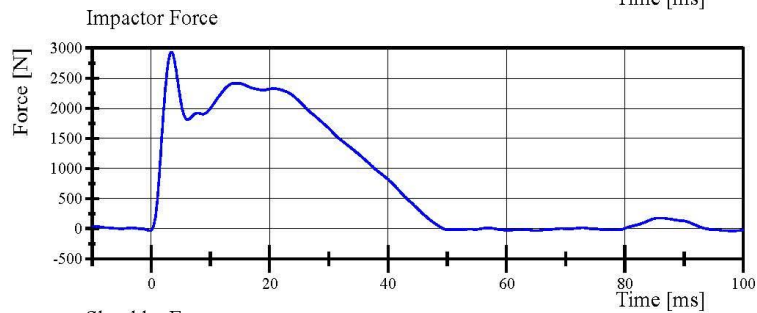
Test Date: 9/29/2021



Filter Class: CFC_180

Max: 12.8 g at 3.4 ms

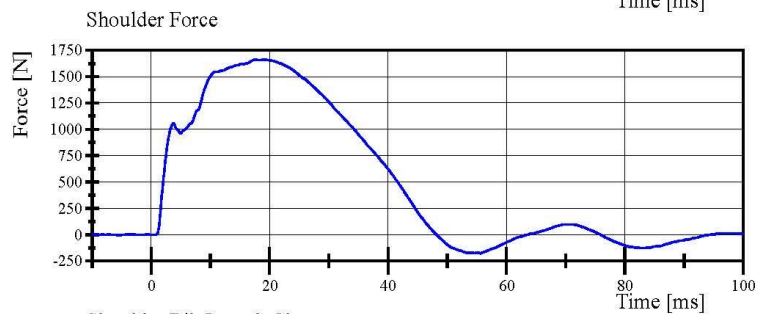
Min: -0.2 g at 98.2 ms



Filter Class: CFC_180

Max: 2,932.8 N at 3.4 ms

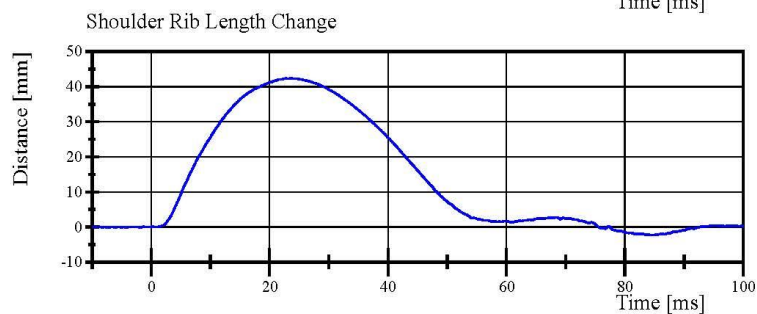
Min: -39.7 N at 98.2 ms



Filter Class: CFC_600

Max: 1,660.1 N at 17.5 ms

Min: -175.7 N at 55.6 ms



Filter Class: CFC_600

Max: 42.3 mm at 23.6 ms

Min: -2.2 mm at 84.9 ms

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

Report Number: EA7820_WHS04

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Transportation Research Center Inc.

Right Lateral Thorax with Arm
WorldSID 50th Serial No. EA7820 Certification No. 4-1
Test Date: 9/29/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Impactor Velocity	6.6 - 6.8 m/s	6.65 m/s	Yes
Impactor Force	5,300 - 6,200 N	6,023.8 N	Yes
Peak Thorax Rib 1 Length Change	35 - 47 mm	41.0 mm	Yes
Peak Thorax Rib 2 Length Change	46 - 56 mm	45.3 mm	No
Peak Thorax Rib 3 Length Change	33.5 - 40.5 mm	34.44 mm	Yes
Peak T4 Acceleration, y-axis	(-28) - (-37) g	-32.4 g	Yes
Peak T12 Acceleration, y-axis	(-22) - (-28) g	-26.0 g	Yes

Test does not meet specifications.

Condition: Used

Comments:

Arm S/N: EE7908

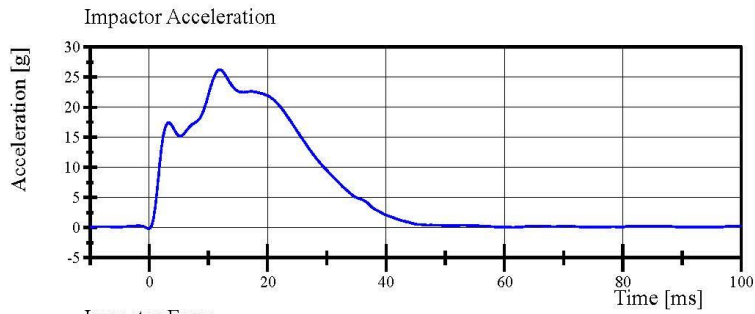
Thorax Rib #1 S/N: EI6666

Thorax Rib #2 S/N: EI8150

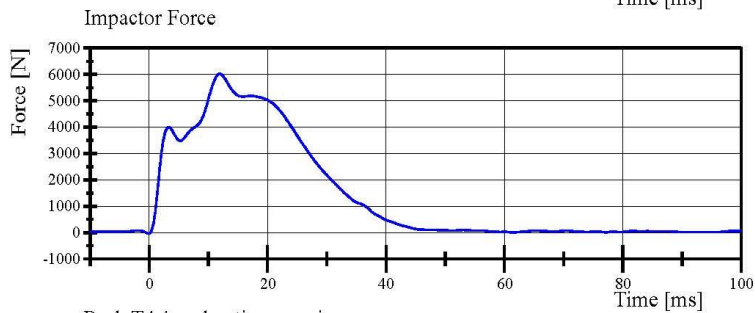
Thorax Rib #3 S/N: EI8148

Transportation Research Center Inc.

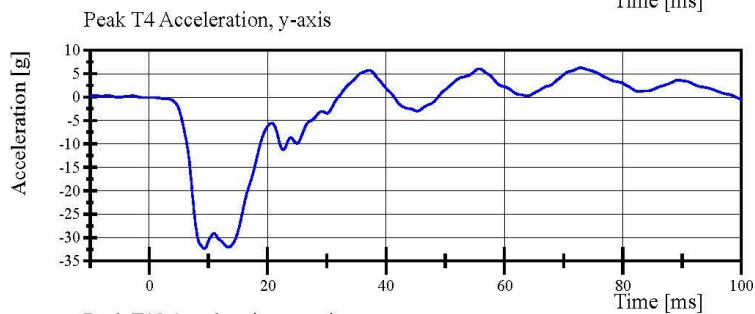
Right Lateral Thorax with Arm
WorldSID 50th Serial No. EA7820 Certification No. 4-1
Test Date: 9/29/2021



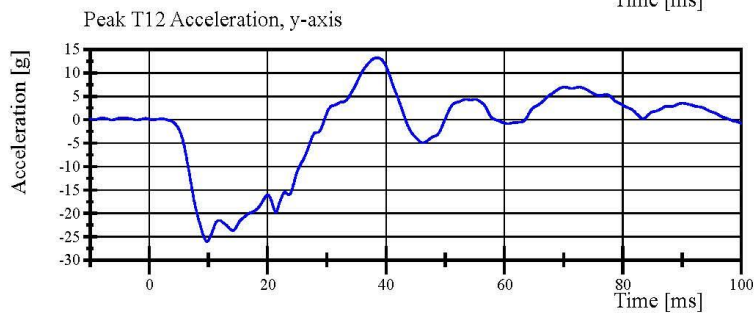
Filter Class: CFC_180
Max: 26.2 g at 11.9 ms
Min: -0.2 g at -0.1 ms



Filter Class: CFC_180
Max: 6,023.8 N at 11.9 ms
Min: -37.8 N at -0.1 ms



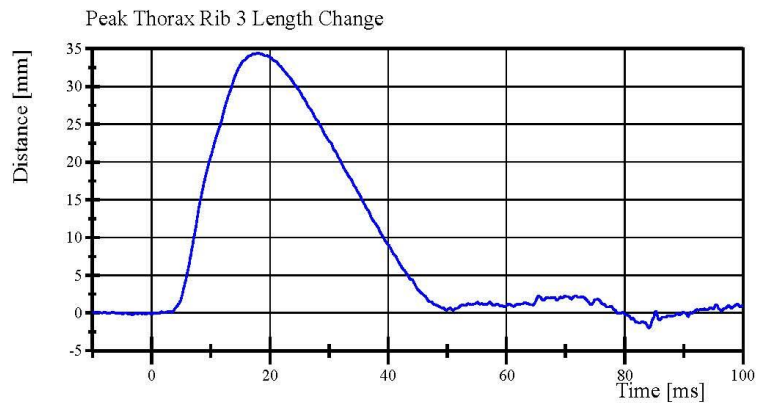
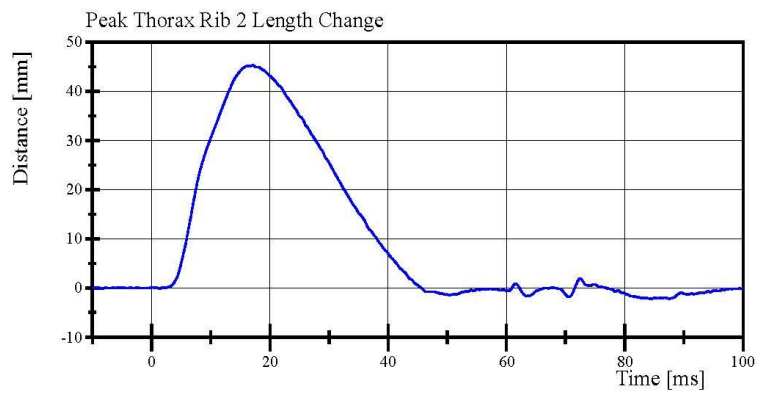
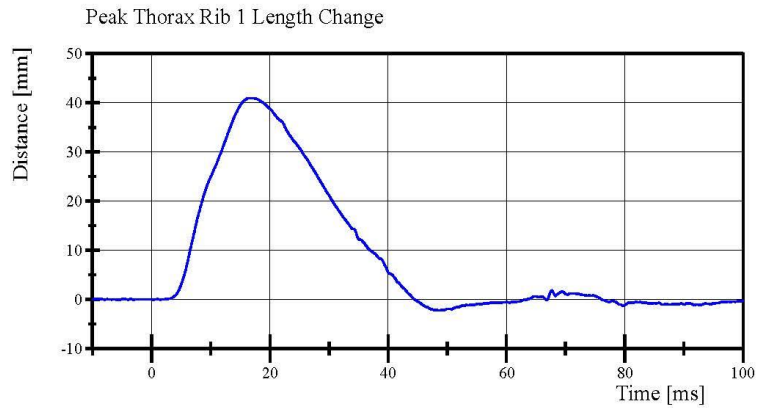
Filter Class: CFC_180
Max: 6.2 g at 72.9 ms
Min: -32.4 g at 9.3 ms



Filter Class: CFC_180
Max: 13.2 g at 38.4 ms
Min: -26.0 g at 9.8 ms

Transportation Research Center Inc.

Right Lateral Thorax with Arm
WorldSID 50th Serial No. EA7820 Certification No. 4-1
Test Date: 9/29/2021



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

Right Lateral Thorax without Arm
WorldSID 50th Serial No. EA7820 Certification No. 4-1
Test Date: 9/30/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.34 m/s	Yes
Impactor Force	3,200 - 3,800 N	3,526.8 N	Yes
Peak Thorax Rib 1 Length Change	33 - 43 mm	37.3 mm	Yes
Peak Thorax Rib 2 Length Change	35 - 43 mm	37.4 mm	Yes
Peak Thorax Rib 3 Length Change	32 - 40 mm	33.2 mm	Yes
Peak T4 Acceleration, y-axis	(-14) - (-20) g	-15.4 g	Yes
Peak T12 Acceleration, y-axis	(-14) - (-22) g	-19.3 g	Yes

Test meets specifications.

Condition: Used

Comments:

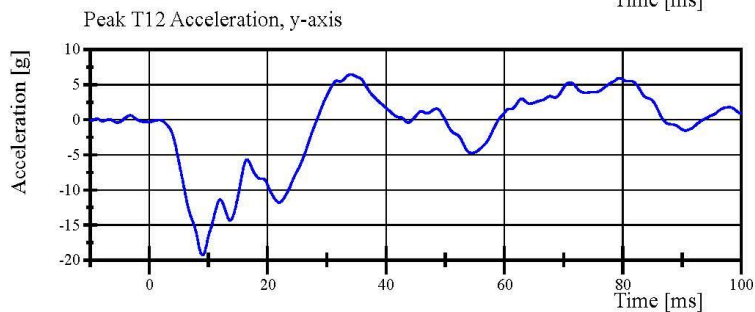
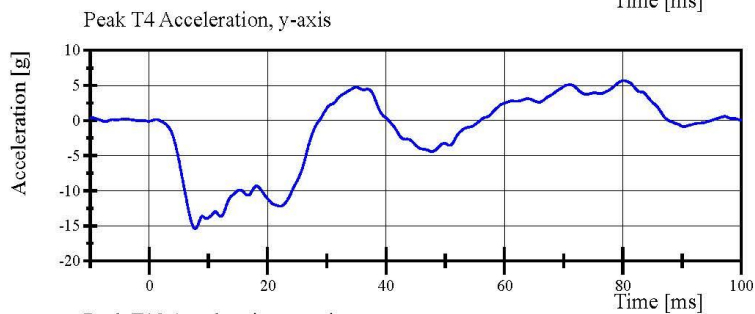
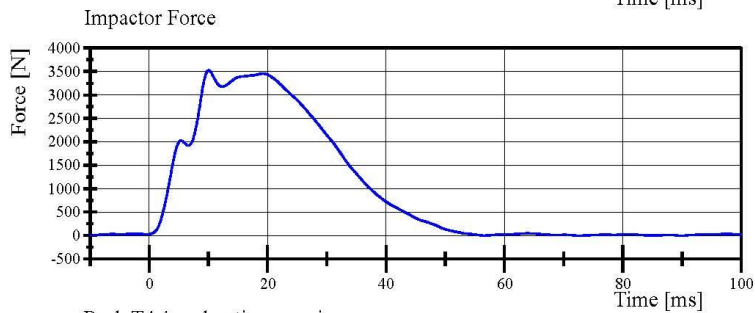
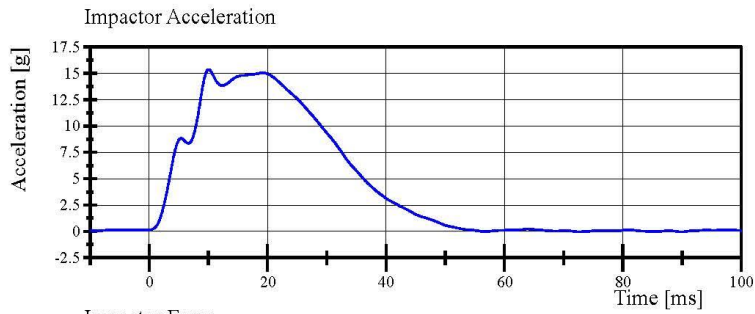
Thorax Rib #1 S/N: EI6666

Thorax Rib #2 S/N: EI8150

Thorax Rib #3 S/N: EI8148

Transportation Research Center Inc.

Right Lateral Thorax without Arm
WorldSID 50th Serial No. EA7820 Certification No. 4-1
Test Date: 9/30/2021



Specification Source: WordSID 50th(W5) VRTC Nov 2020.xlsx
WorldSID 50th_Qualification Manual 11_09_2020
Report Number: EA7820_WHS04

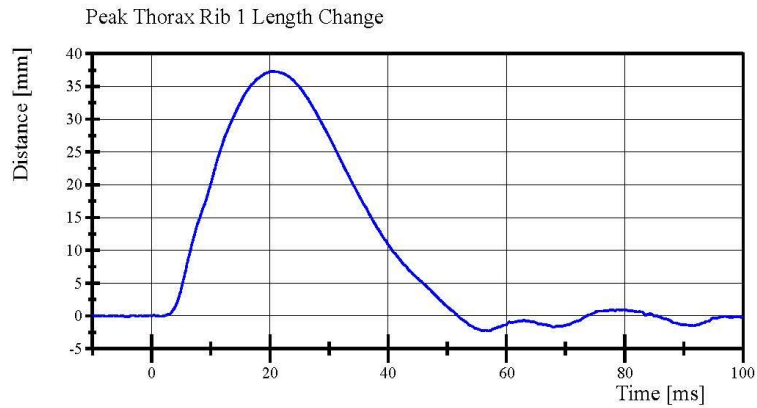
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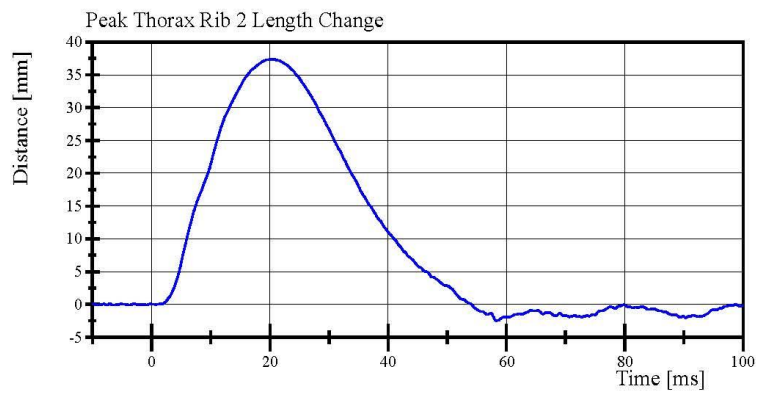


Transportation Research Center Inc.

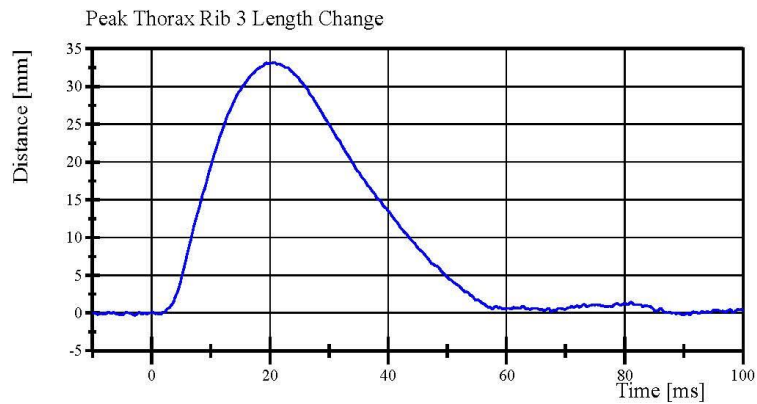
Right Lateral Thorax without Arm
WorldSID 50th Serial No. EA7820 Certification No. 4-1
Test Date: 9/30/2021



Filter Class: CFC_600
Max: 37.3 mm at 20.6 ms
Min: -2.3 mm at 57.0 ms



Filter Class: CFC_600
Max: 37.4 mm at 20.7 ms
Min: -2.5 mm at 58.3 ms



Filter Class: CFC_600
Max: 33.2 mm at 20.8 ms
Min: -0.3 mm at -2.9 ms

Transportation Research Center Inc.

Right Lateral Abdomen

WorldSID 50th Serial No. EA7820 Certification No. 4-1

Test Date: 9/30/2021

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	46 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.35 m/s	Yes
Impactor Force	2,700 - 3,100 N	2,875.5 N	Yes
Peak Abdomen Rib 1 Length Change	32.5 - 39.5 mm	36.30 mm	Yes
Peak Abdomen Rib 2 Length Change	32 - 38 mm	33.6 mm	Yes
Peak T12 Acceleration, y-axis	(-14.5) - (-19.5) g	-17.89 g	Yes

Test meets specifications.

Condition: Used

Comments:

Abdomen Rib #1 S/N: DW8877

Abdomen Rib #2 S/N: DW8878

RibEye S/N: 160

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

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

		WorldSID-50M S/N EA7820		
		Serial Number	Manufacturer	Calibration Date
Head Accelerometers (g)	X	10820-1	Endevco	26-Jul-2021
	Y	10820-3	Endevco	26-Jul-2021
	Z	10820-2	Endevco	26-Jul-2021
Head Angular Rates Sensors (deg/sec)	X	ARS11763	DTS	4-Aug-2020
	Y	ARS11755	DTS	4-Aug-2020
	Z	ARS11079	DTS	4-Aug-2020
Upper Neck Force (N)	X	EC2343	Humanetics	14-Jul-2021
	Y	EC2343	Humanetics	14-Jul-2021
	Z	EC2343	Humanetics	14-Jul-2021
Upper Neck Moment (Nm)	X	EC2343	Humanetics	14-Jul-2021
	Y	EC2343	Humanetics	14-Jul-2021
	Z	EC2343	Humanetics	14-Jul-2021
Lower Neck Force (N)	X	DN9609	Humanetics	14-Jul-2021
	Y	DN9609	Humanetics	14-Jul-2021
	Z	DN9609	Humanetics	14-Jul-2021
Lower Neck Moment (Nm)	X	DN9609	Humanetics	14-Jul-2021
	Y	DN9609	Humanetics	14-Jul-2021
	Z	DN9609	Humanetics	14-Jul-2021
Shoulder Force (N)	X	EC4095	Humanetics	15-Jul-2021
	Y	EC4095	Humanetics	15-Jul-2021
	Z	EC4095	Humanetics	15-Jul-2021
Upper Spine Accelerometers (T1) (g)	X	12376-3	Endevco	26-Jul-2021
	Y	12376-2	Endevco	26-Jul-2021
	Z	12376-1	Endevco	26-Jul-2021
Middle Spine Accelerometers (T4) (g)	X	12300-3	Endevco	26-Jul-2021
	Y	12300-2	Endevco	26-Jul-2021
	Z	12300-1	Endevco	26-Jul-2021
Lower Spine Accelerometers (T12) (g)	X	12172-3	Endevco	26-Jul-2021
	Y	12172-2	Endevco	26-Jul-2021
	Z	12172-1	Endevco	26-Jul-2021
Pubic Symphysis Force (N)	Y	EA8949	Humanetics	1-Sep-2021
Sacro-Iliac Left Force (N)	X	EA8971	Humanetics	14-Jul-2021
	Y	EA8971	Humanetics	14-Jul-2021
	Z	EA8971	Humanetics	14-Jul-2021
Sacro-Iliac Left Moment (Nm)	X	EA8971	Humanetics	14-Jul-2021
	Y	EA8971	Humanetics	14-Jul-2021
	Z	EA8971	Humanetics	14-Jul-2021

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

		WorldSID-50M S/N EA7820		
		Serial Number	Manufacturer	Calibration Date
Sacro-Iliac Right Force (N)	X	EA8971	Humanetics	14-Jul-2021
	Y	EA8971	Humanetics	14-Jul-2021
	Z	EA8971	Humanetics	14-Jul-2021
Sacro-Iliac Right Moment (Nm)	X	EA8971	Humanetics	14-Jul-2021
	Y	EA8971	Humanetics	14-Jul-2021
	Z	EA8971	Humanetics	14-Jul-2021
Lumbar Force (N)	X	EG4790	Humanetics	14-Jul-2021
	Y	EG4790	Humanetics	14-Jul-2021
	Z	EG4790	Humanetics	14-Jul-2021
Lumbar Moment (Nm)	X	EG4790	Humanetics	14-Jul-2021
	Y	EG4790	Humanetics	14-Jul-2021
	Z	EG4790	Humanetics	14-Jul-2021
Pelvis Accelerometers (g)	X	12364-3	Endevco	23-Jul-2021
	Y	12364-2	Endevco	23-Jul-2021
	Z	12364-1	Endevco	23-Jul-2021
Femur Force (N)	X	EG2791	Humanetics	14-Jul-2021
	Y	EG2791	Humanetics	14-Jul-2021
	Z	EG2791	Humanetics	14-Jul-2021
Femur Moment (Nm)	X	EG2791	Humanetics	14-Jul-2021
	Y	EG2791	Humanetics	14-Jul-2021
	Z	EG2791	Humanetics	14-Jul-2021
Femoral Neck Force (N)	X	EB8706	Humanetics	19-Jul-2021
	Y	EB8706	Humanetics	19-Jul-2021
	Z	EB8706	Humanetics	19-Jul-2021
Passenger Outer Knee Force (N)	Y	EC0323	Humanetics	15-Jul-2021
Passenger Inner Knee Force (N)	Y	EC0325	Humanetics	15-Jul-2021

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

			WorldSID-50M S/N EA7820		
			Serial Number	Manufacturer	Calibration Date
Shoulder RibEye (mm)	Front	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
	Middle	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
	Rear	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
Thorax Rib 1 RibEye (mm)	Front	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
	Middle	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
	Rear	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
Thorax Rib 2 RibEye (mm)	Front	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
	Middle	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
	Rear	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
Thorax Rib 3 RibEye (mm)	Front	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
	Middle	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
	Rear	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020

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

			WorldSID-50M S/N EA7820		
			Serial Number	Manufacturer	Calibration Date
Abdomen Rib 1 RibEye (mm)	Front	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
	Middle	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
	Rear	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
Abdomen Rib 2 RibEye (mm)	Front	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
	Middle	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020
	Rear	X	160	Boxboro Systems	26-Oct-2020
		Y	160	Boxboro Systems	26-Oct-2020
		Z	160	Boxboro Systems	26-Oct-2020

TABLE 2 – VEHICLE INSTRUMENTATION

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity (g)	X	P54294	ENDEVCO	19-Mar-2021
	Y	P50487	ENDEVCO	19-Mar-2021
	Z	P94557	ENDEVCO	19-Mar-2021
Vehicle Center of Gravity Angular Rate (deg/sec)	X	ARS9185	DTS	26-Jul-2021
	Y	ARS8001	DTS	26-Jul-2021
	Z	ARS8290	DTS	26-Jul-2021
Right Floor Sill (g)	Y	P45643	ENDEVCO	18-Mar-2021
Right A-Pillar Sill (g)	Y	P50400	ENDEVCO	18-Mar-2021
Right Lower A-Pillar (g)	Y	P61538	ENDEVCO	22-Mar-2021
Right Mid A-Pillar (g)	Y	P50346	ENDEVCO	22-Mar-2021
Right B-Pillar Sill (g)	Y	P61532	ENDEVCO	22-Mar-2021
Right Lower B-Pillar (g)	Y	P94562	ENDEVCO	22-Mar-2021
Right Mid B-Pillar (g)	Y	P97730	ENDEVCO	22-Mar-2021
Passenger Seat Track at Dummy H-Point (g)	Y	P80720	ENDEVCO	8-Feb-2021
Engine Top (g)	X	P72593	ENDEVCO	18-Mar-2021
	Y	P83443	ENDEVCO	18-Mar-2021
Firewall Center (g)	Y	P87031	ENDEVCO	22-Mar-2021
Left Roof at Vertical Impact Reference Line (g)	Y	P84600	ENDEVCO	18-Mar-2021
Left Sill at Vertical Impact Reference Line (g)	X	P68755	ENDEVCO	19-Mar-2021
	Y	P68750	ENDEVCO	19-Mar-2021
	Z	P68518	ENDEVCO	19-Mar-2021
Right Sill at Rear Seat Acceleration (g)	X	P69075	ENDEVCO	19-Mar-2021
	Y	P88565	ENDEVCO	19-Mar-2021
	Z	P87077	ENDEVCO	19-Mar-2021
Rear Floorpan Behind Rear Axle at Centerline (g)	X	P72547	ENDEVCO	22-Mar-2021
Rear Floorpan Behind Rear Axle at Centerline (g)	Y	P54147	ENDEVCO	22-Mar-2021
Right Front Door Mid Centerline (g)	Y	P87824	ENDEVCO	19-Mar-2021
Right Front Door Mid Rear (g)	Y	P88011	ENDEVCO	19-Mar-2021
Right Front Door Upper Centerline (g)	Y	P88005	ENDEVCO	19-Mar-2021
Rear Deck (g)	X	P87064	ENDEVCO	18-Mar-2021
	Y	P81617	ENDEVCO	18-Mar-2021
	Z	P94559	ENDEVCO	18-Mar-2021
Rear Deck Angular Rate (deg/sec)	X	ARS6469	DTS	23-Jul-2021
	Y	ARS12498	DTS	23-Jul-2021
	Z	ARS6470	DTS	23-Jul-2021

TABLE 3 – POLE INSTRUMENTATION

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

Sign Convention
SAE J211 MAR95

Accelerometers:

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

Potentiometers:

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

Rotation potentiometers:

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

Load cells:

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

Neck load cells:

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

Tibia load cells:

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

Sign Convention (Continued)
SAE J211 MAR95

<u>Lumbar load cells:</u>	+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	13HEAD0000WSACXP	Passenger Head Acceleration (X)	1000	+	yes	2000
2	13HEAD0000WSACYP	Passenger Head Acceleration (Y)	1000	+	yes	2000
3	13HEAD0000WSACZP	Passenger Head Acceleration (Z)	1000	+	yes	2000
3A	13HEAD0000WSACRP	Passenger Head Acceleration Resultant	1000			
4	13HEAD0000WSAVXP	Passenger Head Angular Rate (X)	1000	+	yes	8000
5	13HEAD0000WSAVYP	Passenger Head Angular Rate (Y)	1000	+	yes	8000
6	13HEAD0000WSAVZP	Passenger Head Angular Rate (Z)	1000	+	yes	8000
7	13NECKUP00WSFOXP	Passenger Upper Neck Force (X)	1000	+	yes	10000
8	13NECKUP00WSFOYP	Passenger Upper Neck Force (Y)	1000	+	yes	10000
9	13NECKUP00WSFOZP	Passenger Upper Neck Force (Z)	1000	+	yes	12000
10	13NECKUP00WSMOXP	Passenger Upper Neck Moment (X)	600	+	yes	300
11	13NECKUP00WSMOYP	Passenger Upper Neck Moment (Y)	600	+	yes	300
12	13NECKUP00WSMOZP	Passenger Upper Neck Moment (Z)	600	+	yes	200
13	13NECKLO00WSFOXP	Passenger Lower Neck Force (X)	1000	+	yes	10000
14	13NECKLO00WSFOYP	Passenger Lower Neck Force (Y)	1000	+	yes	10000
15	13NECKLO00WSFOZP	Passenger Lower Neck Force (Z)	1000	+	yes	12000
16	13NECKLO00WSMOXP	Passenger Lower Neck Moment (X)	600	+	yes	300
17	13NECKLO00WSMOYP	Passenger Lower Neck Moment (Y)	600	+	yes	300
18	13NECKLO00WSMOZP	Passenger Lower Neck Moment (Z)	600	+	yes	200
19	13SHLDRI00WSFOXP	Passenger Shoulder Force (X)	600	+	yes	5000
20	13SHLDRI00WSFOYP	Passenger Shoulder Force (Y)	600	+	yes	10000
21	13SHLDRI00WSFOZP	Passenger Shoulder Force (Z)	600	+	yes	5000
22	13SHRIRIREWSDSX0	Passenger Shoulder Rear Displacement (X)	0	+	no	60
23	13SHRIRIREWSDSY0	Passenger Shoulder Rear Displacement (Y)	0	+	no	60
24	13SHRIRIREWSDSZ0	Passenger Shoulder Rear Displacement (Z)	0	+	no	60
25	13SHRIRIREWSDSLB	Passenger Shoulder Rear Length Change	600	+	no	60
26	13SHRIRIMIWSDSX0	Passenger Shoulder Middle Displacement (X)	0	+	no	60
27	13SHRIRIMIWSDSY0	Passenger Shoulder Middle Displacement (Y)	0	+	no	60
28	13SHRIRIMIWSDSZ0	Passenger Shoulder Middle Displacement (Z)	0	+	no	60
29	13SHRIRIMIWSDSLB	Passenger Shoulder Middle Length Change	600	+	no	60
30	13SHRIRIFRWSDSX0	Passenger Shoulder Front Displacement (X)	0	+	no	60
31	13SHRIRIFRWSDSY0	Passenger Shoulder Front Displacement (Y)	0	+	no	60
32	13SHRIRIFRWSDSZ0	Passenger Shoulder Front Displacement (Z)	0	+	no	60
33	13SHRIRIFRWSDSLB	Passenger Shoulder Front Length Change	600	+	no	60

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
34	13TRRIRUREWSDSX0	Passenger Thorax Rib 1 Rear Displacement (X)	0	+	no	60
35	13TRRIRUREWSDSY0	Passenger Thorax Rib 1 Rear Displacement (Y)	0	+	no	60
36	13TRRIRUREWSDSZ0	Passenger Thorax Rib 1 Rear Displacement (Z)	0	+	no	60
37	13TRRIRUREWSDSLB	Passenger Thorax Rib 1 Rear Length Change	600	+	no	60
38	13TRRIRUMIWSDSX0	Passenger Thorax Rib 1 Middle Displacement (X)	0	+	no	60
39	13TRRIRUMIWSDSY0	Passenger Thorax Rib 1 Middle Displacement (Y)	0	+	no	60
40	13TRRIRUMIWSDSZ0	Passenger Thorax Rib 1 Middle Displacement (Z)	0	+	no	60
41	13TRRIRUMIWSDSLB	Passenger Thorax Rib 1 Middle Length Change	600	+	no	60
42	13TRRIRUFRWSDSX0	Passenger Thorax Rib 1 Front Displacement (X)	0	+	no	60
43	13TRRIRUFRWSDSY0	Passenger Thorax Rib 1 Front Displacement (Y)	0	+	no	60
44	13TRRIRUFRWSDSZ0	Passenger Thorax Rib 1 Front Displacement (Z)	0	+	no	60
45	13TRRIRUFRWSDSLB	Passenger Thorax Rib 1 Front Length Change	600	+	no	60
46	13TRRIRMREWSDSX0	Passenger Thorax Rib 2 Rear Displacement (X)	0	+	no	60
47	13TRRIRMREWSDSY0	Passenger Thorax Rib 2 Rear Displacement (Y)	0	+	no	60
48	13TRRIRMREWSDSZ0	Passenger Thorax Rib 2 Rear Displacement (Z)	0	+	no	60
49	13TRRIRMREWSDSLB	Passenger Thorax Rib 2 Rear Length Change	600	+	no	60
50	13TRRIRMMIWSDSX0	Passenger Thorax Rib 2 Middle Displacement (X)	0	+	no	60
51	13TRRIRMMIWSDSY0	Passenger Thorax Rib 2 Middle Displacement (Y)	0	+	no	60
52	13TRRIRMMIWSDSZ0	Passenger Thorax Rib 2 Middle Displacement (Z)	0	+	no	60
53	13TRRIRMMIWSDSLB	Passenger Thorax Rib 2 Middle Length Change	600	+	no	60
54	13TRRIRMFRWSDSX0	Passenger Thorax Rib 2 Front Displacement (X)	0	+	no	60
55	13TRRIRMFRWSDSY0	Passenger Thorax Rib 2 Front Displacement (Y)	0	+	no	60
56	13TRRIRMFRWSDSZ0	Passenger Thorax Rib 2 Front Displacement (Z)	0	+	no	60
57	13TRRIRMFRWSDSLB	Passenger Thorax Rib 2 Front Length Change	600	+	no	60

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
58	13TRRIRLREWSDSX0	Passenger Thorax Rib 3 Rear Displacement (X)	0	+	no	60
59	13TRRIRLREWSDSY0	Passenger Thorax Rib 3 Rear Displacement (Y)	0	+	no	60
60	13TRRIRLREWSDSZ0	Passenger Thorax Rib 3 Rear Displacement (Z)	0	+	no	60
61	13TRRIRLREWSDSLB	Passenger Thorax Rib 3 Rear Length Change	600	+	no	60
62	13TRRIRLMIWSDSX0	Passenger Thorax Rib 3 Middle Displacement (X)	0	+	no	60
63	13TRRIRLMIWSDSY0	Passenger Thorax Rib 3 Middle Displacement (Y)	0	+	no	60
64	13TRRIRLMIWSDSZ0	Passenger Thorax Rib 3 Middle Displacement (Z)	0	+	no	60
65	13TRRIRLMIWSDSLB	Passenger Thorax Rib 3 Middle Length Change	600	+	no	60
66	13TRRIRLFRWSDSX0	Passenger Thorax Rib 3 Front Displacement (X)	0	+	no	60
67	13TRRIRLFRWSDSY0	Passenger Thorax Rib 3 Front Displacement (Y)	0	+	no	60
68	13TRRIRLFRWSDSZ0	Passenger Thorax Rib 3 Front Displacement (Z)	0	+	no	60
69	13TRRIRLFRWSDSLB	Passenger Thorax Rib 3 Front Length Change	600	+	no	60
70	13ABRIRUREWSDSX0	Passenger Abdomen Rib 1 Rear Displacement (X)	0	+	no	60
71	13ABRIRUREWSDSY0	Passenger Abdomen Rib 1 Rear Displacement (Y)	0	+	no	60
72	13ABRIRUREWSDSZ0	Passenger Abdomen Rib 1 Rear Displacement (Z)	0	+	no	60
73	13ABRIRUREWSDSLB	Passenger Abdomen Rib 1 Rear Length Change	600	+	no	60
74	13ABRIRUMIWSDSX0	Passenger Abdomen Rib 1 Middle Displacement (X)	0	+	no	60
75	13ABRIRUMIWSDSY0	Passenger Abdomen Rib 1 Middle Displacement (Y)	0	+	no	60
76	13ABRIRUMIWSDSZ0	Passenger Abdomen Rib 1 Middle Displacement (Z)	0	+	no	60
77	13ABRIRUMIWSDSLB	Passenger Abdomen Rib 1 Middle Length Change	600	+	no	60
78	13ABRIRUFRWSDSX0	Passenger Abdomen Rib 1 Front Displacement (X)	0	+	no	60
79	13ABRIRUFRWSDSY0	Passenger Abdomen Rib 1 Front Displacement (Y)	0	+	no	60
80	13ABRIRUFRWSDSZ0	Passenger Abdomen Rib 1 Front Displacement (Z)	0	+	no	60
81	13ABRIRUFRWSDSLB	Passenger Abdomen Rib 1 Front Length Change	600	+	no	60

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
82	13ABRIRLREWSDSX0	Passenger Abdomen Rib 2 Rear Displacement (X)	0	+	no	60
83	13ABRIRLREWSDSY0	Passenger Abdomen Rib 2 Rear Displacement (Y)	0	+	no	60
84	13ABRIRLREWSDSZ0	Passenger Abdomen Rib 2 Rear Displacement (Z)	0	+	no	60
85	13ABRIRLREWSDSLB	Passenger Abdomen Rib 2 Rear Length Change	600	+	no	60
86	13ABRIRLMIWSDSX0	Passenger Abdomen Rib 2 Middle Displacement (X)	0	+	no	60
87	13ABRIRLMIWSDSY0	Passenger Abdomen Rib 2 Middle Displacement (Y)	0	+	no	60
88	13ABRIRLMIWSDSZ0	Passenger Abdomen Rib 2 Middle Displacement (Z)	0	+	no	60
89	13ABRIRLMIWSDSLB	Passenger Abdomen Rib 2 Middle Length Change	600	+	no	60
90	13ABRIRLFRWSDSX0	Passenger Abdomen Rib 2 Front Displacement (X)	0	+	no	60
91	13ABRIRLFRWSDSY0	Passenger Abdomen Rib 2 Front Displacement (Y)	0	+	no	60
92	13ABRIRLFRWSDSZ0	Passenger Abdomen Rib 2 Front Displacement (Z)	0	+	no	60
93	13ABRIRLFRWSDSLB	Passenger Abdomen Rib 2 Front Length Change	600	+	no	60
94	13THSP0100WSACXP	Passenger Spine T1 Acceleration (X)	180	+	yes	2000
95	13THSP0100WSACYP	Passenger Spine T1 Acceleration (Y)	180	+	yes	2000
96	13THSP0100WSACZP	Passenger Spine T1 Acceleration (Z)	180	+	yes	2000
96A	13THSP0100WSACRP	Passenger Spine T1 Acceleration Resultant	180			
97	13THSP0400WSACXP	Passenger Spine T4 Acceleration (X)	180	+	yes	2000
98	13THSP0400WSACYP	Passenger Spine T4 Acceleration (Y)	180	+	yes	2000
99	13THSP0400WSACZP	Passenger Spine T4 Acceleration (Z)	180	+	yes	2000
99A	13THSP0400WSACRP	Passenger Spine T4 Acceleration Resultant	180			
100	13THSP1200WSACXP	Passenger Spine T12 Acceleration (X)	180	+	yes	2000
101	13THSP1200WSACYP	Passenger Spine T12 Acceleration (Y)	180	+	yes	2000
102	13THSP1200WSACZP	Passenger Spine T12 Acceleration (Z)	180	+	yes	2000
102A	13THSP1200WSACRP	Passenger Spine T12 Acceleration Resultant	180			
103	13PUBC0000WSFOYP	Passenger Pubic Symphysis Force (Y)	600	+	yes	12000
104	13SACRLE00WSFOXP	Passenger Sacro-iliac Left Force (X)	600	+	yes	6000
105	13SACRLE00WSFOYP	Passenger Sacro-iliac Left Force (Y)	600	+	yes	12000
106	13SACRLE00WSFOZP	Passenger Sacro-iliac Left Force (Z)	600	+	yes	6000
107	13SACRLE00WSMOXP	Passenger Sacro-iliac Left Moment (X)	600	+	yes	800
108	13SACRLE00WSMOYP	Passenger Sacro-iliac Left Moment (Y)	600	+	yes	400
109	13SACRLE00WSMOZP	Passenger Sacro-iliac Left Moment (Z)	600	+	yes	400

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
110	13SACRRI00WSFOXP	Passenger Sacro-iliac Right Force (X)	600	+	yes	6000
111	13SACRRI00WSFOYP	Passenger Sacro-iliac Right Force (Y)	600	+	yes	12000
112	13SACRRI00WSFOZP	Passenger Sacro-iliac Right Force (Z)	600	+	yes	6000
113	13SACRRI00WSMOXP	Passenger Sacro-iliac Right Moment (X)	600	+	yes	800
114	13SACRRI00WSMOYP	Passenger Sacro-iliac Right Moment (Y)	600	+	yes	400
115	13SACRRI00WSMOZP	Passenger Sacro-iliac Right Moment (Z)	600	+	yes	400
116	13LUSP0000WSFOXP	Passenger Lumbar Force (X)	600	+	yes	10000
117	13LUSP0000WSFOYP	Passenger Lumbar Force (Y)	600	+	yes	10000
118	13LUSP0000WSFOZP	Passenger Lumbar Force (Z)	600	+	yes	12000
119	13LUSP0000WSMOXP	Passenger Lumbar Moment (X)	600	+	yes	300
120	13LUSP0000WSMOYP	Passenger Lumbar Moment (Y)	600	+	yes	300
121	13LUSP0000WSMOZP	Passenger Lumbar Moment (Z)	600	+	yes	200
122	13PELV0000WSACXP	Passenger Pelvic Acceleration (X)	1000	+	yes	2000
123	13PELV0000WSACYP	Passenger Pelvic Acceleration (Y)	1000	+	yes	2000
124	13PELV0000WSACZP	Passenger Pelvic Acceleration (Z)	1000	+	yes	2000
124A	13PELV0000WSACRP	Passenger Pelvic Acceleration Resultant	1000			
125	13FEMRRI00WSFOXP	Passenger Right Femur Force (X)	600	+	yes	15000
126	13FEMRRI00WSFOYP	Passenger Right Femur Force (Y)	600	+	yes	15000
127	13FEMRRI00WSFOZP	Passenger Right Femur Force (Z)	600	+	yes	15000
128	13FEMRRI00WSMOXP	Passenger Right Femur Moment (X)	600	+	yes	350
129	13FEMRRI00WSMOYP	Passenger Right Femur Moment (Y)	600	+	yes	200
130	13FEMRRI00WSMOZP	Passenger Right Femur Moment (Z)	600	+	yes	350
131	13FEACRI00WSFOXP	Passenger Femoral Neck Force (X)	600	+	yes	10000
132	13FEACRI00WSFOYP	Passenger Femoral Neck Force (Y)	600	+	yes	25000
133	13FEACRI00WSFOZP	Passenger Femoral Neck Force (Z)	600	+	yes	10000
134	13KNEERIOUWSFOYP	Passenger Right Outer Knee Force (Y)	600	+	yes	20000
135	13KNEERIINWSFOYP	Passenger Right 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

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
142	13VEHC00LO00ACYA	Right Floor Sill Acceleration (Y)	60	+	yes	2000
143	13APIL000000ACYA	Right A-Pillar Sill Acceleration (Y)	60	+	yes	2000
144	13APILLO0000ACYA	Right Lower A-Pillar Acceleration (Y)	60	+	yes	2000
145	13APILMI0000ACYA	Right Mid A-Pillar Acceleration (Y)	60	+	yes	2000
146	11BPILMI0000ACYA	Left B-Pillar Sill Acceleration (Y)	60	+	yes	2000
147	13BPILLO0000ACYA	Right Lower B-Pillar Acceleration (Y)	60	+	yes	2000
148	13BPILMI0000ACYA	Right Mid B-Pillar Acceleration (Y)	60	+	yes	2000
149	13SETR000000ACYA	Passenger Seat Track at Dummy H-Point Acceleration (Y)	60	+	yes	2000
150	11ENGNTPO000ACXA	Engine Top Acceleration (X)	60	+	yes	2000
151	11ENGNTPO000ACYA	Engine Top Acceleration (Y)	60	+	yes	2000
152	12FIRCX00000ACYA	Firewall Center Acceleration (Y)	60	+	yes	2000
153	11ROFR000000ACYA	Left Roof at Vertical Impact Reference Line Acceleration (Y)	60	+	yes	2000
154	11SILB000000ACXA	Left Sill at Vertical Impact Reference Line Acceleration (X)	60	+	yes	2000
155	11SILB000000ACYA	Left Sill at Vertical Impact Reference Line Acceleration (Y)	60	+	yes	2000
156	11SILB000000ACZA	Left Sill at Vertical Impact Reference Line Acceleration (Z)	60	+	yes	2000
156A	11SILB000000ACRA	Right Sill at Vertical Impact Reference Line Acceleration Resultant	60			
157	16SILB000000ACXA	Right Sill at Rear Seat Acceleration (X)	60	+	yes	2000
158	16SILB000000ACYA	Right Sill at Rear Seat Acceleration (Y)	60	+	yes	2000
159	16SILB000000ACZA	Right Sill at Rear Seat Acceleration (Z)	60	+	yes	2000
159A	16SILB000000ACRA	Right Sill at Rear Seat Acceleration Resultant	60			
160	11FORA000000ACXA	Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)	60	+	yes	2000
161	11FORA000000ACYA	Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)	60	+	yes	2000
162	13DOORMIMI71ACYA	Right Front Door Mid Centerline Acceleration (Y)	60	+	yes	2000
163	13DOORMIRE71ACYA	Right Front Door Mid Rear Acceleration (Y)	60	+	yes	2000
164	13DOORMIUP71ACYA	Right Front Door Upper Centerline Acceleration (Y)	60	+	yes	2000
165	10FORARD0000ACXA	Rear Deck Acceleration (X)	60	+	yes	2000
166	10FORARD0000ACYA	Rear Deck Acceleration (Y)	60	+	yes	2000
167	10FORARD0000ACZA	Rear Deck Acceleration (Z)	60	+	yes	2000
167A	10FORARD0000ACRA	Rear Deck Acceleration Resultant	60			

Channel Number	ISO mnemonic	Channel Title	Filter Class	Flip	Zero	Full Scale
168	10FORARD0000AVXA	Rear Deck Angular Rate (X)	60	+	yes	8000
169	10FORARD0000AVYA	Rear Deck Angular Rate (Y)	60	+	yes	8000
170	10FORARD0000AVZA	Rear Deck Angular Rate (Z)	60	+	yes	8000
171	13HEADCONT00VO00	Passenger Head Contact	0	+	no	1
172	13SHOUCONT00VO00	Passenger Shoulder Contact	0	+	no	1
173	13THORCONT00VO00	Passenger Thorax Contact	0	+	no	1
174	13PELVCONT00VO00	Passenger Pelvis Contact	0	+	no	1
175	K0FBAR010000FOXA	POLE LOAD CELL 1	60	+	yes	400000
176	K0FBAR020000FOXA	POLE LOAD CELL 2	60	+	yes	400000
177	K0FBAR030000FOXA	POLE LOAD CELL 3	60	+	yes	400000
178	K0FBAR040000FOXA	POLE LOAD CELL 4	60	+	yes	400000
179	K0FBAR050000FOXA	POLE LOAD CELL 5	60	+	yes	400000
180	K0FBAR060000FOXA	POLE LOAD CELL 6	60	+	yes	400000
181	K0FBAR070000FOXA	POLE LOAD CELL 7	60	+	yes	400000
182	K0FBAR080000FOXA	POLE LOAD CELL 8	60	+	yes	400000

APPENDIX E
SEATING PROCEDURE WORKSHEETS AND PLOTS

Passenger WSID 50th Seating Worksheet

Vehicle	2019 Mini Cooper	Technician	Frank Xu
VIN #	WMWWG9L54K3E40130	Position	Right Front Passenger
ATD	WSID 50th	Date	9/15/2021
SEATING #	2		

SCRL Angle	Max	25.6	WSID 50th Tilt Sensors		X	Y
	Min -	20.6	Head	0°±2	-0.7	-1.1
	Difference	5				
	/2	2.5	T6	0°±2	-1.3	0.5
	Min +	2.5				
	Mid Angle	23.1	Pelvis	0°±2	-0.3	-0.4

Seat Back Angle	W/Level °	7.9	HEAD REST		FINAL HEAD REST	
Seat Pan Angle	W/Level °	26.1	POST ANGLE	7.9	POST ANGLE	7.9

Pelvis Angle	WSID 50th 0° +/-2.5°	Manual Inclinometer	43.1
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Collected Points			
Name	Meas X	Meas Y	Meas Z
SBU -	-32.682	2.564	-20.040
SBL -	-32.163	1.858	20.347
STRIKER -	0.000	0.000	0.000
FOSB -	611.035	-156.128	405.589
FISB -	610.381	-572.207	408.776
ROSB -	245.224	-156.113	432.292
RISB -	244.975	-571.273	435.091
OSCAR H-POINT -	331.961	-195.479	209.381
PASS PROJECTED WSID H-POINT AT MID-POSITION -	352.000		189.000
PASS STP 11.27 MID-POSITION -	352.000		260.000
PASS STP STEP 14.6 TRIAL 1 -	352.085	-140.078	261.066
PASS PROJECTED WSID H-POINT STEP 14.6.2 TRIAL 1 -	352.000		190.000
PASS STP STEP 14.6 TRIAL 2 -			
PASS PROJECTED WSID H-POINT STEP 14.6.2 TRIAL 2 -			
PASS STP STEP 14.6 TRIAL 3 -			
PASS PROJECTED WSID H-POINT STEP 14.6.2 TRIAL 3 -			
3DRHCG-	180.324	-323.063	-469.799
3DLHCG-	180.324	-323.063	-469.799
LHDCG -	156.689	-480.488	-465.425
BON -	254.804	-402.017	-464.781
TN -	251.961	-402.746	-407.784
TC -	238.575	-398.578	-343.174
SHLD R1 -	217.952	-395.703	-243.192
THX R1 -	256.452	-395.563	-167.944
THX R2 -	293.224	-393.852	-105.694
THX R3 -	314.062	-393.106	-56.215
ABD R1 -	335.637	-394.365	-3.501
ABD R2 -	356.036	-394.361	42.441
TPS -	390.298	-393.965	67.348
C1 -	232.977	-399.050	-218.241
SHT -	141.961	-174.761	-205.648
E1 -	337.579	-153.809	-84.381
P1 -	297.693	-166.974	139.885
H-POINT -	350.918	-166.883	189.263
H-POINT 2 -	354.588	-179.933	187.428

OK -	751.830	-185.457	81.086
IK -	747.122	-578.292	84.500
OA -	1086.505	-248.323	335.931
IA -	1081.667	-477.102	332.566
OH -	1127.059	-246.744	456.620
IH -	1121.971	-484.263	459.572
OP -	-57.776	-309.994	-314.491
R -	255.363	-402.222	-684.616
H -	900.558	-401.629	-589.102
W1 -	1073.811	-402.841	-463.971
W1 Outside -	1085.733	-402.828	-464.389
W2 Outside -	1274.430	-402.691	-308.691
D1 -	939.973	-398.767	-243.276
D2 -	911.063	-215.717	-13.130
D3 -	894.191	-533.007	9.514
HRP -	255.941	-195.311	-570.934
HSP -	254.461	-82.330	-463.867
ADP -	338.540	-29.262	-85.288
HDP -	352.179	-66.945	189.392

Calculated Measurements					
Name	Cal X	Cal Y	Cal Z	Cal 3D Distance	Deg
HZ -			220		
HH -				658	
HW -	819				
CD -				707	
JKD -				171	
OKD -				187	
HR -				232	
HS -		320			
AD -		125			
HD -		100			
HLHL -				238	
KK -				393	
SH -				432	
HRA -					7.9
H-POINT TOOL ANGLE -					42.9
TORSO ANGLE -					14.5
WINDSHIELD ANGLE -					50.5