

REPORT NUMBER: SPNCAP-CAL-20-005

**NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST**

**Polestar Performance AB
2022 Polestar Polestar 2
5-Door Hatchback**

NHTSA No: M20225901

**PREPARED BY:
CALSPAN CORPORATION
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May 24, 2023

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NRM-110
1200 NEW JERSEY AVE SE
WASHINGTON, D.C. 20590**

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Date: May 24, 2023

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Vanessa Hansen, Operations Manager

Date: May 24, 2023

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

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16. Abstract A 32.20 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject 2022 Polestar Polestar 2 five door hatchback in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on June 29, 2022. The impact velocity of the vehicle was 32.33 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle was 21°C. The target vehicle's maximum post-test static crush was 188 mm located at level 3. The test vehicle's occupant performance data is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (SID-IIs) (Serial No. DG8012)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>252.051</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>34.982</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>3123.867</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>19.645</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45</td> <td>17.807</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.				Measurement Description	Driver ATD (SID-IIs) (Serial No. DG8012)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	252.051	Resultant Lower Spine Acceleration	G	82	34.982	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3123.867	Maximum Thoracic Rib Deflection	mm	38	19.645	Maximum Abdomen Rib Deflection	mm	45	17.807
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17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs		18. Distribution Statement <u>Copies of this report are available from:</u> National Highway Traffic Safety Administration Technical Information Services Division, 1200 New Jersey Ave. SE Washington, D.C. 20590																												
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TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1	Test Purpose and Procedure	1-1
2	Summary of Test Results	2-1
3	Occupant and Vehicle Information	3-1
<u>Data Sheet</u>		<u>Page</u>
1	General Test and Vehicle Parameter Data	3-2
2	Seat, Seat Belt, Steering Wheel Adjustment and Fuel Systems Data	3-6
3	Dummy Longitudinal Clearance Dimensions	3-9
4	Dummy Lateral Clearance Dimensions	3-10
5	Camera and instrumentation Data	3-11
6	Vehicle Accelerometer Data	3-12
7	Rigid Pole Load Cell Data	3-13
8	Post-Test Observations	3-14
9	Test Vehicle Profile Measurements	3-16
10	Test Vehicle Exterior Crush Measurements	3-17
11	Vehicle Damage Profile Distances	3-20
12	FMVSS No. 301 Static Rollover Results	3-21
13	Dummy / Vehicle Temperature and Humidity Stabilization Data	3-22
305-1	General Test and Vehicle Parameter Data for Indicant FMVSS No. 305 Testing	3-23
305-2	Pre-Impact Data for Indicant FMVSS No.305 Testing	3-24
305-3	Pre-Impact Electrical Isolation Measurements and Calculations for Indicant FMVSS No. 305 Testing	3-25
305-4	Post-Impact Data for Indicant FMVSS No. 305 Testing	3-26
305-5	Static Rollover Test Data for Indicant FMVSS No. 305 Testing	3-27
<u>Appendix</u>		<u>Page</u>
A	Photographs	A-1
B	Vehicle and Dummy Response Data Plots	B-1
C	Dummy Configuration and Performance Verification Data	C-1
D	Test Equipment and Instrumentation Calibration Data	D-1

SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 2022 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. 693JJ920D000016. The purpose of this test is to generate comparative side impact performance in a 2022 Polestar Polestar 2 five door hatchback. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated March 2020.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2022 Polestar Polestar 2 five door hatchback. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.33 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on June 29, 2022. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated March 2020. The side impact event was documented by 11 cameras. Camera locations and other pertinent camera information are included on page 3-11 in this report.

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

Head CG tri-axial accelerometers

Thorax upper, middle, and lower rib displacement potentiometers

Abdomen upper and lower rib displacement potentiometers

Lower spine tri-axial accelerometers

Iliac load cell

Acetabulum load cell

Appendix B contains the dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report. Appendix D identifies all serial numbers, manufacturers, and calibration dates for test equipment, dummy sensors, potentiometers, and load cells used to collect data during the test.

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

INJURY READINGS

Measurement Description	Driver ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC ₃₆)		1000	252.051
Resultant Lower Spine Acceleration	g	82	34.982
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3123.867
Maximum Thoracic Rib Deflection	mm	38*	19.645
Maximum Abdominal Rib Deflection	mm	45*	17.807

*Proposed IARV

Supplemental restraint information was recorded as follows:

SUPPLEMENTAL RESTRAINT INFORMATION

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 – Torso/Pelvis	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other – Inner Seat Airbag	Yes	No	No	N/A

GENERAL COMMENTS:

1. P1 serial number – DG8012

Data Anomalies:

- Driver Head Acceleration X Primary, Noise spikes present
- Driver Head Acceleration Z Primary, Noise spikes present
- Driver Head Acceleration Y Redundant, Noise spikes present
- Left Lower A-Pillar Acceleration Y, Questionable Data
- Left Sill A-Pillar Y Acceleration, Exceeded calibration range at 42.4 ms
- Left Middle B-Pillar Y Acceleration, Exceeded calibration range at 16.4 ms
- Load Cell Pole Barrier #1 Force Y, Channel failed at 21.0 ms

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

Data Sheet No. 1 – General Test and Vehicle Parameter Data

Data Sheet No. 2 – Seat, Seat Belt, Steering Wheel Adjustment and Fuel Systems Data

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Camera and instrumentation Data

Data Sheet No. 6 – Vehicle Accelerometer Data

Data Sheet No. 7 – Rigid Pole Load Cell Data

Data Sheet No. 8 – Post-Test Observations

Data Sheet No. 9 – Test Vehicle Profile Measurements

Data Sheet No. 10 – Test Vehicle Exterior Crush Measurements

Data Sheet No. 11 – Vehicle Damage Profile Distances

Data Sheet No. 12 – FMVSS No. 301 Static Rollover Results

Data Sheet No. 13 – Dummy / Vehicle Temperature and Humidity Stabilization Data

Data Sheet No. 305-1 – General Test and Parameter Data for Indicant FMVSS No. 305 Testing

Data Sheet No. 305-2 – Pre-Impact Data for Indicant FMVSS No. 305 Testing

Data Sheet No. 305-3 – Pre-Impact Electrical Isolation Measurements and Calculations for
Indicant FMVSS No. 305 Testing

Data Sheet No. 305-4 – Post-Impact Data for Indicant FMVSS No. 305 Testing

Data Sheet No. 305-5 – Static Rollover Test Data for Indicant FMVSS No. 305 Testing

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
Test Date: 6/29/2022

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20225901
Model Year	2022
Make	Polestar
Model	Polestar 2
Body Style	Five door hatchback
VIN	LPSEG3KA0NL074235
Body Color	Black
Odometer Reading (km/mi)	15 mi
Engine Displacement (L)	N/A
Type / No. Cylinders	N/A
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	1 – Direct Drive
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

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

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

No

DATA FROM CERTIFICATION LABEL

Manufactured By	Polestar Performance AB
Date of Manufacture	01/22
Vehicle Type	Passenger Car

GVWR (kg)	2486
GAWR Front (kg)	1270
GAWR Rear (kg)	1297

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	-	5
Capacity Weight (VCW) (kg)				420
DSC X 68.04 kg				340.2
Cargo Weight (RCLW) (kg)				79.8

(A)

(B)

(A-B)

VEHICLE SEAT TYPE

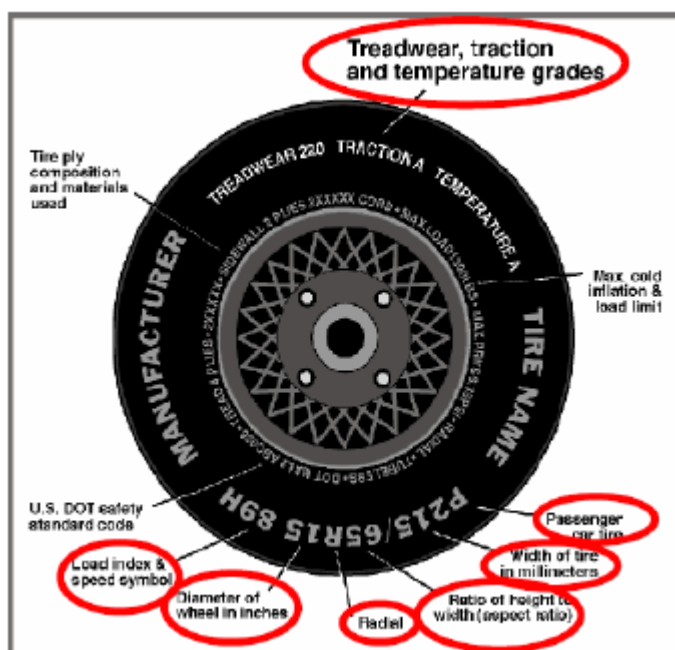
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X					X	
Rear or Second Row Seat			X		X		
Third Row seat							

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

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
Test Date: 6/29/2022

Collected for year, make, model, & VIN, all items circled in red, tire manufacturer and tire name.



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	340	340
Cold Pressure (kPa)	280	290
Recommended Tire Size	245/45R19	245/45R19
Tire Size on Vehicle	245/45R19	245/45R19
Tire Manufacturer	Michelin	Michelin
Tire Model	Primacy 4	Primacy 4
Treadwear	340	340
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	102V	102V
Tire Material	Rubber	Rubber
DOT Safety Code Left	7VYP03VX5221	7VYP03VX0122
DOT Safety Code Right	7VYP03VX5221	7VYP03VX5221

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

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	344	348	386	372
Tire Placard	kPa	280	280	290	290
Owner's Manual	kPa	280	280	290	290
As Tested	kPa	280	280	290	290

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	541	459		558.5	501.5		561.5	517	
Right	kg	552.5	437.5		578	474		562.5	485.5	
Ratio	%	54.9	45.1		53.8	46.2		52.9	47.1	
Totals	kg	1093.5	896.5	1990	1136.5	975.5	2112	1124	1002.5	2126.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1990	(A)
Actual Weight of 1 P572V (SID-IIs) ATD Used	kg	50	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	79.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2119.8	(A+B+C)

Does the measured As Test 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

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Rqmt***
Driver Door Sill Angle (front-to-rear)*	Deg	-0.7	-0.35	-0.35	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-0.4	-0.35	0.15	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	-0.25	-0.3	-0.3	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	-0.15	-0.25	-0.4	Yes
Vehicle CG (Aft of Front Axle)	mm	1233	1265	1291	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	4	3	11	

* 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 Requirement

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

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	14
Tool Kit	2
Jack	2.5
Passenger Rear Window	3
Ballast / Equipment Added	31.7

Test Height – Adjustable Suspension Setting, if Applicable	N/A
--	-----

Test Surface Markings

	Distance from 75° Impact Location Line (mm)
Fore 25 mm target	943
Aft 25 mm target	946

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

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	19.2	8.5	13.85
Front Passenger Seat	18.2	9.1	13.65
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

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	13.9	56	Max	53	69	84
			Mid	27	43	56
			Min	2	15	29
Front Passenger Seat	13.7	62	Max	65	79	92
			Mid	32	48	62
			Min	0	17	31
Front Center Seat			Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Non-Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Rear Center Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-

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

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

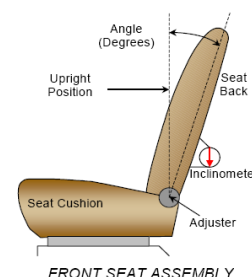
NHTSA No.: M20225901
 Test Date: 6/29/2022

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	260	Power	0	Power
Front Passenger Seat	262	Power	0	Power
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

SEAT BACK ANGLE ADJUSTMENT

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



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/Seated Dummy	53.5	infinite	10.7	-
Front Passenger Seat	56.6	Infinite	10.2	-
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. Zero is defined as the uppermost detent

Seat	Total # of Positions	Placed in Position #
Driver Seat	4 (0-3)	0

HEAD RESTRAINT ADJUSTMENT

The driver's head restraint is adjusted to the lowest and most full forward in-use position.

Seat	Total # of Positions	Placed in Position #
Driver Seat	3 (0-2)	Lowest

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

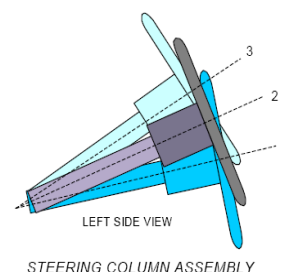
Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.

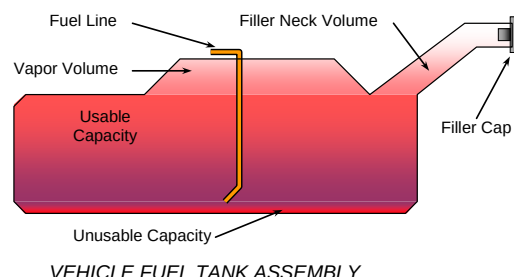
	Degrees	Fore / Aft Position (mm)
Lowermost – Position 1	22.2	
Geometric Center – Position 2	25.6	
Uppermost – Position 3	29.0	
Telescoping Steering Wheel Travel		53
Test Position	25.6	26.5



FUEL PUMP

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

The vehicle is equipped with an electric charge port on the left rear of the vehicle.



FUEL TANK CAPACITY DATA

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

Is the Actual Amount of Solvent Used in the test equal to 93% $\pm$ 1% of the Usable Capacity stated in Form No. 1?

N/A

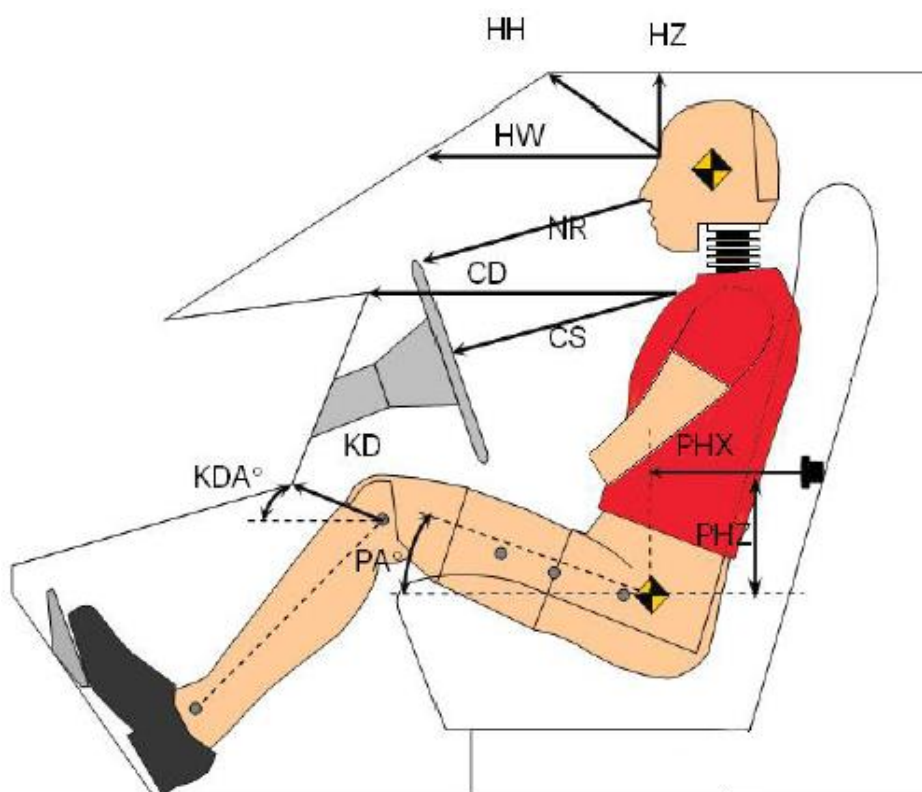
Yes

No

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022



Left Side View

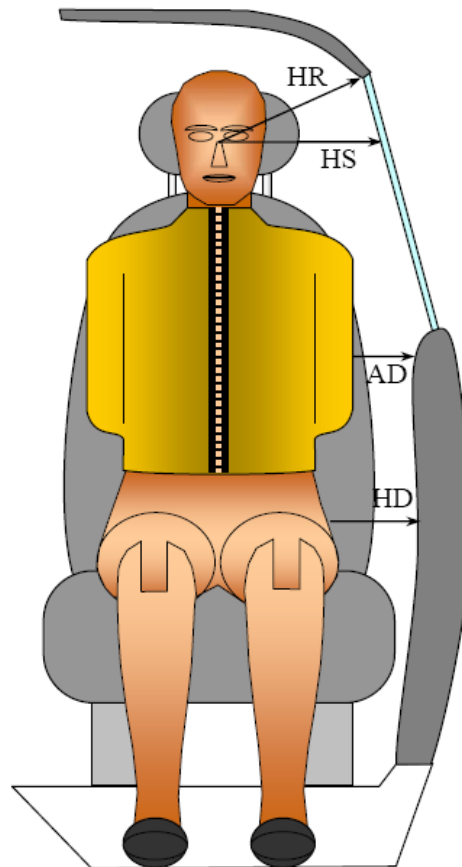
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver (Serial No. DG8012)	
		Length (mm)	Angle (°)
HH	Head to Header	281	
HW	Head to Windshield	537	
HZ	Head to Roof Liner	180	
NR	Nose to Rim	233	
CD	Chest to Dash	418	
CS	Chest to Steering Wheel	194	
KD(L) / KDA(L)°	Left Knee to Dash	174	36.0
KD(R) / KDA(R)°	Right Knee to Dash	160	40.3
PAX°	Pelvic Tilt Angle (X-Axis)		21.0
PAY°	Pelvic Tilt Angle (Y-Axis)		0.1
PHX	Hip Point to Striker (X-Axis)	310	
PHZ	Hip Point to Striker (Z-Axis)	180	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
Test Date: 6/29/2022



FRONT VIEW OF DUMMY

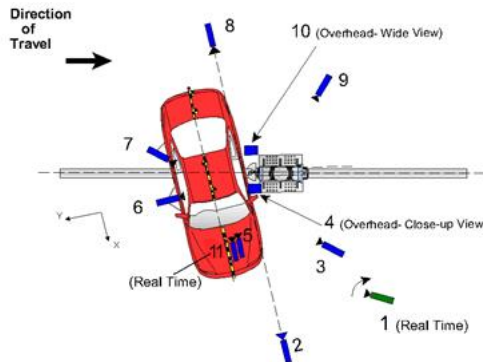
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver - Length (Serial No. DG8012)
HR	Head To Side Header	mm	210
HS	Head to Side Window	mm	355
AD	Arm to Door	mm	170
HD	Hip Point to Door	mm	170

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
Test Date: 6/29/2022



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real-time (24 - 30 fps) pan view of impact				Zoom	60
2	Front ground level - impact view	7500	0	-1432	28	1000
3	Impact side 45° - forward pole view	4971	-1171	-1555	24	1000
4	Overhead Close-up view of impact	0	0	-9375	24	1000
5	Onboard - dummy front view				25	1000
6	Onboard - dummy side view				12.5	1000
7	Onboard - dummy rear oblique view				12.5	1000
8	Rear ground level - impact view	-8132	0	-1456	28	1000
9	Impact side 45° - rearward pole view	-5161	-3855	-1470	24	1000
10	Overhead wide - view of impact	0	0	-9375	12.5	1000
11	Real-time (24 - 30 fps) - dummy front view				Zoom	60

Notes: Reference - From Point of Impact for X and Y; from Ground for Z
+X = Forward of vehicle, +Y = Right of vehicle, +Z = Down
* All measurements accurate to ± 6 mm. Vehicle is at a 75° angle to the rigid pole.

Comments: Cameras located on hood shifted during impact as hood hinge broke during impact event.

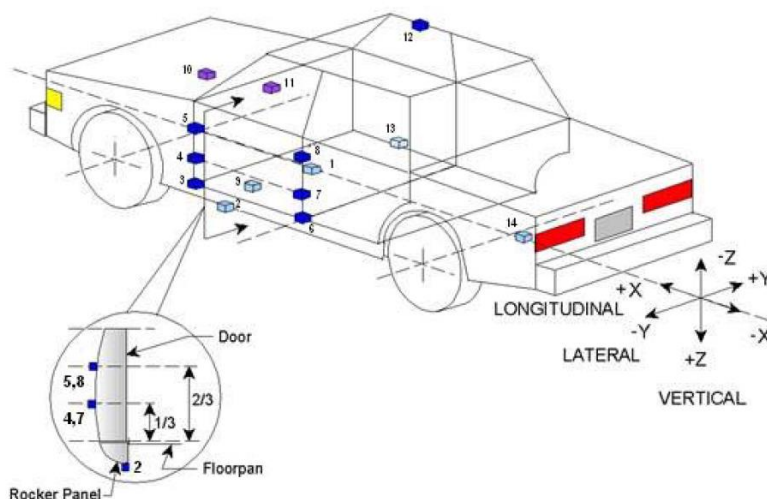
INSTRUMENTATION

Description	Number of Channels
Driver Dummy Channels	16
Vehicle Structure Accelerometers	18
Pole Load Cells	8
Total	42

DATA SHEET NO. 6 **VEHICLE ACCELEROMETER DATA**

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
Test Date: 6/29/2022



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2256	4	86
2	Left Floor Sill	2873	-633	290
3	A-Pillar Sill	3152	-600	273
4	A-Pillar Low	3215	-602	91
5	A-Pillar Mid	3138	-615	-375
6	B-Pillar Sill	2184	-659	290
7	B-Pillar Low	2154	-684	-54
8	B-Pillar Mid	2105	-637	-360
9	Driver Seat Track	2393	-538	331
10	Engine Top	3743	69	-174
11	Firewall	3487	33	-176
12	Right Roof	2276	587	-771
13	Right Floor Sill	2816	643	284
14	Rear Floorpan	1086	20	96

Reference: *X – Rear surface of vehicle (+ forward)*
Y – Vehicle centerline (+ to right)
Z – Ground plane (+ down)

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
Test Date: 6/29/2022

POLE BARRIER



RIGID POLE LOAD CELL LOCATIONS

ID	Units	Height From Ground
1	mm	200
2	mm	590
3	mm	750
4	mm	1075
5	mm	1260
6	mm	1740
7	mm	1920
8	mm	2300

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

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
Test Date: 6/29/2022

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver Seat Dummy (SID-IIs)
Face	Curtain Airbag
Top of Head	Curtain Airbag & Headrest
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag & Headrest
Left Shoulder	Seatback, Torso/Pelvis Airbag & Curtain Airbag
Upper Torso	Seatback & Torso/Pelvis Airbag
Lower Torso	Seatback
Left Hip	Seatpan & Torso/Pelvis Airbag
Left Knee	Driver Door

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/ Other
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Width of Opening at Striker (mm)	0	0	0	0	0

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	No	No	No	No
Seat Disengagement from Floor Pan	No	No	No	No
Seat Back Movement from Initial Position	No	No	No	No
Seat Back Collapse	No	No	No	No

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

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
Test Date: 6/29/2022

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A, B & C-Pillar Buckled
Sill Separation	None
Windshield Damage	Cracks throughout with separation along Driver's A-Pillar & along the upper and lower windshield
Side Window Damage	Driver & Front Passenger Window shattered
Other Notable Effects	Hood hinge broke during impact

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 – Torso/Pelvis	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other – Inner Seat Torso Airbag	Yes	No	No	N/A

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

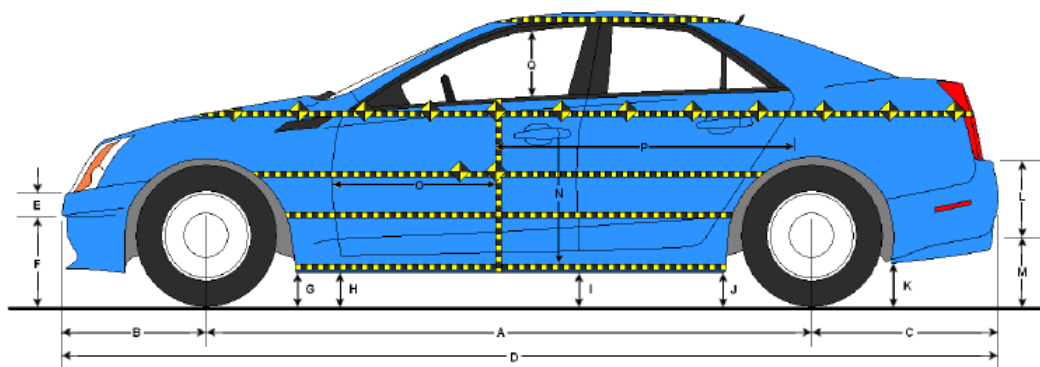
Measured Parameter	Units	Tolerance	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm		1133
Actual Impact Point - Aft of Front Axle	mm		1139
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 *	-6
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75
Trap No. 1 Velocity - Primary	kph	31.4 to 33.0	32.33
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.33

* Of Intended Impact Point

DATA SHEET NO. 9
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
Test Date: 6/29/2022



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

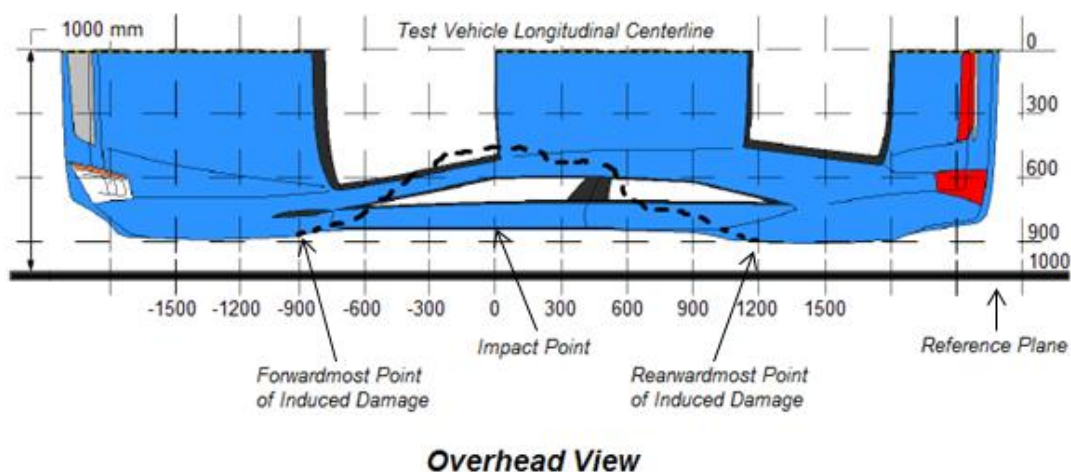
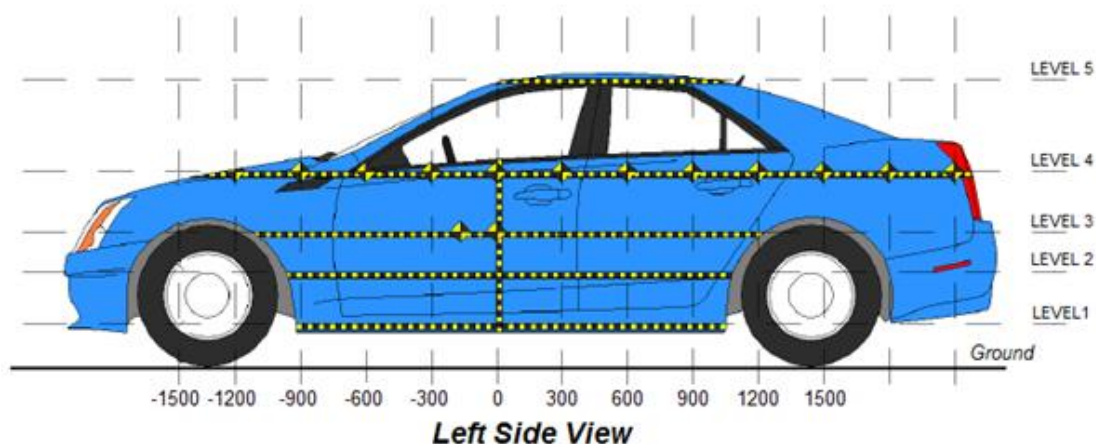
Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2738	2717	21
B	Front Axle to FSOV	857	895	-38
C	Rear Axle to RSOV	1012	1000	12
D	Total Length at Centerline	4606	4612	-6
E	Front Bumper Thickness	113	113	0
F	Front Bumper Bottom to Ground	416	415	1
G	Sill Height at Front Wheel Well	186	161	25
H	Sill Height at Front Door Leading Edge	188	151	37
I	Sill Height at B-Pillar	157	134	23
J1	Sill Height at Rear Wheel Well	200	210	-10
J2	Pinch Weld Height at Rear Wheel Well	185	195	-10
K	Sill Height Aft of Rear Wheel Well	269	279	-10
L	Rear Bumper Thickness	230	230	0
M	Rear Bumper Bottom to Ground	422	424	-2
N	Sill Height to Bottom of Front Window Sill	760	761	-1
O	Front Door Leading Edge to Impact CL	604	579	25
P	Rear Door Trailing Edge to Impact CL	1476	1457	19
Q	Front Window Opening	361	348	13
R	Right Side Length	4499	4505	-6
S	Left Side Length	4495	4474	21
T	Vehicle Width at B-Pillars	1817	1795	22
U	Front Wheel Track Width	1596	1602	6
V	Rear Wheel Track Width	1593	1589	-4

* All measurements in mm with tolerance of ± 3 mm

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

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022



MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	299	139	0
2	Occupant Hip Point	mm	585	175	0
3	Mid - Door	mm	700	188	0
4	Window Sill	mm	992	146	0
5	Window Top	mm	1410	3	0

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

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

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

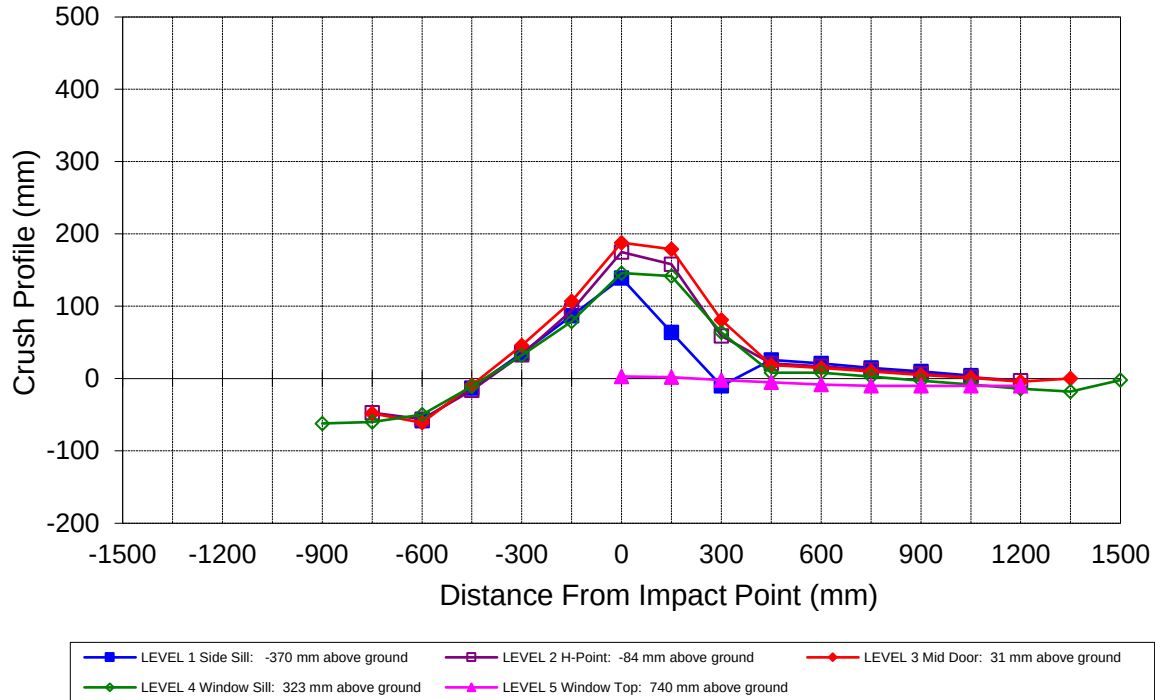
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050															
-900				737					799					-62	
-750		917	908	766			964	956	826			-47	-48	-60	
-600	886	897	897	788		944	953	958	838		-58	-56	-61	-50	
-450	889	891	896	805		902	907	905	816		-13	-16	-9	-11	
-300	893	890	897	818		858	857	851	786		35	33	46	32	
-150	896	890	898	831		809	796	791	752		87	94	107	79	
0	898	890	898	837	574	759	715	710	691	571	139	175	188	146	3
150	900	888	898	839	593	836	730	719	697	591	64	158	179	142	2
300	900	887	898	841	592	910	828	817	777	594	-10	59	81	64	-2
450	900	884	896	842	590	874	863	877	834	595	26	21	19	8	-5
600	900	882	894	843	587	879	865	879	835	595	21	17	15	8	-8
750	897	880	891	842	582	882	868	881	839	592	15	12	10	3	-10
900	893	882	889	840	578	883	875	884	843	588	10	7	5	-3	-10
1050	888	890	893	836	569	884	888	892	844	579	4	2	1	-8	-10
1200		908	904	832	555		911	908	846	565		-3	-4	-14	-10
1350			921	829				921	847				0	-18	
1500				822					824					-2	

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

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

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022



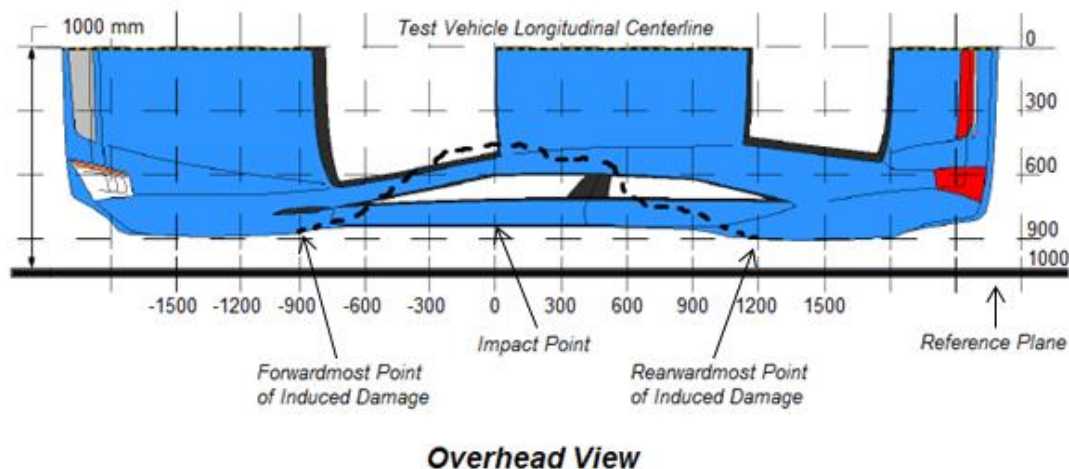
Vehicle Exterior Crush Measurements - Visual Representation

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

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022

For guidance regarding damage profile distance measurements, please refer to the latest version of the *NHTSA Test Reference Guide, Volume 1: Vehicle Tests*.



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-750	3	44	92	-48
2	-360	3	127	103	24
3	30	3	288	102	186
4	420	3	135	104	31
5	810	3	118	110	8
6	1200	3	92	96	-4

DATA SHEET NO. 12
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: <u>2022 Polestar Polestar 2 five door hatchback</u>	NHTSA No.: <u>M20225901</u>
Test Program: <u>NCAP Side MDB Impact Test</u>	Test Date: <u>6/29/2022</u>
Test Time: <u>9:39 AM</u>	Temperature: <u>21° C</u>

- A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable is 1 oz.)
- B. For the 5-minute period after motion ceases: 0 oz.
(Maximum allowable is 5 oz.)
- C. For the following 25 minutes: 0 oz.
(Maximum allowable is 1 oz./minute)
- D. Spillage Details: No Spillage Occurred

FMVSS NO. 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	67	300	367
90° to 180°	62	300	362
180° to 270°	65	300	365
270° to 360°	70	300	370

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

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

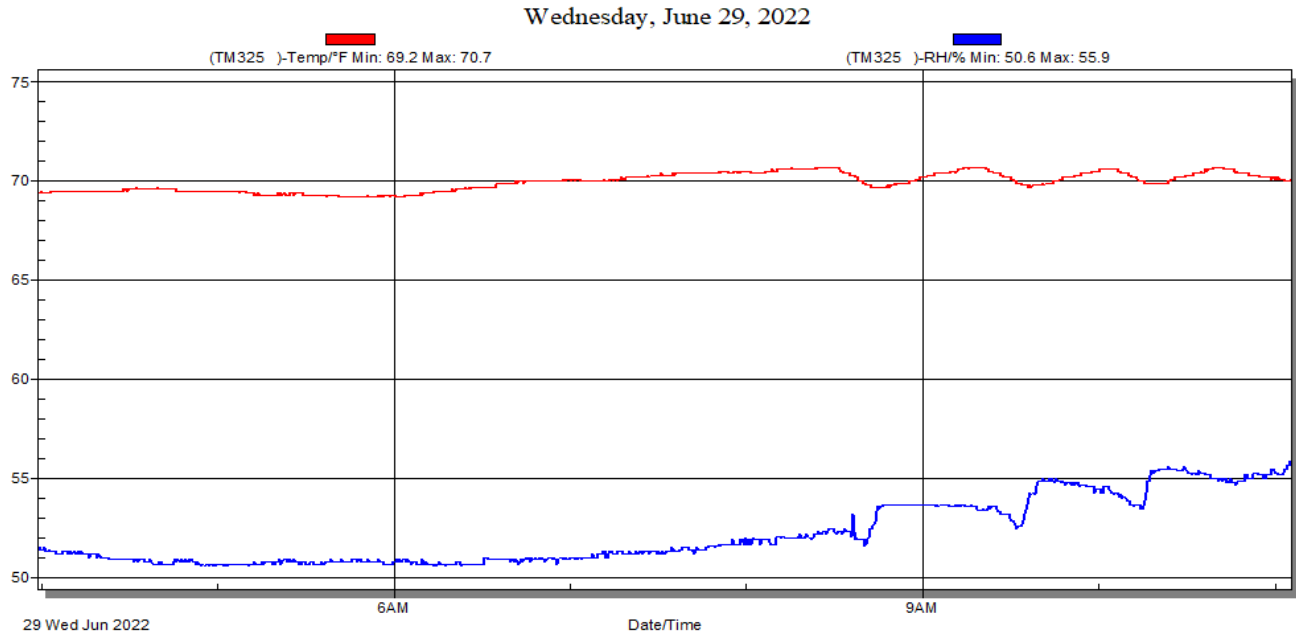
ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
Test Date: 6/29/2022



Temperature and Humidity Stabilization Chart / Data for Dummies and Test Vehicle

DATA SHEET NO. 305-1
GENERAL TEST AND VEHICLE PARAMETER DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022

ELECTRIC VEHICLE PROPULSION SYSTEM

Measured Parameter	Value
Type of Electric Vehicle (Electric/Gas-Electric Hybrid/Fuel Cell-Electric Hybrid)	Electric
Propulsion Battery Type	Li-ion NMC
Nominal Voltage (Volts)	396
Is this Vehicle equipped with an Automatic Propulsion Battery Disconnect?	Yes
Physical Location of Automatic Propulsion Battery Disconnect, if applicable	Inside Battery Distribution Unit
Auxiliary Battery Type	12 V Lead

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED)

Measured Parameter	Value
Electrolyte Fluid Type	Dry Cells
Electrolyte Fluid Specific Gravity	N/A
Electrolyte Fluid Kinematic Viscosity (centistokes)	N/A
Electrolyte Fluid Color	Neutral
Propulsion Battery Coolant Type, Color and Specific Gravity (if applicable)	Glycol, Green
Location of Battery Modules (Inside or Outside of Passenger Compartment?)	Outside

PROPULSION BATTERY STATE OF CHARGE

Measured Parameter	Units	Value
<i>For all battery types:</i>		
Voltage Range corresponding to useable energy of the battery:		
Minimum State of Charge	V	396
Maximum State of Charge	V	451
95% of Maximum	V	428.5
Test Voltage *	V	449.3
<i>For batteries that are rechargeable ONLY by an energy source on the vehicle:</i>		
Voltage range corresponding to useable energy of the battery :		
Minimum State of Charge	V	
Maximum State of Charge	V	
95% of Maximum	V	
Test Voltage *	V	

* For all battery types-No less than 95% of Maximum Operating Voltage; for batteries that are rechargeable ONLY by an energy source on the vehicle-maximum practicable state of charge within normal operating range.

DATA SHEET NO. 305-2
PRE-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
Test Date: 6/29/2022

VEHICLE CHASSIS GROUND PT(S) LOCATION(S) & PROPULSION BATTERY SYSTEM

Measured Parameter	Value
Details of Vehicle Chassis Ground Points & Locations	Ground point is located in the left rear trunk compartment.
Details of Propulsion Battery Components	Provided breakout box was used to read battery voltage

DATA SHEET NO. 305-3
PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS FOR
INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		581
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		4/28/2022

NOTES:

- The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 MΩ
- An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.

**PROPULSION BATTERY VOLTAGE, RESISTANCE &
ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS**

Measured Parameter	Symbol	Units	Value
Normal operating voltage range specified by the manufacturer	V_b	V	451
Propulsion Battery Voltage : (ready to drive position)	V_b	V	449.30
Propulsion Battery to Vehicle Chassis	V_1	V	429.00
Propulsion Battery to Vehicle Chassis	V_2	V	434.10
Propulsion Battery to Vehicle Chassis Across Known Resistor	R_o	Ω	299,200
Propulsion Battery to Vehicle Chassis with R_o installed	V_1'	V	165.10
Propulsion Battery to Vehicle Chassis with R_o installed	V_2'	V	167.40
$R_{i1} = R_o * (1 + V_2/V_1) * [(V_1 - V_1')/V_1']$	R_{i1}	Ω	962,183
$R_{i2} = R_o * (1 + V_1/V_2) * [(V_2 - V_2')/V_2']$	R_{i2}	Ω	947,765
Lesser value of R_{i1} and R_{i2}	R_i	Ω	947,765
Electrical Isolation Value (Minimum E.I. Value is 500 Ω/V)	R_i/V_b	Ω/V	2,109

Is the Electrical Isolation Value $\geq 500 \Omega/V$ (Yes/No)? X Yes No (Fail)

NOTES:

- The measurement shall be made with the propulsion battery connected to the vehicle propulsion system, and the vehicle in the "ready-to-drive" (propulsion motor(s) activated) position.
- If the voltage measurement is not at the voltage or within the normal operating voltage range specified by the manufacturer, the battery must be charged.
- The known resistance R_o (in Ohms) should be approximately 500 times the nominal operating voltage of the vehicle (in volts) per SAE J1766
- If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant

DATA SHEET NO. 305-4
POST-IMPACT DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		581
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		4/28/2022

NOTES:

- The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 MΩ
- An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.

ELECTRICAL ISOLATION MEASUREMENTS & IMPACT CALCULATIONS

Parameter	Value	Units		Value		Value	
V ₁ =	32.7	V	Time:	1	Minutes	47	Seconds
V ₂ =	29.1	V	Time:	1	Minutes	54	Seconds
R ₀ =	299,200	Ω	Time:		Minutes		Seconds
V ₁ ' =	0.74	V	Time:	2	Minutes	1	Seconds
V ₂ ' =	0.50	V	Time:	2	Minutes	6	Seconds
R _{i1} =	24,421,783	Ω	Time:	2	Minutes	1	Seconds
R _{i2} =	36,345,706	Ω	Time:	2	Minutes	6	Seconds
R _i =	24,421,783	Ω	Time:	2	Minutes	1	Seconds
R _i /V ₀ =	244,217,830	Ω/V	Time:	2	Minutes	1	Seconds

Is the Electrical Isolation Value ≥ 500 Ω/V (Yes/No)? X Yes No (Fail)

NOTES:

- $R_{i1} = R_0 * (1 + V_2/V_1) * [(V_1 - V_1')/V_1]$, $R_{i2} = R_0 * (1 + V_1/V_2) * [(V_2 - V_2')/V_2]$, R_i = Lesser value of R_{i1} and R_{i2}
- If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant
- Minimum Electrical Isolation Value is 500 Ω/V

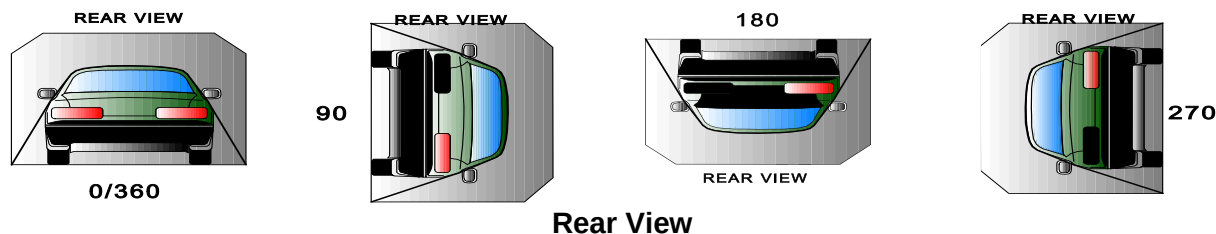
PROPULSION BATTERY SYSTEM COMPONENTS

Measured Parameter	Comments	Passed	Failed
Propulsion Battery Module movement within the passenger compartment	None	X	
Intrusion of an outside Propulsion Battery Component into the passenger compartment	None	X	
Is propulsion battery electrolyte spillage visible in the passenger compartment?		X	

DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022



DETERMINATION OF PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

Rollover Stage	Rotation Time (spec. 1 -3 min)		FMVSS 301 Hold Time	Total Time		Next Whole Minute Interval
	Minutes	Seconds		Minutes	Seconds	
0° to 90°	1	7	5	6	7	7
90° to 180°	1	2	5	6	2	7
180° to 270°	1	5	5	6	5	7
270° to 360°	1	10	5	6	10	7

ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

Rollover Stage	Propulsion Battery Electrolyte Spillage	Units	Spillage Location
0° to 90°	0.0	Liters	None
90° to 180°	0.0	Liters	None
180° to 270°	0.0	Liters	None
270° to 360°	0.0	Liters	None
Total Spillage	0.0	Liters	None

* FMVSS 305 Requirements: Maximum allowable propulsion battery electrolyte spillage is **5.0 Liters**

Is the total spillage of propulsion battery electrolyte greater than 5.0 Liters? ☐ Yes (Fail) ☒ No
 Is propulsion battery electrolyte spillage visible in the passenger compartment? ☐ Yes (Fail) ☒ No

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		581
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		4/28/2022

NOTES:

- The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 MΩ
- An oscilloscope meeting the above requirements may need to be used to adequately measure voltage in some vehicles.

DATA SHEET NO. 305-5
STATIC ROLLOVER TEST DATA FOR INDICANT FMVSS NO. 305 TESTING (CONT'D)

Test Vehicle: 2022 Polestar Polestar 2 five door hatchback
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20225901
 Test Date: 6/29/2022

ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Parameter	Rollover Stage	Value	Units		Minutes	Seconds
$V_b =$	90°	0.12	V	$R_o = 299,200 \Omega$		
	180°	0.12	V			
	270°	0.12	V			
	360°	0.12	V			
$V_1 =$	90°	9.17	V	Time:	1	15
	180°	0.92	V		10	17
	270°	4.50	V		16	45
	360°	1.0	V		25	27
$V_2 =$	90°	5.20	V	Time:	1	23
	180°	0.95	V		10	25
	270°	1.80	V		16	50
	360°	0.03	V		25	33
$V_1' =$	90°	0.34	V	Time:	1	31
	180°	0.12	V		10	31
	270°	0.03	V		16	58
	360°	0.02	V		25	40
$V_2' =$	90°	0.06	V	Time:	1	38
	180°	0.18	V		10	38
	270°	0.04	V		17	3
	360°	0.02	V		25	45
$R_{i1} =$	90°	12,176,734	Ω	Time:	1	31
	180°	4,054,377	Ω		10	31
	270°	62,413,120	Ω		16	58
	360°	15,100,624	Ω		25	40
$R_{i2} =$	90°	70,831,572	Ω	Time:	1	38
	180°	2,519,404	Ω		10	38
	270°	46,076,800	Ω		17	3
	360°	5,136,267	Ω		25	45
$R_i =$	90°	12,176,734	Ω	Time:	1	31
	180°	2,519,404	Ω		10	38
	270°	46,076,800	Ω		17	3
	360°	5,136,267	Ω		25	45
$R_i/V_b =$	90°	101,472,783	Ω/V	Time:	1	31
	180°	20,995,033	Ω/V		10	38
	270°	383,973,333	Ω/V		17	3
	360°	42,802,225	Ω/V		25	45

Is the Electrical Isolation Value $\geq 500 \Omega/V$ (Yes/No)?

☒ Yes

☐ No (Fail)

APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Fig.	Description	Page
1	As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle	A-5
2	As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle	A-5
3	Pre-Test Frontal View of Test Vehicle	A-6
4	Post-Test Frontal View of Test Vehicle	A-6
5	Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-7
6	Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-7
7	Pre-Test Left Side View of Test Vehicle	A-8
8	Post-Test Left Side View of Test Vehicle	A-8
9	Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-9
10	Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-9
11	Pre-Test Rear View of Test Vehicle	A-10
12	Post-Test Rear View of Test Vehicle	A-10
13	Pre-Test Right Side View of Test Vehicle	A-11
14	Post-Test Right Side View of Test Vehicle	A-11
15	Pre-Test Overhead View of Test Area	A-12
16	Post-Test Overhead View of Test Area	A-12
17	Pre-Test Left Side View of Pole Positioned Against Side of Vehicle	A-13
18	Pre-Test Right Side View of Pole Positioned Against Side of Vehicle	A-13
19	Pre-Test Close-Up View of Impact Point Target	A-14
20	Post-Test Close-Up View of Impact Point Target Showing Impact Location	A-14
21	Pre-Test Front Close-Up View of Dummy Head and Chest	A-15
22	Post-Test Front Close-Up View of Dummy	A-15
23	Pre-Test Left Side View of Dummy Showing Belt and Chalking	A-16
24	Pre-Test Left Side View of Dummy Shoulder and Door Top View	A-16
25	Post-Test Left Side View of Dummy Shoulder and Door Top View	A-17
26	Pre-Test Frontal View of Seat Back Prior to Dummy Positioning	A-17
27	Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint	A-18
28	Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning	A-18
29	Pre-Test Overhead View of Dummy Thighs on Seat Pan	A-19
30	Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket	A-19
31	Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level	A-20
32	Pre-Test Placement of Dummy's Feet	A-20
33	Pre-Test View of Belt Anchorage for Dummy	A-21
34	Pre-Test Left Side View of Steering Wheel	A-21
35	Pre-Test View of Disengaged Parking Brake	A-22

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

Fig.	Description	Page
305-1	Auxiliary Power Module Warning Label	A-42
305-2	Power Inverter Warning Label	A-42
305-3	First Responder Warning Label	A-43
305-4	First Responder Warning Location	A-43
305-5	Other Vehicle Label(s) Related to Electrical Propulsion System	A-44
305-6	Manual High Voltage Service Disconnect in Place	A-44
305-7	Manual High Voltage Service Disconnect Removed (Plug)	A-45
305-8	Manual High Voltage Service Disconnect Removed Location	A-45
305-9	Pre-Impact View of Propulsion Battery	A-46
305-10	Post-Impact Front View of Propulsion Battery	A-46
305-11	Post-Impact Rear View of Propulsion Battery (if any part of it is visible)	A-47
305-12	Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules	A-47
305-13	Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules	A-48
305-14	Pre-Impact View of Propulsion Battery Module(s)	A-48
305-15	Post-Impact View of Propulsion Battery Module(s)	A-49
305-16	Pre-Impact View of Electric Propulsion Drive	A-49
305-17	Post-Impact View of Electric Propulsion Drive	A-50
305-18	Pre-Impact View of High Voltage Interconnects	A-50
305-19	Pre-Impact View of Propulsion Venting System(s)	A-51
305-20	Pre-Impact View of Other Visible Electric Propulsion Components	A-51
305-21	Pre-Impact View of Ground Lead Attached	A-52
305-22	Pre-Impact View of High Voltage Leads Attached	A-52
305-23	Pre-Impact Close-Up View of High Voltage Leads Attached	A-53
305-24	Pre-Impact View of Installed Test Interface Port	A-53
305-25	Post-Impact View of Installed Test Interface Port	A-54
305-26	Pre-Impact View or Other Test Devices	A-54
305-27	Post-Impact View or Other Test Devices	A-55
305-28	FMVSS No. 305 Static Rollover 90 Degrees	A-55
305-29	FMVSS No. 305 Static Rollover 180 Degrees	A-56
305-30	FMVSS No. 305 Static Rollover 270 Degrees	A-56
305-31	FMVSS No. 305 Static Rollover 360 Degrees	A-57
305-32	Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery	A-57
305-33	Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery	A-58
305-34	Post-Impact Propulsion Battery System Mounting and/or Intrusion Failure(s)	A-58
305-35	Post-Impact View of Battery Component Intrusion	A-59
305-36	Post-Impact View of Battery Module Movement or Retention Loss	A-59
305-37	Post –Impact View of Propulsion Battery Electrolyte Spillage Location (Prior to static roll)	A-60
305-38	Post –Impact View of Propulsion Battery Electrolyte Spillage Location (After to static roll)	A-60



Figure A-1: As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



Figure A-2: As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle

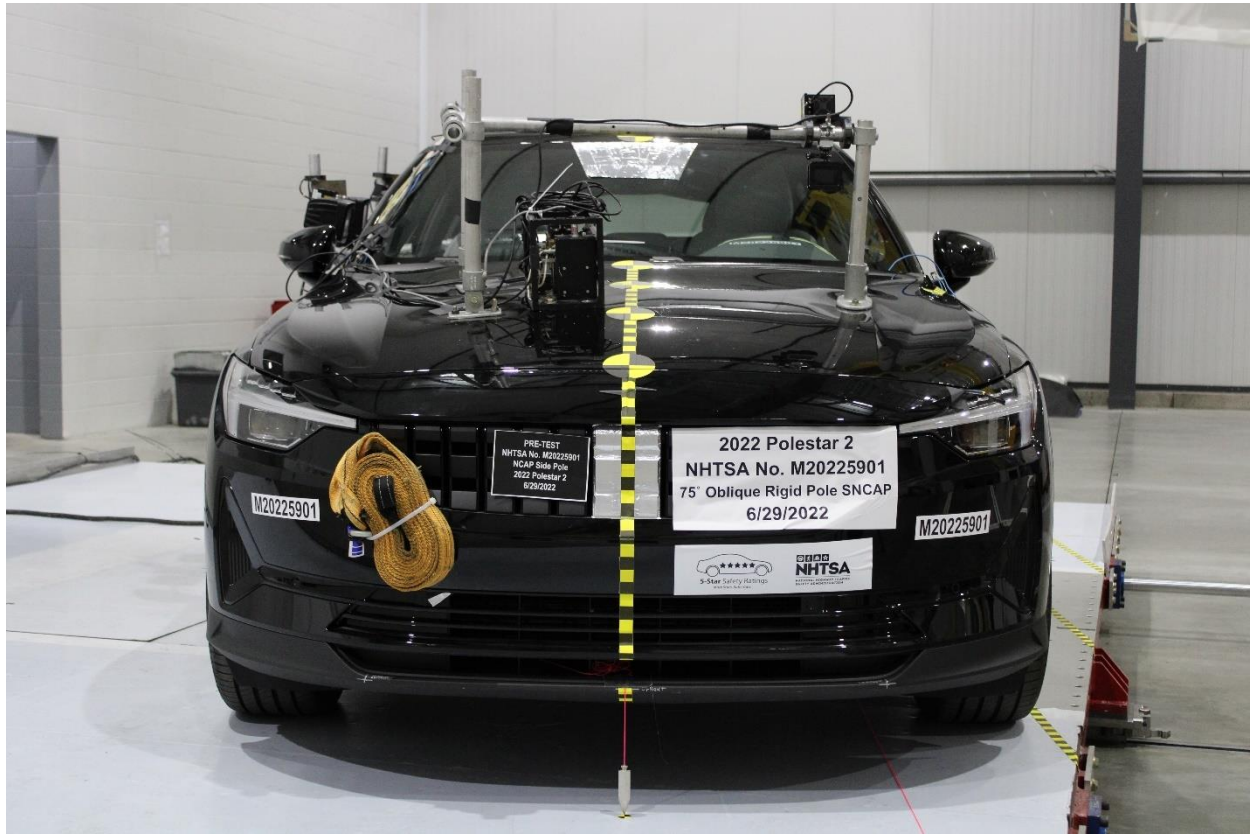


Figure A-3: Pre-Test Frontal View of Test Vehicle

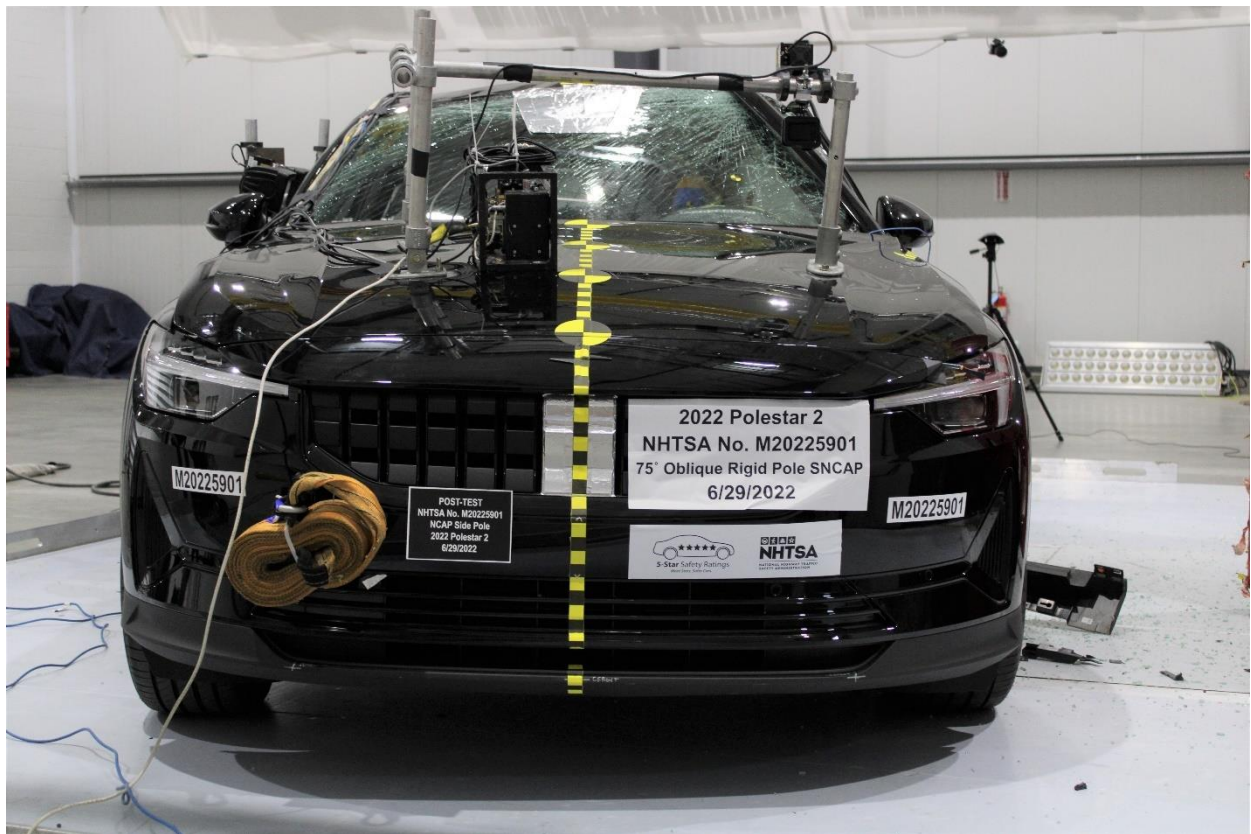


Figure A-4: Post-Test Frontal View of Test Vehicle

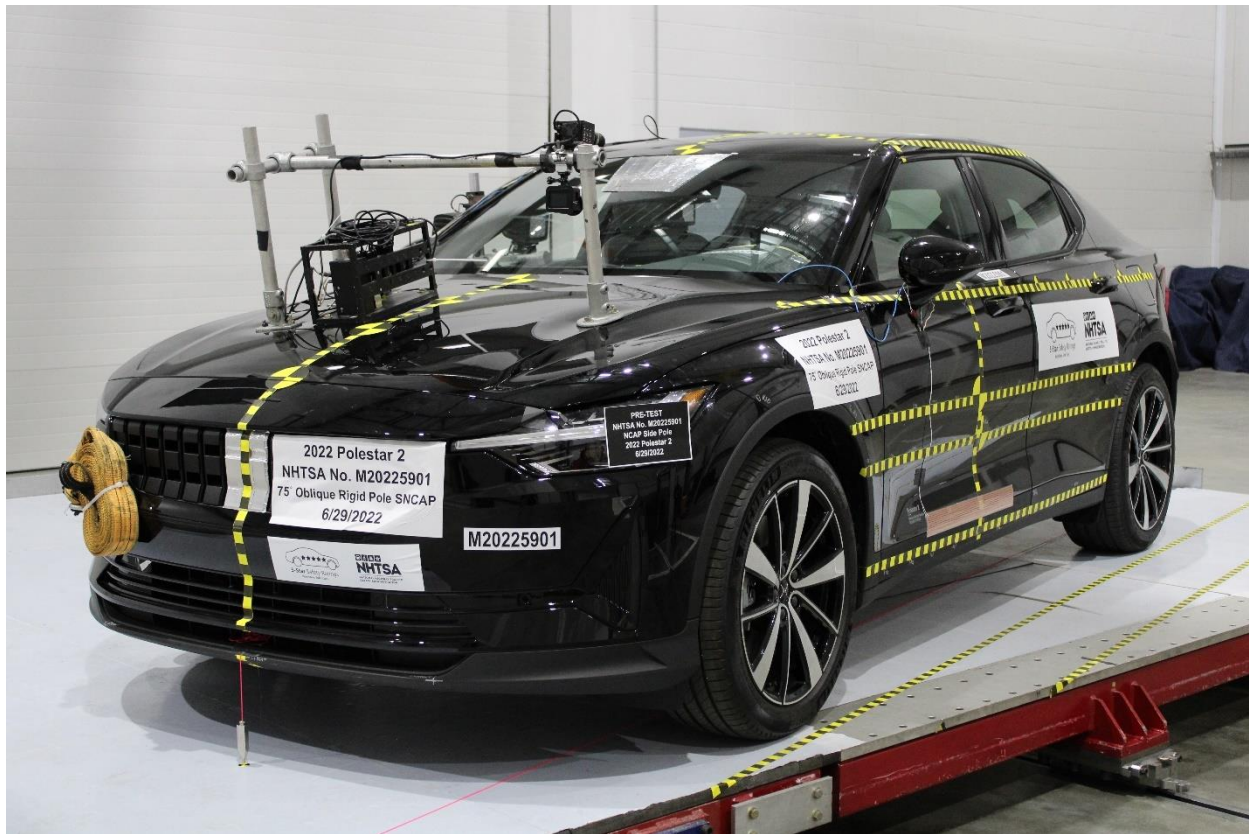


Figure A-5: Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle



Figure A-6: Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle

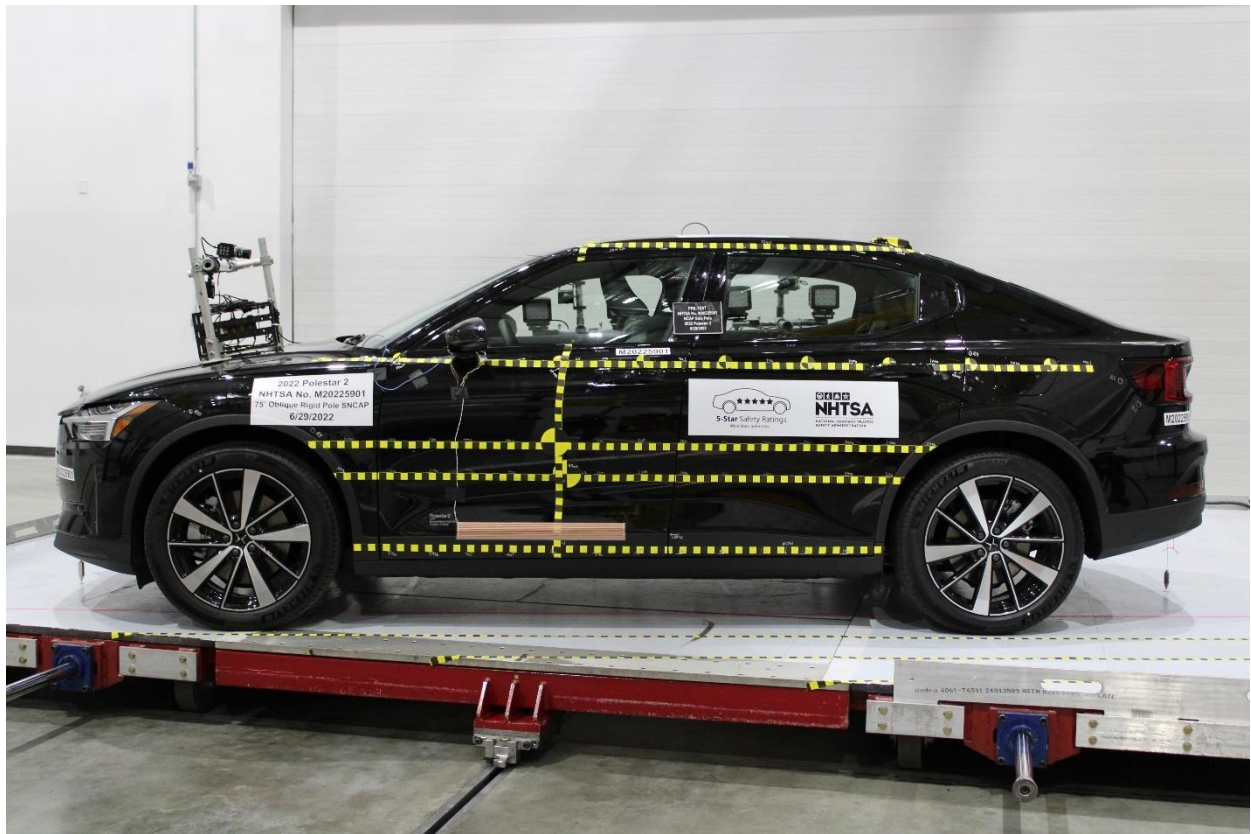


Figure A-7: Pre-Test Left Side View of Test Vehicle



Figure A-8: Post-Test Left Side View of Test Vehicle

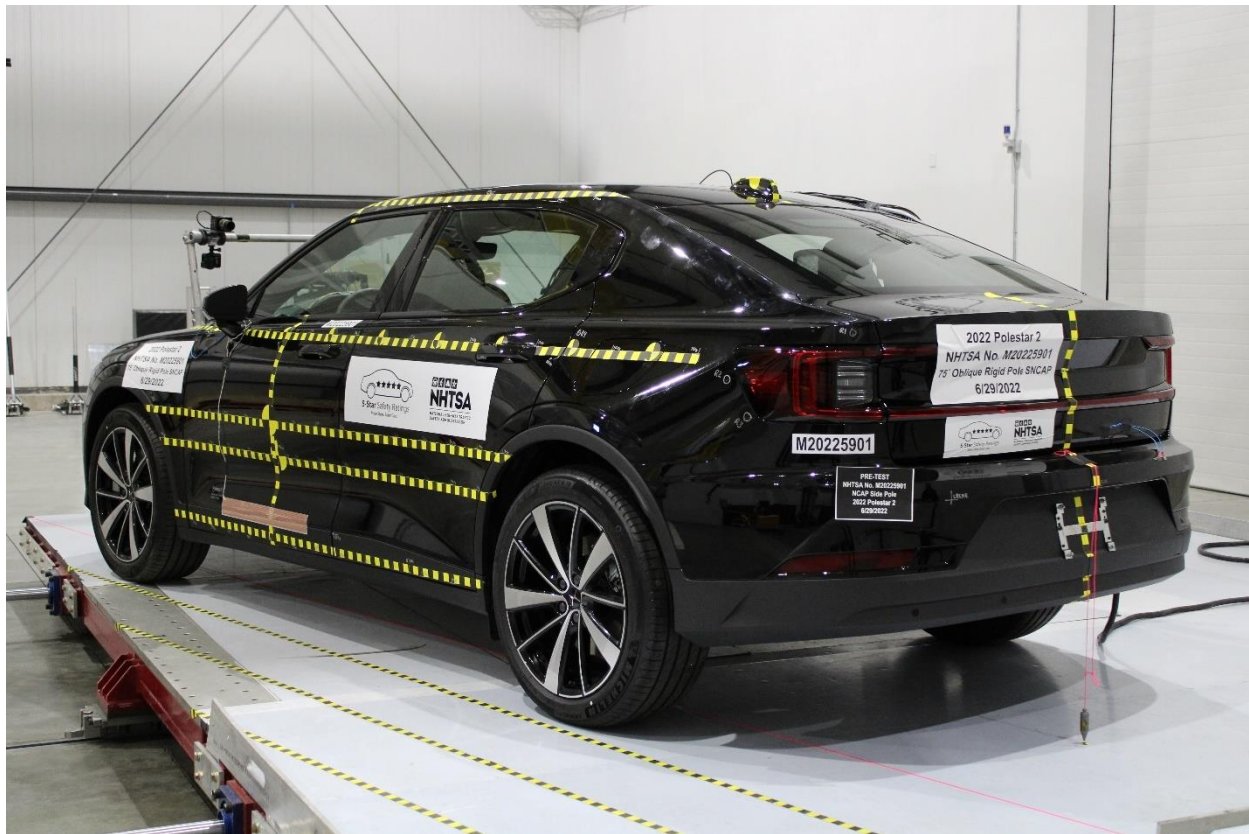


Figure A-9: Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



Figure A-10: Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle

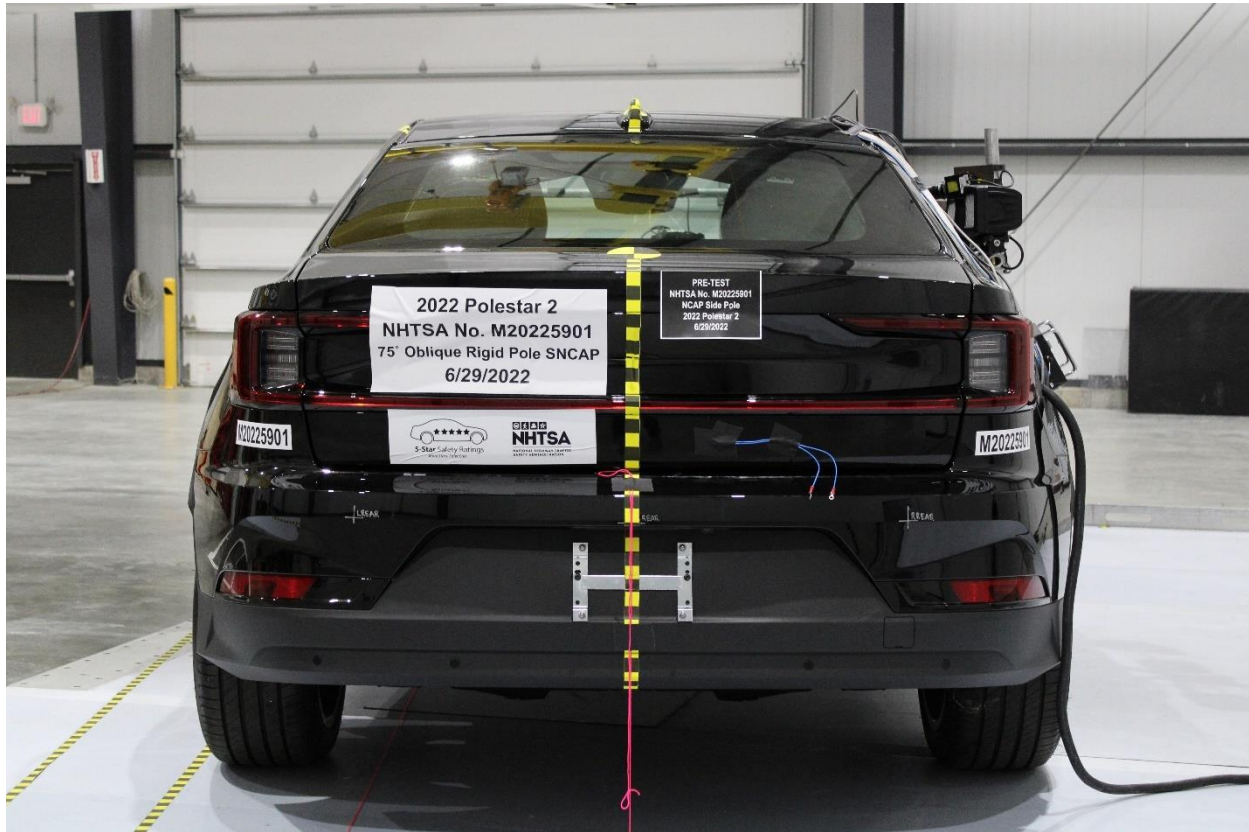


Figure A-11: Pre-Test Rear View of Test Vehicle



Figure A-12: Post-Test Rear View of Test Vehicle



Figure A-13: Pre-Test Right Side View of Test Vehicle



Figure A-14: Post-Test Right Side View of Test Vehicle

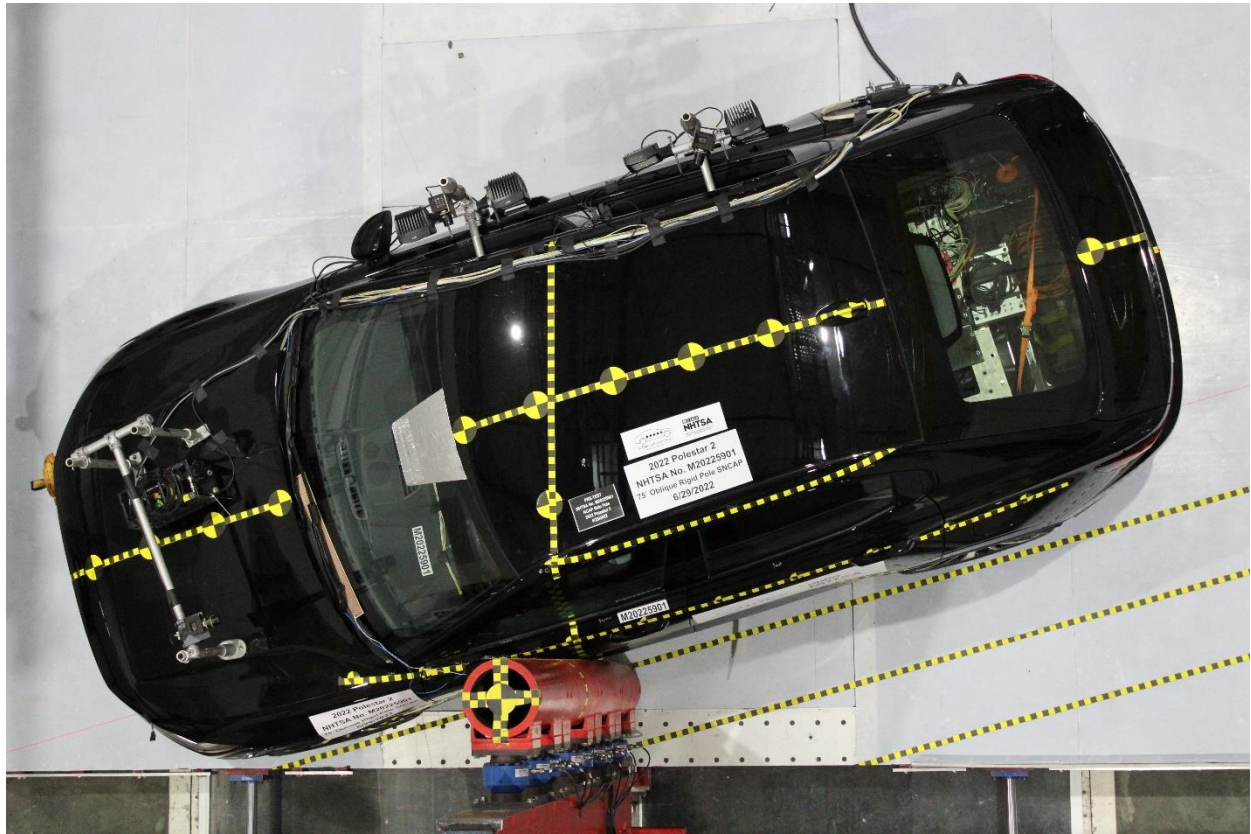


Figure A-15: Pre-Test Overhead View of Test Area

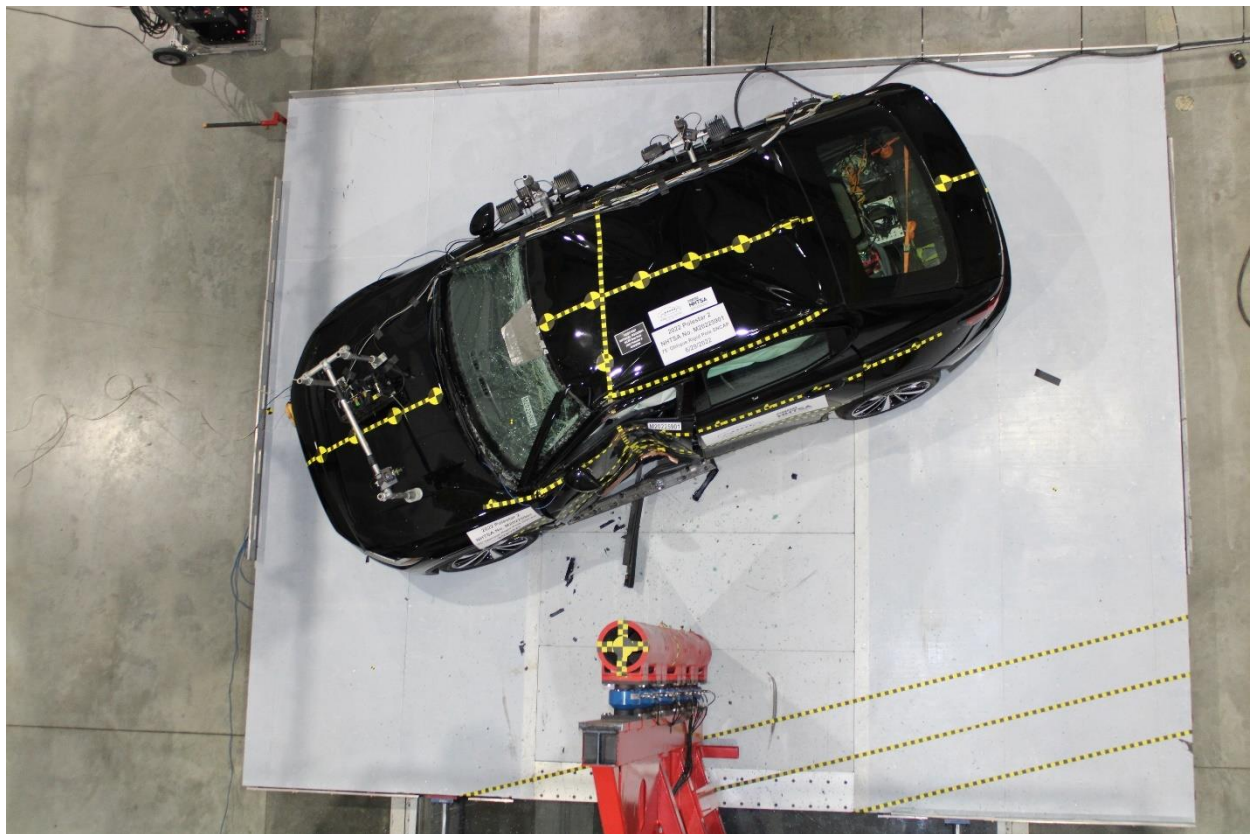


Figure A-16: Post-Test Overhead View of Test Area

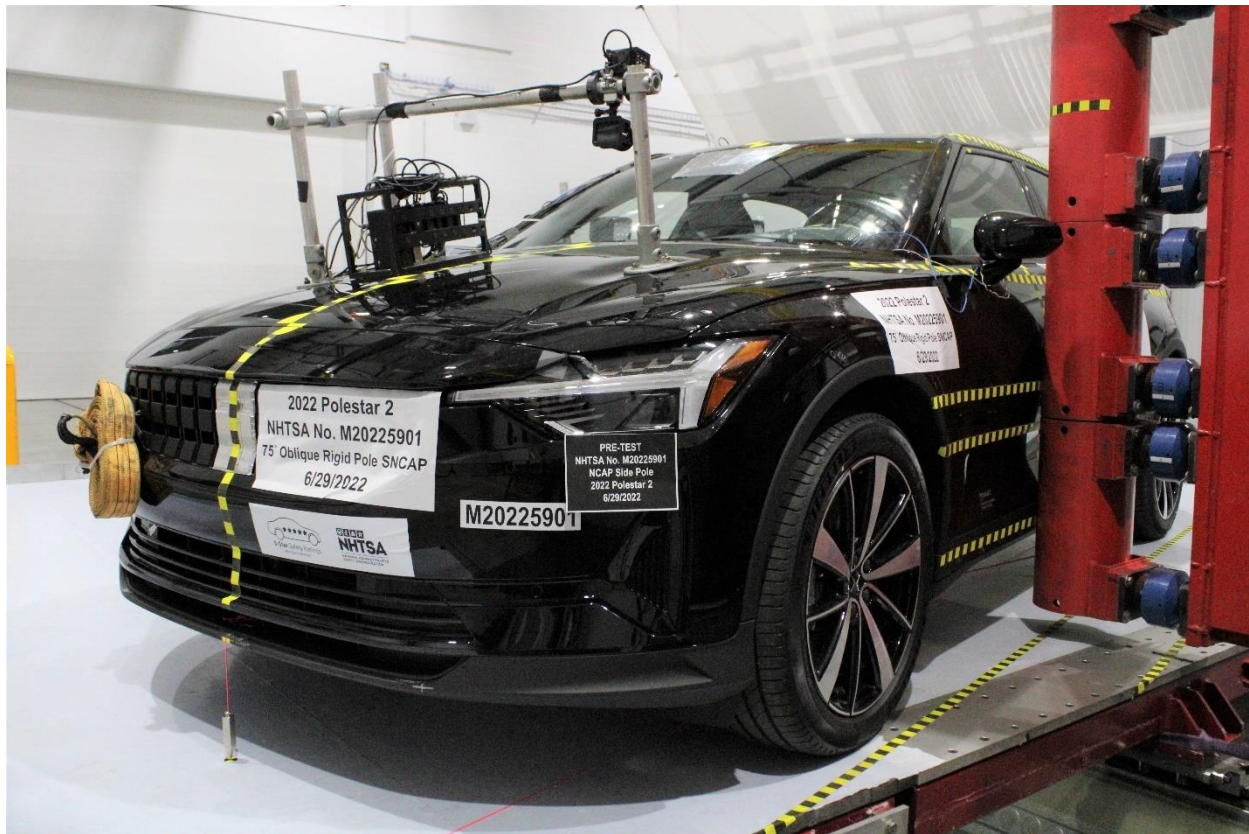


Figure A-17: Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



Figure A-18: Pre-Test Right Side View of Pole Positioned Against Side of Vehicle



Figure A-19: Pre-Test Close-Up View of Impact Point Target



Figure A-20: Post-Test Close-Up View of Impact Point Target Showing Impact Location

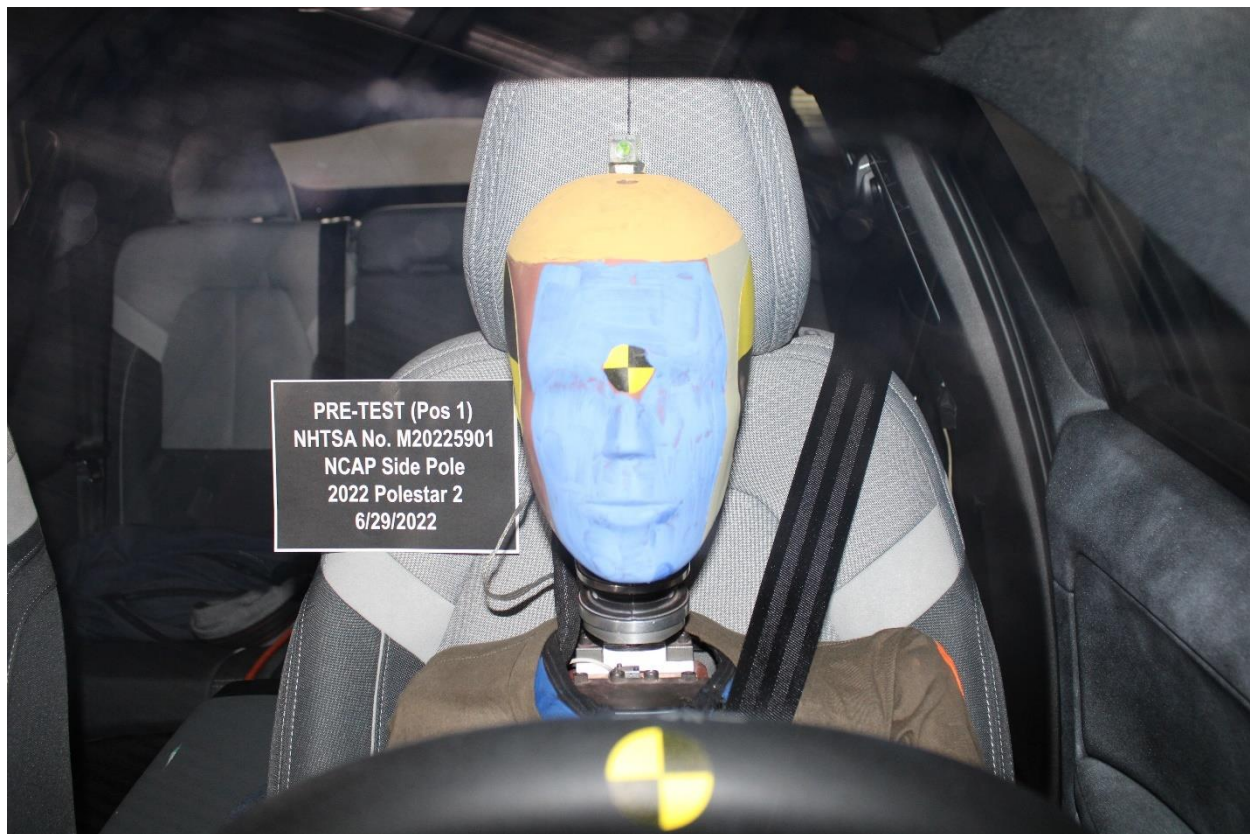


Figure A-21: Pre-Test Front Close-Up View of Dummy Head and Chest

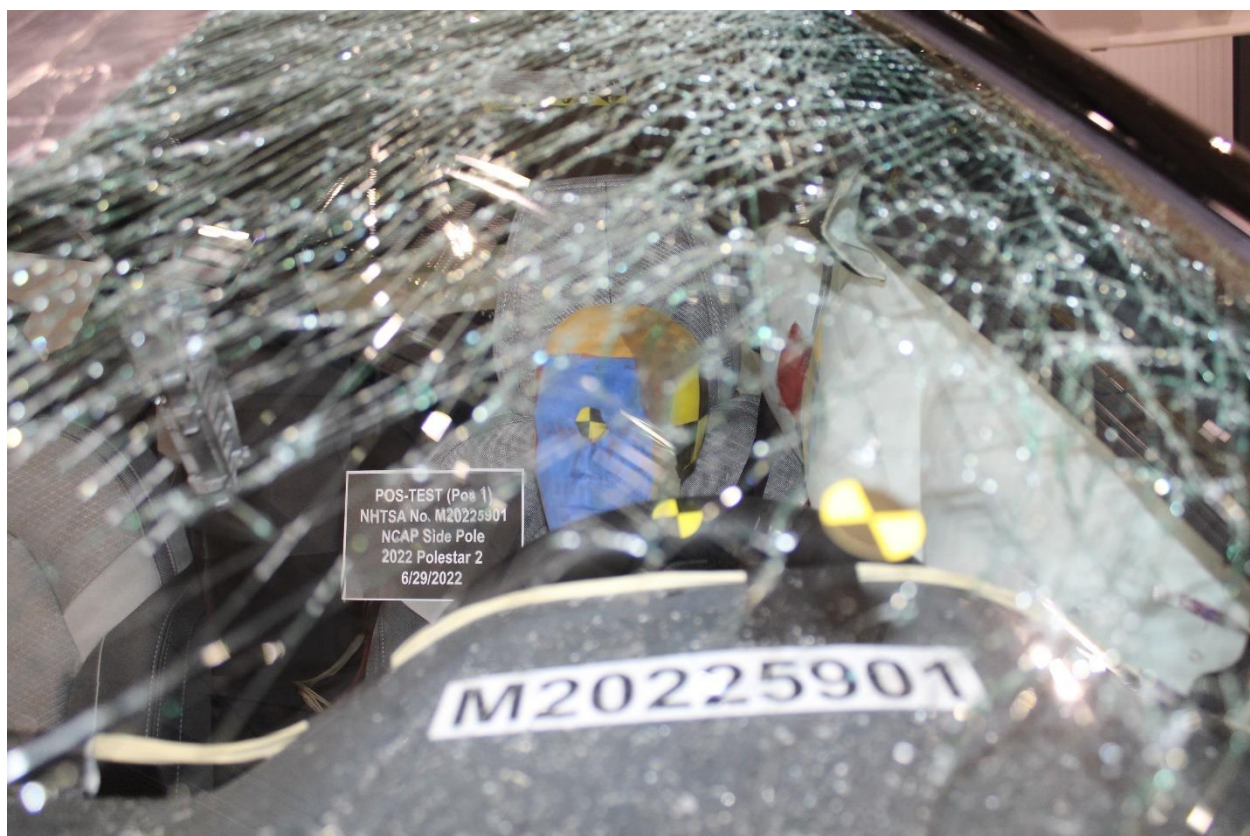


Figure A-22: Post-Test Front Close-Up View of Dummy



Figure A-23: Pre-Test Left Side View of Dummy Showing Belt and Chalking



Figure A-24: Pre-Test Left Side View of Dummy Shoulder and Door Top View



Figure A-25: Post-Test Left Side View of Dummy Shoulder and Door Top View

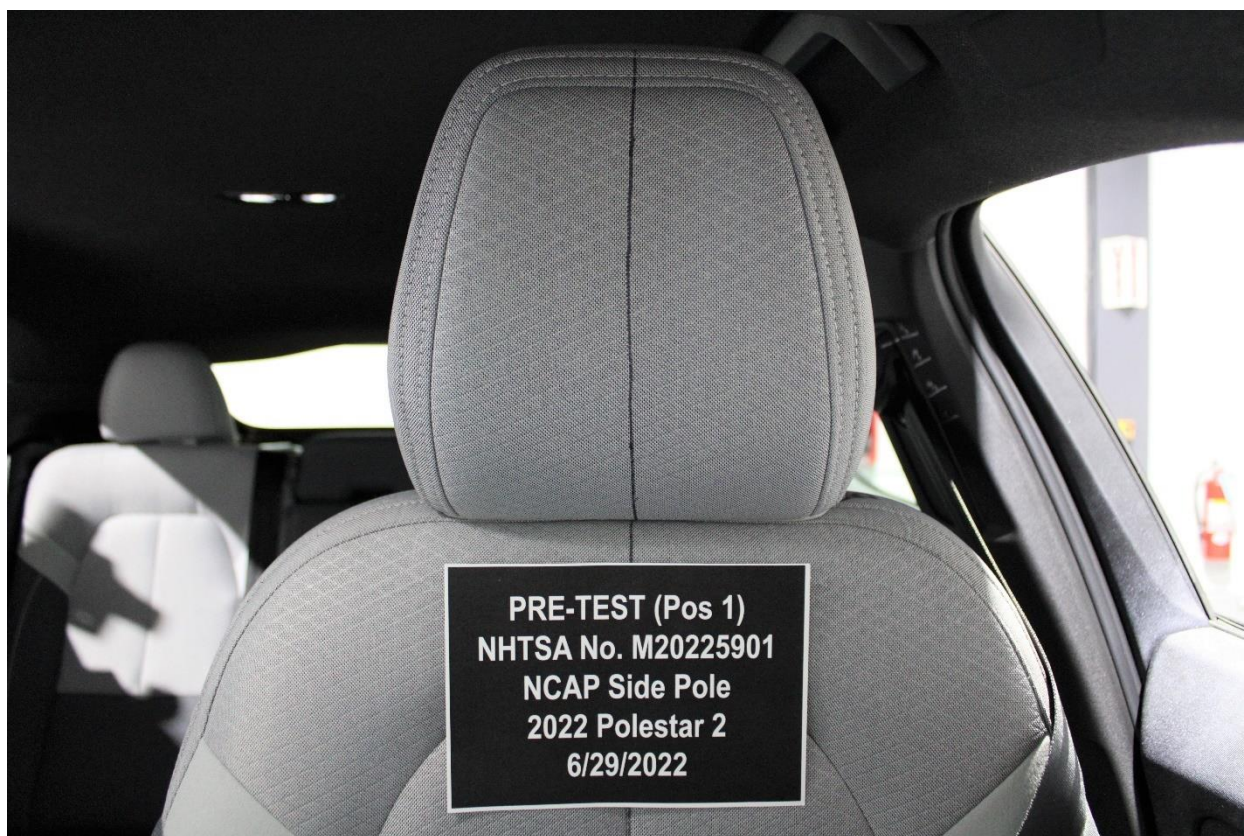


Figure A-26: Pre-Test Frontal View of Seat Back Prior to Dummy Positioning

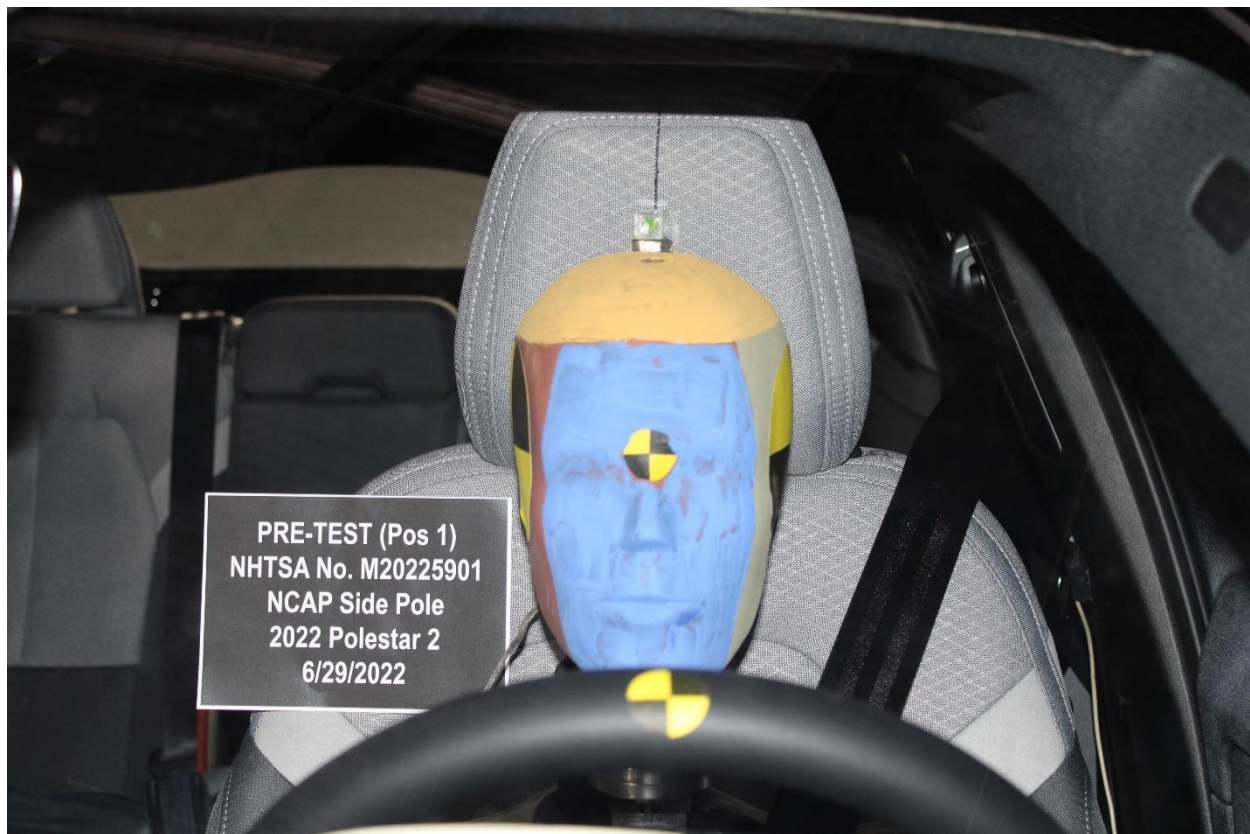


Figure A-27: Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint



Figure A-28: Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning



Figure A-29: Pre-Test Overhead View of Dummy Thighs on Seat Pan



Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket

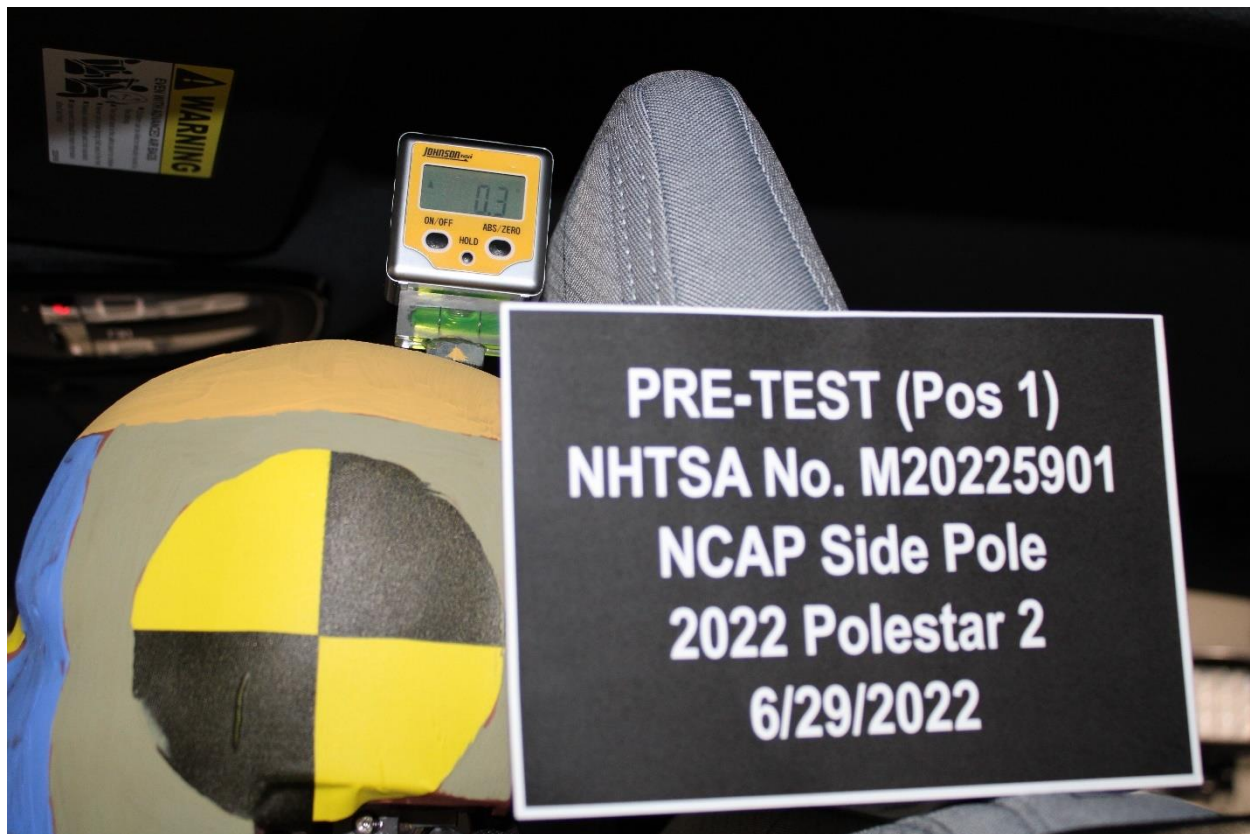


Figure A-31: Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level



Figure A-32: Pre-Test Placement of Dummy's Feet



Figure A-33: Pre-Test View of Belt Anchorage for Dummy



Figure A-34: Pre-Test Left Side View of Steering Wheel



Figure A-35: Pre-Test View of Disengaged Parking Brake



Figure A-36: Pre-Test View of Parking Brake



Figure A-37: Pre-Test Close-Up Left Side View of Driver Seat Track



Figure A-38: Pre-Test Close-Up Left Side View of Driver Seat Back



Figure A-39: Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Figure A-40: Pre-Test Dummy and Door Clearance View



Figure A-41: Post-Test Dummy and Door Clearance View



Figure A-42: Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Figure A-43: Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Figure A-44: Pre-Test Inner Door Panel View



Figure A-45: Post-Test Inner Door Panel View Showing Dummy Contact Location



Figure A-46: Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



Figure A-47: Post-Test Dummy Close-Up Head Contact with Side Airbag View



Figure A-48: Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



Figure A-49: Post-Test Dummy Close-Up Torso Contact with Side Airbag View



Figure A-50: Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View



Figure A-51: Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View



Figure A-52: Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View



Figure A-53: Pre-Test Right Side View of Dummy and Rear Seat of Occupant Compartment



Figure A-54: Post-Test Inner Rear Passenger Torso Air Bag Deployment View



Figure A-55: Pre-Test View of Charging Port



Figure A-56: Post-Test View of Charging Port



Figure A-57: Close-Up View of Vehicle's Certification Label



Figure A-58: Close-Up View of Vehicle's Tire Information Placard or Label

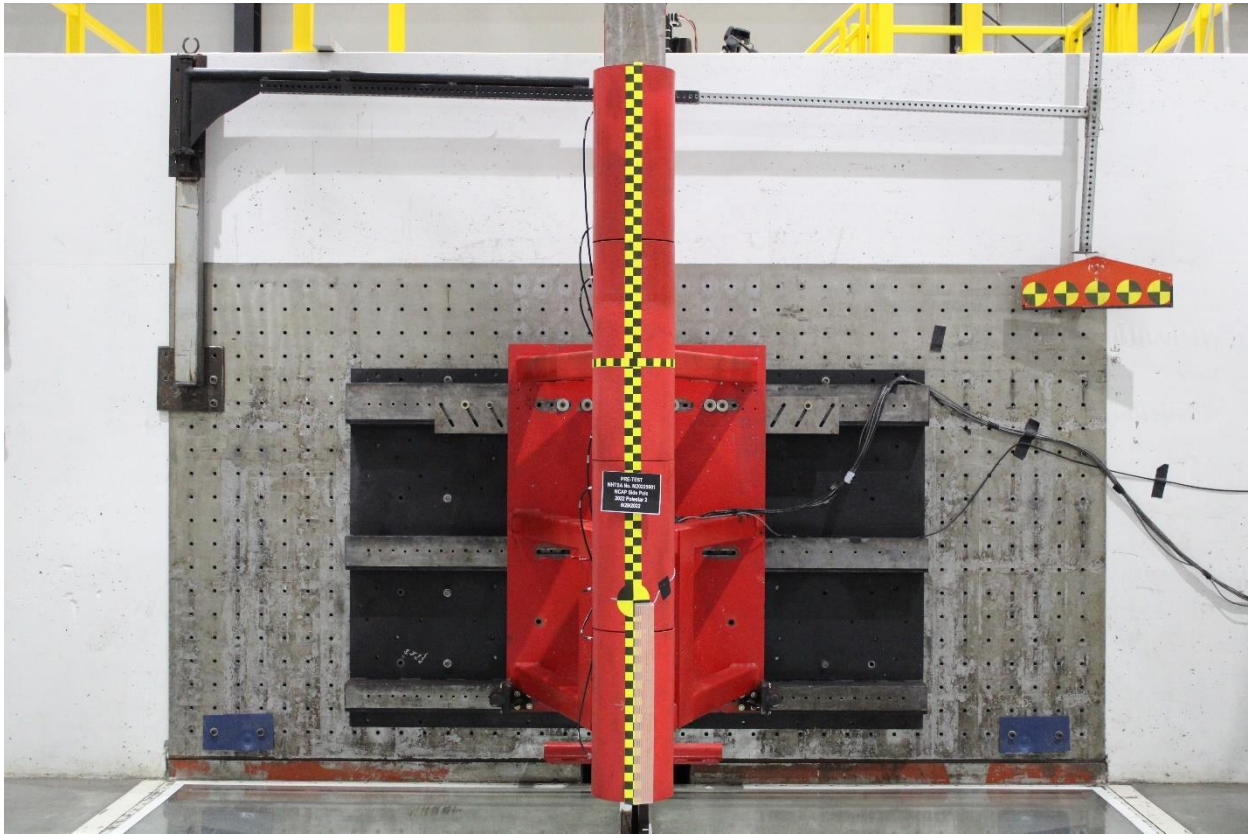


Figure A-59: Pre-Test Pole Barrier Front View

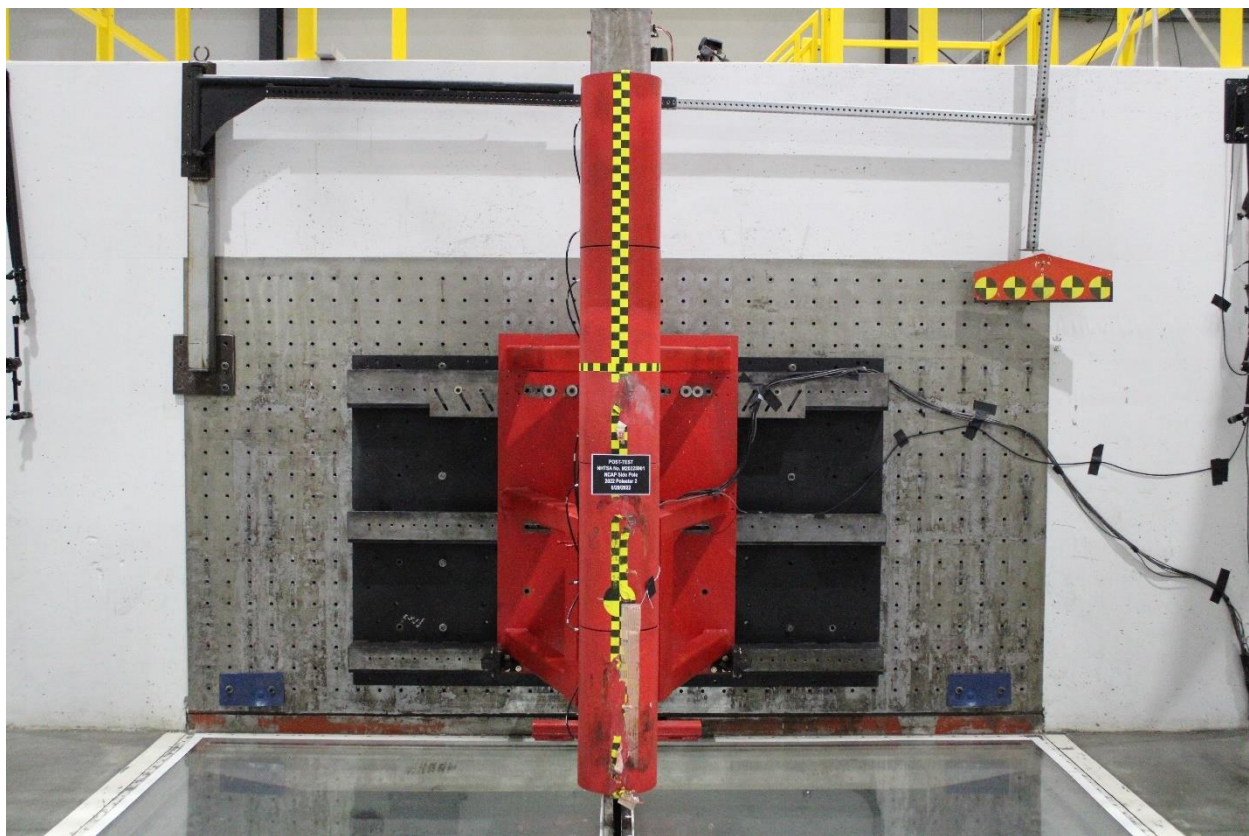


Figure A-60: Post-Test Pole Barrier Front View

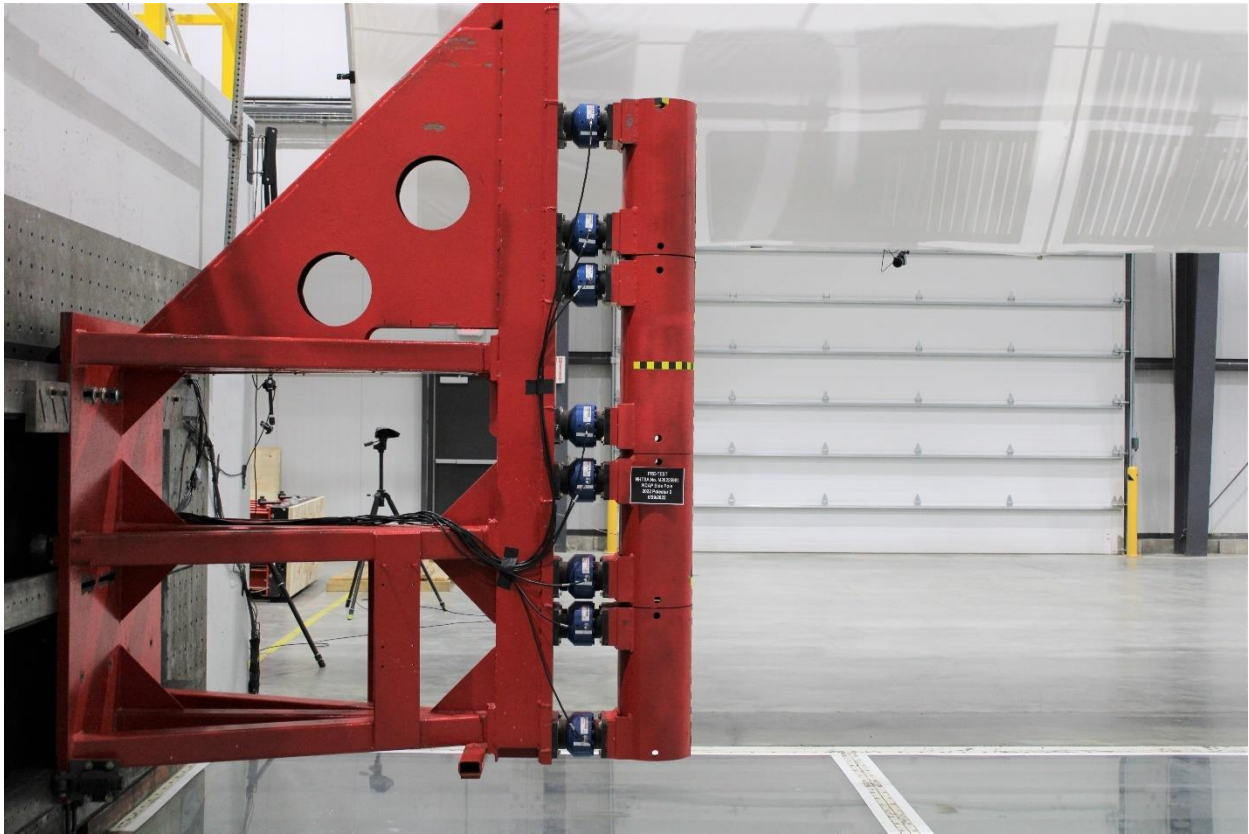


Figure A-61: Pre-Test Pole Barrier Side View

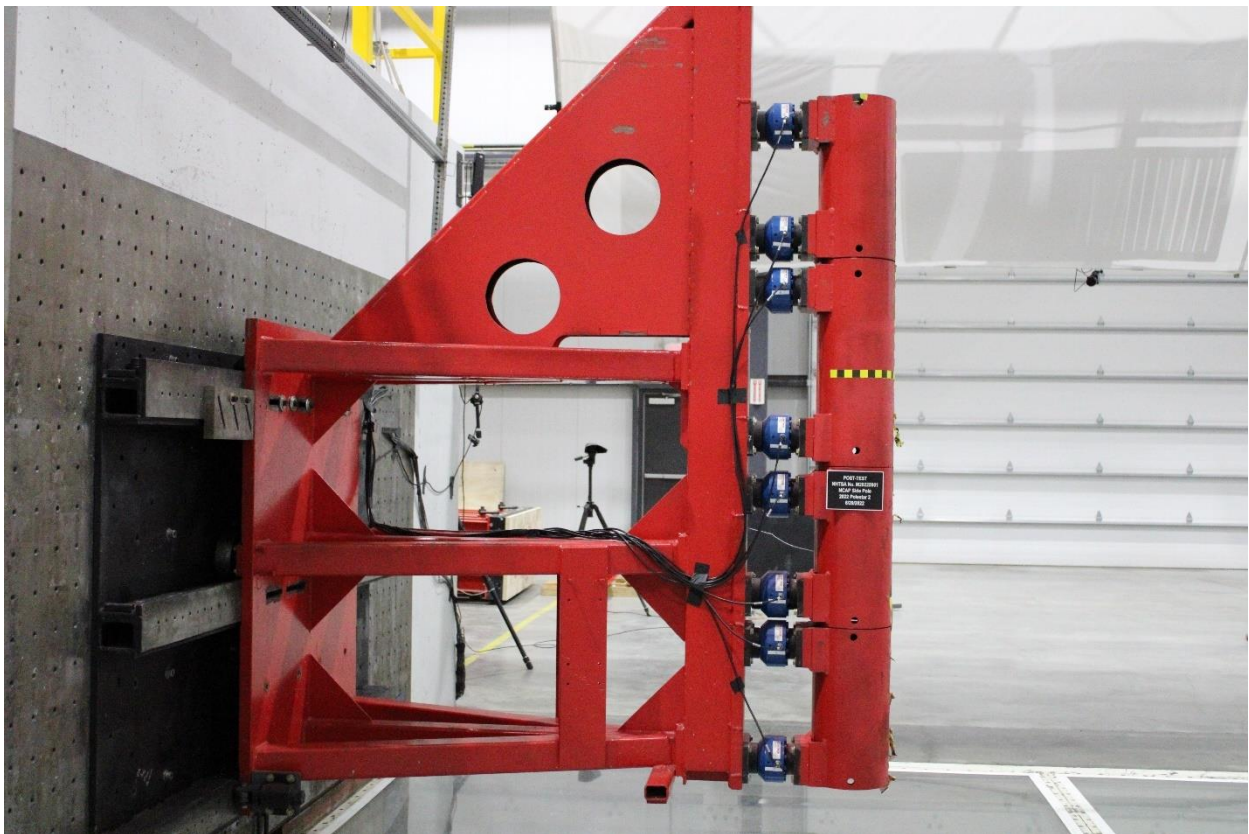


Figure A-62: Post-Test Pole Barrier Side View

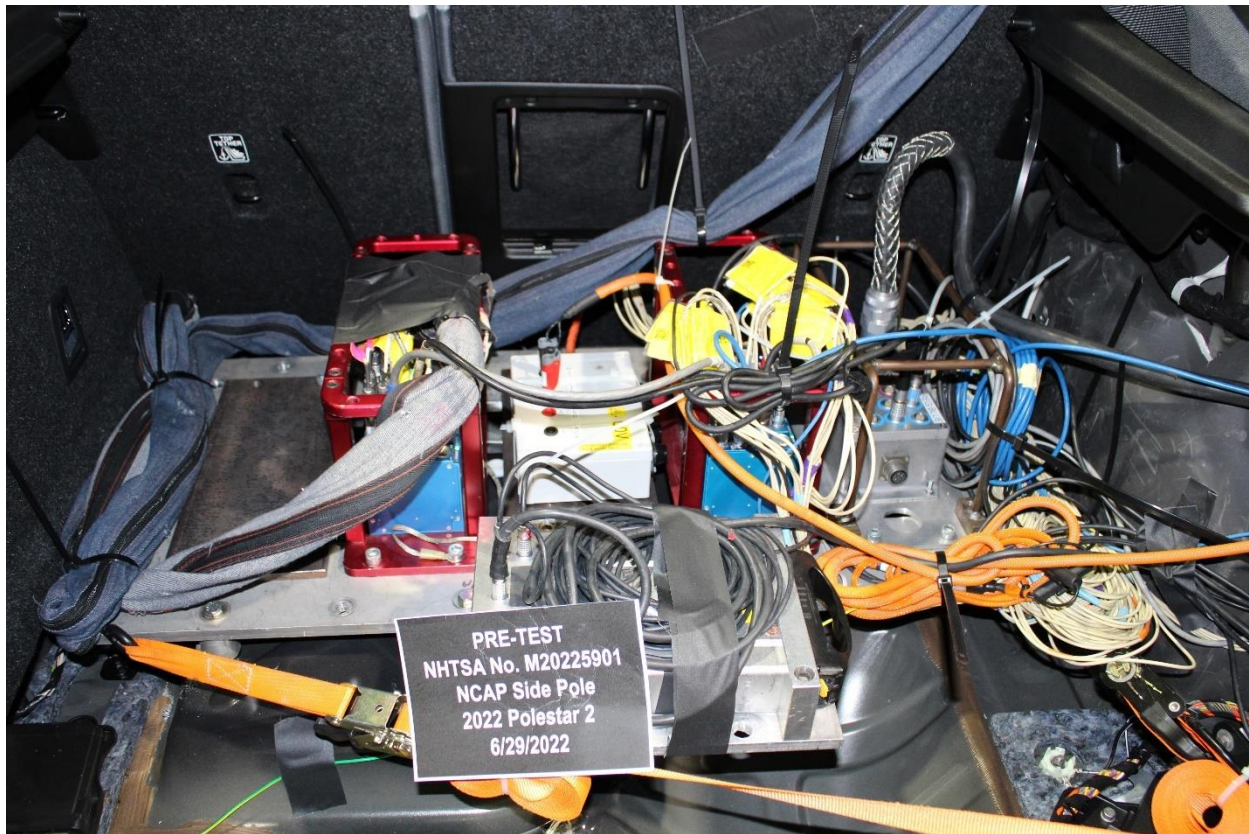


Figure A-63: Pre-Test Ballast View



Figure A-64: Post-Test Primary and Redundant Speed Trap Read-Out



Figure A-65: FMVSS No. 301 Static Rollover 0 Degrees



Figure A-66: FMVSS No. 301 Static Rollover 90 Degrees

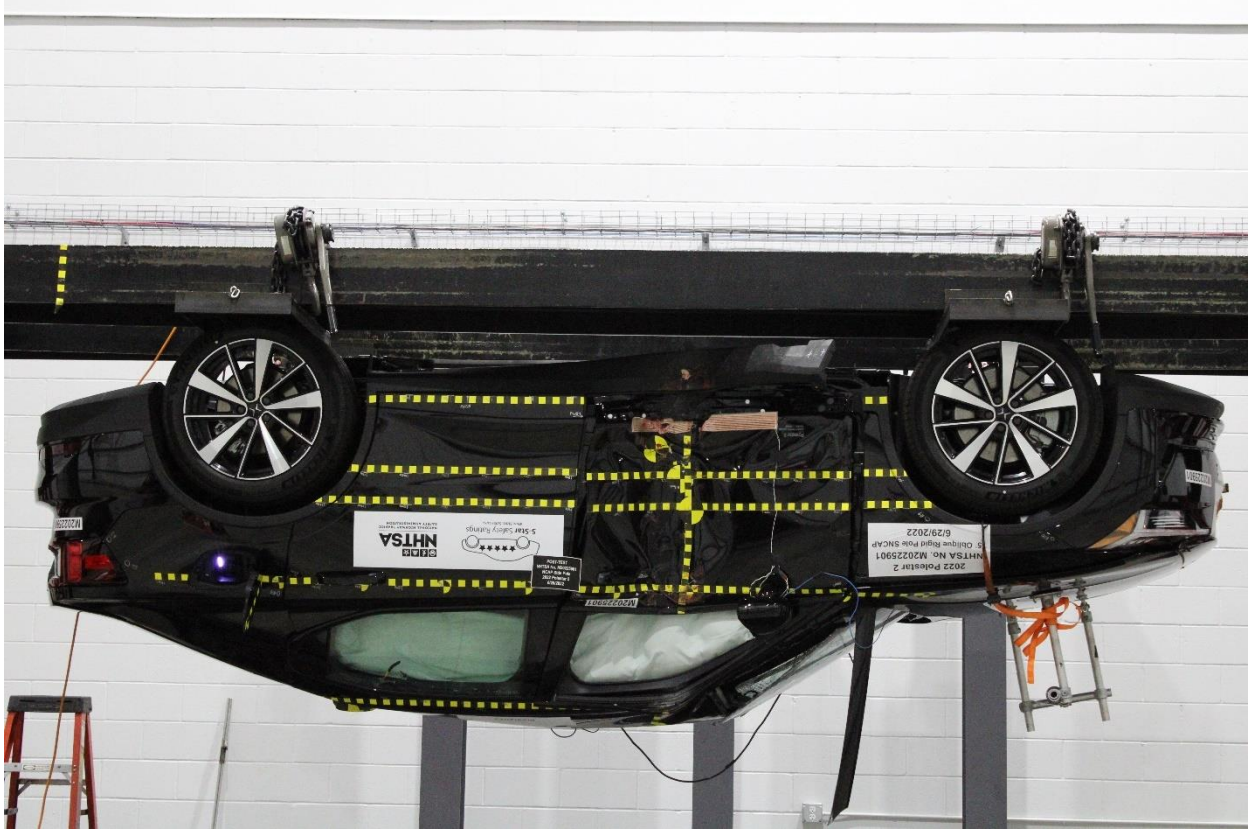


Figure A-67: FMVSS No. 301 Static Rollover 180 Degrees

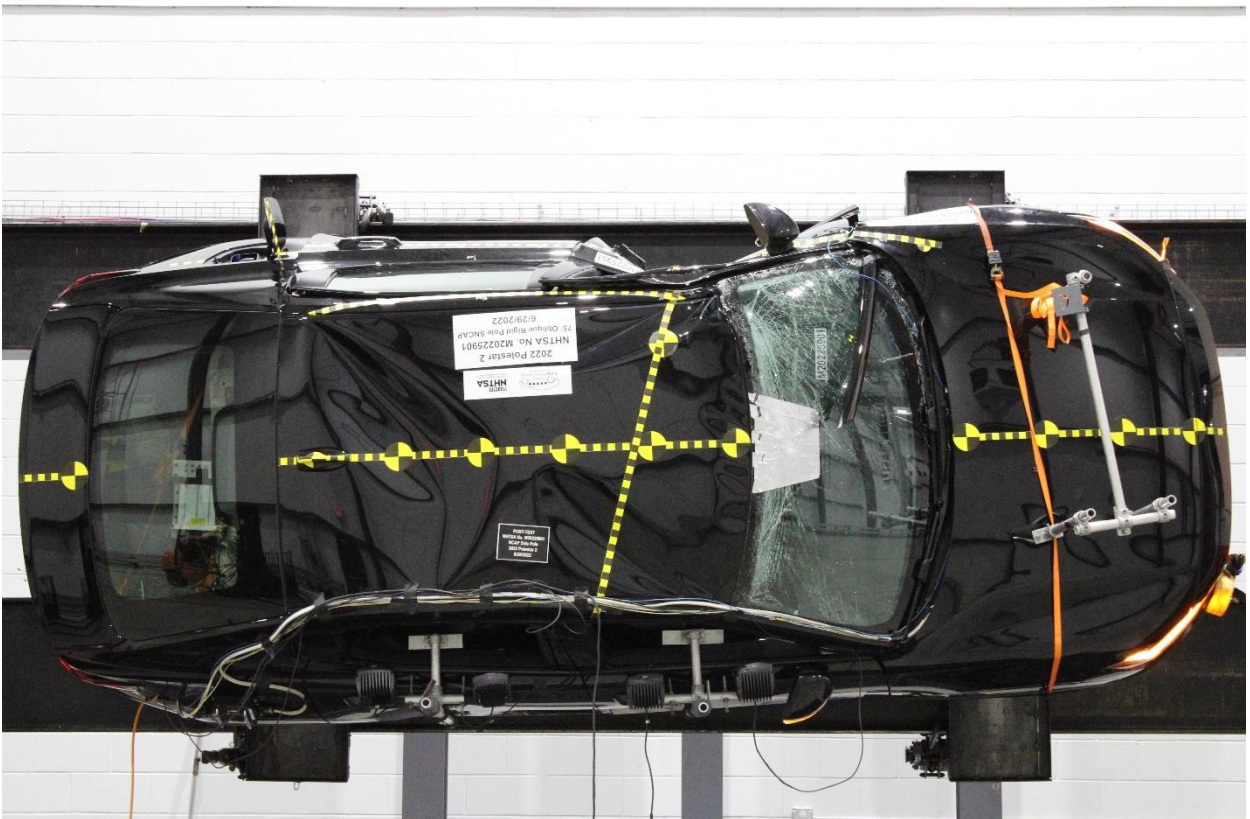


Figure A-68: FMVSS No. 301 Static Rollover 270 Degrees

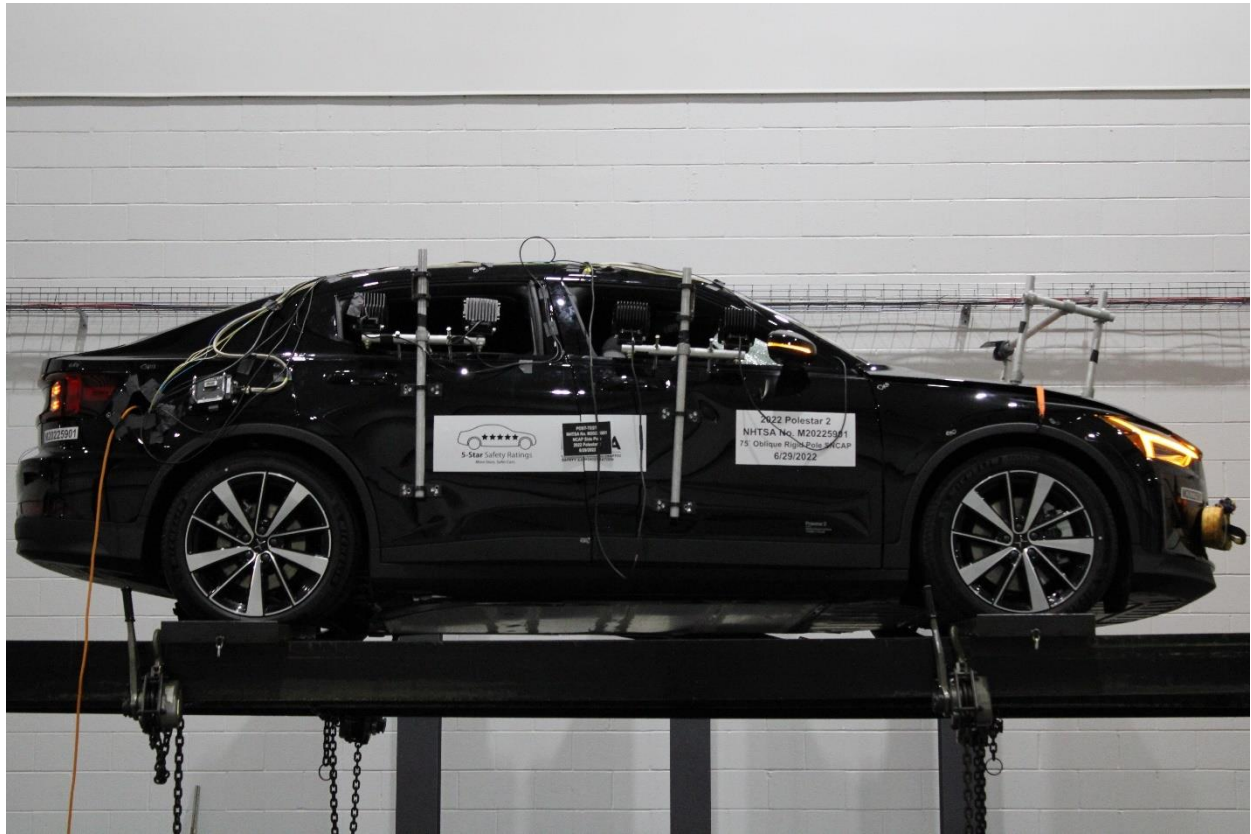


Figure A-69: FMVSS No. 301 Static Rollover 360 Degrees

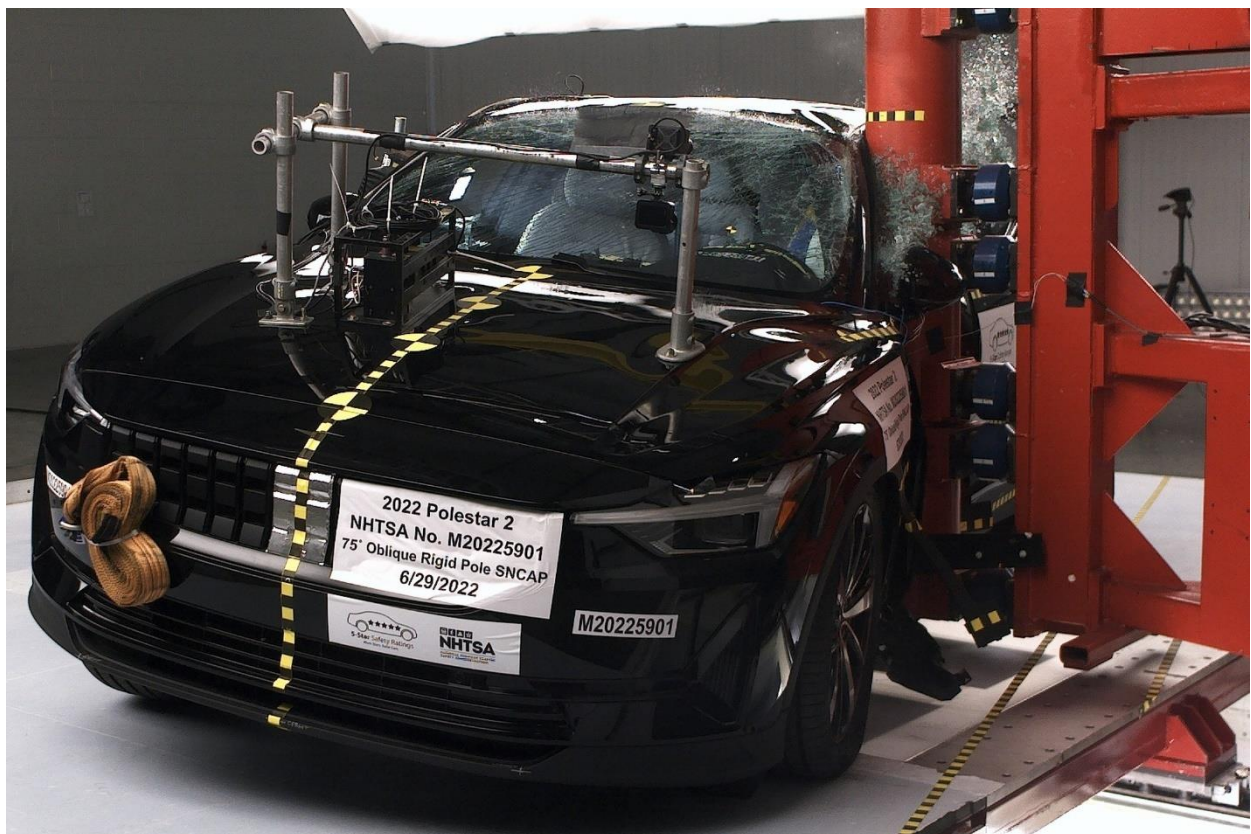


Figure A-70: Impact Event



Figure A-73: Post-Test View of Shattered Vehicle Inner Door Panel

Photo Not Applicable

Figure 305-1: Auxiliary Power Module Warning Label



Figure 305-2: Power Inverter Warning Label

Photo Not Applicable

Figure 305-3 First Responder Warning Label

Photo Not Applicable

Figure 305-4: First Responder Warning Label Location

Photo Not Applicable

Figure 305-5: Other Vehicle Label Related to Electric Propulsion System

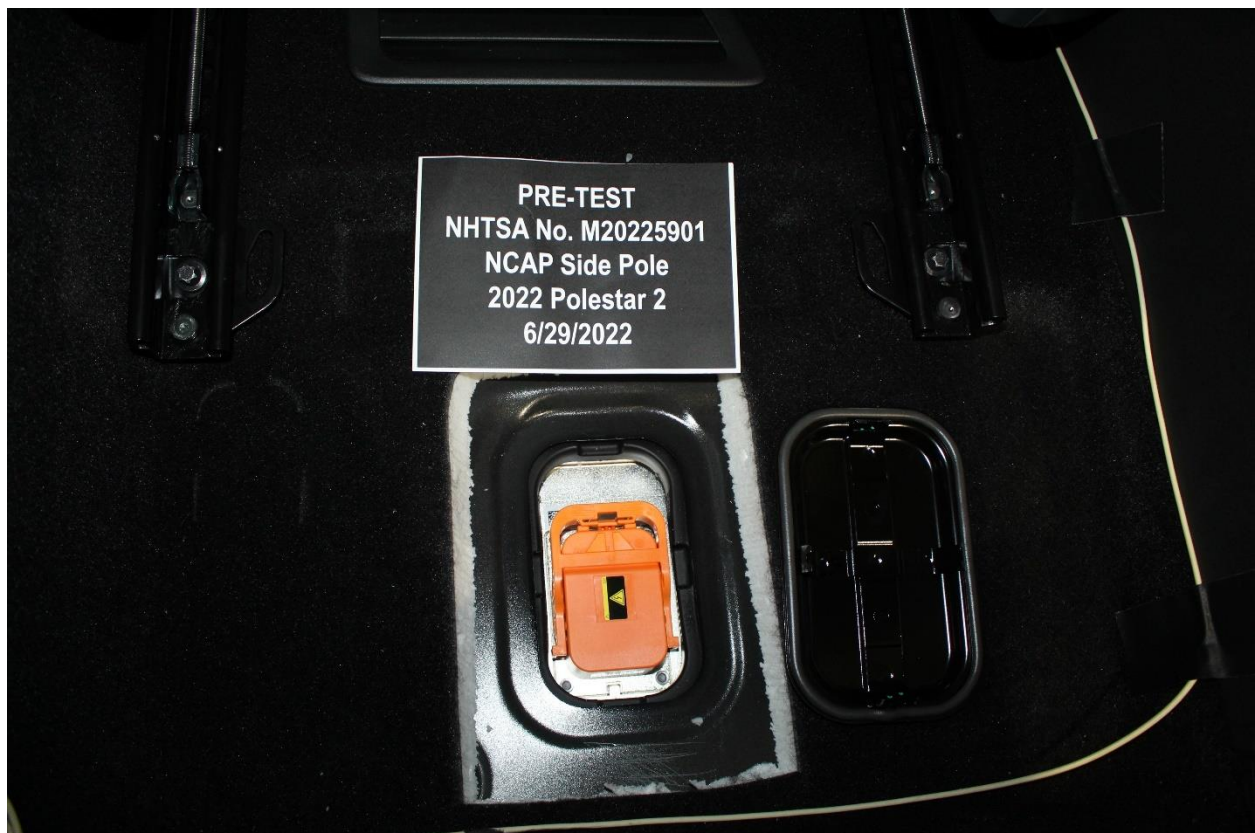


Figure 305-6: Manual High Voltage Service Disconnect in Place

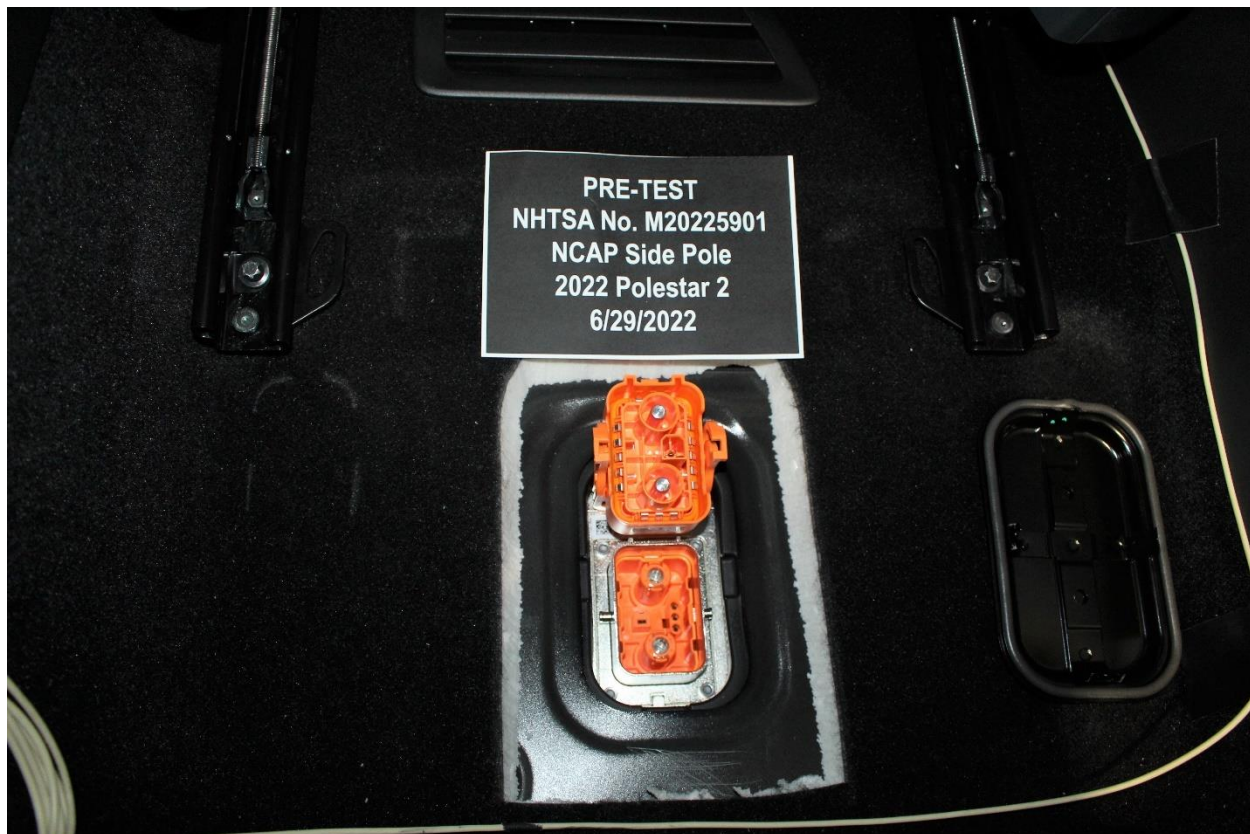


Figure 305-7: Manual High Voltage Service Disconnect Removed (Show Plug)



Figure 305-8: Manual High Voltage Service Disconnect Removed Location



Figure 305-9: Pre-Impact View of Propulsion Battery



Figure 305-10: Post-Impact Front View of Propulsion Battery

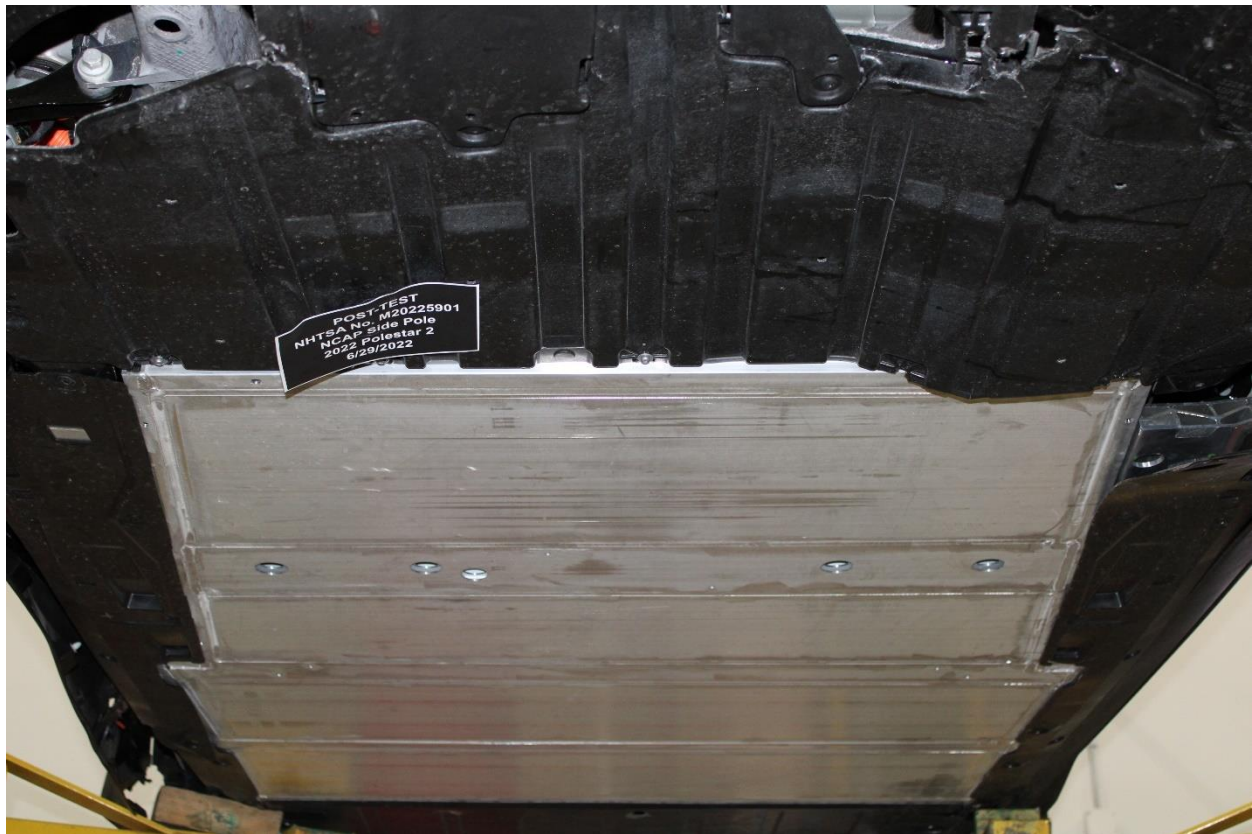


Figure 305-11: Post-Impact Rear View of Propulsion Battery (if any part of it is visible)



Figure 305-12: Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules



Figure 305-13: Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

Photo Not Applicable

Figure 305-14: Pre-Impact View of Propulsion Battery Module(s)

Photo Not Applicable

Figure 305-15: Post-Impact View of Propulsion Battery Module(s)



Figure 305-16: Pre-Impact View of Electric Propulsion Drive

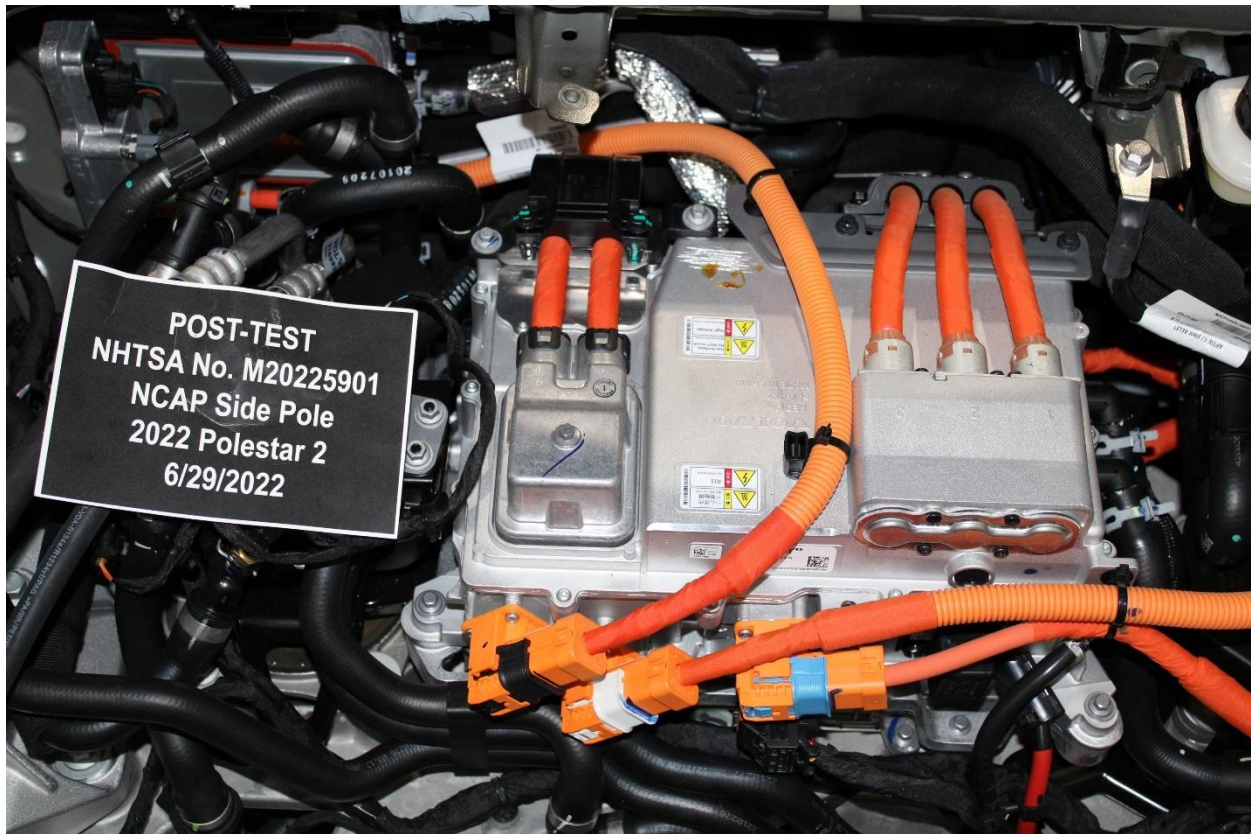


Figure 305-17: Post-Impact View of Electric Propulsion Drive



Figure 305-18: Pre-Impact View of High Voltage Interconnects

Photo Not Applicable

Figure 305-19: Pre-Impact View of Propulsion Battery Venting System

Photo Not Applicable

Figure 305-20: Pre-Impact View of Other Visible Electric Propulsion Components



Figure 305-21: Pre-Impact View of Ground Lead Attached



Figure 305-22: Pre-Impact View of High Voltage Leads Attached

Photo Not Applicable

Figure 305-23: Pre-Impact Close Up View of High Voltage Leads Attached

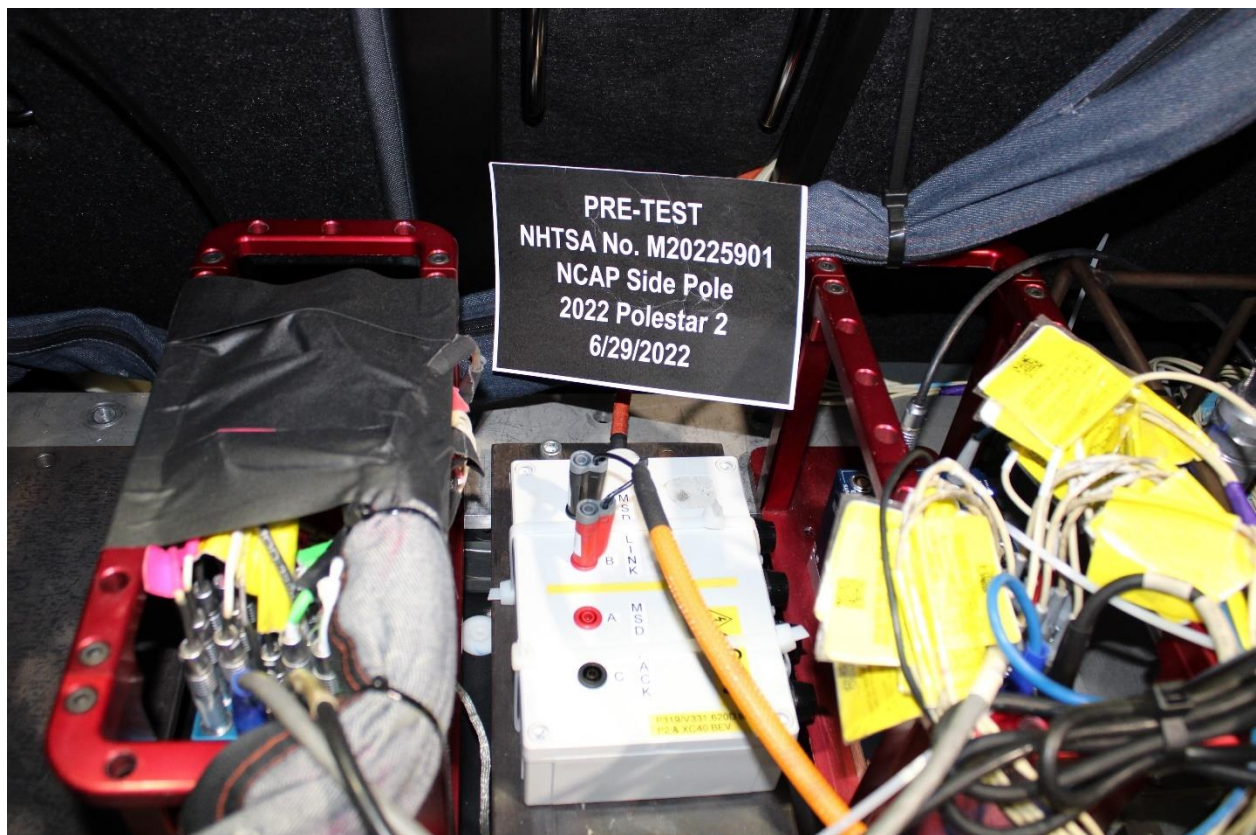


Figure 305-24: Pre-Impact View of Installed Test Interface Port



Figure 305-25: Post-Impact View of Installed Test Interface Port



Figure 305-26: Pre-Impact View of Other Test Devices



Figure 305-27: Post-Impact View of Other Test Devices



Figure 305-28: FMVSS No. 305 Static Rollover 90 Degrees

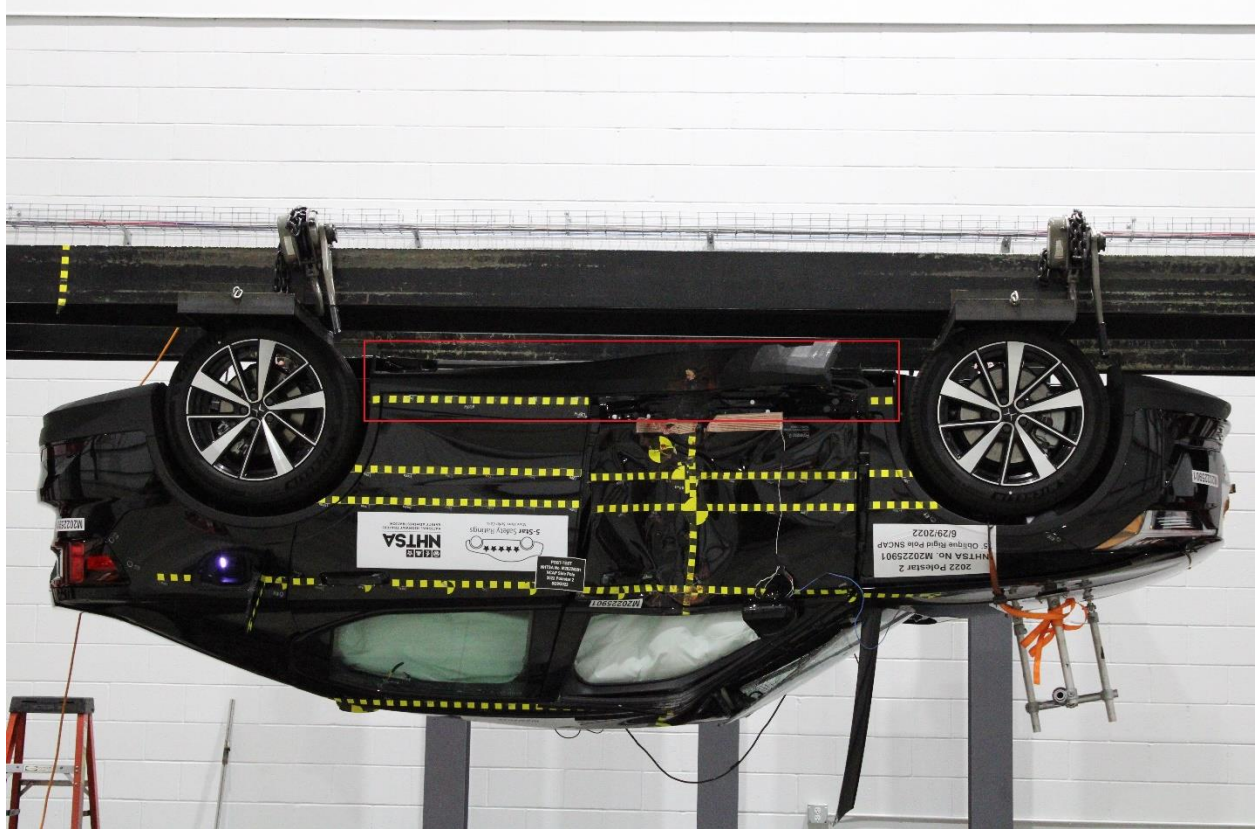


Figure 305-29: FMVSS No. 305 Static Rollover 180 Degrees

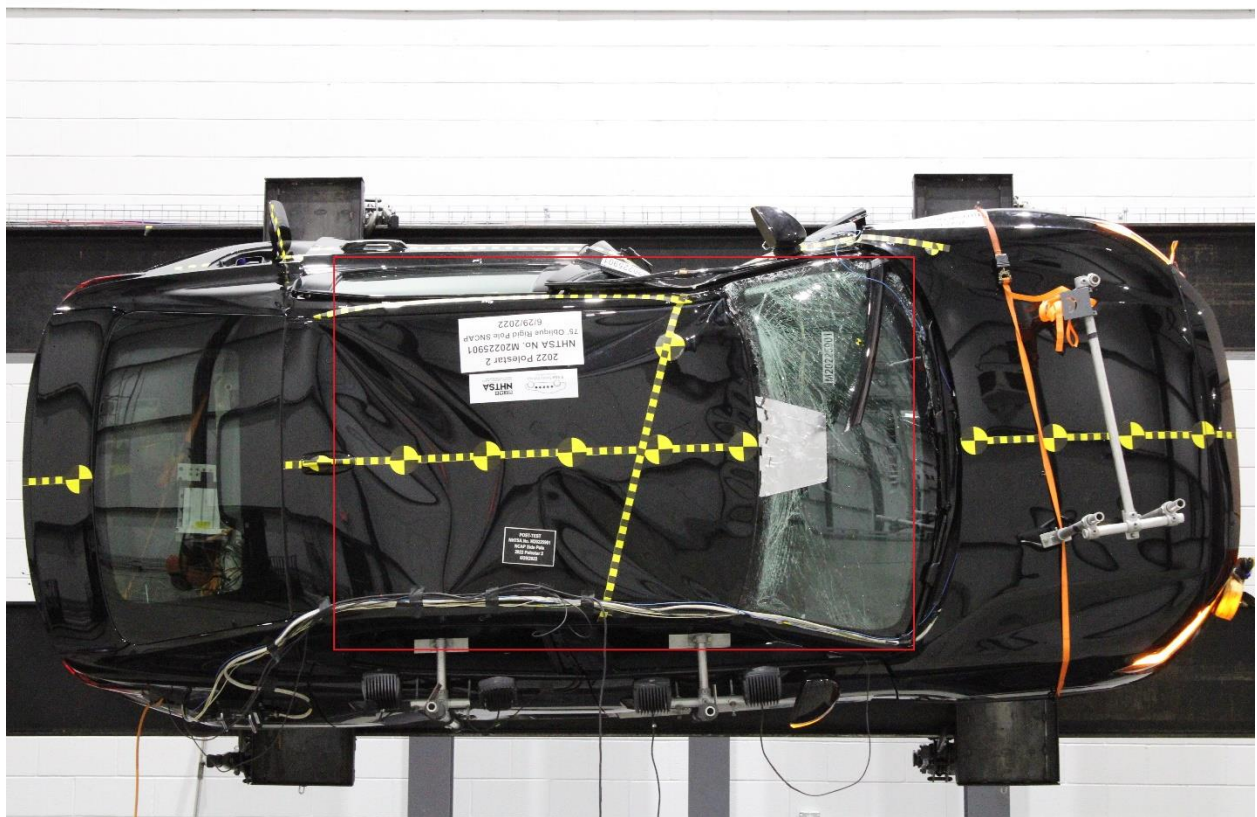


Figure 305-30: FMVSS No. 305 Static Rollover 270 Degrees

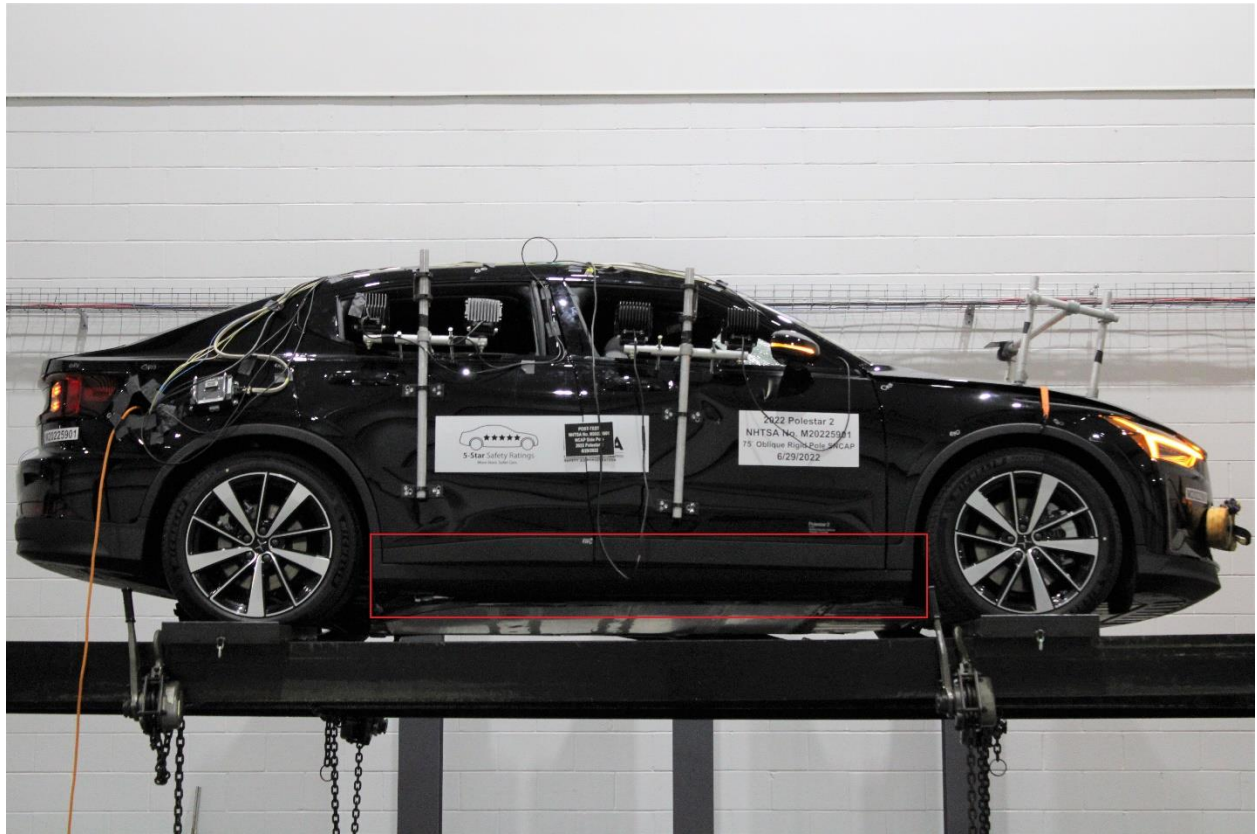


Figure 305-31: FMVSS No. 305 Static Rollover 360 Degrees

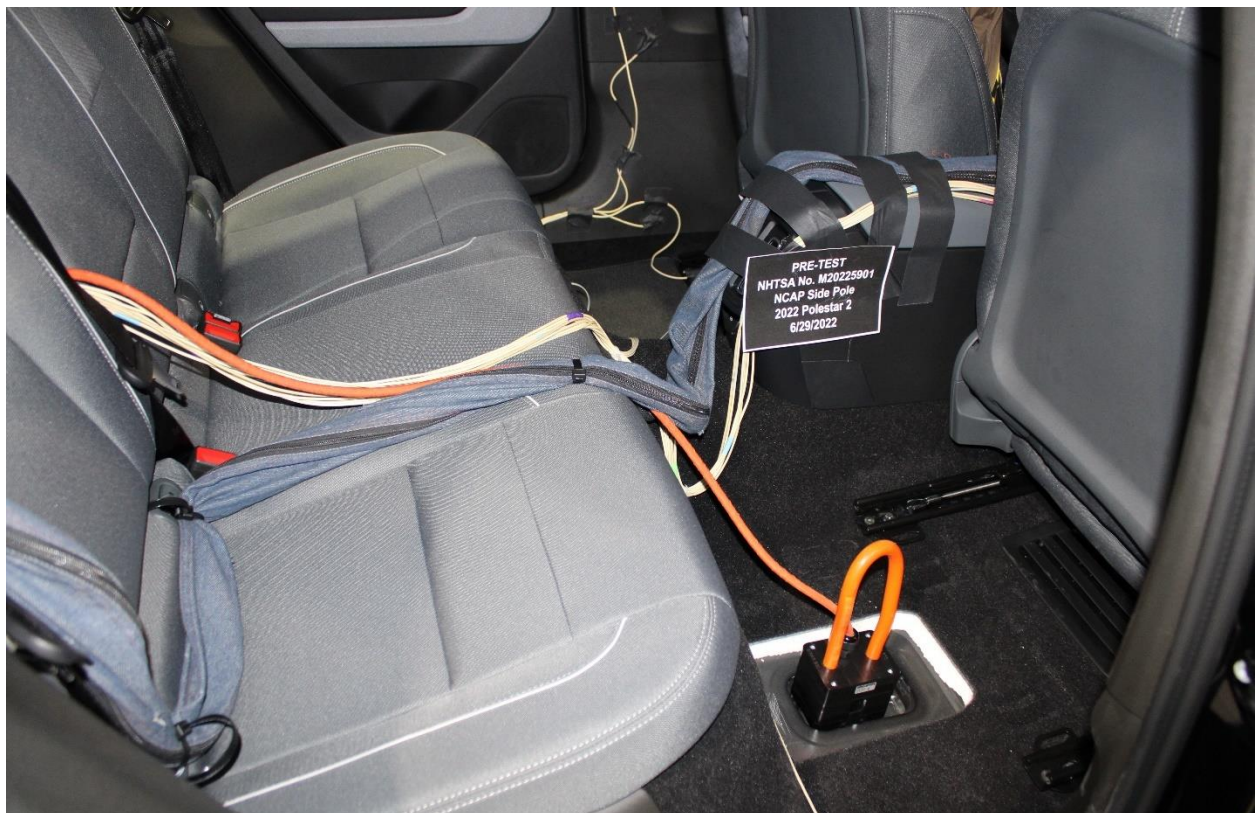


Figure 305-32: Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery



Figure 305-33: Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

Photo Not Applicable

Figure 305-34: Post-Impact Propulsion Battery System Mounting and-or Intrusion Failure(s)

Photo Not Applicable

Figure 305-35: Post-Impact View of Battery Component Intrusion (if applicable)

Photo Not Applicable

Figure 305-36: Post-Impact View of Battery Module Movement or Retention Loss (if applicable)

Photo Not Applicable

Figure 305-37: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (if applicable)

Photo Not Applicable

Figure 305-38: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (after rollover)

APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

Table of Data Plots

Driver Dummy Instrumentation Plots

Fig.	Description	Page
Plot 1	Driver Head Acceleration (X) Primary vs. Time	B-4
Plot 2	Driver Head Acceleration (Y) Primary vs. Time	B-4
Plot 3	Driver Head Acceleration (Z) Primary vs. Time	B-4
Plot 4	Driver Head Resultant Primary vs. Time	B-4
Plot 5	Driver Lower Spine T12 Acceleration (X) vs. Time	B-5
Plot 6	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-5
Plot 7	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-5
Plot 8	Driver Lower Spine T12 Resultant Acceleration vs. Time	B-5
Plot 9	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-6
Plot 10	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-6
Plot 11	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-6

Additional Driver Dummy Instrumentation Data

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

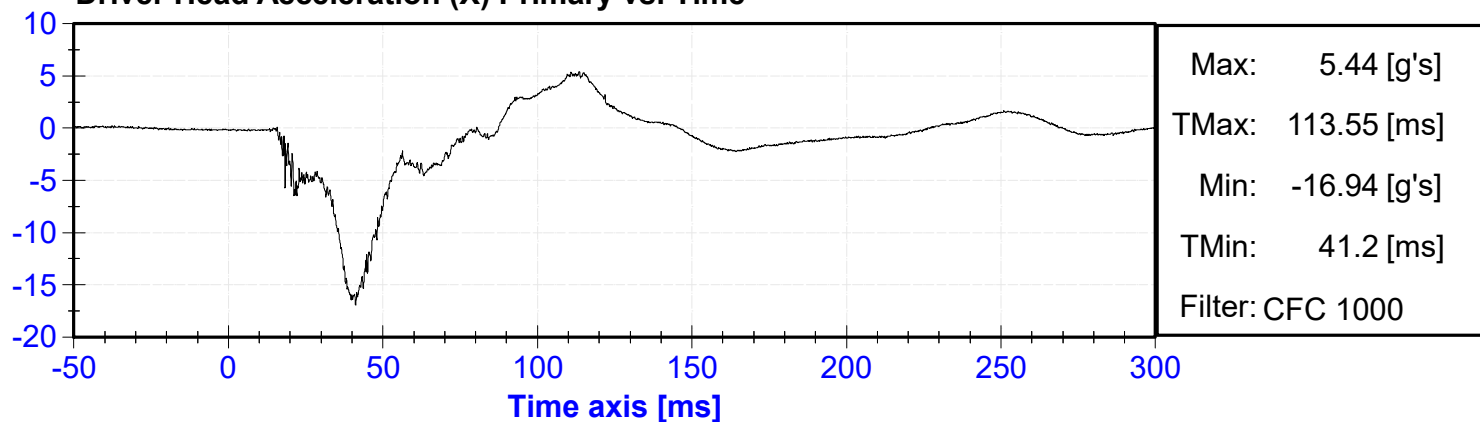
Vehicle Instrumentation Data

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

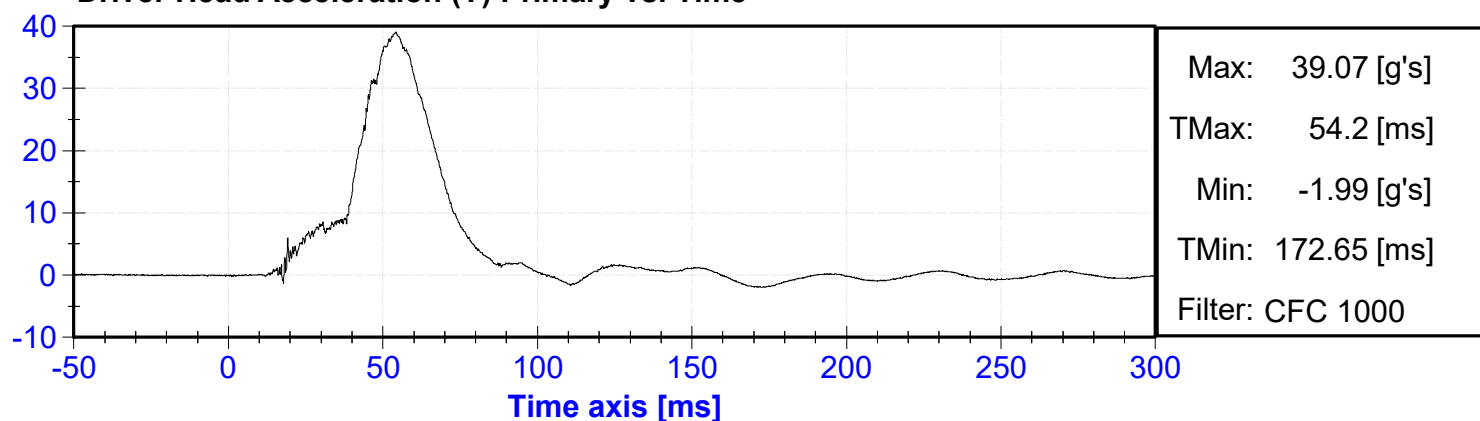
Pole Instrumentation Data

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

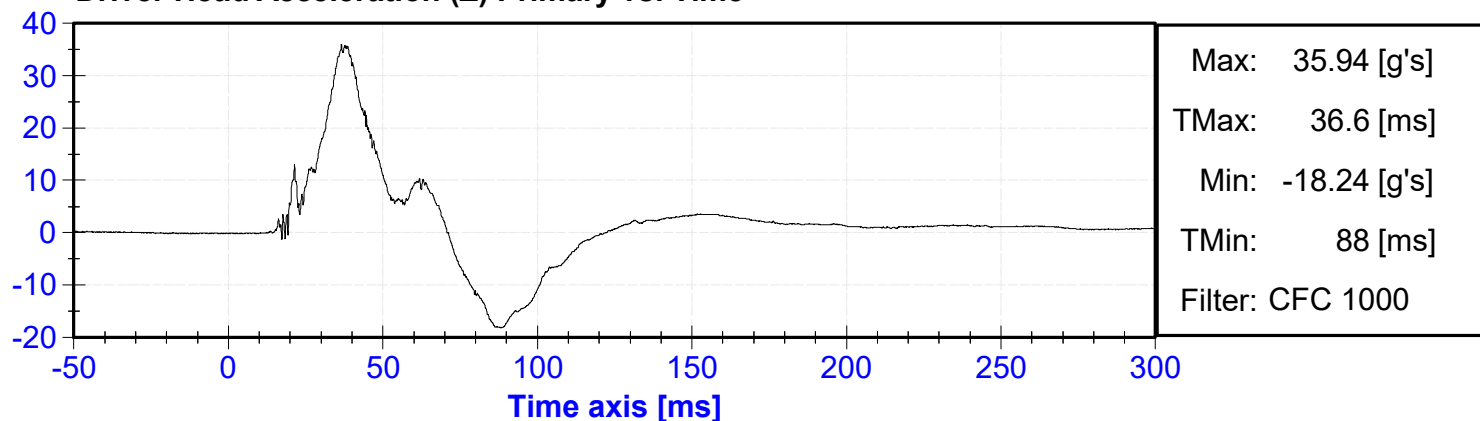
Driver Head Acceleration (X) Primary vs. Time



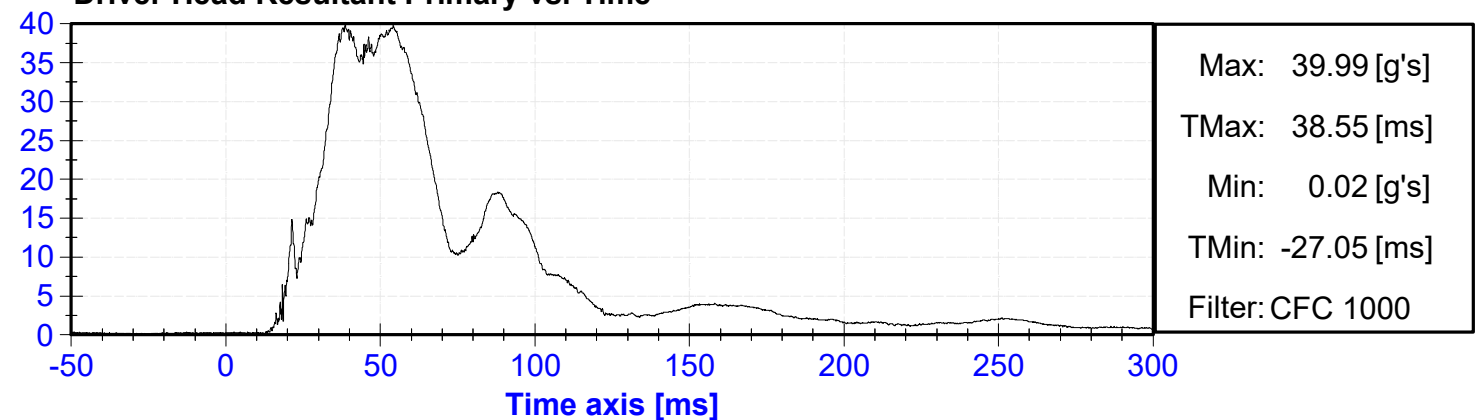
Driver Head Acceleration (Y) Primary vs. Time



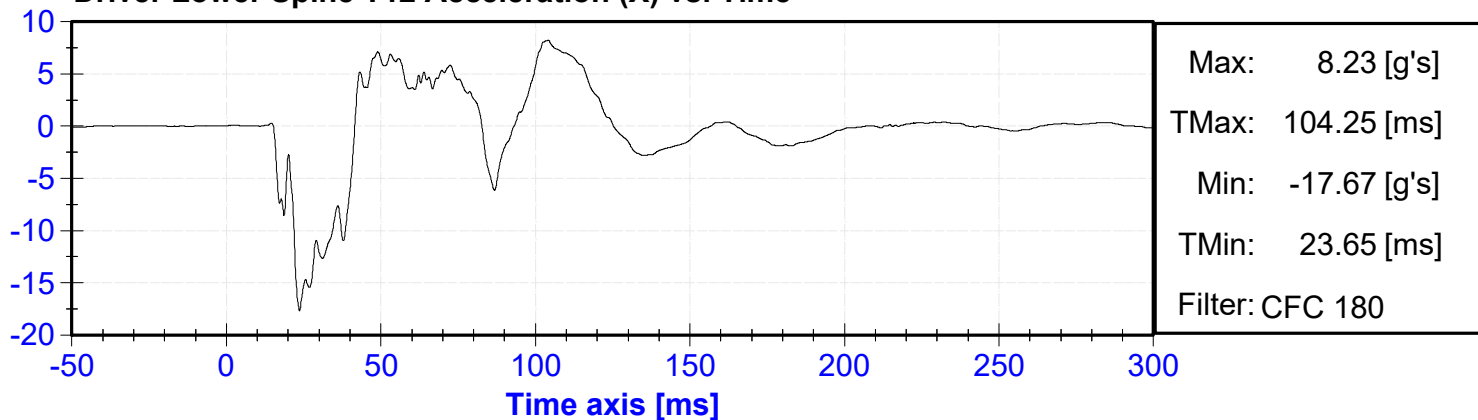
Driver Head Acceleration (Z) Primary vs. Time



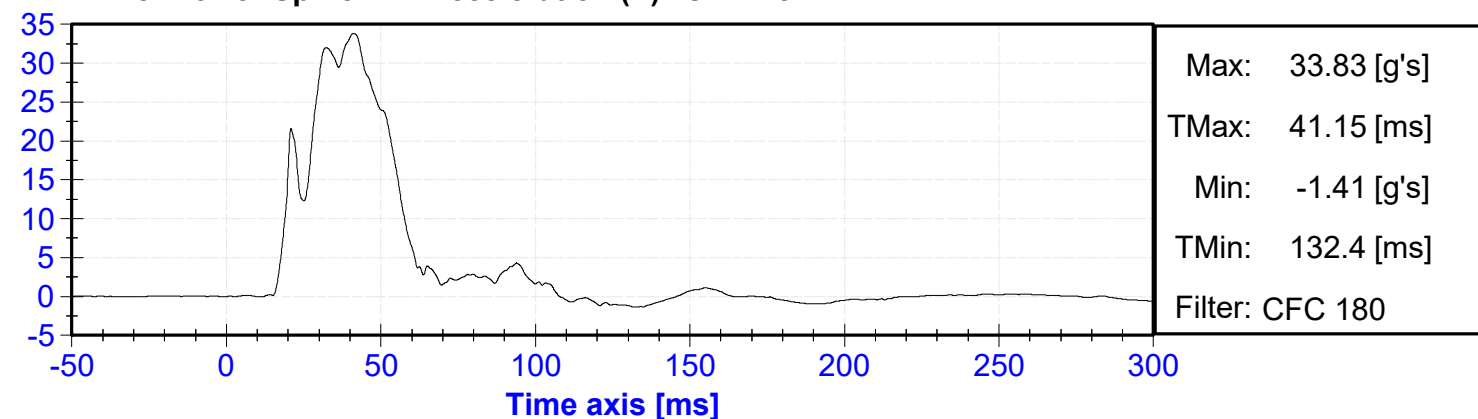
Driver Head Resultant Primary vs. Time



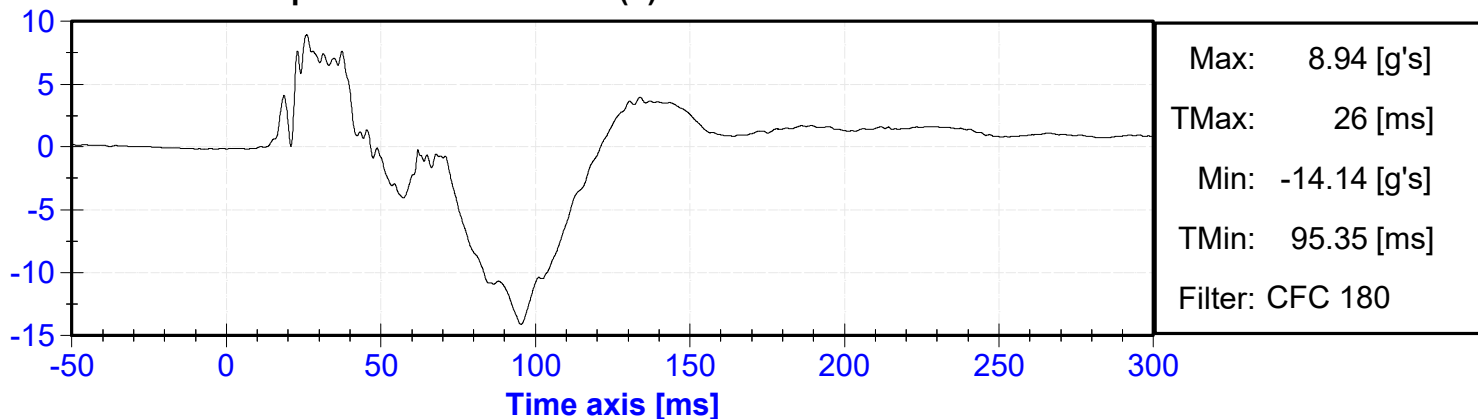
Driver Lower Spine T12 Acceleration (X) vs. Time



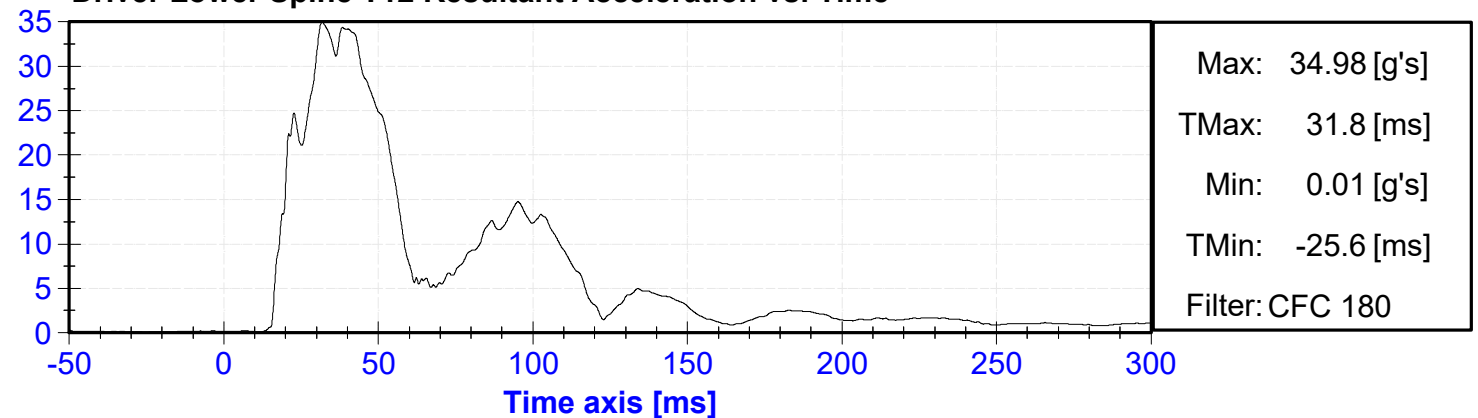
Driver Lower Spine T12 Acceleration (Y) vs. Time



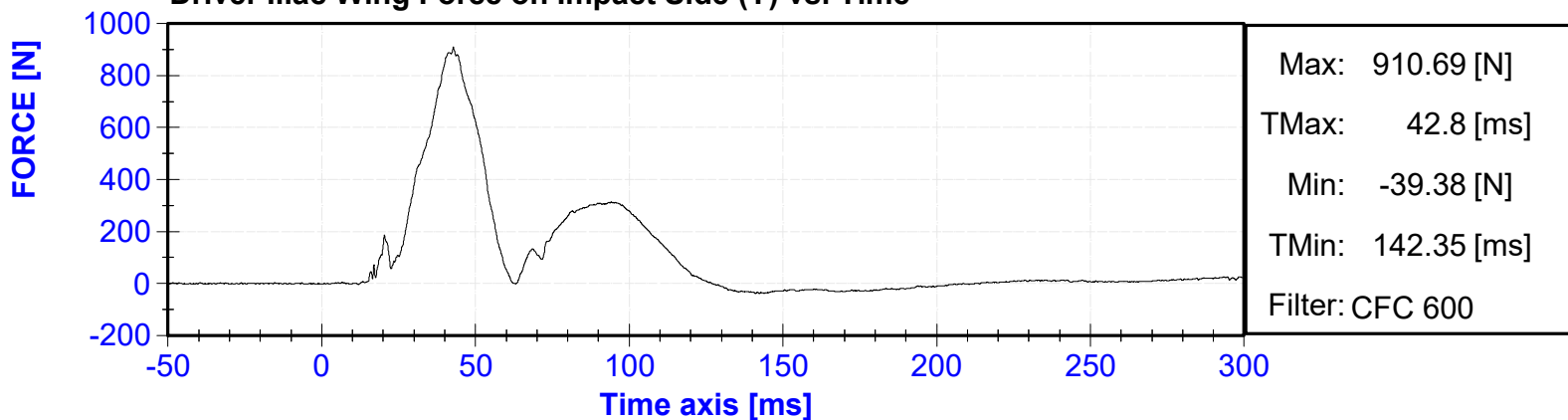
Driver Lower Spine T12 Acceleration (Z) vs. Time



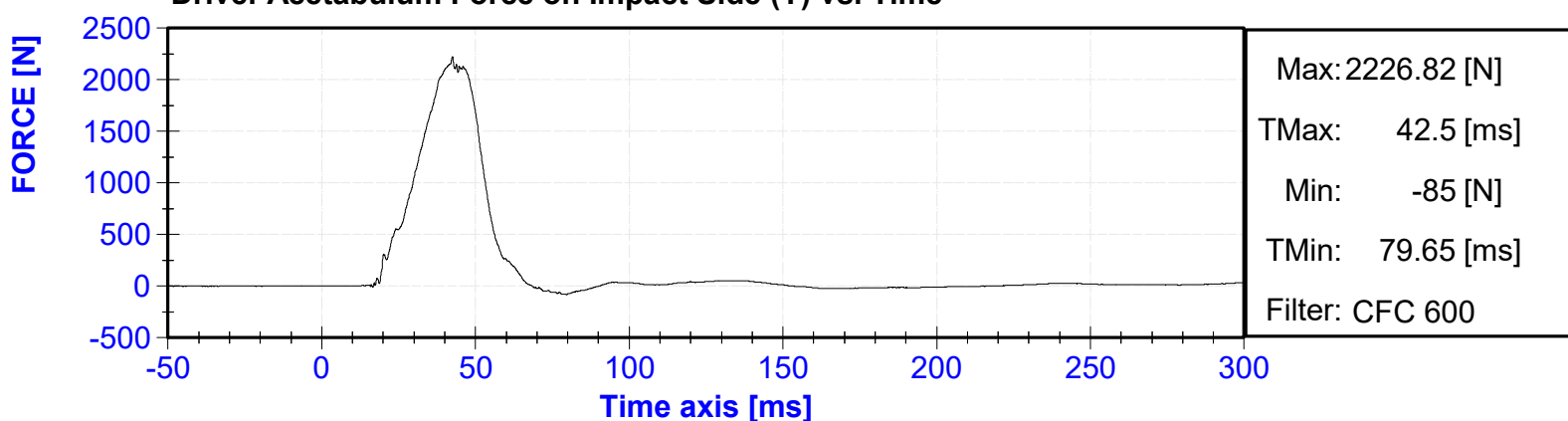
Driver Lower Spine T12 Resultant Acceleration vs. Time



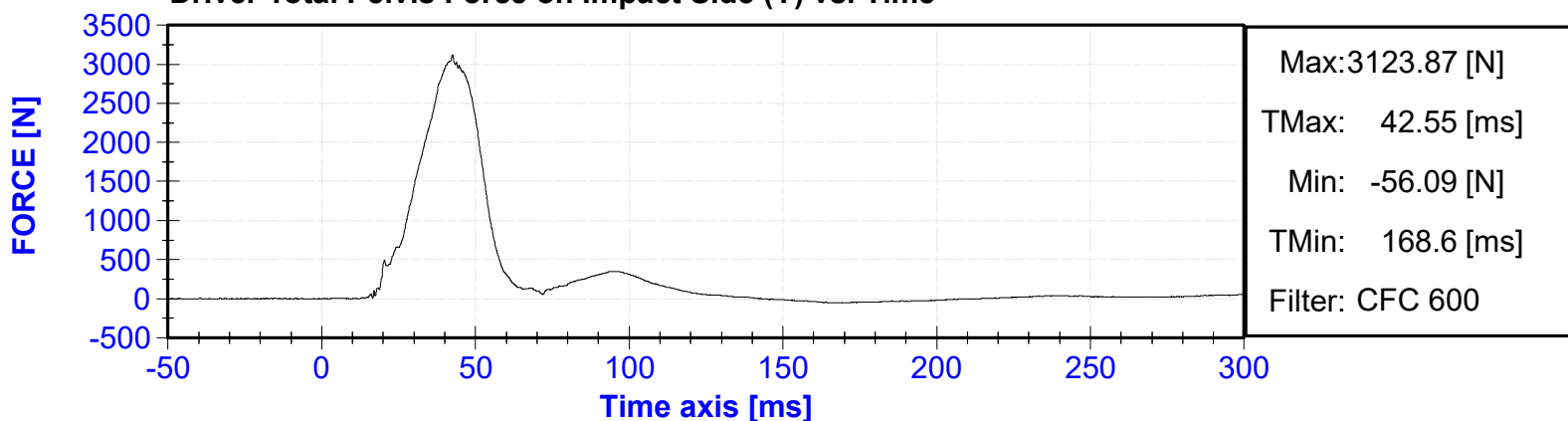
Driver Iliac Wing Force on Impact Side (Y) vs. Time



Driver Acetabulum Force on Impact Side (Y) vs. Time



Driver Total Pelvis Force on Impact Side (Y) vs. Time



APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

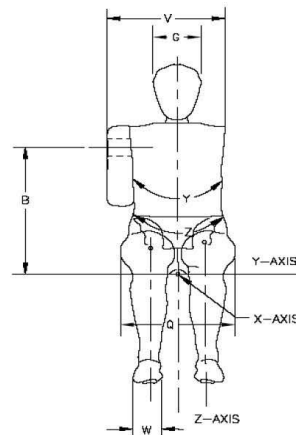
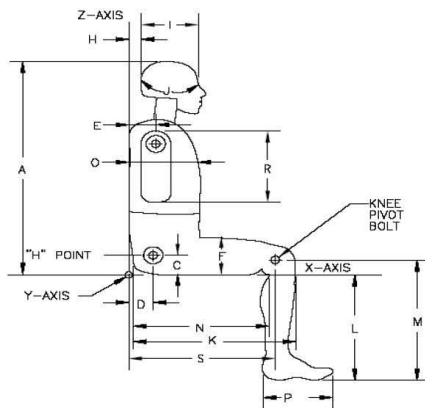


External Measurements - SID-IIs

Technician: **K. Brogan**

Date: **06/28/2022**

Dummy Serial Number: **DG8012**



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	102	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	185	Pass
J	Head Circumference	541	551	545	Pass
K	Buttock to Knee Length	514	540	530	Pass
L	Popliteal Height	343	369	356	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	432	Pass
O	Chest Depth w/o jacket	195	211	207	Pass
P	Foot Length	216	232	225	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	320	Pass
R	Arm Length	249	259	250	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	348	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	780	Pass

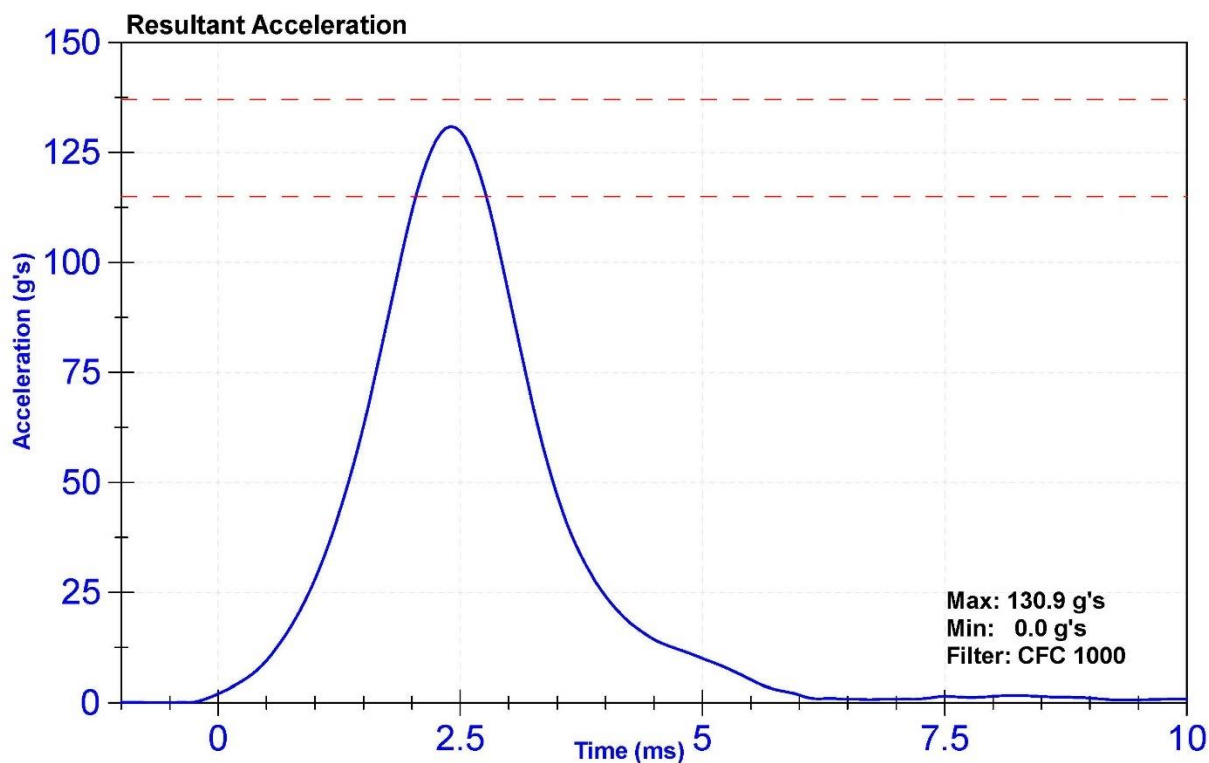
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

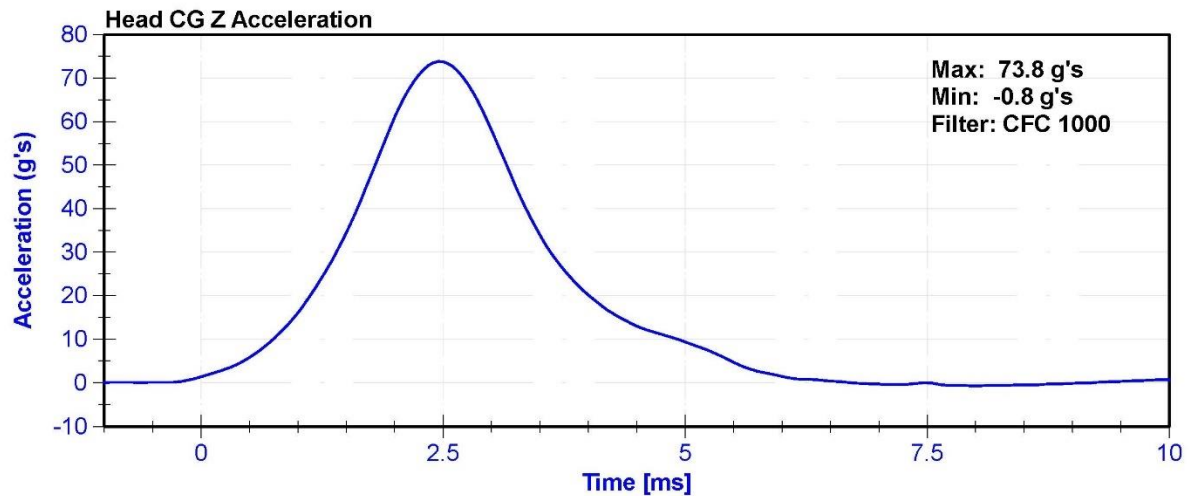
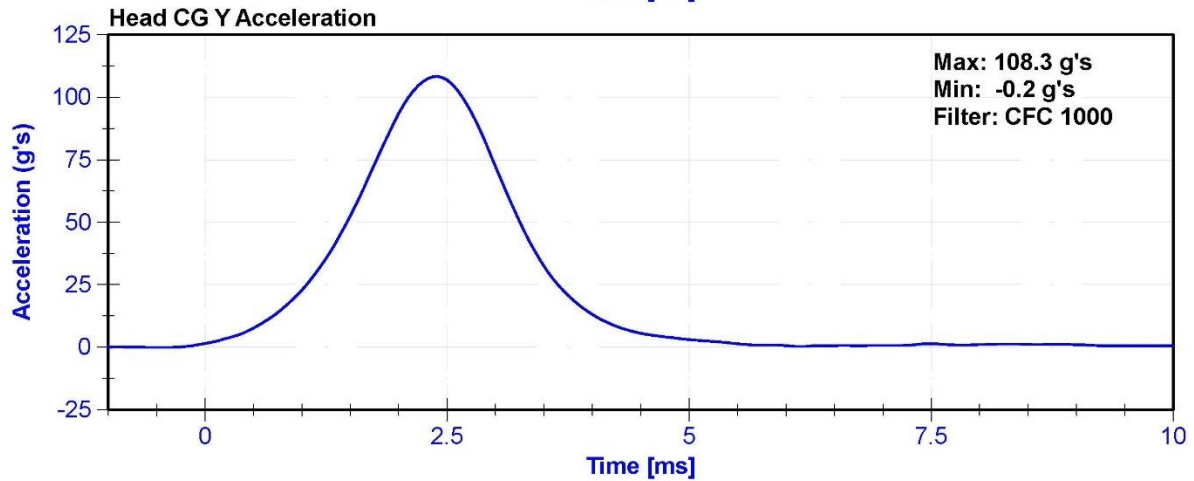
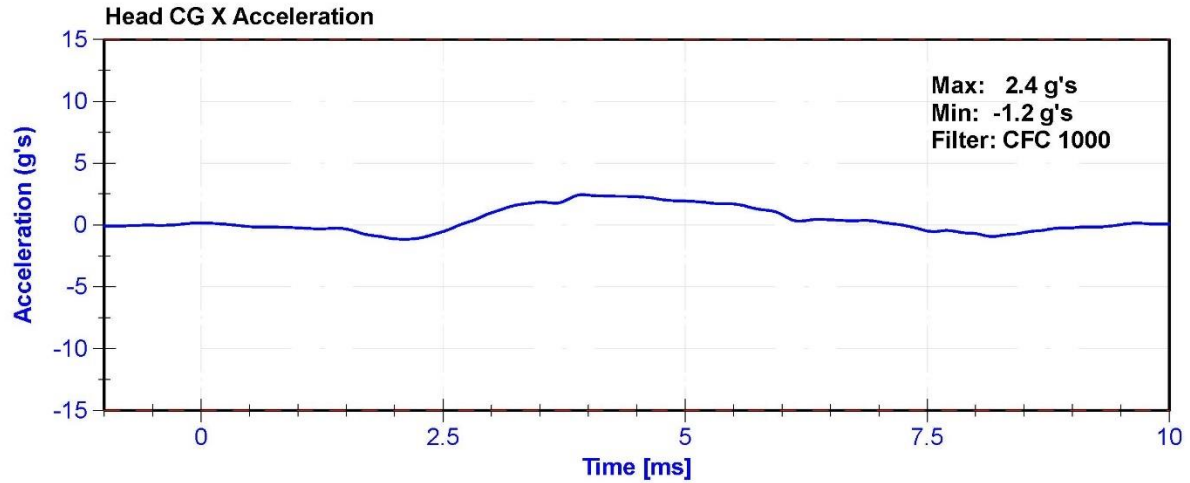
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	52.0	Pass
Resultant Acceleration	115	137	g's	130.9	Pass
Oscillation	0	15	%	1.2	Pass
Fore-Aft Acceleration	-15	15	g's	2.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P74788	6/17/2022	12/14/2022
Y Accelerometer	Endevco	P83432	6/17/2022	12/14/2022
Z Accelerometer	Endevco	P83319	6/17/2022	12/14/2022





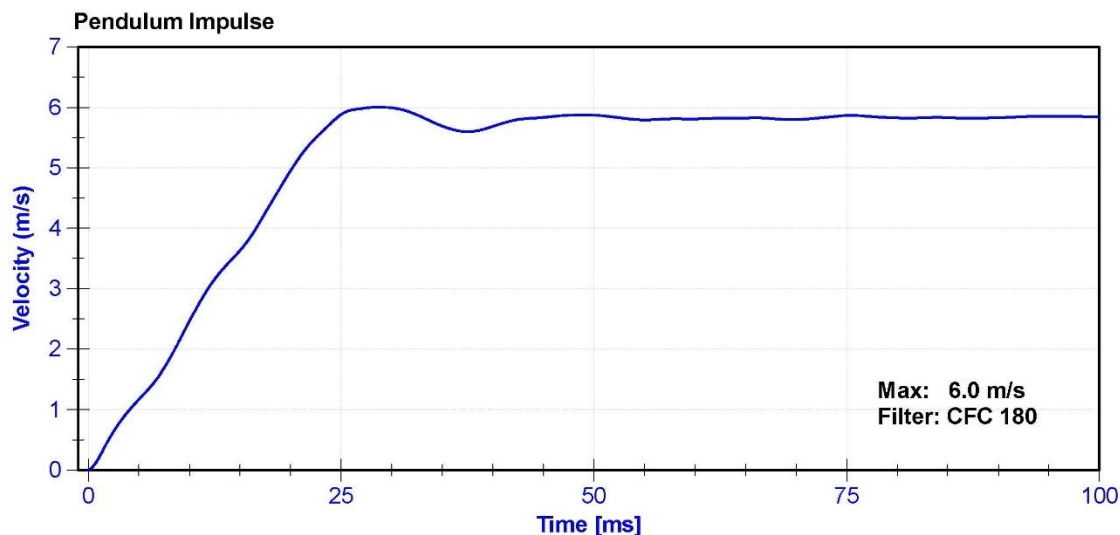
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

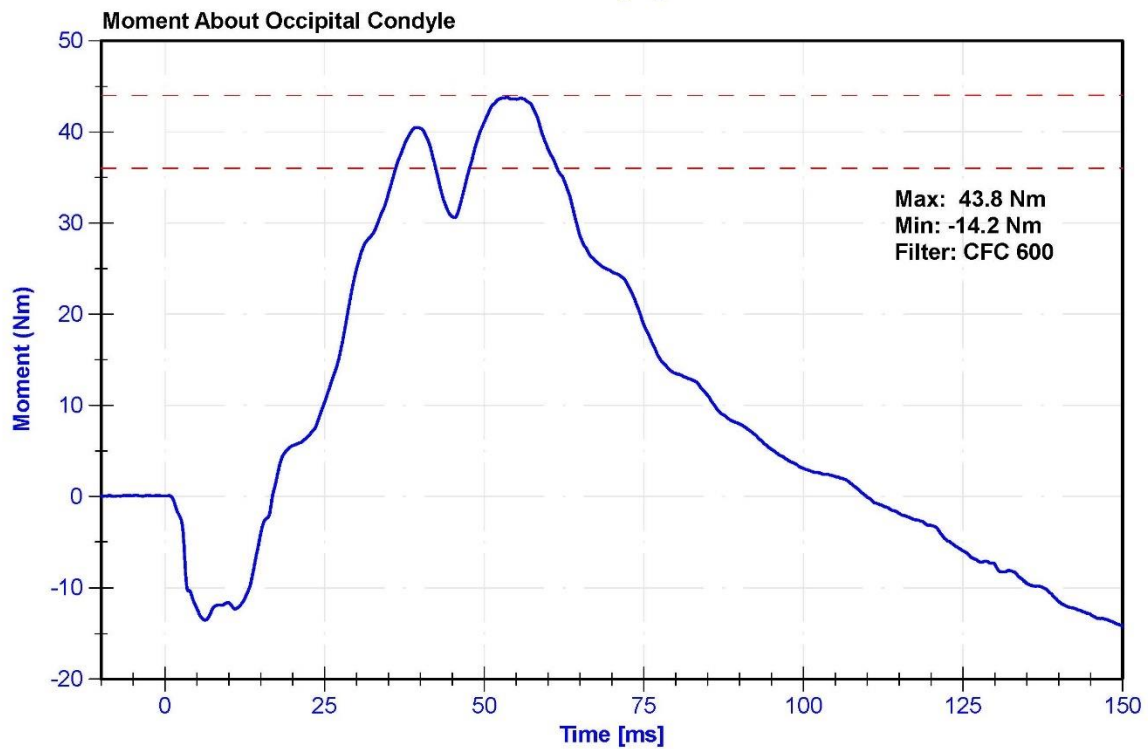
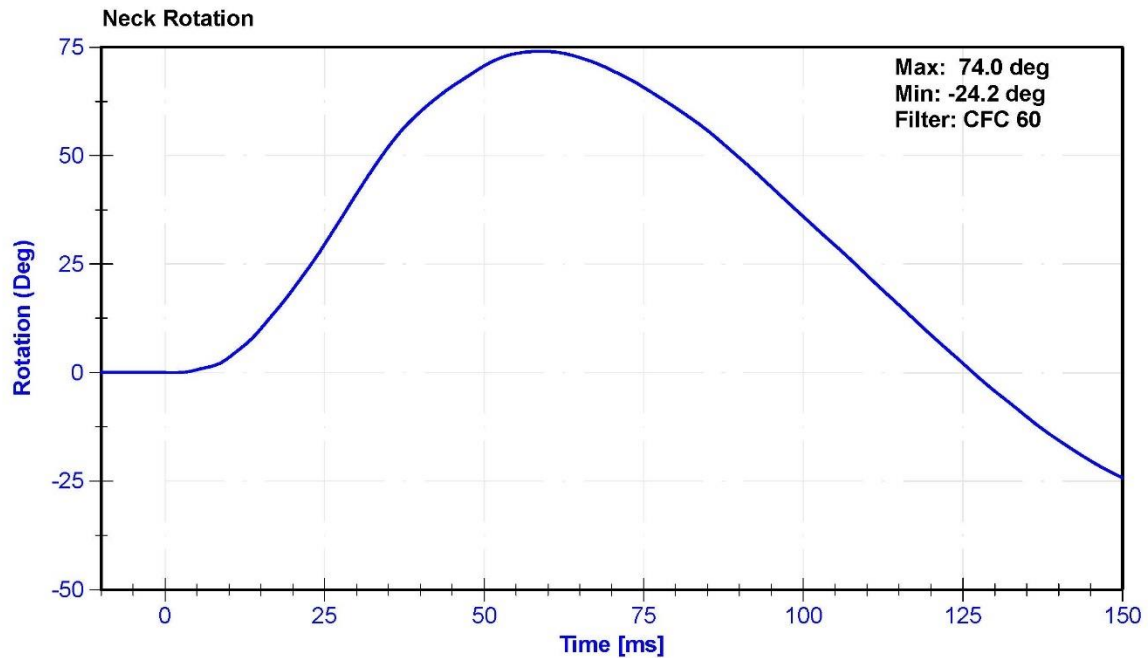
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.8	Pass
Humidity	10	70	%	52.0	Pass
Velocity	5.51	5.63	m/s	5.618	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.46	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.63	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.95	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.88	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	6.00	Pass
Neck Rotation	71	81	deg	74.0	Pass
Time at Maximum Rotation	50	70	ms	58.9	Pass
Moment about the OC	36	44	Nm	43.8	Pass
Moment Decay to 0 Nm	102	126	ms	109.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	1/31/2022	7/30/2022
Pendulum Potentiometer	Servo	4961	2/23/2022	2/23/2023
Condyle Potentiometer	Servo	DS185	11/12/2021	11/12/2022
Upper Neck Load Cell	Denton	1716A-1037-FY	6/29/2021	6/29/2022





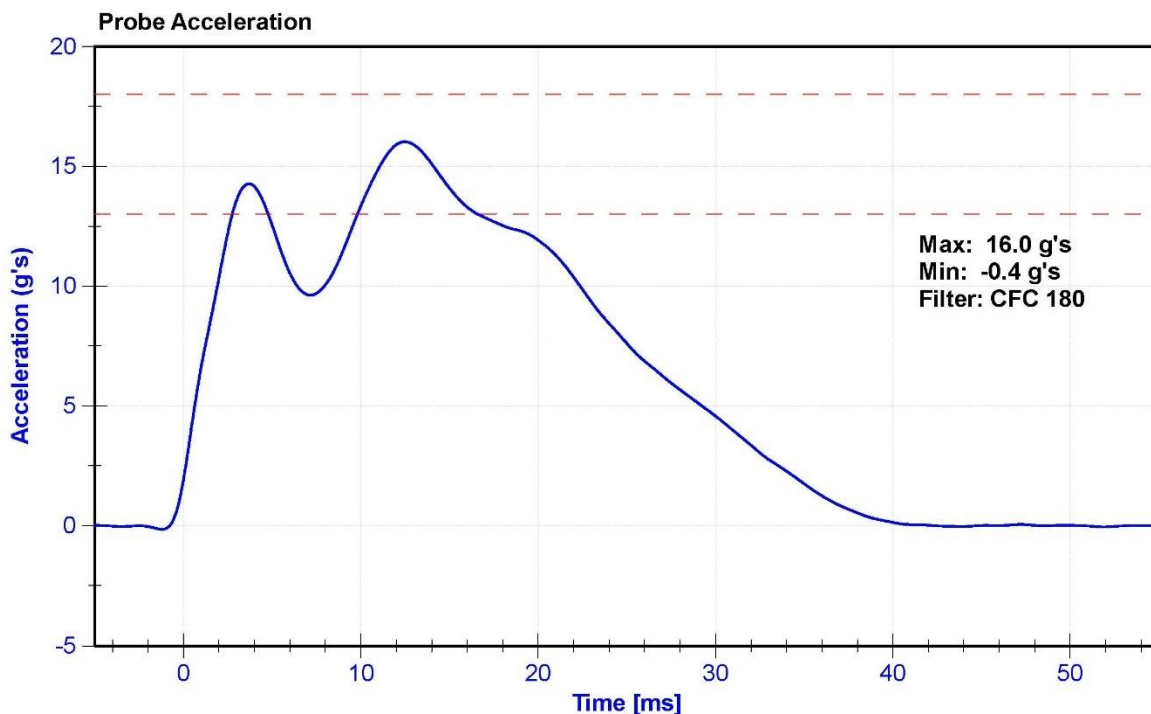
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

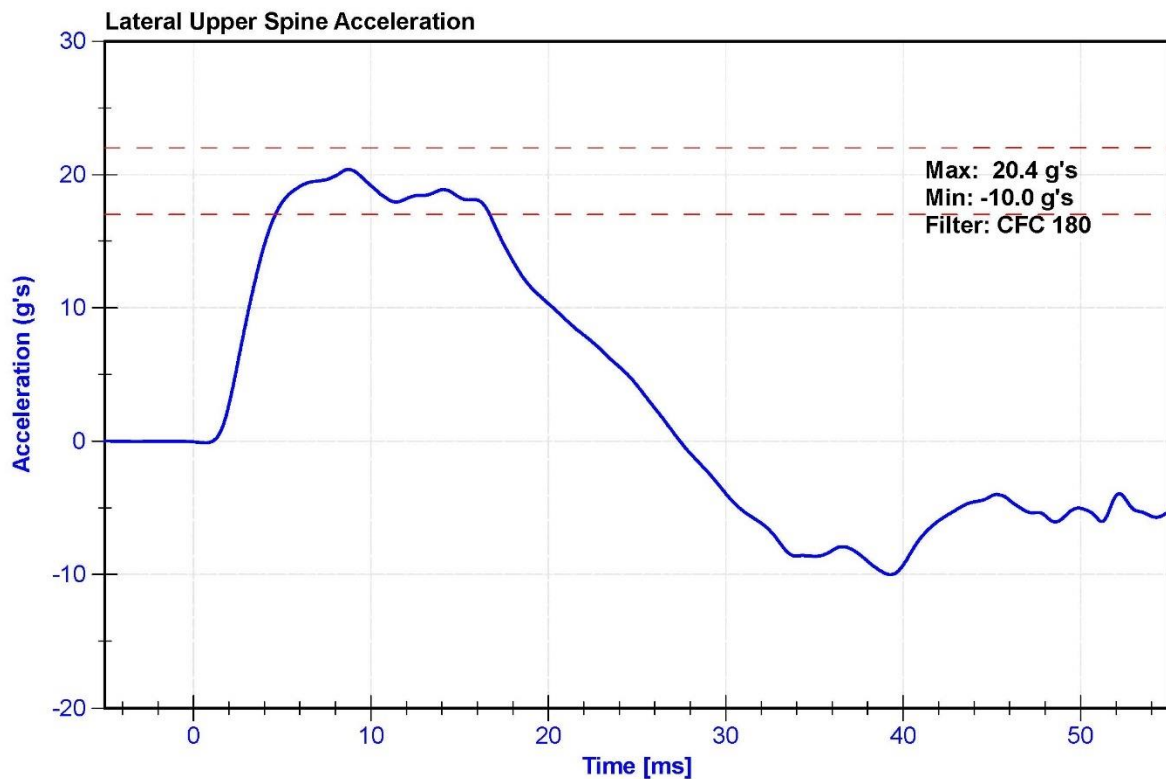
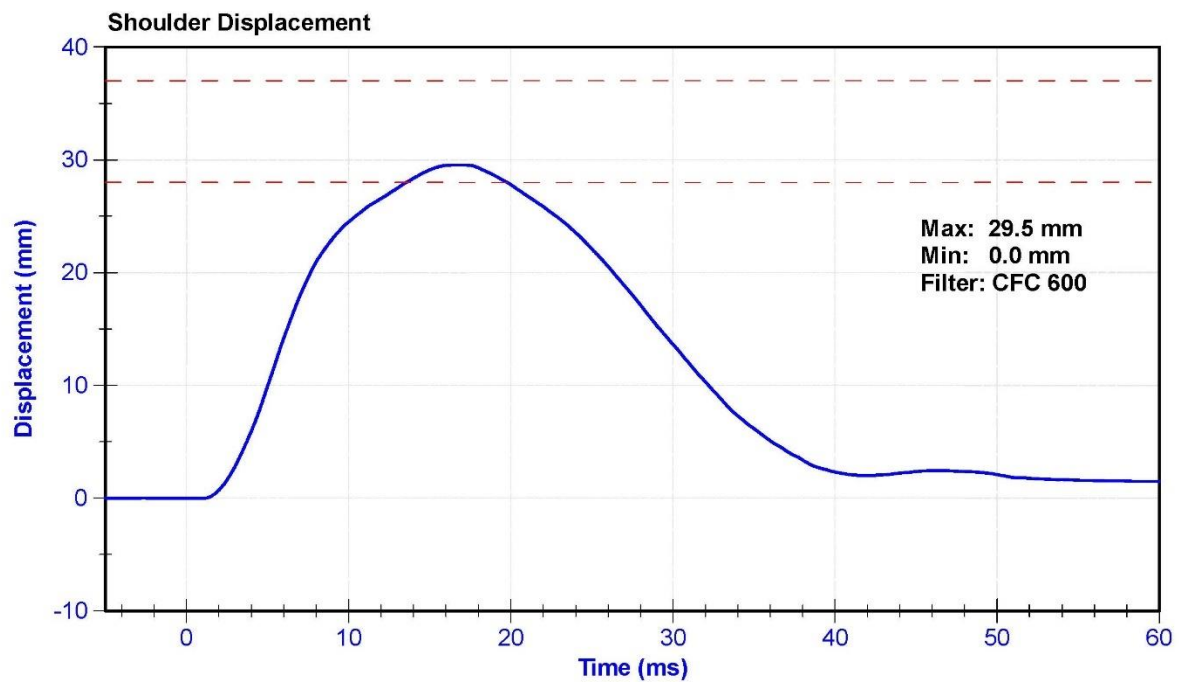
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	52.8	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	13	18	g's	16.0	Pass
Shoulder Deflection	28	37	mm	29.5	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Shoulder Potentiometer	Servo	1274GFE	6/20/2022	12/19/2022
Upper Spine Y Accelerometer	Endevco	P64148	6/17/2022	12/14/2022





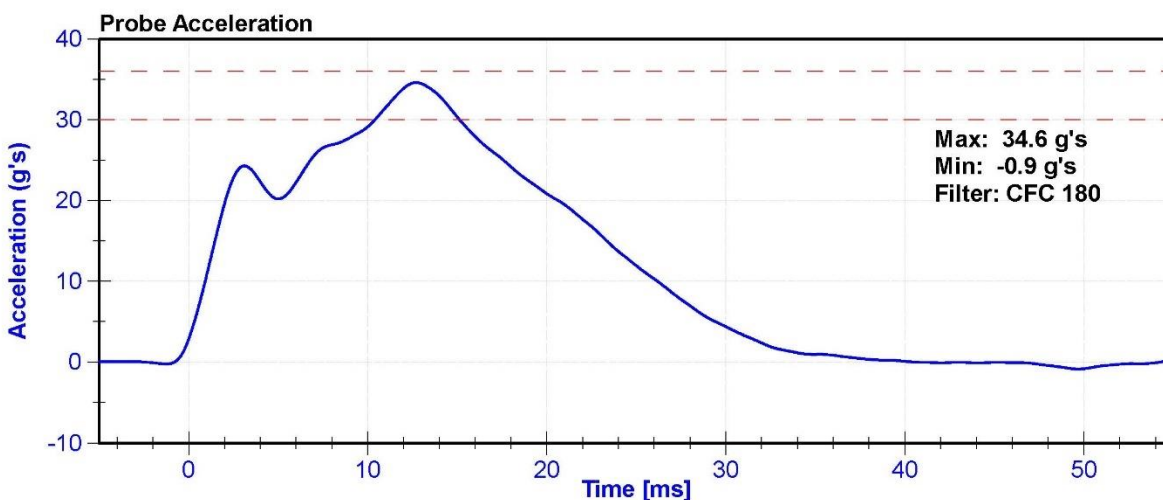
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

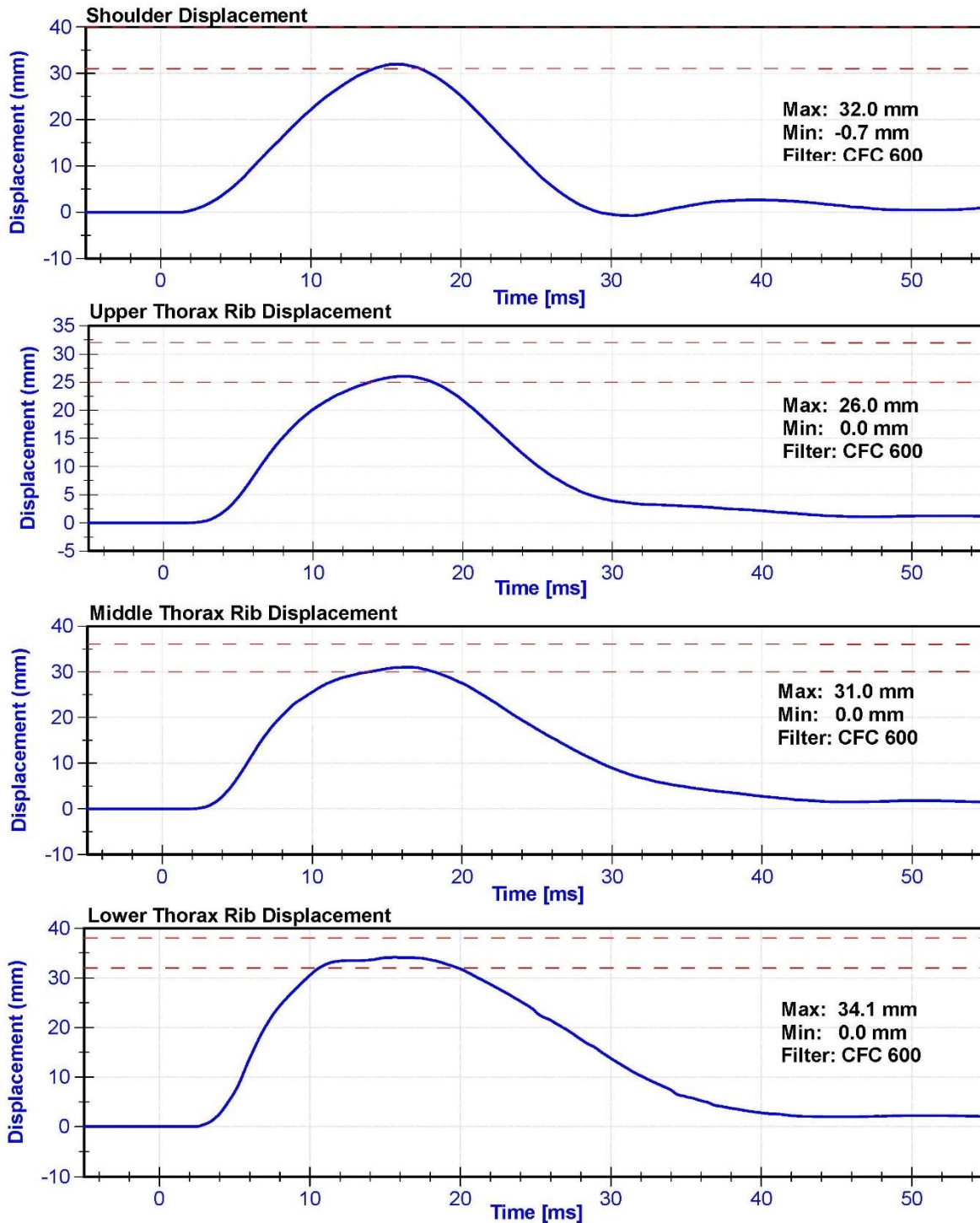
Results

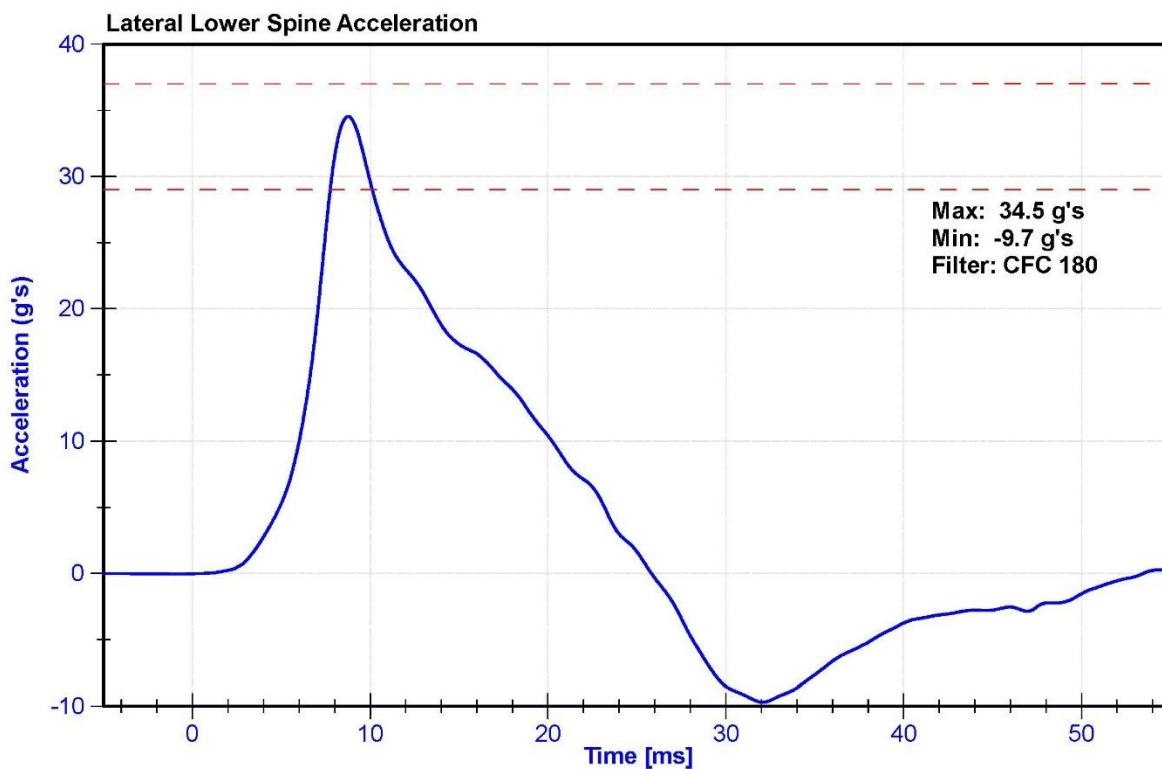
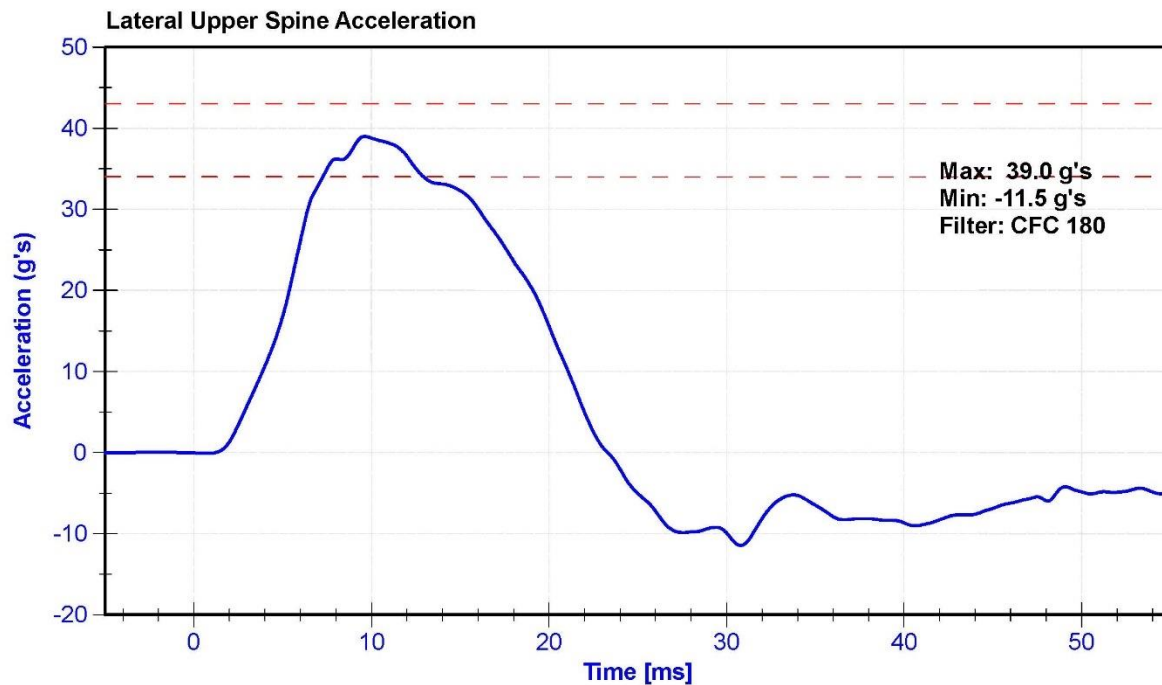
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	52.8	Pass
Velocity	6.6	6.8	m/s	6.68	Pass
Probe Acceleration after 5 ms	30	36	g's	34.6	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.0	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.5	Pass
Shoulder Deflection	31	40	mm	32.0	Pass
Upper Thorax Rib Deflection	25	32	mm	26.0	Pass
Mid Thorax Rib Deflection	30	36	mm	31.0	Pass
Lower Thorax Rib Deflection	32	38	mm	34.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Upper Spine T1 Y Accelerometer	Endevco	P64148	6/17/2022	12/14/2022
Upper Spine T12 Y Accelerometer	Endevco	P51327	6/17/2022	12/14/2022
Shoulder Potentiometer	Servo	1274GFE	6/20/2022	12/19/2022
Upper Thorax Rib Potentiometer	Servo	1199GFE	6/17/2022	12/16/2022
Middle Thorax Rib Potentiometer	Servo	1246GFE	6/17/2022	12/16/2022
Lower Thorax Rib Potentiometer	Servo	011GFE	6/17/2022	12/16/2022







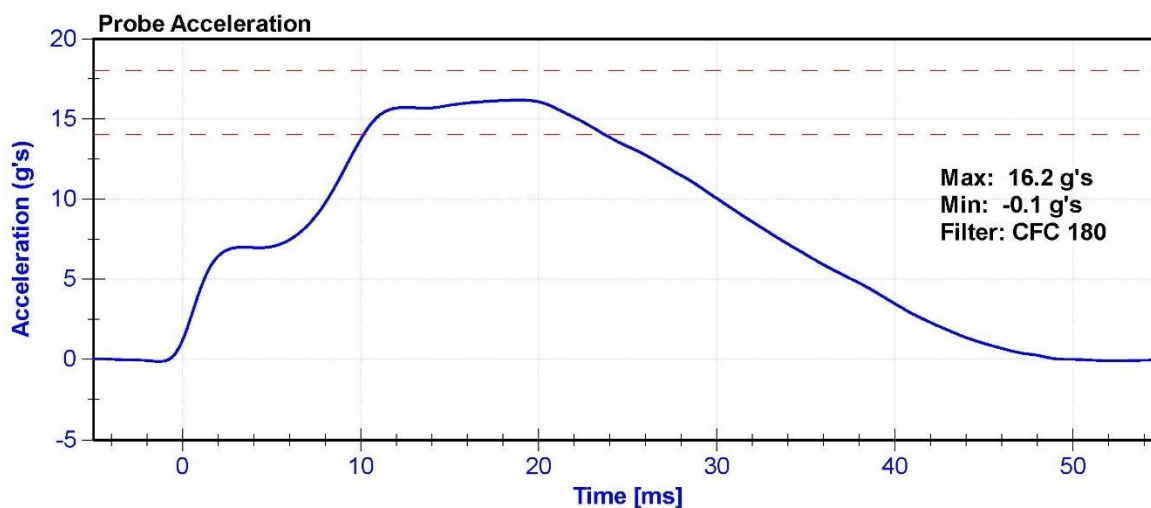
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

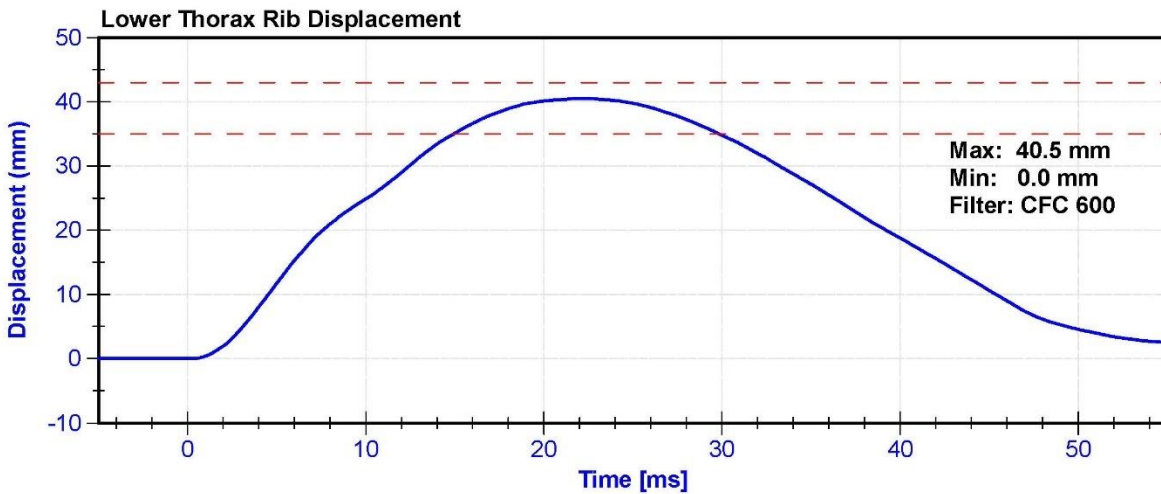
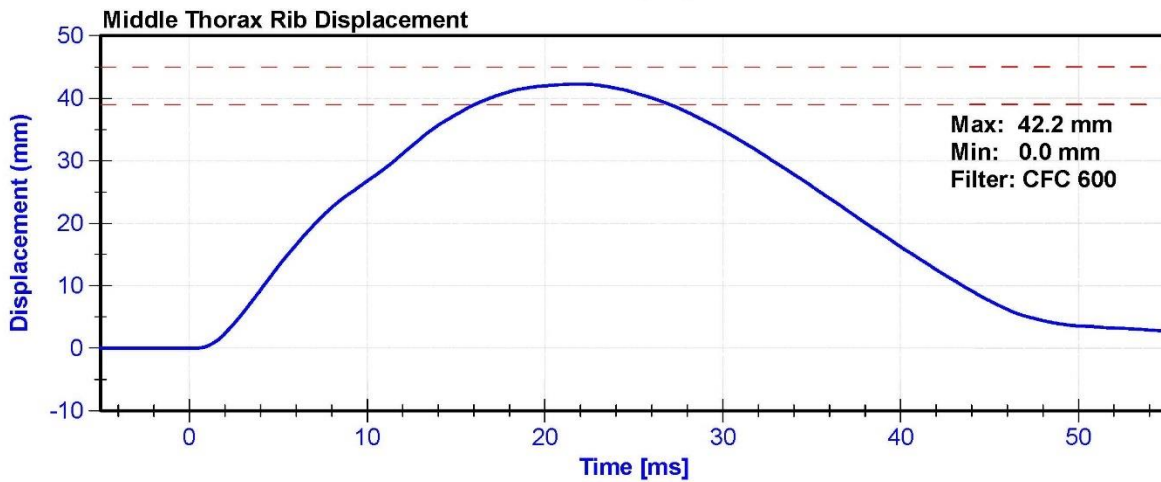
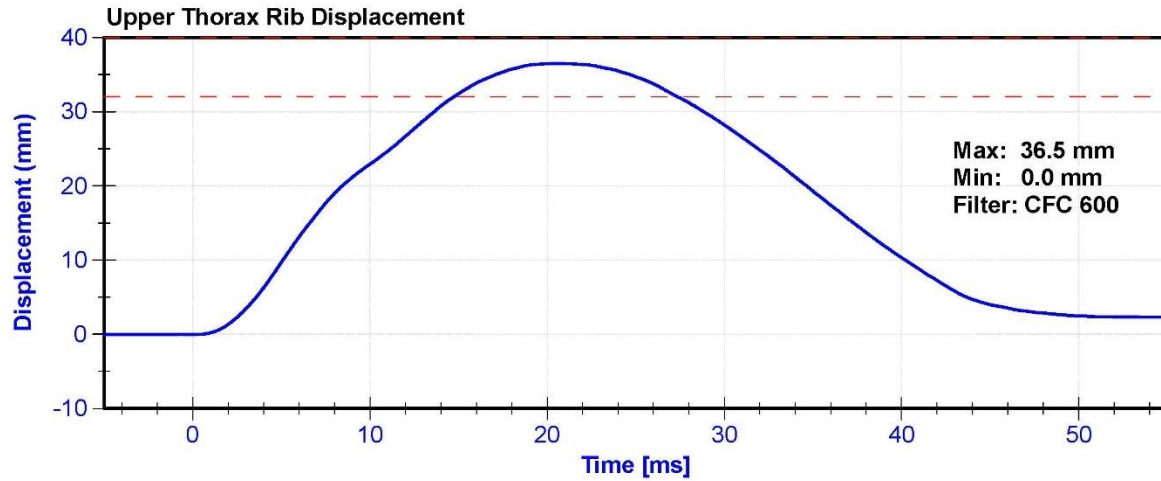
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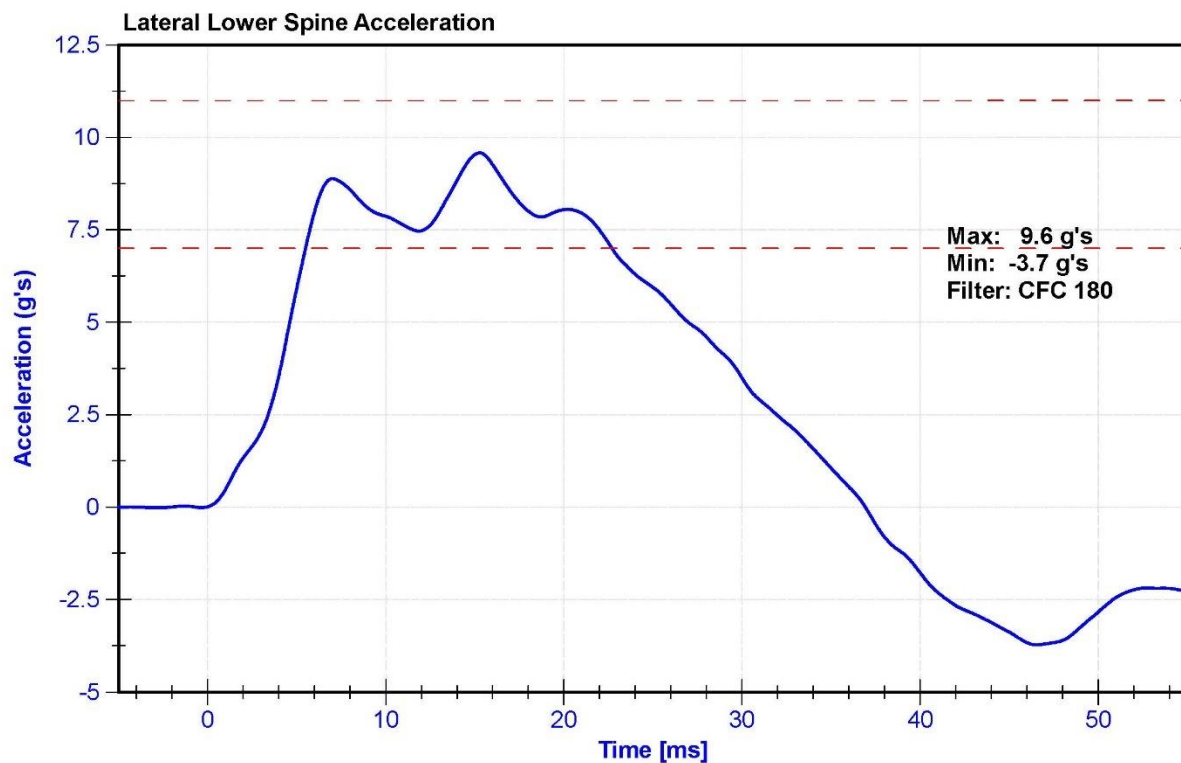
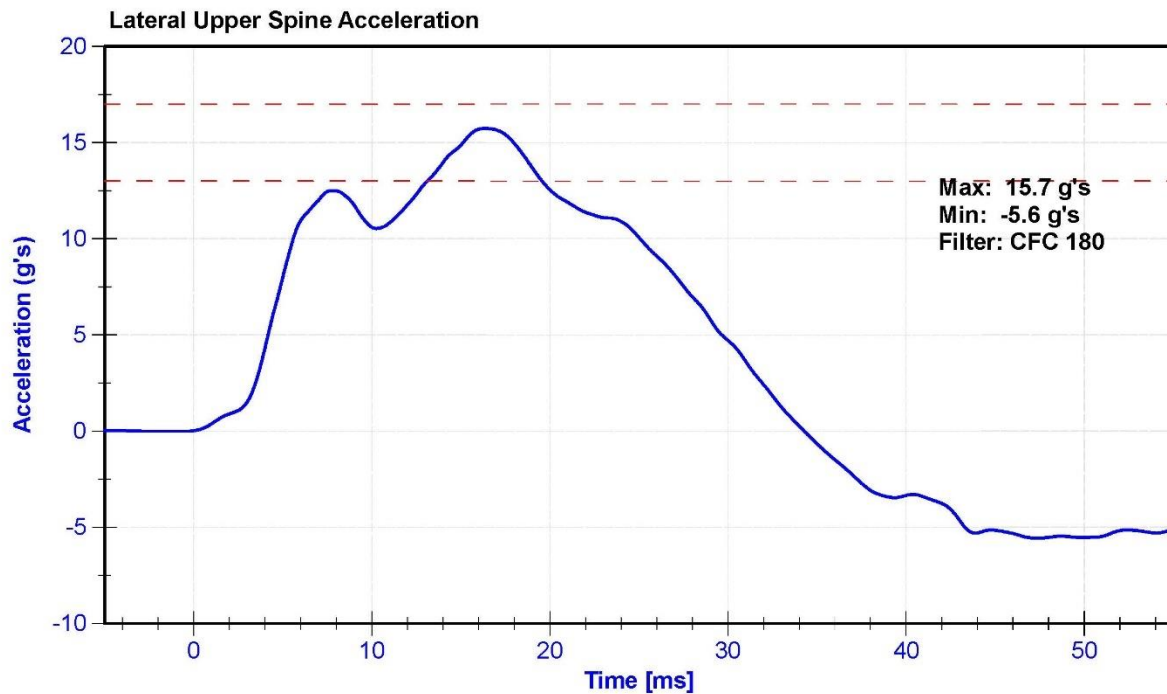
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	52.8	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	14	18	g's	16.2	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.7	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.6	Pass
Upper Thorax Rib Deflection	32	40	mm	36.5	Pass
Middle Thorax Rib Deflection	39	45	mm	42.2	Pass
Lower Thorax Rib Deflection	35	43	mm	40.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Upper Spine Y Accelerometer	Endevco	P64148	6/17/2022	12/14/2022
Lower Spine Y Accelerometer	Endevco	P51327	6/17/2022	12/14/2022
Upper Thorax Rib Potentiometer	Servo	1199GFE	6/17/2022	12/16/2022
Middle Thorax Rib Potentiometer	Servo	1246GFE	6/17/2022	12/16/2022
Lower Thorax Rib Potentiometer	Servo	011GFE	6/17/2022	12/16/2022







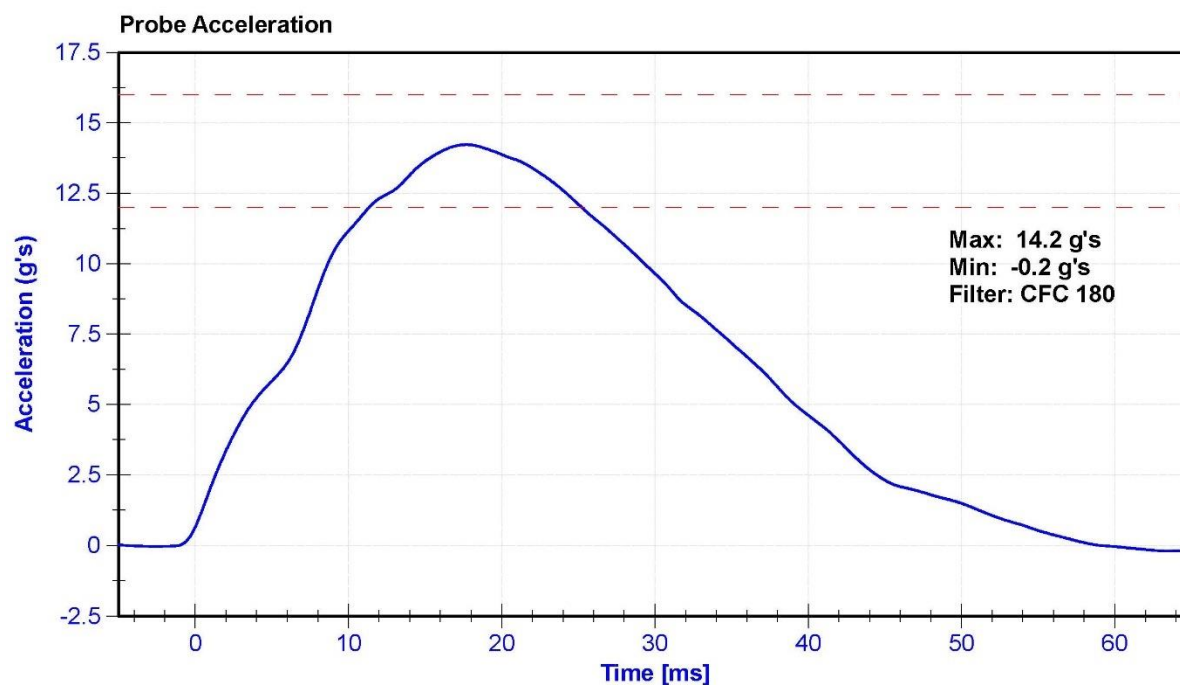
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

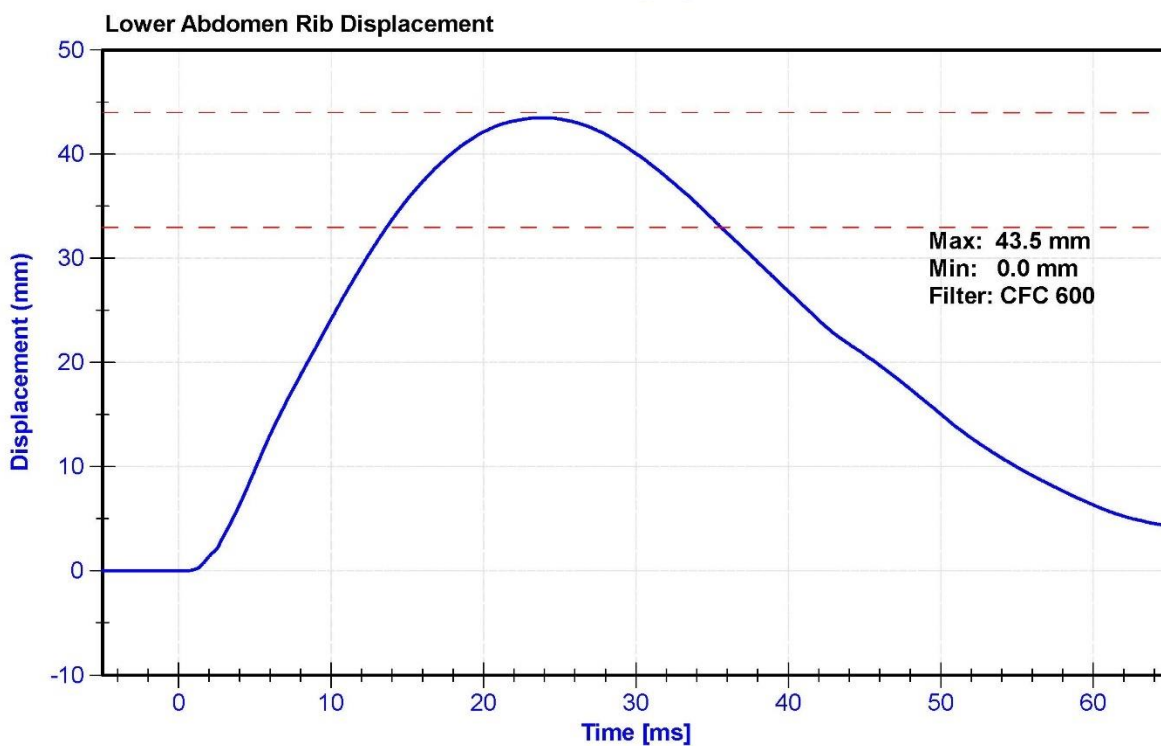
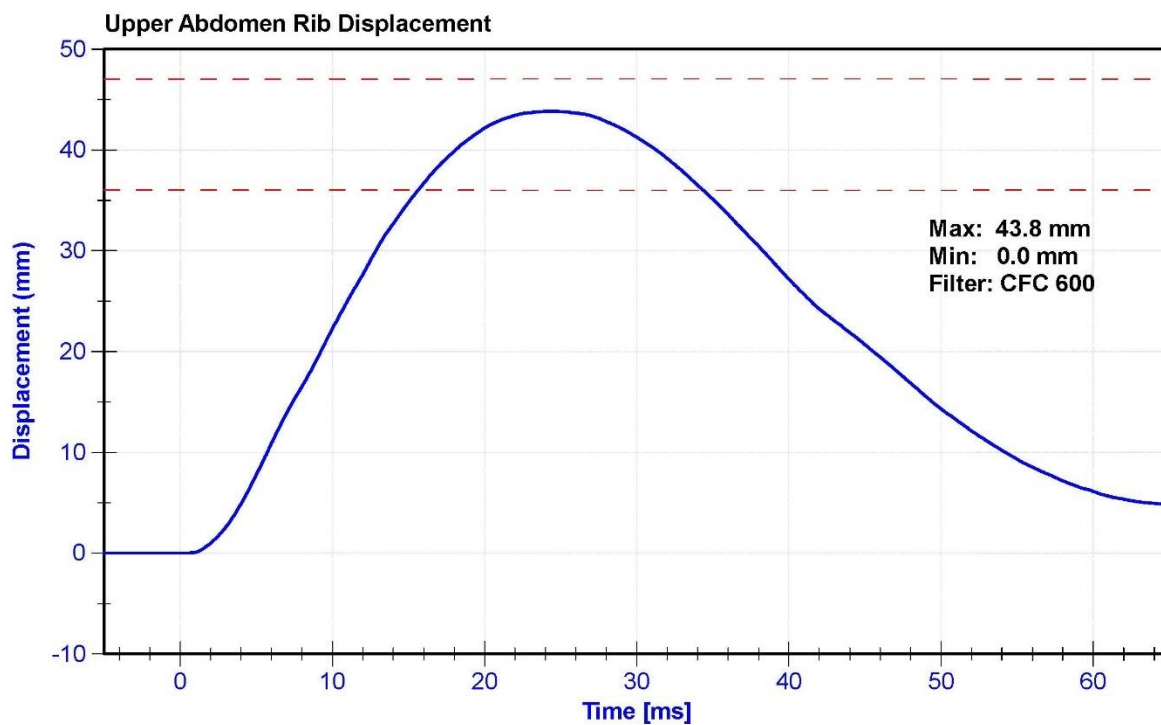
Results

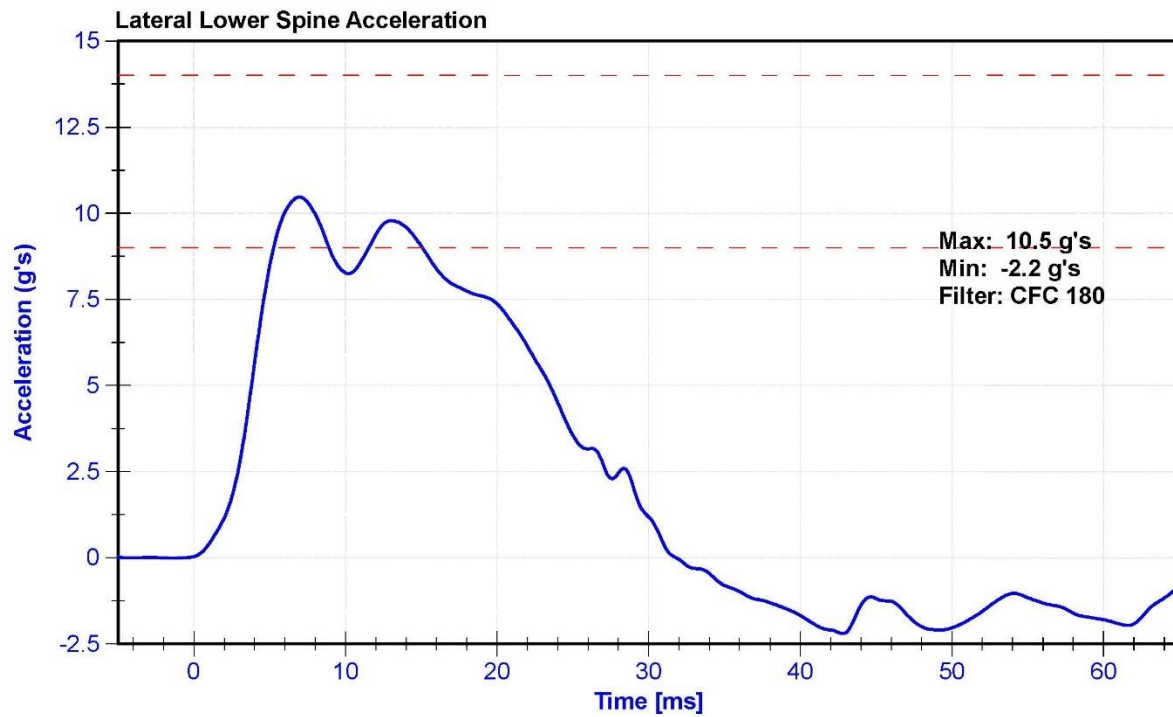
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	52.8	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	14.2	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.5	Pass
Upper Abdomen Rib Deflection	36	47	mm	43.8	Pass
Lower Abdomen Rib Deflection	33	44	mm	43.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Lower Spine Y Accelerometer	Endevco	P51327	6/17/2022	12/14/2022
Upper Abdomen Rib Potentiometer	Servo	008GFE	6/17/2022	12/16/2022
Lower Abdomen Rib Potentiometer	Servo	041 GFE	6/17/2022	12/16/2022







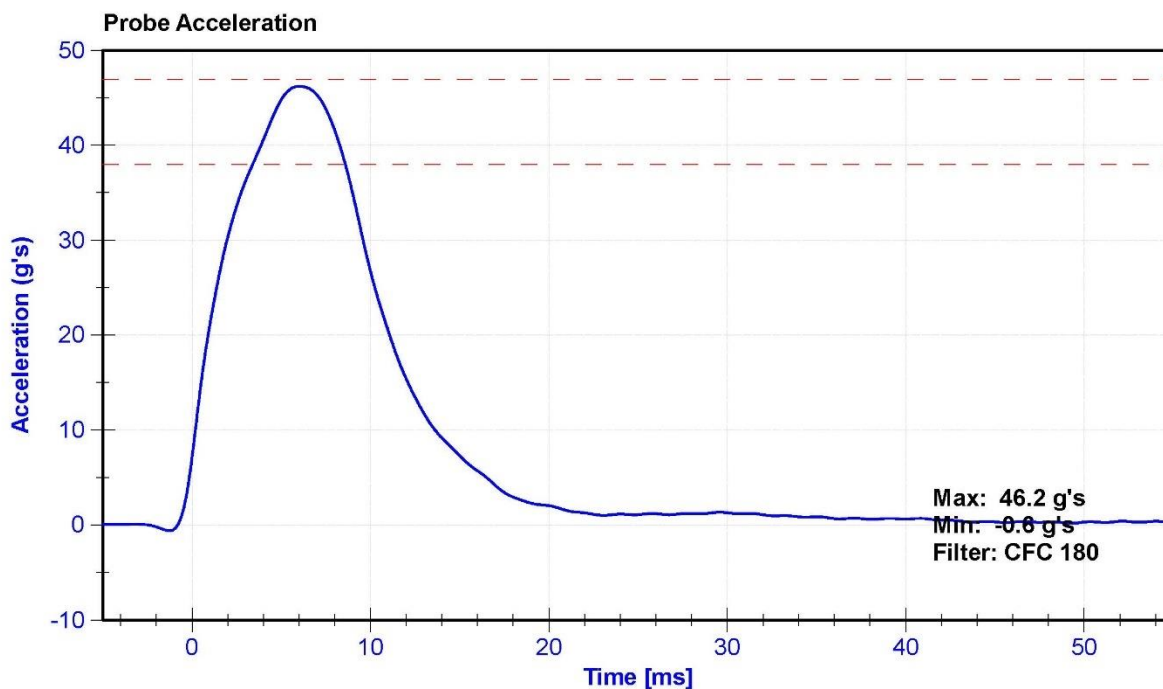
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

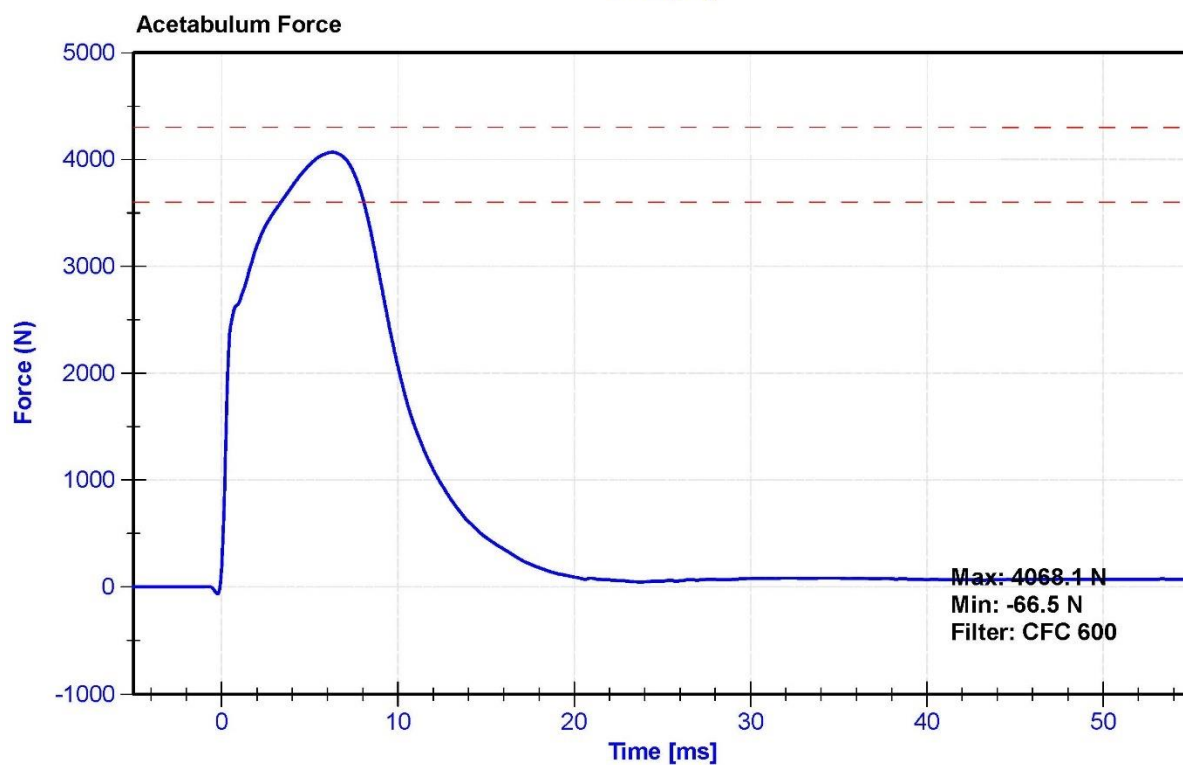
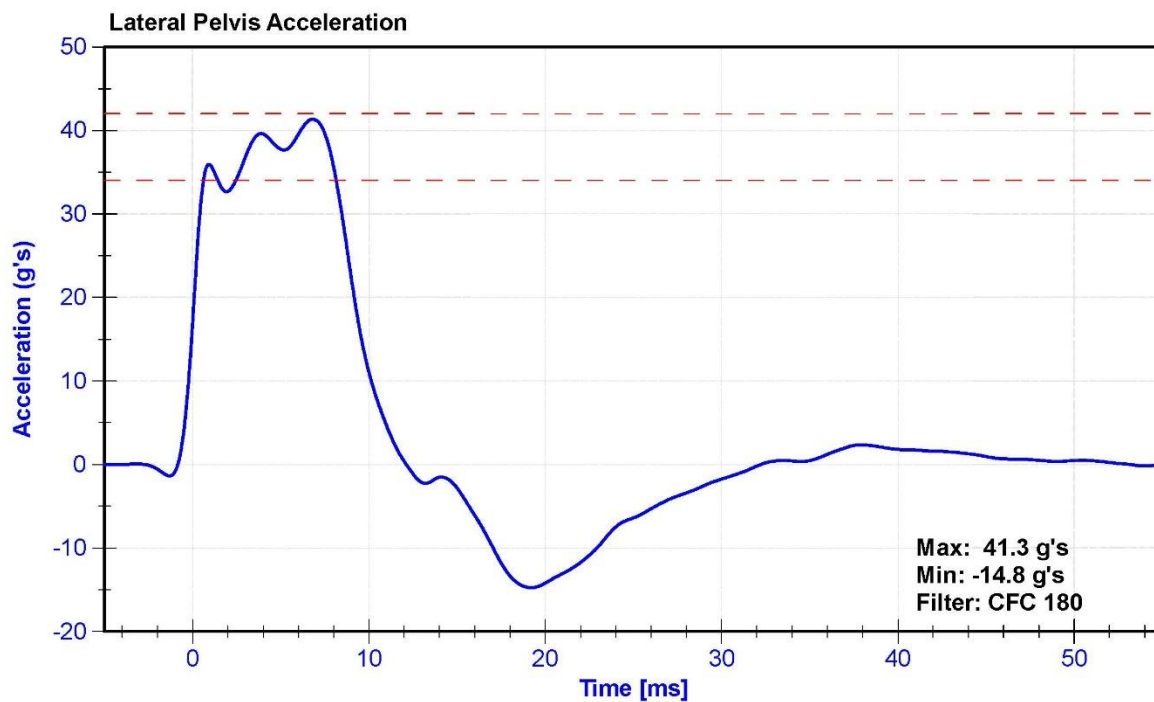
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	42.5	Pass
Velocity	6.6	6.8	m/s	6.61	Pass
Probe Acceleration	38	47	g's	46.2	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	41.3	Pass
Acetabulum Force	3600	4300	N	4068.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Pelvis Y Accelerometer	Endevco	P51875	6/17/2022	12/14/2022
Acetabulum Load Cell	Denton	276-FY	9/14/2021	9/14/2022
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A







Test 1

Pass - 6/28/22

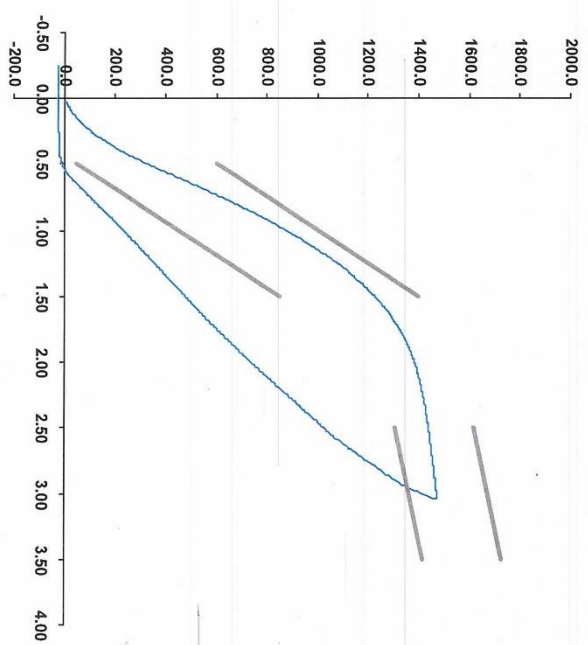
SID-ILs Pelvis Plug Certification Test

Force (-N) vs Extension (-mm)

Plug S/N 13985
Test Number 13459
Report Number 13504
Test Date 5/22/2020 10:38:09 AM

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	336	600
Force @ 1.5 mm (N)	1,228	1,400
Force @ 2.5 mm (N)	1,440	1,618
Force @ 3.0 mm (N)	1,473	1,673

Testing Machine STM-20 5965542
Load Cell S/N (F1360947), Units (LBS) 1000
Crosshead Speed (mm / min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)
Notes:



Operator _____

Part Number 180-4450

Template No 107 08-Jul-21

SACO Research

By: _____ Date: _____

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX _____



Crash - Impact

SID-11s Pelvis Plug Certification Test

Plug S/N 13105

Test Number 10425

Report Number 10460

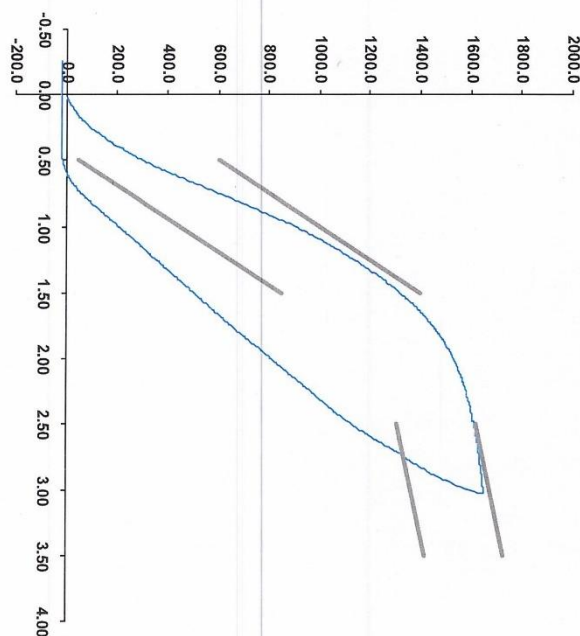
Test Date 7/30/2019 4:59:55 PM

Force (-N) vs Extension (-mm)

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	50	800
Force @ 1.5 mm (N)	850	1,400
Force @ 2.5 mm (N)	1,306	1,618
Force @ 3.0 mm (N)	1,361	1,673

Testing Machine STM-20 5965542
Load Cell S/N (F1360947), Units (LBS) 1000
Crosshead Speed (mm / min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:



Operator

Part Number 180-4450

Template No 107 08-Jul-21

SACO Research

By: _____ Date: _____

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



Cash - Non Impact

SID-IIs Pelvis Plug Certification Test

Plug S/N 14064

Test Number 13538

Report Number 13583

Test Date 5/25/2020 11:20:38 AM

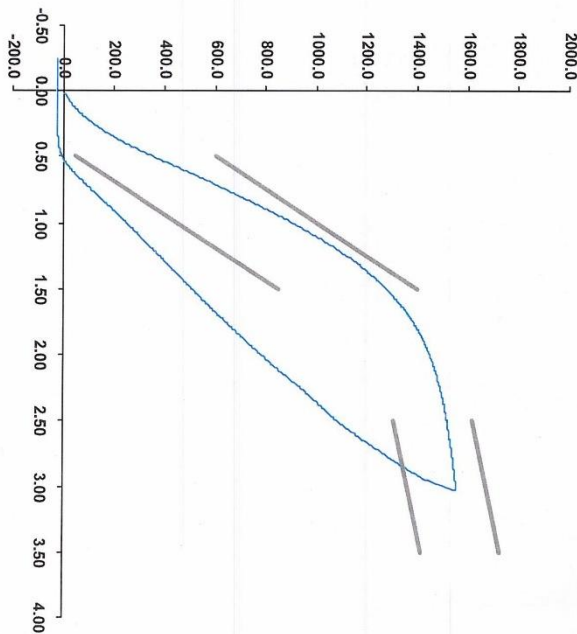
Force (-N) vs Extension (-mm)

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	50	600
Force @ 1.5 mm (N)	850	1,400
Force @ 2.5 mm (N)	1,306	1,618
Force @ 3.0 mm (N)	1,361	1,673

Testing Machine STM-20 5965542
Load Cell S/N (F1360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:



Operator 14061

Part Number 180-4450

Template No 107 08-Jul-21
SACO Research

By : _____ Date : _____

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

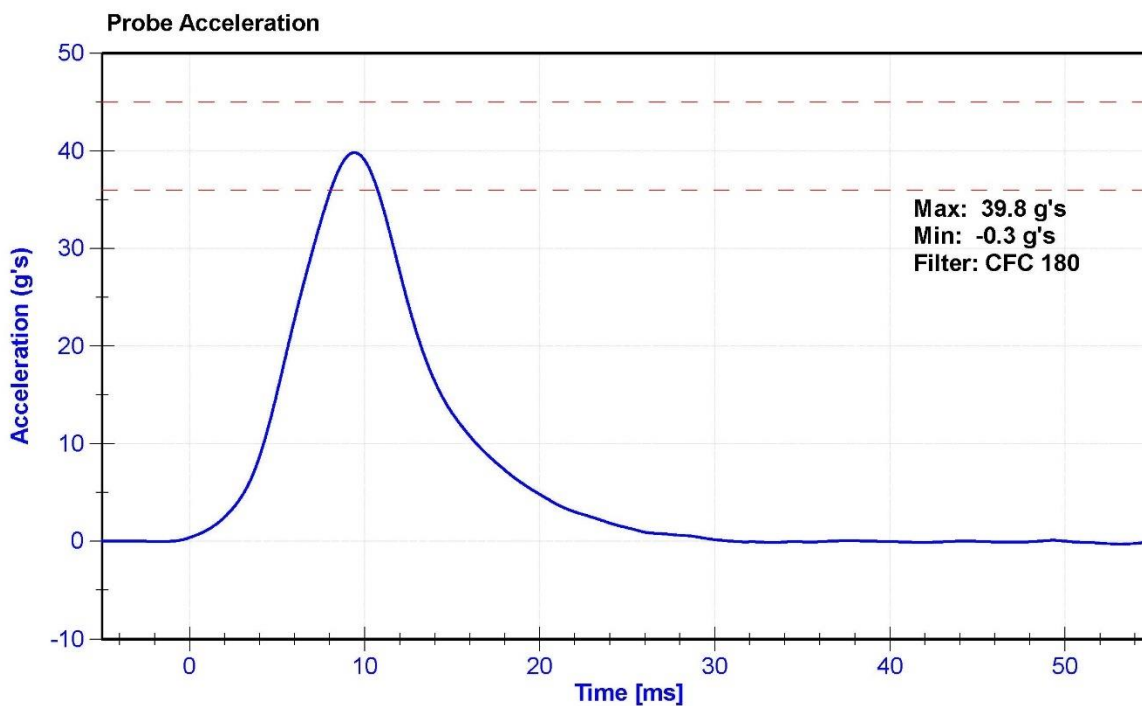
ATD Manufacturer	FTSS	Test Technician	B. Kirchner
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

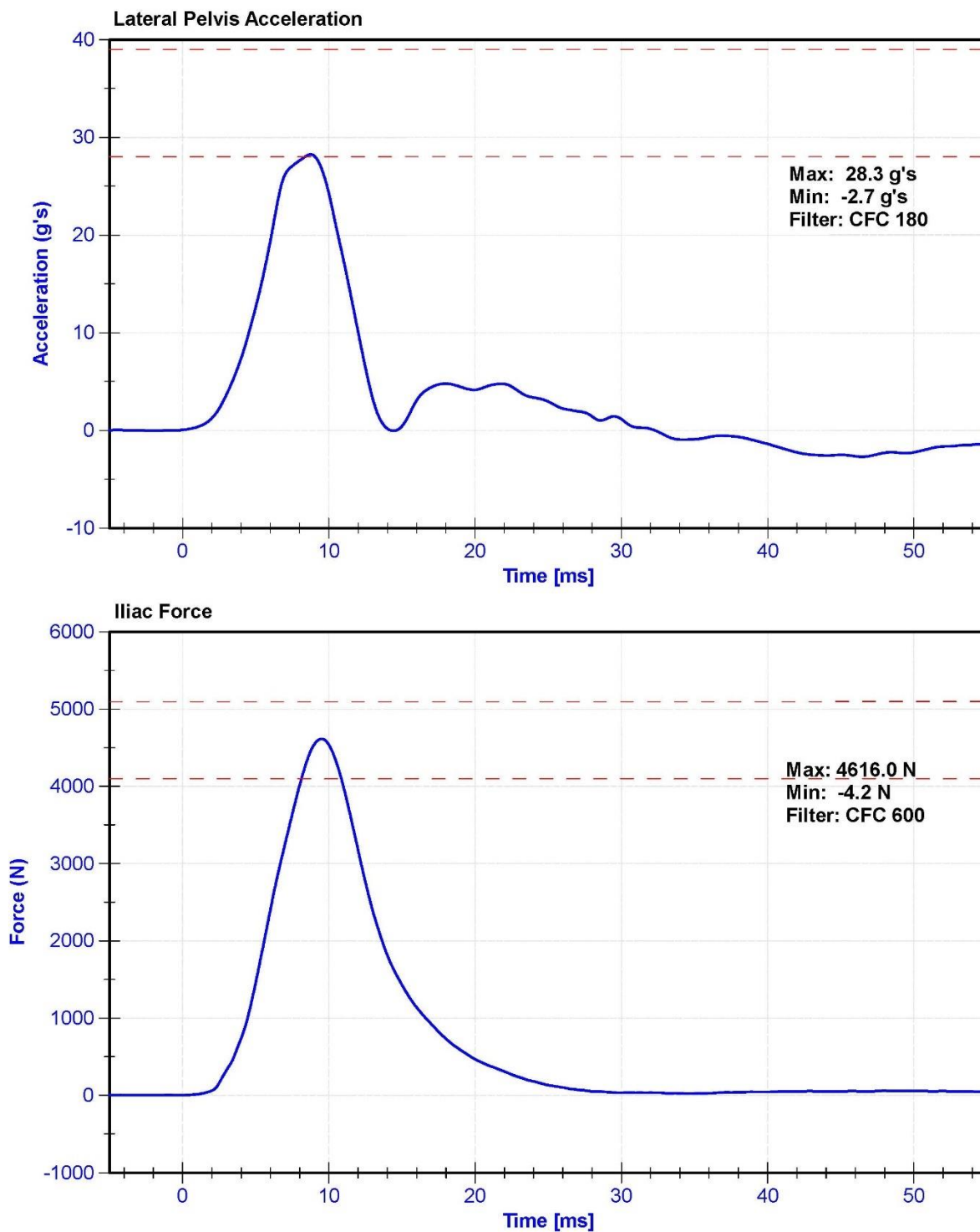
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	42.5	Pass
Velocity	4.2	4.4	m/s	4.40	Pass
Probe Acceleration	36	45	g's	39.8	Pass
Lateral Pelvis Acceleration	28	39	g's	28.3	Pass
Iliac Force	4100	5100	N	4616.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Pelvis Y Accelerometer	Endevco	P51875	6/17/2022	12/14/2022
Iliac Load Cell	Denton	290-FY	9/14/2021	9/14/2022





CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE - DRIVER ATD

SERIAL NO: DG8012

(CONFIGURED FOR LEFT SIDE IMPACT)

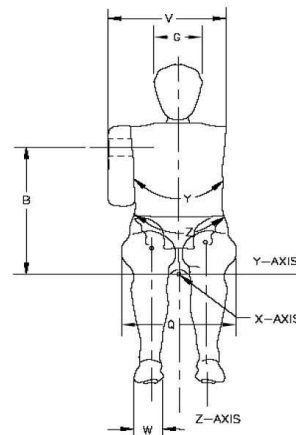
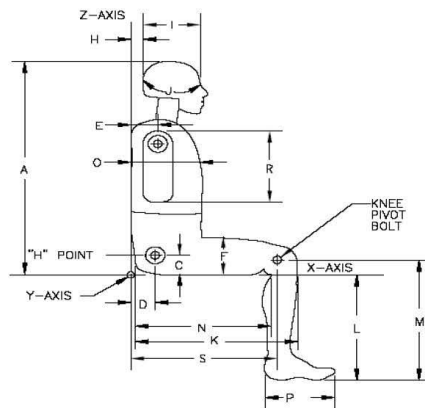


External Measurements - SID-IIs

Technician: **K. Brogan**

Date: **06/30/2022**

Dummy Serial Number: **DG8012**



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	84	Pass
D	H-point from seatback	141	151	145	Pass
E	Shoulder Pivot from Backline	97	107	102	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	185	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	530	Pass
L	Popliteal Height	343	369	356	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	432	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	225	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	320	Pass
R	Arm Length	249	259	250	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	348	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	868	Pass
Z	Waist Circumference	761	791	775	Pass



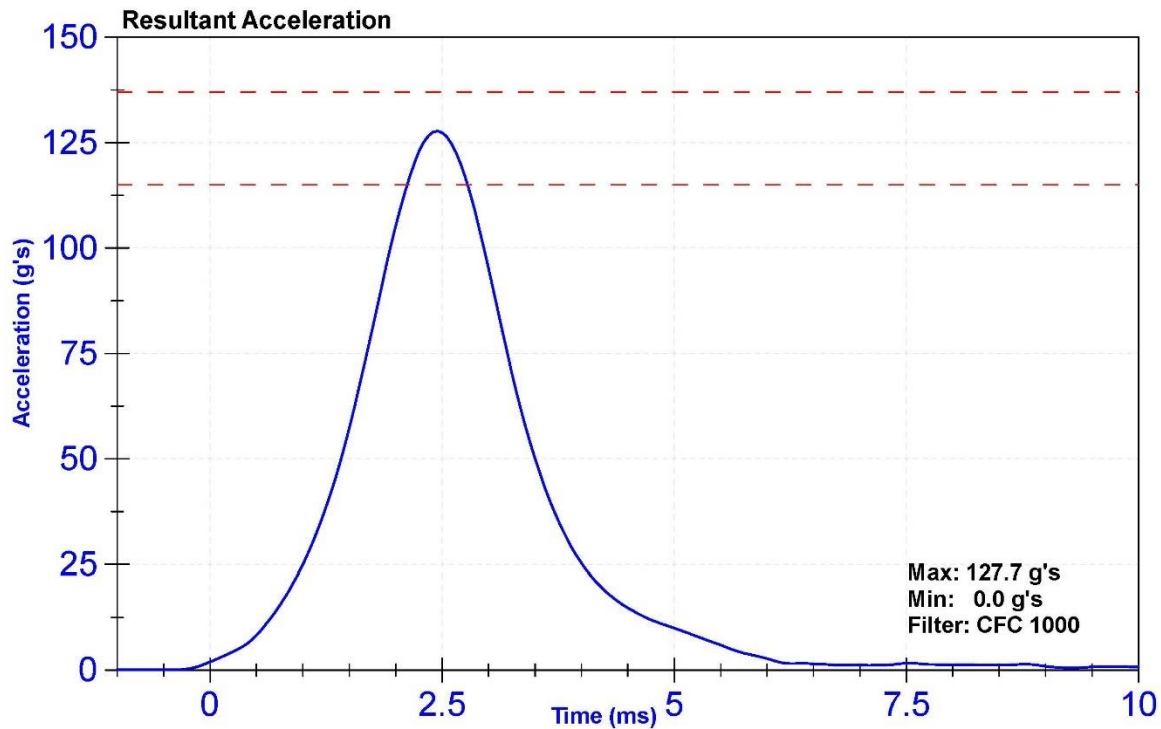
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

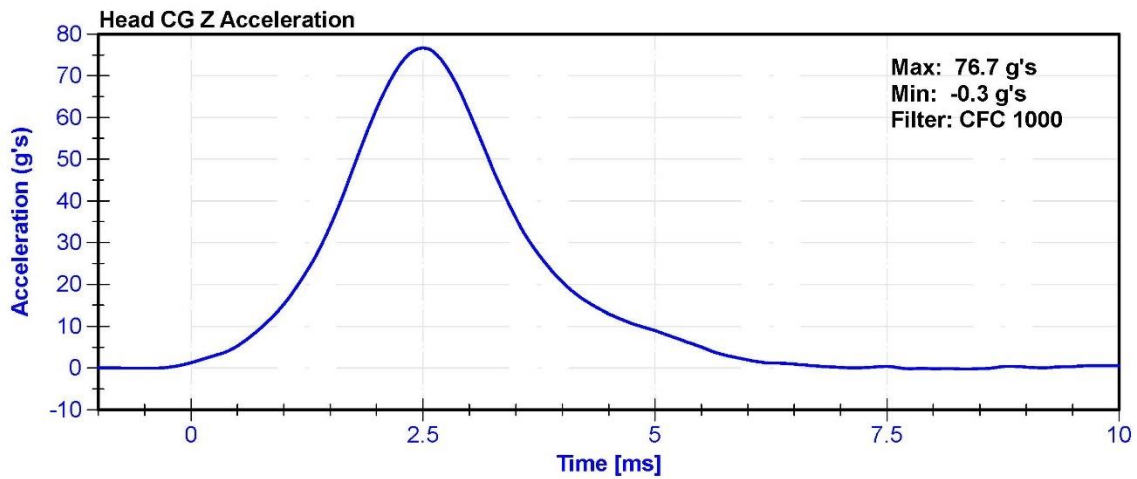
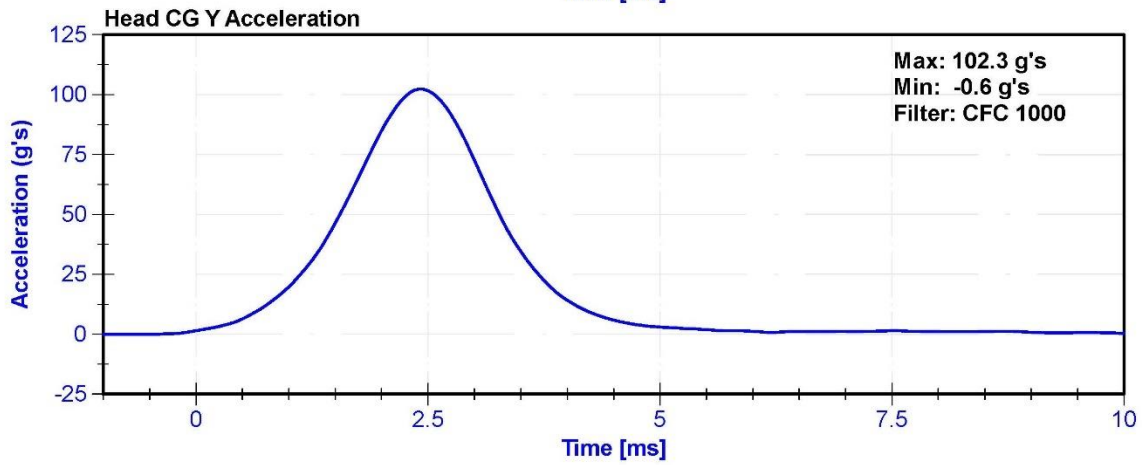
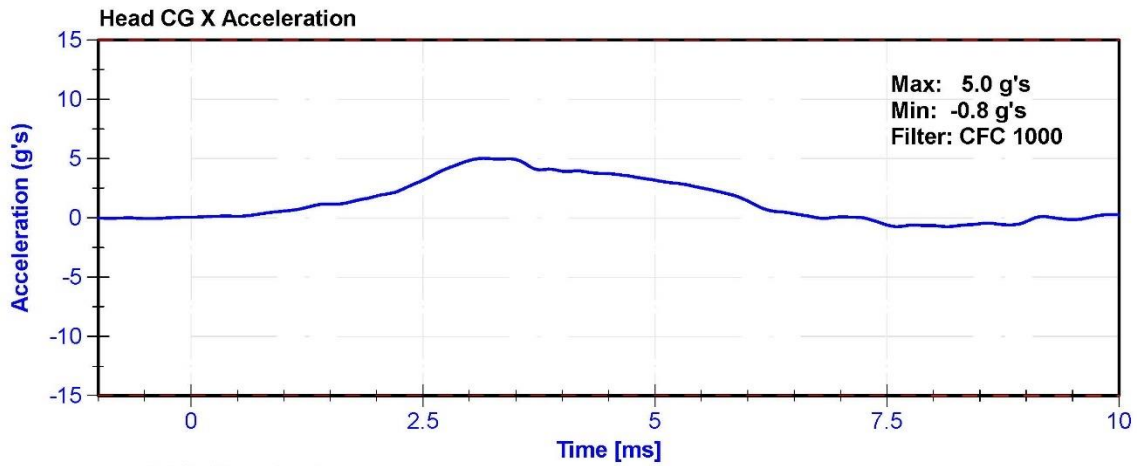
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	48.9	Pass
Resultant Acceleration	115	137	g's	127.7	Pass
Oscillation	0	15	%	1.2	Pass
Fore-Aft Acceleration	-15	15	g's	5.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P74788	6/17/2022	12/14/2022
Y Accelerometer	Endevco	P83432	6/17/2022	12/14/2022
Z Accelerometer	Endevco	P83319	6/17/2022	12/14/2022





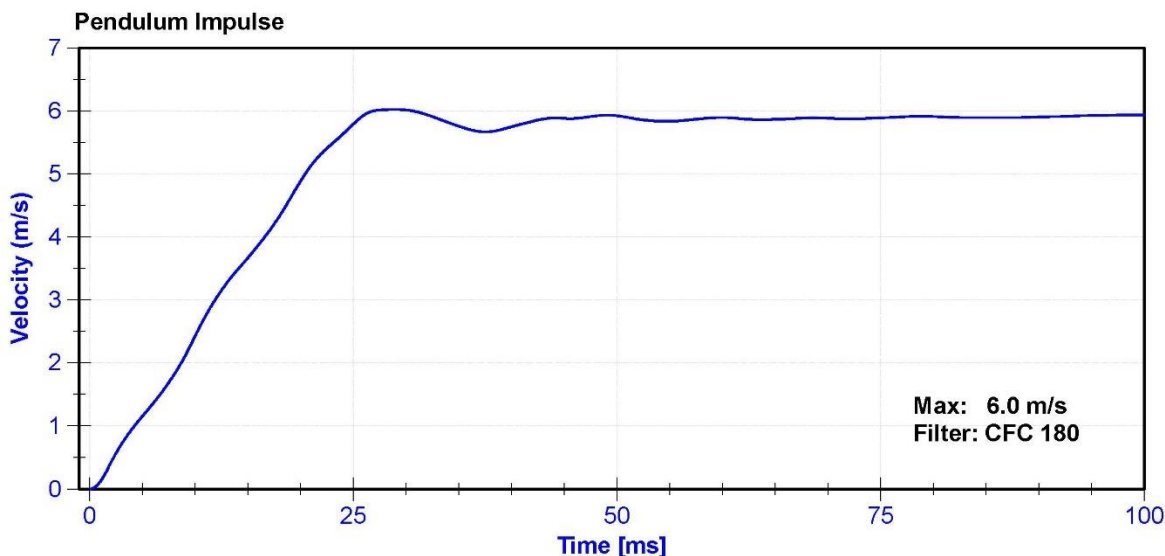
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

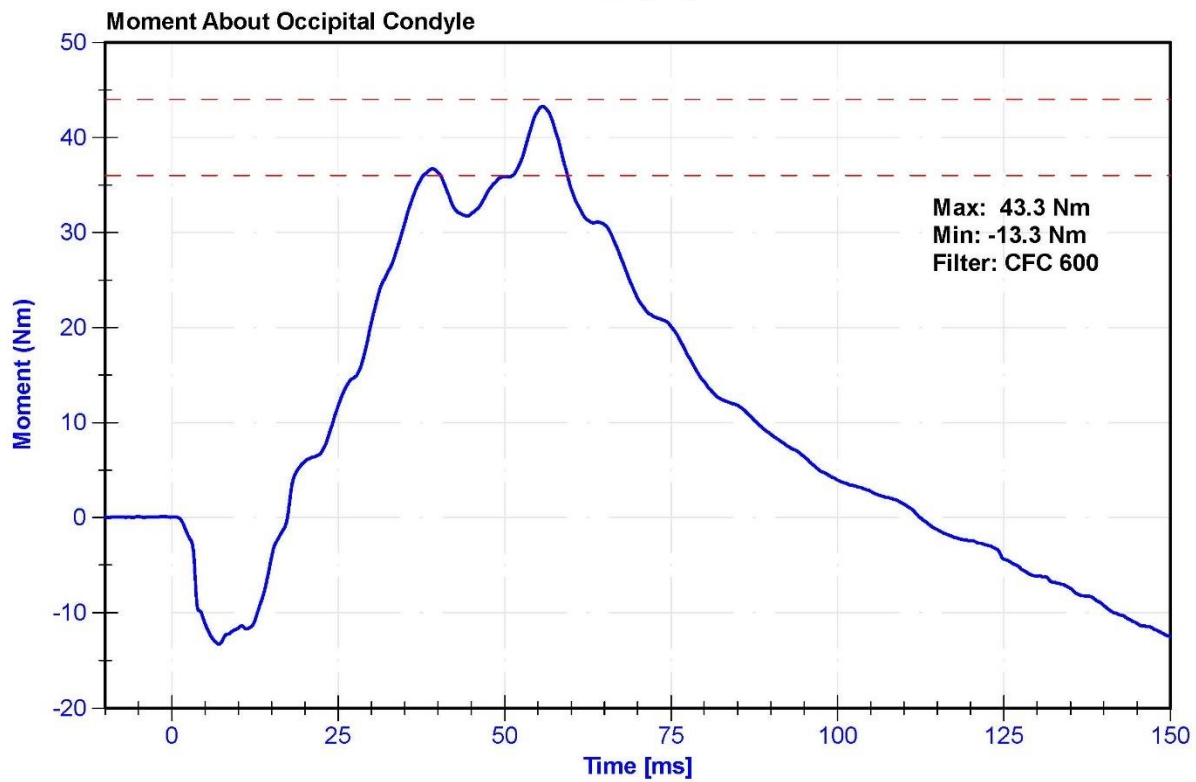
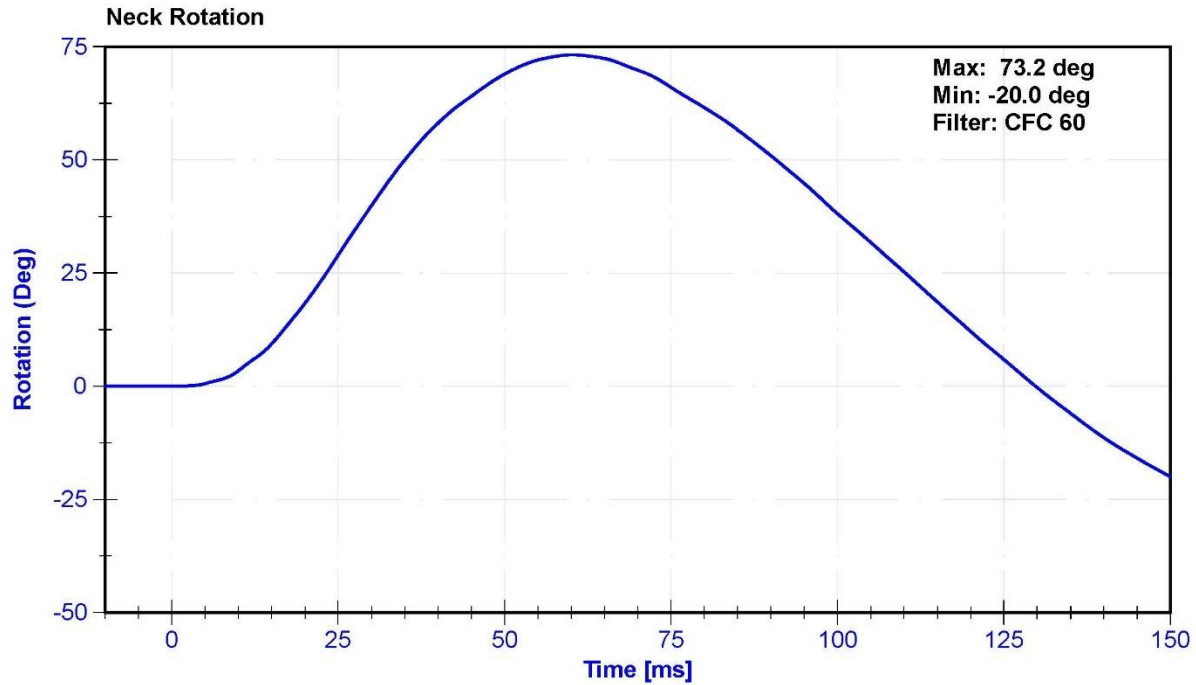
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	45	Pass
Velocity	5.51	5.63	m/s	5.593	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.43	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.67	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.89	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.79	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	6.02	Pass
Neck Rotation	71	81	deg	73.2	Pass
Time at Maximum Rotation	50	70	ms	60.1	Pass
Moment about the OC	36	44	Nm	43.3	Pass
Moment Decay to 0 Nm	102	126	ms	112.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231CT	10/28/2021	10/28/2022
Pendulum Potentiometer	Servo	4961	2/23/2022	2/23/2023
Condyle Potentiometer	Servo	DS185	11/12/2021	11/12/2022
Upper Neck Load Cell	Humanetics	1716A_1872-FY	6/13/2022	6/13/2023





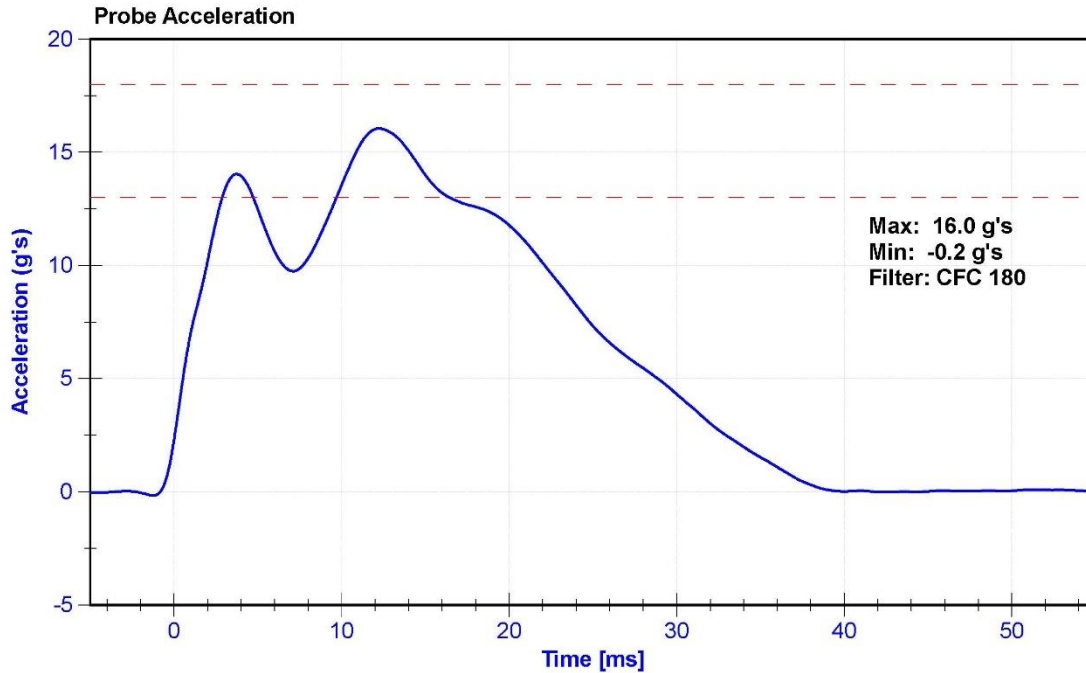
ATD Manufacturer	FTSS	Test Technician	D. Sakona, T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

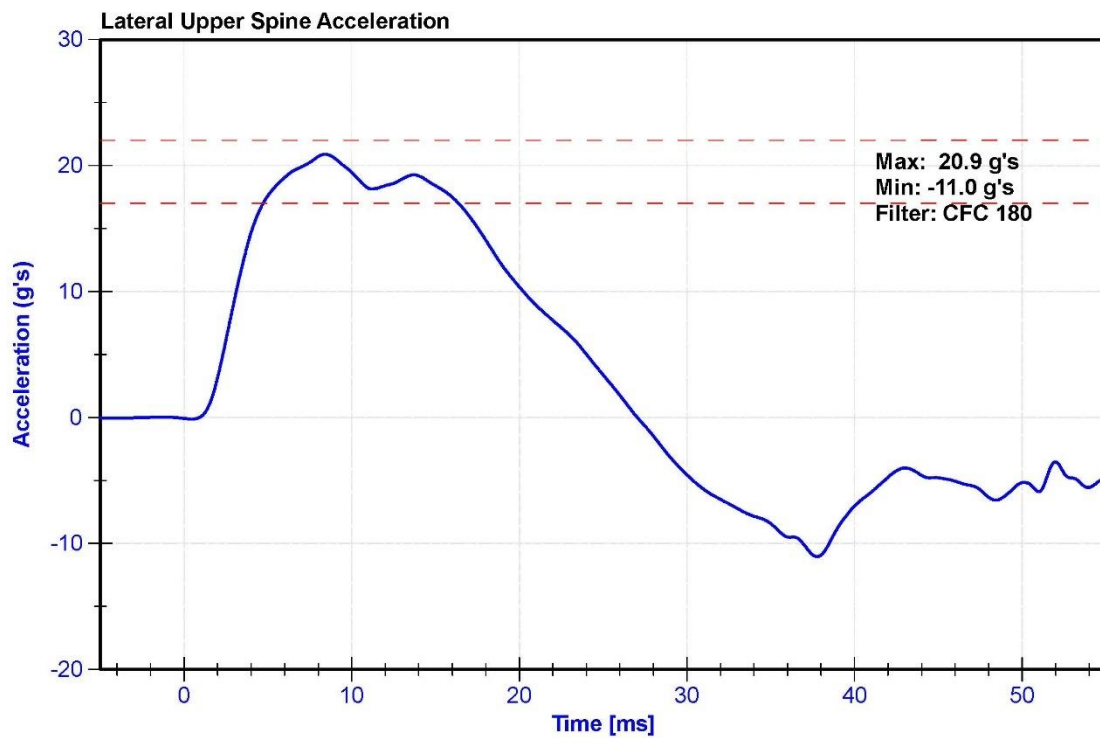
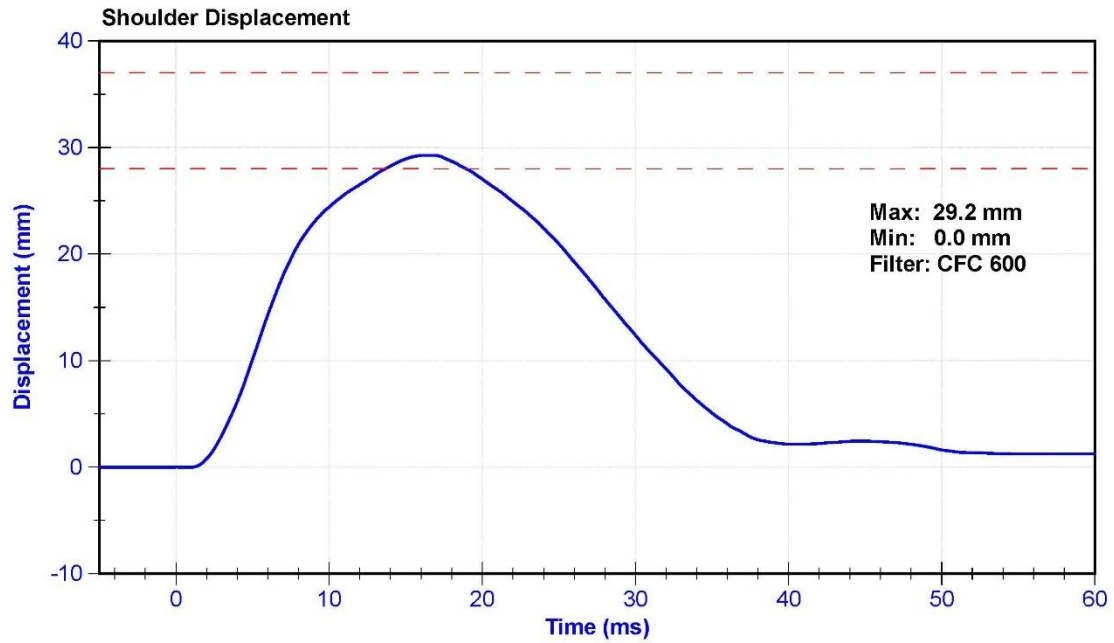
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	42.5	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	13	18	g's	16.0	Pass
Shoulder Deflection	28	37	mm	29.2	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Shoulder Potentiometer	Servo	1274GFE	6/20/2022	12/19/2022
Upper Spine Y Accelerometer	Endevco	P64148	6/17/2022	12/14/2022





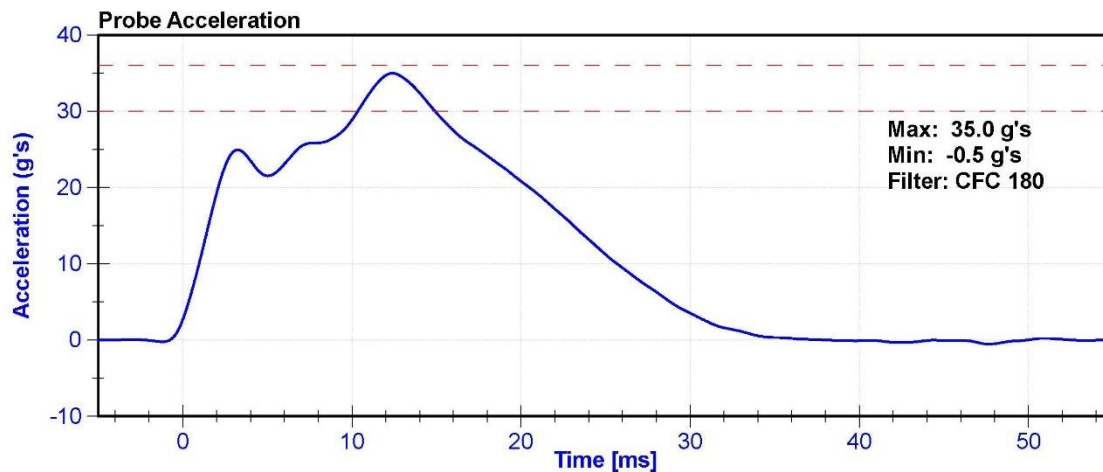
ATD Manufacturer	FTSS	Test Technician	D. Sakona, T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

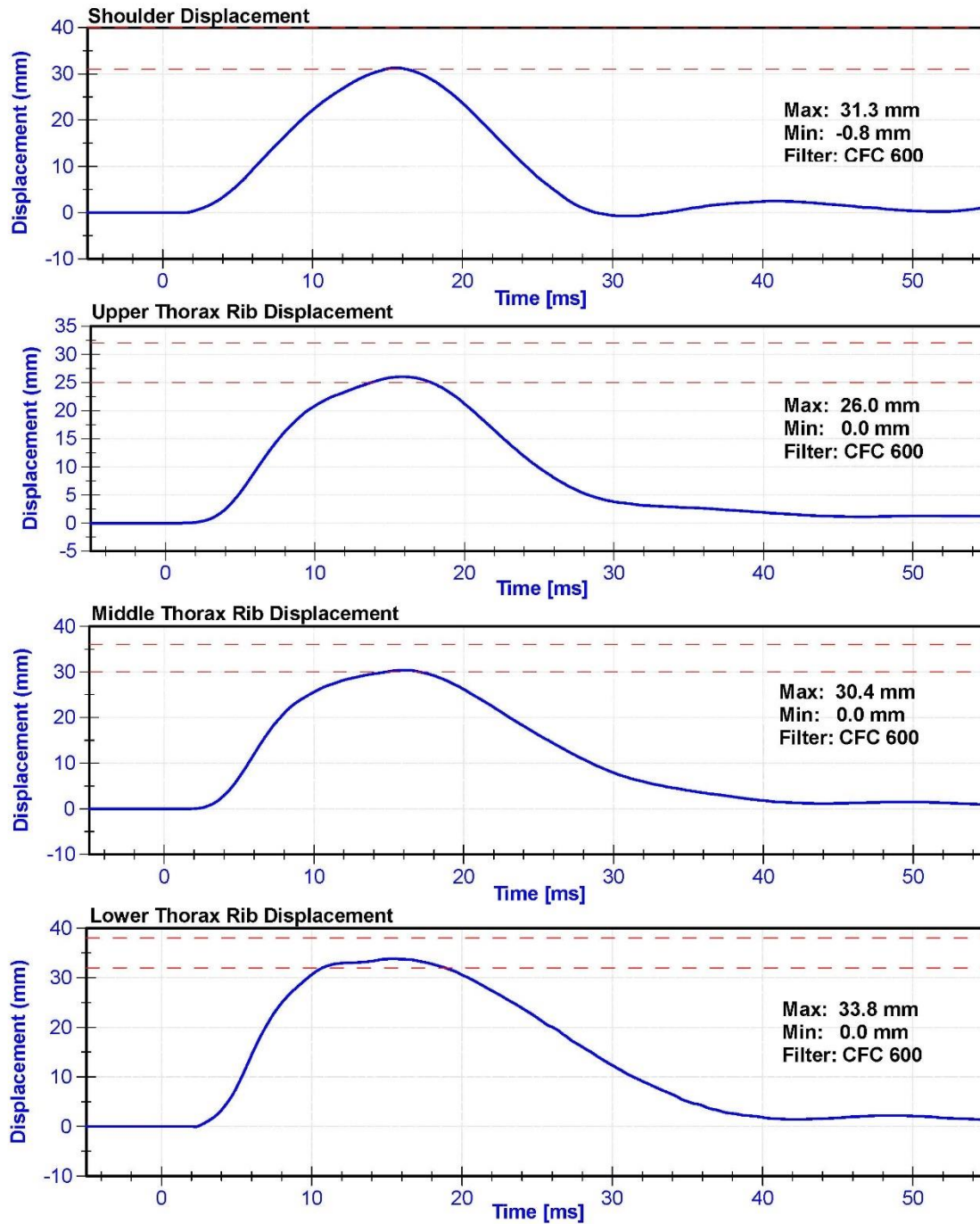
Results

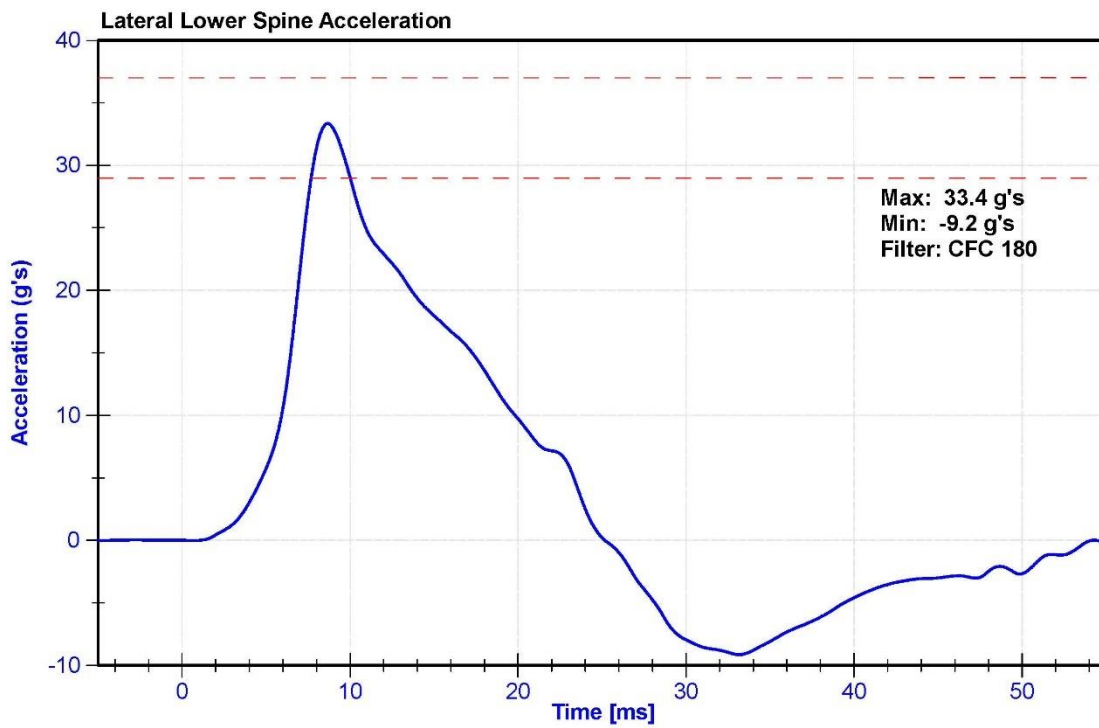
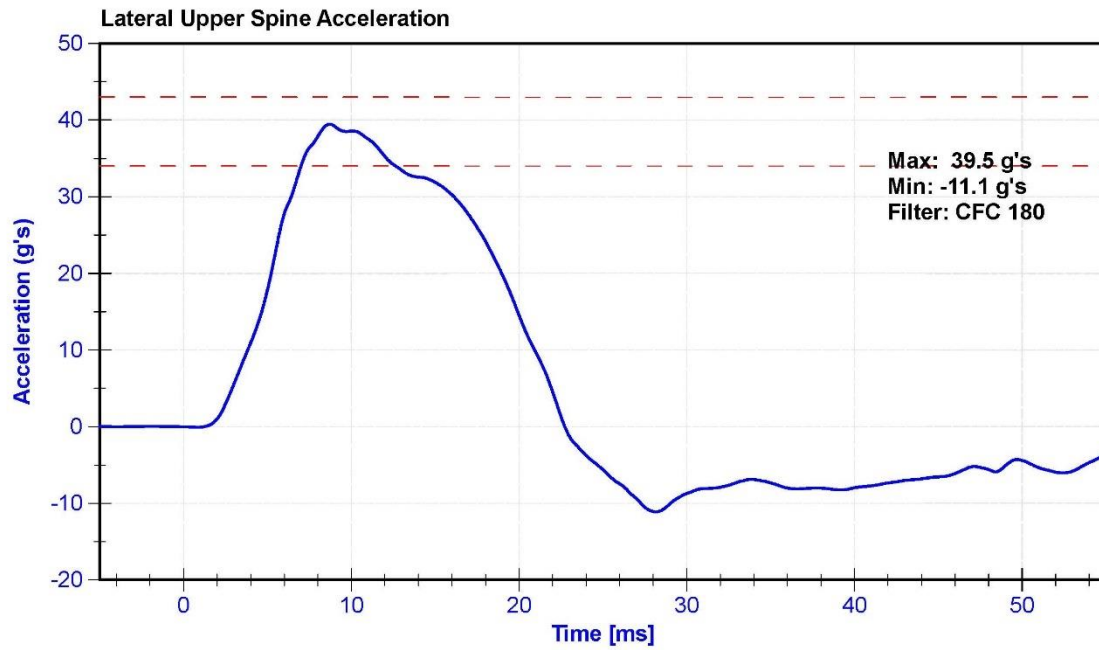
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	42.5	Pass
Velocity	6.6	6.8	m/s	6.62	Pass
Probe Acceleration after 5 ms	30	36	g's	35.0	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.5	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.4	Pass
Shoulder Deflection	31	40	mm	31.3	Pass
Upper Thorax Rib Deflection	25	32	mm	26.0	Pass
Mid Thorax Rib Deflection	30	36	mm	30.4	Pass
Lower Thorax Rib Deflection	32	38	mm	33.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Upper Spine T1 Y Accelerometer	Endevco	P64148	6/17/2022	12/14/2022
Upper Spine T12 Y Accelerometer	Endevco	P51327	6/17/2022	12/14/2022
Shoulder Potentiometer	Servo	1274GFE	6/20/2022	12/19/2022
Upper Thorax Rib Potentiometer	Servo	1199GFE	6/17/2022	12/16/2022
Middle Thorax Rib Potentiometer	Servo	1246GFE	6/17/2022	12/16/2022
Lower Thorax Rib Potentiometer	Servo	011GFE	6/17/2022	12/16/2022







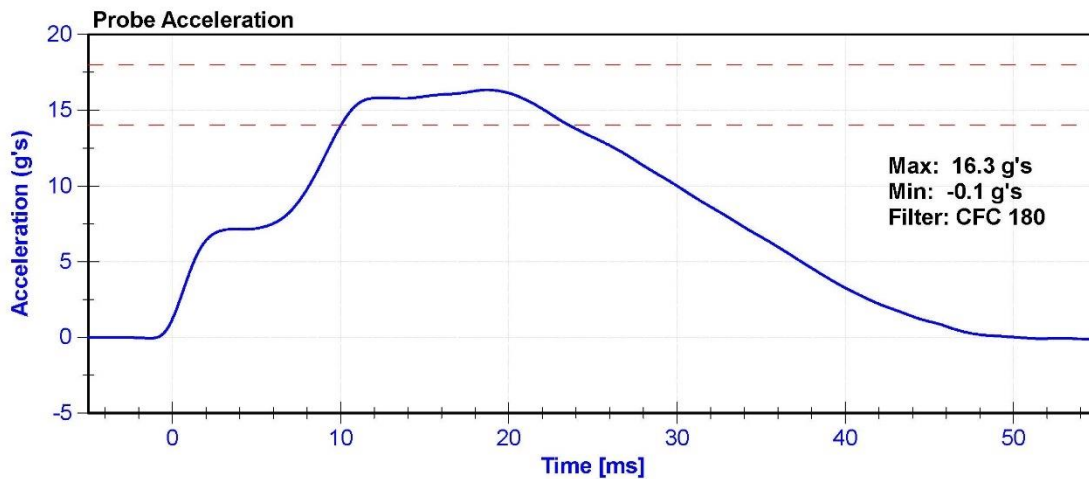
ATD Manufacturer	FTSS	Test Technician	D. Sakona, T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

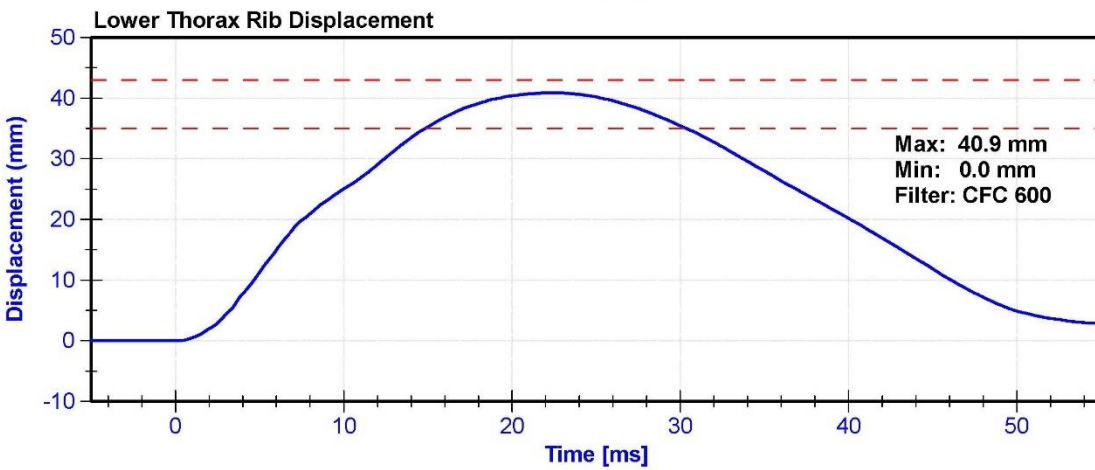
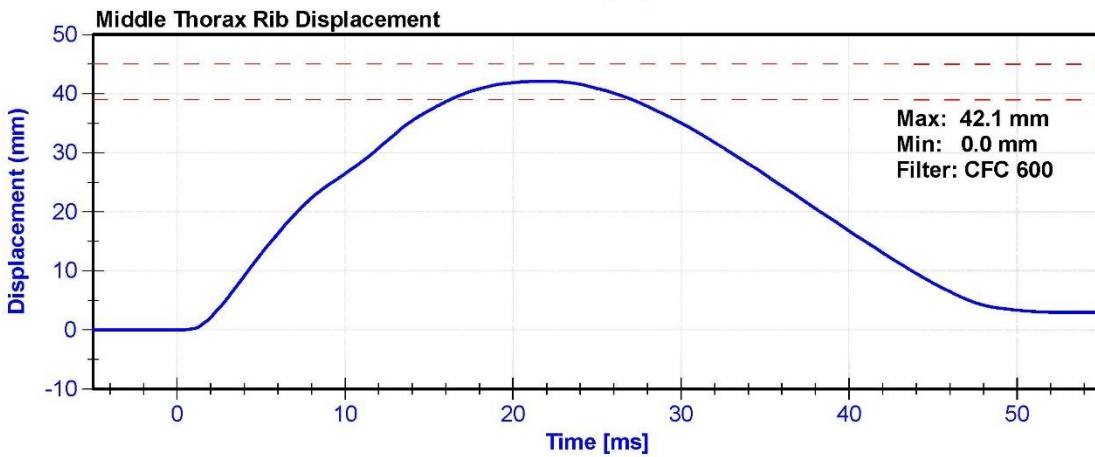
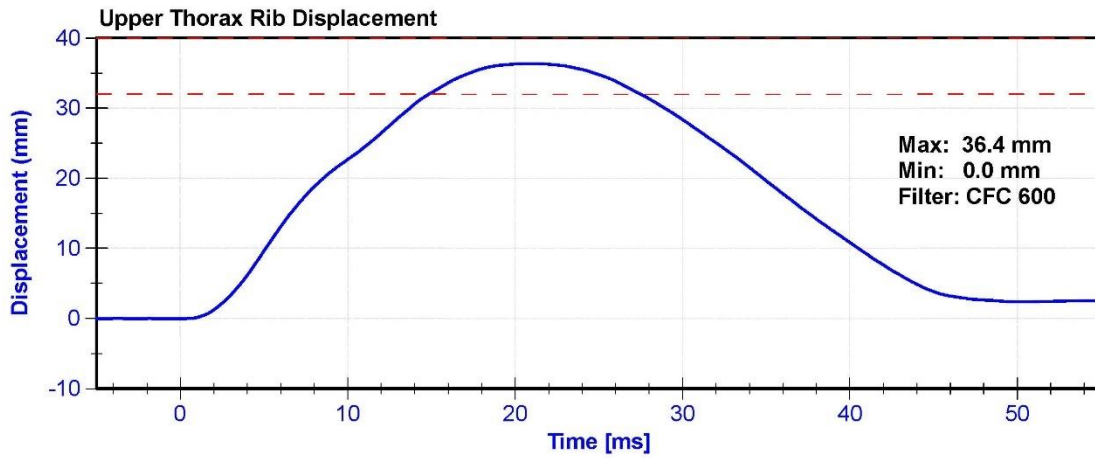
Results

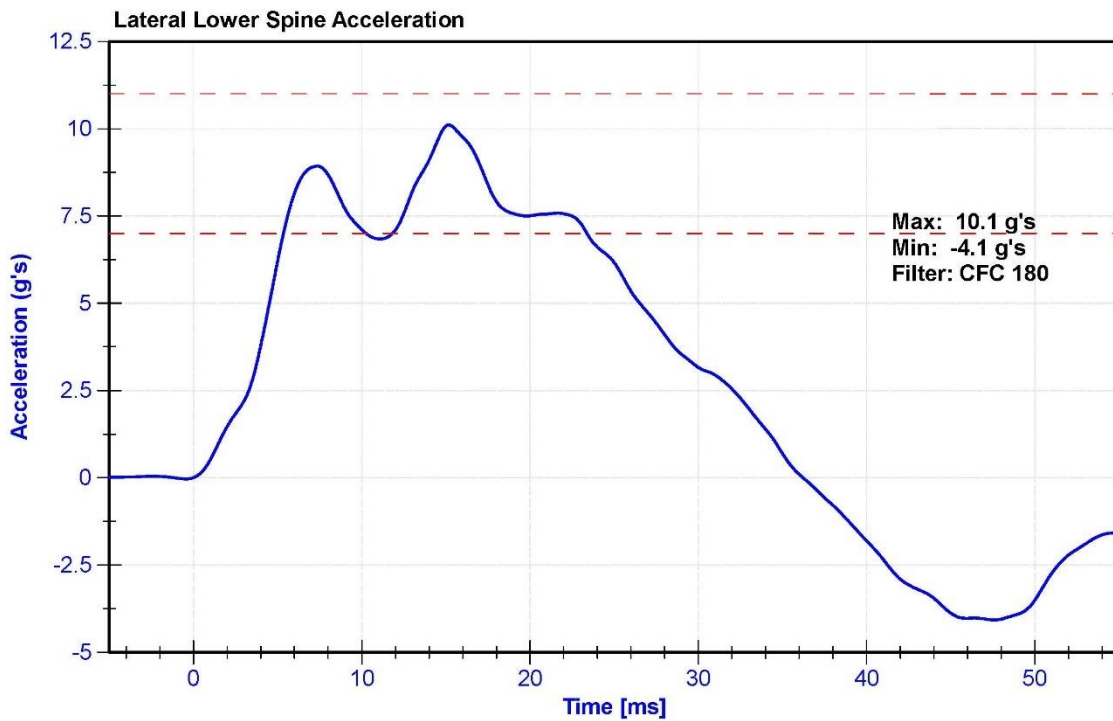
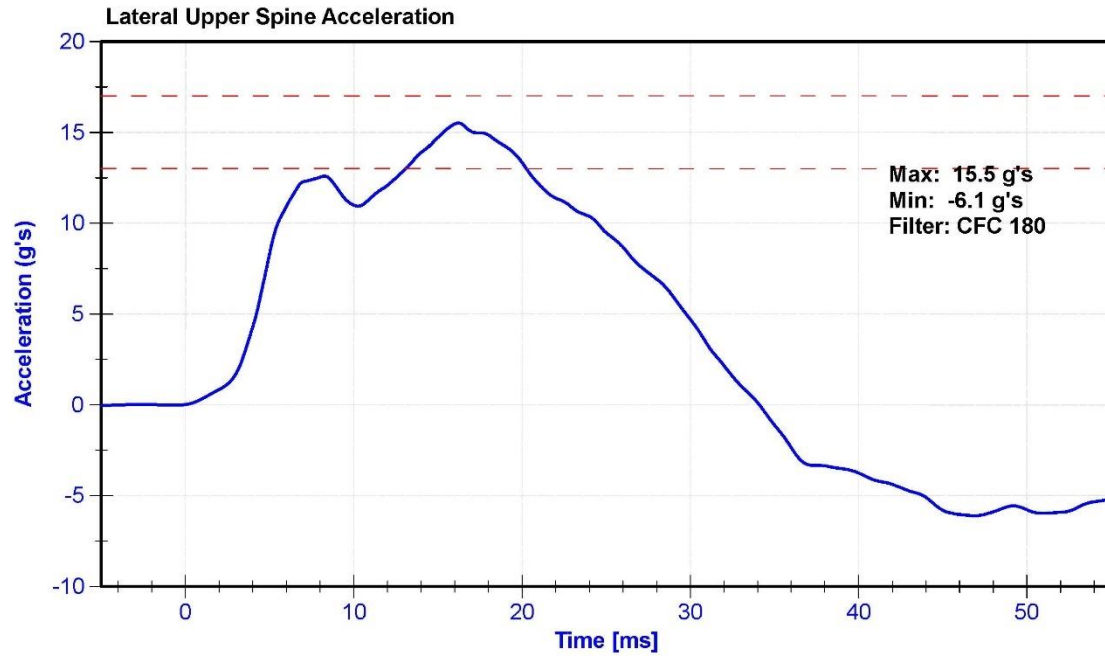
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	42.5	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	14	18	g's	16.3	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.5	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.1	Pass
Upper Thorax Rib Deflection	32	40	mm	36.4	Pass
Middle Thorax Rib Deflection	39	45	mm	42.1	Pass
Lower Thorax Rib Deflection	35	43	mm	40.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Upper Spine Y Accelerometer	Endevco	P64148	6/17/2022	12/14/2022
Lower Spine Y Accelerometer	Endevco	P51327	6/17/2022	12/14/2022
Upper Thorax Rib Potentiometer	Servo	1199GFE	6/17/2022	12/16/2022
Middle Thorax Rib Potentiometer	Servo	1246GFE	6/17/2022	12/16/2022
Lower Thorax Rib Potentiometer	Servo	011GFE	6/17/2022	12/16/2022







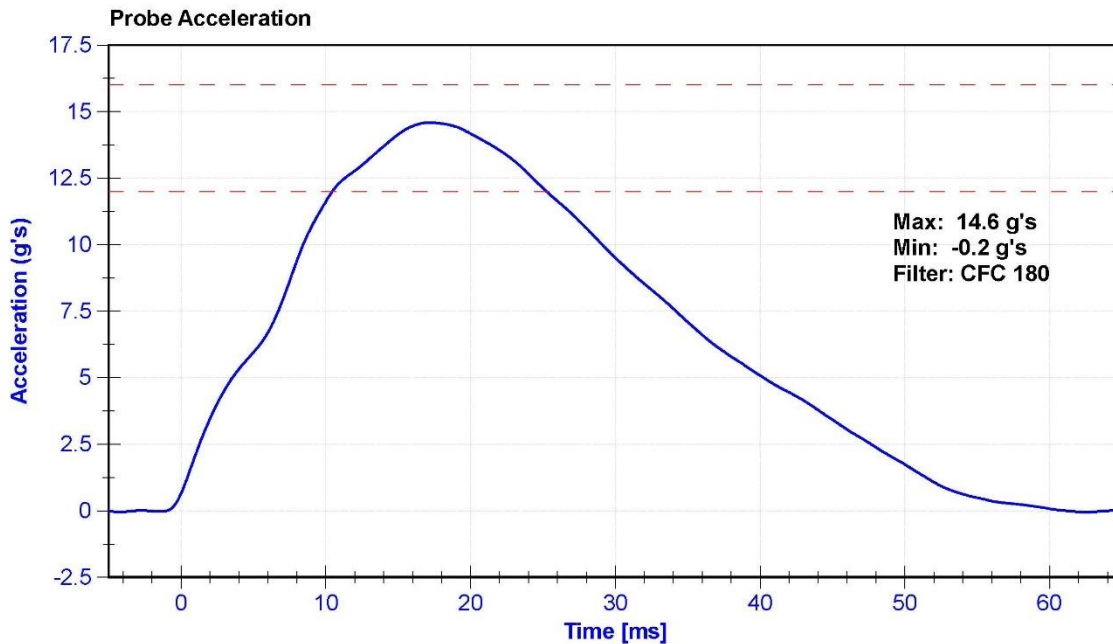
ATD Manufacturer	FTSS	Test Technician	D. Sakona, T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

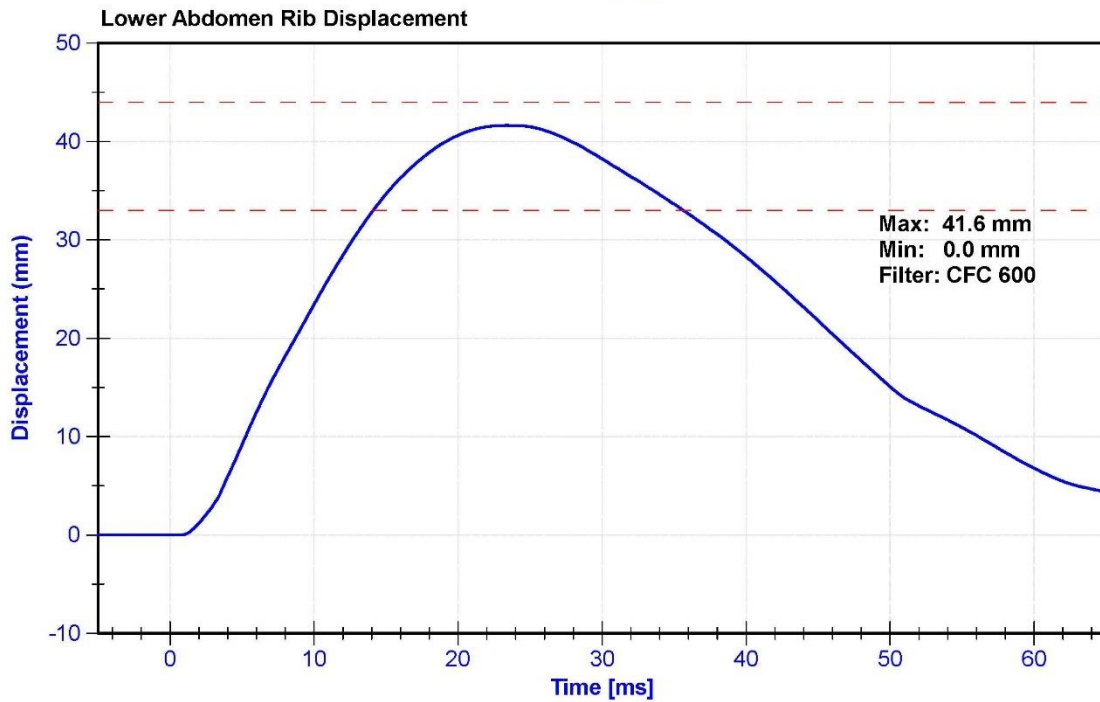
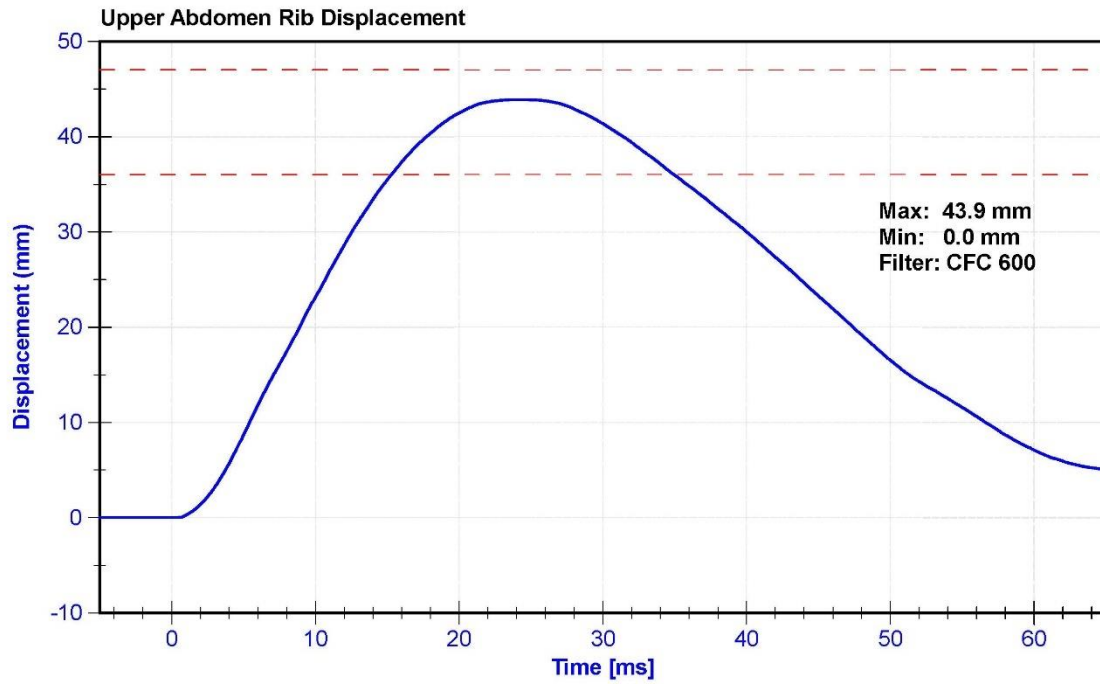
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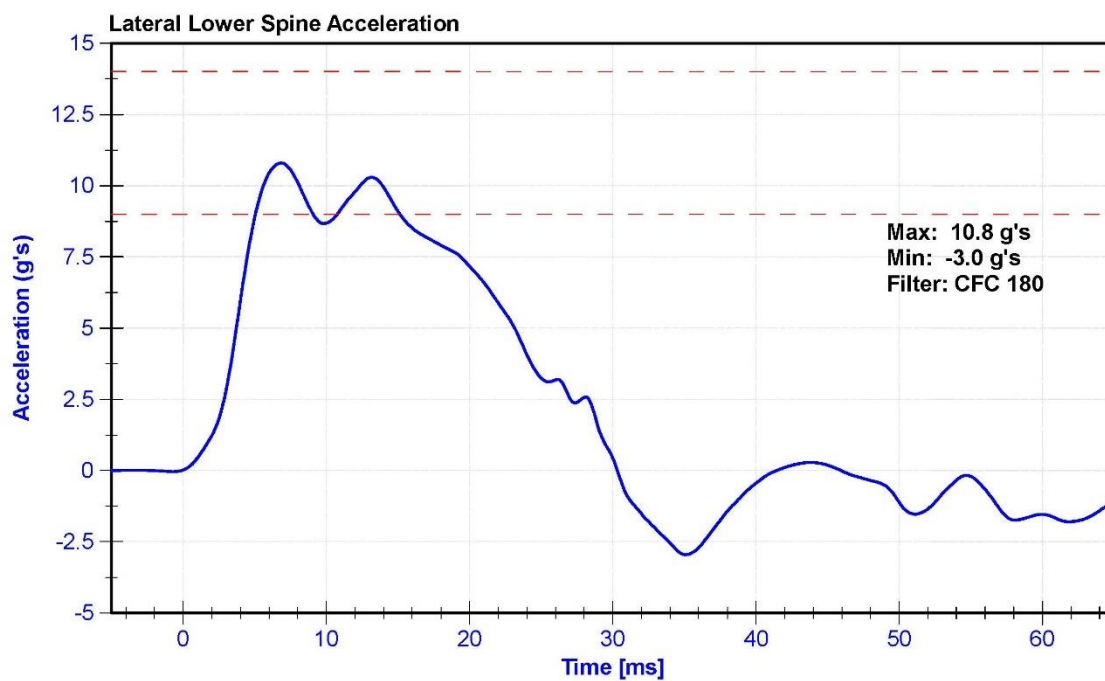
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	42.5	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	14.6	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.8	Pass
Upper Abdomen Rib Deflection	36	47	mm	43.9	Pass
Lower Abdomen Rib Deflection	33	44	mm	41.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Lower Spine Y Accelerometer	Endevco	P51327	6/17/2022	12/14/2022
Upper Abdomen Rib Potentiometer	Servo	008GFE	6/17/2022	12/16/2022
Lower Abdomen Rib Potentiometer	Servo	041 GFE	6/17/2022	12/16/2022







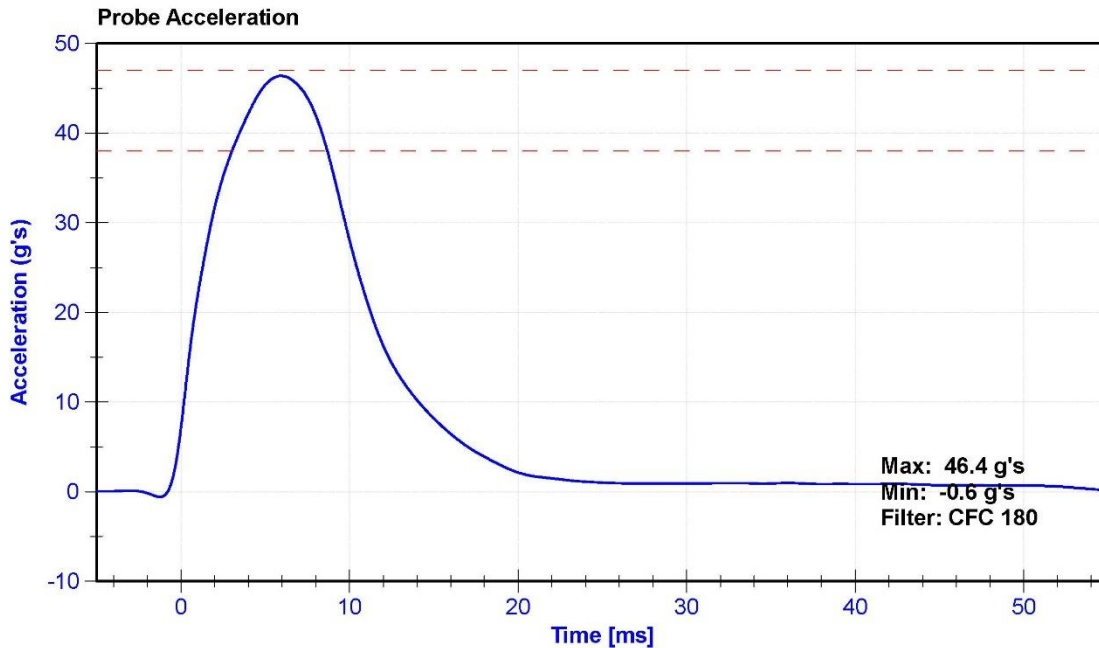
ATD Manufacturer	FTSS	Test Technician	D. Sakona, T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

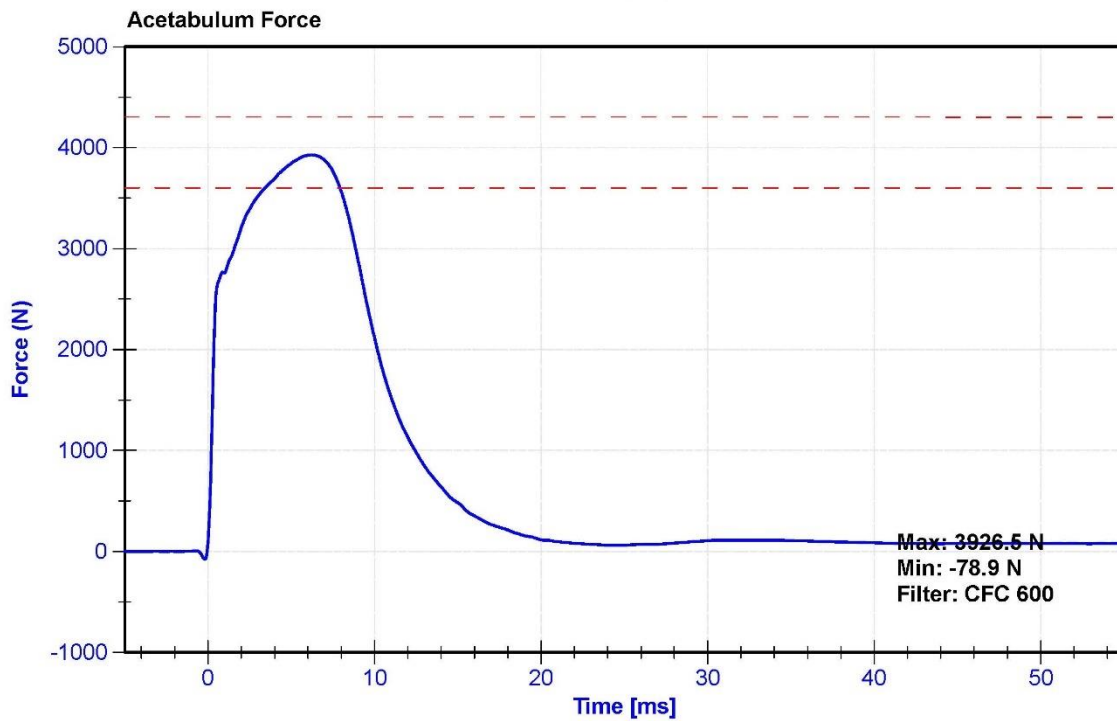
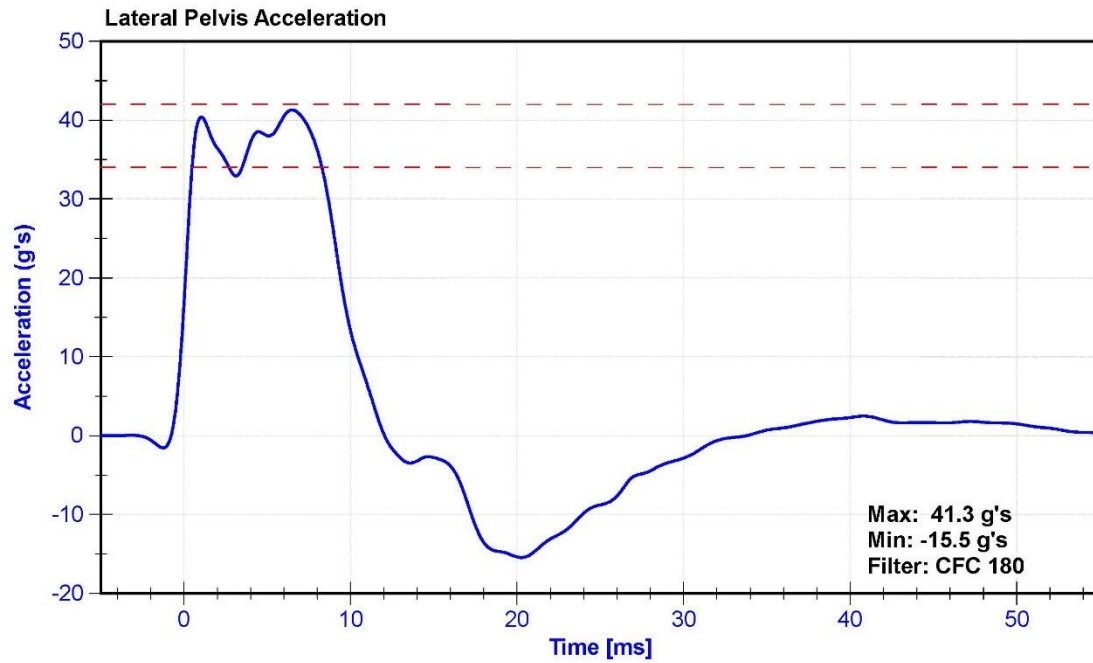
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	42.5	Pass
Velocity	6.6	6.8	m/s	6.61	Pass
Probe Acceleration	38	47	g's	46.4	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	41.3	Pass
Acetabulum Force	3600	4300	N	3926.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Pelvis Y Accelerometer	Endevco	P51875	6/17/2022	12/14/2022
Acetabulum Load Cell	Denton	276-FY	9/14/2021	9/14/2022
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A







PG8012 CERT
6/30/2022

SID-Its Pelvis Plug Certification Test

Plug S/N 15200

Test Number 17916

Report Number 17965

Test Date 3/8/2021 1:27:19 PM

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	334	600
Force @ 1.5 mm (N)	1,156	1,400
Force @ 2.5 mm (N)	1,397	1,618
Force @ 3.0 mm (N)	1,449	1,673

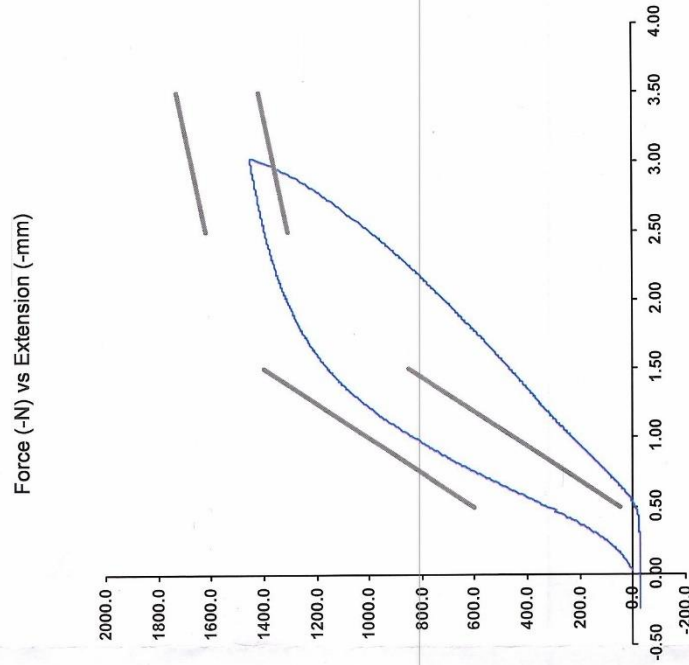
Testing Machine STM-20 5985542

Load Cell S/N (F1360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:



Operator

Part Number 180-4450

Template No 107 08-Mar-21

SACO Research

By: De Date: 3/8/2021

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 810-694-2082 FAX



DG8012 CRASH
6/30/2022

SID-Ils Pelvis Plug Certification Test

Plug S/N 15130

Test Number 17842

Report Number 17891

Test Date 3/5/2021 10:11:56 AM

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	236	600
Force @ 1.5 mm (N)	1,144	1,400
Force @ 2.5 mm (N)	1,401	1,618
Force @ 3.0 mm (N)	1,455	1,673

Testing Machine STM-20 5965542

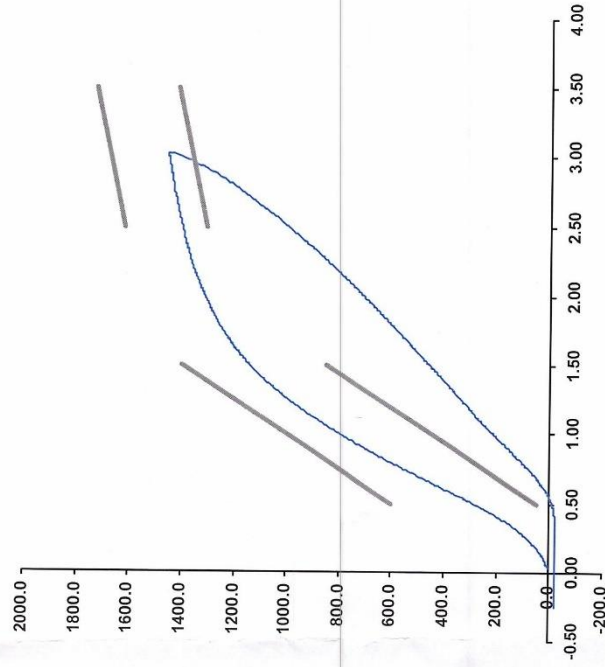
Load Cell S/N (F1360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 05-Mar-21

SACO Research

By: DC Date: 3/5/2021

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



D68812 NON IMPACT
6/30/2021

SID-11s Pelvis Plug Certification Test

Plug S/N 15225

Test Number 17976

Report Number 18025

Test Date 3/10/2021 12:41:19 PM

Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	310	600
Force @ 1.5 mm (N)	1,145	1,400
Force @ 2.5 mm (N)	1,409	1,618
Force @ 3.0 mm (N)	1,482	1,673

Testing Machine STM-20 5965542

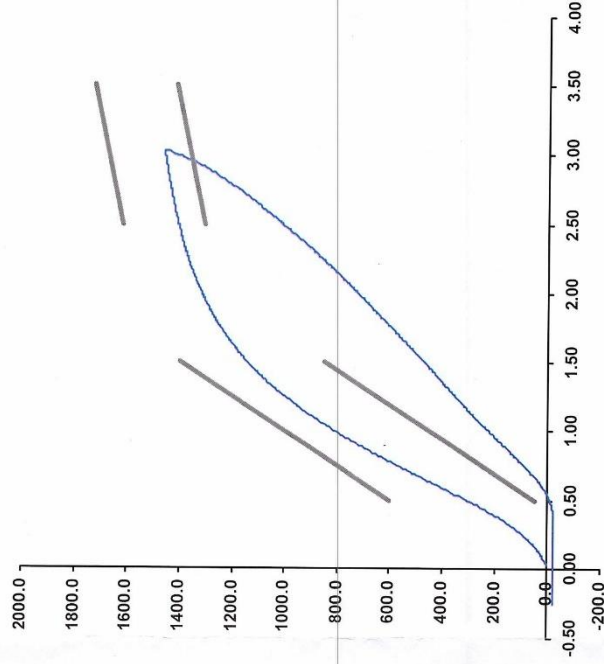
Load Cell S/N (F1360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 10-Mar-21

SACO Research

By: DC Date: 3/10/2021

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

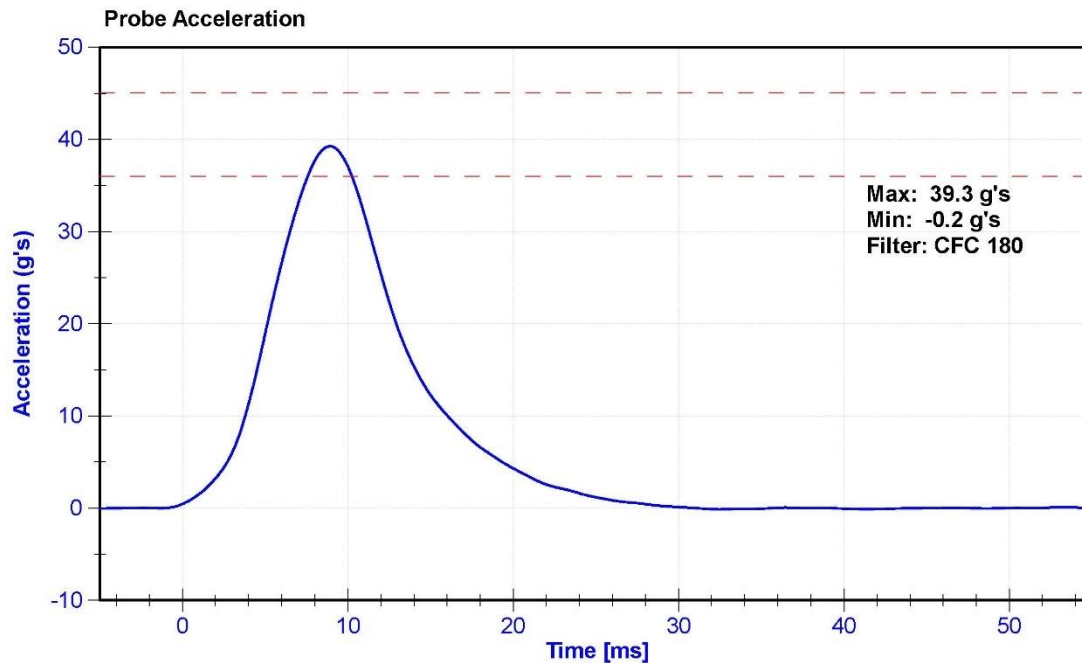
ATD Manufacturer	FTSS	Test Technician	D. Sakona, T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

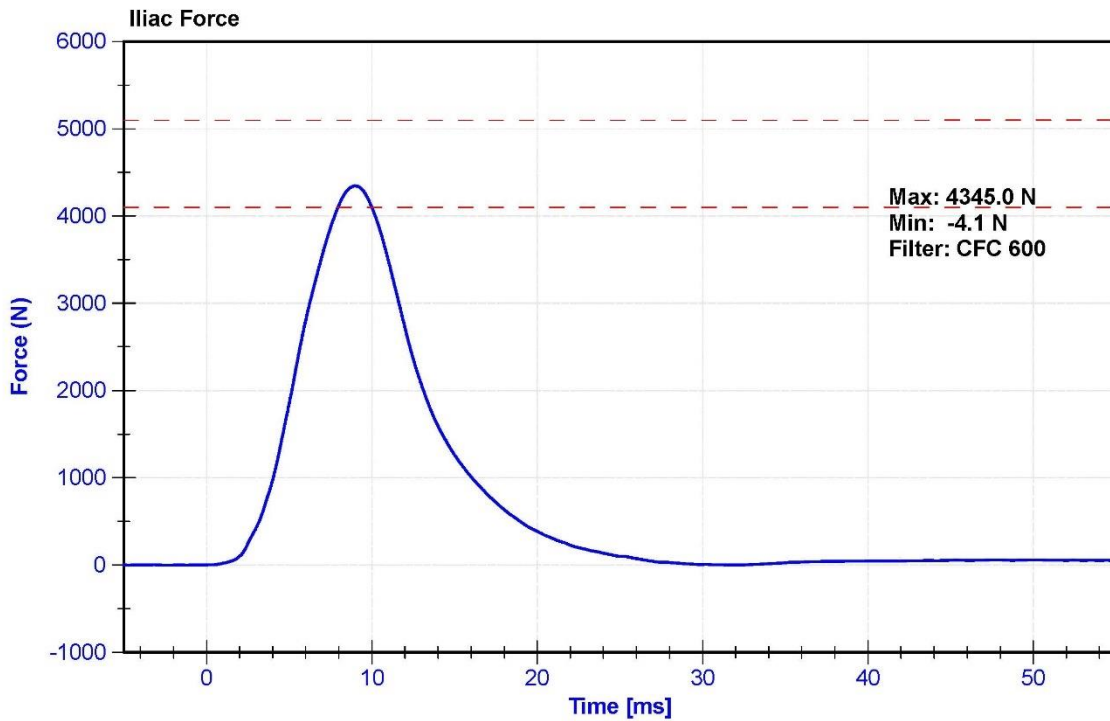
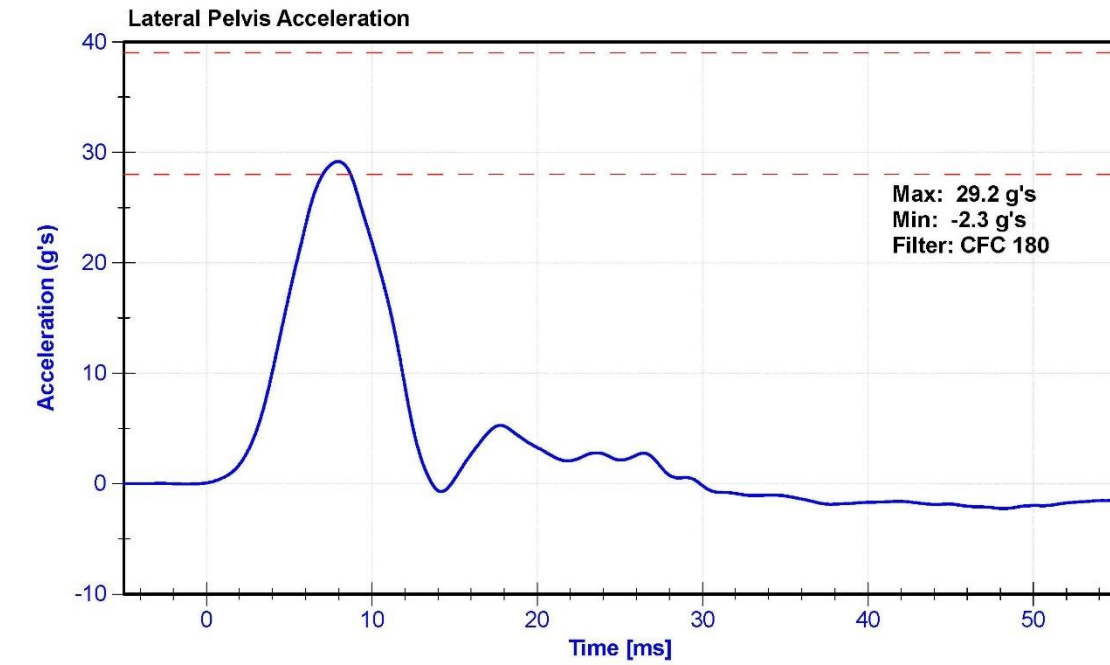
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.7	Pass
Humidity	10	70	%	42.5	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	36	45	g's	39.3	Pass
Lateral Pelvis Acceleration	28	39	g's	29.2	Pass
Iliac Force	4100	5100	N	4345.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25885	10/25/2021	10/25/2022
Pelvis Y Accelerometer	Endevco	P51875	6/17/2022	12/14/2022
Iliac Load Cell	Denton	290-FY	9/14/2021	9/14/2022





APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (SID-IIs)

			SID-IIs S/N: DG8012			
			Serial Number	Manufacturer	Calibration Date	
Head Accelerometers			X	P74788	Endevco	6/17/2022
			Y	P83432	Endevco	6/17/2022
			Z	P83319	Endevco	6/17/2022
Head Accelerometers - Redundant			X	P80334	Endevco	6/17/2022
			Y	P52155	Endevco	6/17/2022
			Z	P83322	Endevco	6/17/2022
Displacement Potentiometer	Shoulder		Y			
	Thoracic Rib	Upper	Y	1199GFE	Servo	6/17/2022
		Middle	Y	1246GFE	Servo	6/17/2022
		Lower	Y	011GFE	Servo	6/17/2022
	Abdominal Rib	Upper	Y	008GFE	Servo	6/17/2022
		Lower	Y	041 GFE	Servo	6/17/2022
Lower Spine Accelerometers (T12)			X	P71272	Endevco	6/17/2022
			Y	P51327	Endevco	6/17/2022
			Z	P52067	Endevco	6/17/2022
Acetabulum Load Cell			Y	276-FY	Denton	9/14/2021
Lilac Wing Load Cell			Y	290-FY	Denton	9/14/2021
Pelvis Plug (Struck Side)				13105	SACO	7/30/2019
Pelvis Plug (Non-Struck Side)				13583	SACO	5/25/2020

Table 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	A276074	Measurement	3/31/2022
Vehicle Center of Gravity	Y	A315106	Measurement	3/31/2022
Vehicle Center of Gravity	Z	A372860	Measurement	3/31/2022
Left Floor Sill	Y	A431355	Measurement	3/22/2022
A-Pillar Sill	Y	A428017	Measurement	3/1/2022
A-Pillar Low	Y	A428037	Measurement	3/2/2022
A-Pillar Mid	Y	A428010	Measurement	3/1/2022
B-Pillar Sill	Y	A431365	Measurement	3/22/2022
B-Pillar Low	Y	A400744	Measurement	3/21/2022
B-Pillar Mid	Y	A400756	Measurement	4/22/2022
Driver Seat	Y	A431251	Measurement	3/22/2022
Engine Top	X	A290949	Measurement	5/13/2022
Engine Top	Y	A335487	Measurement	5/13/2022
Firewall	Y	A427995	Measurement	3/1/2022
Right Roof	Y	A405553	Measurement	4/25/2022
Right Floor Sill	Y	A428008	Measurement	3/1/2022
Rear Floorpan	X	A280971	Measurement	6/16/2022
Rear Floorpan	Y	A396614	Measurement	6/16/2022

Table 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	1220AF-1117023-F0	Interface	8/5/2021
Load Cell 2	1220AF-1117006-F0	Interface	8/5/2021
Load Cell 3	1220AF-1117025-F0	Interface	7/28/2021
Load Cell 4	1220AF-1117019-F0	Interface	8/2/2021
Load Cell 5	1220AF-1117011-F0	Interface	8/2/2021
Load Cell 6	1220AF-1117017-F0	Interface	8/2/2021
Load Cell 7	1220AF-1117035-F0	Interface	8/2/2021
Load Cell 8	1220AF-1057559-F0	Interface	8/2/2021