REPORT NUMBER: SINCAP-CAL-21-008

NEW CAR ASSESSMENT PROGRAM (NCAP)
MOVING DEFORMABLE BARRIER SIDE IMPACT TEST

Volkswagen AG
2021 Volkwagen ID.4 Pro
Five Door SUV

NHTSA No: M20215802

PREPARED BY:
CALSPAN CORPORATION
P.O. BOX 400
BUFFALO, NEW YORK 14225

October 26, 2021

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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Prepared by: Matthew Pronko — Date: October 26, 2021
Matthew Pronko, Test Engineer

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Edward Dutton, Operations Manager
Transportation Test Operations

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: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. SINCAP-CAL-21-008	***2. Government Accession No.***	***3. Recipient's Catalog No.***
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing and FMVSS No. 305 indicant testing of a 2021 Volkswagen ID.4 Pro SUV NHTSA No.: M20215802		***5. Report Date*** October 26, 2021 ***6. Performing Organization Code*** CAL
Matthew Pronko, Test Engineer Edward Dutton, Operations Manager		***8. Performing Organization Report No.*** CAL-DOT-2021-008
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operations P.O. Box 400 Buffalo, New York 14225		***10. Work Unit No.*** ***11. Contract or Grant No.*** DTNH22-14-D-00352
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590		***13. Type of Report and Period Covered:*** Final Test Report July 7, 2021 - October 26, 2021 ***14. Sponsoring Agency Code*** NRM-110
15. ***Supplementary Notes***		

16. Abstract

A 55/28, (61.90kph / 38.5 mph), 90^0 Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2021 Volkwagen ID.4 Pro SUV in accordance with the specifications of the Office of Crashworthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on July 7, 2021

The impact velocity of the Moving Deformable Barrier (MDB) was 61.92 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.1°C. The target vehicle's maximum post-test static crush was 203 mm located at level 3. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})	N/A	1000	76.207
Maximum Thoracic Rib Deflection	mm	44	20.931
Total Abdominal Force	N	2500	568.673
Pubic Symphysis Force	N	6000	1582.897

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC_{36})	N/A	1000	124.677
Lower Spine Resultant Acceleration	G	82	34.842
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2342.537
Maximum Thoracic Rib Deflection	mm	38*	5.068
Maximum Abdominal Rib Deflection	mm	45*	6.654

** Proposed IARV*

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

17. Key Words New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs	***18. Distribution Statement*** Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave. SE Washington, D.C. 20590

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UNCLASSIFIED	UNCLASSIFIED	223	

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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2020 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-14-D-00352. The purpose of this test is to generate comparative side impact performance in a 2021 Volkwagen ID.4 Pro SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated March 2020.

SECTION 2

SUMMARY OF TEST RESULTS

A 2021 Volkwagen ID.4 Pro SUV was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.92 km/h. The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by the Calspan Corporation's Transportation Test Operations Center in Buffalo, New York on July, 7, 2021. Pre-test and post-test photographs of the test vehicle, the MDB and the dummies (ES-2re and SID-IIs) are included in this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated March 2020. The side impact event was documented by 9 high-speed and 2 real-time cameras. Camera locations are included in this report.

The Dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)
Primary and redundant head CG tri-axial accelerometers
Chest upper rib, middle rib, and lower rib y-axis displacement potentiometers
Abdomen forward, middle, and rear y-axis load cells
Lower spine (T12) tri-axial accelerometers
Public symphysis y-axis load cell

PASSENGER ATD (SID-IIs)
Primary and redundant head CG tri-axial accelerometers
Chest upper rib, middle rib, and lower rib y-axis displacement potentiometers
Abdomen upper rib and lower rib y-axis displacement potentiometers
Lower spine (T12) tri-axial accelerometers
Acetabulum and iliac wing y-axis load cells

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

DUMMY INJURY VALUES

Measurement Description	Driver ATD (ES-2re)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	76.207
Maximum Thorax Rib Deflection	mm	44	20.931
Combined Abdominal Force	N	2500	568.673
Pubic Symphysis Force	N	6000	1582.897

Measurement Description	Passenger ATD (SID-IIs)		
	Units	Threshold	Result
Head Injury Criteria (HIC36)		1000	124.677
Lower Spine (T12) Resultant Acceleration	G	82	34.842
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2342.537
Maximum Thoracic Rib Deflection	mm	38*	5.068
Maximum Abdominal Rib Deflection	mm	45*	6.654

*Proposed IARV

SUPPLEMENTAL RESTRAINT INFORMATION

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

GENERAL COMMENTS:

1. P1 serial number – F033
2. P4 serial number – 300

Data Anomalies:

- 14HEADCG00S2AVXP,Rear Left Passenger Head Angular Rate X,Questionable data from 190 ms to 216 ms
- 10BPILLELO00ACYP,Left B-Pillar Lower Y Acceleration,Exceeded calibration range and saturated at 10.1 ms
- 10SECMLERE00ACYP,Left Rear Seat Track/Structure Y Acceleration,Exceeded calibration range at 19 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 System 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 – Test Vehicle Accelerometer Locations

Data Sheet No. 7 – MDB Accelerometer Locations

Data Sheet No. 8 – Post-Test Observations

Data Sheet No. 9 – MDB Summary of Results

Data Sheet No. 10 – Test Vehicle Profile Measurements

Data Sheet No. 11 – Test Vehicle Exterior Crush Measurements

Data Sheet No. 12 – MDB Exterior Static Crush Measurements

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Data Sheet No. 15 – Dummy/Vehicle Temperature and Humidity Stabilization Data

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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: 2021 Volkswagen ID. 4 SUV
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20215802
Test Date: 07/07/2021

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20215802	Traction Control System (TCS)	Yes
Model Year	2021	Auto-Leveling System	No
Make	Volkswagen	Automatic Door Locks (ADL)	Yes
Model	ID.4 Pro	Power Window Auto-Reverse	No
Body Style	SUV	Other Optional Feature	N/A
VIN	WVGRMPE23MPO36692	Driver Front Air bag	Yes
Body Color	Gray	Driver Curtain Air bag	Yes
Odometer Reading (km/mi)	30 miles	Driver Head/Torso Air bag	No
Engine Displacement (L)	EV	Driver Torso Air bag	No
Type/No. Cylinders	N/A	Driver Torso/Pelvis Air bag	Yes
Engine Placement	N/A	Driver Pelvis Air bag	No
Transmission Type	Automatic	Driver Knee Air bag	No
Transmission Speeds	Direct Drive	Rear Pass. Curtain Air bag	Yes
Overdrive	No	Rear Pass. Head/Torso Air bag	No
Final Drive	Rear Wheel Drive	Rear Pass. Torso Air bag	No
Roof Rack	No	Rear Pass. Torso/Pelvis Air bag	No
Sunroof/T-Top	No	Rear Pass. Pelvis Air bag	No
Running Boards	No	Driver Seat Belt Pretensioners	Yes
Tilt Steering Wheel	Yes	Rear Pass. Seat Belt Pretensioners	Yes
Power Seats	Partial	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Rear Pass. Load Limiter	Yes
		Other Safety Restraint	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Volkswagen	GVWR (kg)	2560
Date of Manufacture	04/21	GAWR Front (kg)	1130
Vehicle Type	MPV	GAWR Rear (kg)	1480

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	0	5	
Capacity Weight (VCW) (kg)				430	(A)
DSC X 68.04 kg				340.2	(B)
Cargo Weight (RCLW) (kg)				89.8	(A-B)

VEHICLE SEAT TYPE

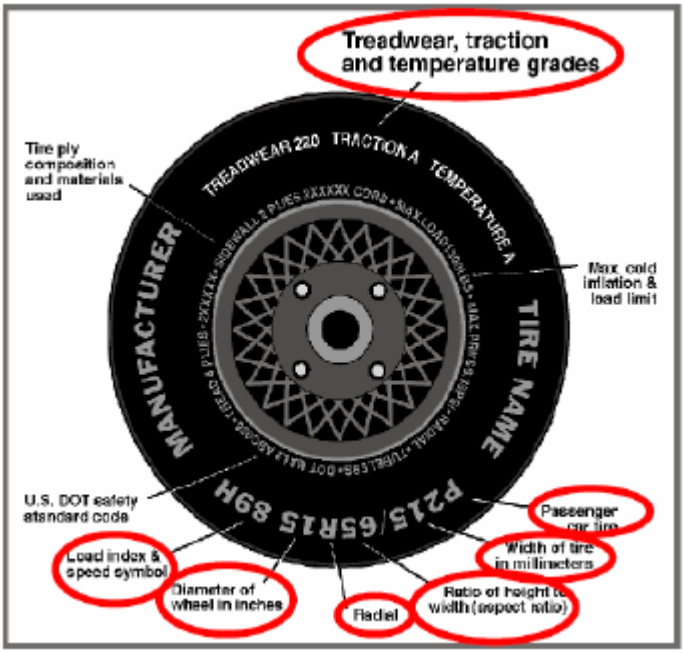
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable W/ Lever	Adjustable W/ Knob
Front Seat	X						X
Rear or Second Row Seat			X		X		
Third Row seat							

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

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

VEHICLE TIRE INFORMATION

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



TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	340	340
Cold Pressure (kPa)	290	290
Recommended Tire Size	235/55 R19 105T XL	255/50 R19 107T XL
Tire Size on Vehicle	235/55 R19 105T XL	255/50 R19 107T XL
Tire Manufacturer	Hankook	Hankook
Tire Model	Kinergy AS X ev	Kinergy AS X ev
Treadwear	500	500
Traction	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Steel, 2 Polyester, 1 Nylon	2 Steel, 2 Polyester, 1 Nylon
Tire Plies Body	2 Polyester	2 Polyester
Load Index/Speed Symbol	105T	107T
Tire Material	Rubber	Rubber
DOT Safety Code Left	15M98 9V HO 5120	15M7F 9V HO 5020
DOT Safety Code Right	15M98 9V HO 5120	15M7F 9V HO 5020

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

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	290	290	290	290
Tire Placard	kPa	290	290	290	290
Owner's Manual	kPa	290	290	290	290
As Tested	kPa	290	290	290	290

MDB TIRE SPECIFICATIONS

	Units	Requirement	LF	RF	LR	RR
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21	200	200	200	200

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	499	553		542	633		532	658	
Right	kg	496	546		512	618		512	611	
Ratio	%	47.5	52.5		1054	1251		45.1	54.9	
Totals	kg	995	1099	2094	45.7	54.3	2305	1044	1269	2313

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2094	(A)
Sum of Actual Weight of 1 ES2re and 1 P572 ATD (SID-IIs)	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	89.9	(C)
Calculated Target Vehicle Test Weight (TVTW)	kg	2310.8	(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)? [X] **Yes** [ ] **No**

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Requirement**
LF	mm	864	856	Yes
RF	mm	866	858	Yes
RR	mm	863	859	Yes
LR	mm	858	853	Yes
Vehicle CG (Aft of Front Axle)	mm	1519	1502	
Vehicle CG (Left(+)/Right(-) from Longitudinal Centerline)	mm	+23	+15	

**** The "As Tested" vehicle attitude measurements must be equal to or within ± 10mm of the "Fully Loaded" vehicle attitude measurements at each wheel well. Indicate "Yes" or "No" for "Meets Requirements".*

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

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

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Ballast / Equipment Added	31.8

TEST SURFACE MARKINGS

	Distance from 63° Impact Angle Line (mm)
Fore 25 mm target	1135
Aft 25 mm target	1134
Pre-Impact Angle Line	236

Parallel Track Target	X Location (mm)	Y Location (mm)
A	0	0
B	2955	1555
C	2955	4455
D	0	3000

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

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	18.8	14.6	16.7
Front Passenger Seat	19.7	15.3	17.5
Front Center Seat*	N/A	N/A	N/A
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed

**if applicable*

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore/Aft	Forward-Most
Driver Seat	16.7	25	Max	-	-	-
			Mid	-	-	-
			Min	20	25	30
Front Passenger Seat	17.5	25	Max	-	-	-
			Mid	-	-	-
			Min	20	25	30
Front Center Seat*	N/A	N/A	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	-	-	-

**if applicable*

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

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

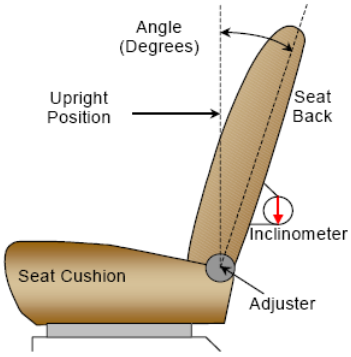
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	248	37 (0-36)	124	18
Front Passenger Seat	248	37 (0-36)	124	18
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

**if applicable*

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. 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 seat back is positioned such that the dummy's head is level. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as the struck-side rear seat back.



FRONT SEAT ASSEMBLY

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/ Seated Dummy	N/A	Powered	15.8	Powered
Front Passenger Seat	N/A	Powered	16.0	Powered
Front Center Seat*	-	-	-	-
Struck Side Rear Seat w/ Seated Dummy	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat*	Fixed	Fixed	Fixed	Fixed

**if applicable*

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

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. For this test zero is defined as the uppermost position.

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

HEAD RESTRAINT ADJUSTMENT

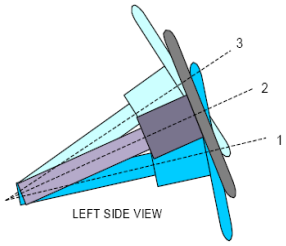
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	5 (0-4)	0 (Uppermost)
Rear Seat	2 (0-1)	(Lowest)

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	18.7	
Geometric Center – Position 2	21.4	
Uppermost – Position 3	24.0	
Telescoping Steering Wheel Travel		60
Test Position	21.4	30

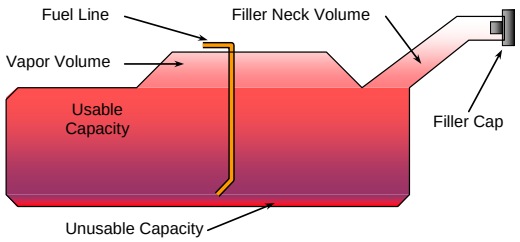


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

The vehicle is a full electric vehicle.



VEHICLE FUEL TANK ASSEMBLY

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

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

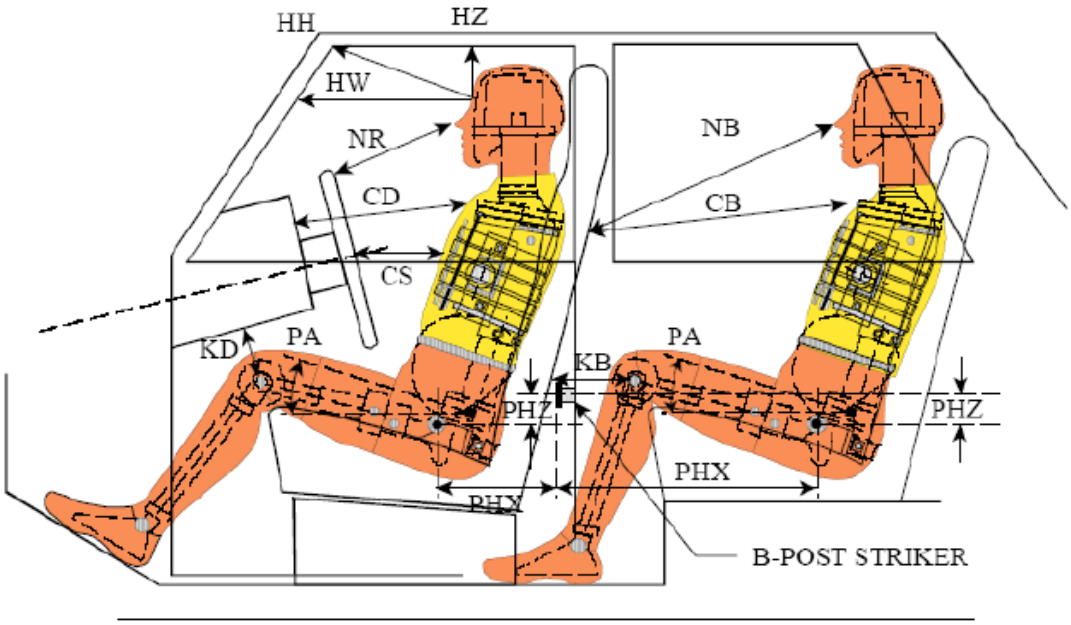
FUEL TANK CAPACITY

	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% ± 1% of the Usable Capacity stated in Form No. 1? ☐ **Yes** ☐ **No**

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021



NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

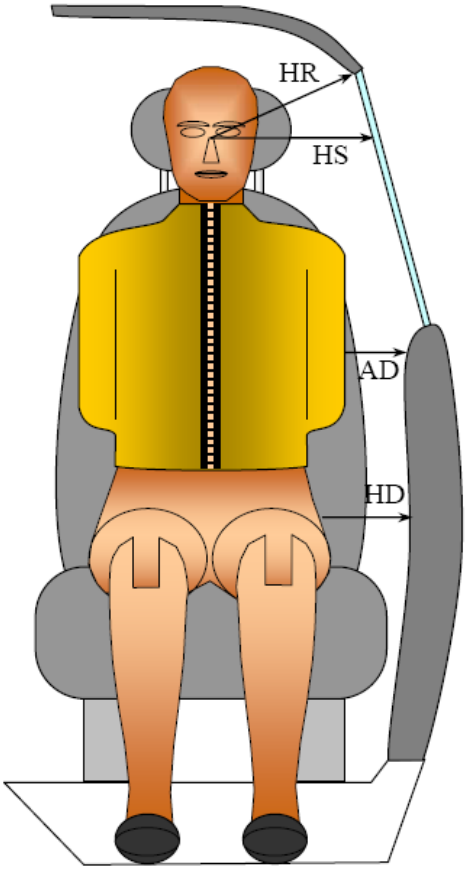
LEFT SIDE VIEW

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver (Serial No. F033)		Passenger (Serial No. 300)	
			Length (mm)	Angle	Length (mm)	Angle
HH		Header to Header	374			
HW		Header to Windshield	718			
HZ	HZ	Head to Roof Liner	196		286	
NR	NB	Nose to Rim/Seat Back	418		637	
CD	CB	Chest to Dash/Seat Back	579		652	
CS		Chest to Steering Wheel	381			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	232	27.2	330	0.8
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	235	27.9	332	0.5
PAX°	PAX°	Pelvic Tilt Angle X		20.0		22.4
	PAY°	Pelvic Tilt Angle Y				0.2
PHX	PHX	Hip Point to Striker (X-Axis)	176		186	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	220		231	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021



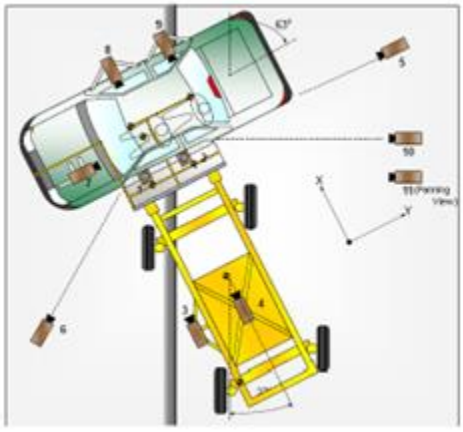
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F033)	Passenger (Serial No. 300)
HR	Head to Side Header	mm	220	263
HS	Head to Side Window	mm	342	355
AD	Arm to Door	mm	113	160
HD	Hip Point to Door	mm	158	148

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2021 Volkswagen ID. 4 SUV NHTSA No.: M20215802
Test Program: NCAP Side MDB Impact Test Test Date: 07/07/2021



CAMERA LOCATIONS AND DATA

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	0	0	-8385	12.5	1000
2	Overhead Close-up	0	0	-8385	24	1000
3	Left Impact Point (MDB)				25	1000
4	Side Overall (MDB)				8	1000
5	Rear	0	8705	-1253	28	1000
6	Left Front	-3807	-4276	-1226	24	1000
7	Driver Front (OB)				25	1000
8	Driver Side (OB)				12.5	1000
9	Passenger Side (OB)				12.5	1000
10	Real-time Left Rear				Zoom	30
11	Real-time In run				Zoom	30

Notes: *Reference: Impact Point projected to Ground*
+X = To Front of MDB, +Y = To Right of MDB, +Z = Down
**All measurements accurate to ± 6 mm.*

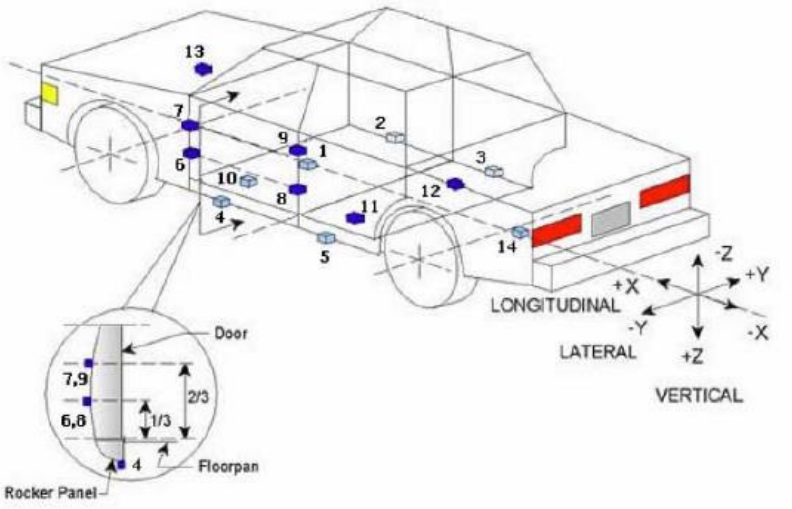
If applicable, explain why camera(s) did not operate as intended: All cameras operated normally

INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	22
Vehicle Structure Accelerometers	24
MDB Accelerometers	7
Total	69

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021



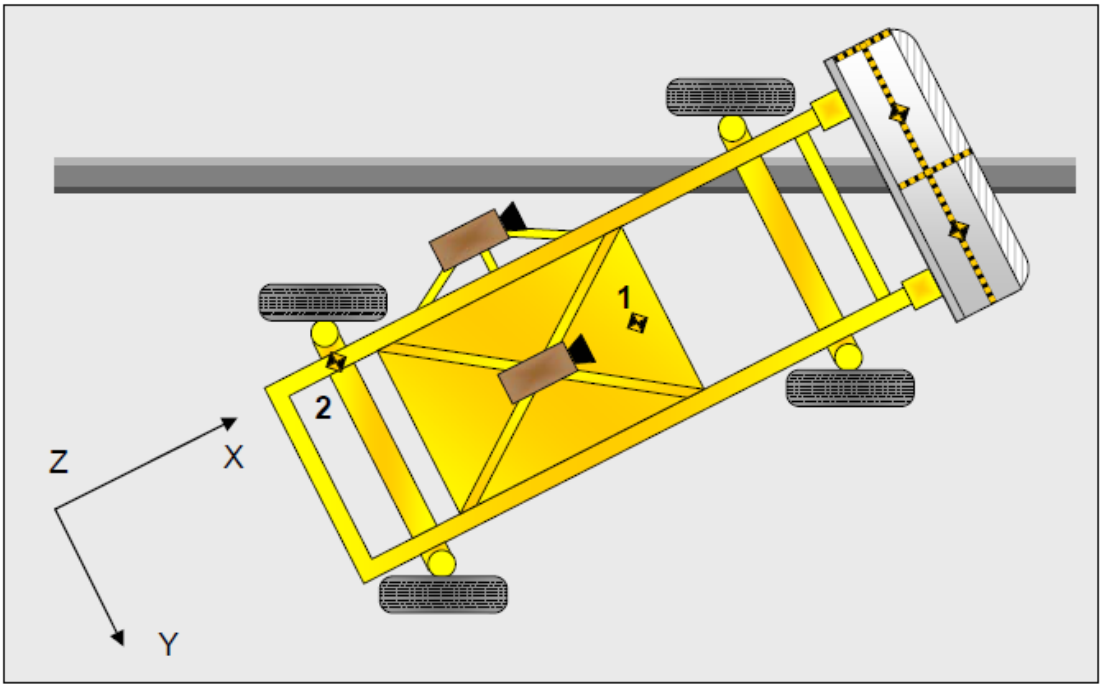
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2457	-2	-51
2	Right Sill at Front Seat	2750	653	26
3	Right Sill at Rear Seat	1840	660	26
4	Left Sill at Front Door	2754	-654	34
5	Left Sill at Rear Door	1842	-655	34
6	A-Post Lower	3311	-627	-225
7	A-Post Middle	3204	-666	-686
8	B-Post Lower	2134	-686	-361
9	B-Post Middle	2088	-662	-649
10	Front Seat Track	2243	-601	15
11	Rear Seat Structure	1616	-645	-160
12	Rt. Rear Occ. Compartment	2047	393	75
13	Engine Block	3846	49	-506
14	Rear Above Axle	990	-1	-145

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

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021



MDB ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	MDB CG	1859	0	-330
2	MDB Rear	386	-660	-660

Reference: X – Face of MDB (+ forward)
Y – MDB centerline (+ to right)
Z – Ground plane (+ down)

Width between left and right contact switches (mm): 1464

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	None
Top of Head	Side Header	Curtain Airbag, P5 Head Restraint
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Head Restraint	Curtain Airbag, P5 Head Restraint
Left Shoulder	Curtain Airbag	Left Rear Passenger Door
Upper Torso	Torso/Pelvis Airbag, Seatback	Interior Trim, Left Rear Passenger Door
Lower Torso	Torso/Pelvis Airbag, Seatback	Left Rear Passenger Door
Left Hip	Driver Door, Seat Pan	Seat Pan, Left Rear Passenger Door
Left Knee	None	None

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)	N/A	N/A	N/A	N/A	N/A

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	B-Pillar Buckled
Sill Separation	None
Windshield Damage	None
Side Window Damage	Driver and Rear Passenger Window Shattered Completely
Other Notable Effects	None

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

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2768
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		444
Actual Impact Point (Aft of Frontal Axle)	mm		450
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	-6
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	0

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1,250
Overall Length Including Honeycomb Frame	4,120
Wheelbase of Framework Carriage	2,600
CG Location of Front Axle	1,120

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	392.5	297.5	690
Right	kg	386.0	291.5	677.5
Ratio	%	57.4	42.6	100.0
Totals	kg	778.5	589.0	1367.5

SPEED AND ANGLE AT IMPACT DATA

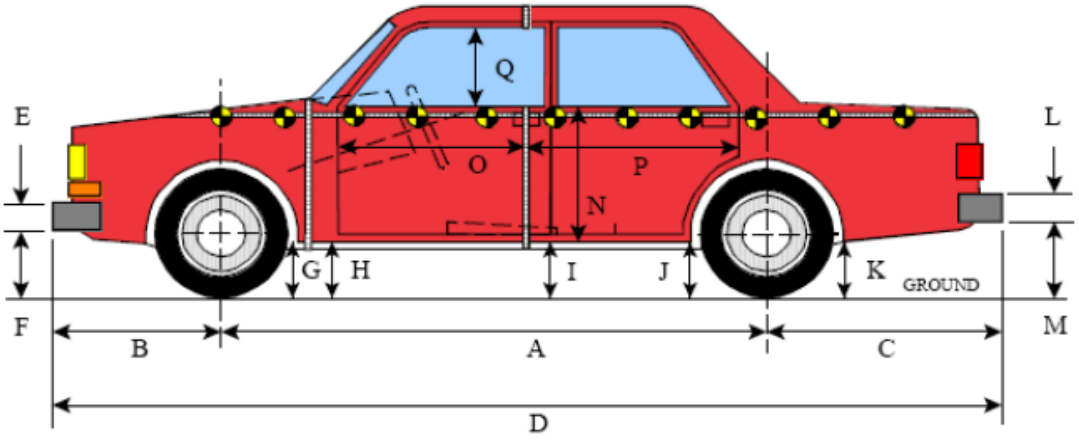
Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.10 to 62.70	61.92
Trap No. 2 Velocity (Redundant)	km/h	61.10 to 62.70	61.92
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.0

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	430	800	Left	301
B	Top of Bumper	542	800	Left	208
C	Mid-Level	682	800	Left	224
D	Top of Stack	811	800	Left	207

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021



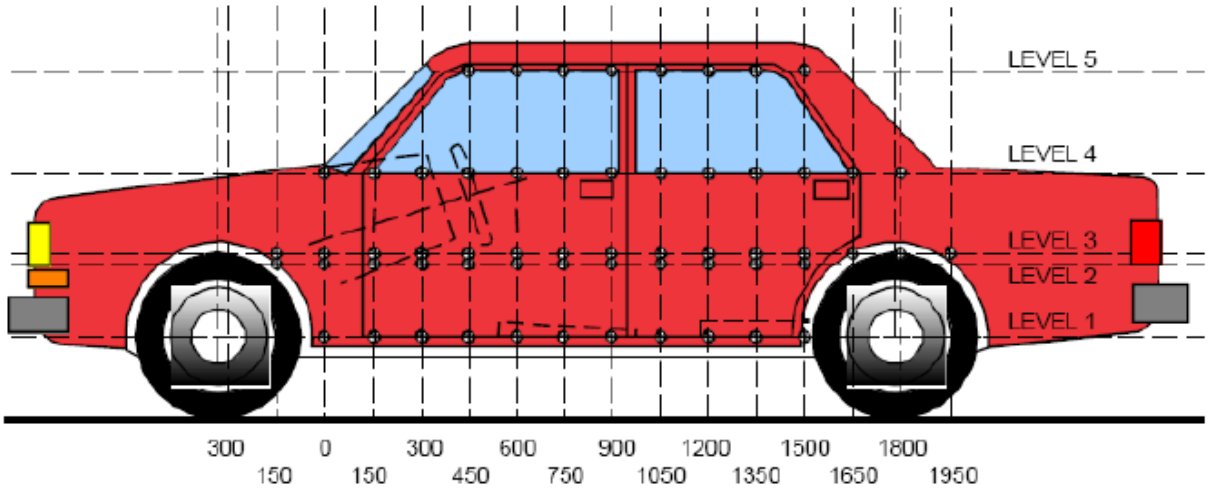
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2768	2747	-21
B	Front Axle to FSOV	853	877	24
C	Rear Axle to RSOV	964	961	-3
D	Total Length at Centerline	4586	4585	-1
E	Front Bumper Thickness	155	155	0
F	Front Bumper Bottom to Ground	446	446	0
G	Sill Height at Front Wheel Well	193	203	10
H	Sill Height at Front Door Leading Edge	203	201	-2
I	Sill Height at B Pillar	199	203	4
J1	Sill Height at Rear Wheel Well	210	210	0
J2	Pinch Weld Height at Rear Wheel Well	193	199	6
K	Sill Height Aft of Rear Wheel Well	238	245	7
L	Rear Bumper Thickness	85	85	0
M	Rear Bumper Bottom to Ground	418	425	7
N	Sill Height to Window Bottom of Front Window Sill	864	852	-12
O	Front Door Leading Edge to Impact CL	734	734	0
P	Rear Door Trailing Edge to Impact CL	1407	1344	-63
Q	Front Window Opening	446	455	9
R	Right Side Length	4480	4480	0
S	Left Side Length	4475	4475	0
T	Maximum Vehicle Width	1835	1737	-98

DATA SHEET NO. 11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	304	15	300
2	Driver Hip Point	mm	637	195	1650
3	Mid-Door	mm	728	203	1650
4	Window Sill	mm	1083	84	1650
5	Window Top	mm	1557	2	1950

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. 11 … (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2021 Volkswagen ID. 4 SUV NHTSA No.: M20215802
Test Program: NCAP Side MDB Impact Test Test Date: 07/07/2021

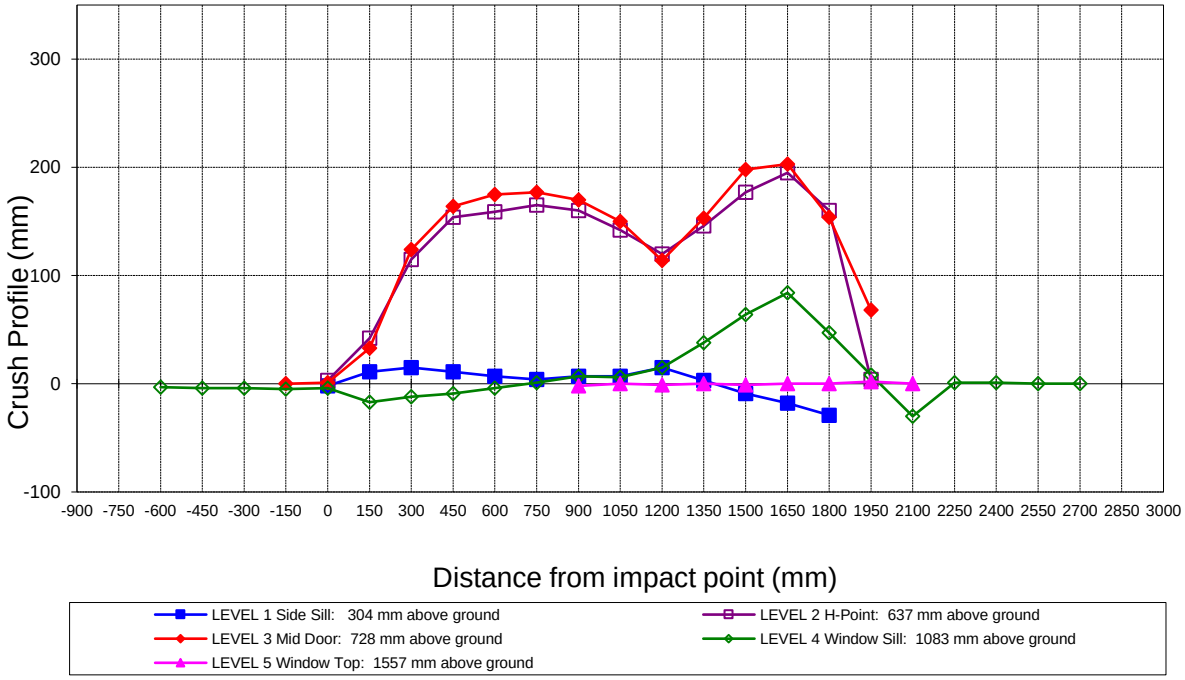
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600				746					749					-3	
-450				781					785					-4	
-300				805					809					-4	
-150			927	813				927	818				0	-5	
0	900	923	923	818		902	920	926	822		-2	3	-3	-4	
150	898	919	922	821		887	877	889	838		11	42	33	-17	
300	895	916	921	821		880	801	797	833		15	115	124	-12	
450	886	915	920	816		875	761	756	825		11	154	164	-9	
600	885	913	919	821		878	754	744	825		7	159	175	-4	
750	883	910	917	828		879	745	740	827		4	165	177	1	
900	884	907	915	832	606	877	747	745	825	608	7	160	170	7	-2
1050	882	905	913	835	621	875	763	763	829	621	7	142	150	6	0
1200	880	905	912	838	623	865	785	798	823	624	15	120	114	15	-1
1350	880	905	911	838	622	877	759	758	800	622	3	146	153	38	0
1500	880	905	909	839	617	889	728	711	775	618	-9	177	198	64	-1
1650	889	905	908	838	613	907	710	705	754	613	-18	195	203	84	0
1800	888	907	910	843	604	917	747	756	796	604	-29	160	154	47	0
1950		907	909	859	592		903	841	851	590		4	68	8	2
2100				869	571				899	571				-30	0
2250				870					869					1	
2400				866					865					1	
2550				854					854					0	
2700				836					836					0	
2850															
3000															

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 test based on an estimated impact point.

DATA SHEET NO. 11 (CONTINUED)
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

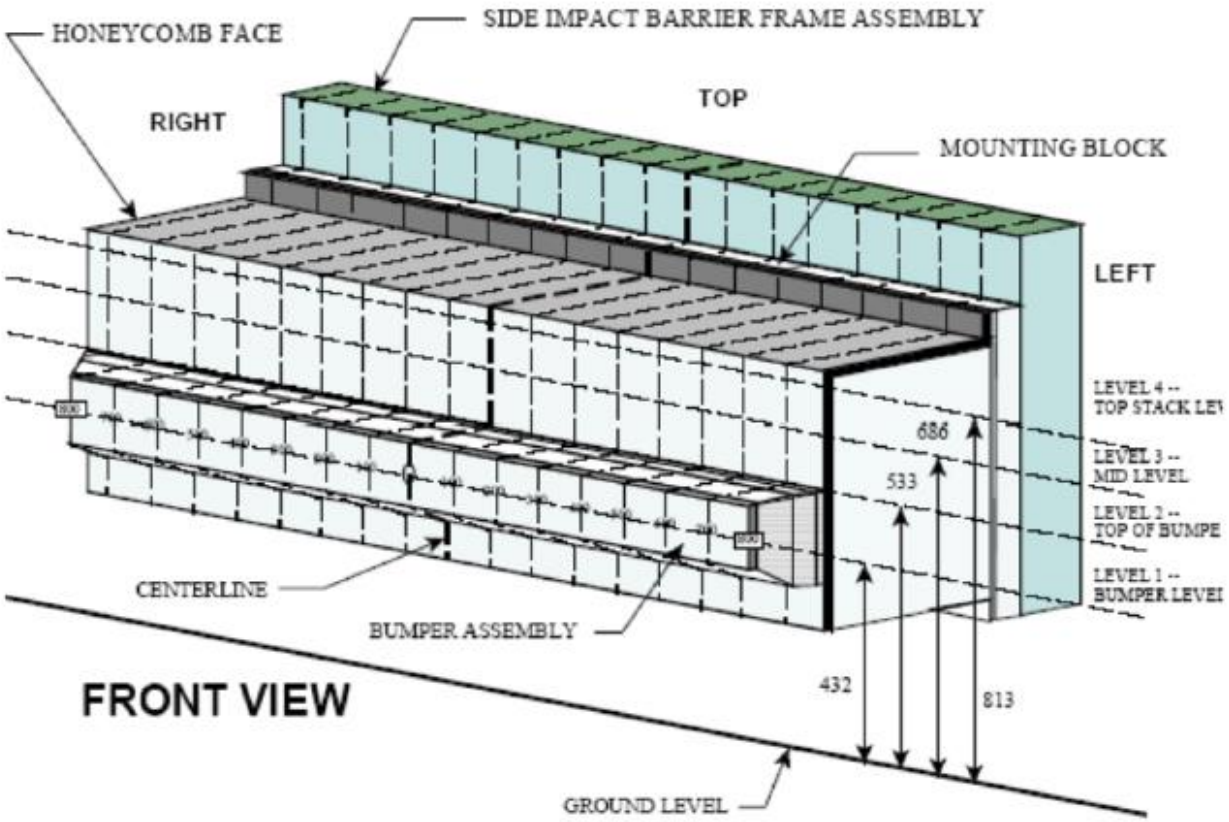
Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO. 12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021



NOTE: Dimensions are shown in millimeters, mm

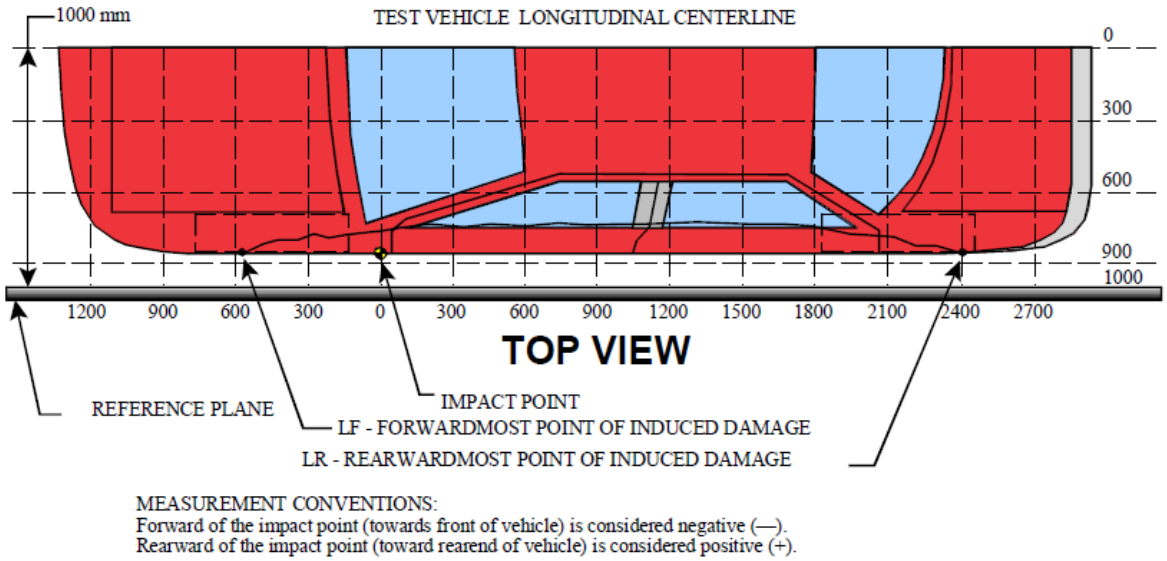
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	292	261	262	263	265	268	270	268	262	257	252	252	252	252	253	258	301
2	153	158	152	150	159	178	160	154	153	154	151	151	151	151	152	160	208
3	81	68	72	88	109	120	127	102	81	70	66	66	71	81	101	154	224
4	97	62	61	88	128	168	146	114	94	73	80	85	91	104	111	144	207

DATA SHEET NO. 13
VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

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



MEASUREMENT CONVENTIONS:
Forward of the impact point (towards front of vehicle) is considered negative (—).
Rearward of the impact point (toward rearend of vehicle) is considered positive (+).

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-150	3	73	73	0
2	270	3	185	79	106
3	690	3	258	82	176
4	1110	3	223	87	136
5	1530	3	290	91	199
6	1950	3	159	91	68

MDB DAMAGE PROFILE DISTANCES

DPD	Distance From Center of MDB	Level	Post-Test (mm)*
1	800 mm left of center	1	301
2	480 mm left of center	1	252
3	160 mm left of center	1	254
4	160 mm right of center	1	269
5	480 mm right of center	1	263
6	800 mm right of center	1	292

DATA SHEET NO. 14
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021
Test Time:	1:11 PM	Temperature:	21.1˚C

A. From impact until vehicle motion ceases: (Maximum allowable is 1 oz.) — N/A oz.

B. For the 5-minute period after motion ceases: (Maximum allowable is 5 oz.) — N/A oz.

C. For the following 25 minutes: (Maximum allowable is 1 oz./minute) — N/A oz.

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°	N/A	300	N/A
90° to 180°	N/A	300	N/A
180° to 270°	N/A	300	N/A
270° to 360°	N/A	300	N/A

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

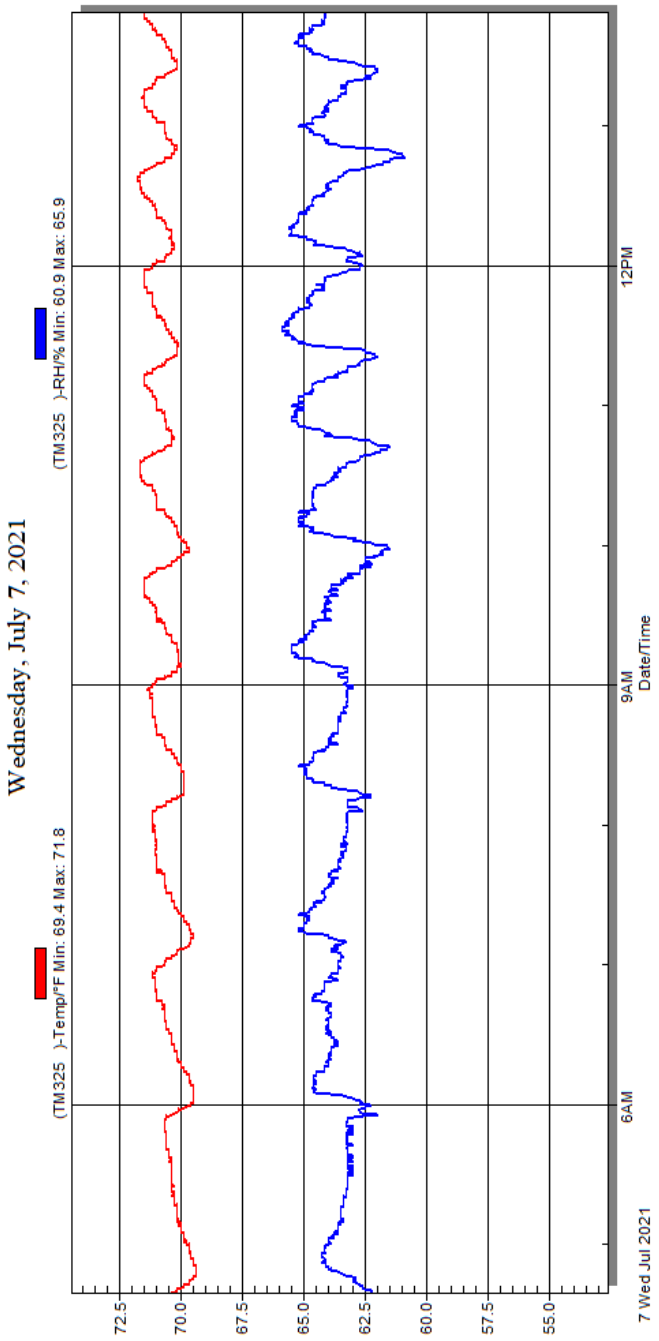
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

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. 15
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021



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:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

ELECTRIC VEHICLE PROPULSION SYSTEM

Measured Parameter	Value
Type of Electric Vehicle (Electric/Gas-Electric Hybrid/Fuel Cell-Electric Hybrid)	Electric
Propulsion Battery Type	Lithium-Ion
Nominal Voltage (Volts)	352
Is this Vehicle equipped with an Automatic Propulsion Battery Disconnect?	Yes
Physical Location of Automatic Propulsion Battery Disconnect, if applicable	Inside the high voltage battery housing
Auxiliary Battery Type	AGM 12V

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED)

Measured Parameter	Value
Electrolyte Fluid Type	LiPF6 + EC + EMC
Electrolyte Fluid Specific Gravity	1.29 g/cm^3
Electrolyte Fluid Kinematic Viscosity (centistokes)	3.19 mm^2/sec
Electrolyte Fluid Color	Clear and Colorless
Propulsion Battery Coolant Type, Color and Specific Gravity (if applicable)	G12evo,Pink (Magenta)
Location of Battery Modules (Inside or Outside of Passenger Compartment?)	Outside Passenger Compartment

PROPULSION BATTERY STATE OF CHARGE

Measured Parameter	Units	Value
For all battery types: 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 batteries that are rechargeable ONLY by an energy source on the vehicle: Voltage range corresponding to **useable energy** of the battery :		
Minimum State of Charge	V	240
Maximum State of Charge	V	408
95% of Maximum	V	388
Test Voltage *	V	390.8

* *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:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

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

Measured Parameter	Value
Details of Vehicle Chassis Ground Points & Locations	Ground wire was attached to the under hood cross brace on the vehicle body.
Details of Propulsion Battery Components	All battery components are internal to the battery located on the underside of the vehicle.

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

Test Vehicle:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587 FC
Serial No.		49210189
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		01/19/2021

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 M Ω*
- *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	288
Propulsion Battery Voltage : (ready to drive position)	V_b	V	390.8
Propulsion Battery to Vehicle Chassis	V_1	V	176
Propulsion Battery to Vehicle Chassis	V_2	V	60.3
Propulsion Battery to Vehicle Chassis Across Known Resistor	R_o	Ω	200,300
Propulsion Battery to Vehicle Chassis with R_o installed	V_1'	V	18.27
Propulsion Battery to Vehicle Chassis with R_o installed	V_2'	V	26.2
$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$	R_{i1}	Ω	2,321,709
$R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$	R_{i2}	Ω	1,021,599
Lesser value of R_{i1} and R_{i2}	R_i	Ω	1,021,599
Electrical Isolation Value (Minimum E.I. Value is 500 Ω/V)	R_i/V_b	Ω/V	2,614

Is the Electrical Isolation Value ≥ 500 Ω/V (Yes/No)? Yes 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 Ro (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:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587 FC
Serial No.		49210189
Internal Impedance Value	MΩ	10
Nominal Propulsion Battery Voltage (V_b)	V	0.01

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 M Ω*
- *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 =	0.392	V	Time:	2	Minutes	38	Seconds
V_2 =	0.471	V	Time:	2	Minutes	45	Seconds
$R_{o\,=}$	200,300	Ω	Time:		Minutes		Seconds
V_1' =	0.041	V	Time:	2	Minutes	51	Seconds
V_2' =	0.05	V	Time:	2	Minutes	56	Seconds
R_{i1} =	3,775,104	Ω	Time:	2	Minutes	56	Seconds
R_{i2} =	3,090,174	Ω	Time:	2	Minutes	56	Seconds
R_i =	3,090,174	Ω	Time:	2	Minutes	56	Seconds
R_i/V_b =	309,017,397	Ω/V	Time:	2	Minutes	56	Seconds

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

NOTES:

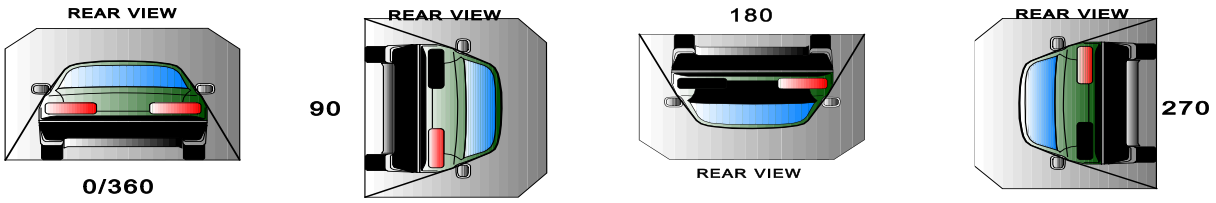
- *R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1'], R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2'], R_i = Lesser value of R_{i1} and R_{i2}*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*
- *Minimum Electrical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

. PROPULSION BATTERY SYSTEM COMPONENTS

Measured Parameter	Comments	Passed	Failed
Propulsion Battery Module movement within the passenger compartment	No Movement	X	
Intrusion of an outside Propulsion Battery Component into the passenger compartment	No Intrusion	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:	2021 Volkswagen ID. 4 SUV	NHTSA No.:	M20215802
Test Program:	NCAP Side MDB Impact Test	Test Date:	07/07/2021



Rear View

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	Minutes	Seconds	Minutes
0° to 90°	1	11	5	6	11	7
90° to 180°	1	3	5	6	3	7
180° to 270°	1	3	5	6	3	7
270° to 360°	1	9	5	6	9	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)	X	No
Is propulsion battery electrolyte spillage visible in the passenger compartment?		Yes (Fail)	X	No

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587 FC
Serial No.		49210189
Internal Impedance Value	MΩ	10
Nominal Propulsion Battery Voltage (V_b)	V	0.002

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 M Ω*
- *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: 2021 Volkswagen ID. 4 SUV
NHTSA No.: M20215802
Test Program: NCAP Side MDB Impact Test
Test Date: 07/07/2021

ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Parameter	Rollover Stage	Value	Units		Minutes	Seconds
V_1 =	90°	0.043	V	Time:	1	49
	180°	0.027	V		8	31
	270°	0.025	V		14	29
	360°	0.017	V		21	00
V_2 =	90°	0.001	V	Time:	2	02
	180°	0.003	V		8	42
	270°	0.005	V		14	39
	360°	0.003	V		21	11
V_1' =	90°	0.002	V	Time:	2	13
	180°	0.002	V		8	52
	270°	0.002	V		15	05
	360°	0.001	V		21	26
V_2' =	90°	0.002	V	Time:	2	45
	180°	0.001	V		9	26
	270°	0.001	V		15	42
	360°	0.001	V		21	40
R_{i1} =	90°	4201642	Ω	Time:	2	54
	180°	2781944	Ω		9	26
	270°	2764140	Ω		15	42
	360°	3770353	Ω		21	55
R_{i2} =	90°	4406600	Ω	Time:	3	02
	180°	4006000	Ω		9	33
	270°	4807200	Ω		15	46
	360°	2670667	Ω		22	12
R_i =	90°	4201642	Ω	Time:	3	04
	180°	2781944	Ω		9	37
	270°	2764140	Ω		15	51
	360°	2670667	Ω		22	18
R_i/V_b =	90°	2100820930	Ω/V	Time:	3	07
	180°	1390972222	Ω/V		9	41
	270°	1382070000	Ω/V		15	53
	360°	1335333333	Ω/V		22	23

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

APPENDIX A

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

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

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Figure A-10: Post-Test Left Rear ¾ View of Test Vehicle

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

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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 the Test Area

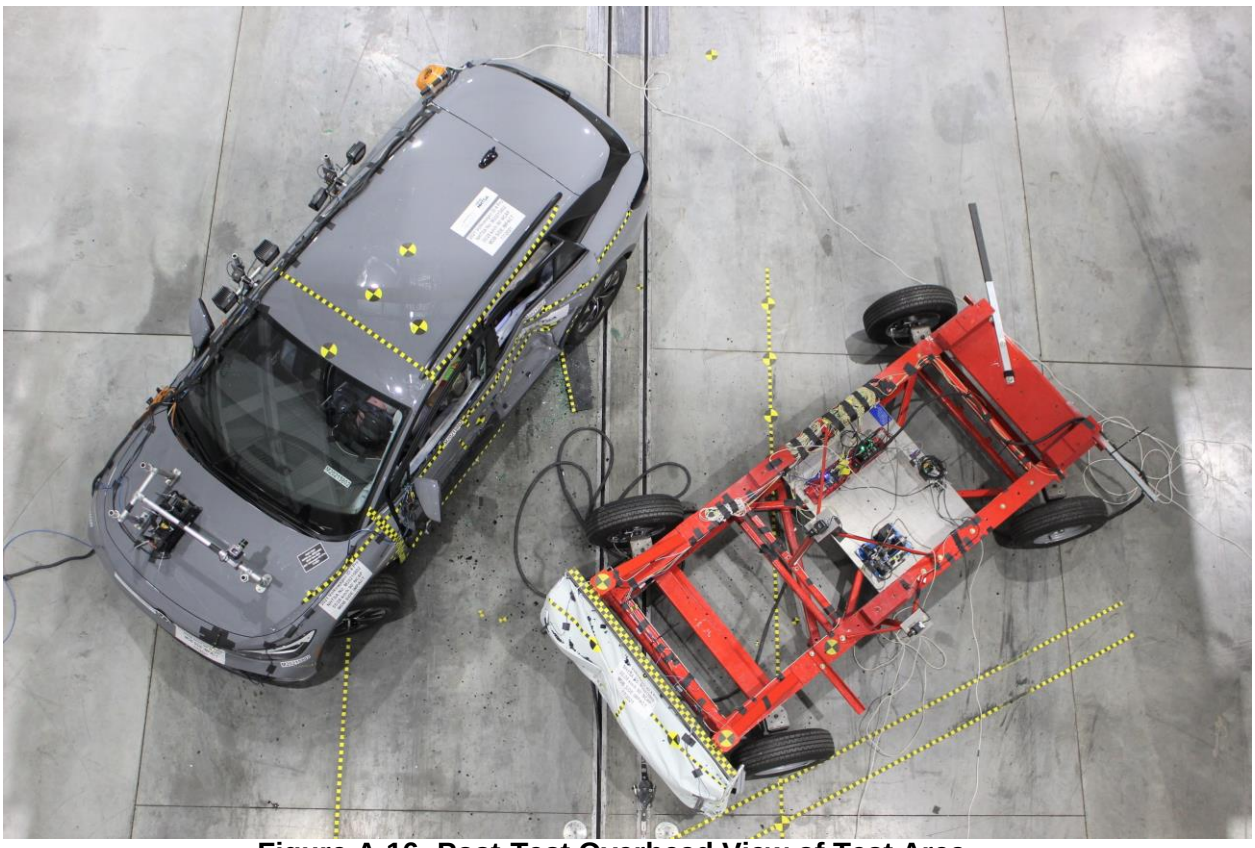

Figure A-16: Post-Test Overhead View of Test Area

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

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

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Figure A-20: Post-Test Close-up View of Impact Point Target

Figure A-21: Pre-Test Left Front Door Latch Close-Up

Figure A-22: Post-Test Left Front Door Latch Close-Up

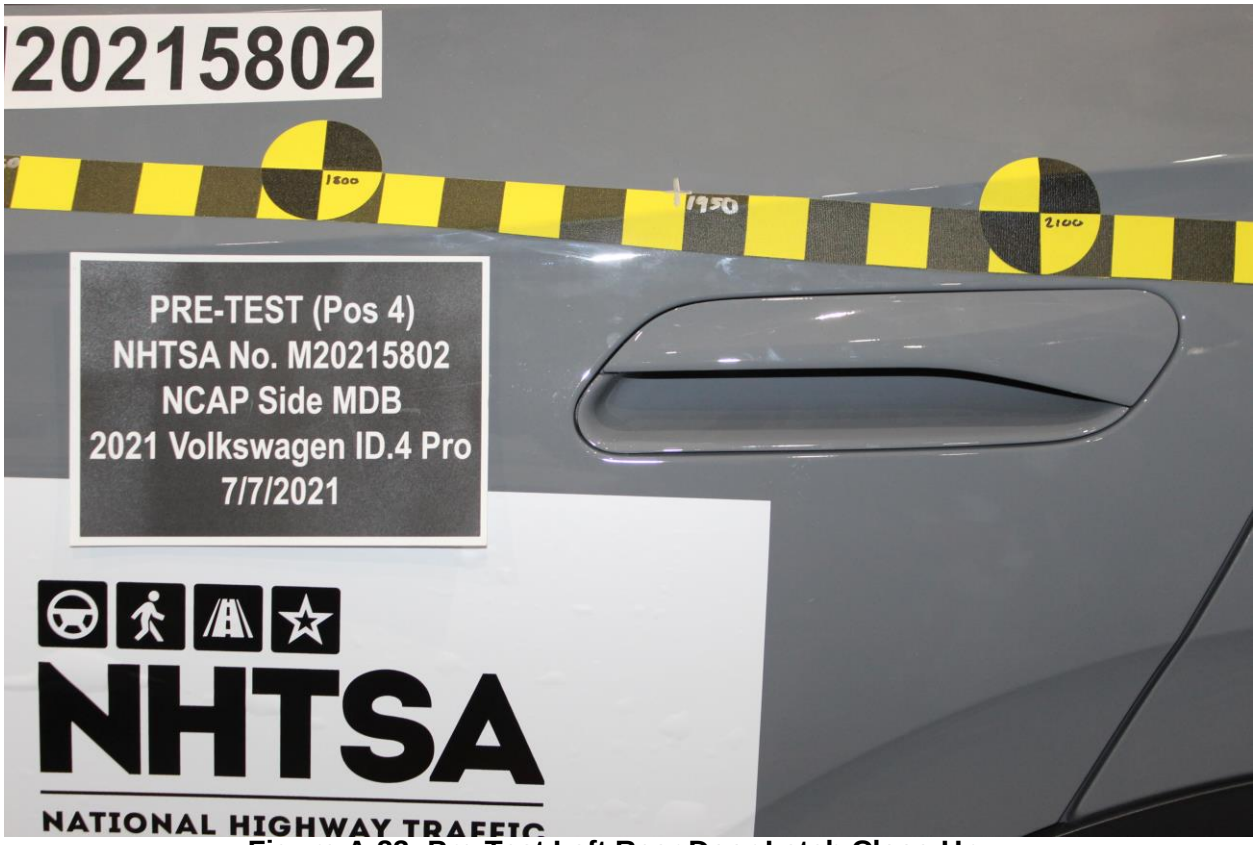

Figure A-23: Pre-Test Left Rear Door Latch Close-Up

Figure A-24: Post-Test Left Rear Door Latch Close-Up

Figure A-25: Pre-Test Front Close-up View of Driver Dummy

Figure A-26: Post-Test Front Close-up View of Driver Dummy

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Figure A-31: Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint

Figure A-32: Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning

Figure A-33: Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan

Figure A-34: Pre-Test Placement of Driver Dummy's Feet

Figure A-35: Pre-Test View of Belt Anchorage for Driver Dummy

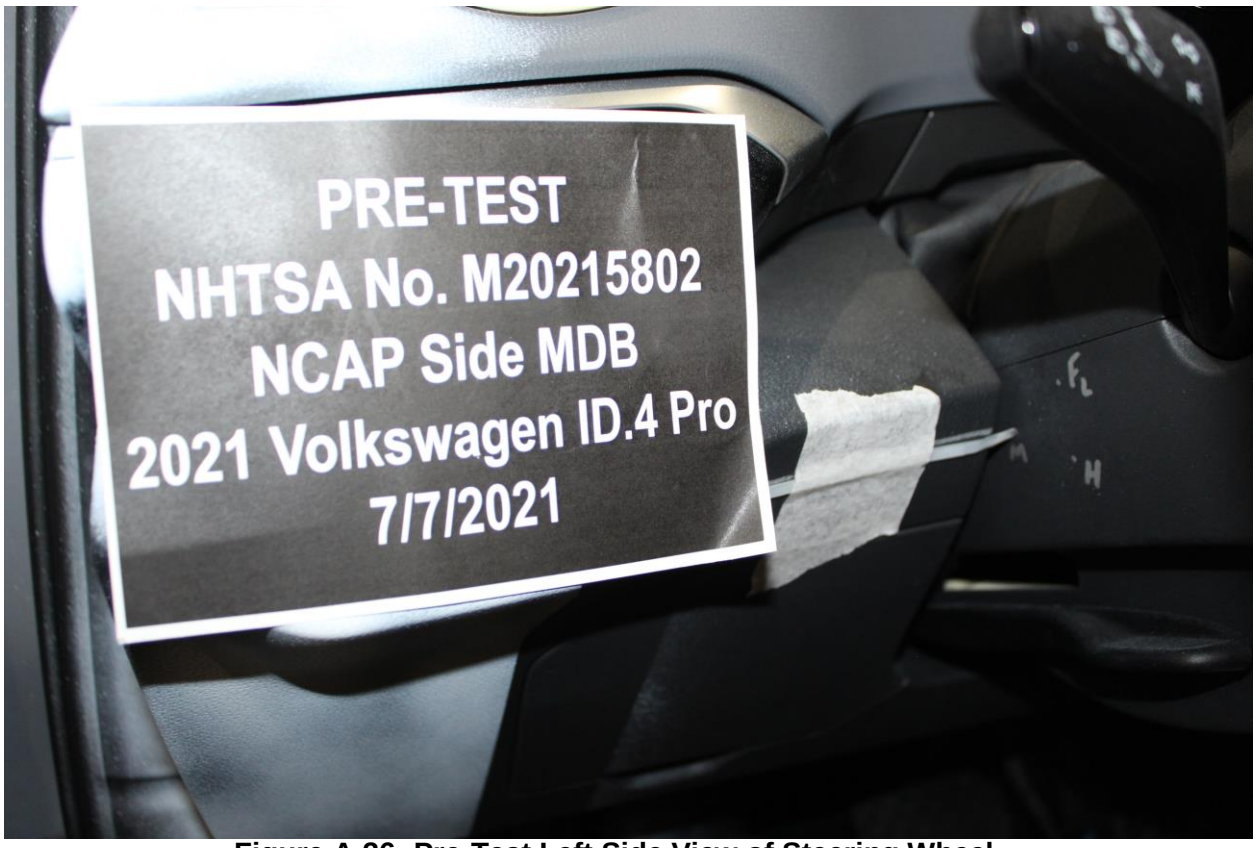

Figure A-36: Pre-Test Left Side View of Steering Wheel

Figure A-37: View of Disengaged Parking Brake

Figure A-38: Pre-Test View of Parking Brake

Figure A-39: Pre-test Close-Up Left Side View of Driver Seat Track

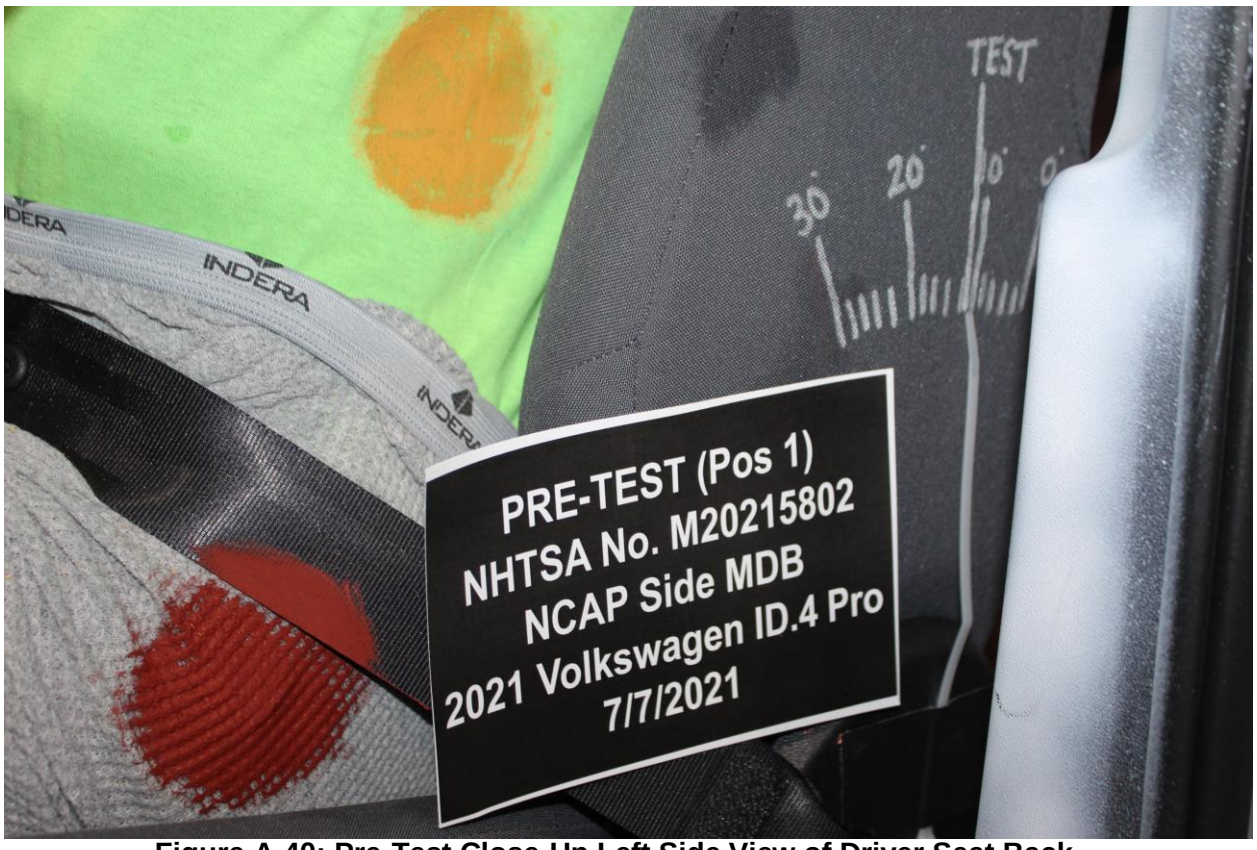

Figure A-40: Pre-Test Close-Up Left Side View of Driver Seat Back

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Figure A-44: Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

Figure A-45: Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

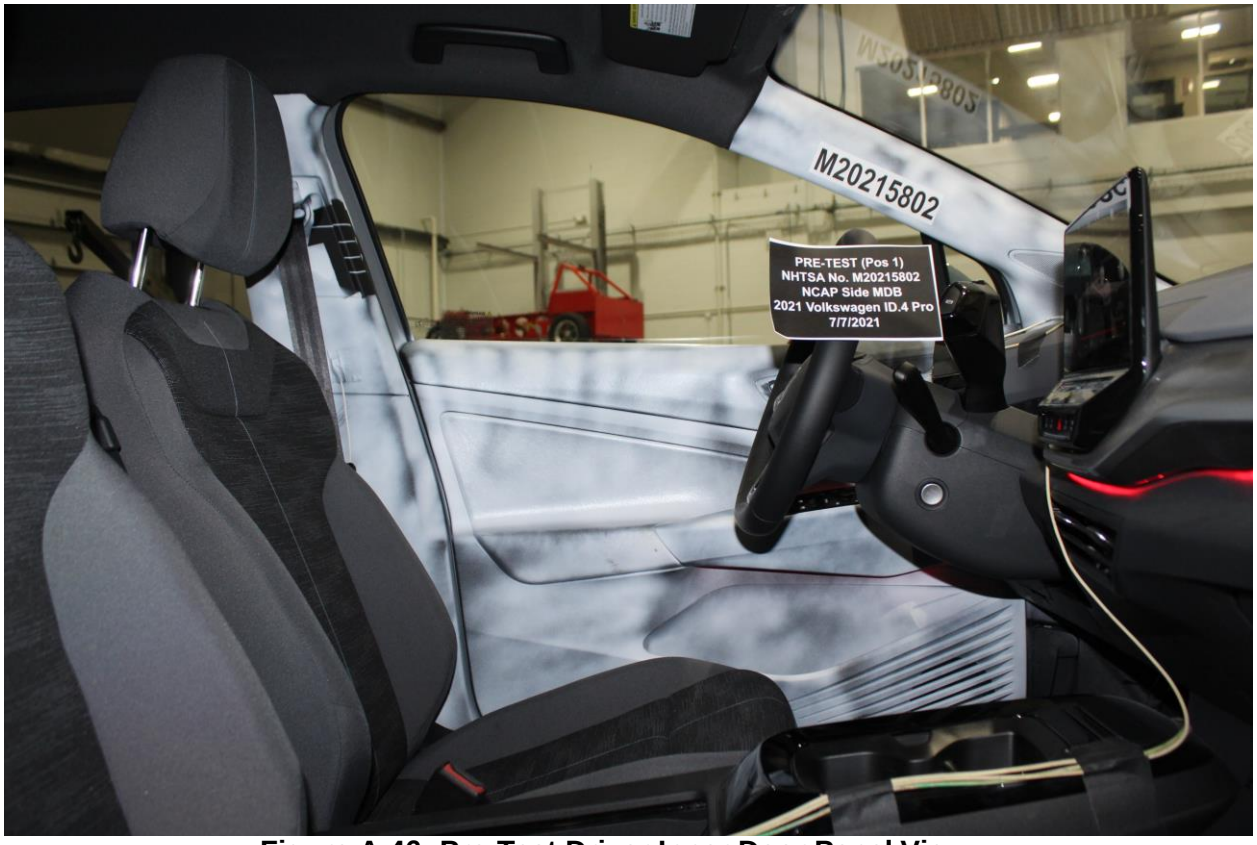

Figure A-46: Pre-Test Driver Inner Door Panel View

Figure A-47: Post-Test Driver Inner Door Panel View Showing Driver Dummy Contact Locations

Figure A-48: Post-Test Driver Dummy Close-Up Head Contact with Vehicle View

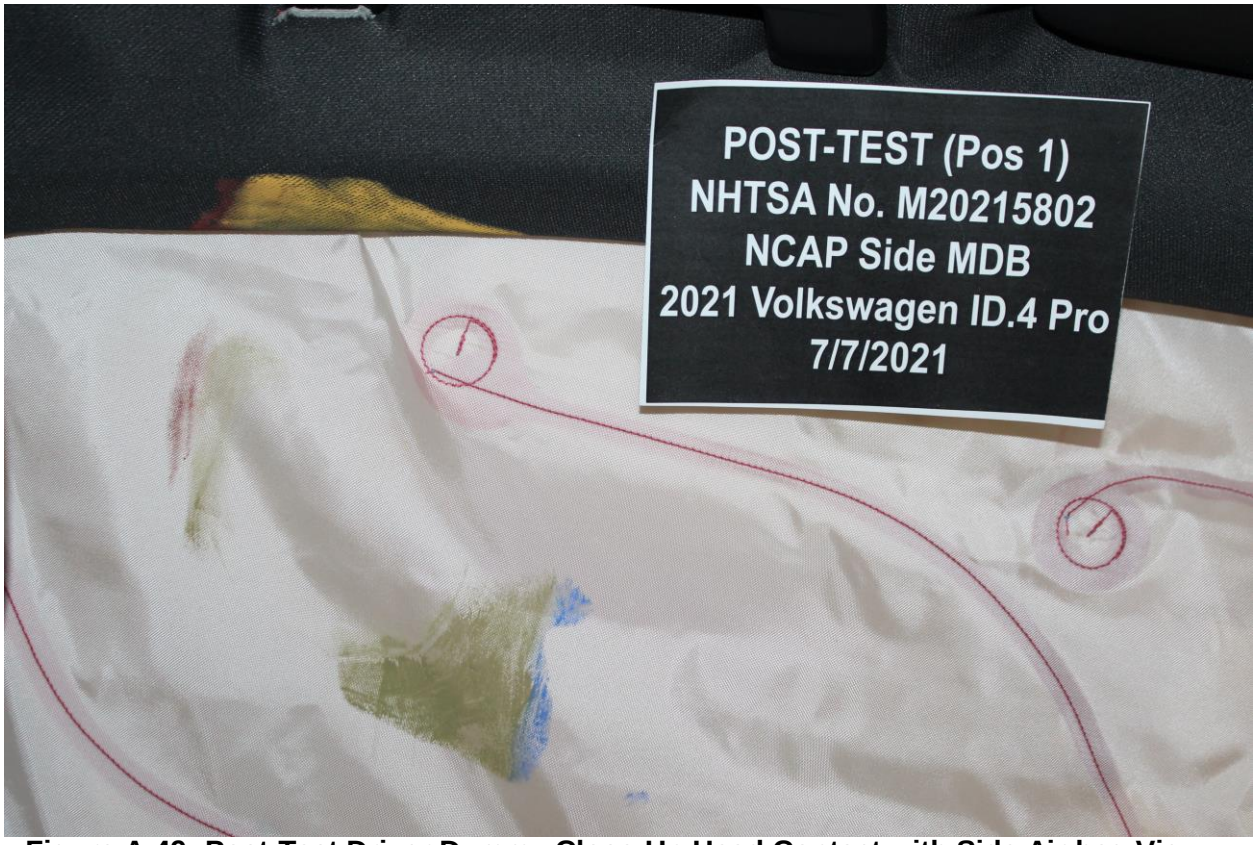

Figure A-49: Post-Test Driver Dummy Close-Up Head Contact with Side Air bag View

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

Figure A-51: Post-Test Driver Dummy Close-Up Torso Contact with Side Air bag View

Figure A-52: Post-Test Driver Dummy Close-Up Pelvis Contact View

Figure A-53: Post-Test Driver Dummy Close-Up Pelvis Contact with Side Air bag View

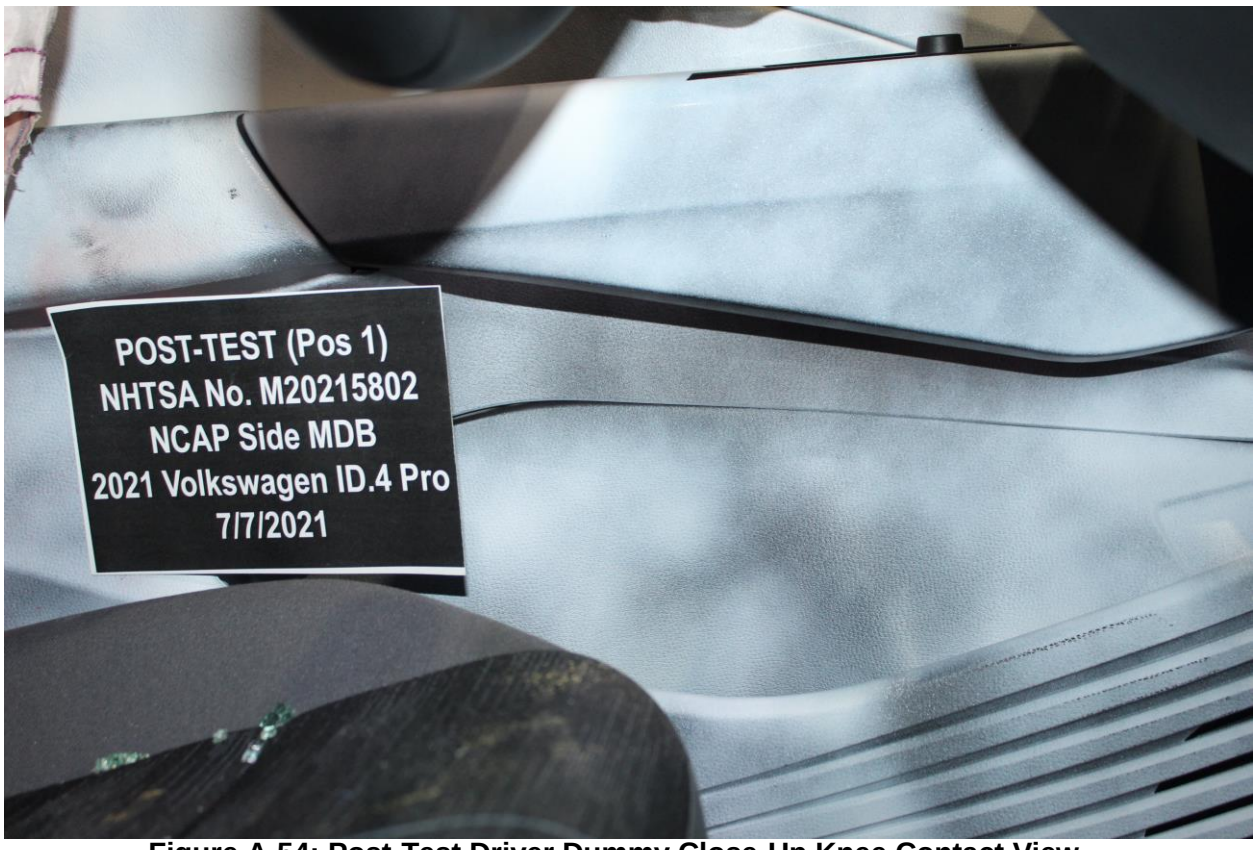

Figure A-54: Post-Test Driver Dummy Close-Up Knee Contact View

Figure A-55: Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking

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Figure A-57: Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View

Figure A-58: Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning

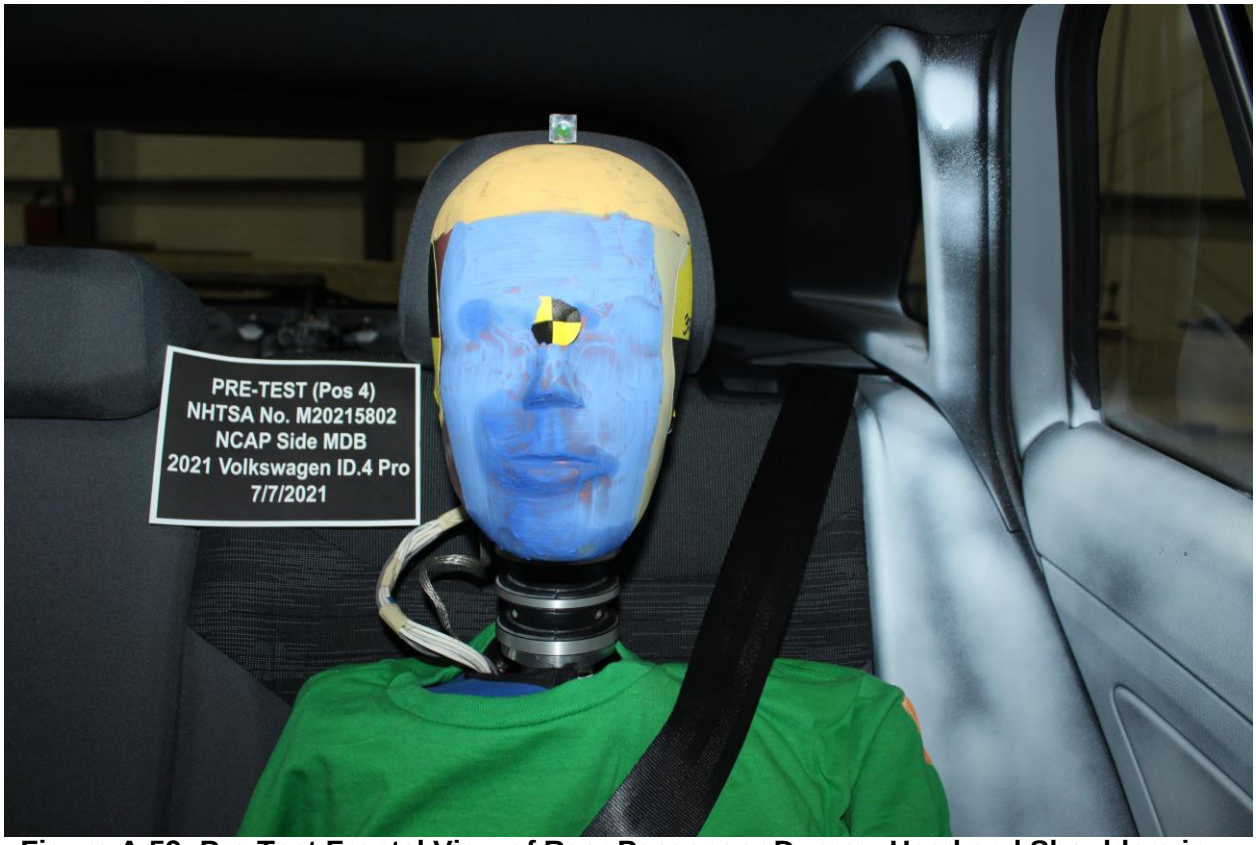

Figure A-59: Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint

Figure A-60: Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning

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Figure A-65: Pre-Test View of Belt Anchorage for Rear Passenger Dummy

Figure A-66: Pre-Test Close-Up Left Side View of Rear Passenger Seat Track

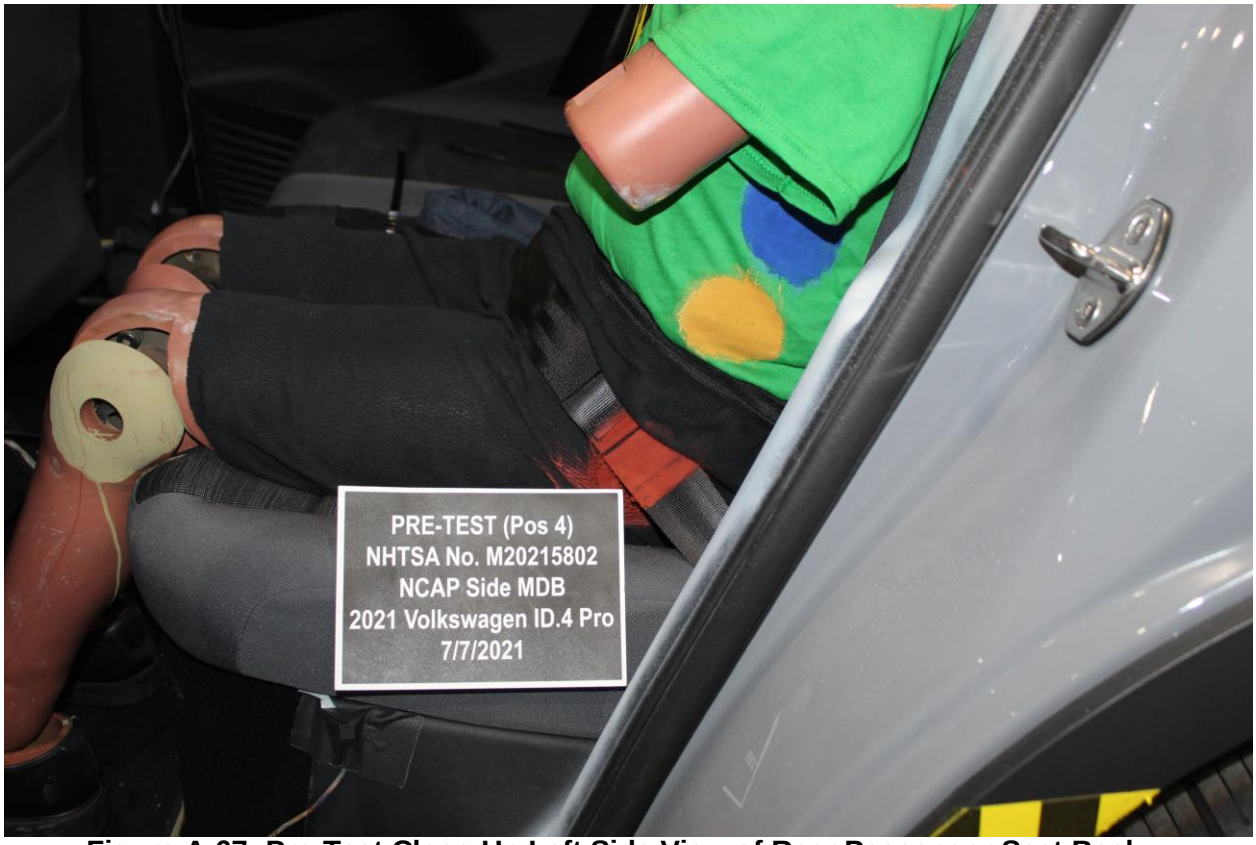

Figure A-67: Pre-Test Close-Up Left Side View of Rear Passenger Seat Back

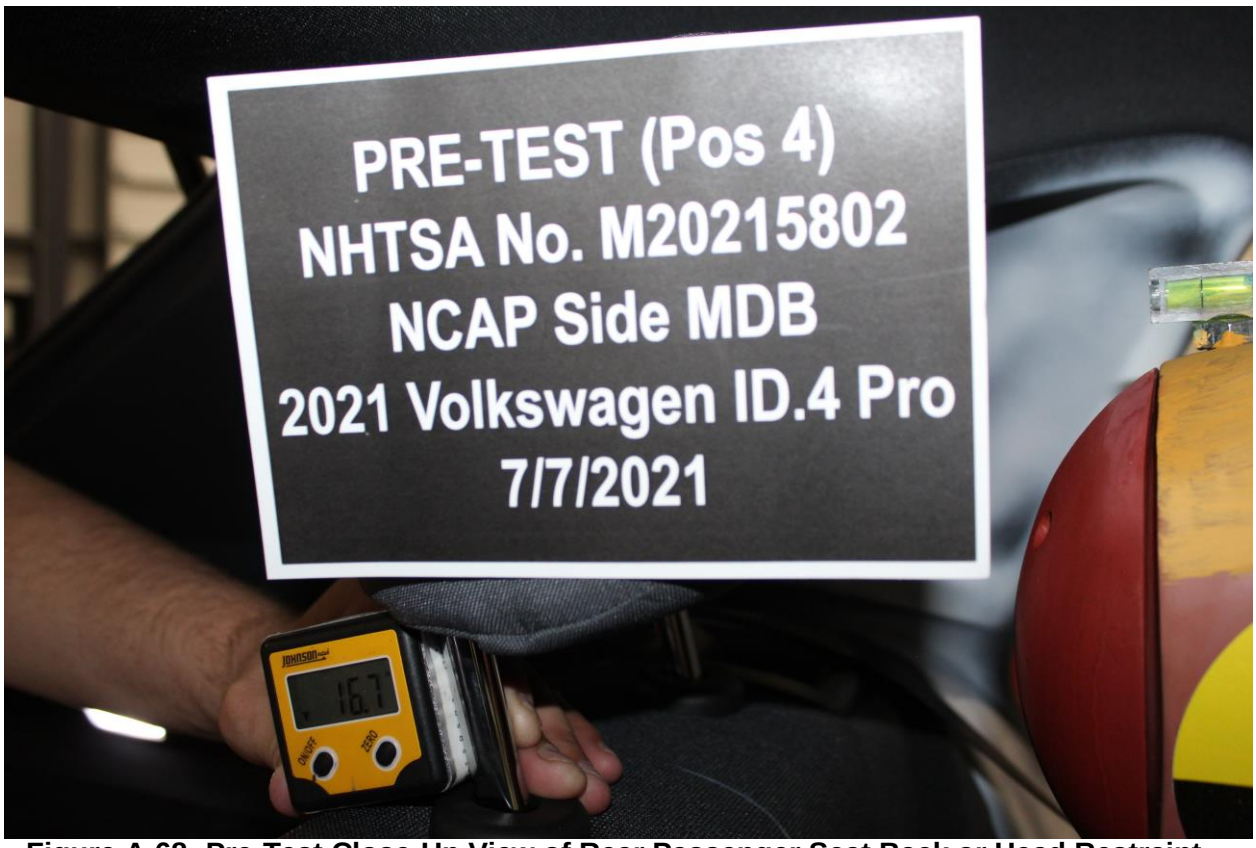

Figure A-68: Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint

Figure A-69: Pre-Test Rear Passenger Dummy and Door Clearance View

Figure A-70: Post-Test Rear Passenger Dummy and Door Clearance View

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Figure A-73: Pre-Test Rear Passenger Inner Door Panel View

Figure A-74: Post-Test Rear Passenger Inner Door Panel View Showing Rear Passenger Dummy Contact Locations

Figure A-75: Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle View

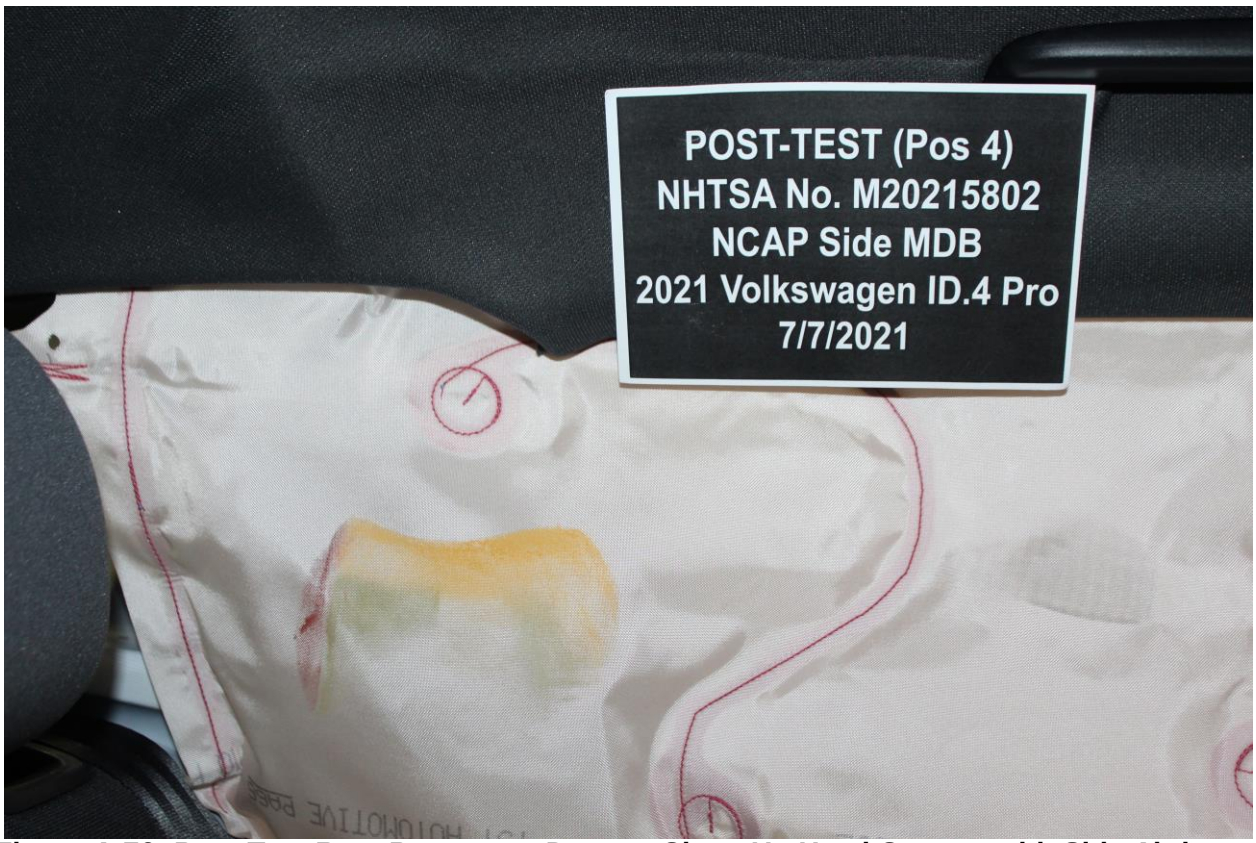

Figure A-76: Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Air bag View

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Figure A-78: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Air bag View

Figure A-79: Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View

Figure A-80: Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Air bag View

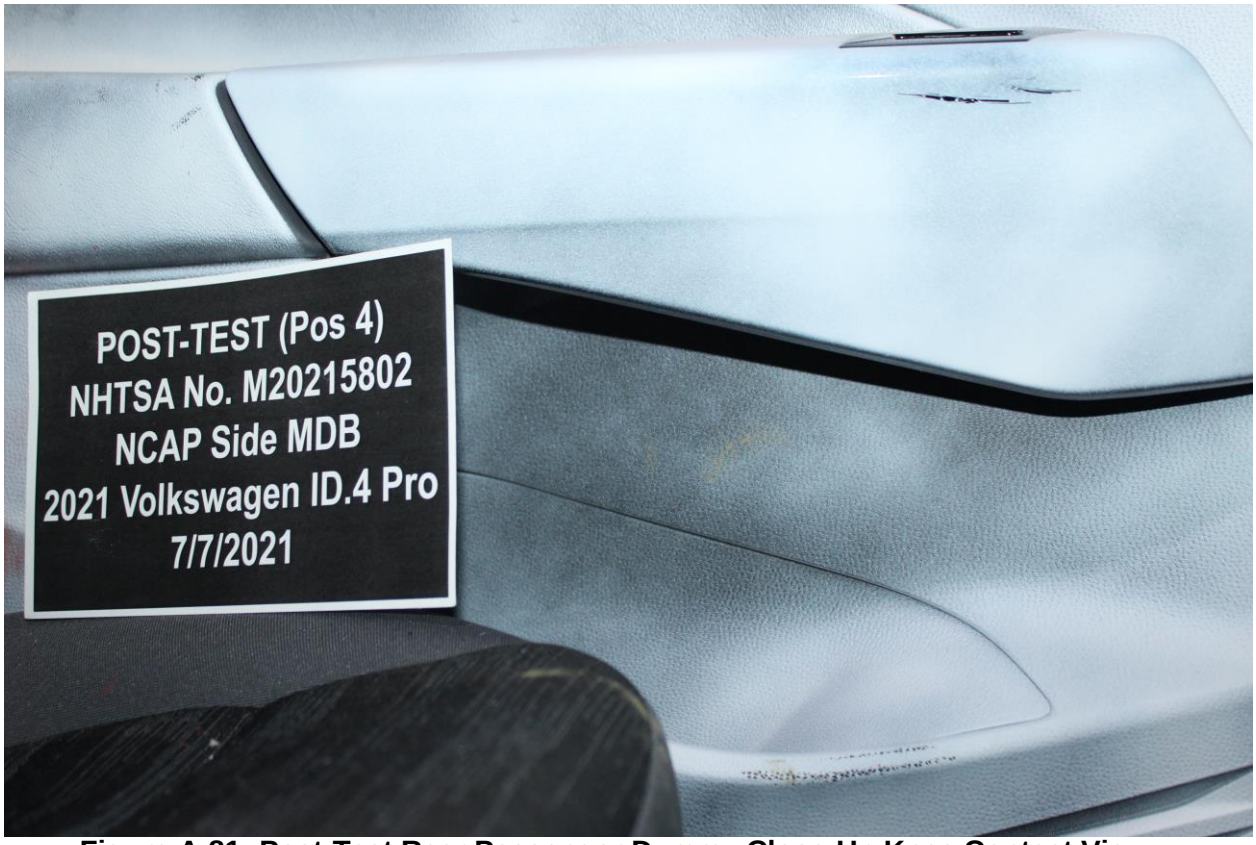


Figure A-81: Post-Test Rear Passenger Dummy Close-Up Knee Contact View

Figure A-82: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

Figure A-83: Post-Test View of Fuel Filler Cap or Fuel Filler Neck

Figure A-84: Pre-Test Front View of MDB Impactor Face

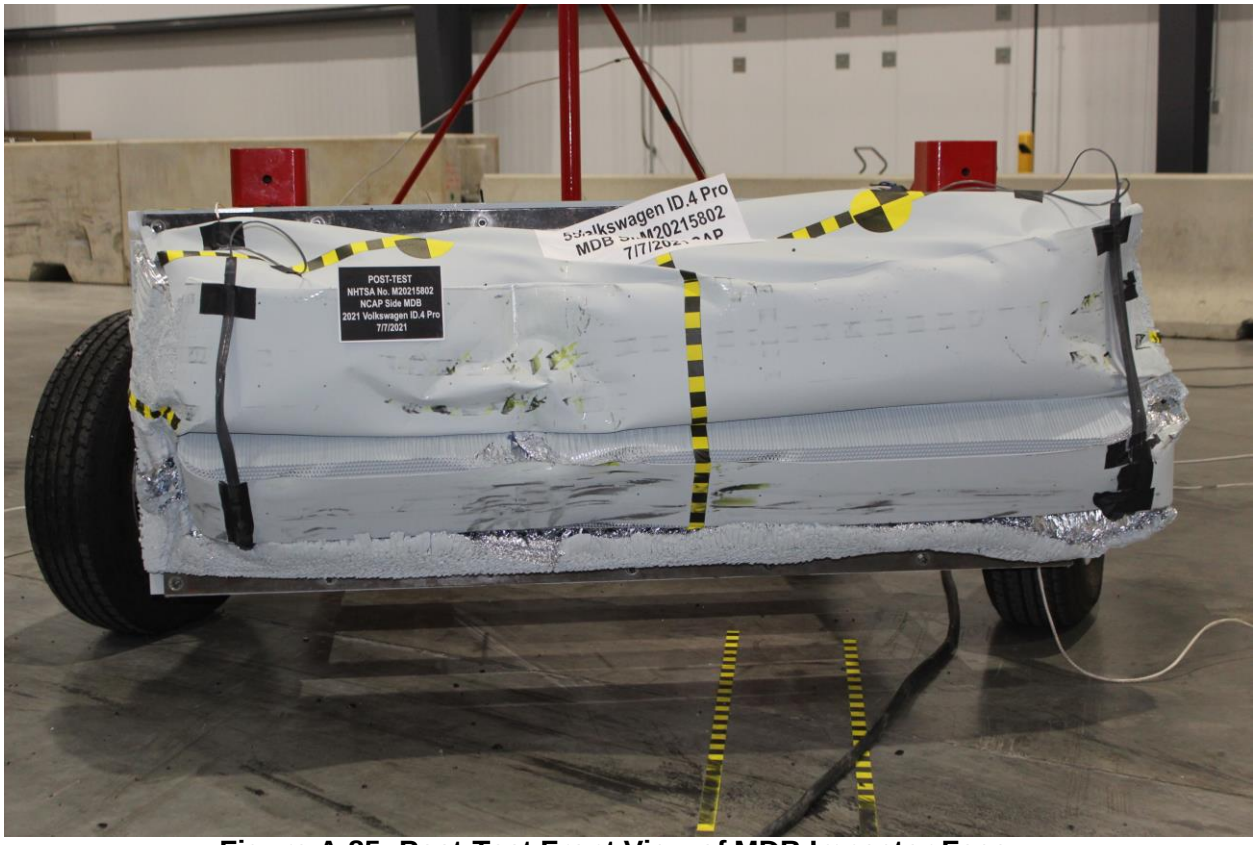


Figure A-85: Post-Test Front View of MDB Impactor Face

Figure A-86: Pre-Test Top View of MDB Impactor Face

Figure A-87: Post-Test Top View of MDB Impactor Face

Figure A-88: Pre-Test Left Side View of MDB Impactor Face

Figure A-89: Post-Test Left Side View of MDB Impactor Face

Figure A-90: Pre-Test Right Side View of MDB Impactor Face

Figure A-91: Post-Test Right Side View of MDB Impactor Face

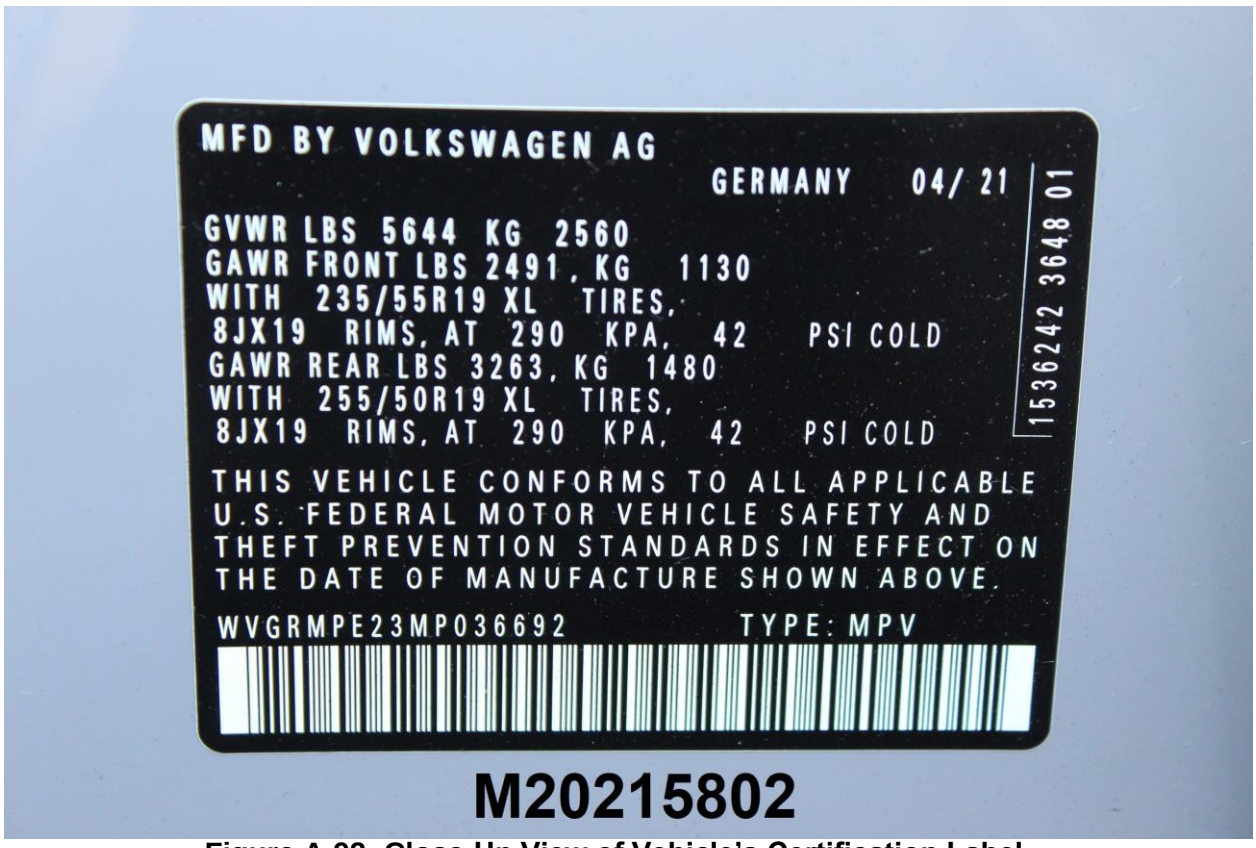


Figure A-92: Close-Up View of Vehicle's Certification Label

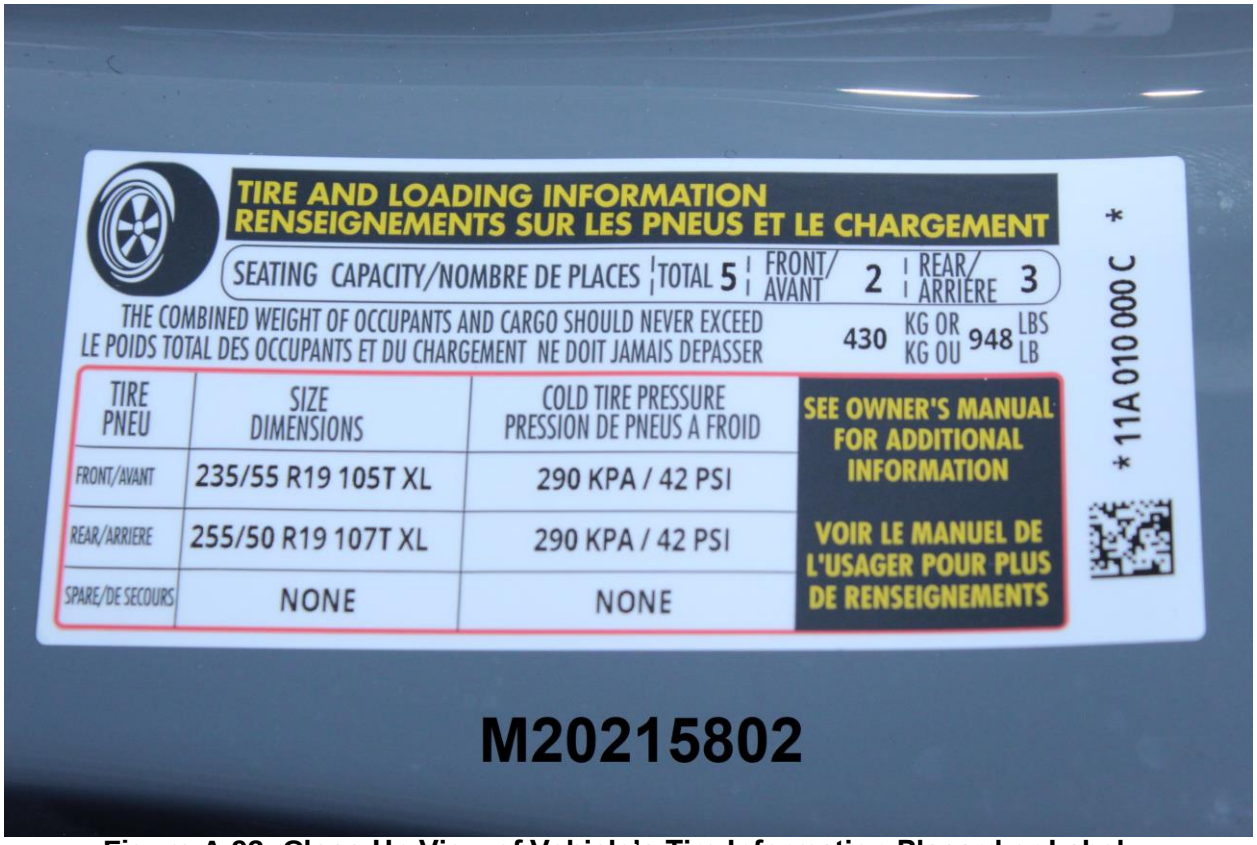


Figure A-93: Close-Up View of Vehicle's Tire Information Placard or Label

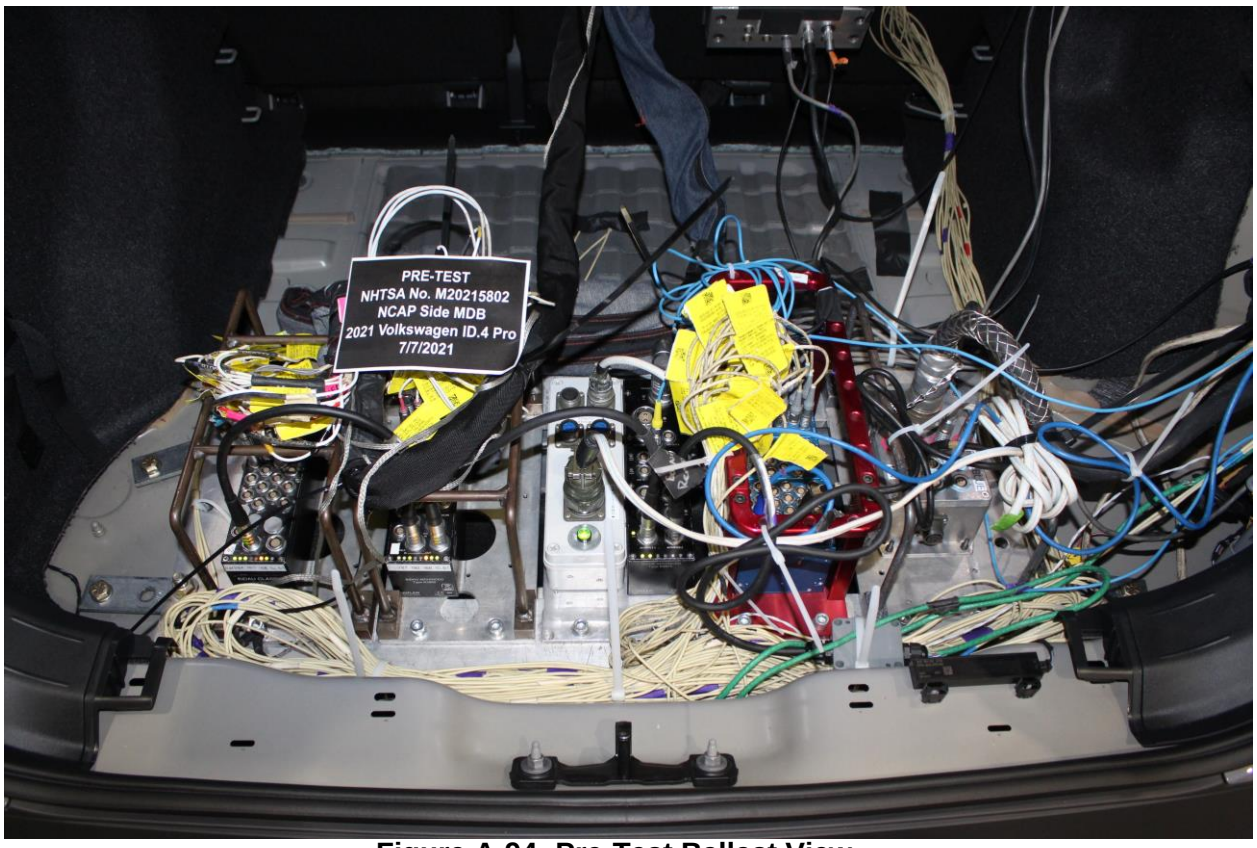


Figure A-94: Pre-Test Ballast View

Figure A-95: Post-Test Primary and Redundant Speed Trap Read-Out

Photo Not Applicable

Figure A-96: FMVSS No. 301 Static Rollover 0 Degrees

Figure A-97: FMVSS No. 301 Static Rollover 90 Degrees

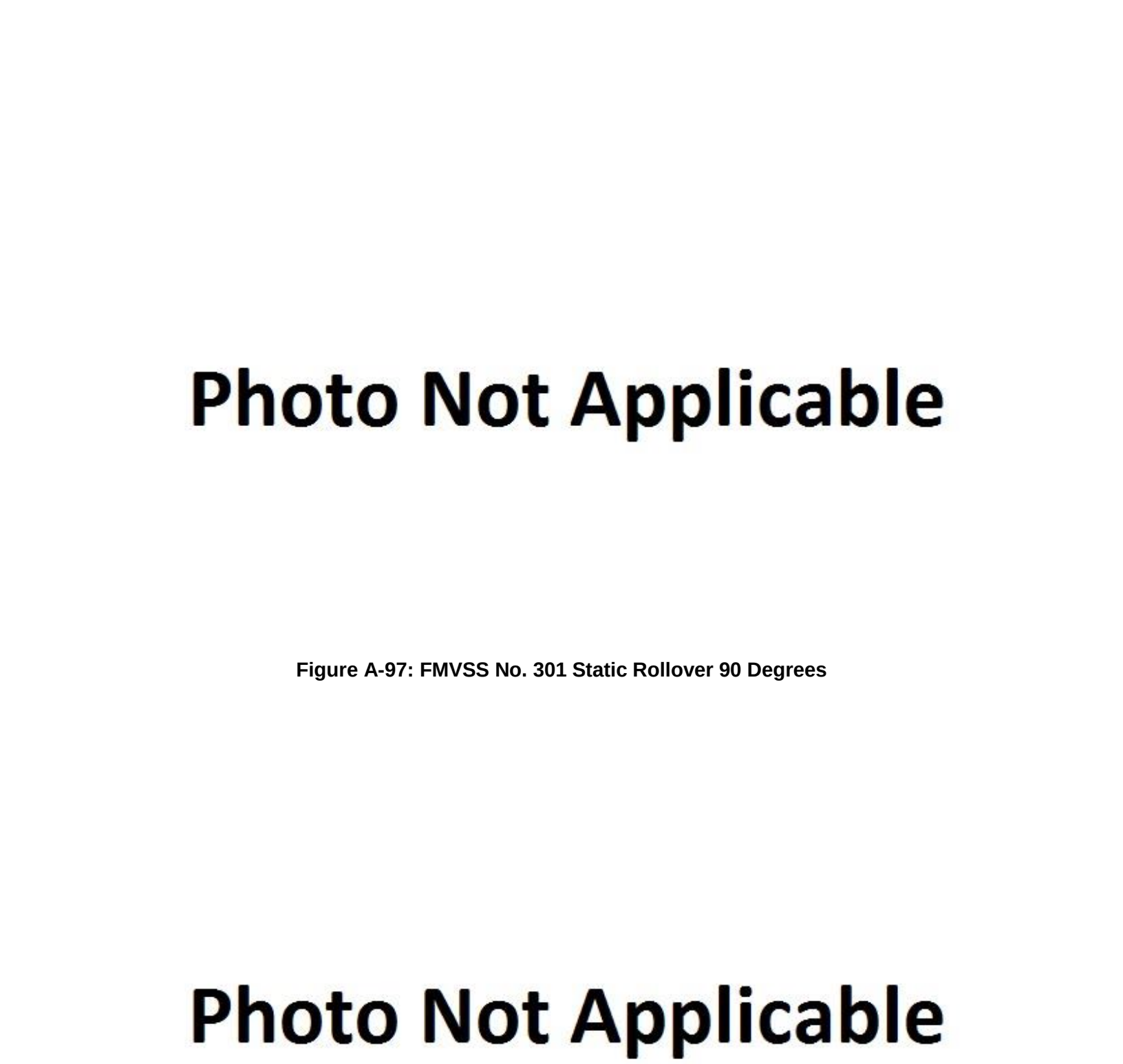


Figure A-98: FMVSS No. 301 Static Rollover 180 Degrees

Figure A-99: FMVSS No. 301 Static Rollover 270 Degrees

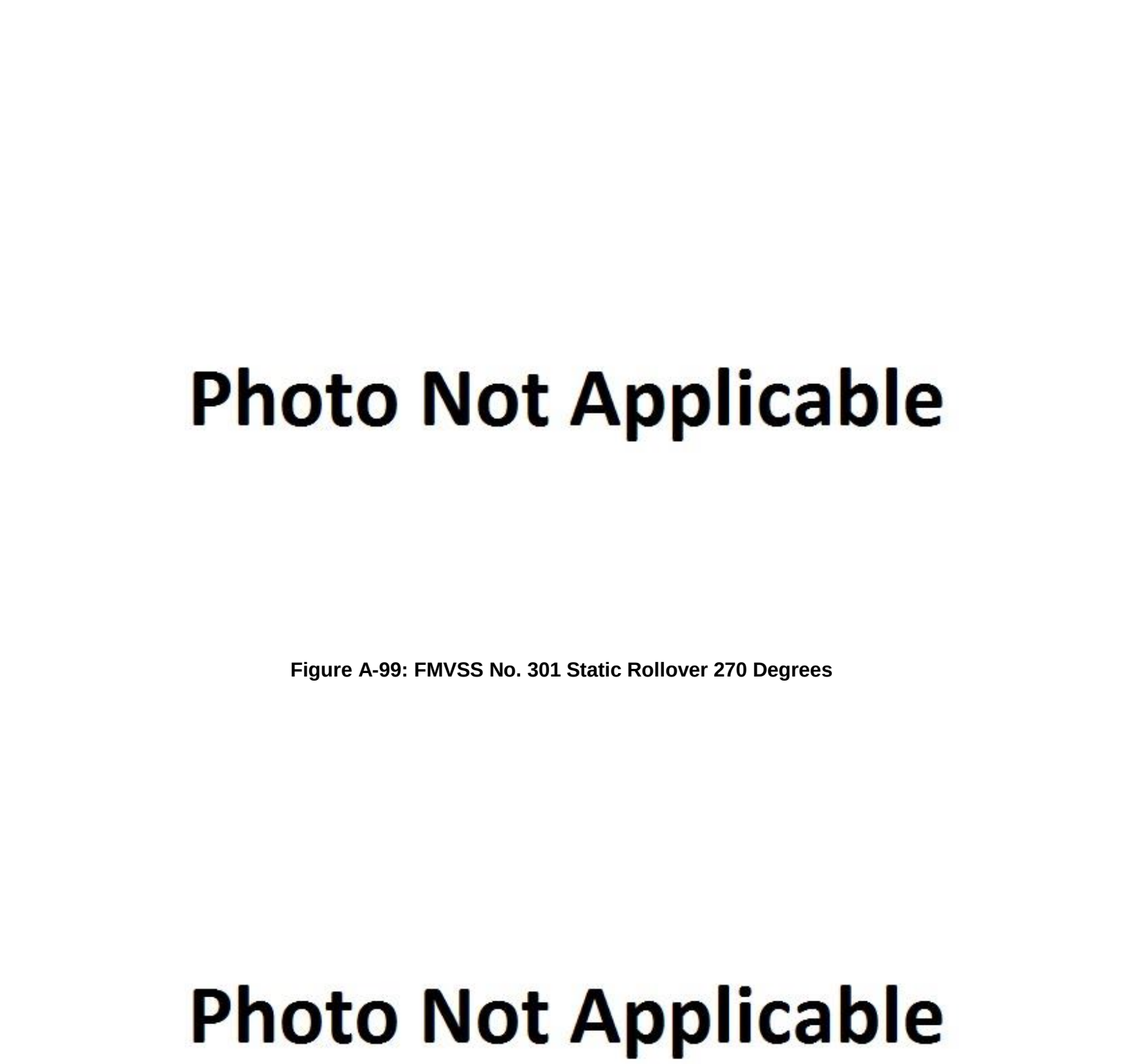


Figure A-100: FMVSS No. 301 Static Rollover 360 Degrees

Figure A-101: Impact Event

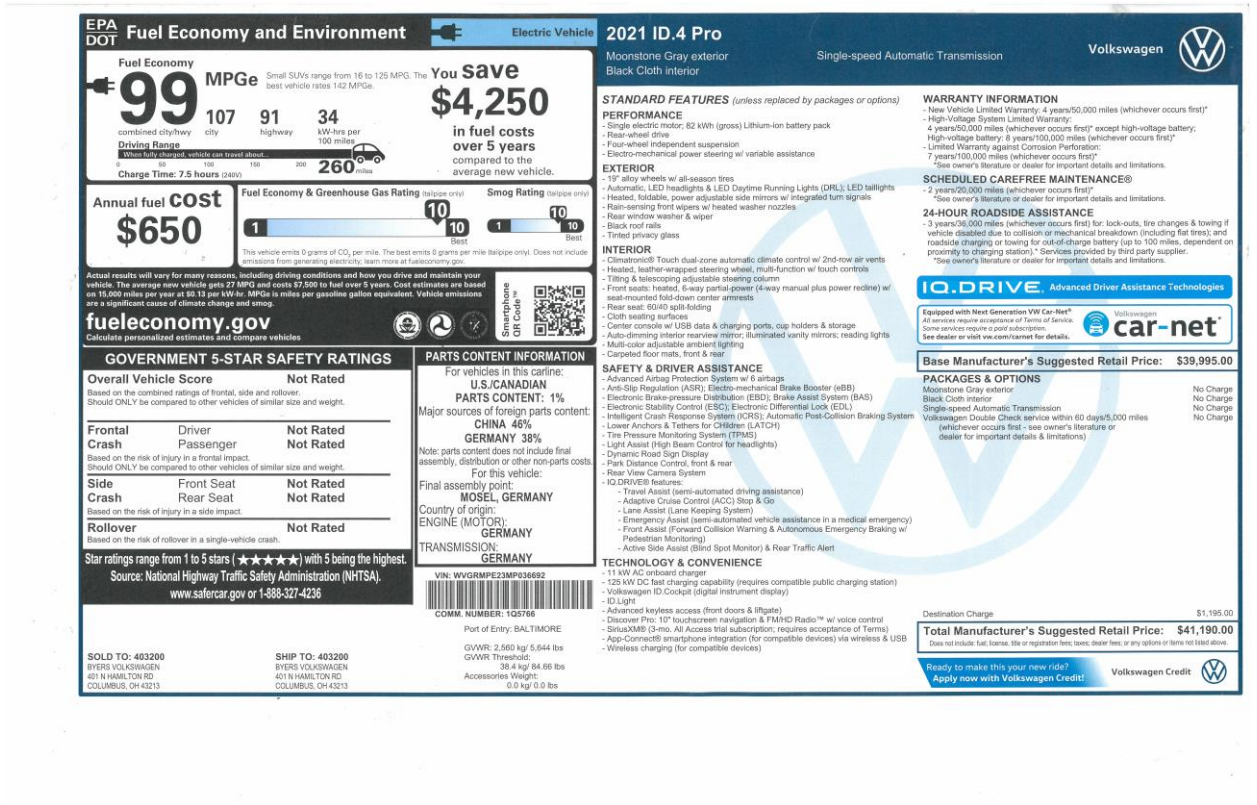


Figure A-102: Monroney Label

Head restraints

Introduction

The information that follows describes how the head restraints can be adjusted and removed. Always make sure the seats are adjusted to the correct position → page 30.

All seats are equipped with head restraints. The center rear head restraint (depending on the vehicle equipment) is only intended for the center seat on the rear bench seat. Therefore do not install this head restraint in any other position.

There are notches in the head restraint supports so that they can be locked in different positions. Only head restraints which are correctly mounted can lock into the notches within the adjustable range. To prevent the head restraints from being removed unintentionally after mounting, there are stops at the top and bottom of the adjustable range.

Correct head restraint adjustment

Adjust the head restraint so that the upper edge of the head restraint is in line with the upper portion of the head as much as possible, but not lower than eye level. Position the back of the head as close as possible to the head restraint.

Head restraint adjustment for shorter persons

Slide the head restraint all the way down, even if the head is then below the upper edge of the head restraint. When the head restraint is in the lowest position, there may be a small gap between the head restraint and the backrest.

Head restraint adjustment for taller persons

Move the head restraint up all the way.

WARNING

Driving with head restraint that have been removed or adjusted incorrectly increases the risk of serious or fatal injuries in the event of an accident or sudden driving and braking maneuvers.

- If a person is sitting in a seat, only drive with the head restraints correctly installed and adjusted on that seat.
- To reduce the risk of neck injuries in an accident, every occupant in the vehicle, including the driver, must have the head restraint adjusted correctly according to their body size. To do this, the upper edge of the head restraint must be in line with the upper portion of the head as much as possible, but not lower than eye level. Position the back of the head as close as possible and centered to the head restraint.
- Never adjust the head restraint while driving.

NOTICE

When removing and installing the head restraints, make sure the head restraint does not hit the headliner, the front seat backrest, or other vehicle components. Otherwise, damage could result.

Adjusting the head restraints

Please read the introductory information and heed the Warnings and Notice and on page 90.

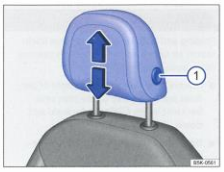


Fig. 65 Front head restraint: adjusting.

Adjusting the height of the front head restraint

– Push the head restraint upward in the direction of the arrow → fig. 65 (1) or slide it downward while pressing the button.

The head restraint must lock securely into the top position or into an intermediate position. In the bottom position, where the guide rod is slid completely into the guide rail, the head restraint does not lock.

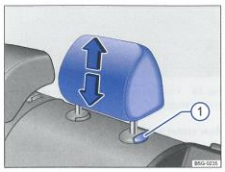


Fig. 66 Rear head restraint: adjusting.

Adjusting the height of the rear head restraint (general example)

– If necessary, slide the head restraint upward or downward in the direction of the arrow and when pressing the → fig. 66 (1) button.

The head restraint must lock securely into place.

Removing and installing the head restraints

Please read the introductory information and heed the Warnings and Notice and on page 90.

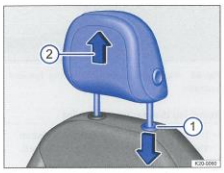


Fig. 67 Front head restraints: removing.

Removing the front head restraints

– Lower the head restraint if necessary.
– To unlock, push down the ring around the support rod guide of the head restraint → fig. 67 (1).
– Pull out the head restraint in the direction of the arrow → fig. 67 (2).

Installing the front head restraints

– Position the head restraint correctly above the head restraint guides and insert into the guides on the seat backrest.
– Slide the head restraint downward until it engages into the guide rods.
– Adjust the head restraint to the correct position.

11A012723SO

Figure A-103: Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

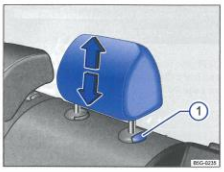


Fig. 68 Rear head restraint: removing. (general example)

Removing the rear head restraint

– If necessary, adjust the seat backrest so that the head restraint can be removed.
– Slide the head restraint all the way upward.
– Pull the head restraint all the way out while pressing the → fig. 68 (1) button.

Installing the rear head restraint

– Release the backrest of the rear bench seat and fold slightly forwards.
– Position the head restraint correctly above the head restraint guides and insert into the guides on the seat backrest.
– Push the head restraint downward while pressing the → fig. 68 (1) button.
– Fold the rear bench seat backrest toward the rear and lock it securely into place.
– Adjust the head restraint to the correct position.

Seat functions

Center armrest

Fig. 69 Folding center armrest in the rear (general example).

Rear center armrest

There may be a folding armrest in the backrest of the rear center seat.

– To *fold out*: pull the loop in the direction of the arrow → fig. 69.
– To *fold back*: fold the center armrest upward in the opposite direction of the arrow → fig. 69 and press it all the way toward the seat backrest.

Passengers must not sit in the center rear seat when the center armrest is folded down.

WARNING

To reduce the risk of injuries while driving, the rear center armrest must always be folded up.

- If the center armrest is folded down, the center rear seat must never be used by either adults or children. Doing so would create an incorrect seating position that could result in serious injuries.

Figure A-104: Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual-Rear Restraints Not Adjustable

Figure 305-1: Auxiliary Power Module Warning Label

Photo Not Applicable

Figure 305-2: Power Inverter Warning Label

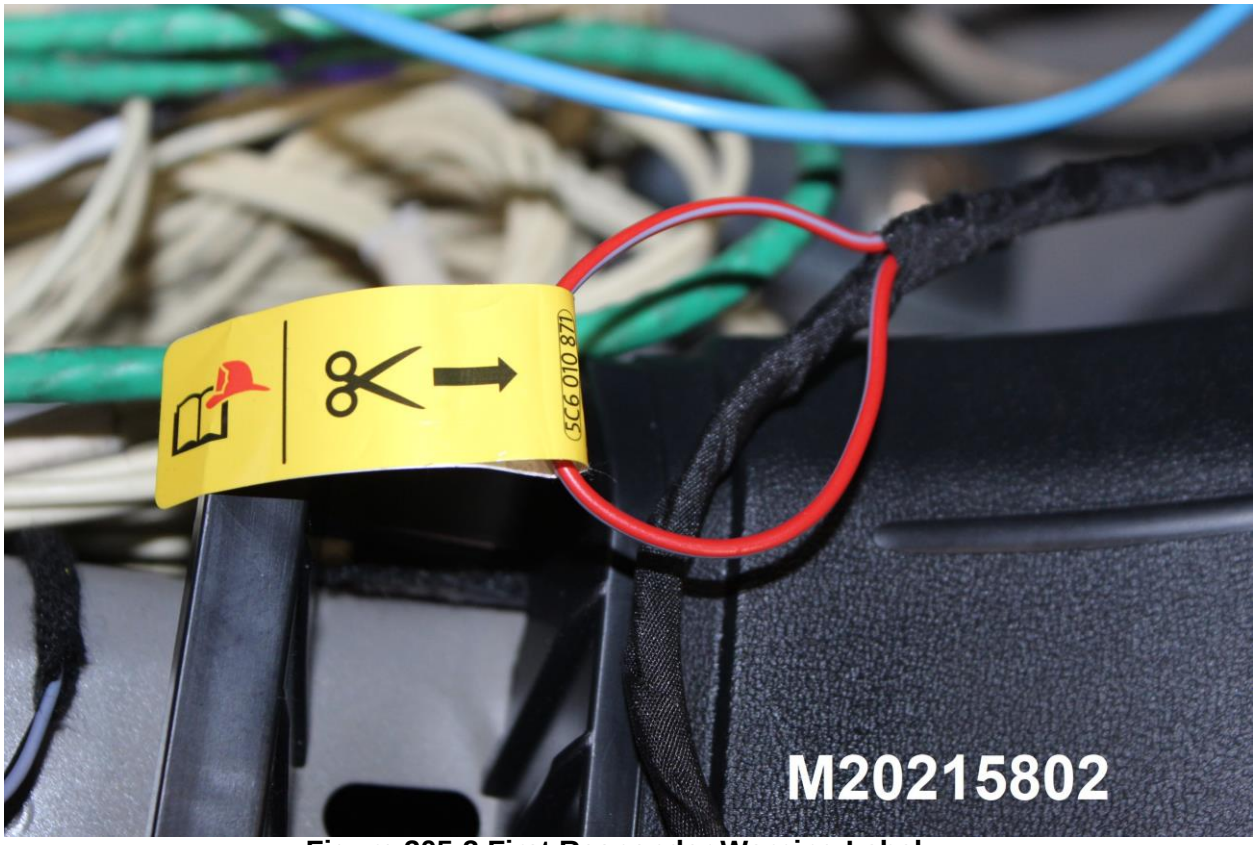


Figure 305-3 First Responder Warning Label

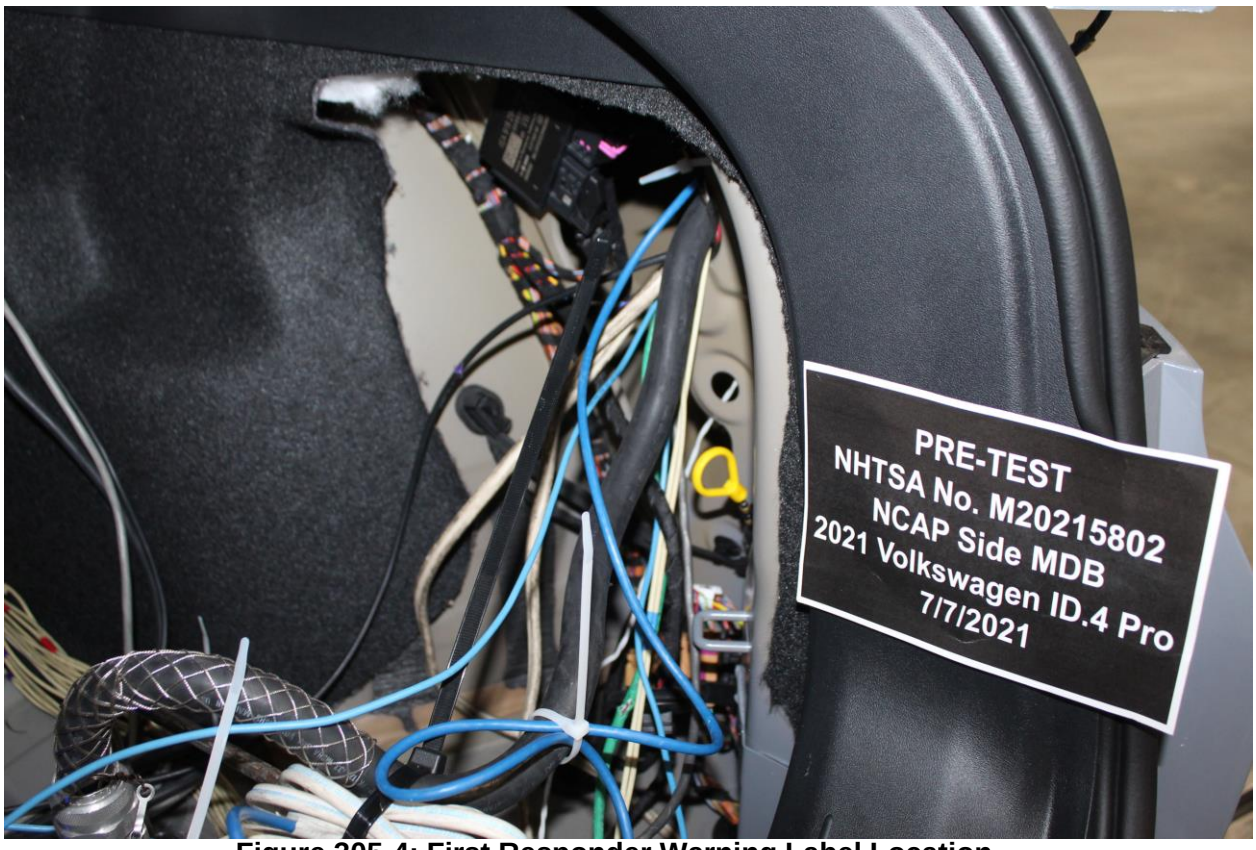


Figure 305-4: First Responder Warning Label Location

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

Photo Not Applicable

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

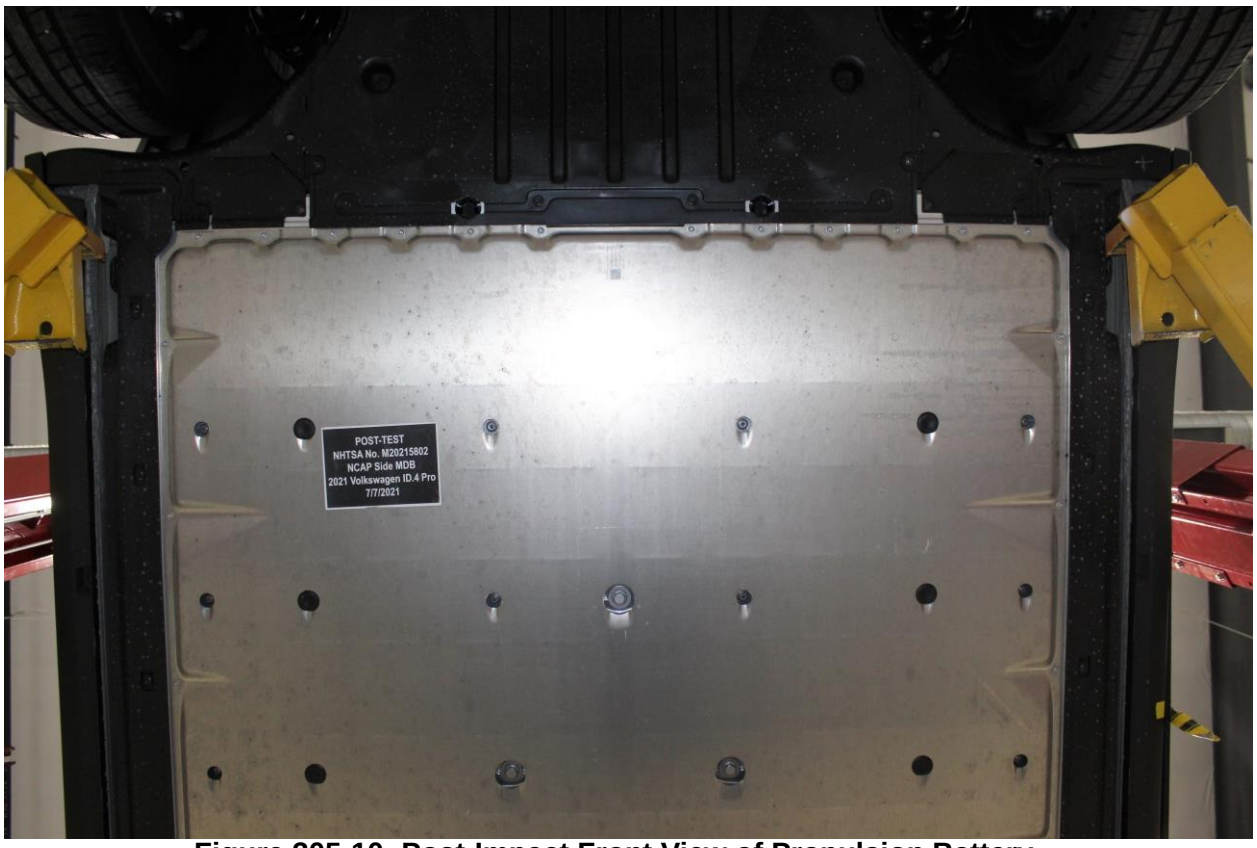


Figure 305-10: Post-Impact Front View of Propulsion Battery

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

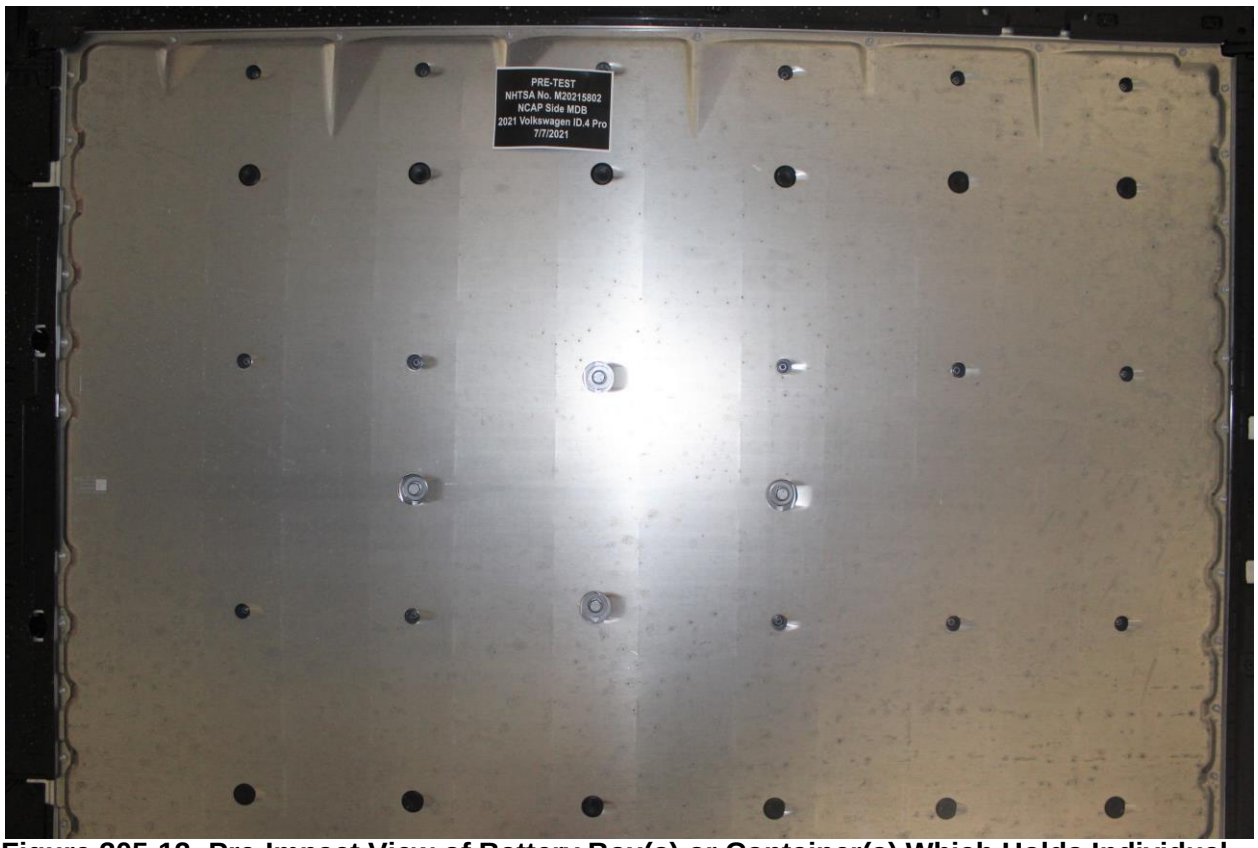


Figure 305-12: Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

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)

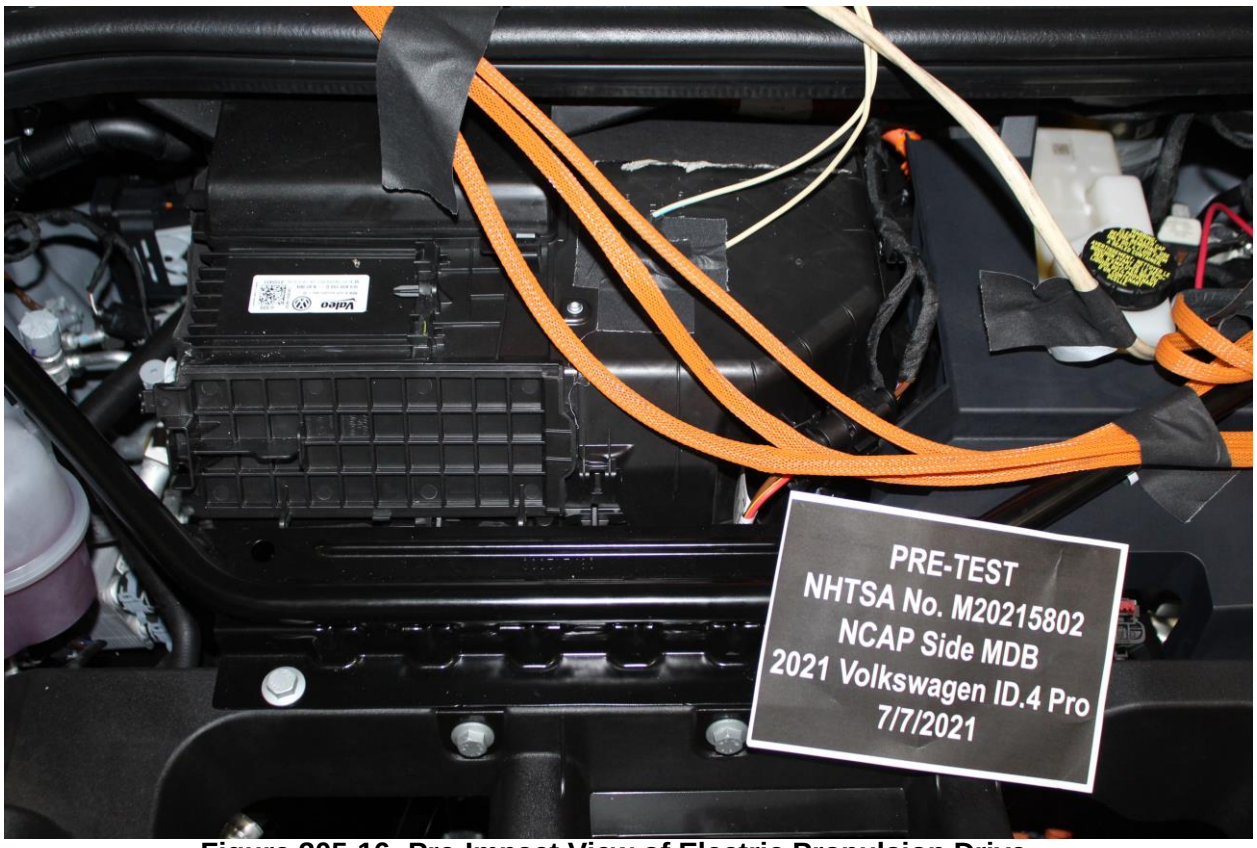


Figure 305-16: Pre-Impact View of Electric Propulsion Drive

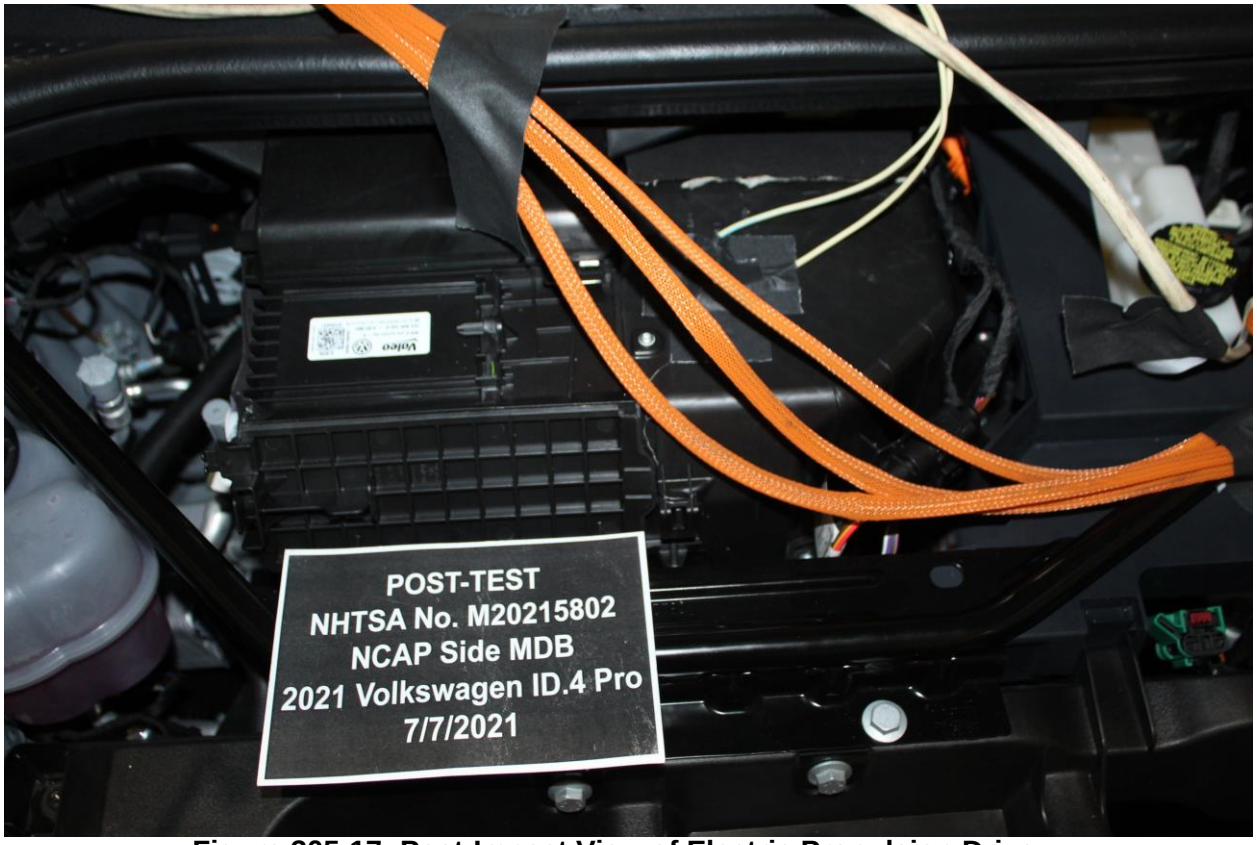


Figure 305-17: Post-Impact View of Electric Propulsion Drive

Photo Not Applicable

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

Photo Not Applicable

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

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

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

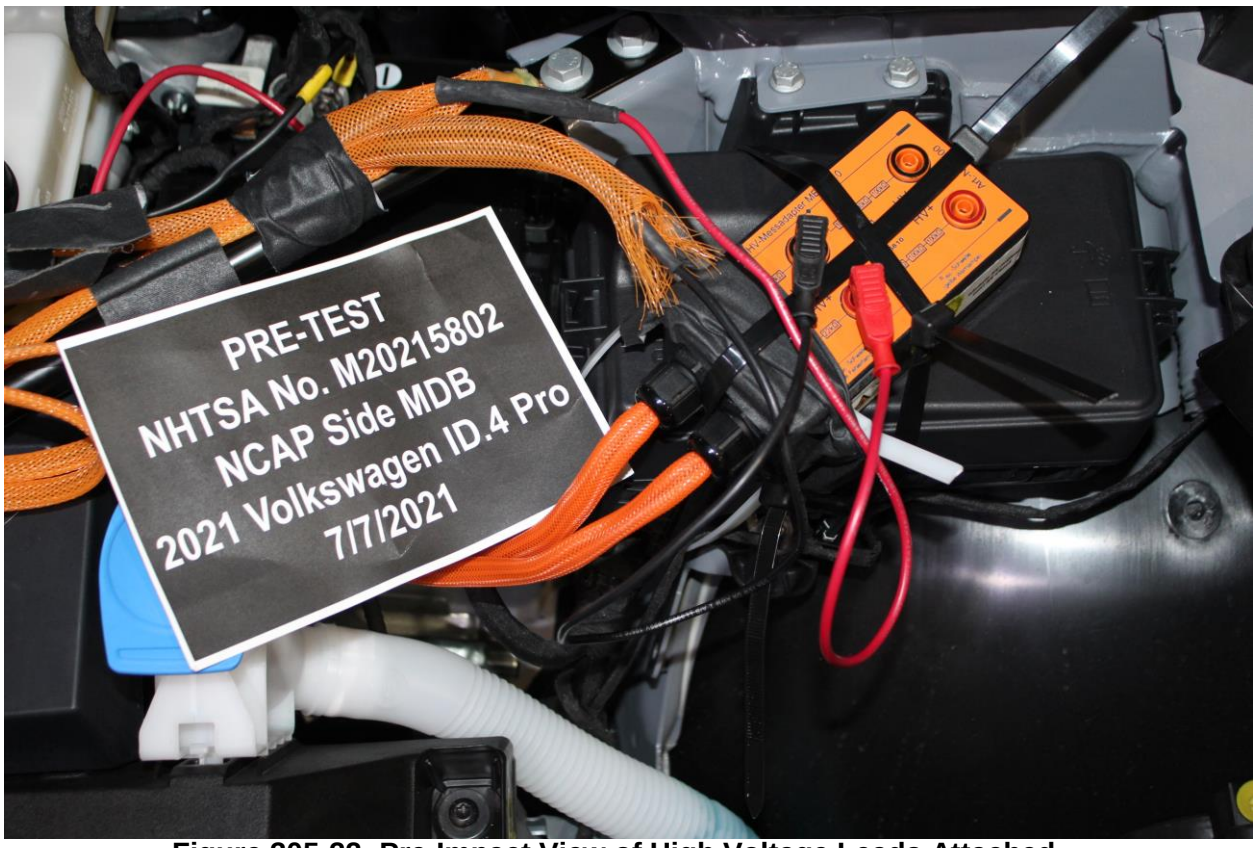


Figure 305-22: Pre-Impact View of High Voltage Leads Attached

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

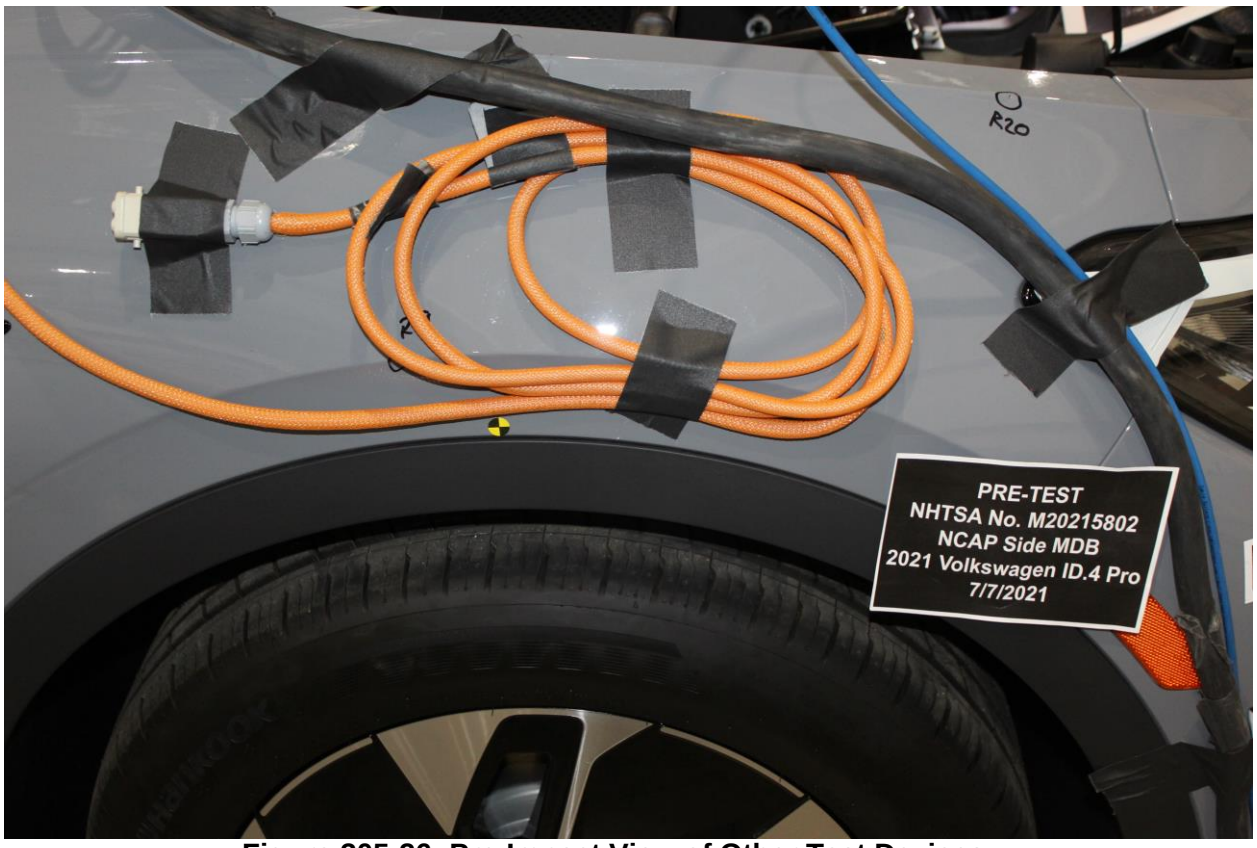


Figure 305-26: Pre-Impact View of Other Test Devices

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

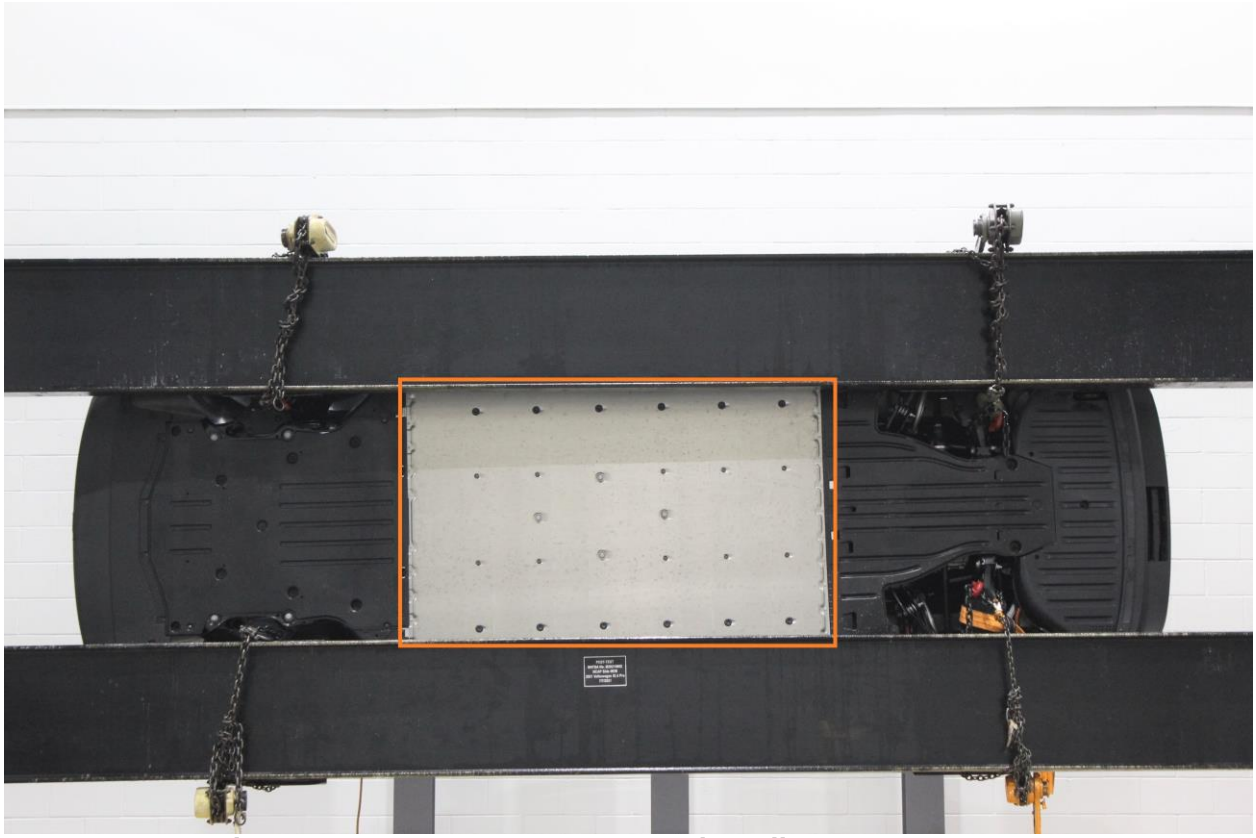


Figure 305-28: FMVSS No. 305 Static Rollover 90 Degrees

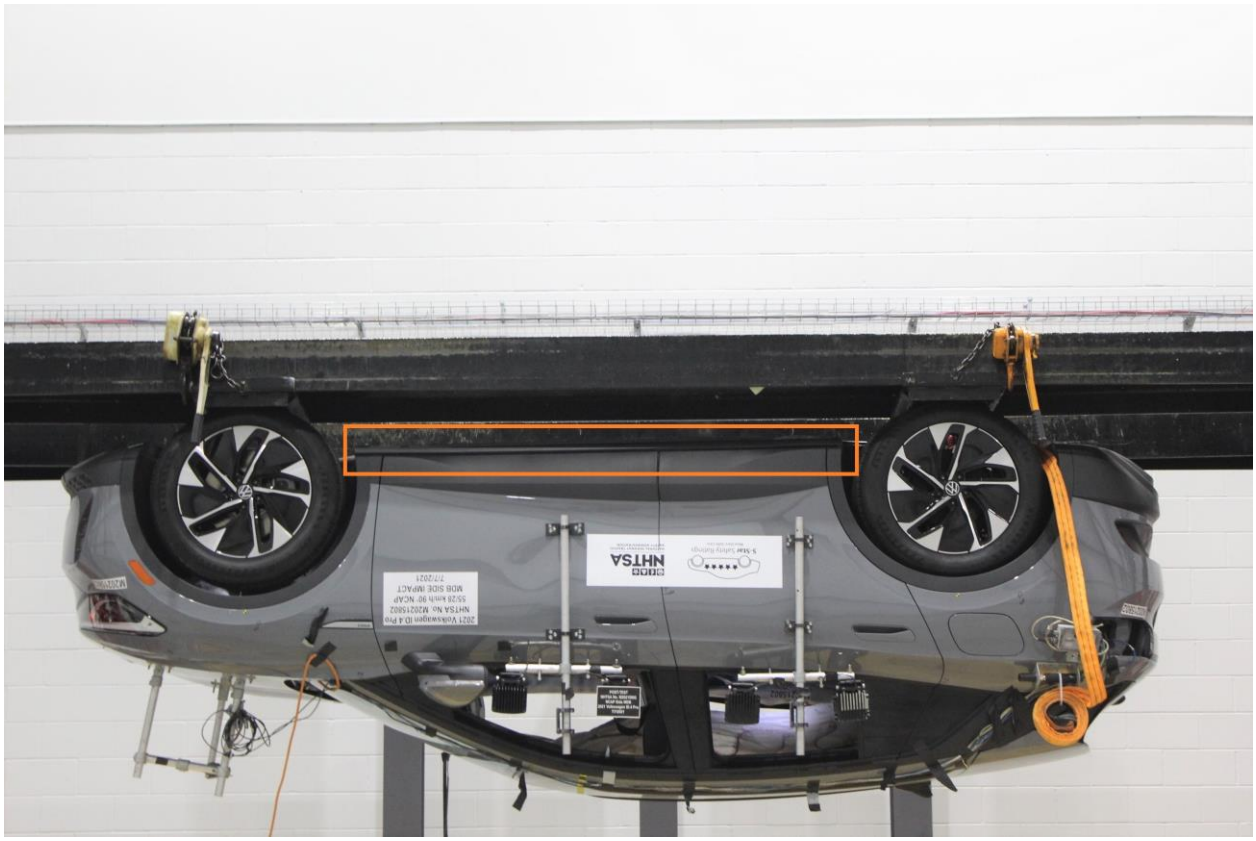


Figure 305-29: FMVSS No. 305 Static Rollover 180 Degrees

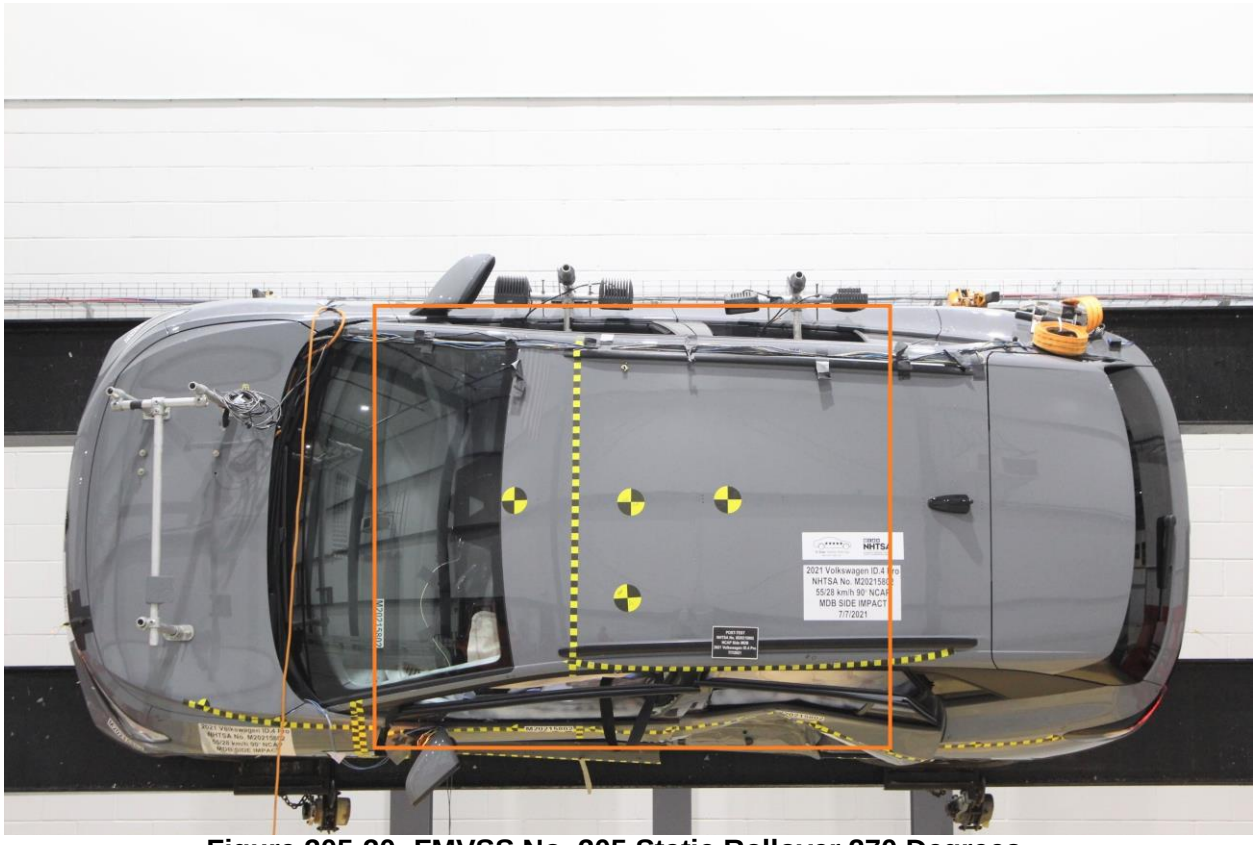


Figure 305-30: FMVSS No. 305 Static Rollover 270 Degrees

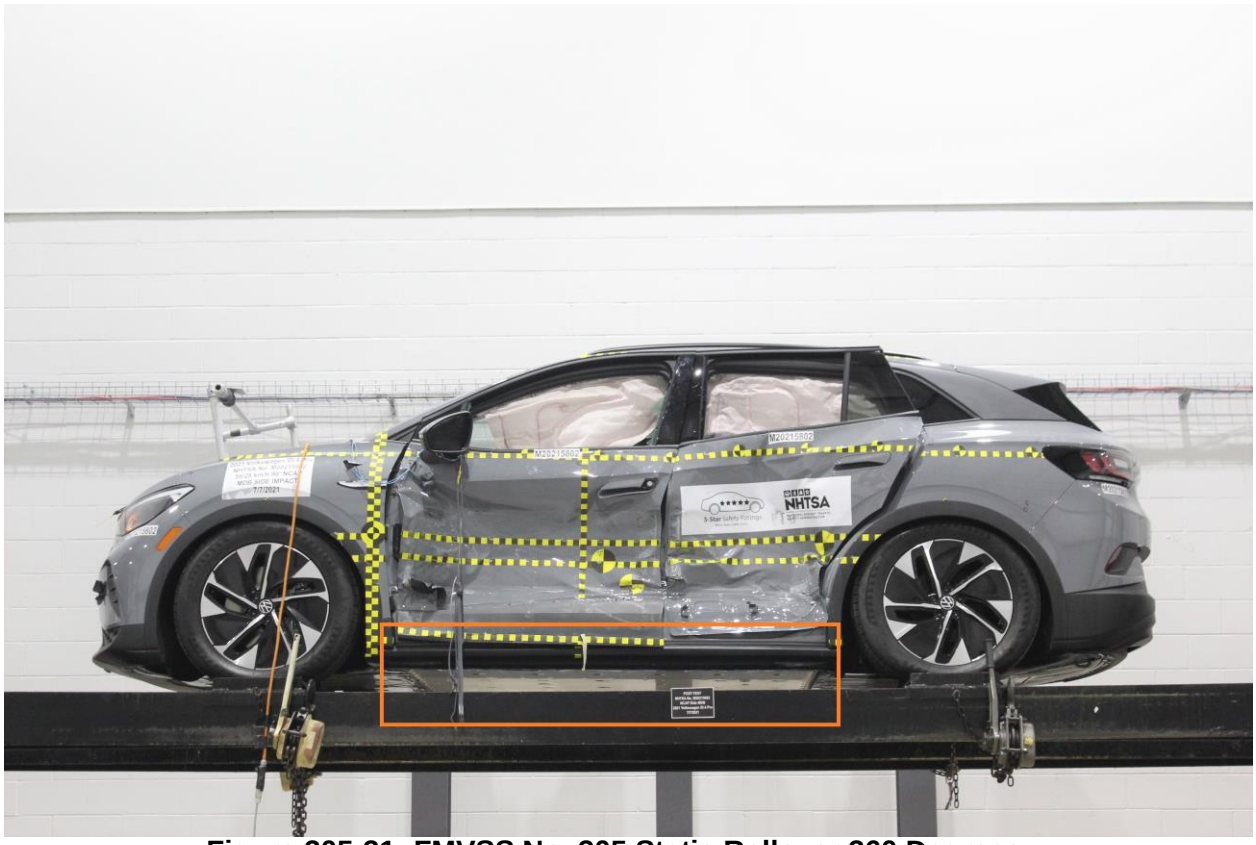


Figure 305-31: FMVSS No. 305 Static Rollover 360 Degrees

Photo Not Available

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)

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

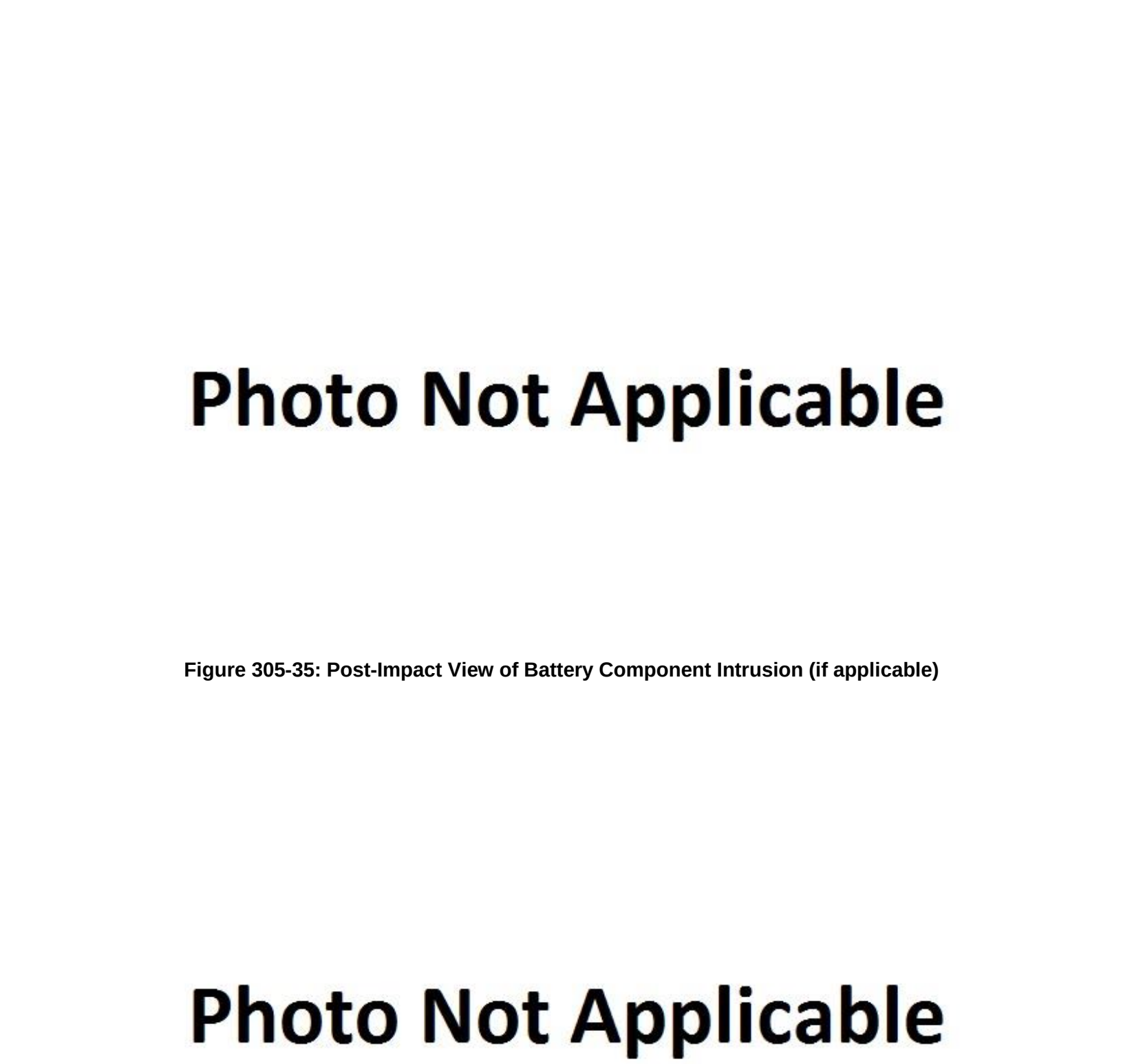


Figure 305-36: Post-Impact View of Battery Module Movement or Retention Loss (if applicable)

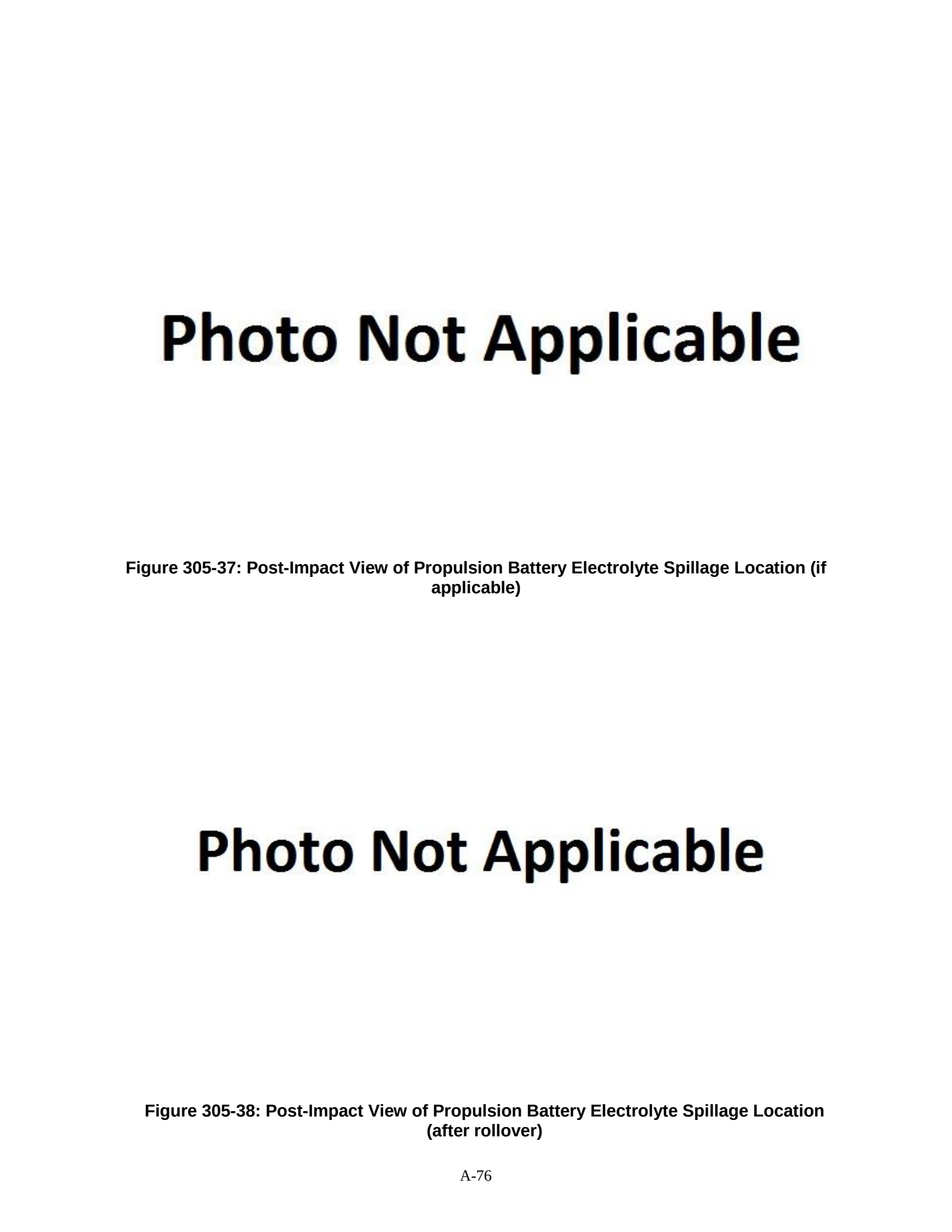


Figure 305-37: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (if applicable)

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

APPENDIX B

VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

Driver & Passenger Dummy Instrumentation Plots

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

Additional Driver & Passenger Dummy Instrumentation Data

Driver Lower Spine T12 Acceleration (X)
Driver Lower Spine T12 Acceleration (Y)
Driver Lower Spine T12 Acceleration (Z)
Passenger Upper Thorax Rib Deflection (Y)
Passenger Middle Thorax Rib Deflection (Y)
Passenger Lower Thorax Rib Deflection (Y)
Passenger Upper Abdomen Rib Deflection (Y)
Passenger Lower Abdomen Rib Deflection (Y)
Driver Head Acceleration Redundant (X)
Driver Head Acceleration Redundant (Y)
Driver Head Acceleration Redundant (Z)
Passenger Head Acceleration Redundant (X)
Passenger Head Acceleration Redundant (Y)
Passenger Head Acceleration Redundant (Z)

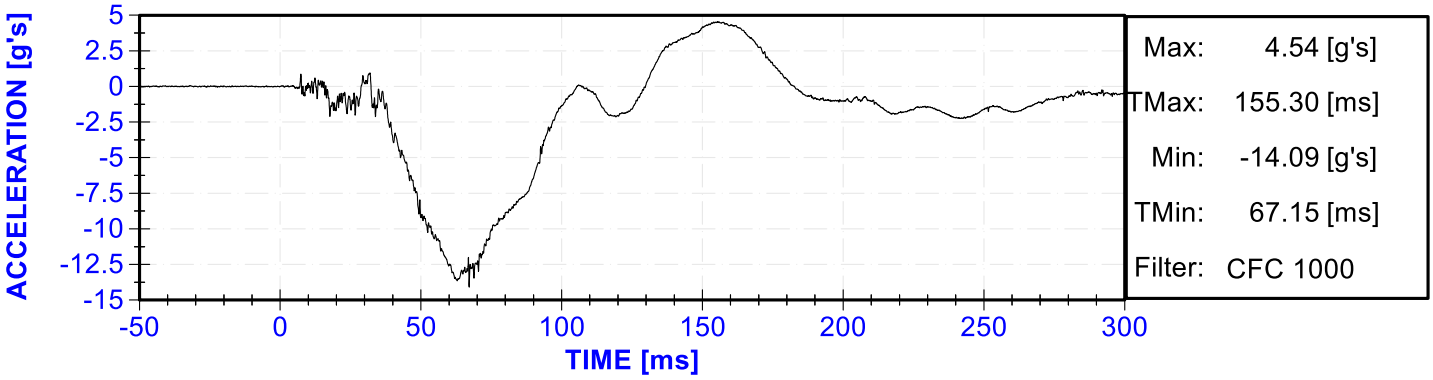
Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration (X)
Right Side Sill at Rear Seat Acceleration (Y)
Right Side Sill at Rear Seat Acceleration (Z)
Left Side Sill at Front Seat Acceleration (Y)
Left Side Sill at Rear Seat Acceleration (Y)
Lower A-Post Acceleration (Y)
Middle A-Post Acceleration (Y)
Lower B-Post Acceleration (Y)
Middle B-Post Acceleration (Y)
Front Seat Track Acceleration (Y)
Rear Seat Structure Acceleration (Y)
Right Rear Occupant Compartment Acceleration (Y)
Engine Block (X)
Engine Block (Y)
Rear Floorpan Above Axle Acceleration (X)
Rear Floorpan Above Axle Acceleration (Y)
Rear Floorpan Above Axle Acceleration (Z)

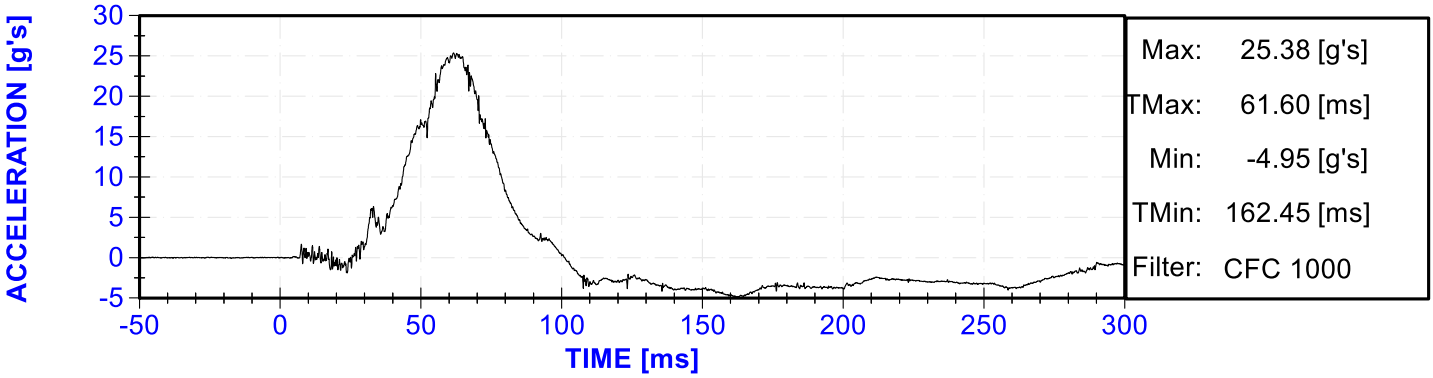
MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)
MDB Center of Gravity Acceleration (Y)
MDB Center of Gravity Acceleration (Z)
MDB Rear Acceleration (X)
MDB Rear Acceleration (Y)
Left MDB Contact Switch
Right MDB Contact Switch

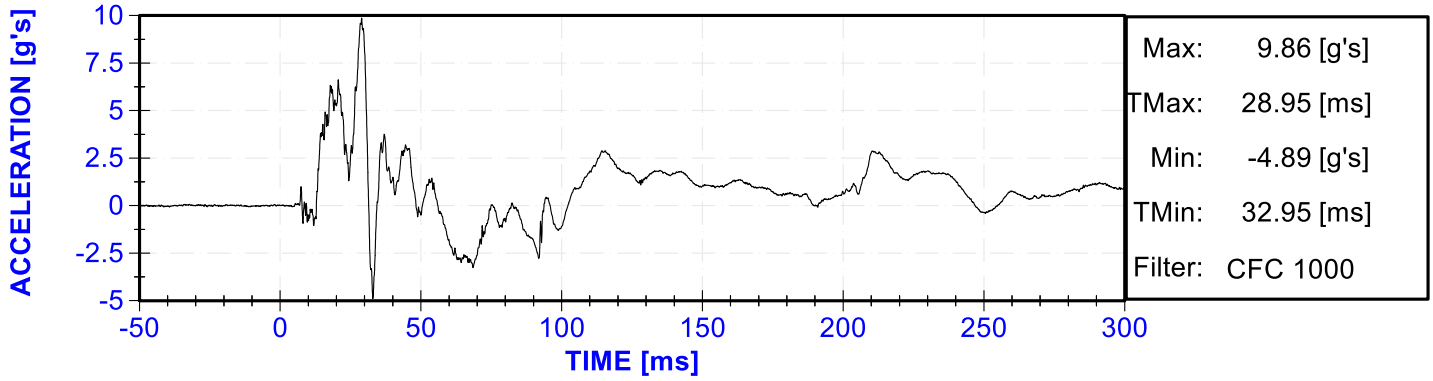
Driver Head Acceleration (X) Primary vs. Time



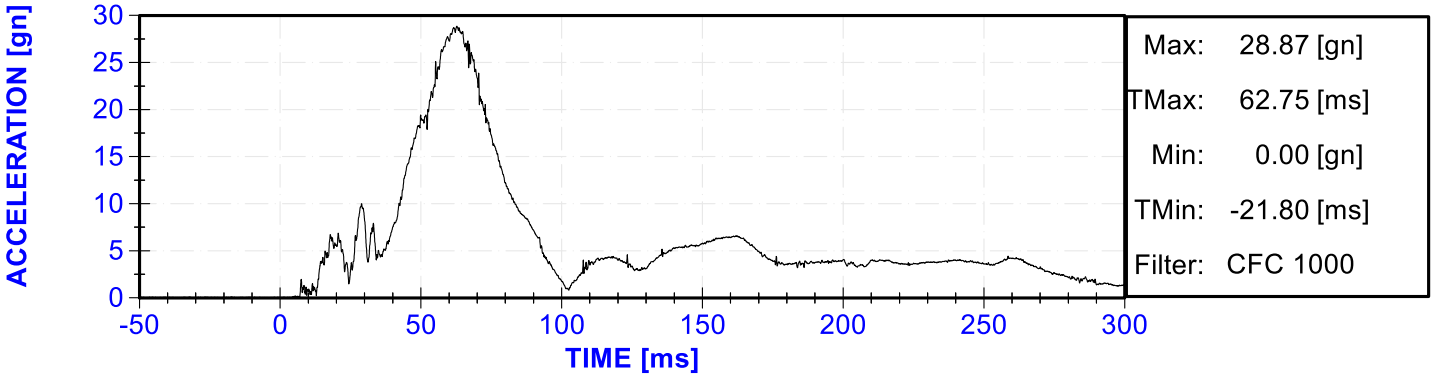
Driver Head Acceleration (Y) Primary vs. Time



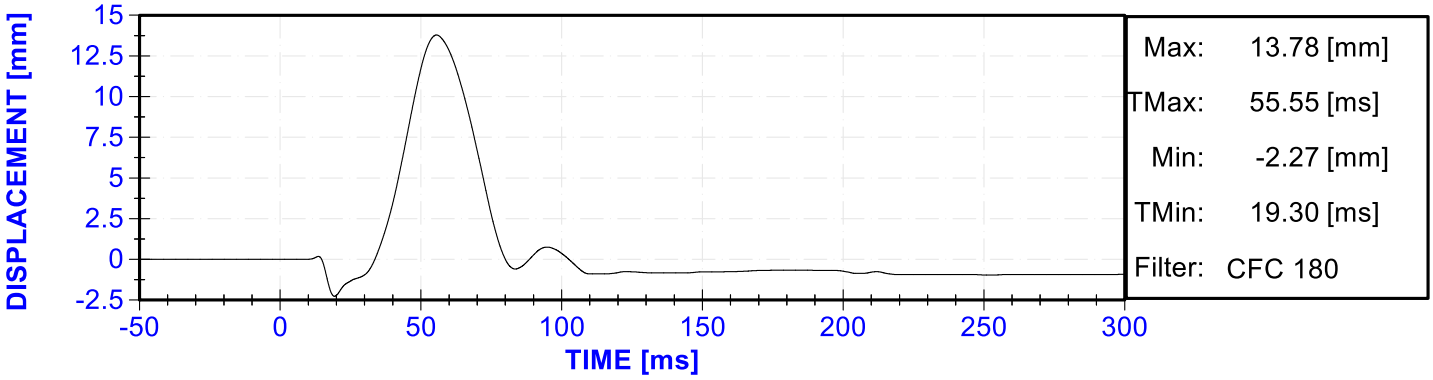
Driver Head Acceleration (Z) Primary vs. Time



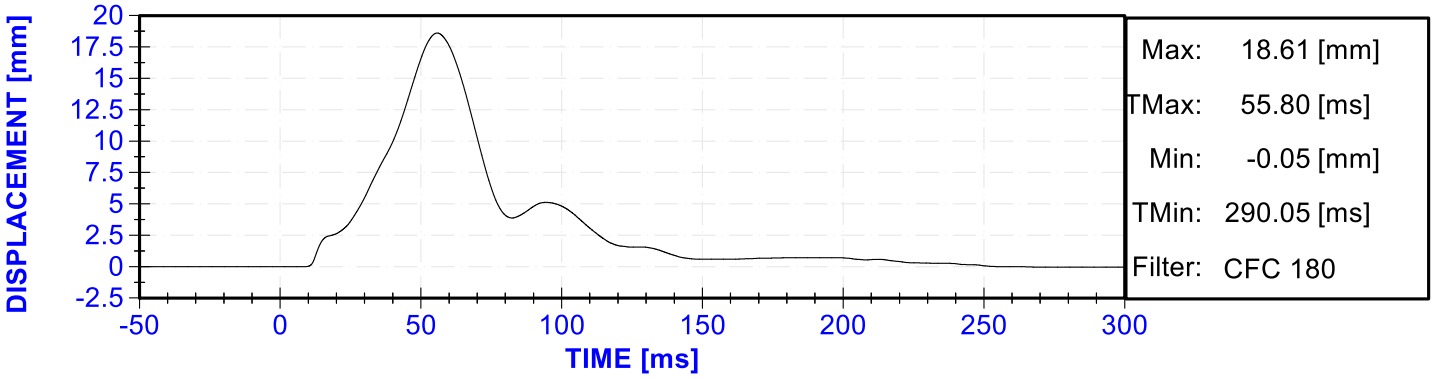
Driver Head Resultant Acceleration Primary vs. Time



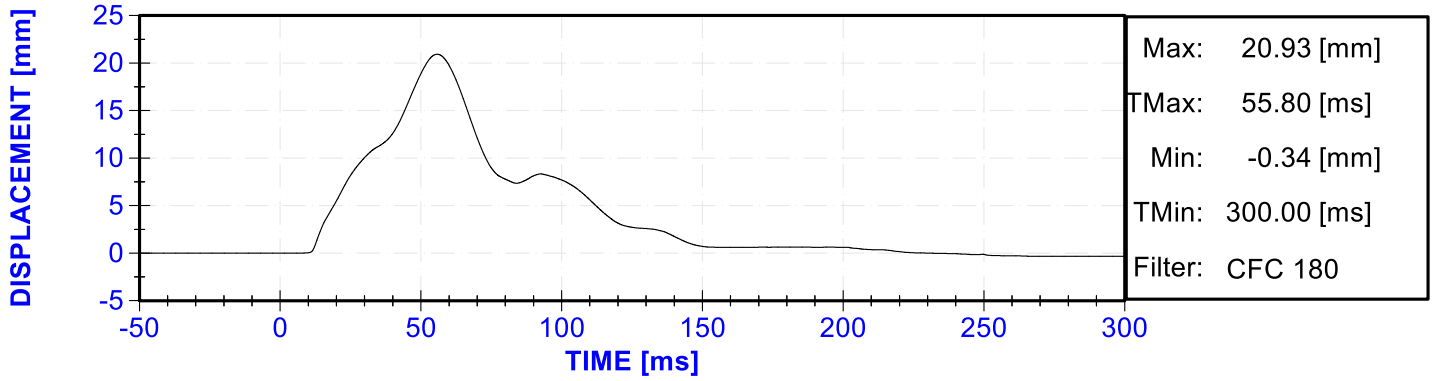
Driver Upper Thorax Rib Deflection (Y) vs. Time



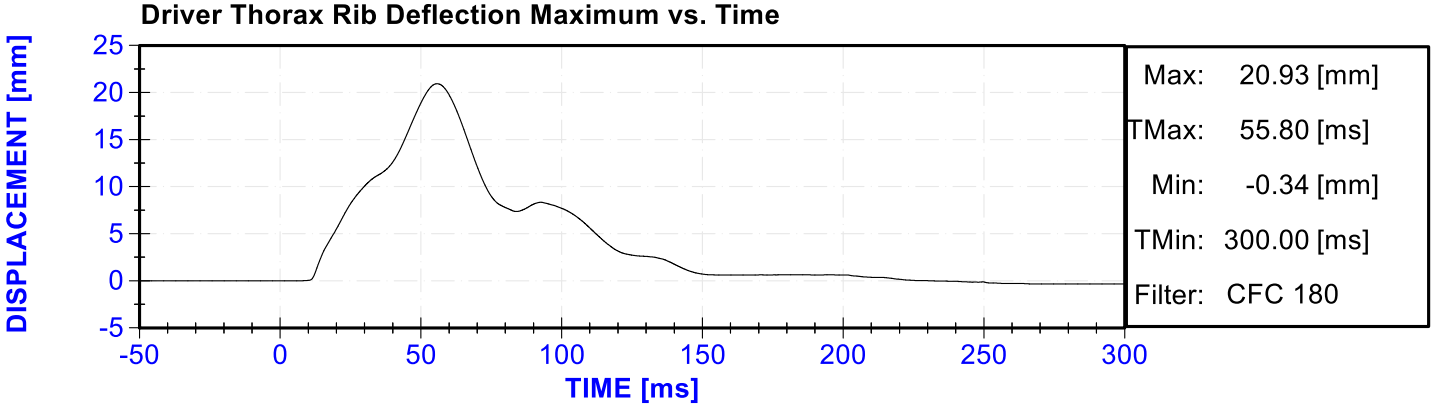
Driver Middle Thorax Rib Deflection (Y) vs. Time



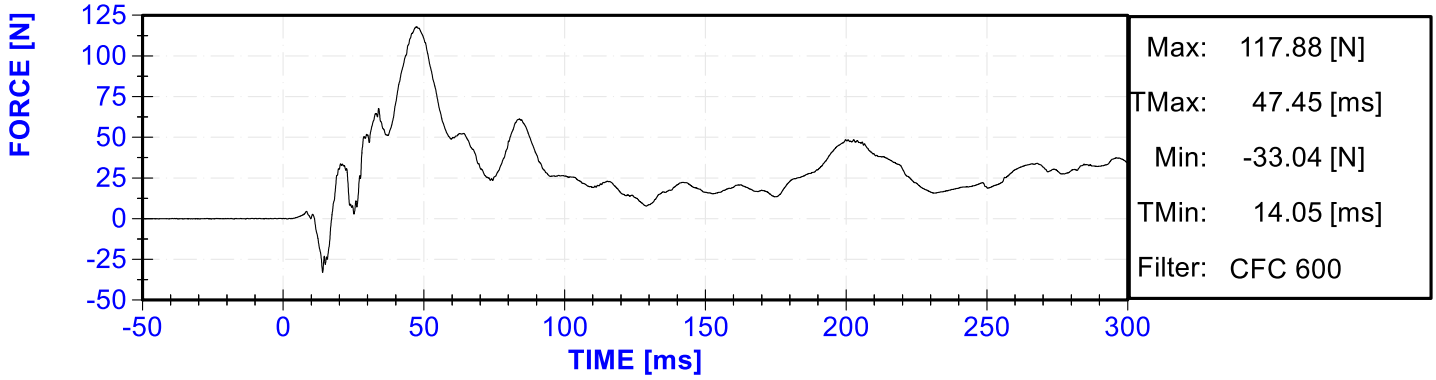
Driver Lower Thorax Rib Deflection (Y) vs. Time



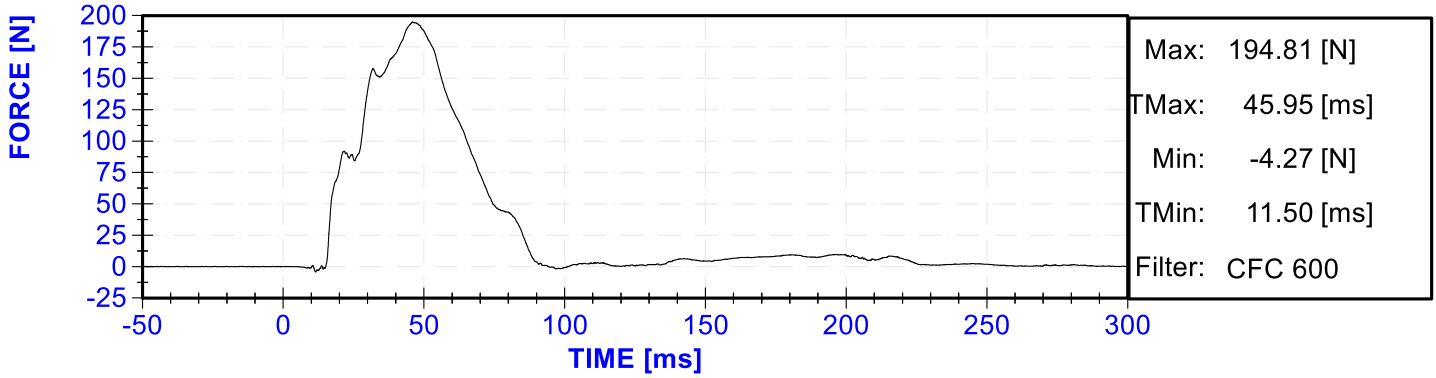
Driver Thorax Rib Deflection Maximum vs. Time



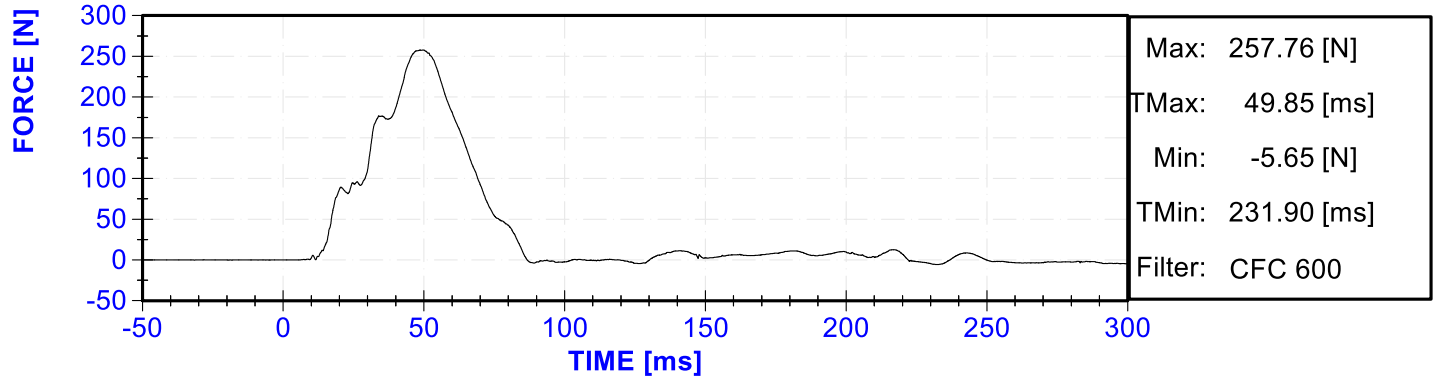
Driver Anterior Abdominal Force (Y) vs. Time



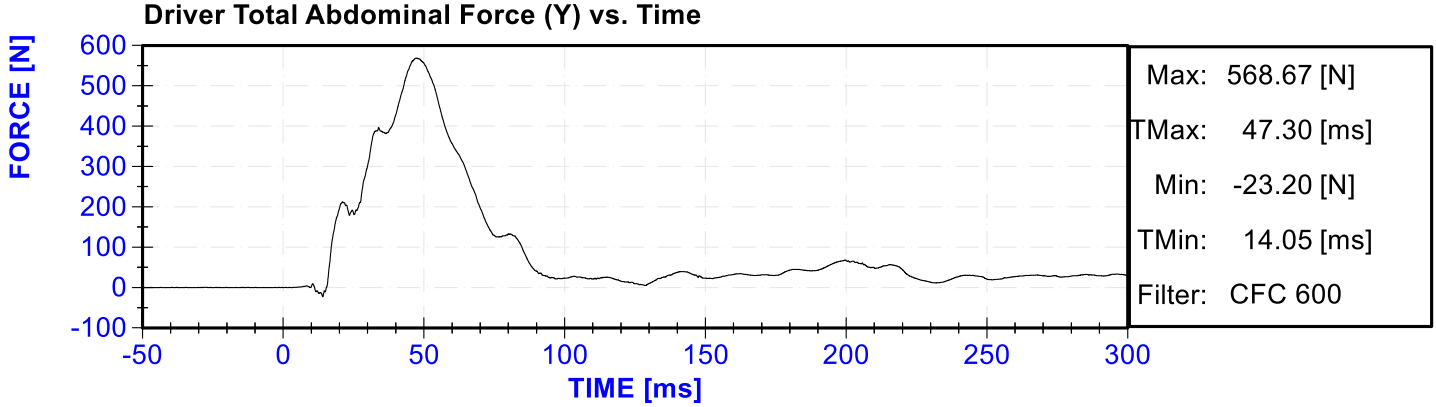
Driver Middle Abdominal Force (Y) vs. Time



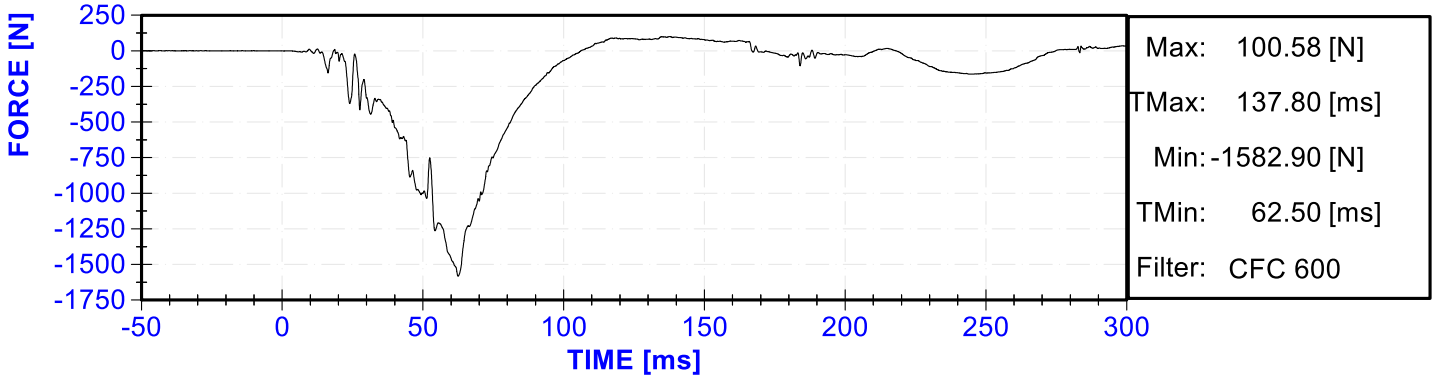
Driver Posterior Abdominal Force (Y) vs. Time



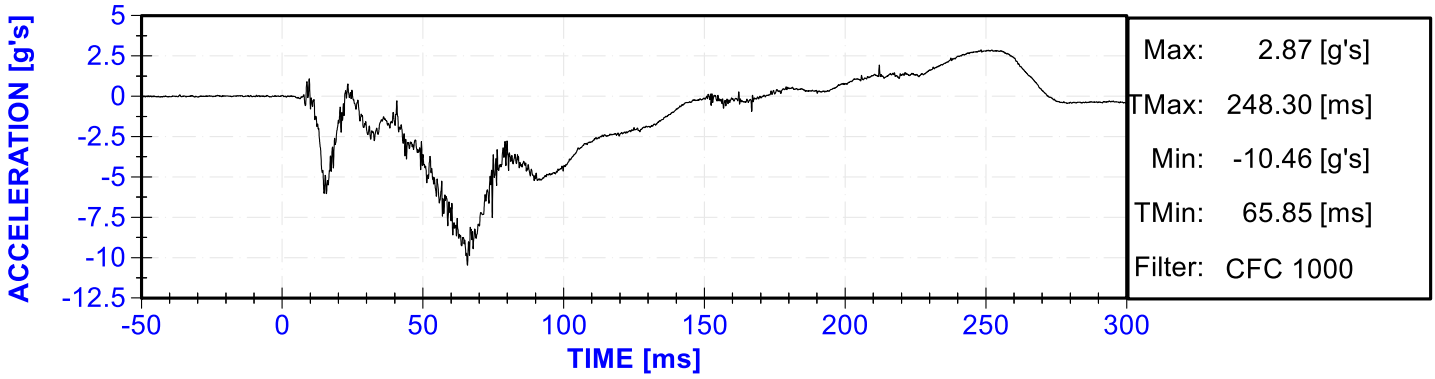
Driver Total Abdominal Force (Y) vs. Time



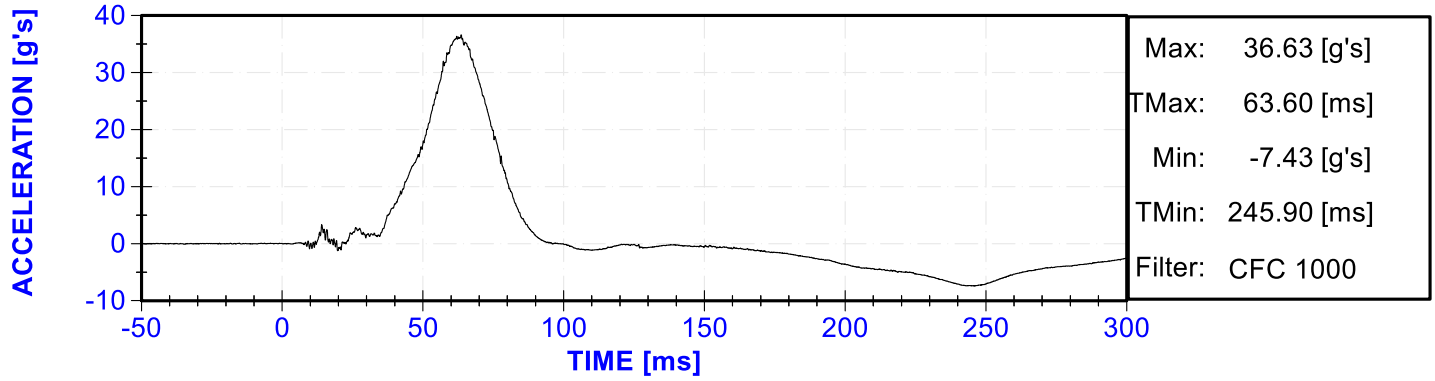
Driver Pubic Symphysis Force (Y) vs. Time



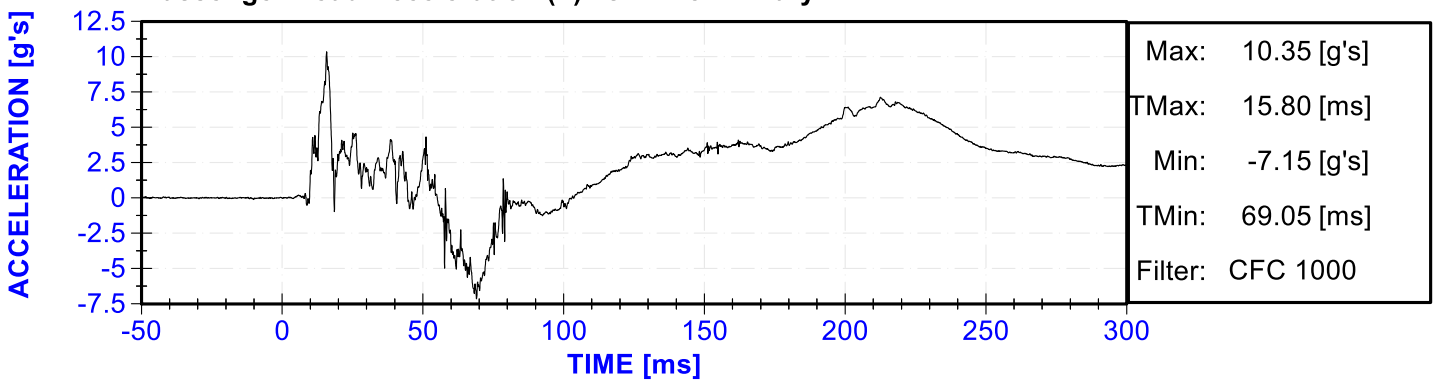
Passenger Head Acceleration (X) vs. Time Primary



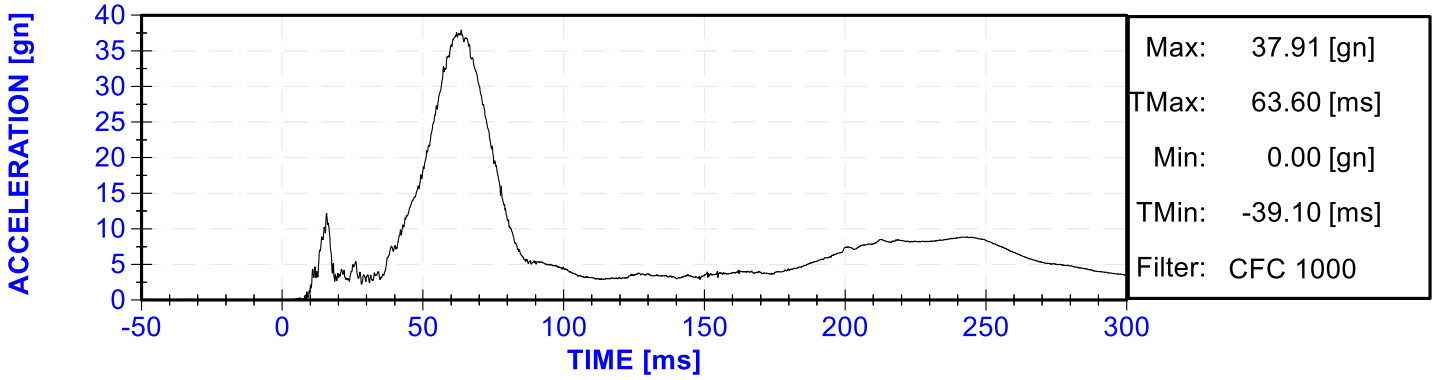
Passenger Head Acceleration (Y) vs. Time Primary



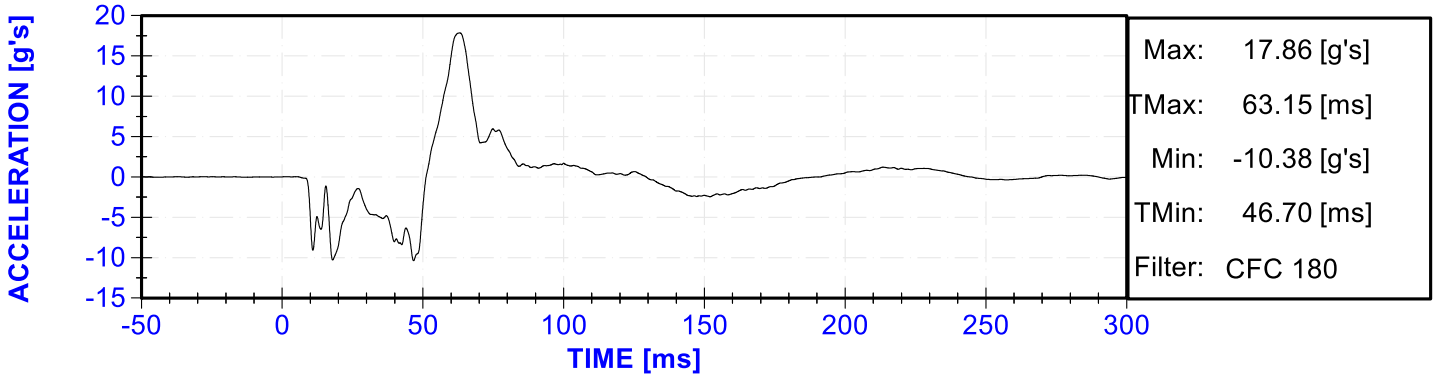
Passenger Head Acceleration (Z) vs. Time Primary



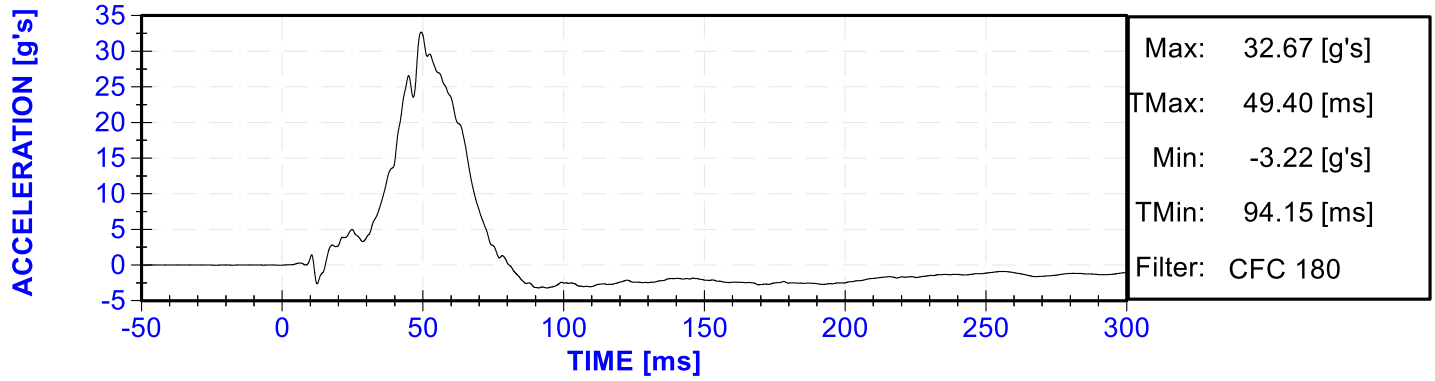
Passenger Head Resultant Acceleration Primary vs. Time



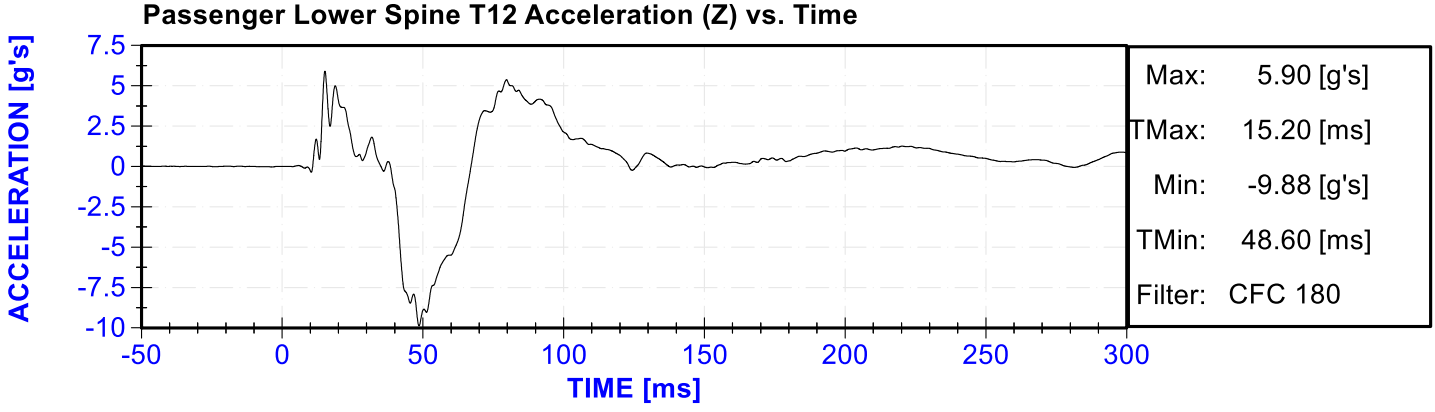
Passenger Lower Spine T12 Acceleration (X) vs. Time



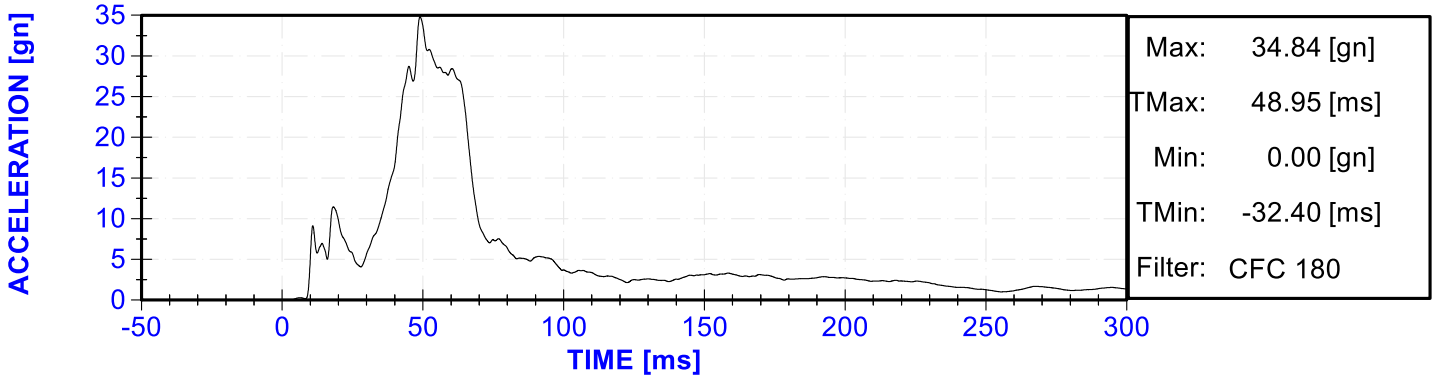
Passenger Lower Spine T12 Acceleration (Y) vs. Time



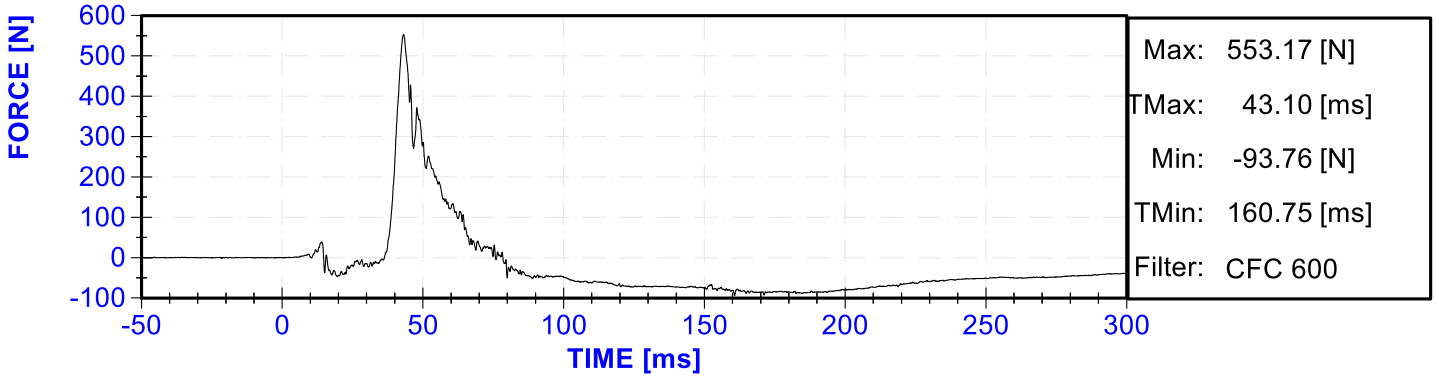
Passenger Lower Spine T12 Acceleration (Z) vs. Time



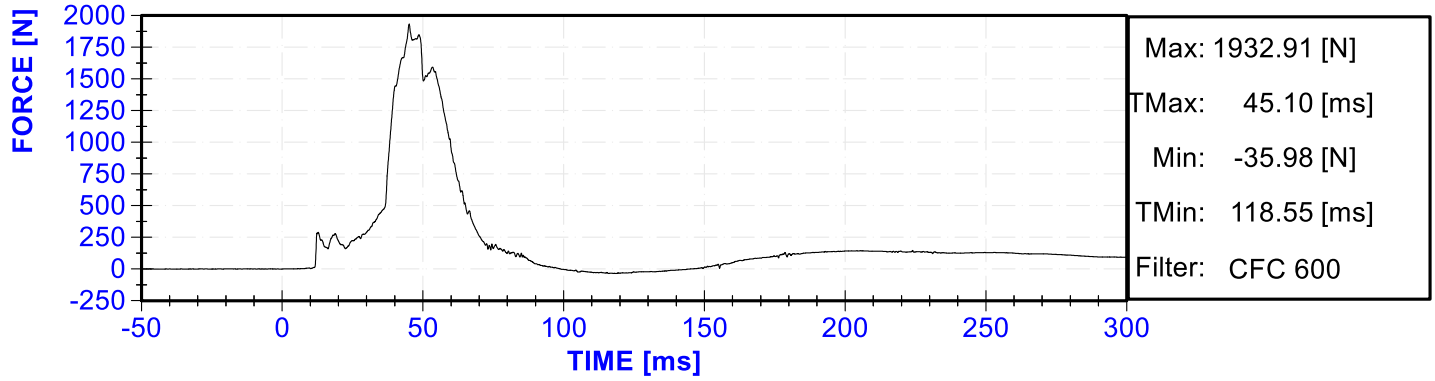
Passenger Lower Spine T12 Resultant Acceleration vs. Time



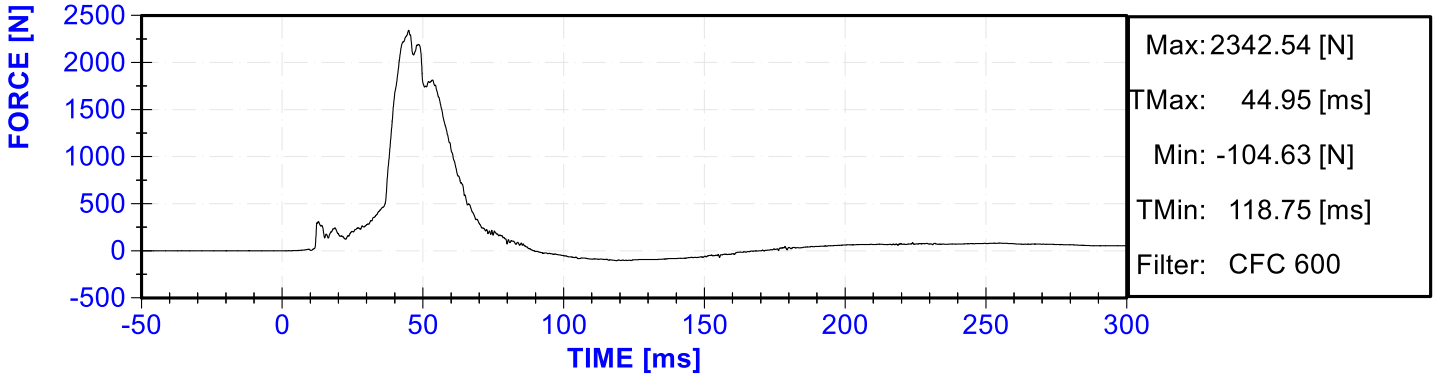
Passenger Iliac Force on Impact Side (Y) vs. Time



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



Passenger Total Pelvic Force on Impact Side (Y) vs. Time



APPENDIX C

DUMMY PERFORMANCE CALIBRATION TEST DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

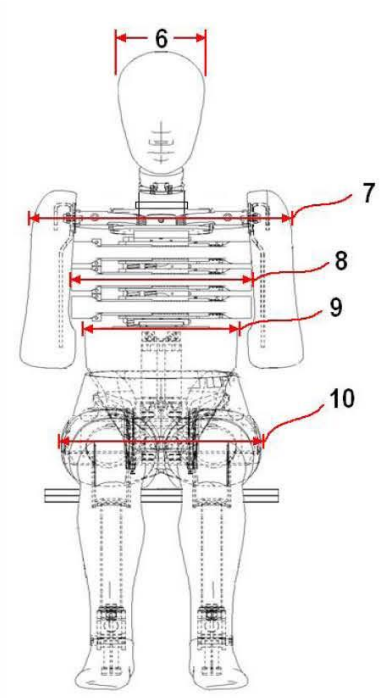
SERIAL NO: F033

(CONFIGURED FOR LEFT SIDE IMPACT)

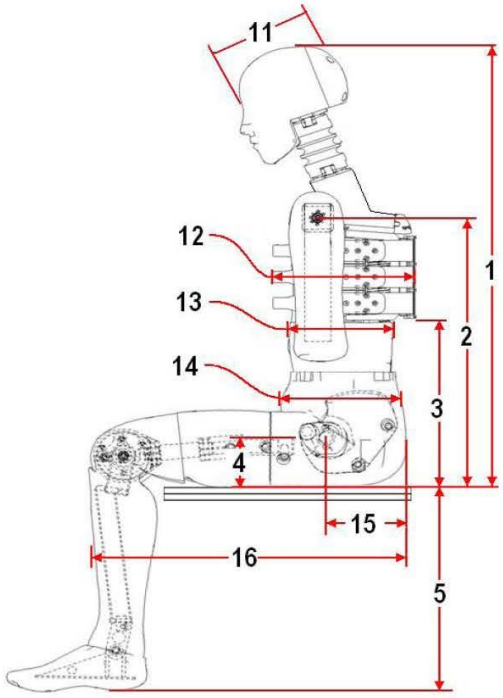
External Measurements - EuroSID-2re

Technician: K. Brogan Date: 5/13/2021

Dummy Serial Number: F033



FRONT VIEW



SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	912	Pass
2	Seat to Shoulder Joint	558	572	569	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	353	Pass
4	Seat to Hip Joint (center of bolt)	97	103	98	Pass
5	Sole to Seat, Sitting	333	451	426	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	472	Pass
8	Thorax Width	322	332	329	Pass
9	Abdomen Width	273	287	285	Pass
10	Pelvis Lap Width	359	373	368	Pass
11	Head Depth	196	206	201	Pass
12	Thorax Depth	262	272	269	Pass
13	Abdomen Depth	194	204	201	Pass
14	Pelvis Depth	235	245	239	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	155	Pass
16	Back of Buttocks to Front Knee	597	615	609	Pass

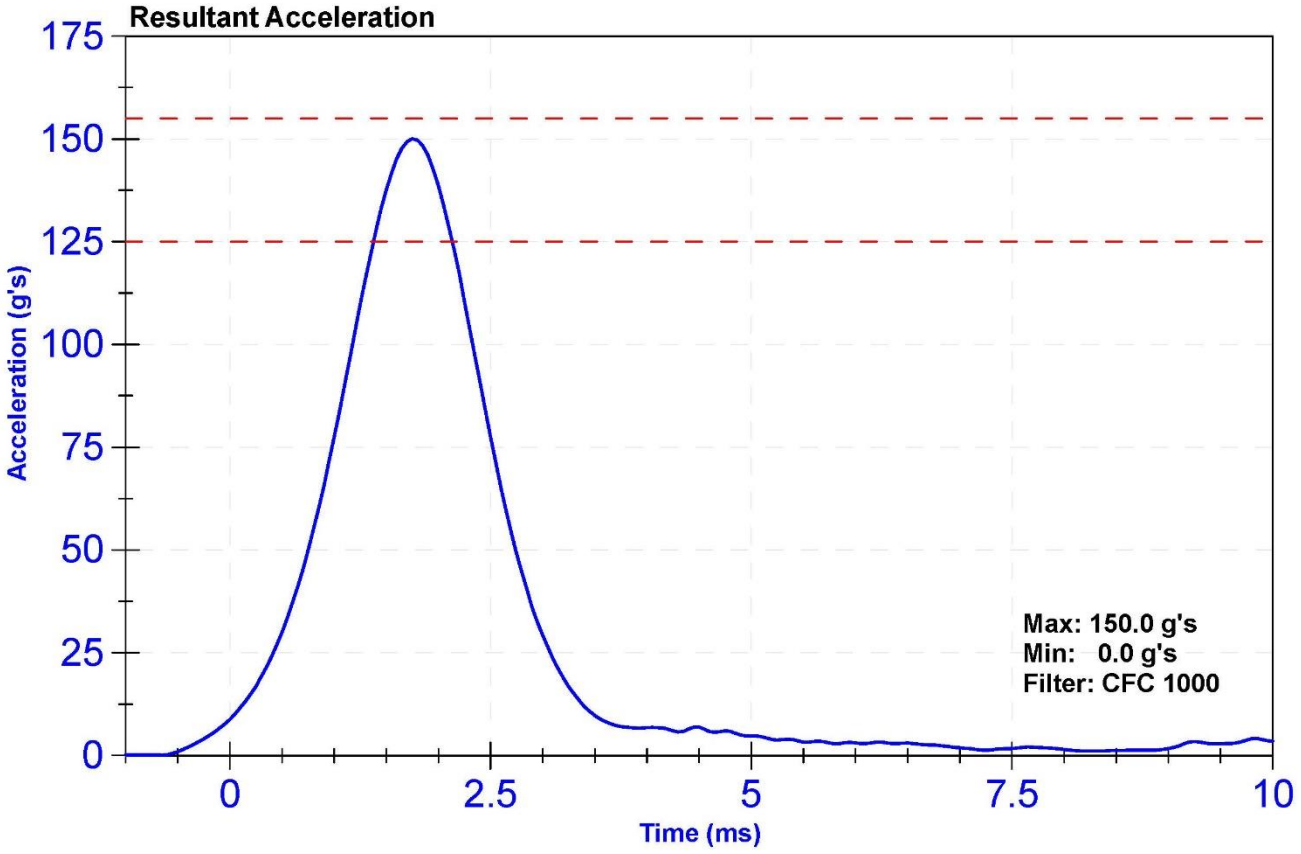
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

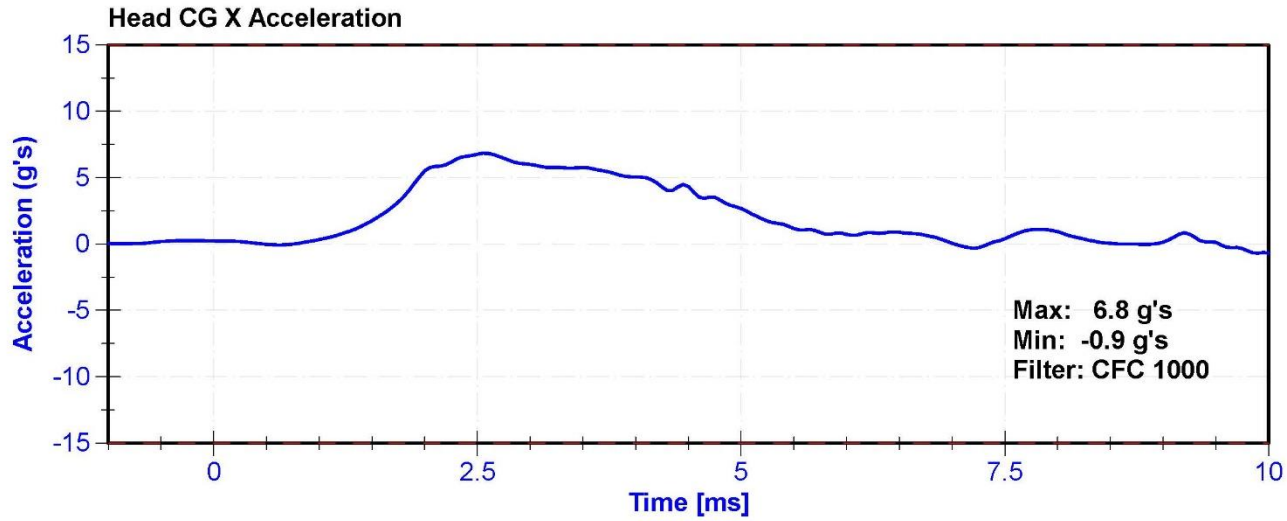
Results

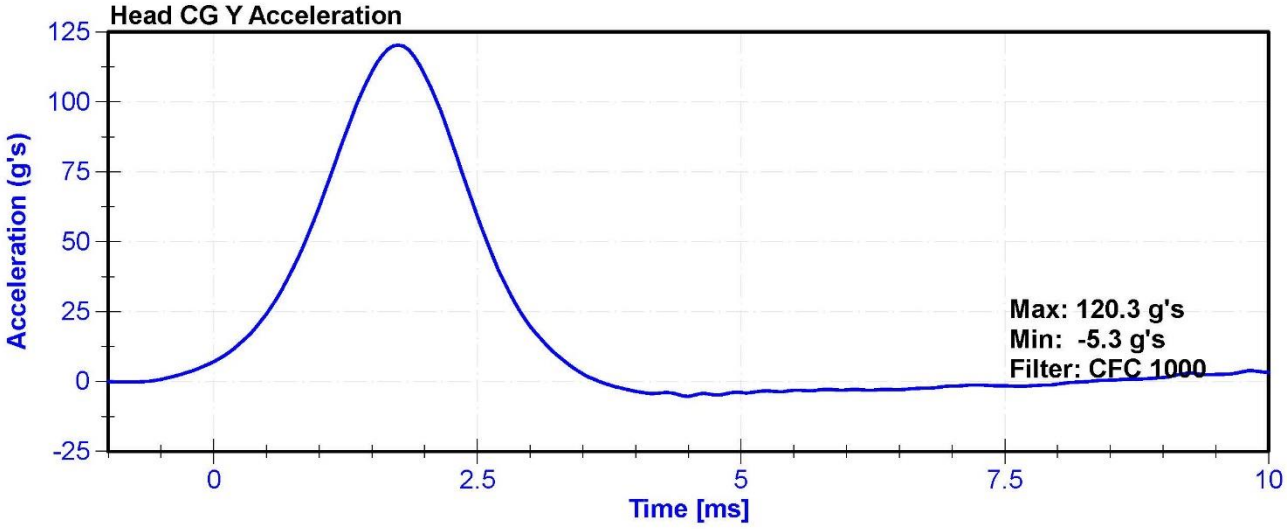
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	34.0	Pass
Resultant Acceleration	125	155	g's	150.0	Pass
Oscillation	0	15	%	4.60	Pass
Fore-Aft Acceleration	-15	15	g's	6.8	Pass

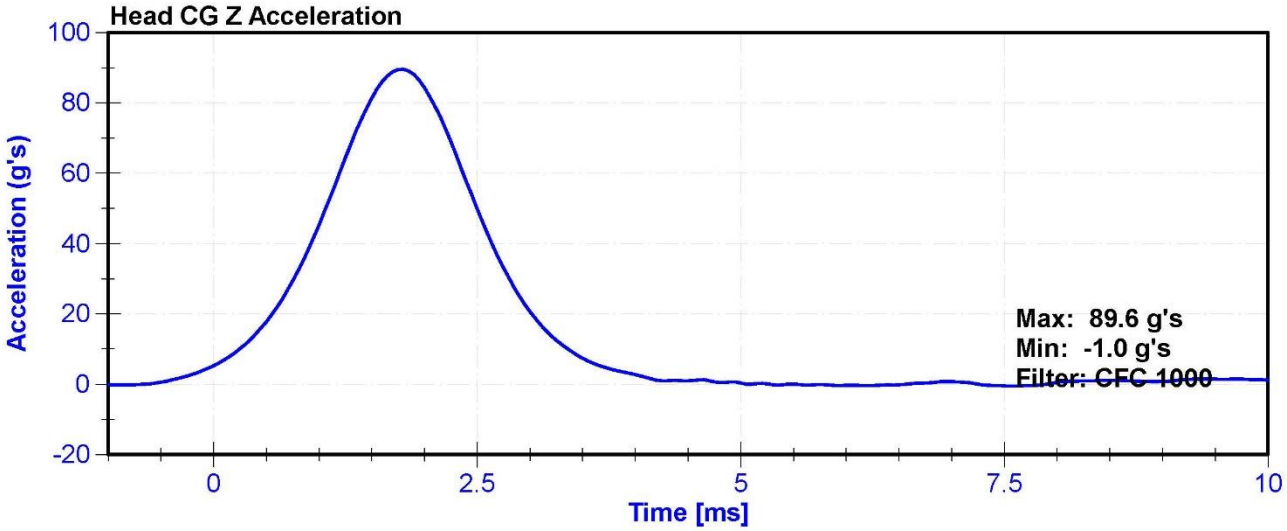
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P63861	11/24/2020	5/25/2021
Y Accelerometer	ENDEVCO 7264CT	AC-P49216	11/24/2020	5/25/2021
Z Accelerometer	ENDEVCO 7264	AC-P51303	11/24/2020	5/25/2021




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 6.8 g's
Min: -0.9 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 120.3 g's
Min: -5.3 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]
Max: 89.6 g's
Min: -1.0 g's
Filter: CFC 1000

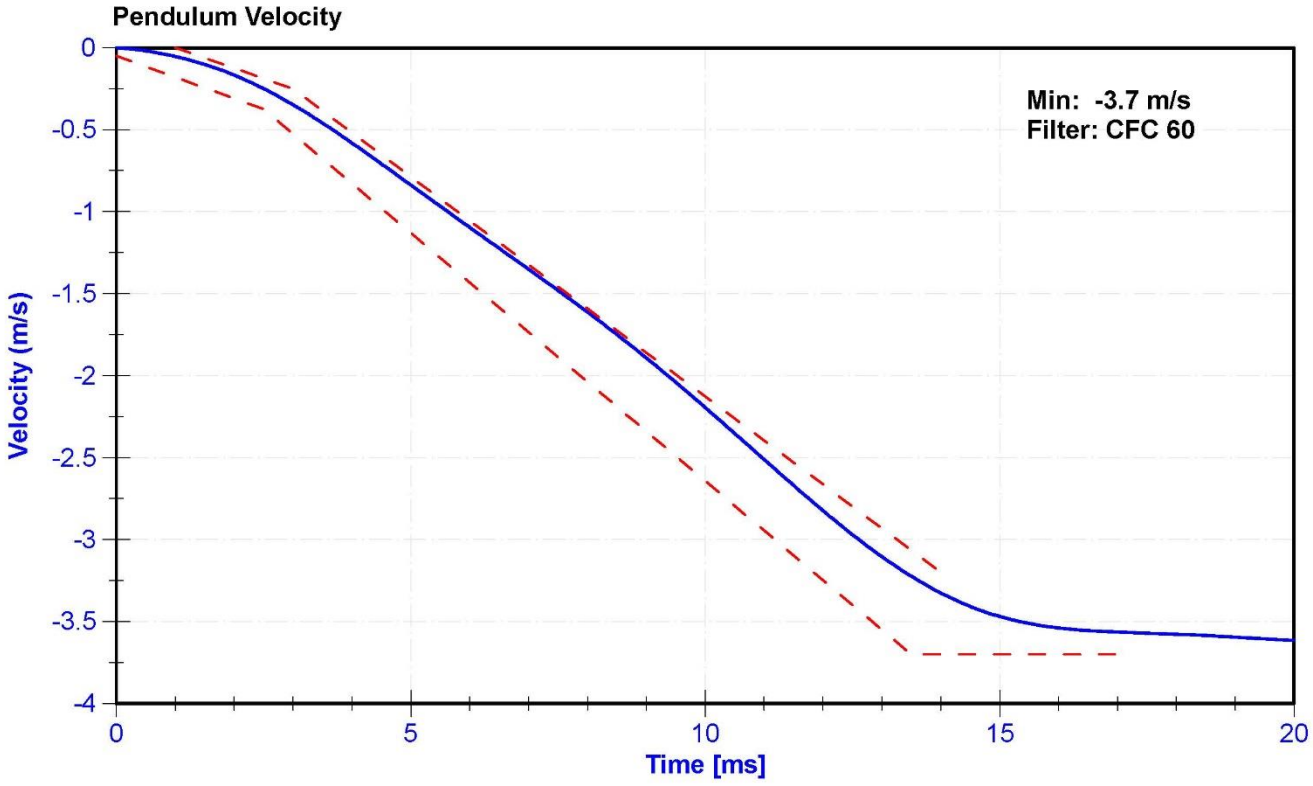
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

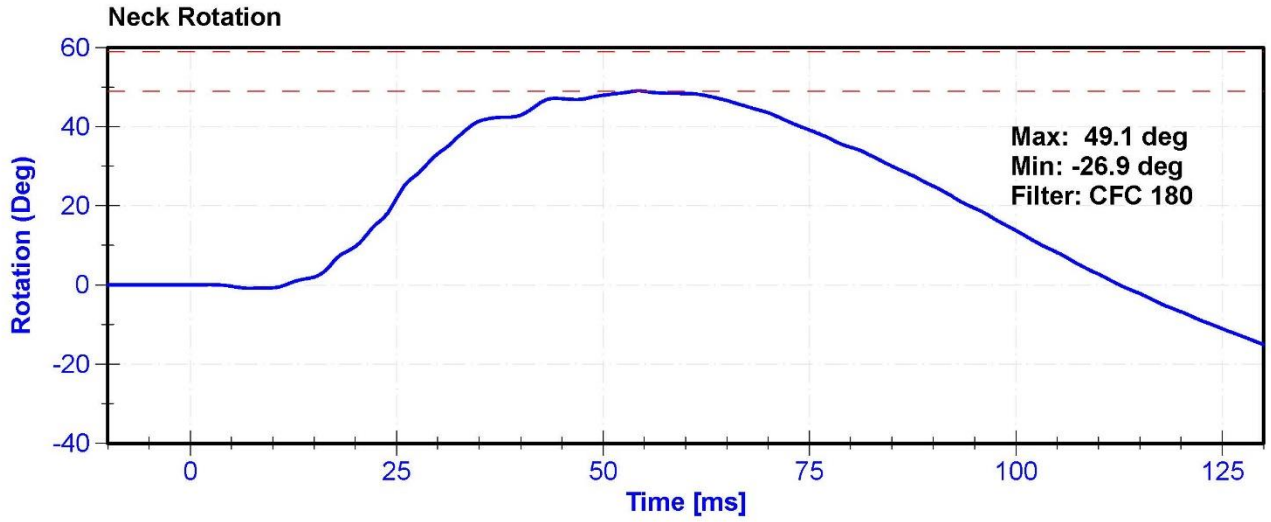
Results

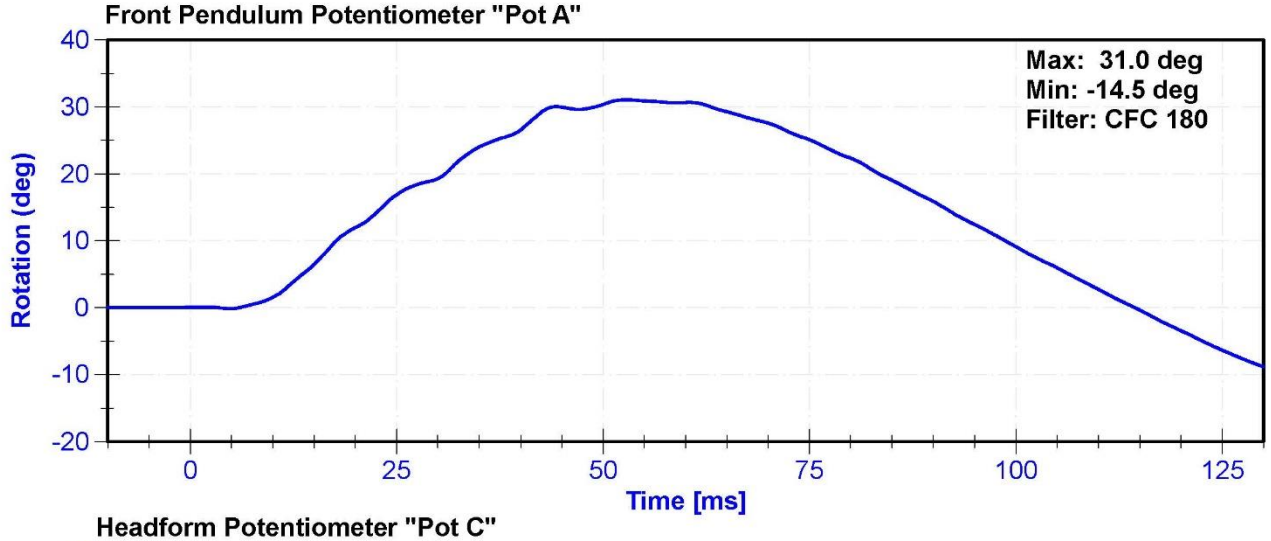
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	34	Pass
Velocity	3.3	3.5	m/s	3.38	Pass
Lateral Neck Rotation	49	59	deg	49.1	Pass
Time at Maximum Rotation	54	66	ms	54.3	Pass
Time of Rotation Decay from Maximum	53	88	ms	58.3	Pass

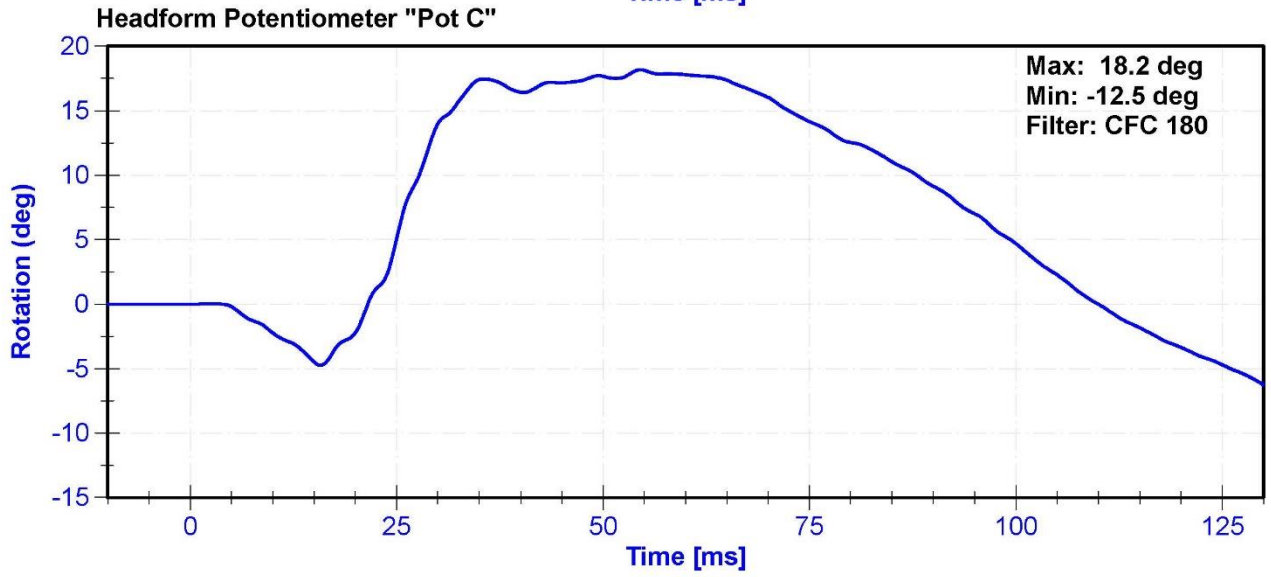
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503	2/5/2021	2/5/2022
Front Pendulum Potentiometer	SP22G	DS-094	8/18/2020	8/18/2021
Headform Potentiometer	SP22G	DS-095	8/18/2020	8/18/2021




Neck Rotation
Rotation (Deg)
Time [ms]
Max: 49.1 deg
Min: -26.9 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 31.0 deg
Min: -14.5 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 18.2 deg
Min: -12.5 deg
Filter: CFC 180

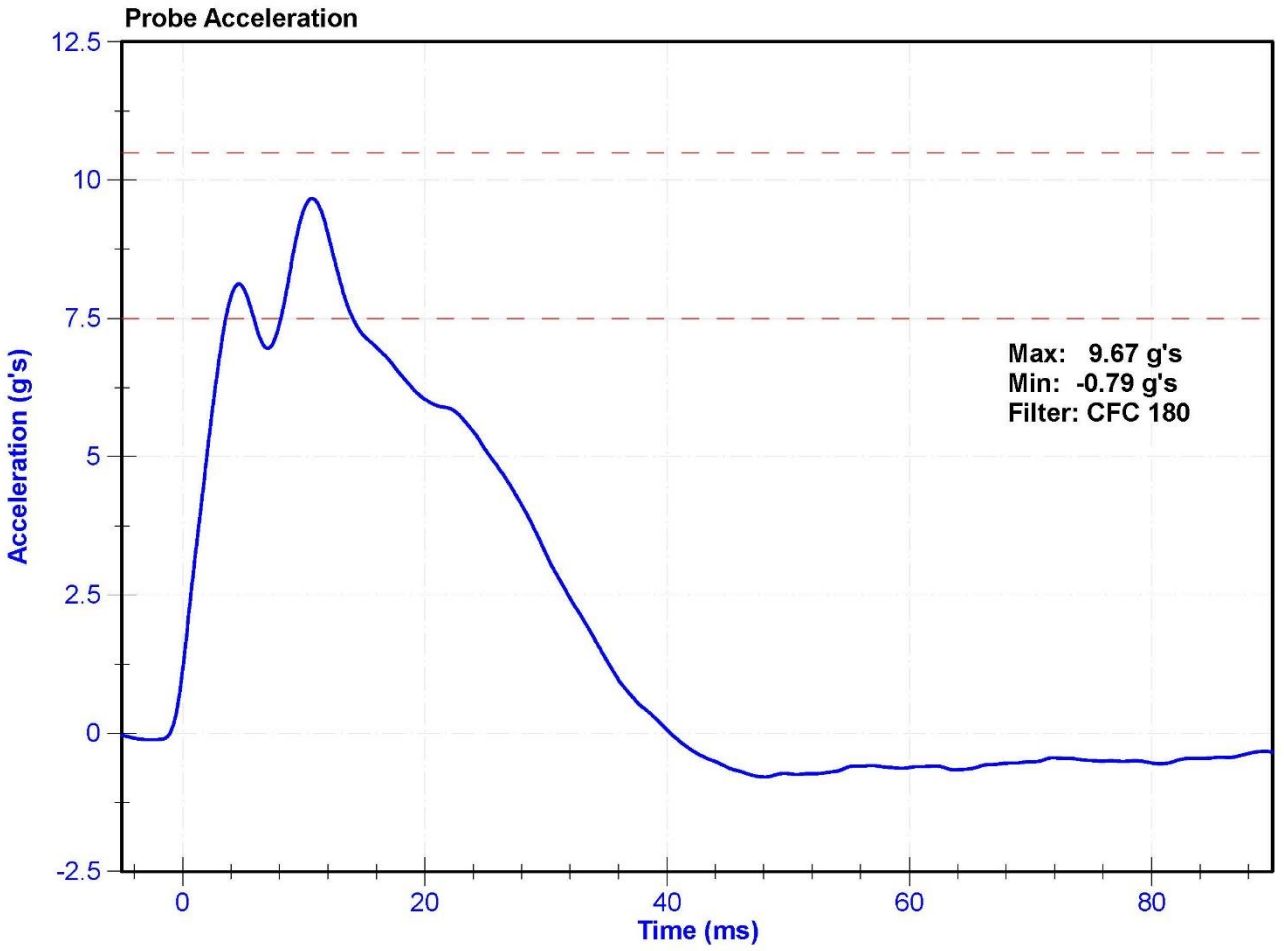
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	35.0	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	7.5	10.5	g's	9.67	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	MSI 64C-2000	A278994	12/3/2020	12/3/2021



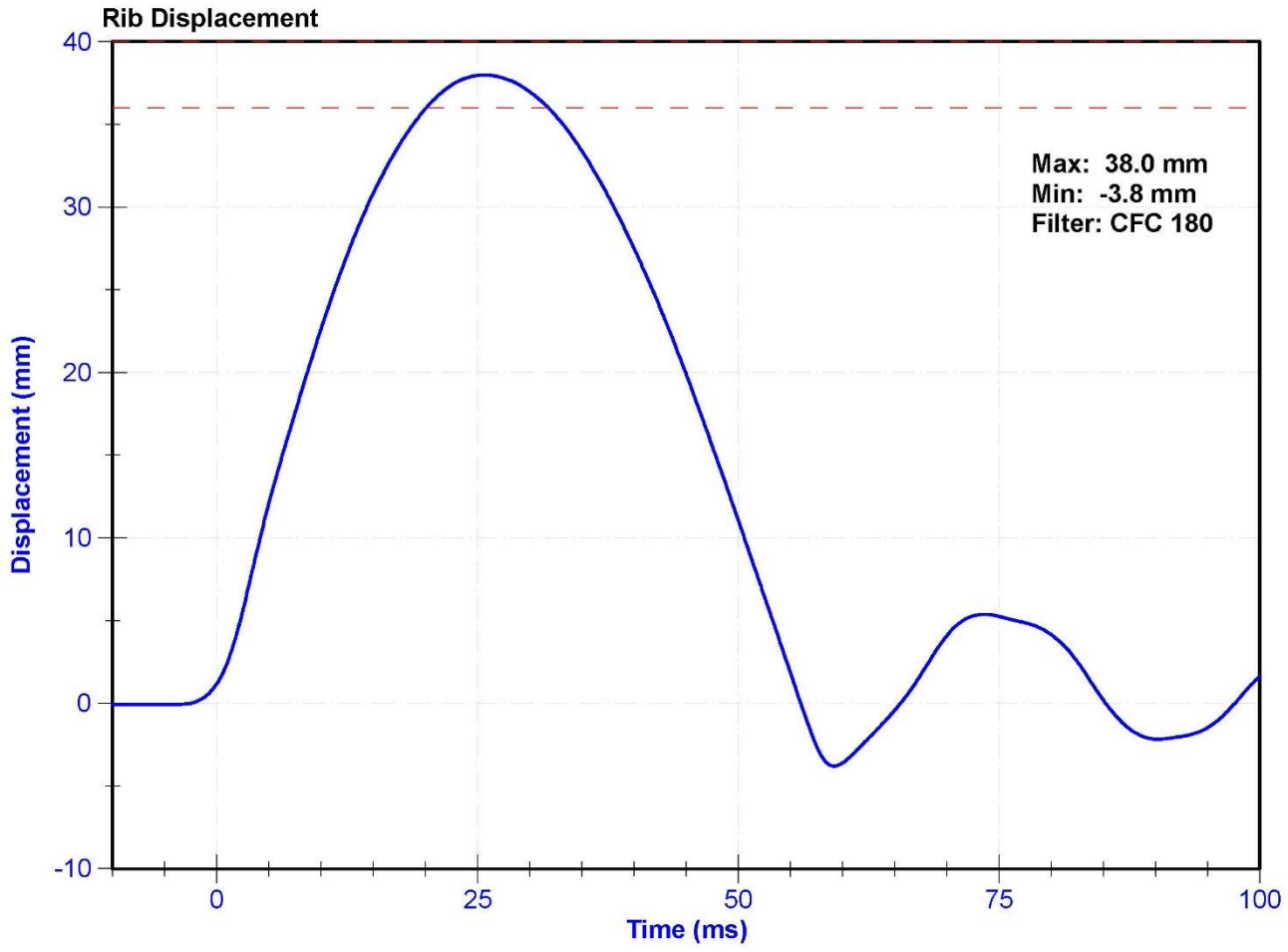
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	59.0	Pass
Rib Displacement	36	40	mm	38.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-179GFE	6/17/2021	12/16/2021



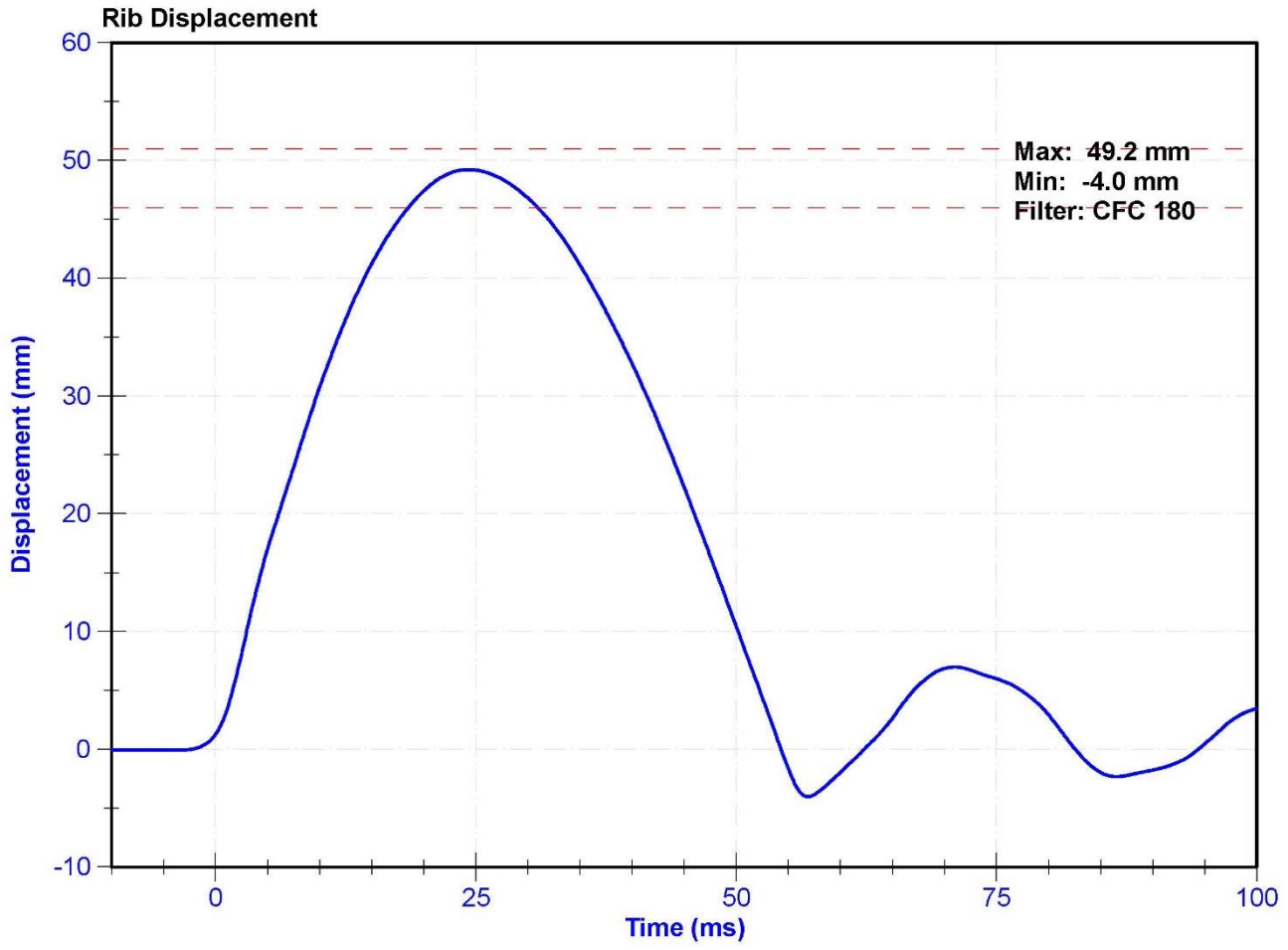
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	59.0	Pass
Rib Displacement	46	51	mm	49.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-179GFE	6/17/2021	12/16/2021



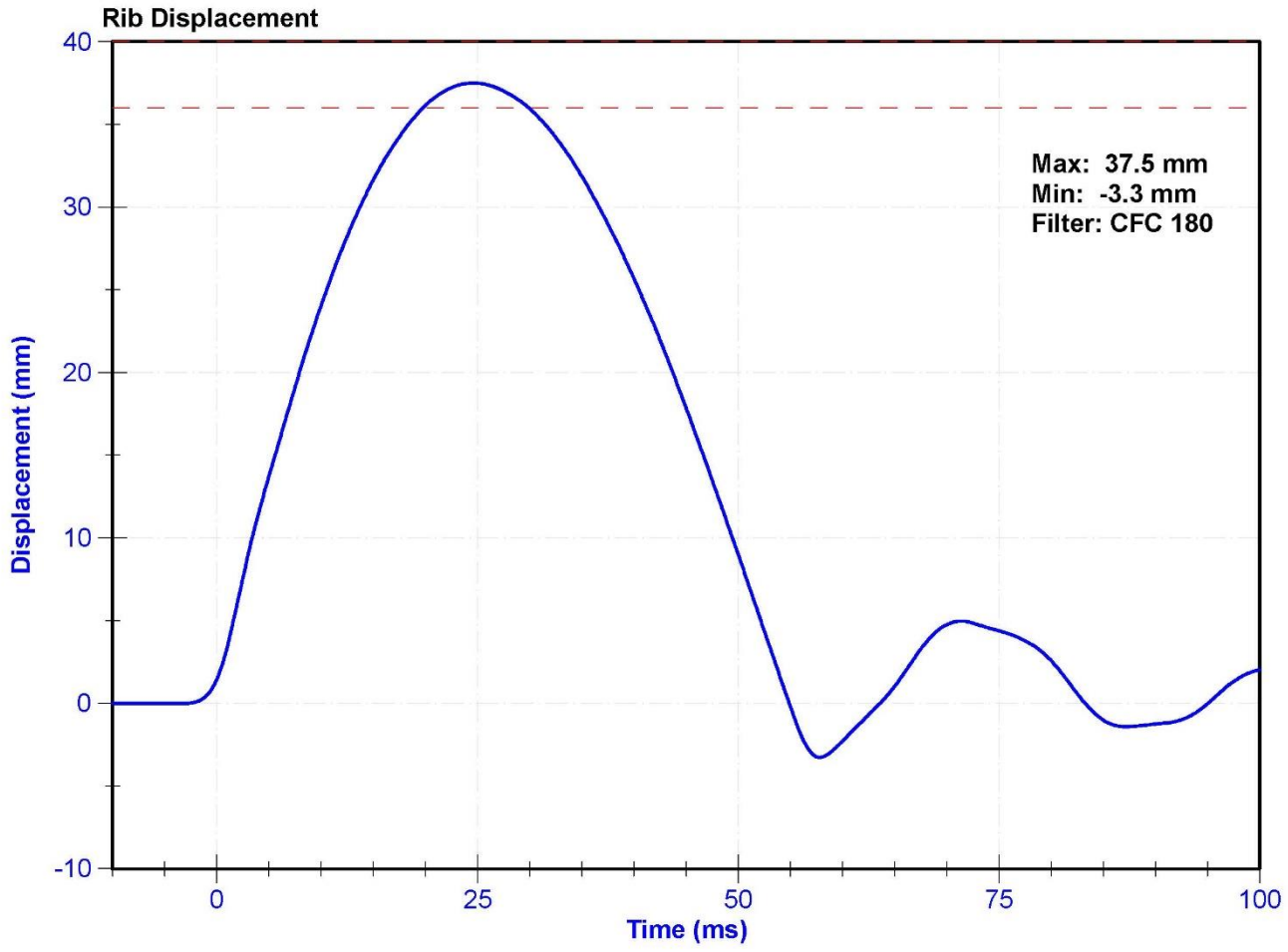
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	59.0	Pass
Rib Displacement	36	40	mm	37.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-185GFE	6/17/2021	12/16/2021



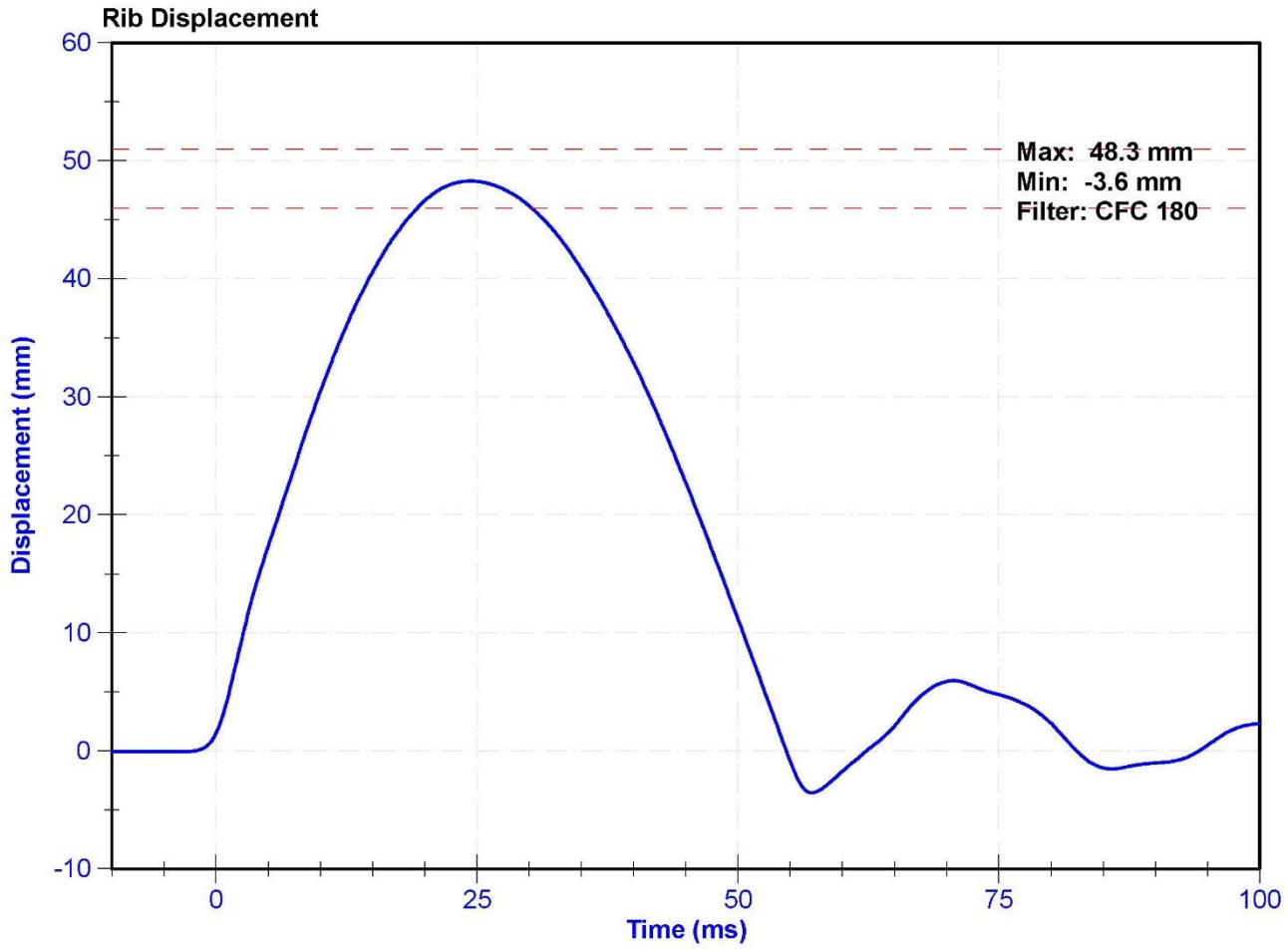
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	59.0	Pass
Rib Displacement	46	51	mm	48.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-185GFE	6/17/2021	12/16/2021



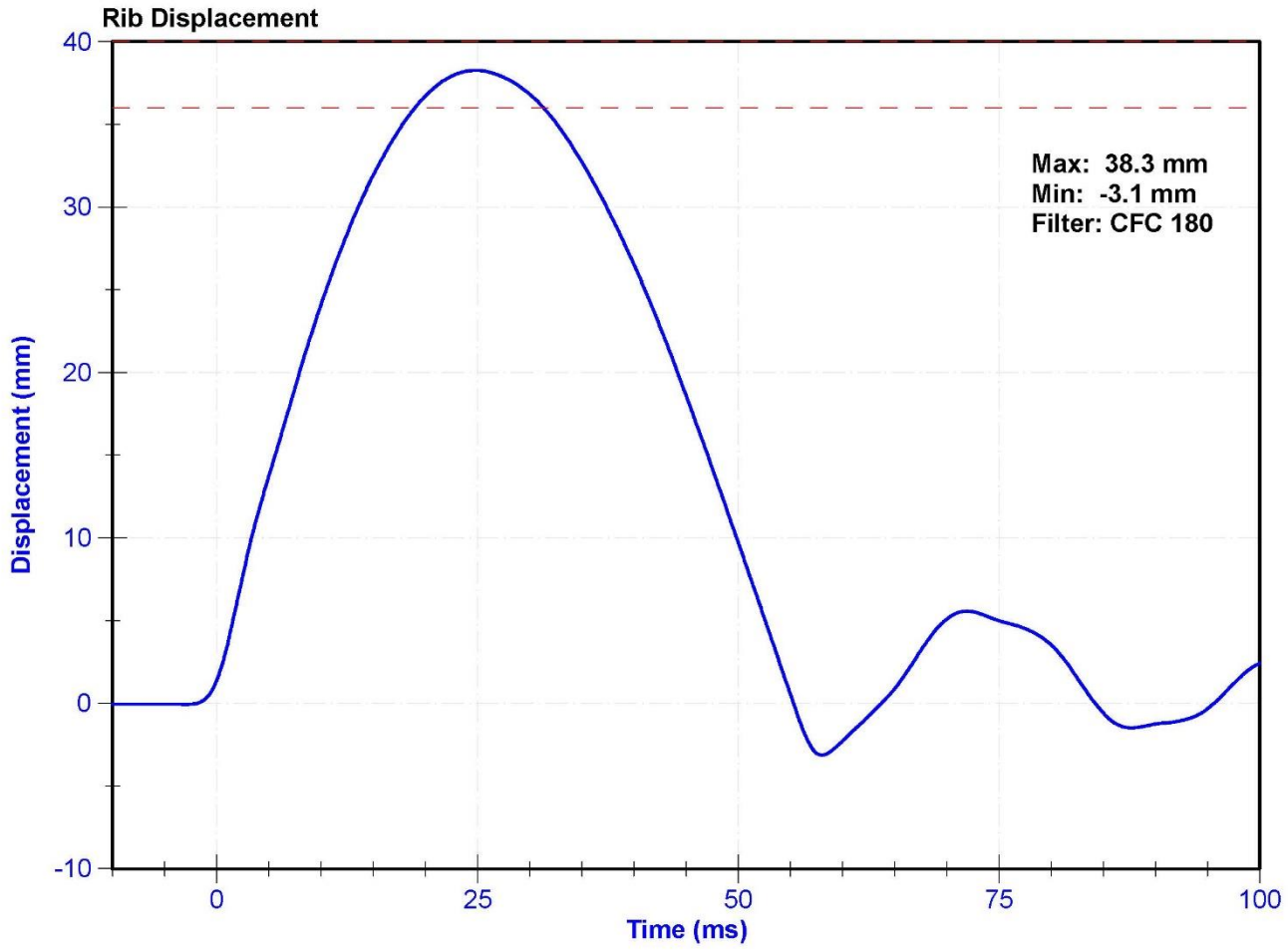
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	59.0	Pass
Rib Displacement	36	40	mm	38.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-178GFE	6/17/2021	12/16/2021



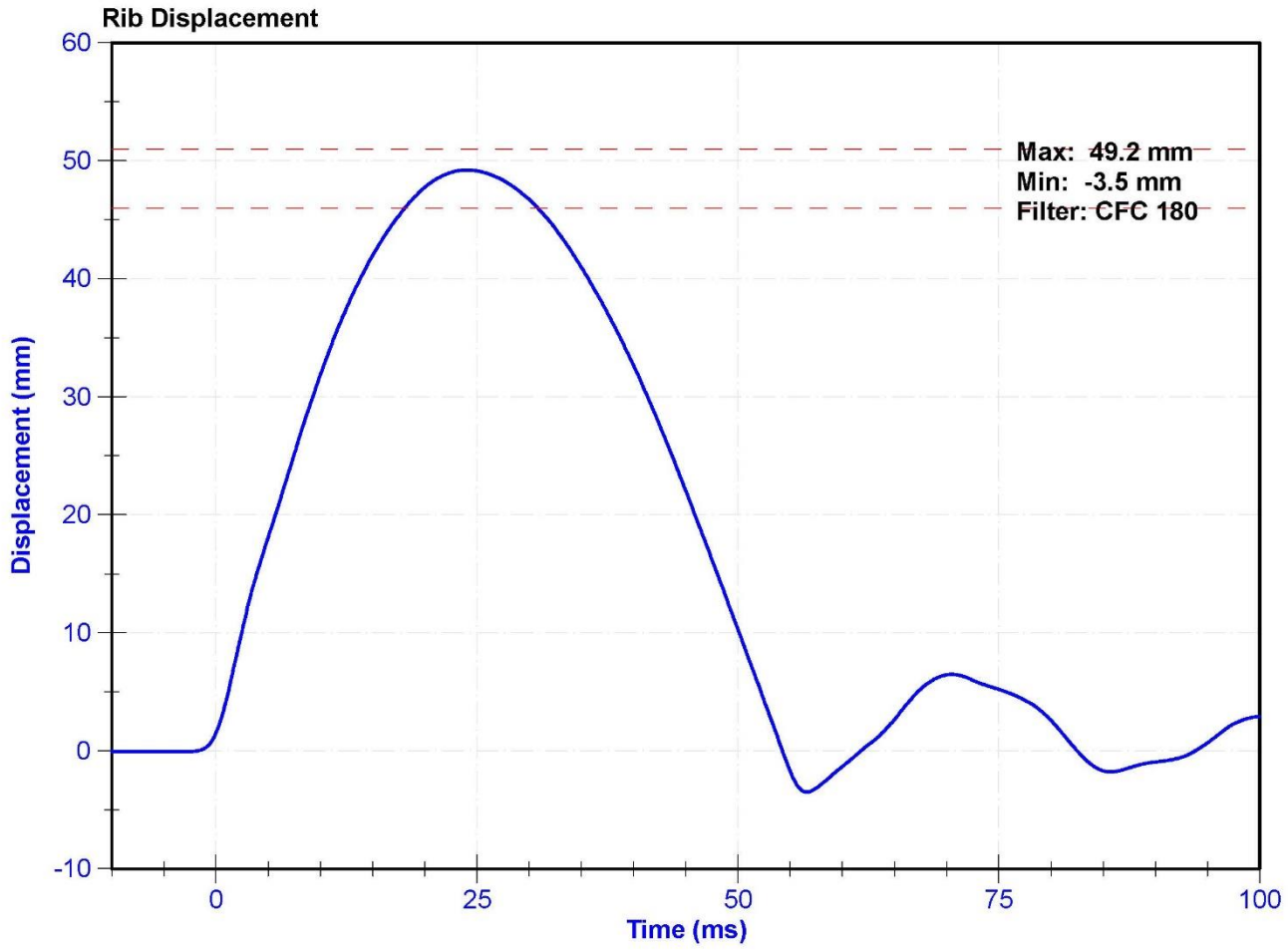
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.1	Pass
Humidity	10	70	%	59.0	Pass
Rib Displacement	46	51	mm	49.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-178GFE	6/17/2021	12/16/2021



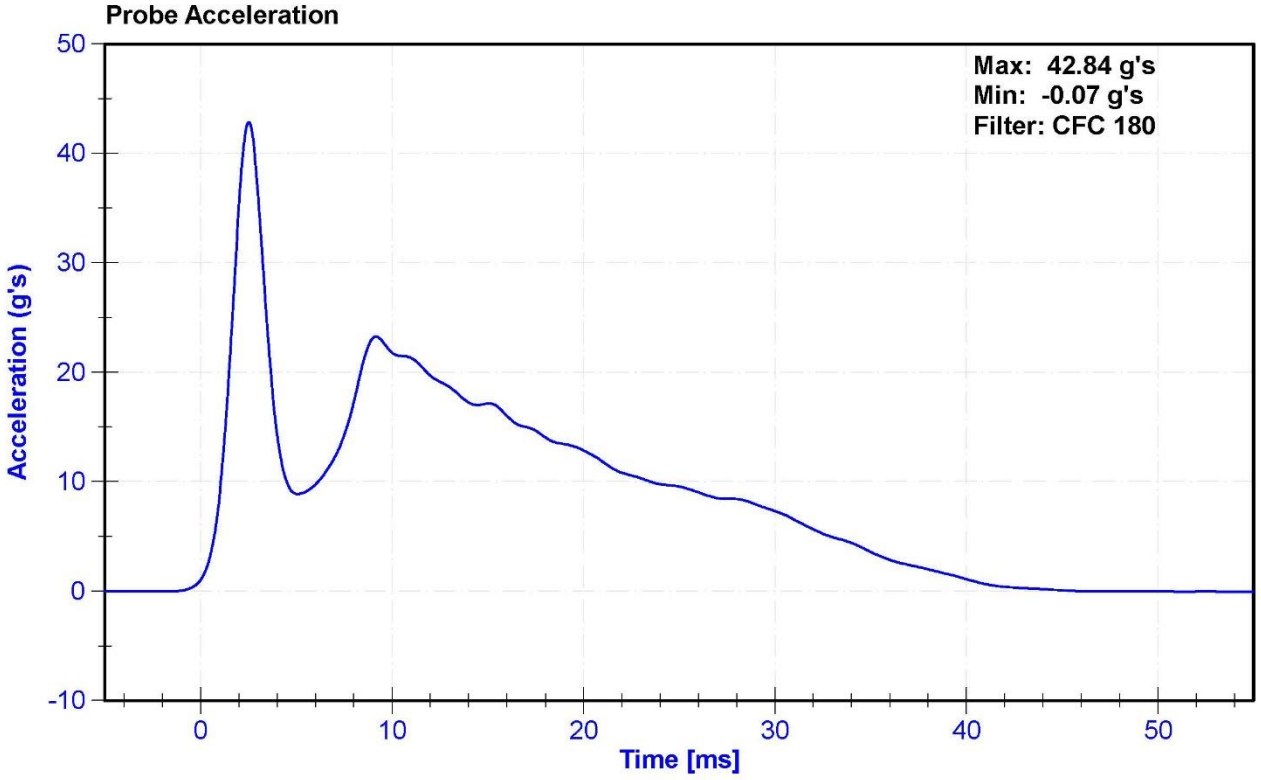
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

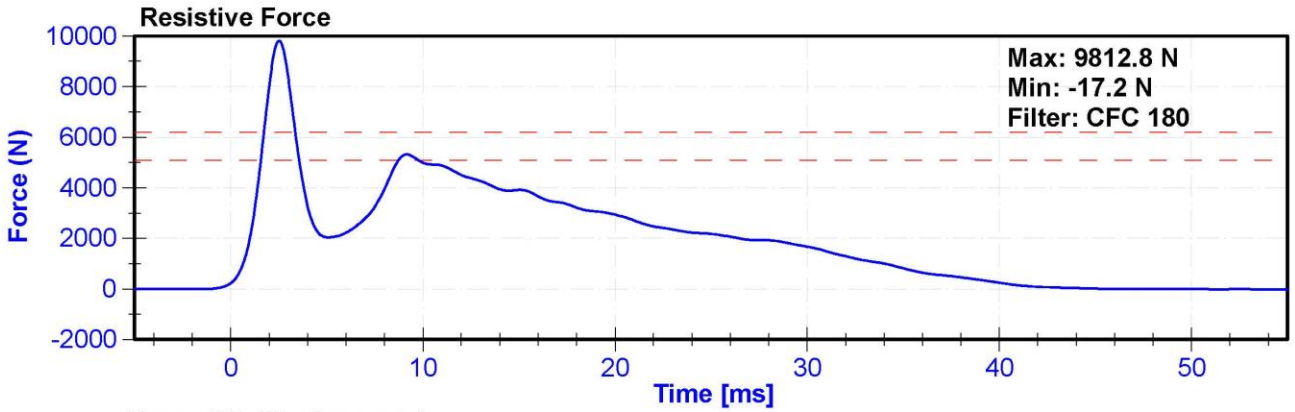
Results

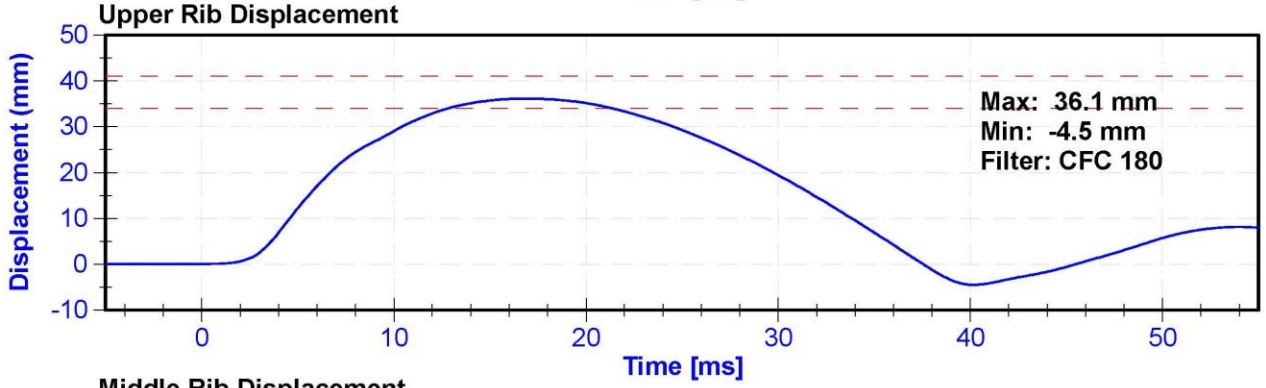
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	62.2	Pass
Velocity	5.4	5.6	m/s	5.50	Pass
Resistive Force after 6ms	5100	6200	N	5329.7	Pass
Upper Thorax Rib Deflection	34	41	mm	36.1	Pass
Mid Thorax Rib Deflection	37	45	mm	40.2	Pass
Lower Thorax Rib Deflection	37	44	mm	40.6	Pass

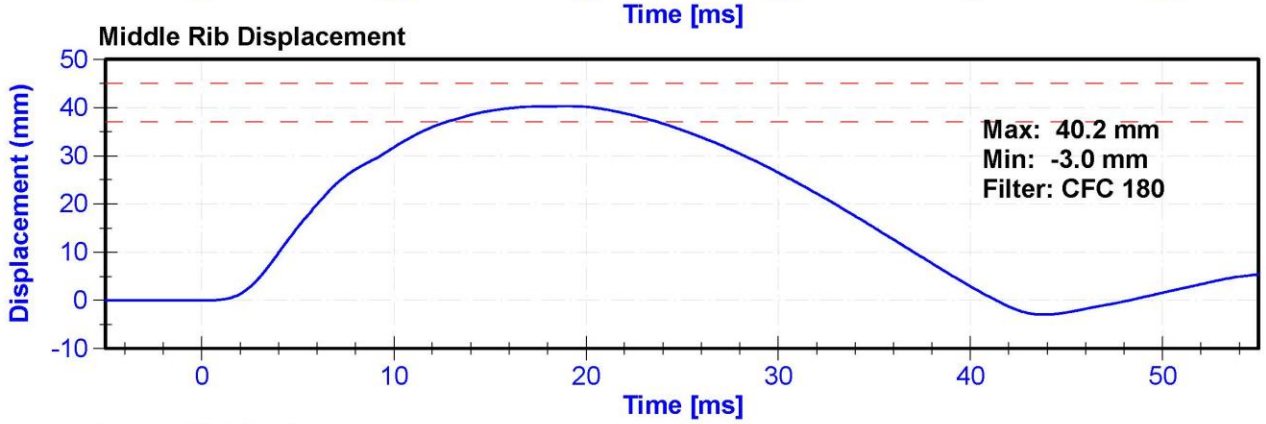
Transducer Calibrations

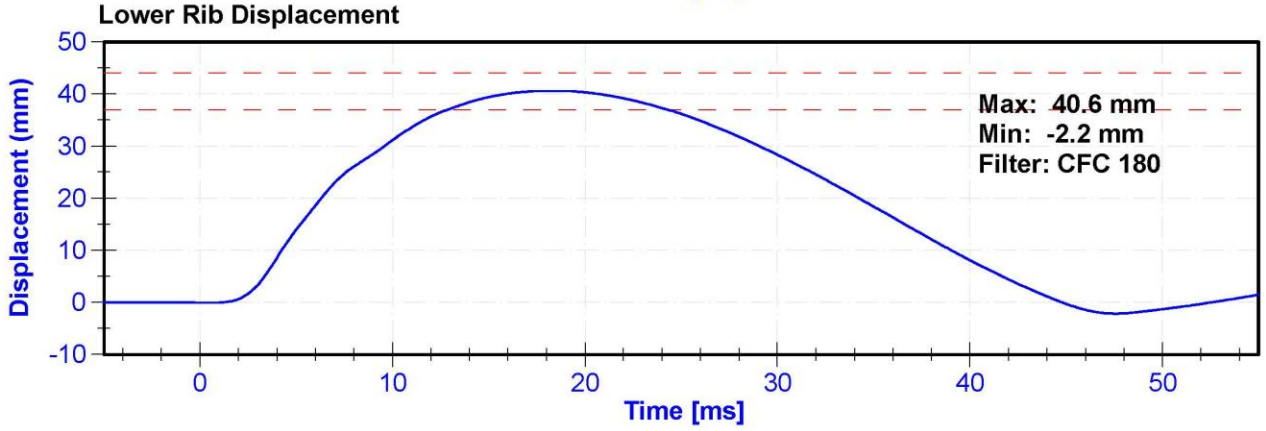
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Upper Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-179GFE	6/17/2021	12/16/2021
Middle Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-185GFE	6/17/2021	12/16/2021
Lower Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-178GFE	6/17/2021	12/16/2021




Resistive Force
Max: 9812.8 N
Min: -17.2 N
Filter: CFC 180
Force (N)
Time [ms]


Upper Rib Displacement
Max: 36.1 mm
Min: -4.5 mm
Filter: CFC 180
Displacement (mm)
Time [ms]


Middle Rib Displacement
Max: 40.2 mm
Min: -3.0 mm
Filter: CFC 180
Displacement (mm)
Time [ms]


Lower Rib Displacement
Max: 40.6 mm
Min: -2.2 mm
Filter: CFC 180
Displacement (mm)
Time [ms]

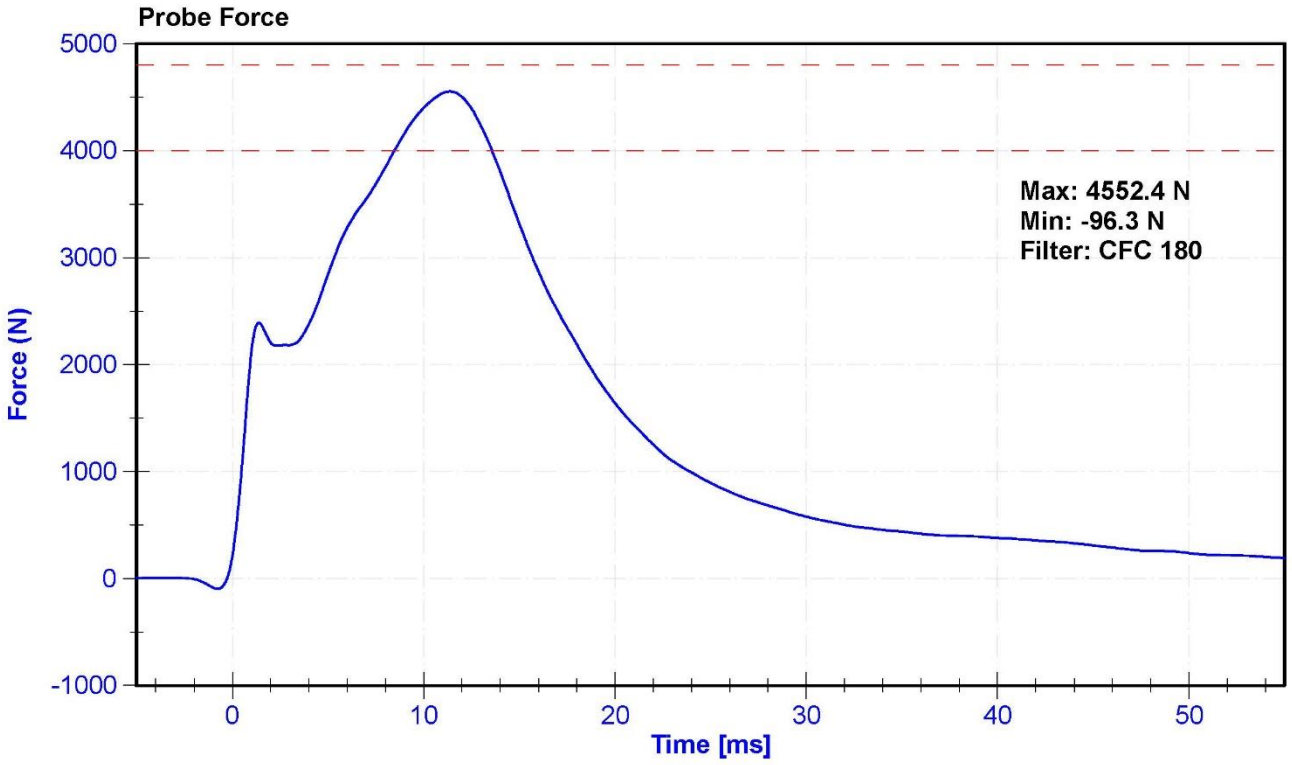
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

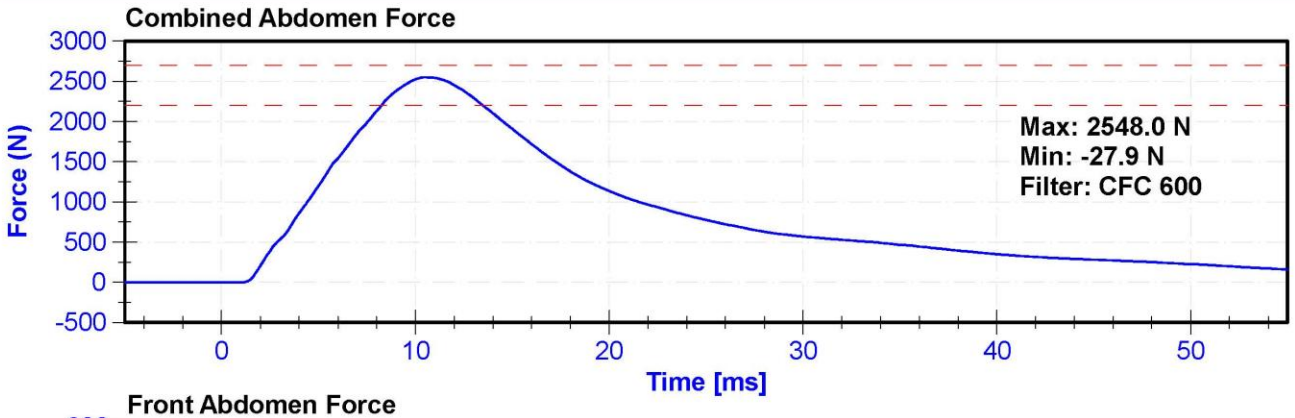
Results

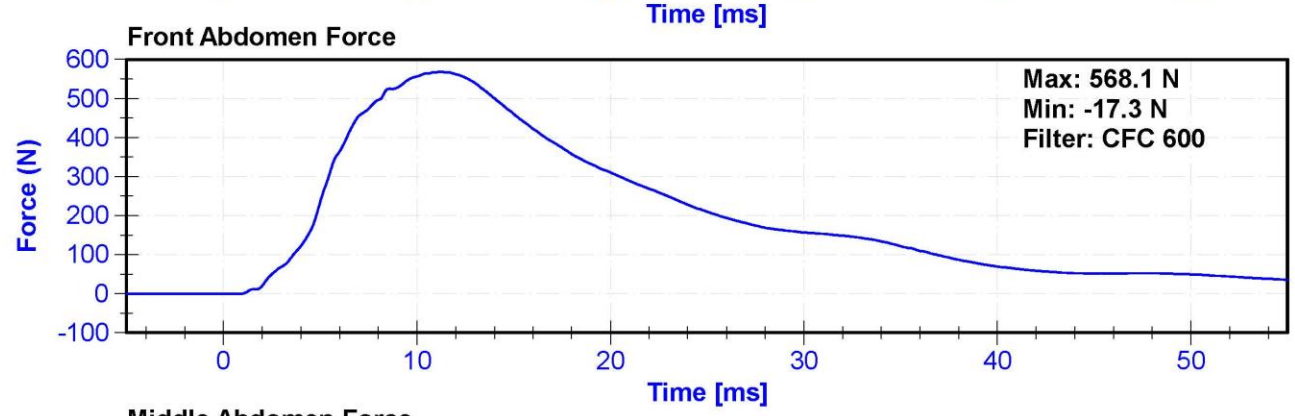
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	62.3	Pass
Velocity	3.9	4.1	m/s	4.08	Pass
Combined Abdomen Force	2200	2700	N	2548.0	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.45	Pass
Resistive Probe Force	4000	4800	N	4552.4	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.35	Pass

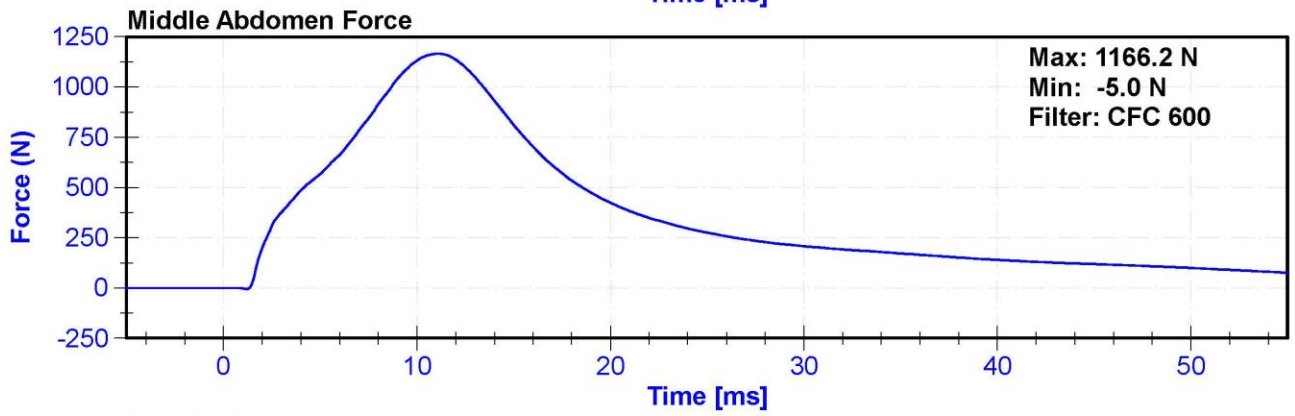
Transducer Calibrations

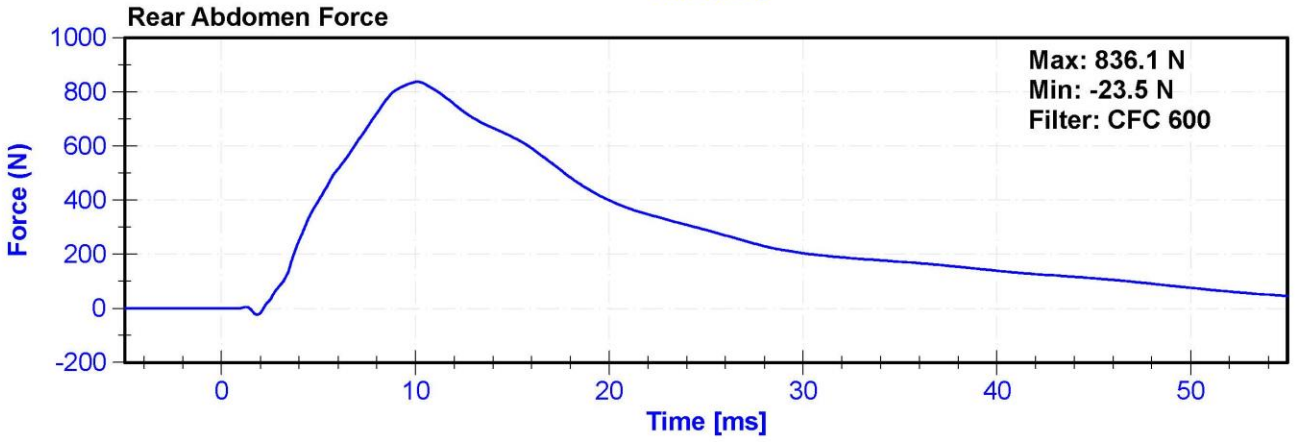
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Front Abdomen Load Cell	FTSS 2631	LC-1509	11/10/2020	11/10/2021
Middle Abdomen Load Cell	DENTON 2631	LC-1508	11/10/2020	11/10/2021
Rear Abdomen Load Cell	FTSS 2631	LC-1507	11/10/2020	11/10/2021




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2548.0 N
Min: -27.9 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 568.1 N
Min: -17.3 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1166.2 N
Min: -5.0 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 836.1 N
Min: -23.5 N
Filter: CFC 600

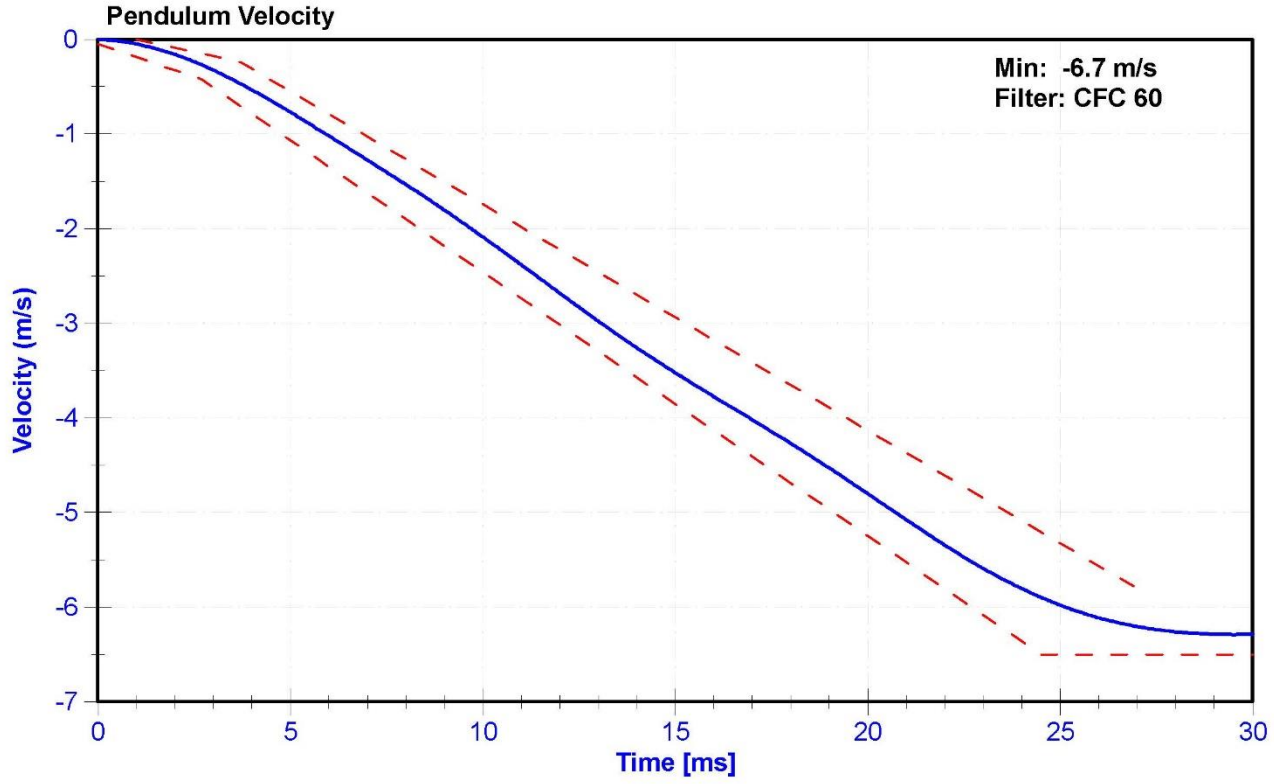
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

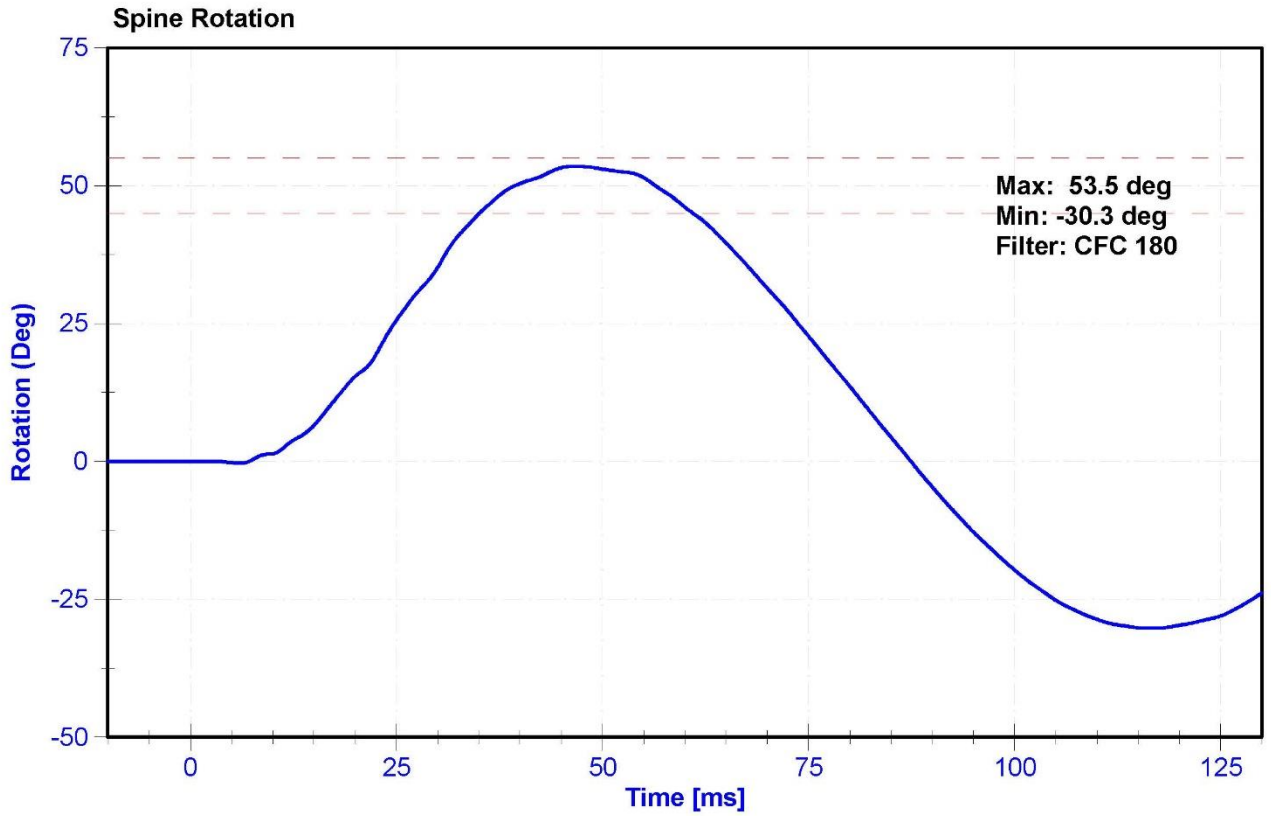
Results

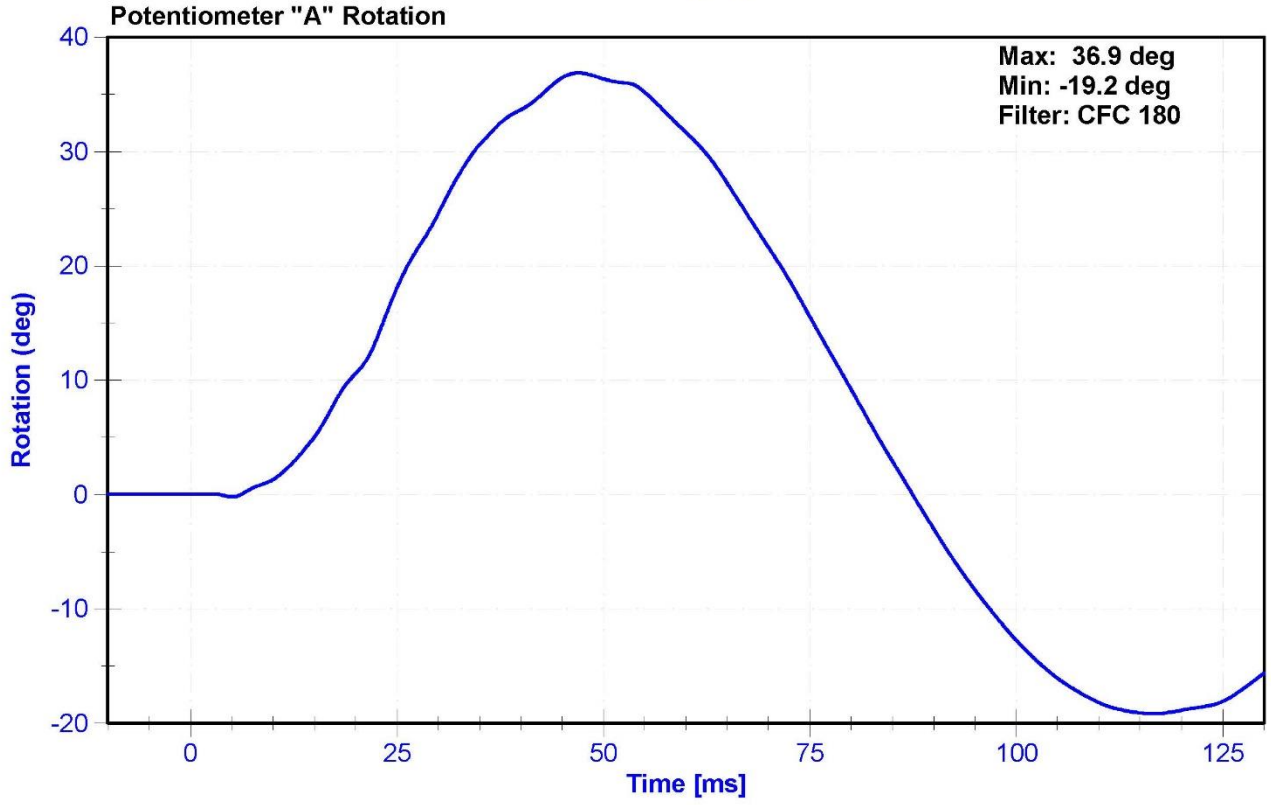
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	38.0	Pass
Velocity	5.95	6.15	m/s	6.000	Pass
Lateral Spine Rotation	45	55	deg	53.5	Pass
Time at Maximum Rotation	39	53	ms	46.5	Pass
Time of Decay to Zero Degrees	37	57	ms	40.9	Pass

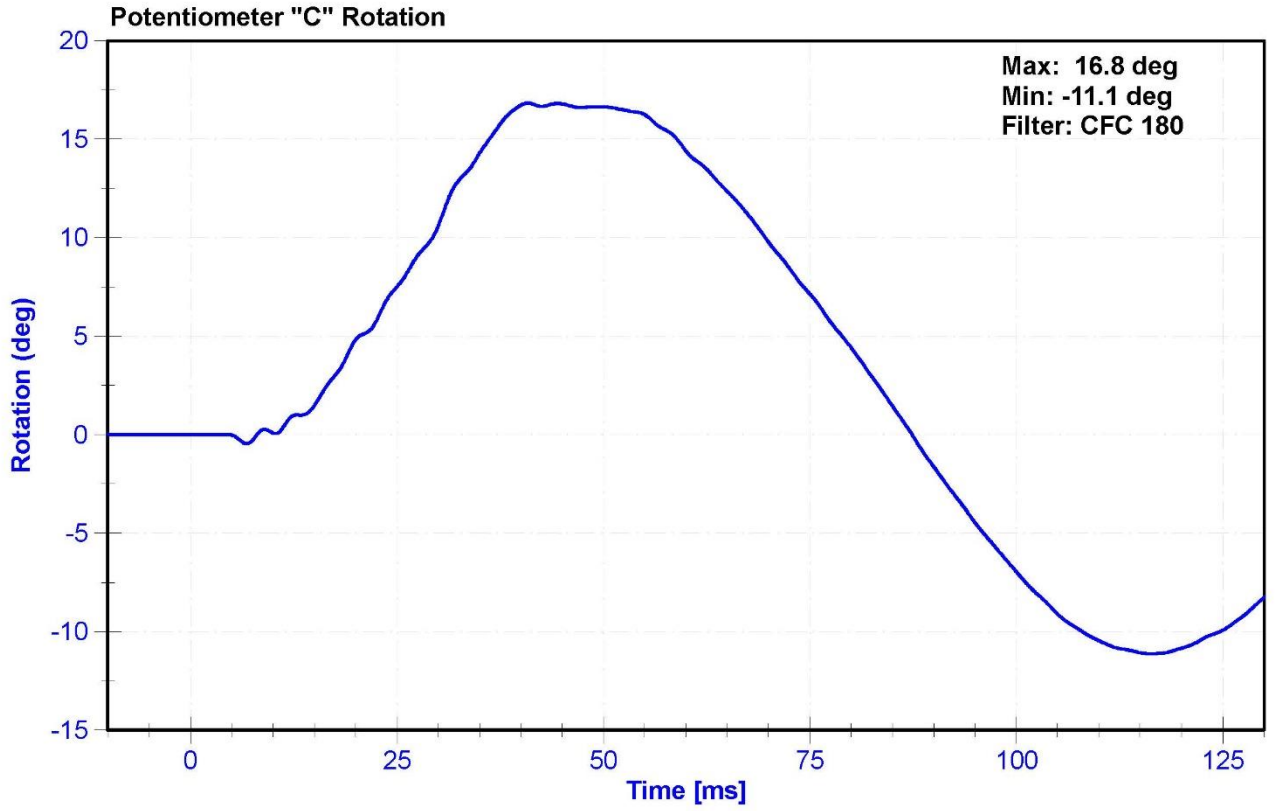
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum "A" Potentiometer	SP22G	DS-094	8/18/2020	8/18/2021
Condyle "B" Potentiometer	SP22G	DS-095	8/18/2020	8/18/2021




Spine Rotation
Max: 53.5 deg
Min: -30.3 deg
Filter: CFC 180
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 36.9 deg
Min: -19.2 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]


Potentiometer "C" Rotation
Max: 16.8 deg
Min: -11.1 deg
Filter: CFC 180
Rotation (deg)
20
15
10
5
0
-5
-10
-15
0
25
50
75
100
125
Time [ms]

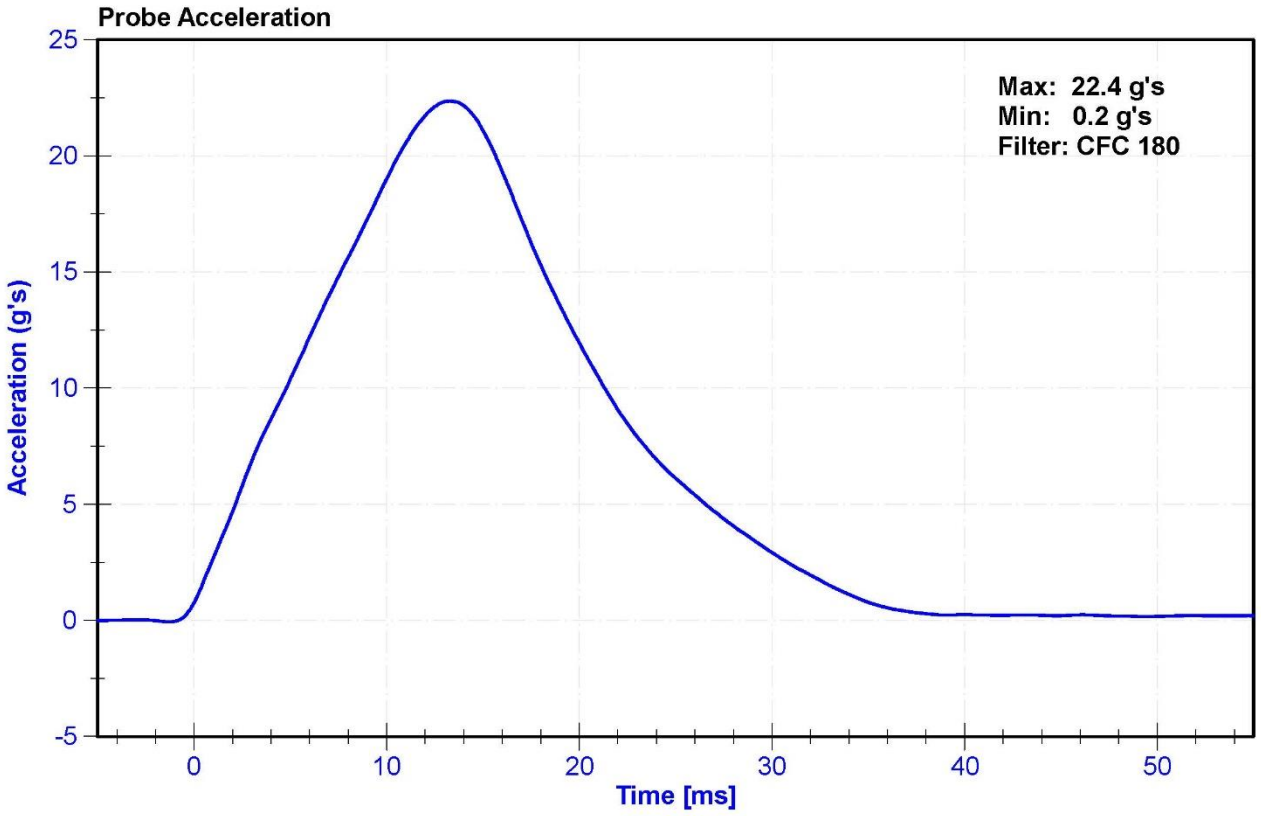
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

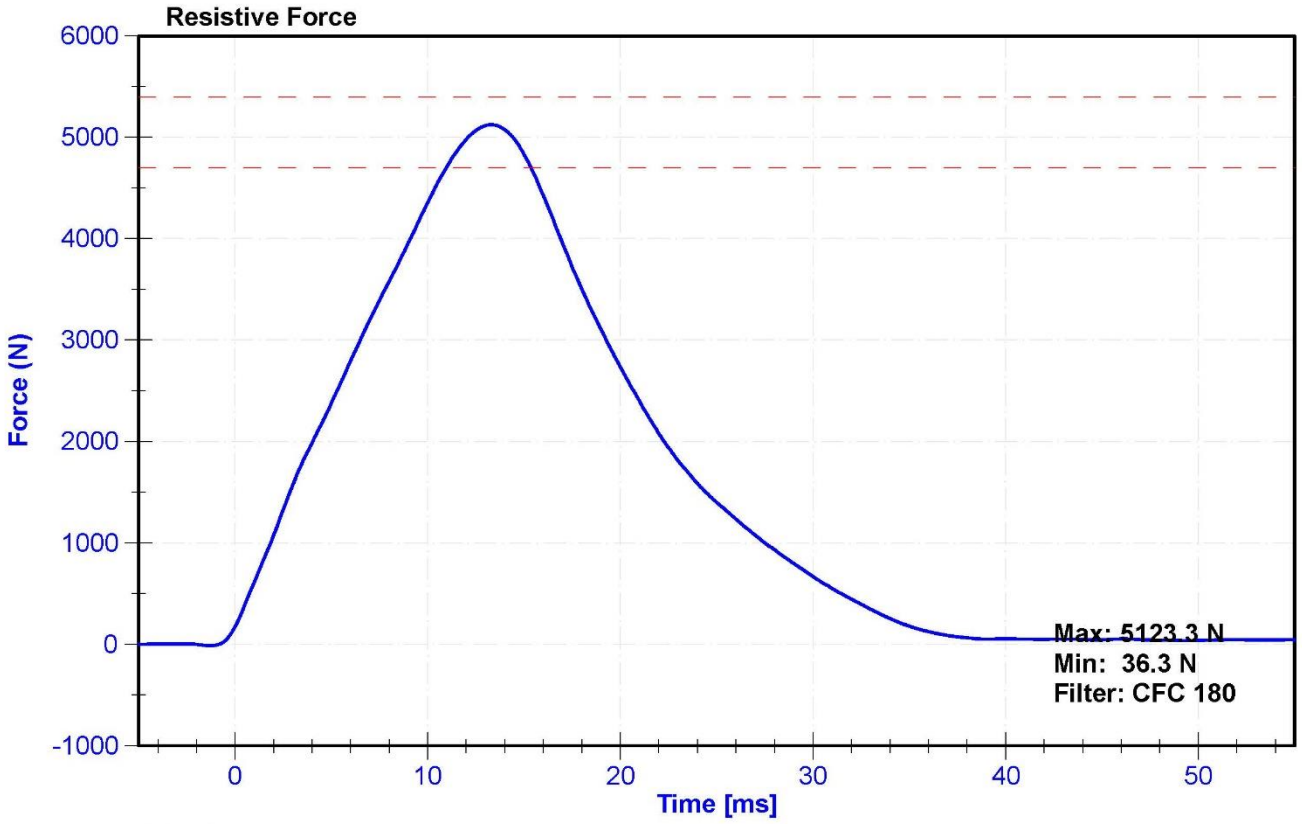
Results

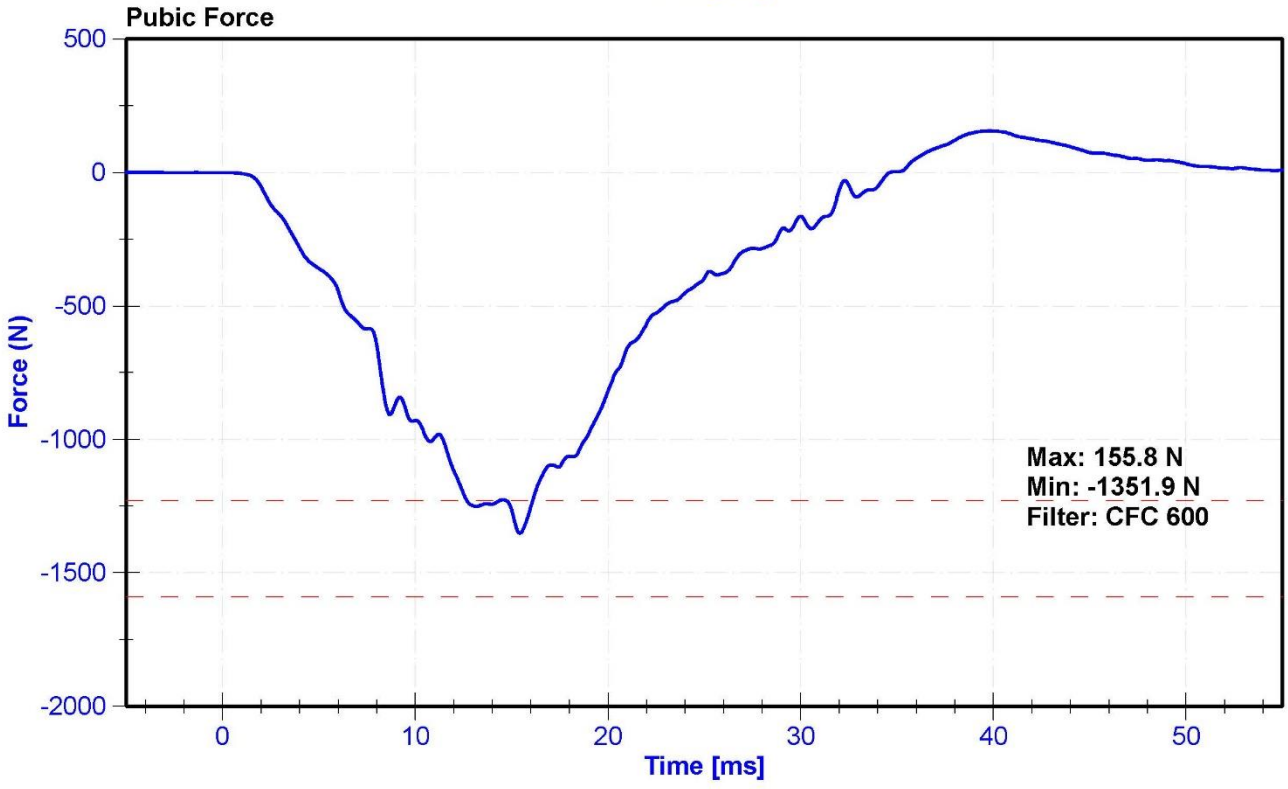
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	62.3	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Resistive Force	4700	5400	N	5123.3	Pass
Time at Peak Resistive Force	11.8	16.1	ms	13.30	Pass
Pubic Force	-1590	-1230	N	-1351.9	Pass
Time at Peak Pubic Force	12.2	17.0	ms	15.40	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Pubic Load Cell	FTSS 3096	LC-458	11/10/2020	11/10/2021




Resistive Force
6000
5000
4000
3000
2000
1000
0
-1000
Force (N)
0
10
20
30
40
50
Time [ms]
Max: 5123.3 N
Min: 36.3 N
Filter: CFC 180


Pubic Force
500
0
-500
-1000
-1500
-2000
Force (N)
0
10
20
30
40
50
Time [ms]
Max: 155.8 N
Min: -1351.9 N
Filter: CFC 600

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

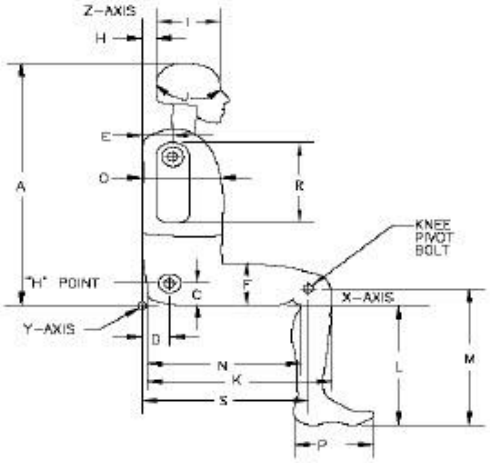
SERIAL No: 300

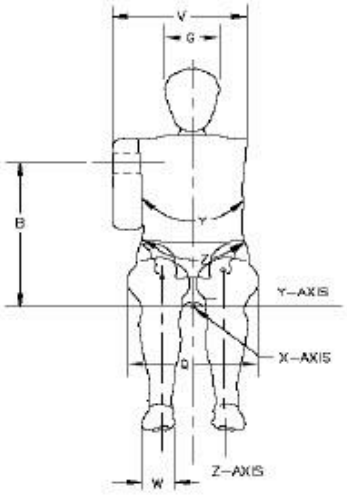
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: J.Pericak Date: 6/30/2021

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	782	Pass
B	Shoulder Pivot Height	437	453	446	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	144	Pass
E	Shoulder Pivot from Backline	97	107	101	Pass
F	Thigh Clearance	119	135	128	Pass
G	Head Breadth	140	148	146	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	184	Pass
J	Head Circumference	541	551	546	Pass
K	Buttock to Knee Length	514	540	533	Pass
L	Popliteal Height	343	369	360	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	429	Pass
O	Chest Depth w/o jacket	195	211	203	Pass
P	Foot Length	216	232	220	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	320	Pass
R	Arm Length	249	259	254	Pass
S	Knee Joint to seatback	477	493	487	Pass
V	Shoulder Width	341	357	349	Pass
W	Foot Width	78	94	83	Pass
Y	Chest Circumference w/jacket	851	881	878	Pass
Z	Waist Circumference	761	791	774	Pass

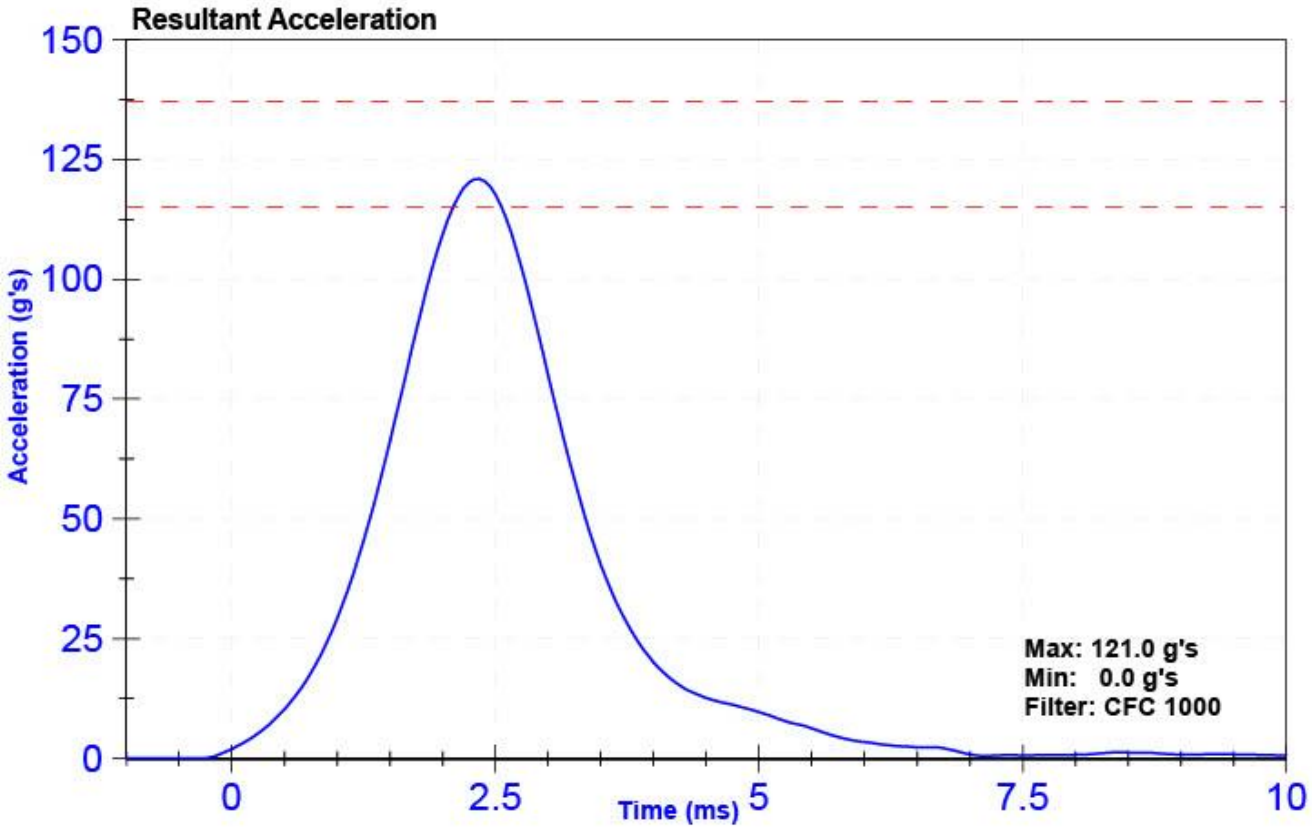
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

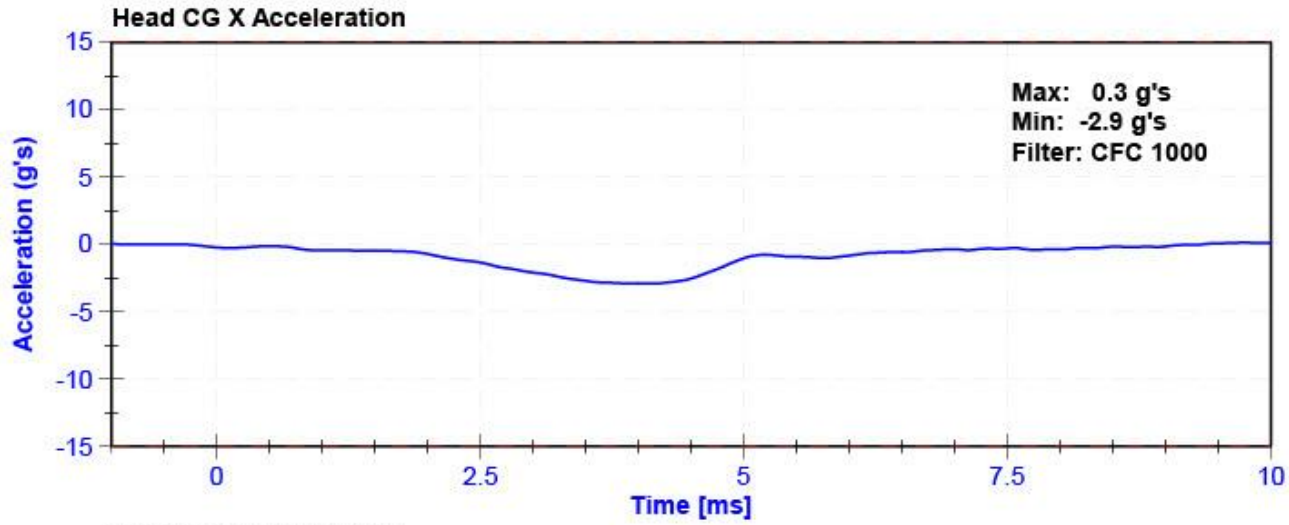
Results

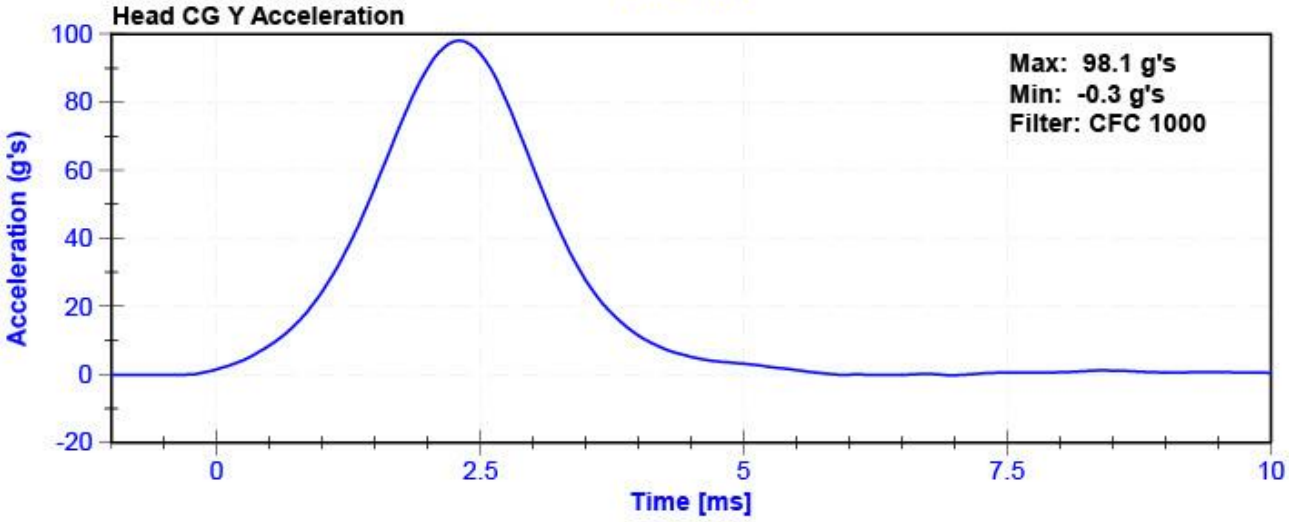
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	50	Pass
Resultant Acceleration	115	137	g's	121.0	Pass
Oscillation	0	15	%	1.9	Pass
Fore-Aft Acceleration	-15	15	g's	-2.9	Pass

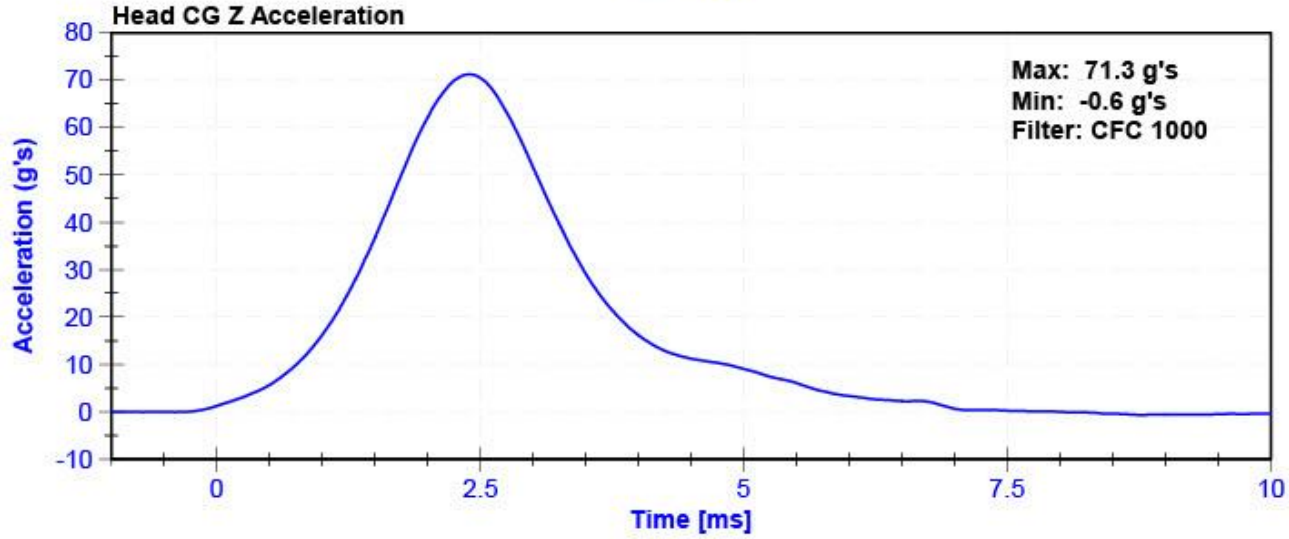
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P59018	5/11/2021	11/9/2021
Y Accelerometer	ENDEVCO 7264	AC-P79189	5/11/2021	11/9/2021
Z Accelerometer	ENDEVCO 7264CT	AC-P58777	5/11/2021	11/9/2021




Head CG X Acceleration
Max: 0.3 g's
Min: -2.9 g's
Filter: CFC 1000
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]


Head CG Y Acceleration
Max: 98.1 g's
Min: -0.3 g's
Filter: CFC 1000
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 71.3 g's
Min: -0.6 g's
Filter: CFC 1000
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]

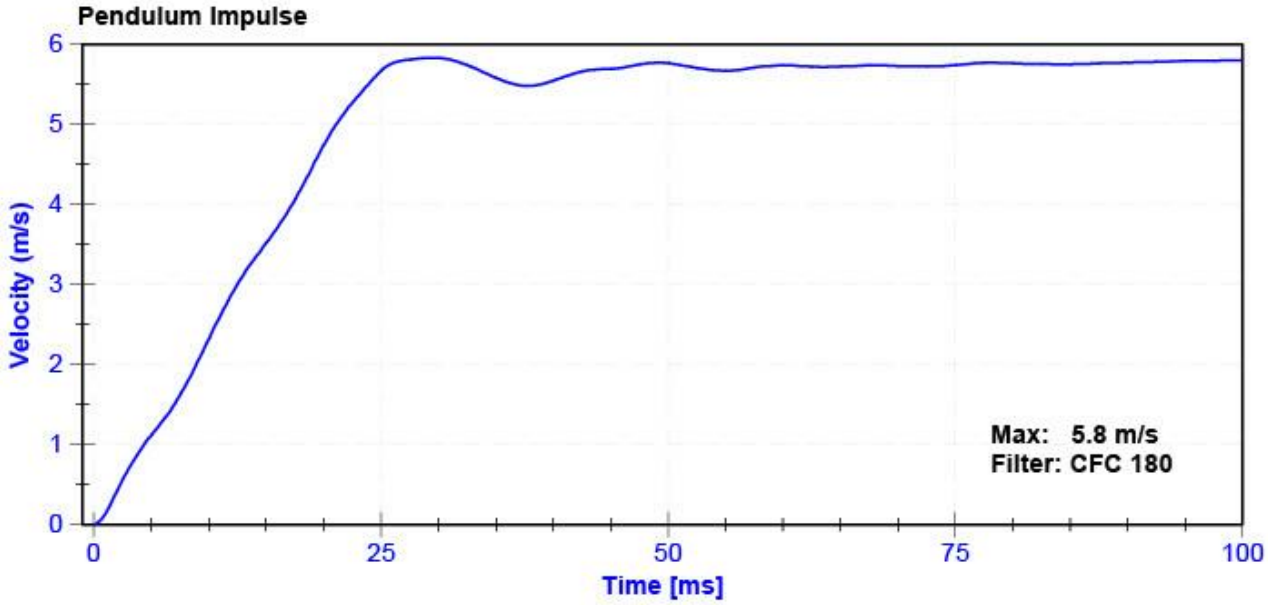
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

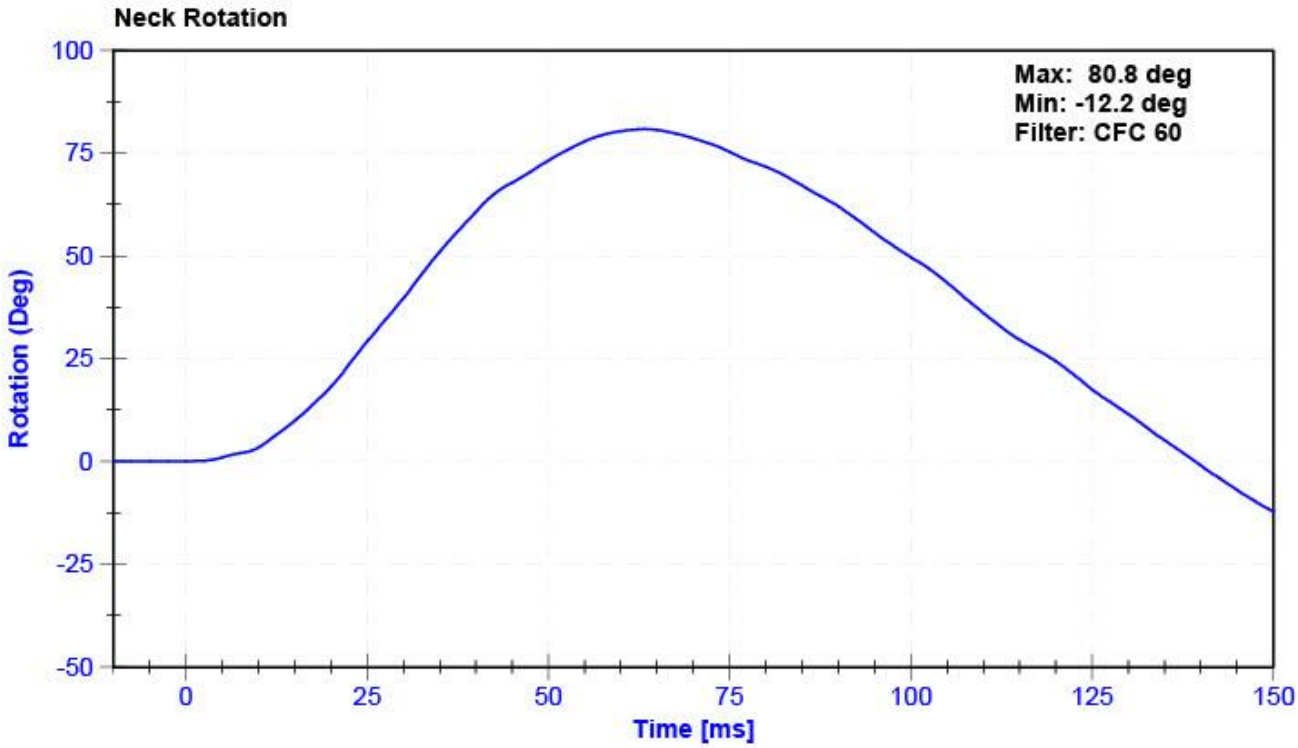
Results

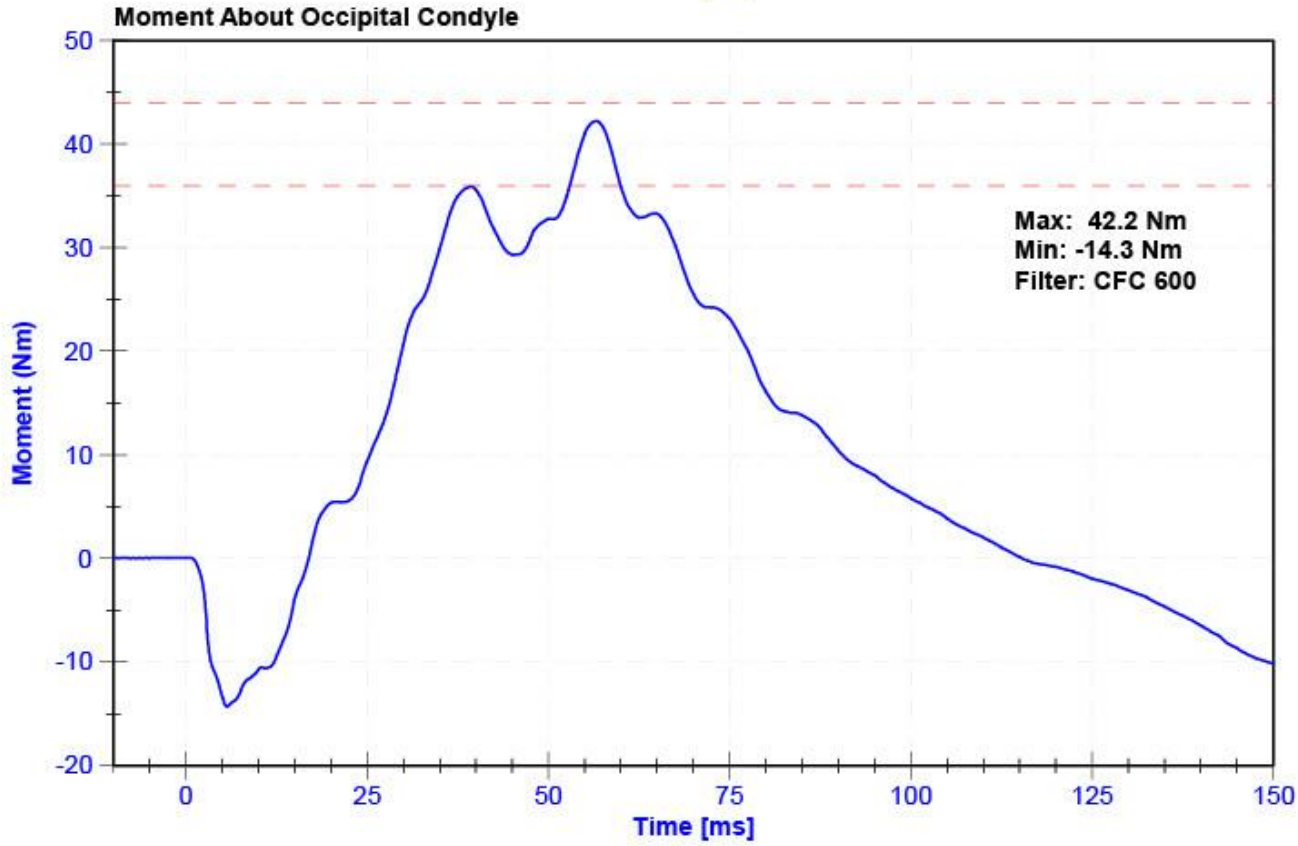
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	45	Pass
Velocity	5.51	5.63	m/s	5.565	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.32	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.51	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.74	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.67	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.83	Pass
Neck Rotation	71	81	deg	80.8	Pass
Time at Maximum Rotation	50	70	ms	63.2	Pass
Moment about the OC	36	44	Nm	42.2	Pass
Moment Decay to 0 Nm	102	126	ms	115.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	11/6/2020	11/6/2021
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/6/2020	11/6/2021
Upper Neck Load Cell	Denton 1716AJ	17162187-FY	8/12/2020	8/12/2021




Neck Rotation
Max: 80.8 deg
Min: -12.2 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 42.2 Nm
Min: -14.3 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

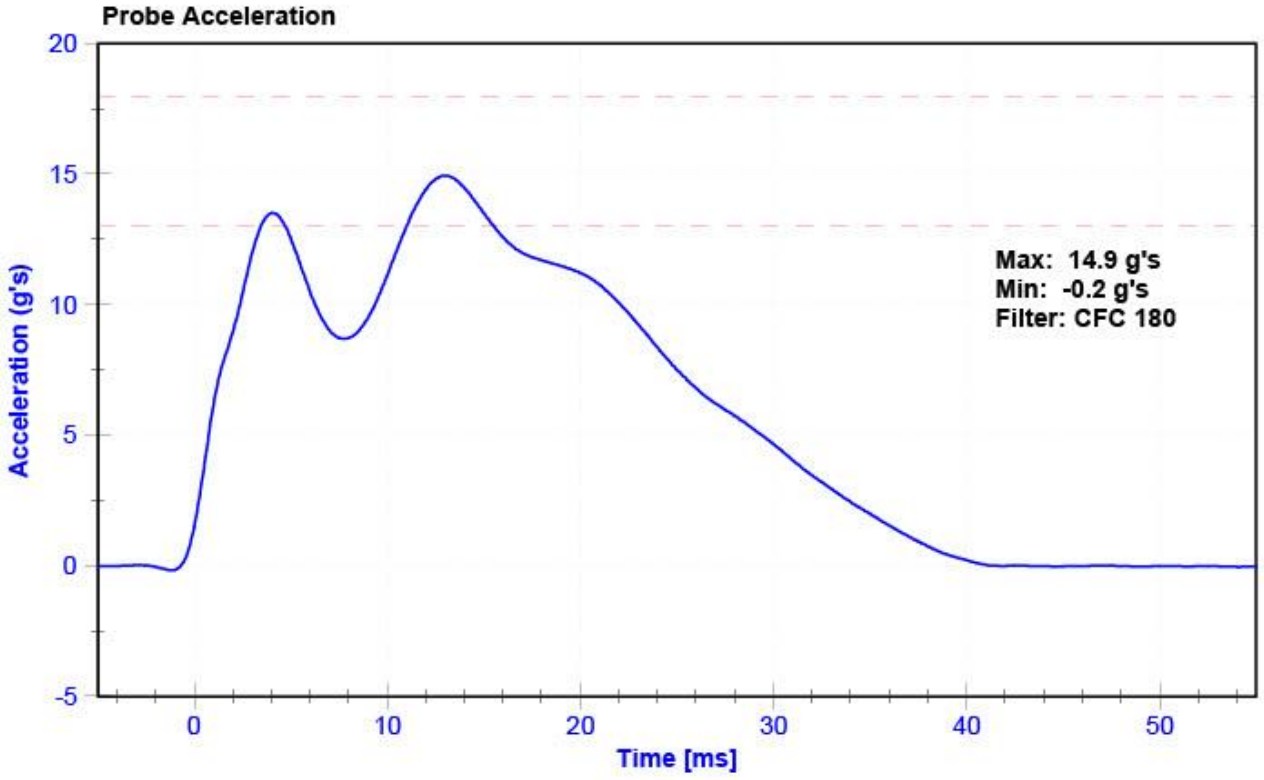
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

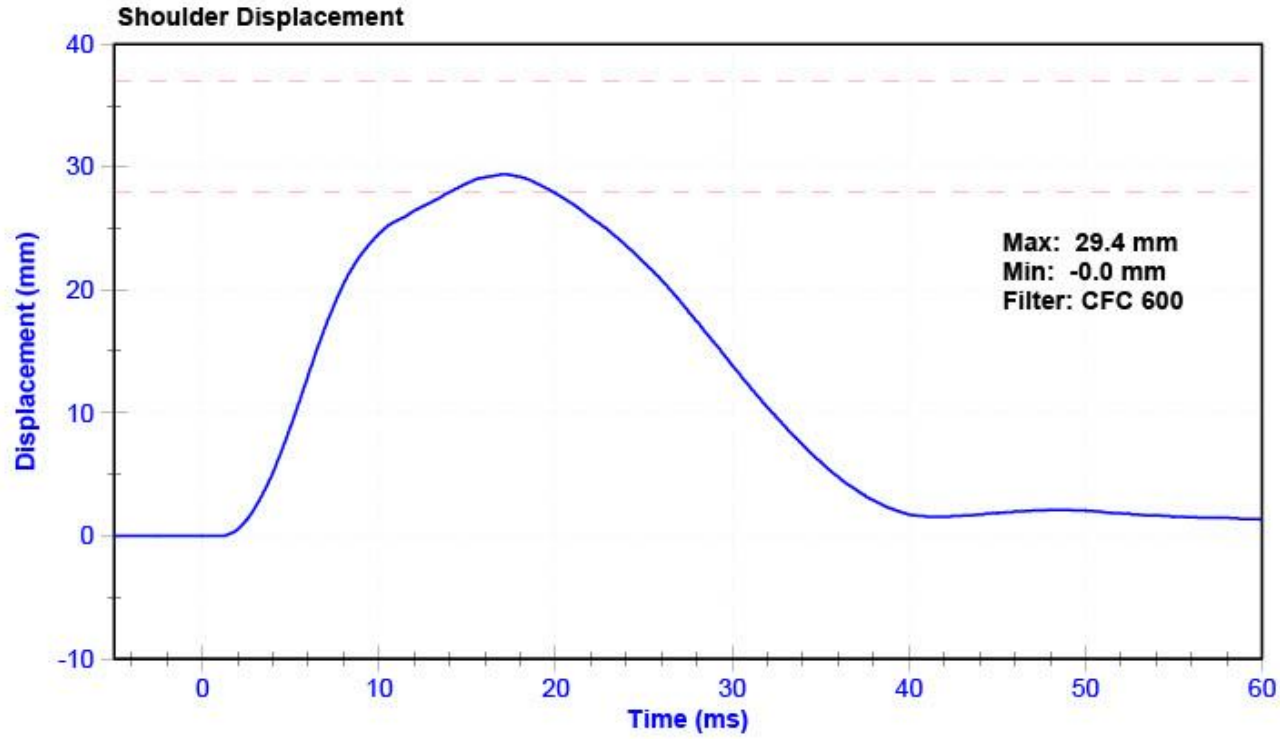
Results

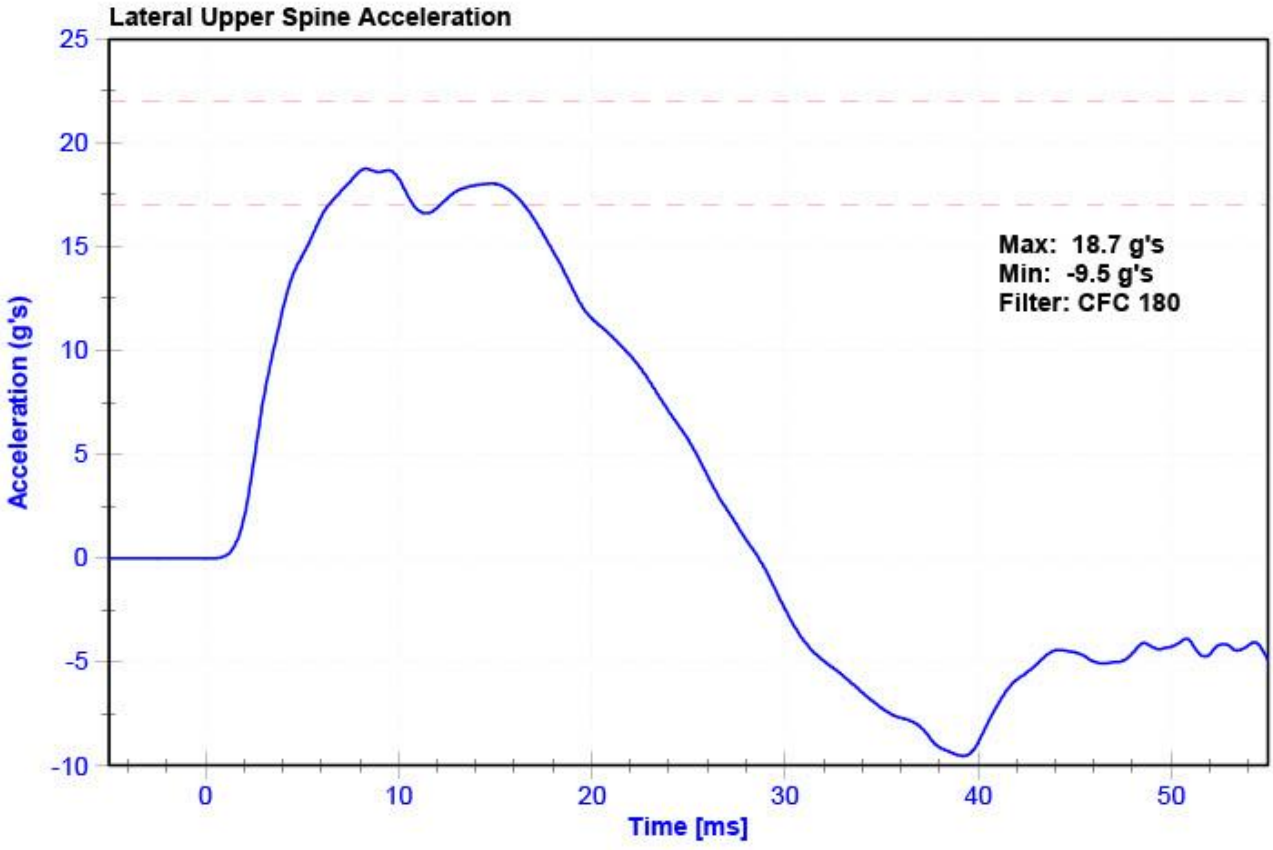
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	45	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	13	18	g's	14.9	Pass
Shoulder Deflection	28	37	mm	29.4	Pass
Lateral Upper Spine Acceleration	17	22	g's	18.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51736	5/14/2021	5/14/2022
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	5/12/2021	11/10/2021
Upper Spine Y Accelerometer	Endevco 7264C-2KTZ-2-240	T20880	5/13/2021	11/11/2021




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 29.4 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 18.7 g's
Min: -9.5 g's
Filter: CFC 180

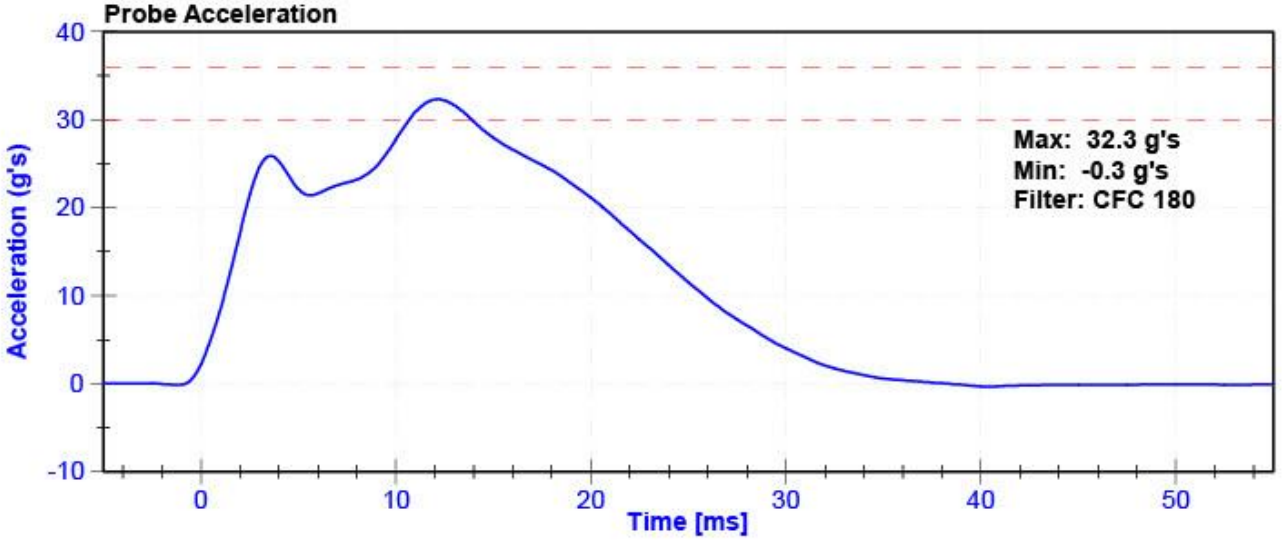
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

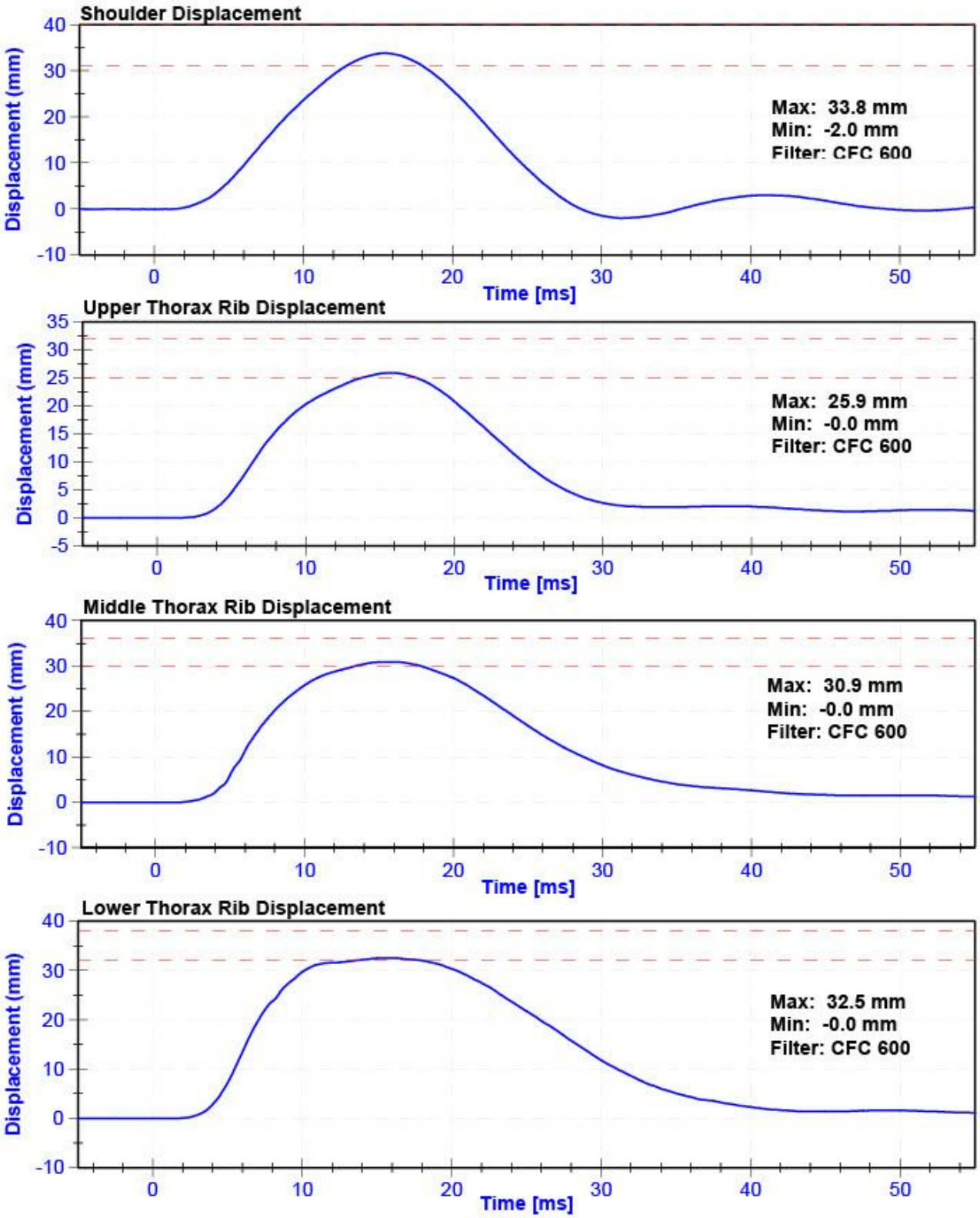
Results

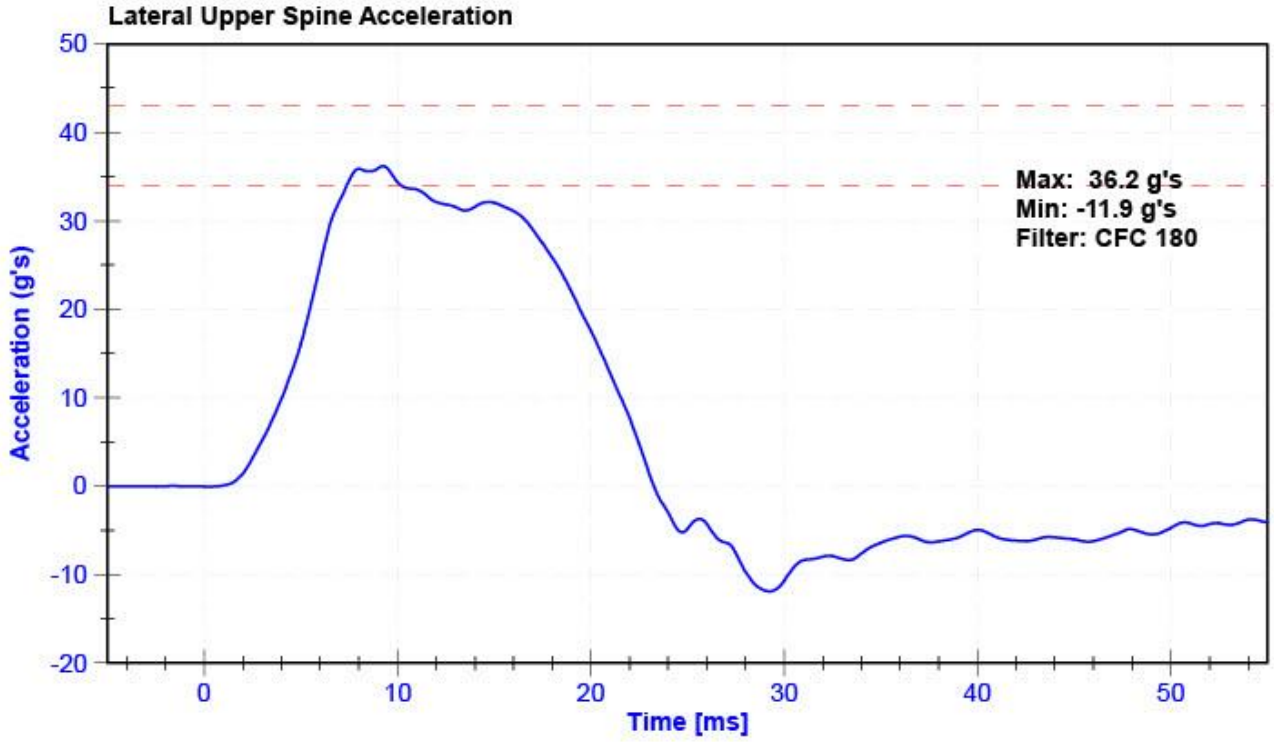
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	55.0	Pass
Velocity	6.6	6.8	m/s	6.65	Pass
Probe Acceleration after 5 ms	30	36	g's	32.3	Pass
Lateral Upper Spine Acceleration	34	43	g's	36.2	Pass
Lateral Lower Spine Acceleration	29	37	g's	29.9	Pass
Shoulder Deflection	31	40	mm	33.8	Pass
Upper Thorax Rib Deflection	25	32	mm	25.9	Pass
Mid Thorax Rib Deflection	30	36	mm	30.9	Pass
Lower Thorax Rib Deflection	32	38	mm	32.5	Pass

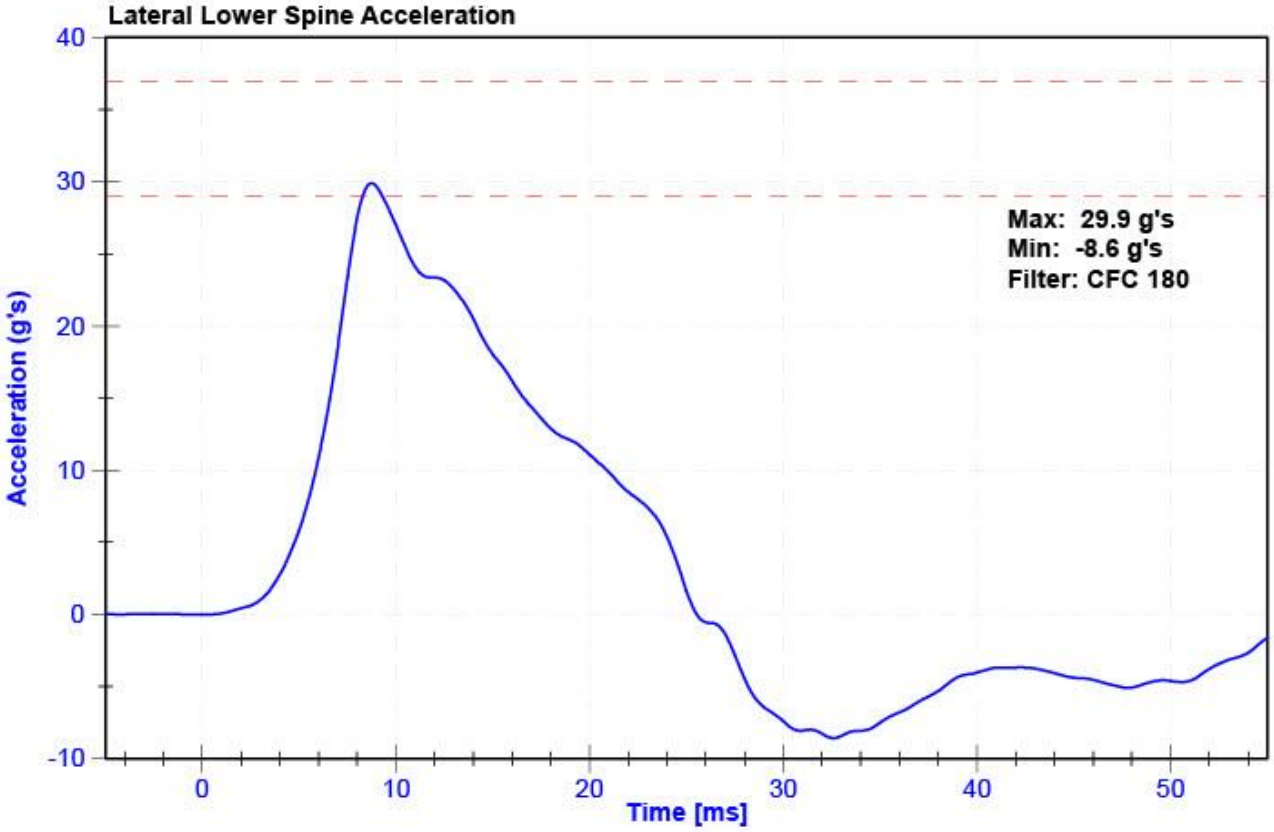
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51736	5/14/2021	5/14/2022
Upper Spine T1 Y Accelerometer	Endevco 7264C-2KTZ-2-240	T20880	5/13/2021	11/11/2021
Upper Spine T12 Y Accelerometer	Endevco 7264C-2KTZ-2-240	P52071	5/24/2021	11/22/2021
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	5/12/2021	11/10/2021
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	5/12/2021	11/10/2021
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	5/12/2021	11/10/2021
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	5/12/2021	11/10/2021




Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 33.8 mm
Min: -2.0 mm
Filter: CFC 600
Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 25.9 mm
Min: -0.0 mm
Filter: CFC 600
Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.9 mm
Min: -0.0 mm
Filter: CFC 600
Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.5 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 36.2 g's
Min: -11.9 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 29.9 g's
Min: -8.6 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

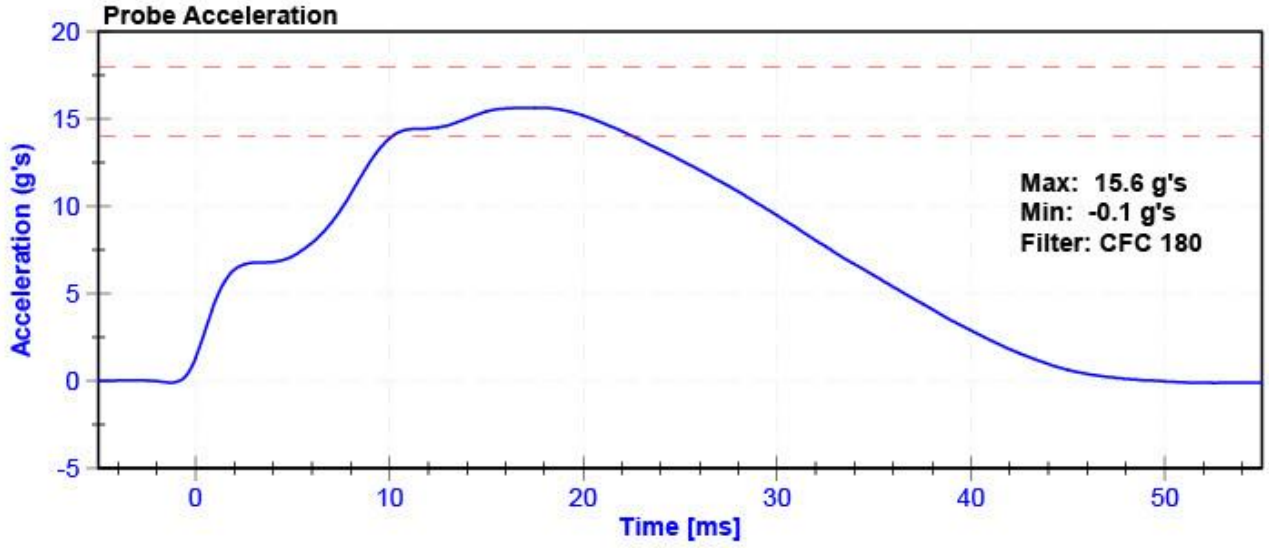
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

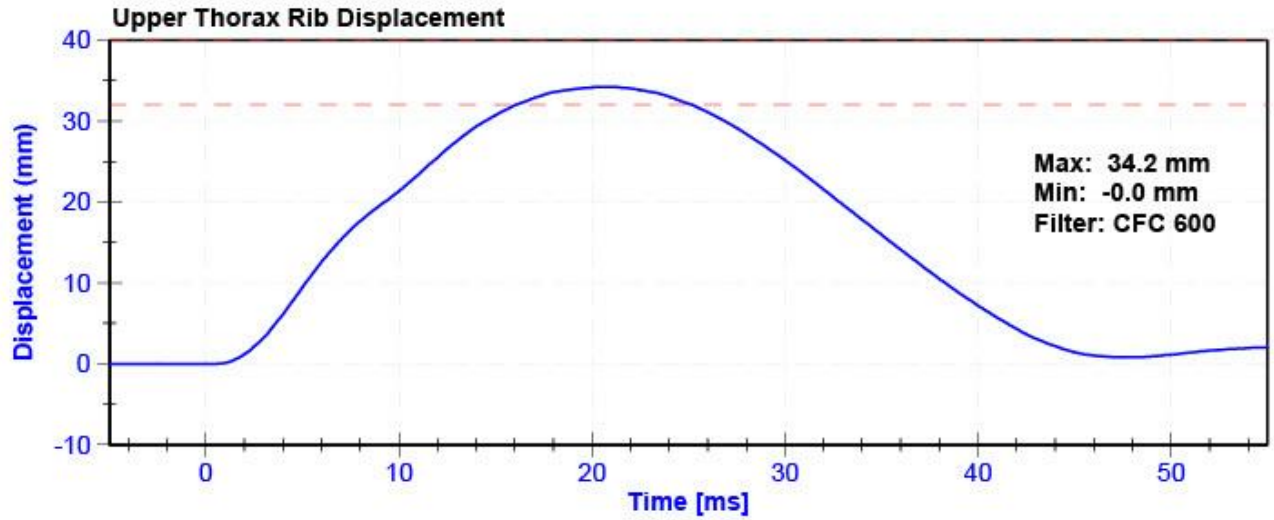
Results

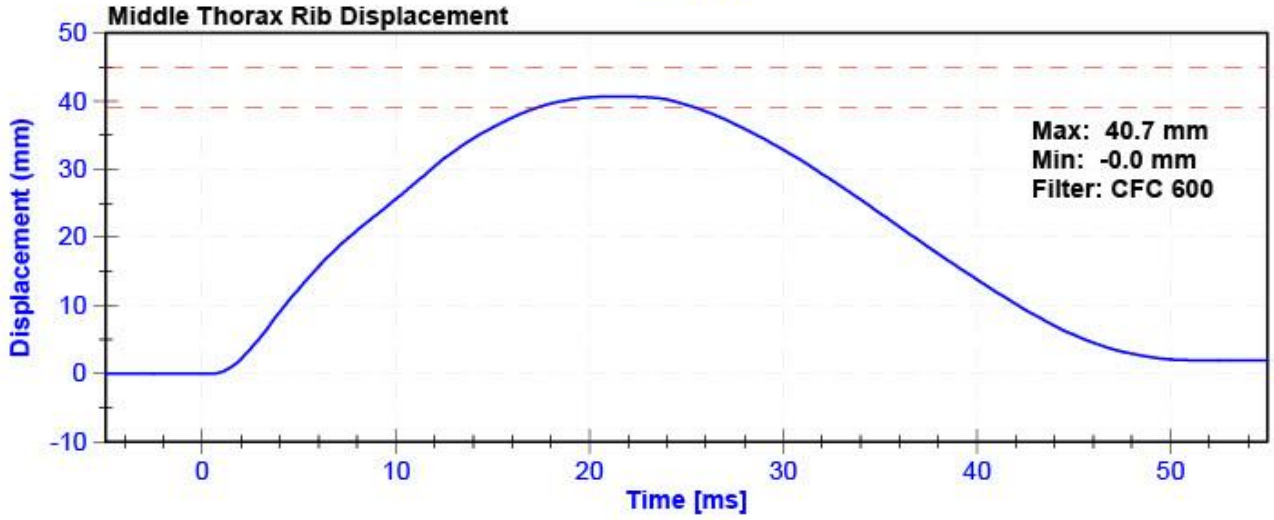
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	54	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	14	18	g's	15.6	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.1	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.2	Pass
Upper Thorax Rib Deflection	32	40	mm	34.2	Pass
Middle Thorax Rib Deflection	39	45	mm	40.7	Pass
Lower Thorax Rib Deflection	35	43	mm	38.6	Pass

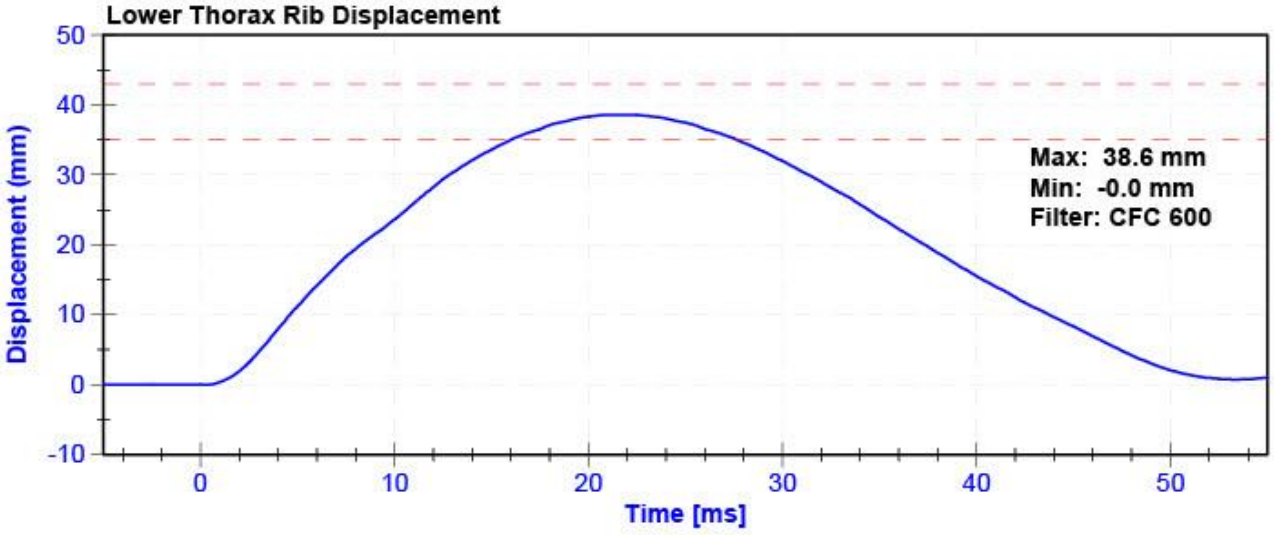
Transducer Calibrations

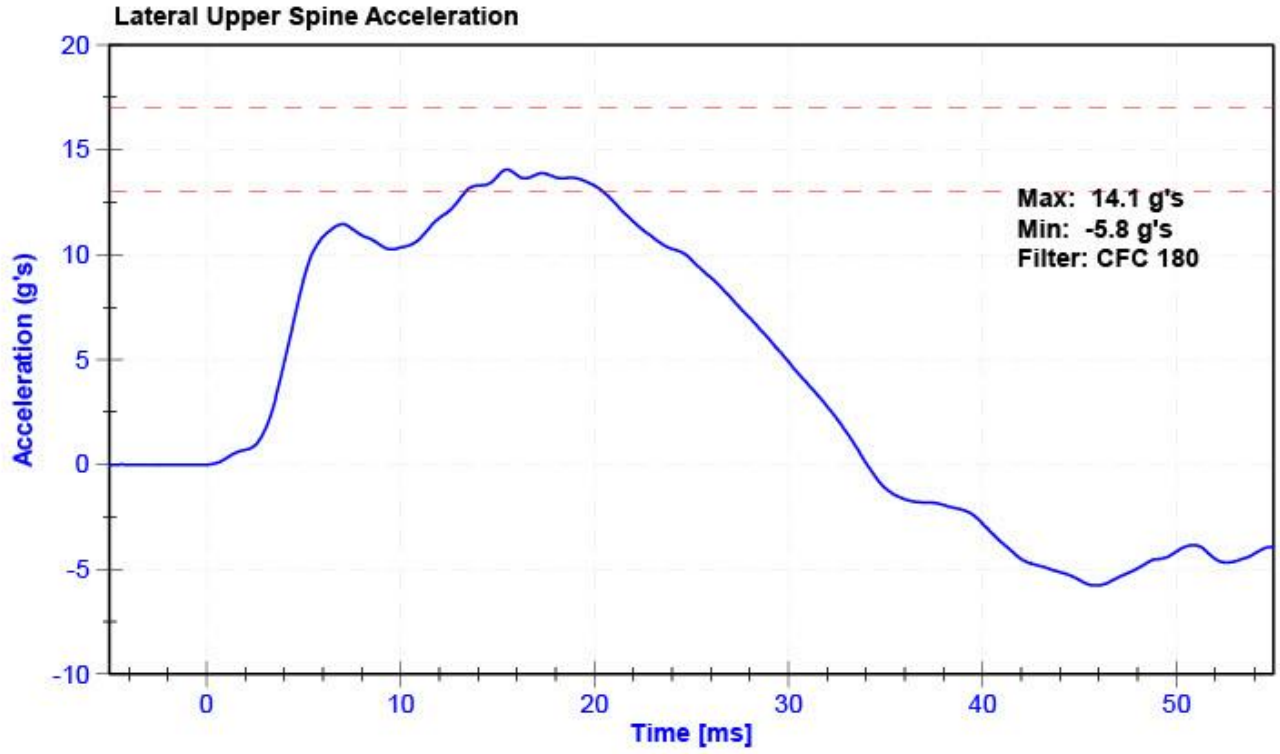
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51736	5/14/2021	5/14/2022
Upper Spine Y Accelerometer	Endevco 7264C-2KTZ-2-240	T20880	5/13/2021	11/11/2021
Lower Spine Y Accelerometer	Endevco 7264C-2KTZ-2-240	P52071	5/24/2021	11/22/2021
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	5/12/2021	11/10/2021
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	5/12/2021	11/10/2021
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	5/12/2021	11/10/2021

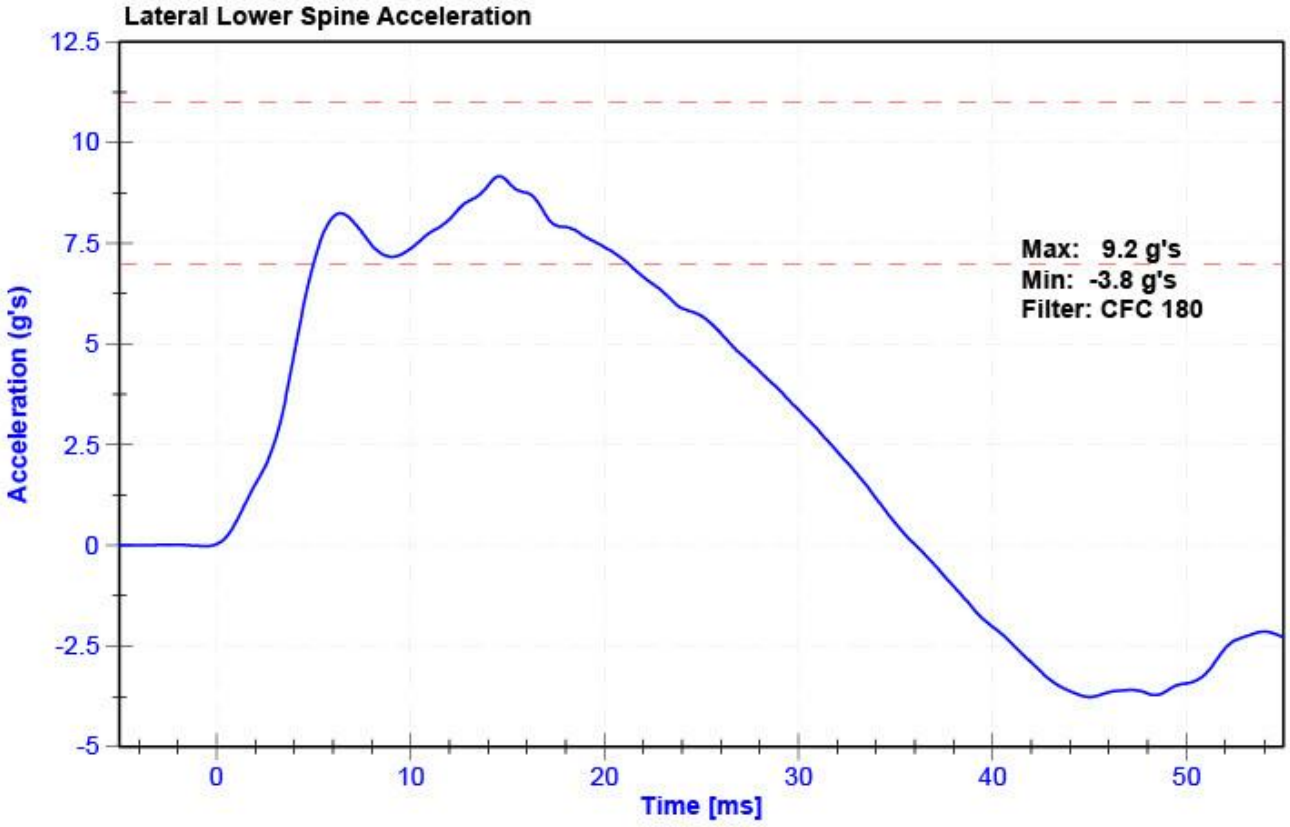



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.2 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.7 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.6 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 14.1 g's
Min: -5.8 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.2 g's
Min: -3.8 g's
Filter: CFC 180

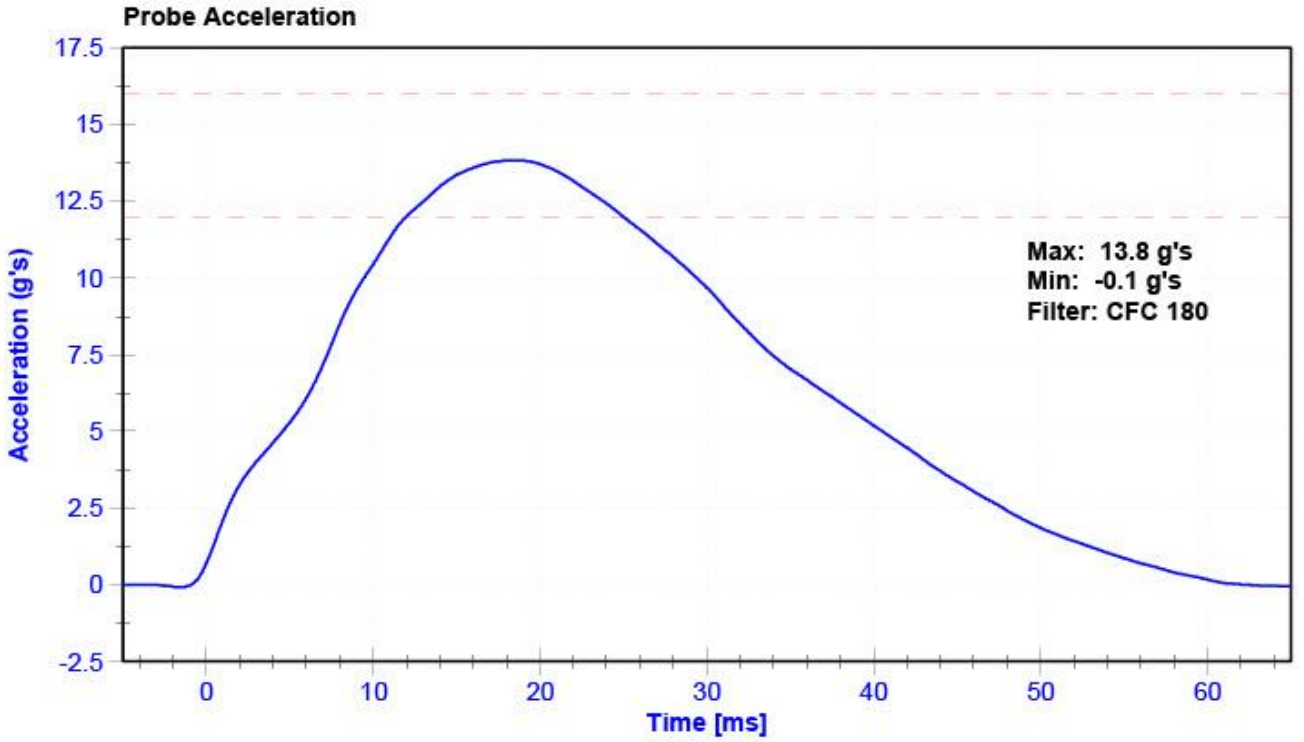
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

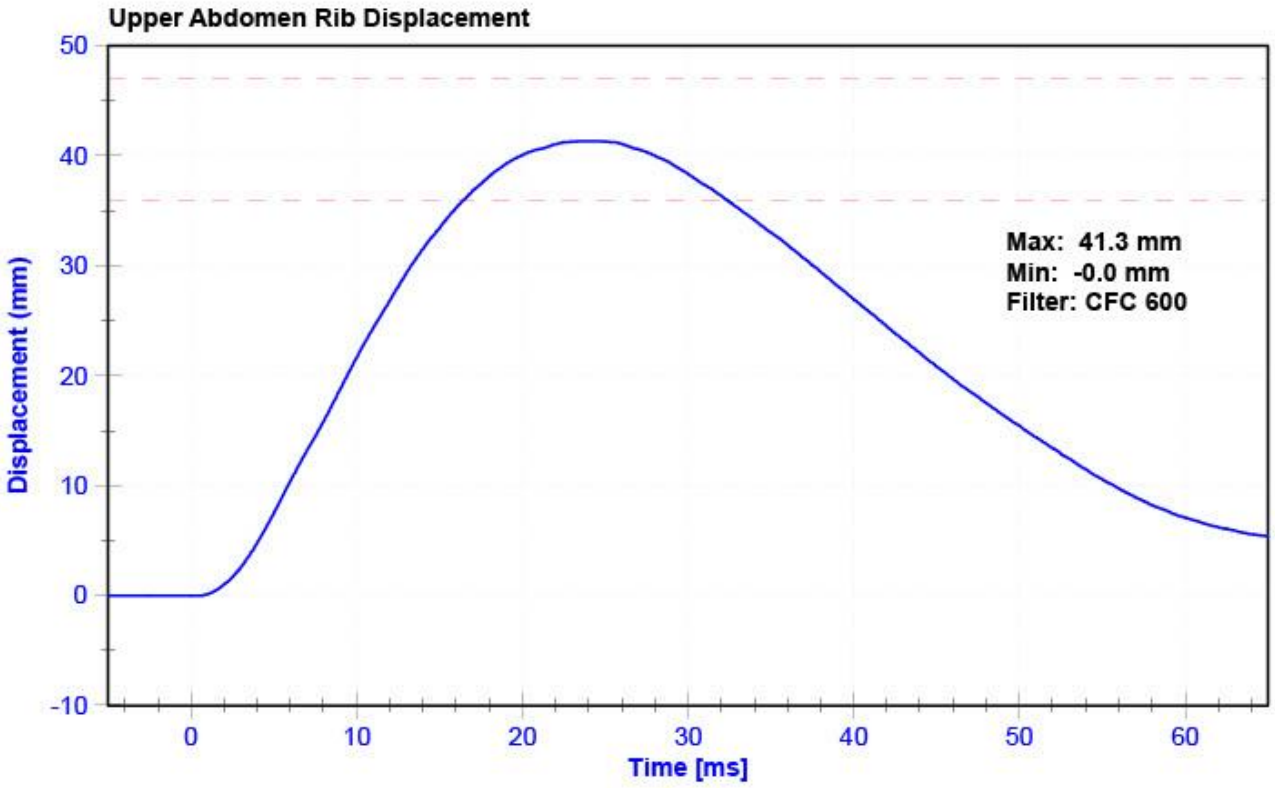
Results

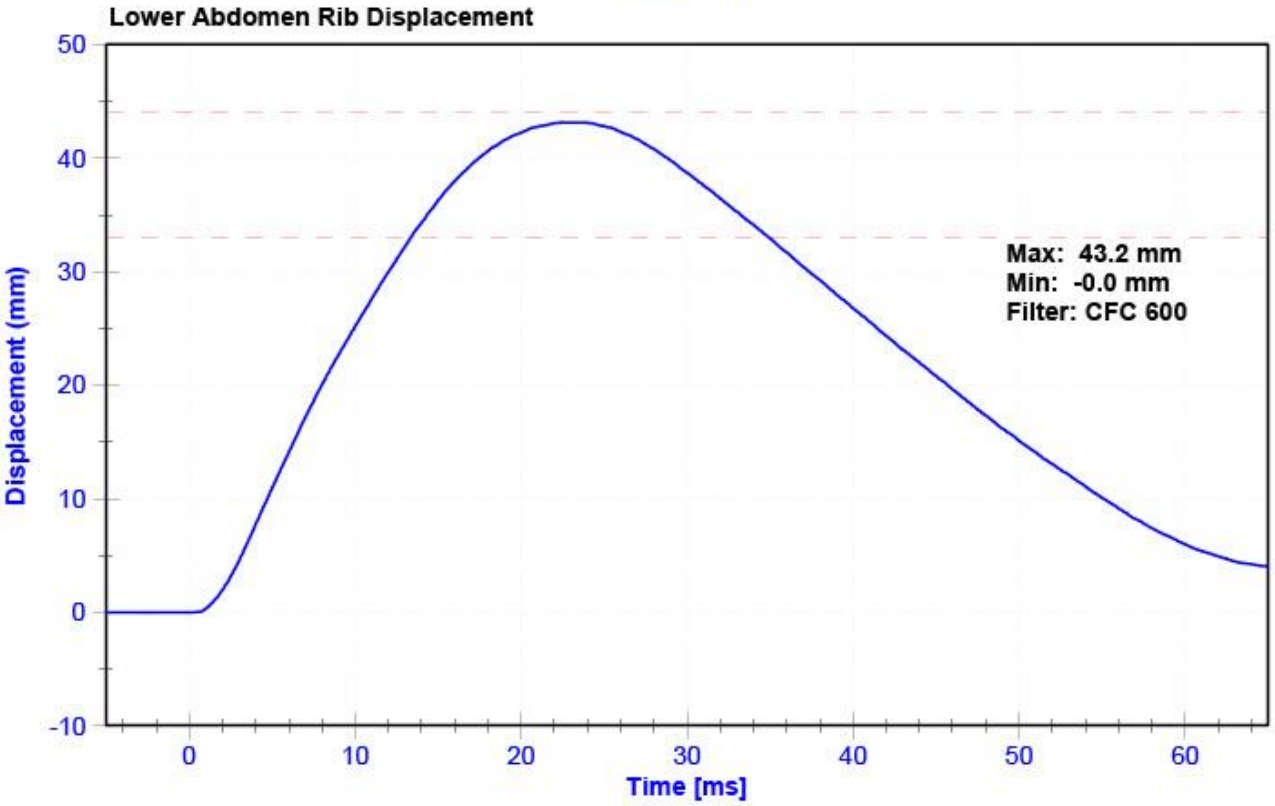
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	29.0	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Probe Acceleration	12	16	g's	13.8	Pass
Lateral Lower Spine Acceleration	9	14	g's	9.8	Pass
Upper Abdomen Rib Deflection	36	47	mm	41.3	Pass
Lower Abdomen Rib Deflection	33	44	mm	43.2	Pass

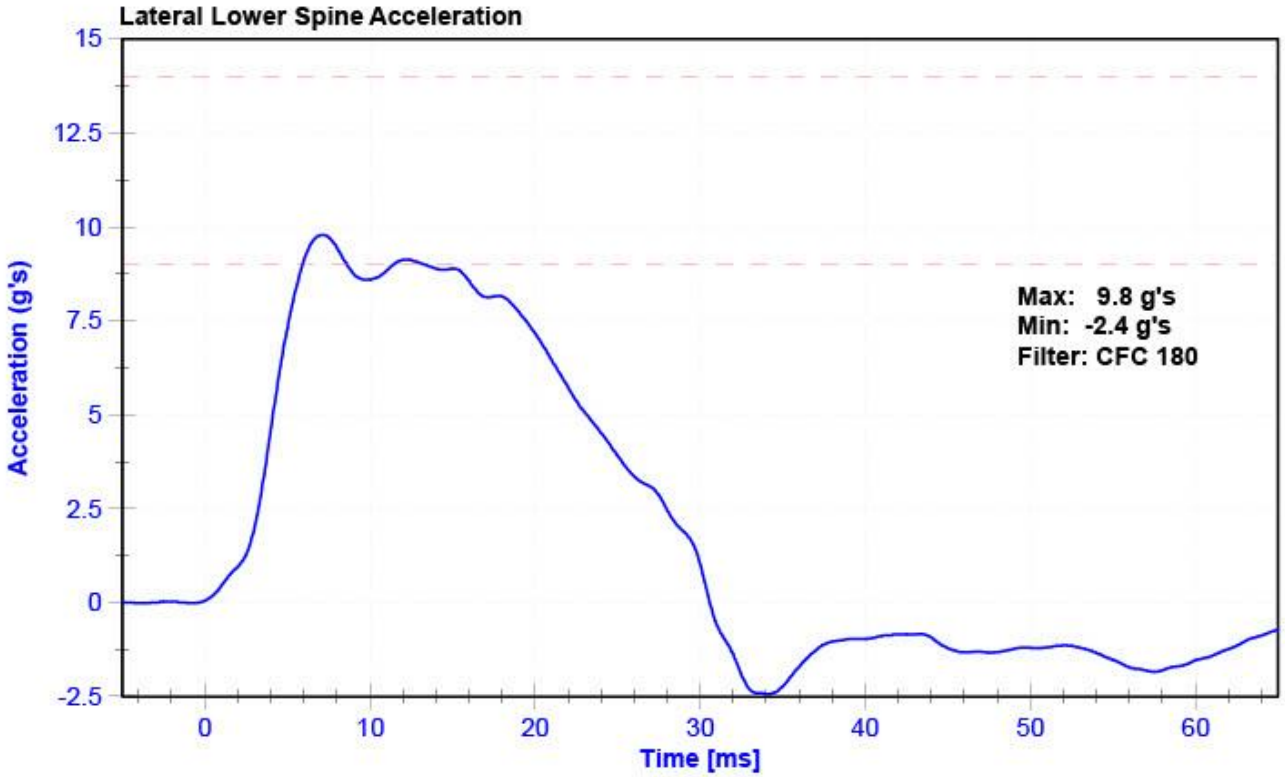
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264C-2K-TZAC-P51736		5/14/2021	5/14/2022
Lower Spine Y Accelerometer	Endevco 7264C-2KTZ-2-240P52071		5/24/2021	11/22/2021
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	5/12/2021	11/10/2021
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	5/12/2021	11/10/2021




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.3 mm
Min: -0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 43.2 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
0
10
20
30
40
50
60
Time [ms]
Max: 9.8 g's
Min: -2.4 g's
Filter: CFC 180

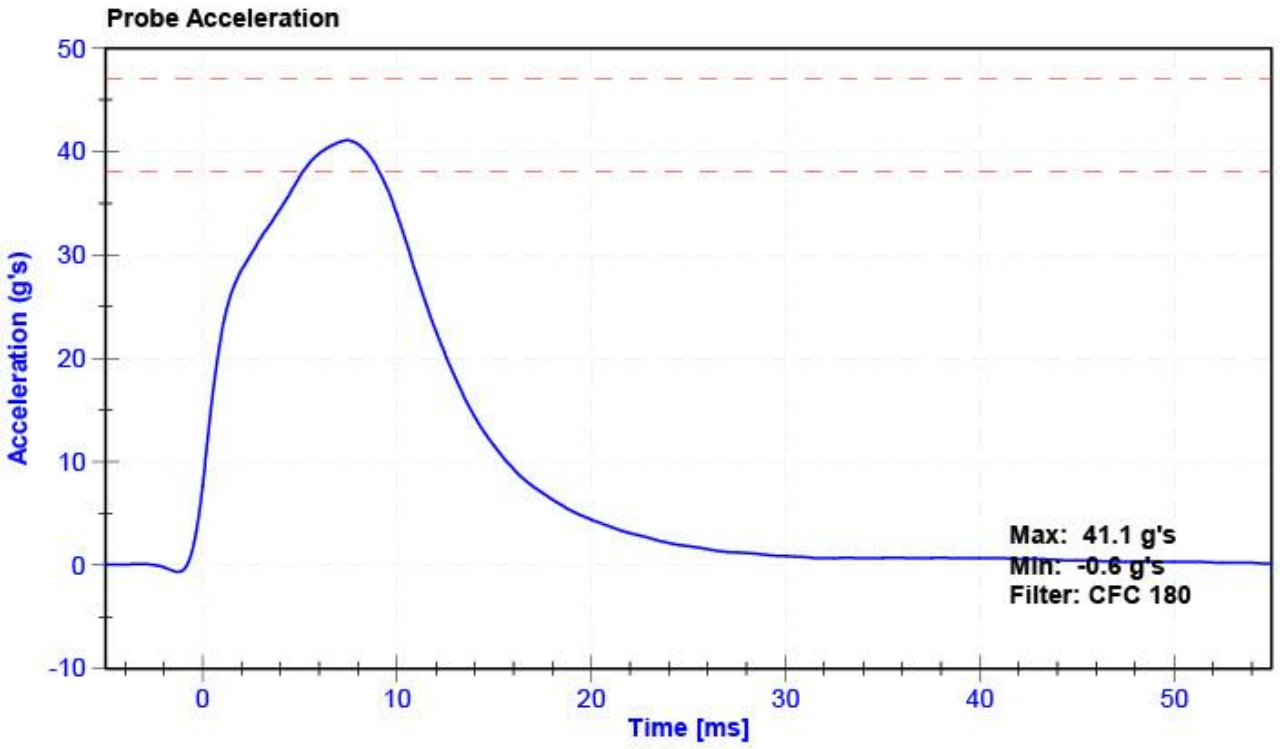
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

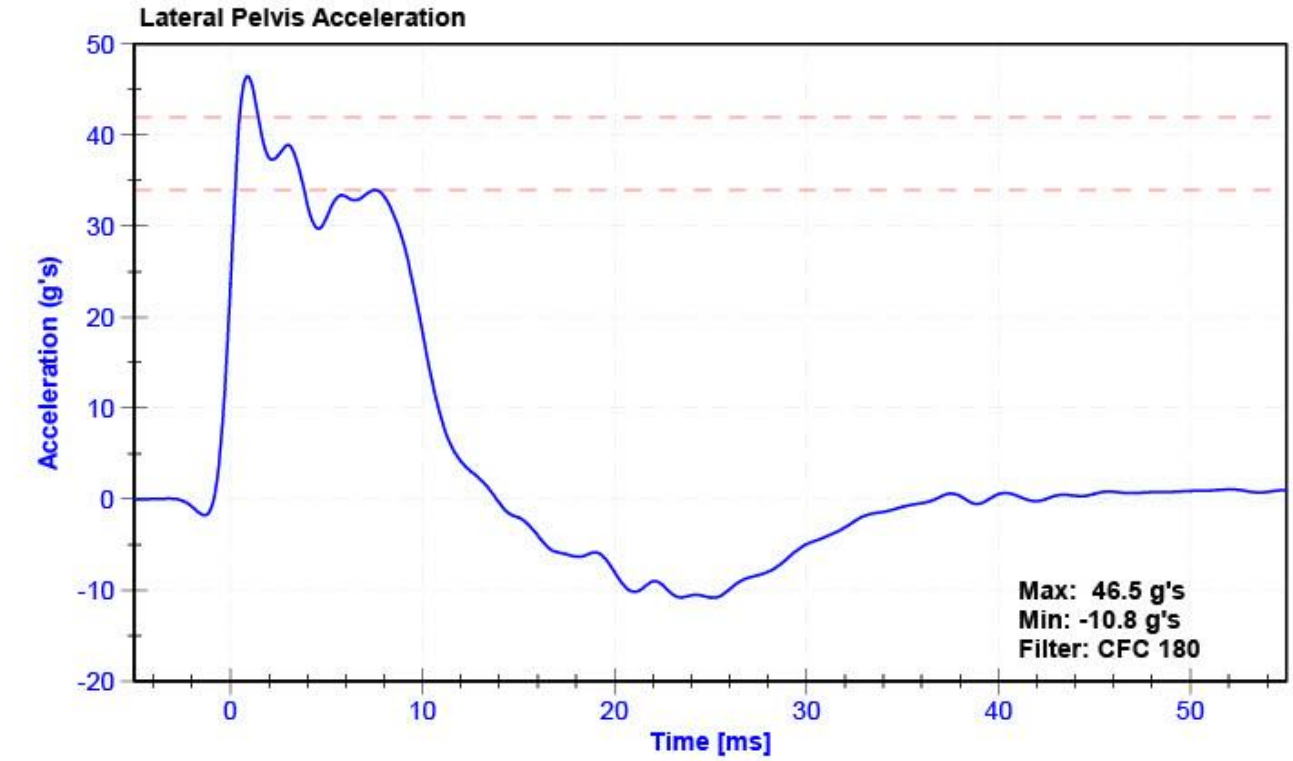
Results

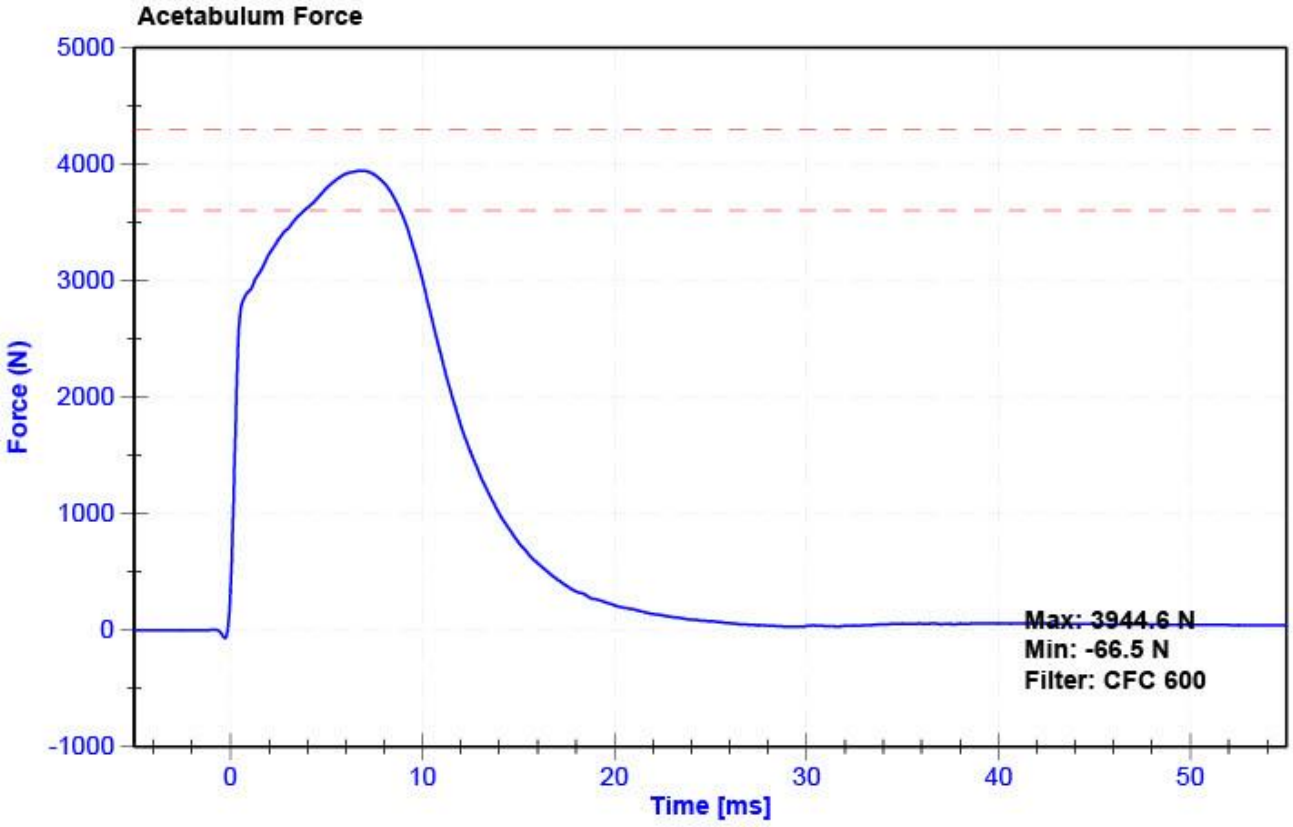
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	53	Pass
Velocity	6.6	6.8	m/s	6.72	Pass
Probe Acceleration	38	47	g's	41.1	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	34.0	Pass
Acetabulum Force	3600	4300	N	3944.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51736	5/14/2021	5/14/2022
Pelvis Y Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51731	5/13/2021	11/11/2021
Acetabulum Load Cell	DENTON 3249J	LC-275Fy	11/23/2020	11/23/2021
Certification Plug	Humanetics	13827	5/15/2020	N/A
Crash Test Plug	Humanetics	13683	9-26-2019	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 46.5 g's
Min: -10.8 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 3944.6 N
Min: -66.5 N
Filter: CFC 600

300 7/1/21 Crash

SID-IIs Pelvis Plug Certification Test

Plug S/N 13683
Test Number 11331
Report Number 11369
Test Date 9/26/2019 1:28:14 PM

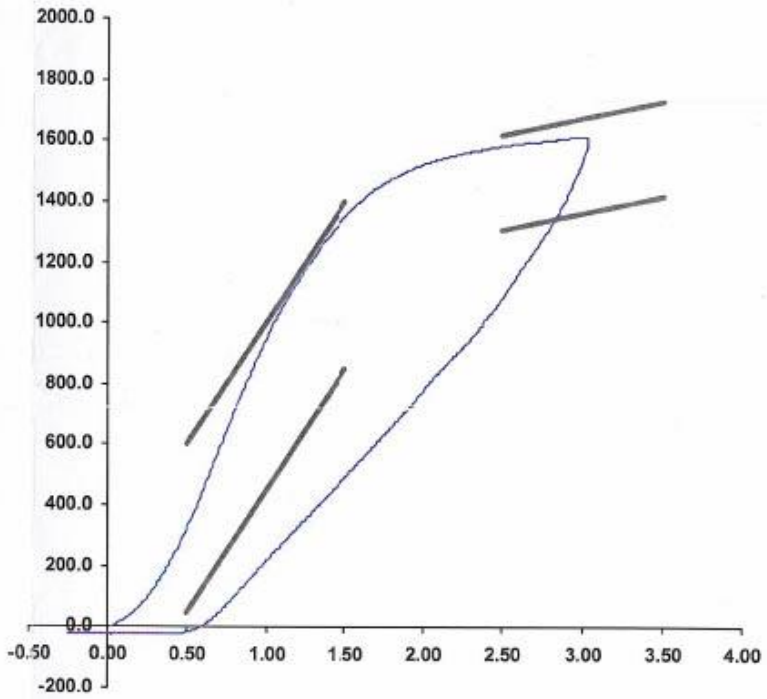
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	330.75	50.00	600.00
Force @ 1.5 mm (N)	1,355.03	850.00	1,400.00
Force @ 2.5 mm (N)	1,584.54	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,614.73	1,361.00	1,673.00

Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS 1000

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

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 26-Sep-19
SACO Research

By : DC Date : 9/26/2019

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

SACO RESEARCH

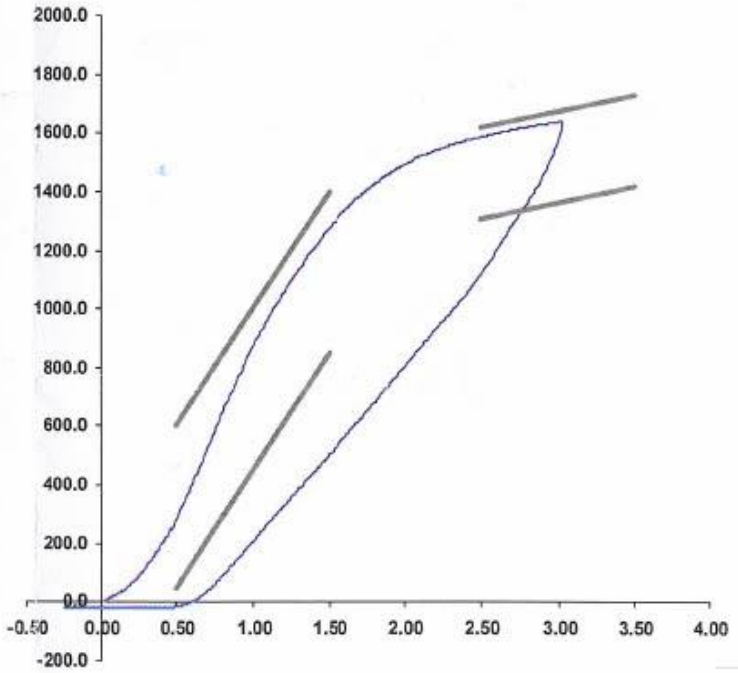
300
CRASH NON-IMPACT
7/1/2021

SID-IIs Pelvis Plug Certification Test

Plug S/N 13088
Test Number 10408
Report Number 10443
Test Date 7/30/2019 4:36:47 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	293.47	50.00	600.00
Force @ 1.5 mm (N)	1,278.30	850.00	1,400.00
Force @ 2.5 mm (N)	1,590.25	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,639.46	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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 **30-Jul-19**
SACO Research

By : DC Date : 7/30/2019

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

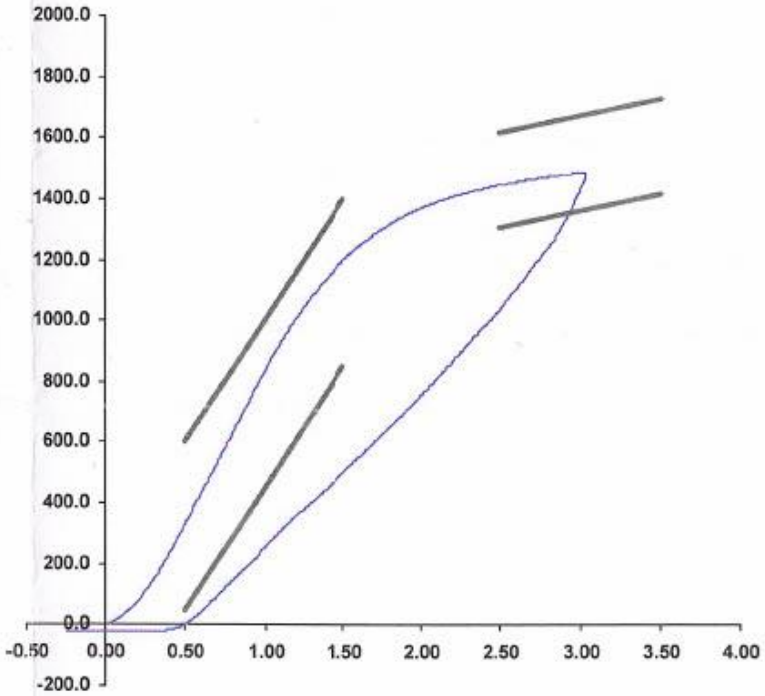
300
7/1/21 cert 2

SID-IIs Pelvis Plug Certification Test

Plug S/N 14182
Test Number 14220
Report Number 14265
Test Date 6/28/2020 1:07:15 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	332.87	50.00	600.00
Force @ 1.5 mm (N)	1,196.71	850.00	1,400.00
Force @ 2.5 mm (N)	1,445.69	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,487.96	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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 28-Jun-20
SACO Research

By : _____ Date : 6-28-2020

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

SACO RESEARCH

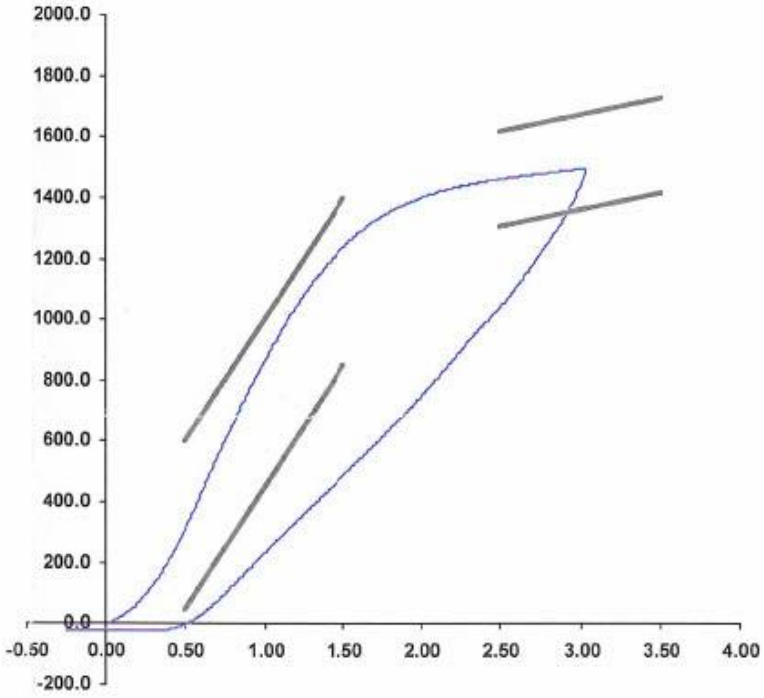
300 Cert #3
7/1/2021

SID-IIs Pelvis Plug Certification Test

Plug S/N 13889
Test Number 13363
Report Number 13408
Test Date 5/20/2020 8:09:52 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	313.67	50.00	600.00
Force @ 1.5 mm (N)	1,239.45	850.00	1,400.00
Force @ 2.5 mm (N)	1,462.81	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,496.88	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS) 1000
Preload Value (-N) 22.24
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 20-May-20
SACO Research

By : DC Date : 5/20/2020

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

SACO RESEARCH

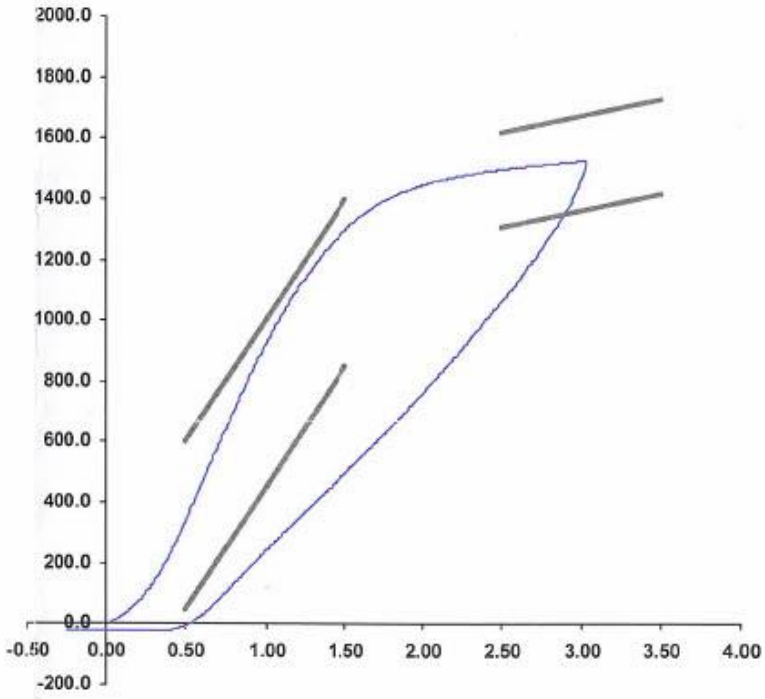
300
Cert #4
7/1/21

SID-IIs Pelvis Plug Certification Test

Plug S/N 13827
Test Number 13288
Report Number 13333
Test Date 5/15/2020 11:25:49 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	337.33	50.00	600.00
Force @ 1.5 mm (N)	1,297.75	850.00	1,400.00
Force @ 2.5 mm (N)	1,497.62	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,525.77	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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 15-May-20
SACO Research

By : DC Date : 5/15/2020

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

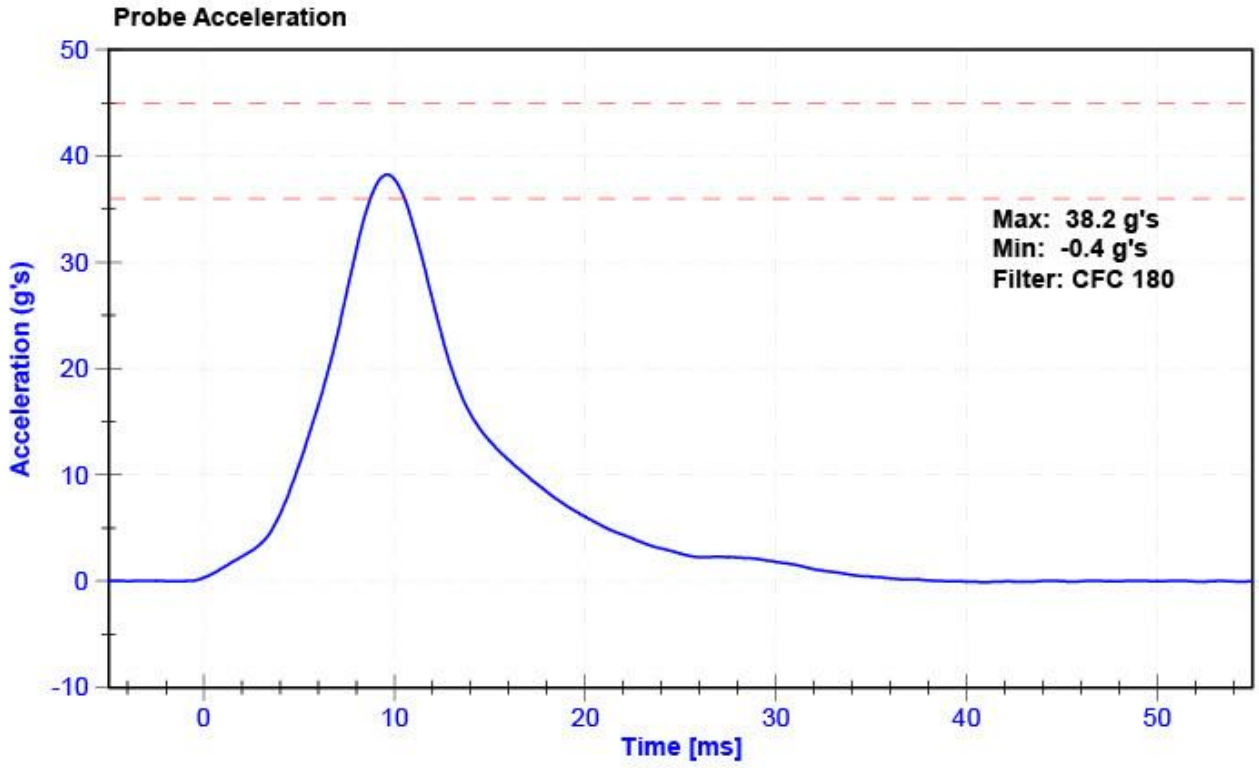
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

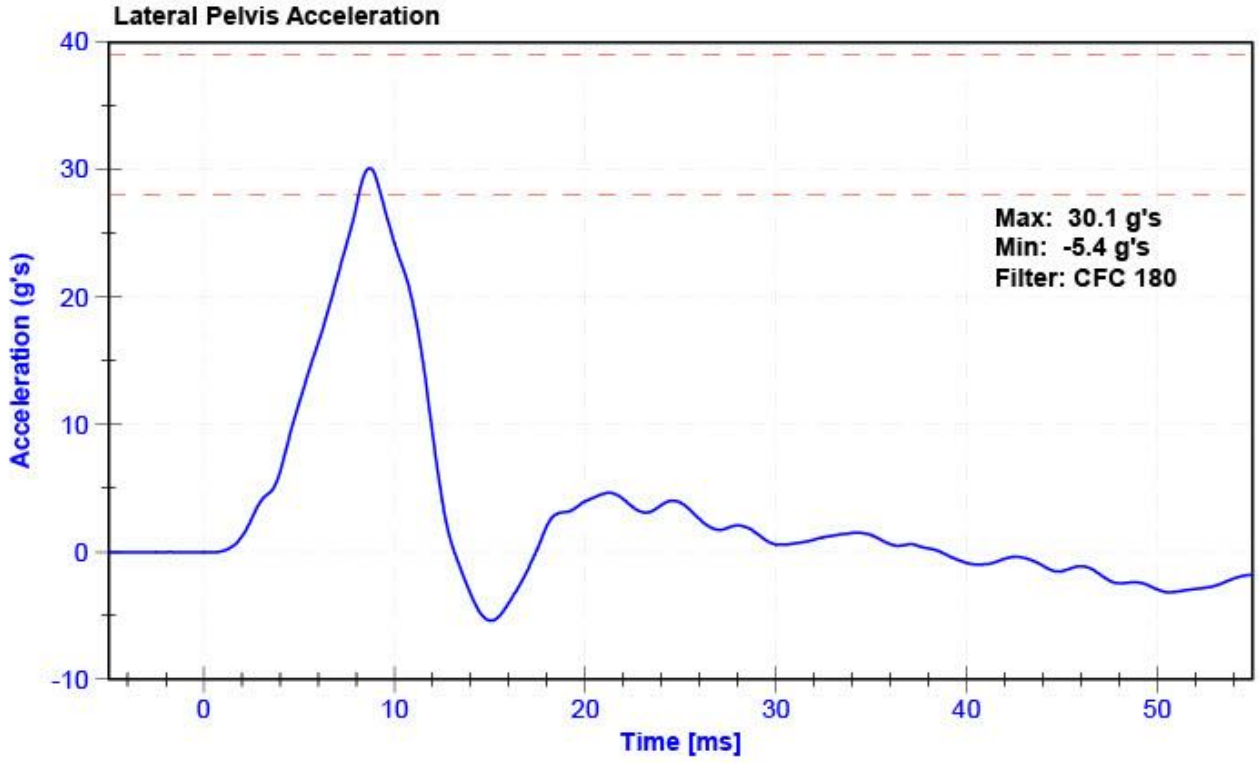
Results

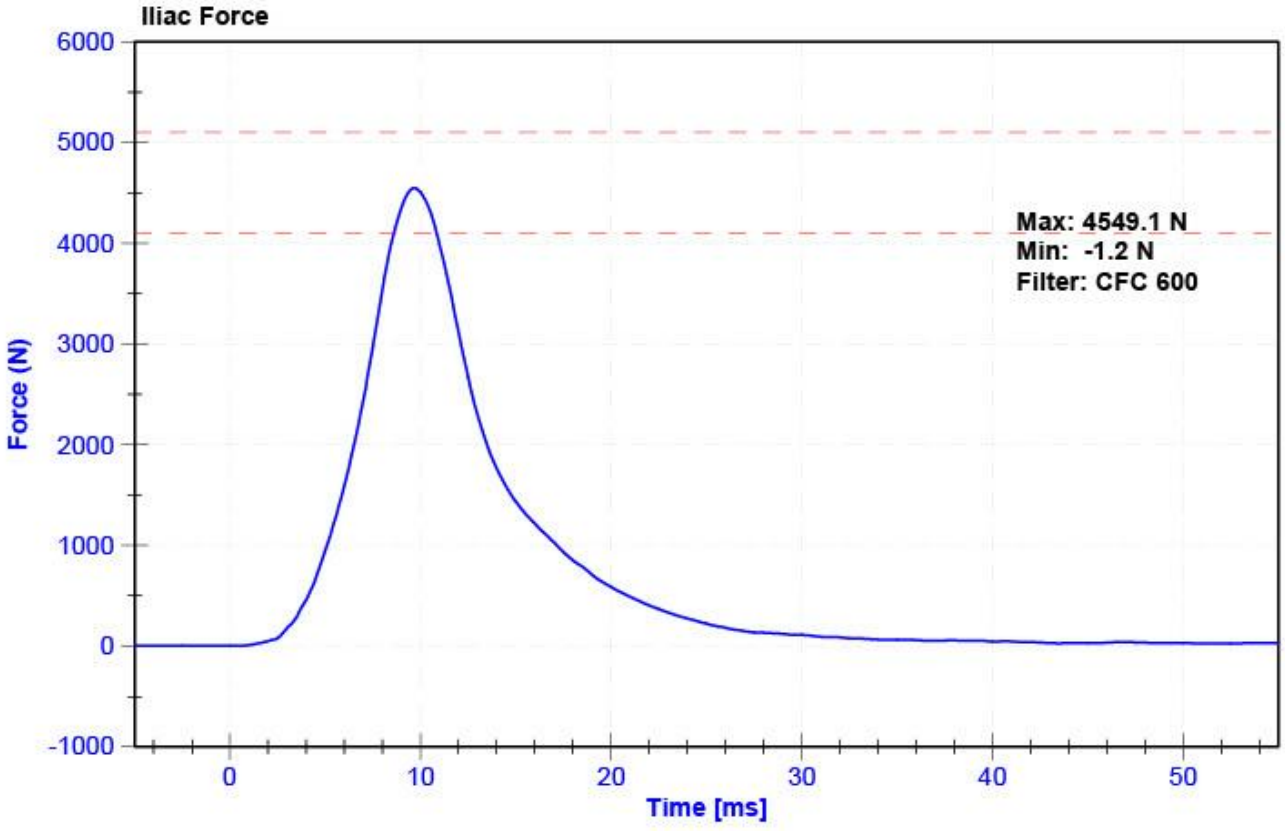
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	45	Pass
Velocity	4.2	4.4	m/s	4.25	Pass
Probe Acceleration	36	45	g's	38.2	Pass
Lateral Pelvis Acceleration	28	39	g's	30.1	Pass
Iliac Force	4100	5100	N	4549.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51736	5/14/2021	5/14/2022
Pelvis Y Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51731	5/13/2021	11/11/2021
Iliac Load Cell	DENTON 3228J	LC-279Fy	11/23/2020	11/23/2021




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 30.1 g's
Min: -5.4 g's
Filter: CFC 180


Iliac Force
Force (N)
Time [ms]
Max: 4549.1 N
Min: -1.2 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

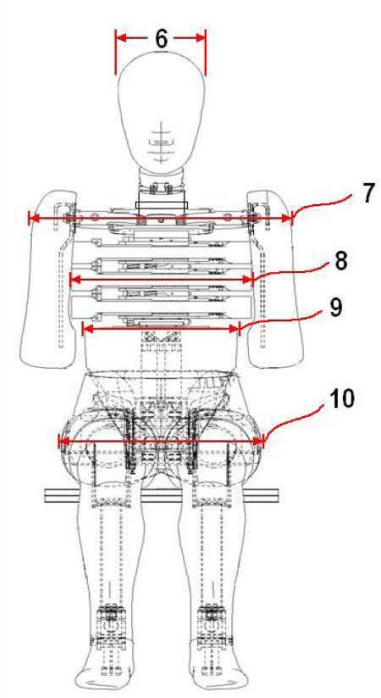
SERIAL NO: F033

(CONFIGURED FOR LEFT SIDE IMPACT)

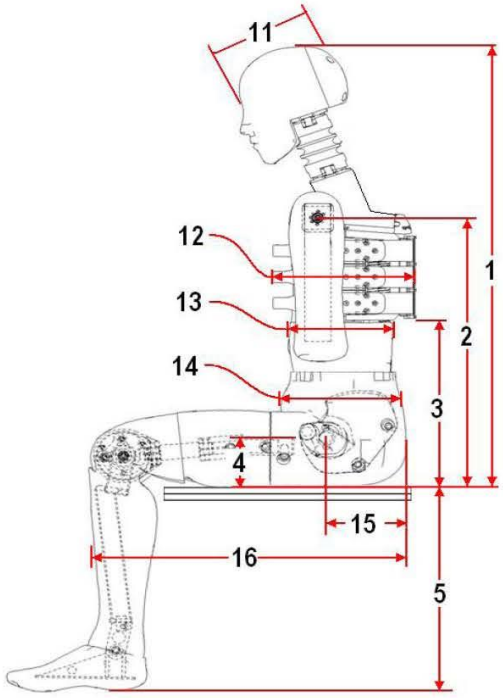
External Measurements - EuroSID-2re

Technician: J.Pericak Date: 7/8/2021

Dummy Serial Number: F033



FRONT VIEW



SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	910	Pass
2	Seat to Shoulder Joint	558	572	567	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	351	Pass
4	Seat to Hip Joint (center of bolt)	97	103	98	Pass
5	Sole to Seat, Sitting	333	451	429	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	472	Pass
8	Thorax Width	322	332	327	Pass
9	Abdomen Width	273	287	285	Pass
10	Pelvis Lap Width	359	373	365	Pass
11	Head Depth	196	206	201	Pass
12	Thorax Depth	262	272	267	Pass
13	Abdomen Depth	194	204	199	Pass
14	Pelvis Depth	235	245	241	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	156	Pass
16	Back of Buttocks to Front Knee	597	615	609	Pass

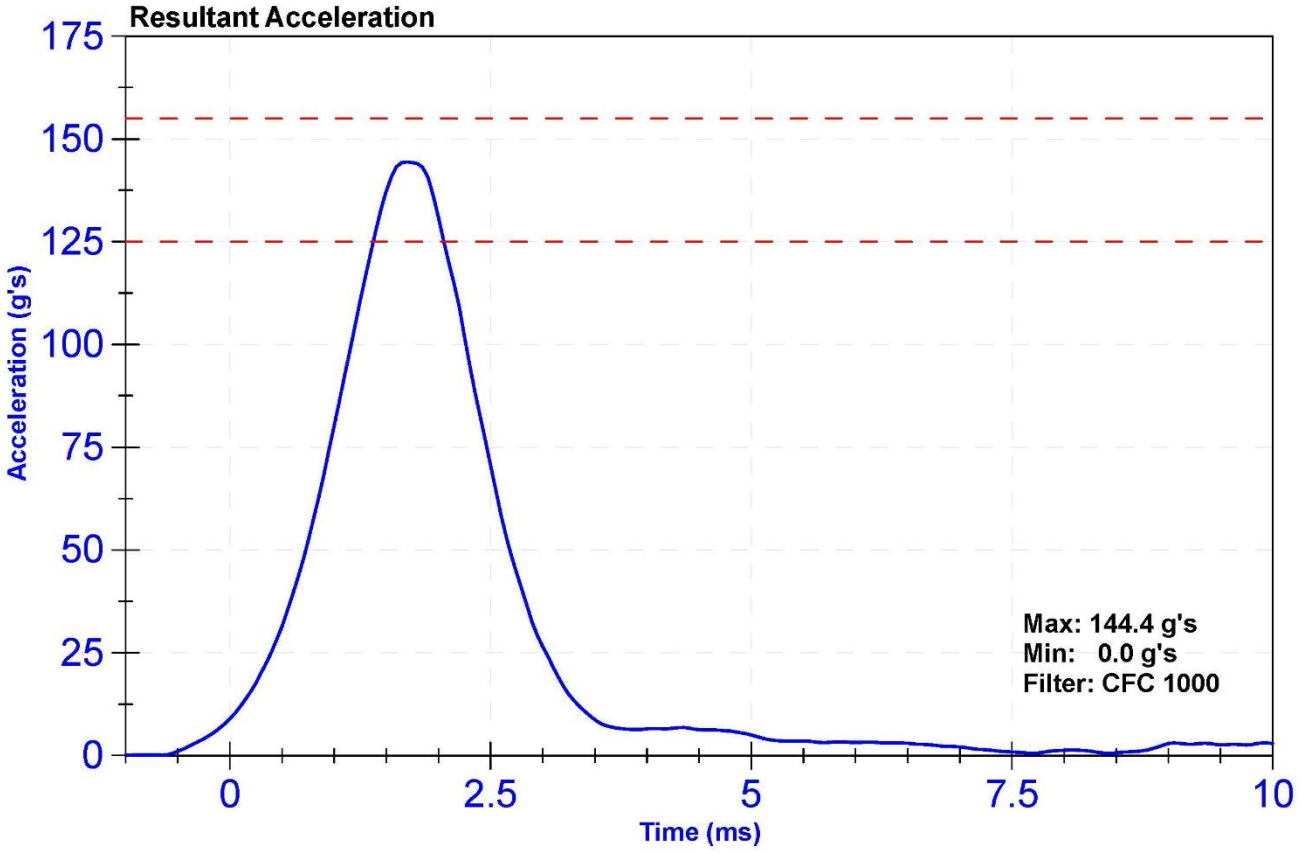
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

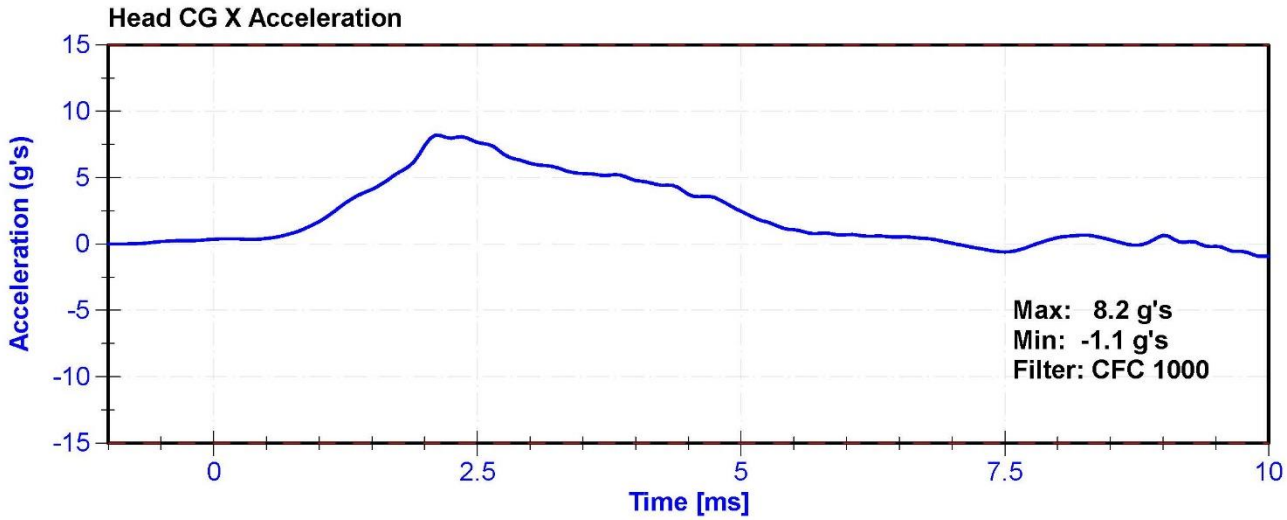
Results

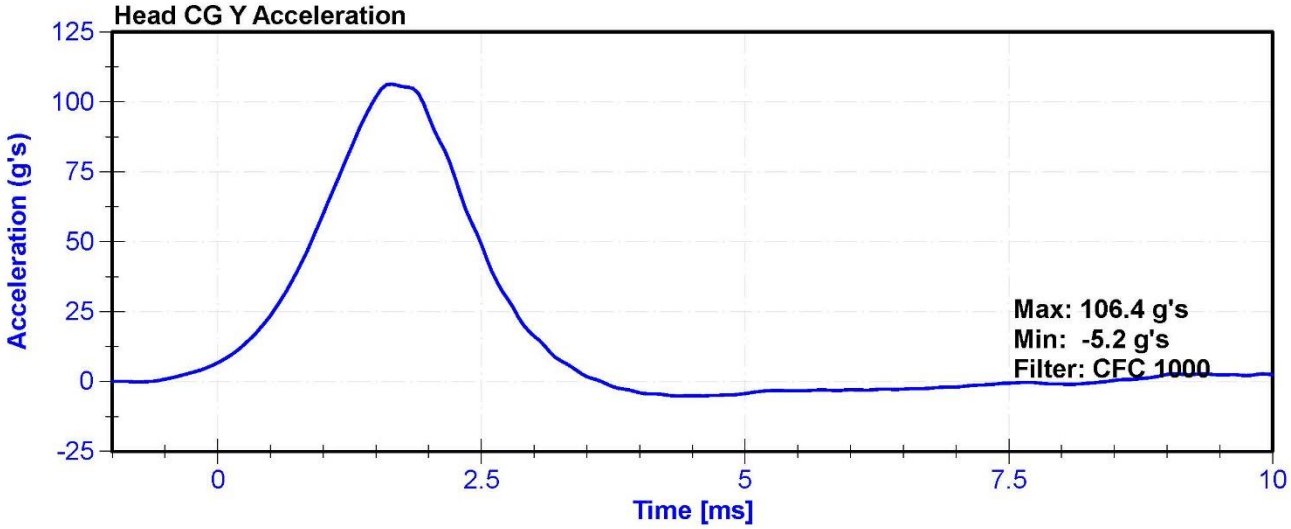
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	62.3	Pass
Resultant Acceleration	125	155	g's	144.4	Pass
Oscillation	0	15	%	4.72	Pass
Fore-Aft Acceleration	-15	15	g's	8.2	Pass

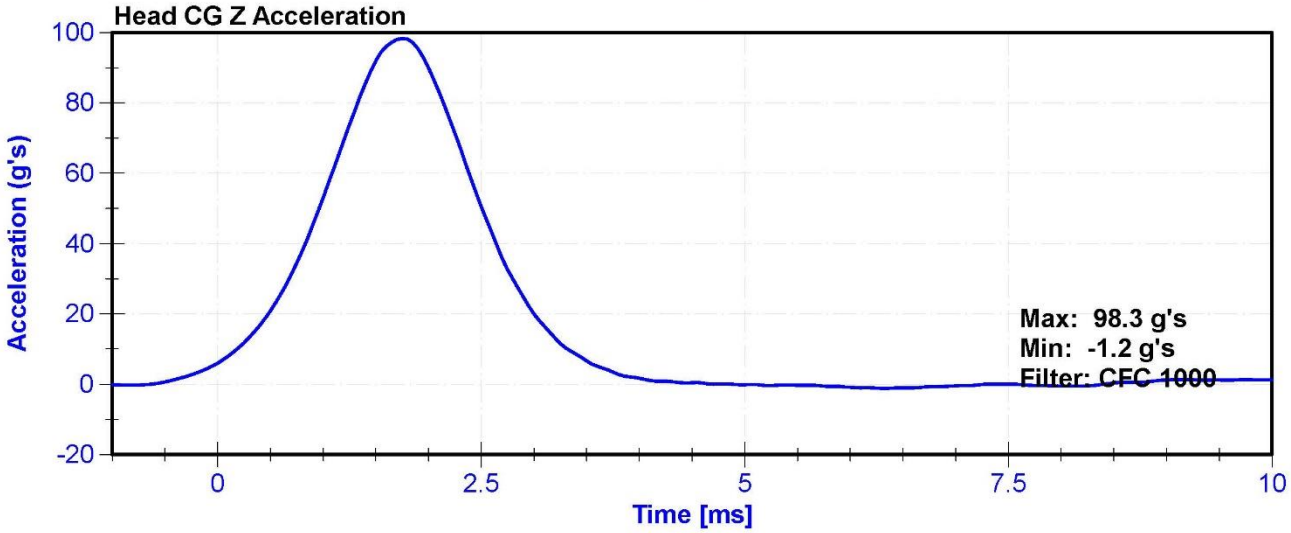
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P63861	6/18/2021	12/17/2021
Y Accelerometer	ENDEVCO 7264CT	AC-P49216	6/18/2021	12/17/2021
Z Accelerometer	ENDEVCO 7264	AC-P51303	6/18/2021	12/17/2021




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 8.2 g's
Min: -1.1 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 106.4 g's
Min: -5.2 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]
Max: 98.3 g's
Min: -1.2 g's
Filter: CFC 1000

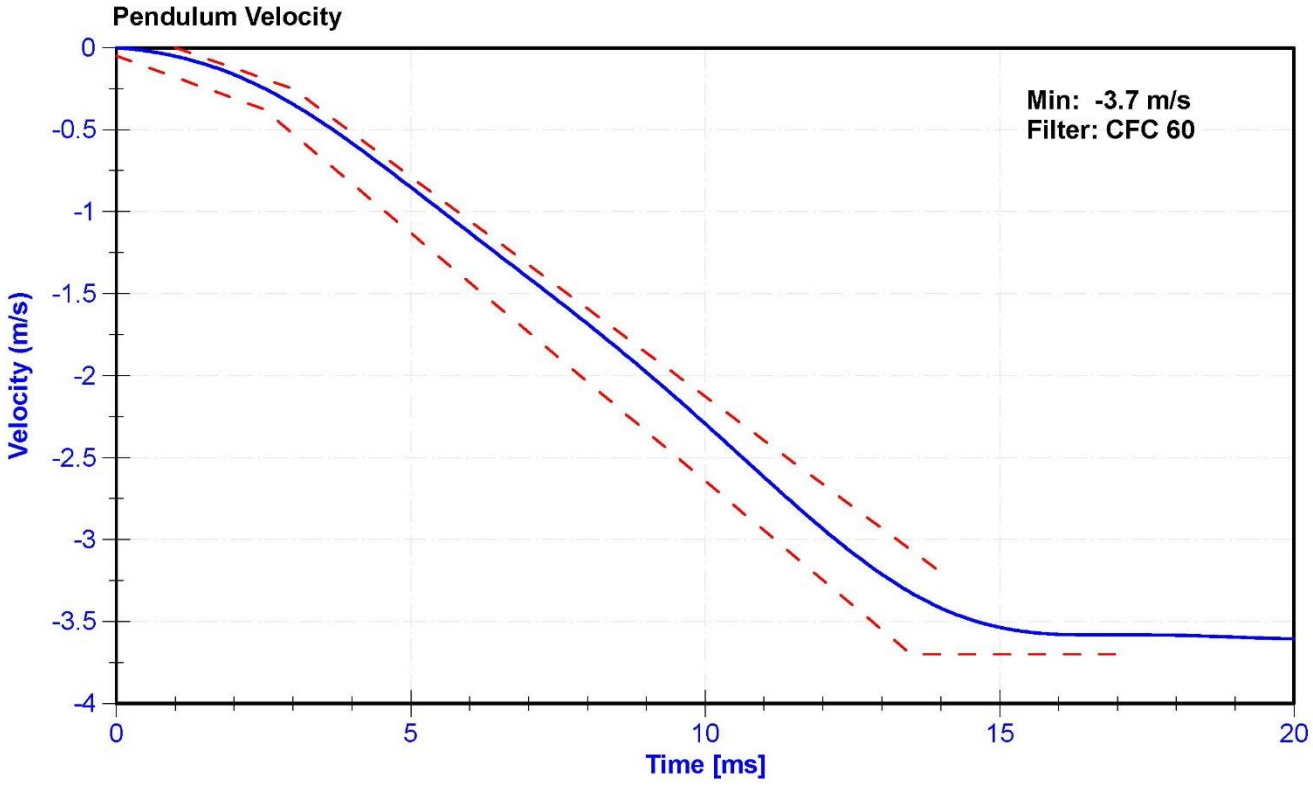
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

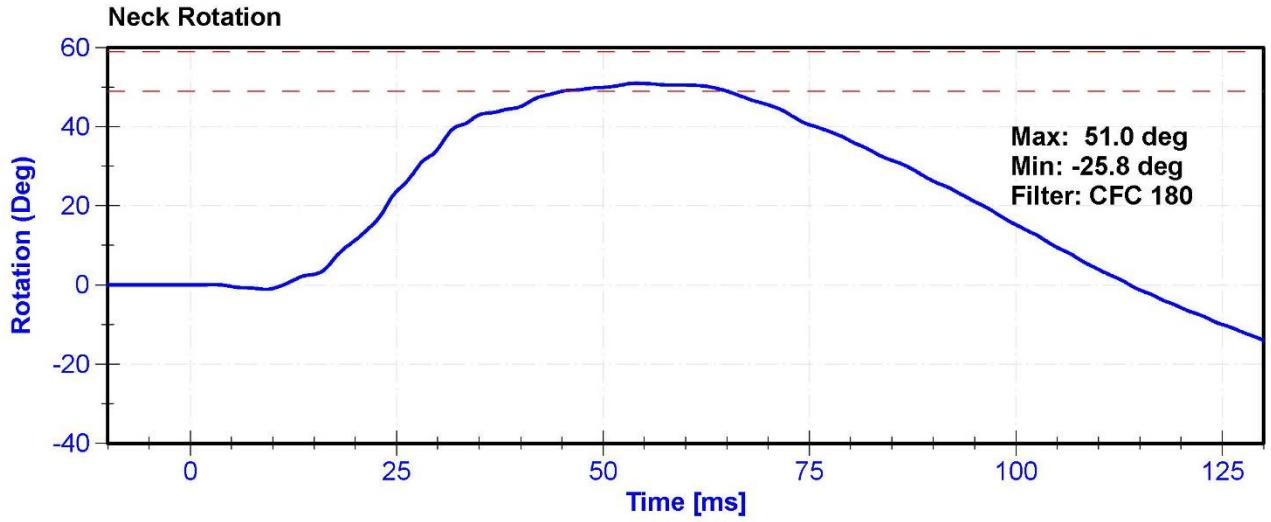
Results

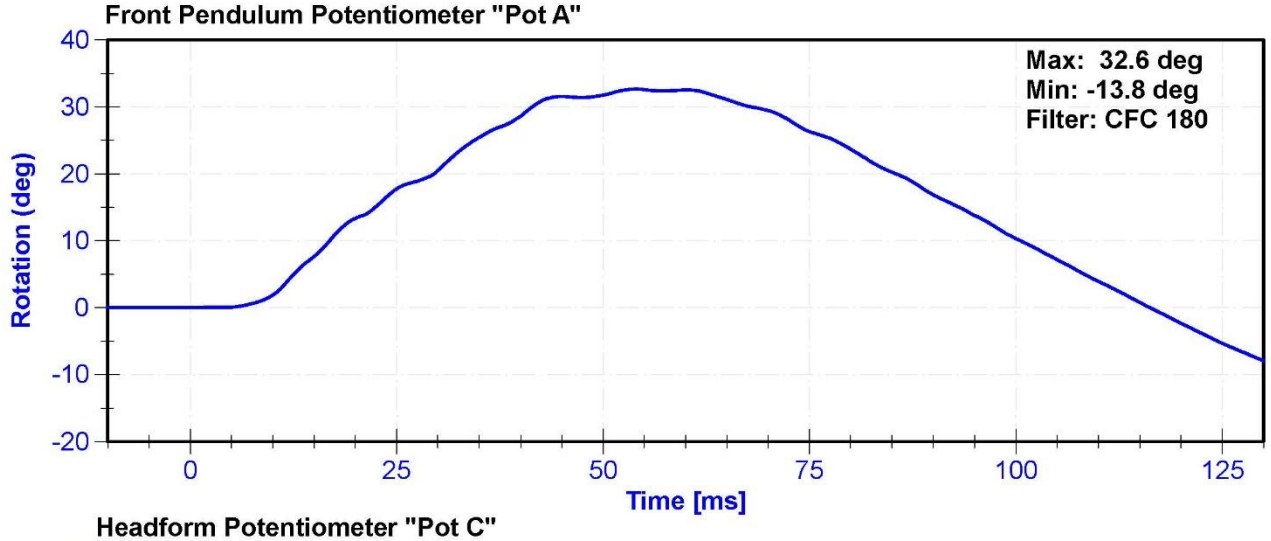
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	58.6	Pass
Velocity	3.3	3.5	m/s	3.45	Pass
Lateral Neck Rotation	49	59	deg	51.0	Pass
Time at Maximum Rotation	54	66	ms	54.1	Pass
Time of Rotation Decay from Maximum	53	88	ms	59.8	Pass

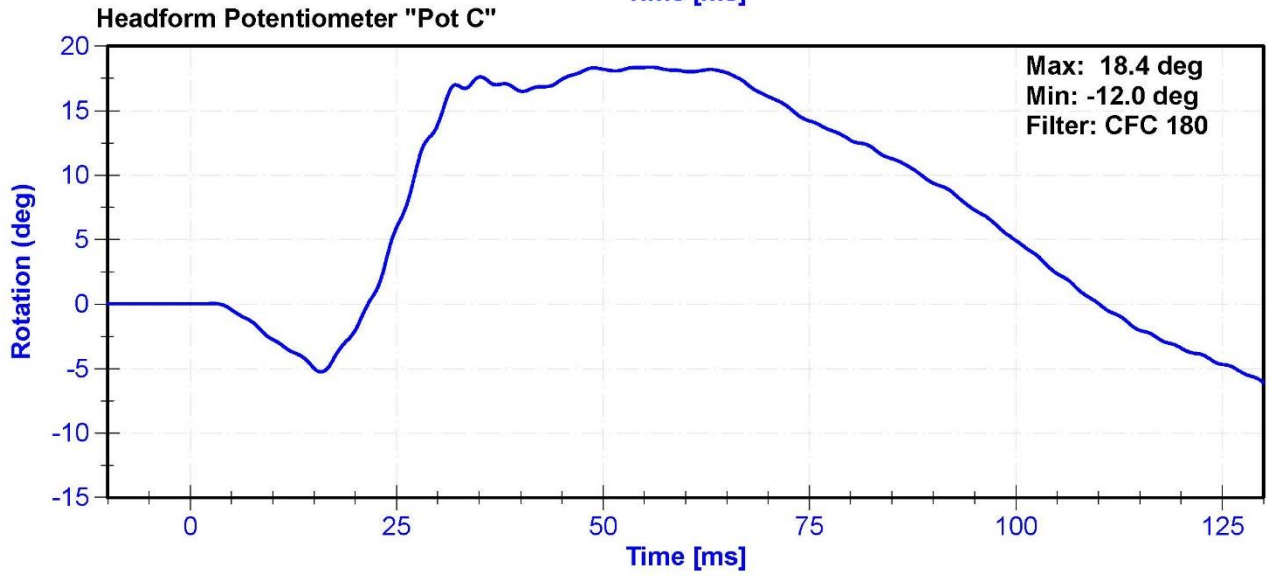
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CTAC-C16503 Striker		2/5/2021	2/5/2022
Front Pendulum Potentiometer	SP22G	DS-094	8/18/2020	8/18/2021
Headform Potentiometer	SP22G	DS-095	8/18/2020	8/18/2021




Neck Rotation
Rotation (Deg)
Time [ms]
Max: 51.0 deg
Min: -25.8 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 32.6 deg
Min: -13.8 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 18.4 deg
Min: -12.0 deg
Filter: CFC 180

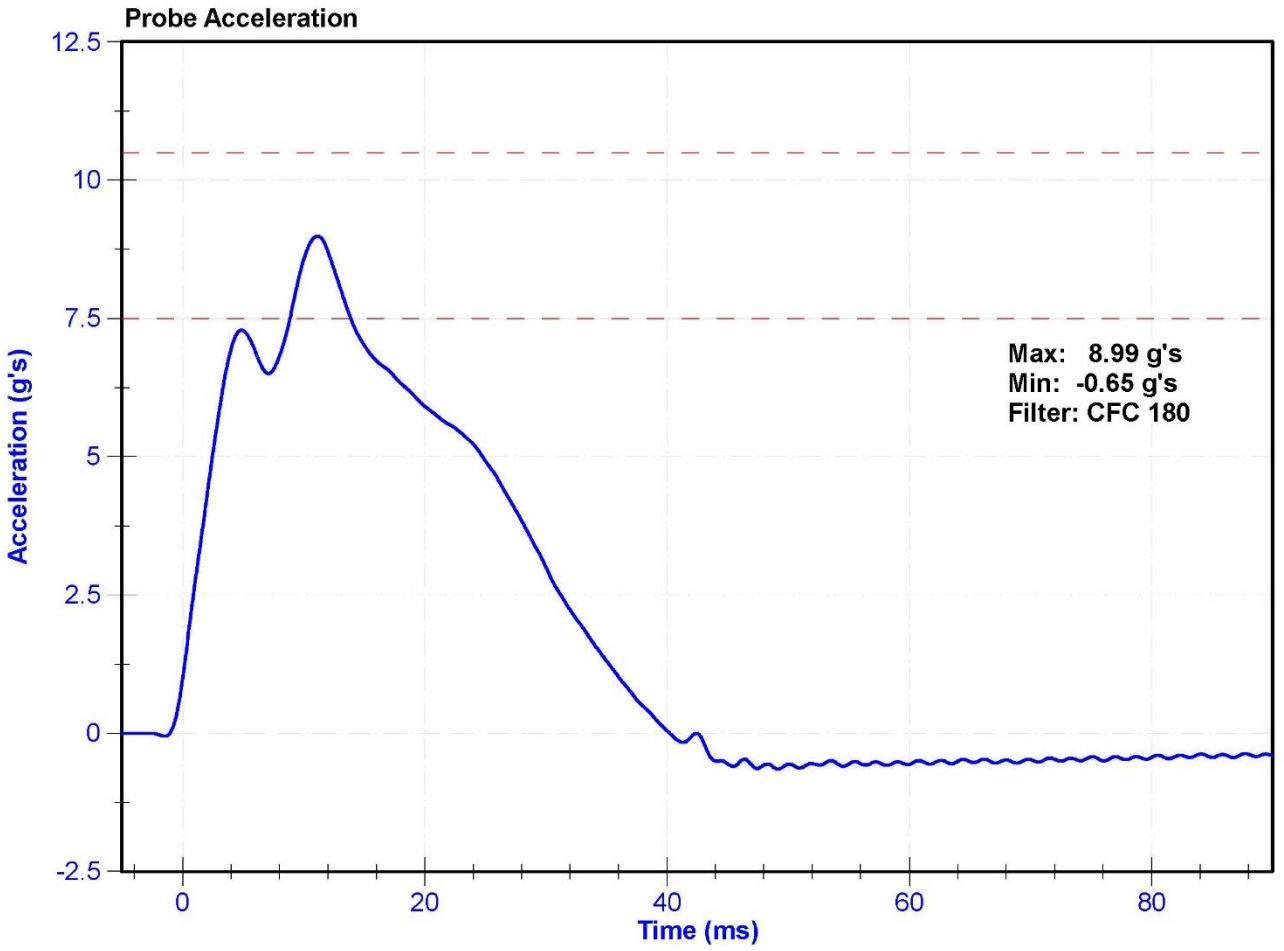
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	57.0	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	7.5	10.5	g's	8.99	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51736	5/14/2021	5/14/2022



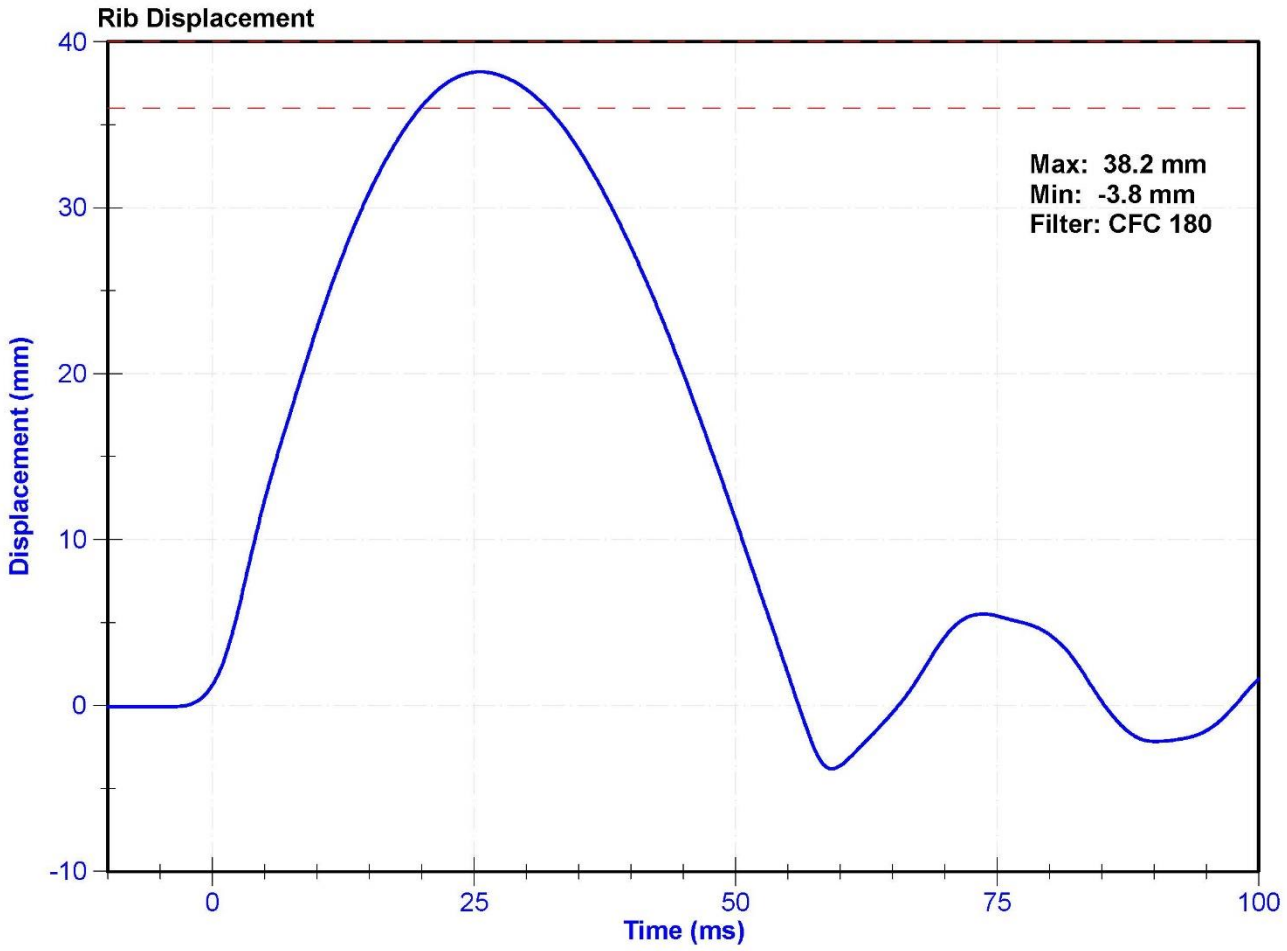
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	58.6	Pass
Rib Displacement	36	40	mm	38.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-179GFE	6/17/2021	12/16/2021



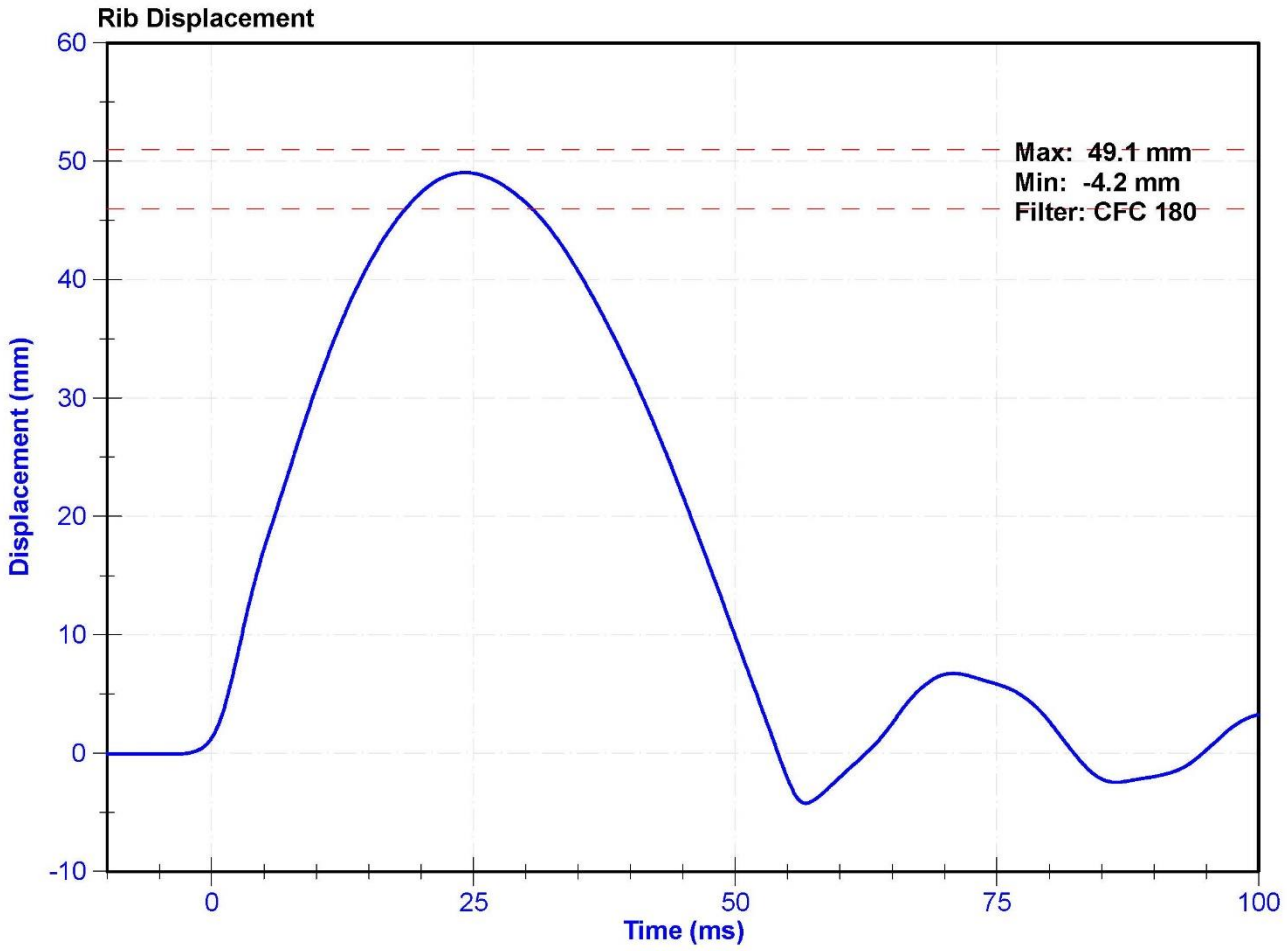
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	58.6	Pass
Rib Displacement	46	51	mm	49.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-179GFE	6/17/2021	12/16/2021



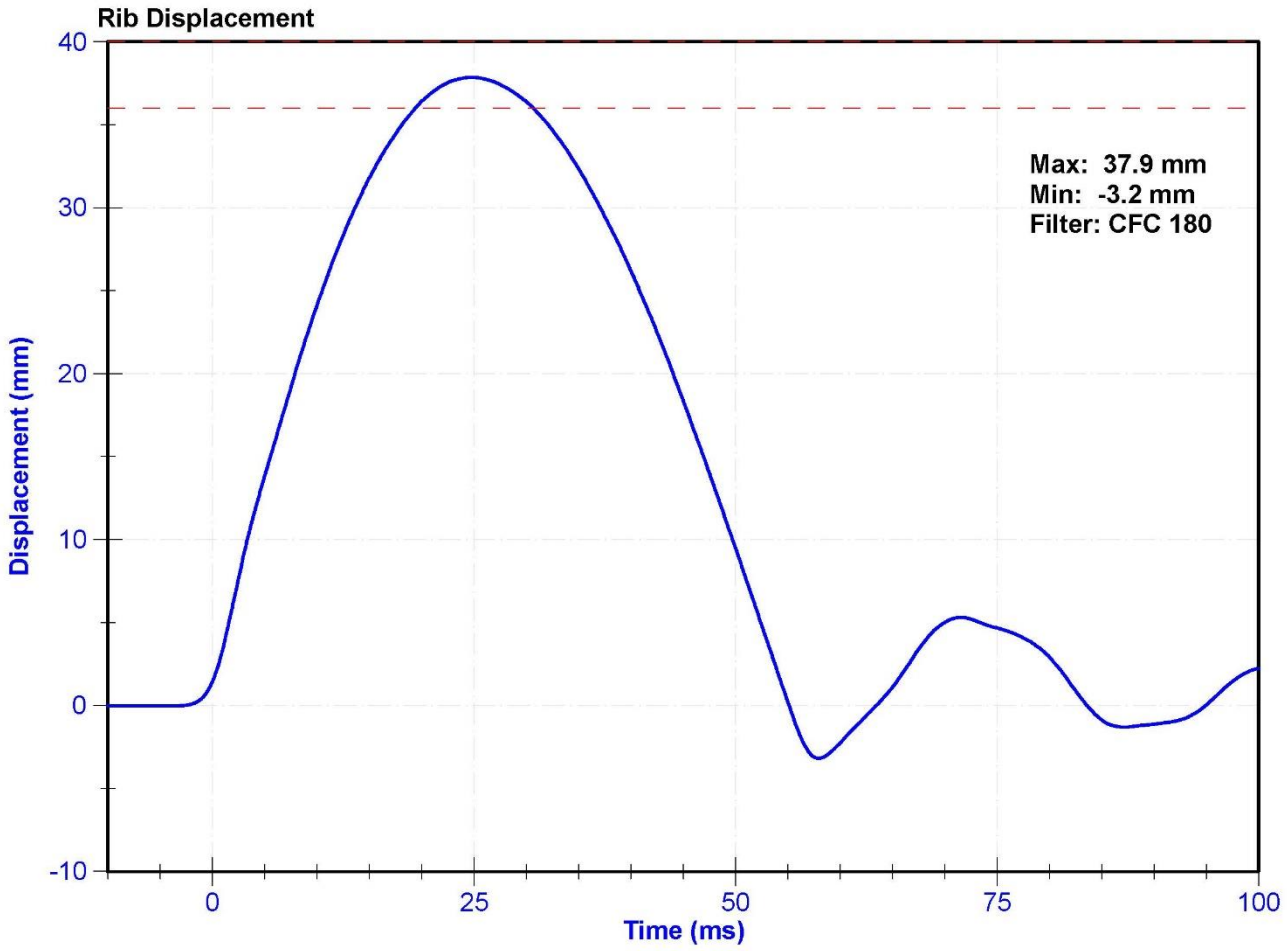
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	58.6	Pass
Rib Displacement	36	40	mm	37.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-185GFE	6/17/2021	12/16/2021



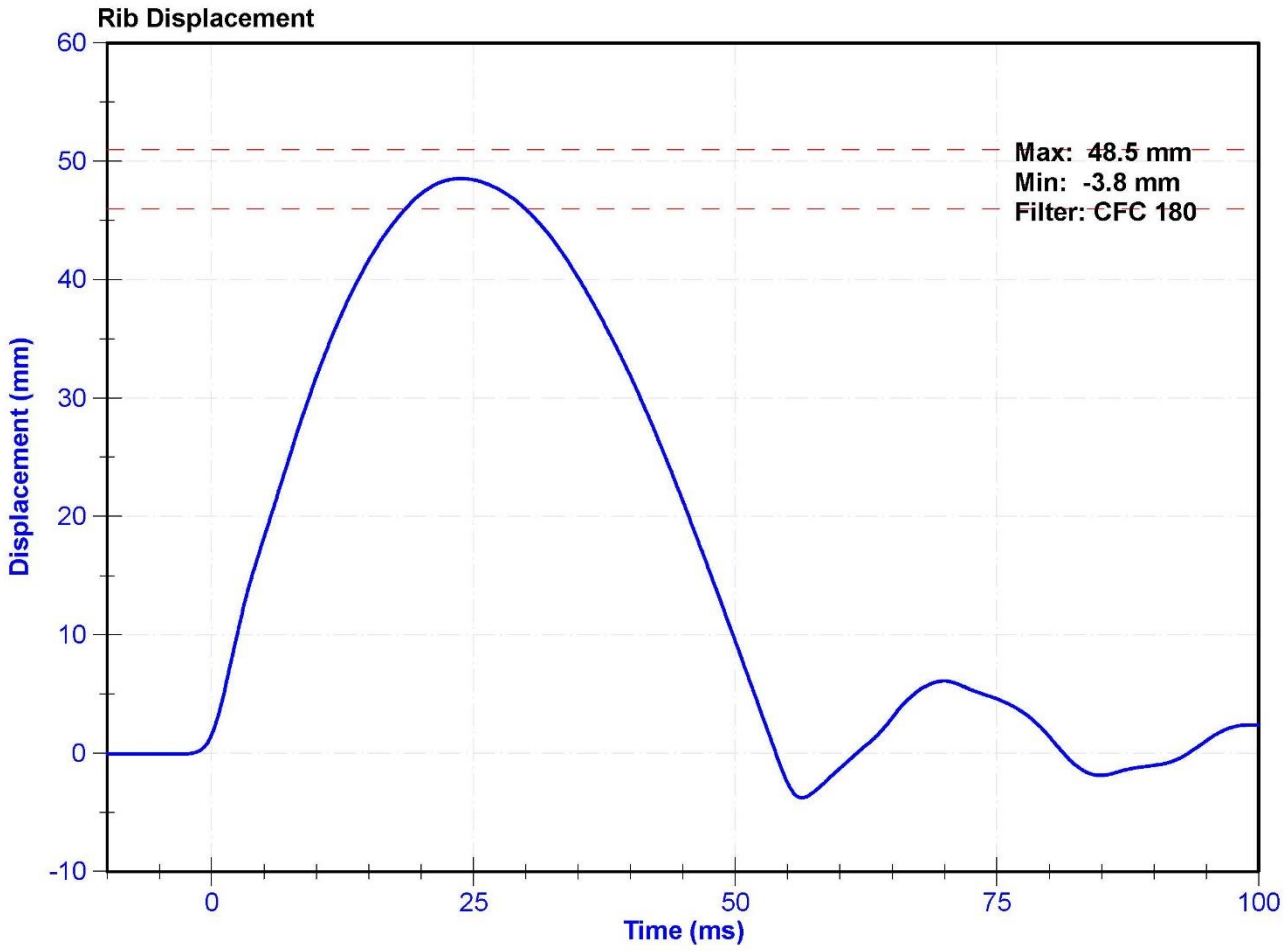
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	58.6	Pass
Rib Displacement	46	51	mm	48.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-185GFE	6/17/2021	12/16/2021



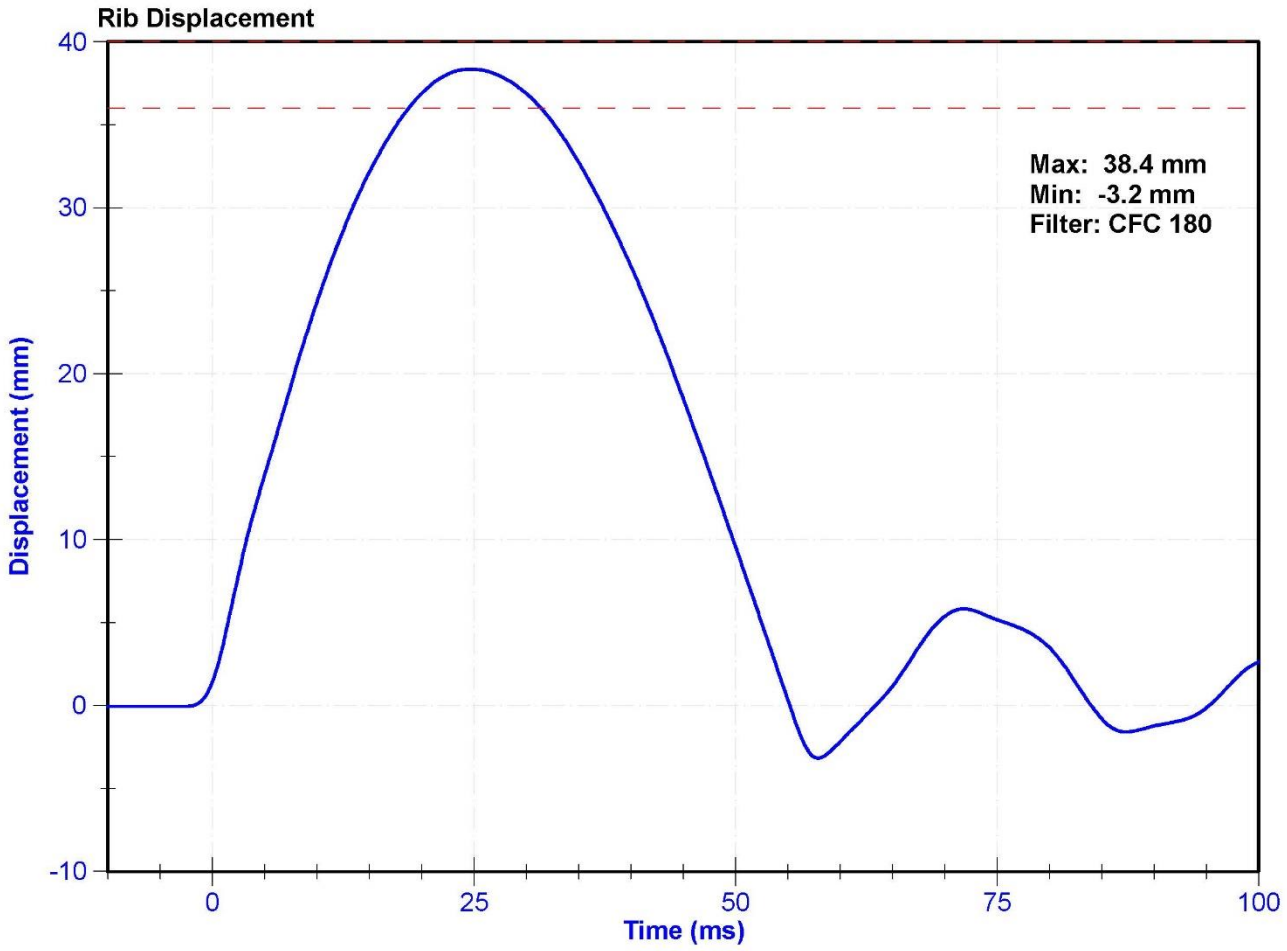
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	58.6	Pass
Rib Displacement	36	40	mm	38.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-178GFE	6/17/2021	12/16/2021



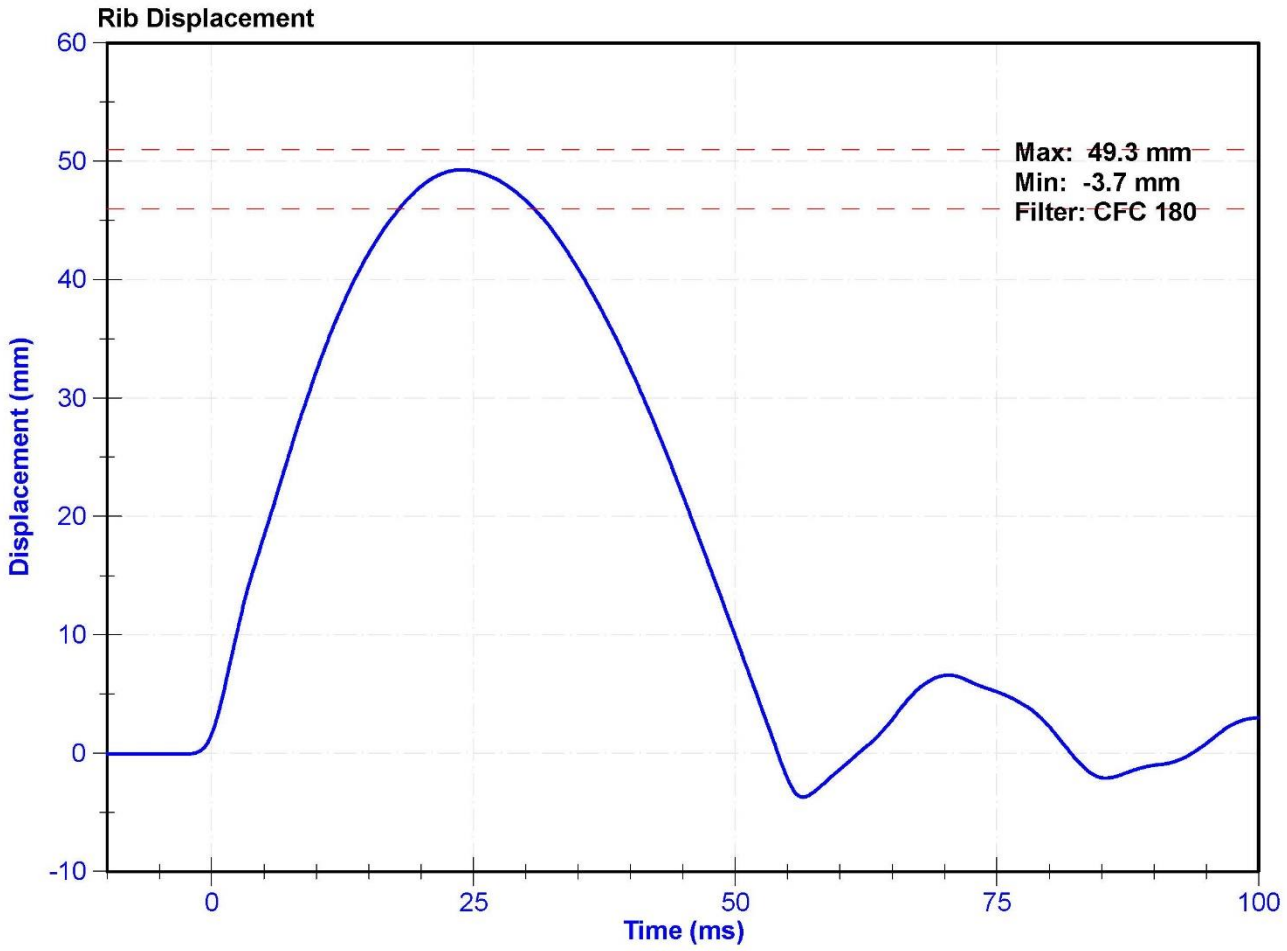
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	58.6	Pass
Rib Displacement	46	51	mm	49.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell MLT-38000203	DS-178GFE	6/17/2021	12/16/2021



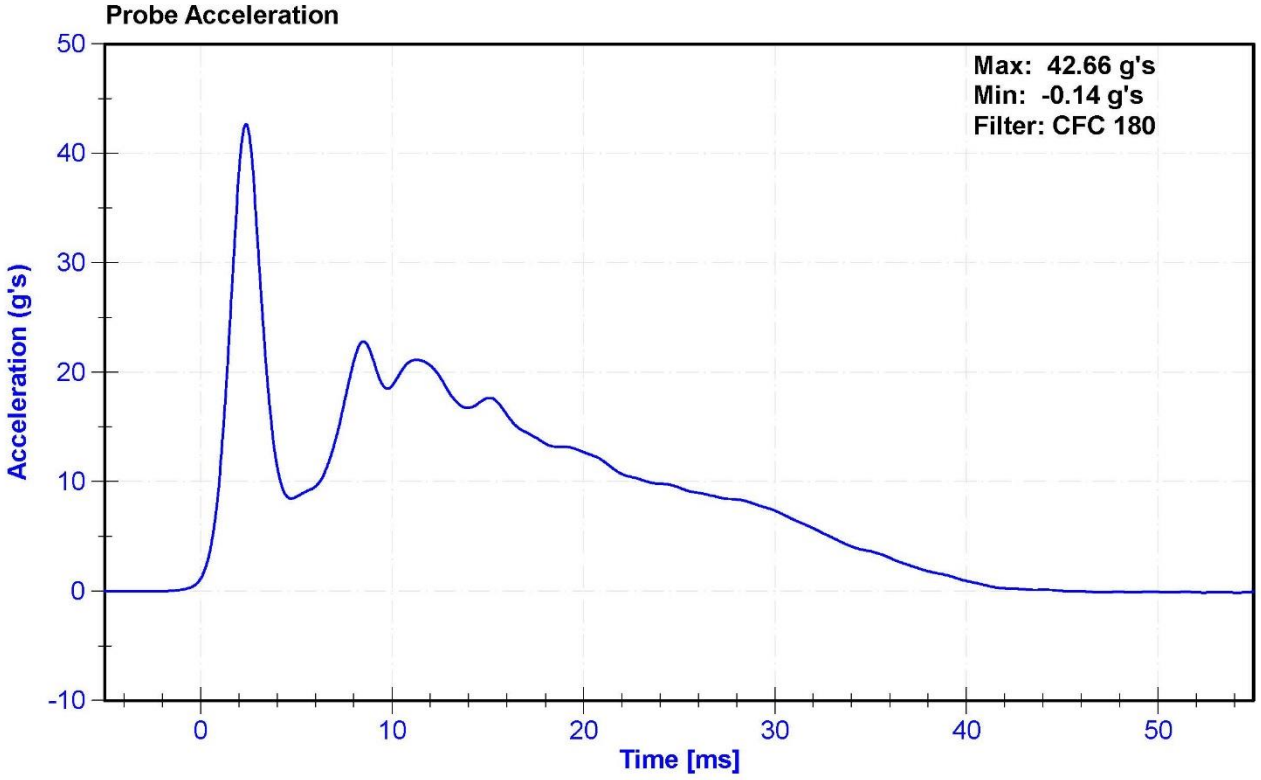
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

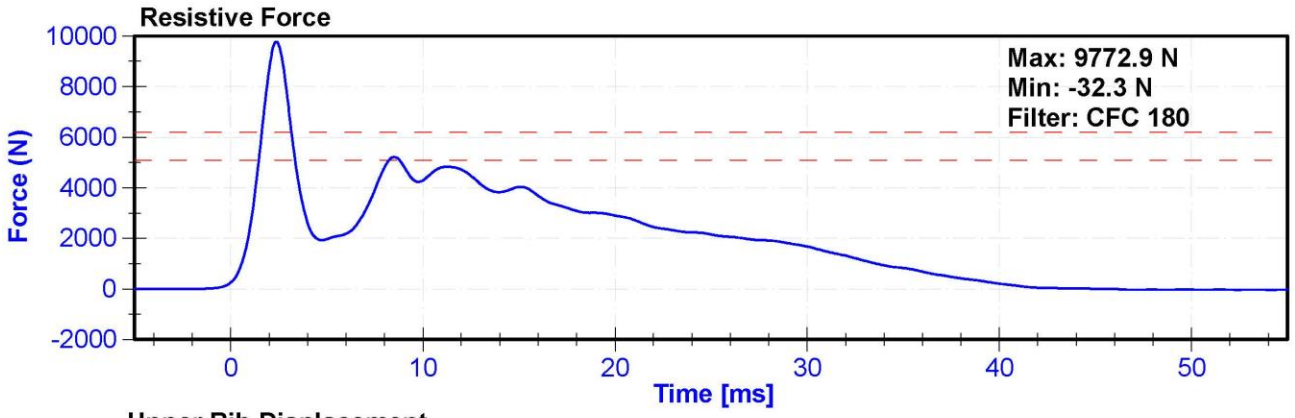
Results

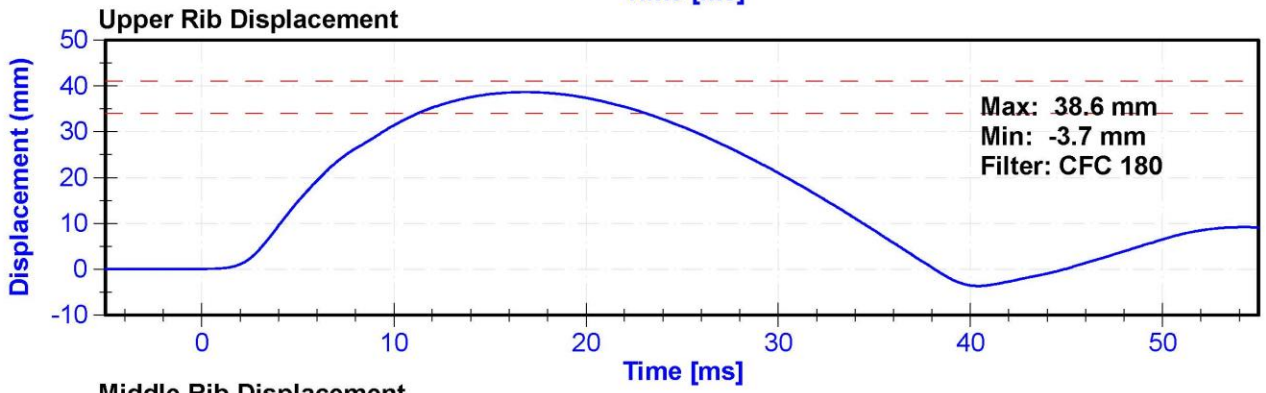
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	56.0	Pass
Velocity	5.4	5.6	m/s	5.48	Pass
Resistive Force after 6ms	5100	6200	N	5222.8	Pass
Upper Thorax Rib Deflection	34	41	mm	38.6	Pass
Mid Thorax Rib Deflection	37	45	mm	40.8	Pass
Lower Thorax Rib Deflection	37	44	mm	40.5	Pass

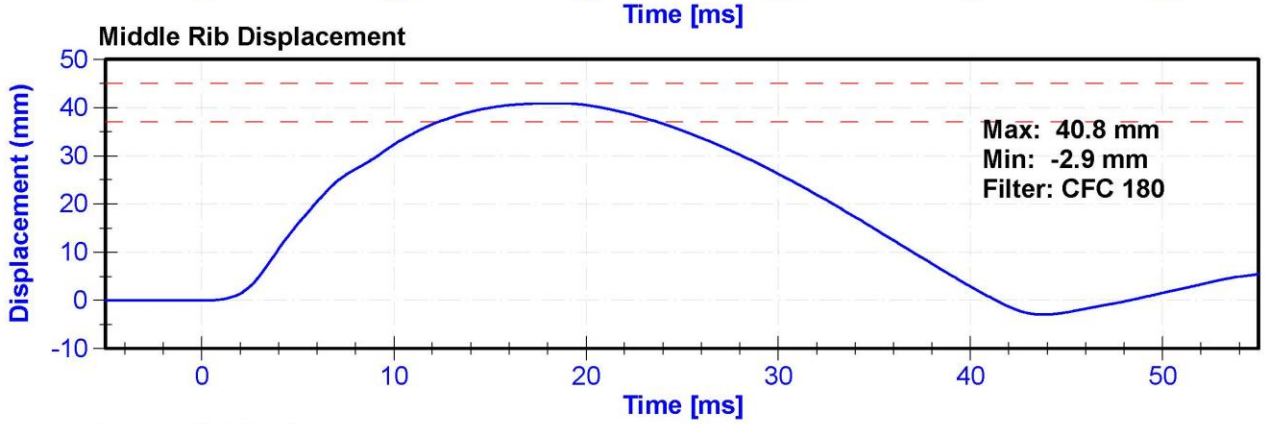
Transducer Calibrations

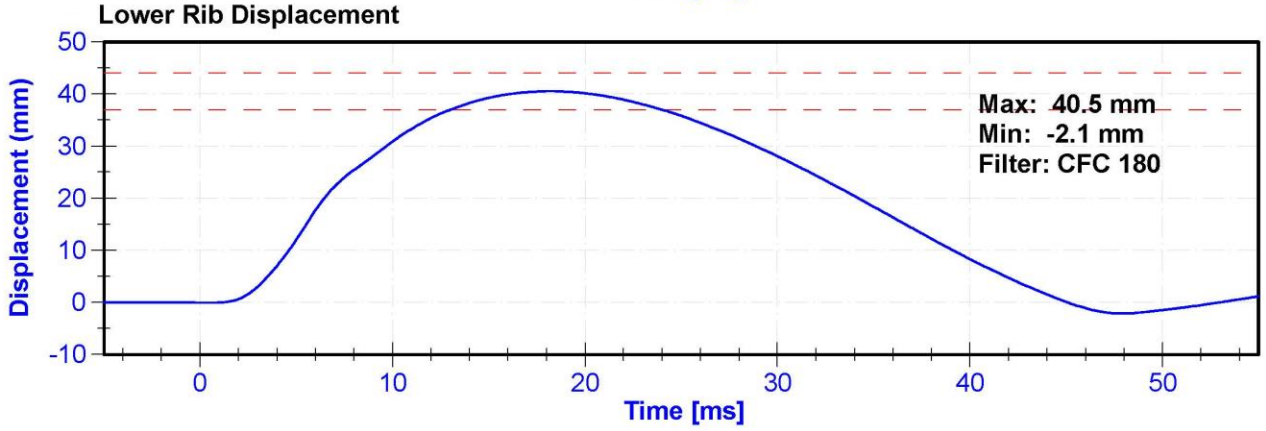
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51736	5/14/2021	5/14/2022
Upper Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-179GFE	6/17/2021	12/16/2021
Middle Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-185GFE	6/17/2021	12/16/2021
Lower Thorax Rib Potentiometer	Honeywell MLT-38000203	DS-178GFE	6/17/2021	12/16/2021




Resistive Force
Force (N)
Time [ms]
Max: 9772.9 N
Min: -32.3 N
Filter: CFC 180


Upper Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.6 mm
Min: -3.7 mm
Filter: CFC 180


Middle Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.8 mm
Min: -2.9 mm
Filter: CFC 180


Lower Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.5 mm
Min: -2.1 mm
Filter: CFC 180

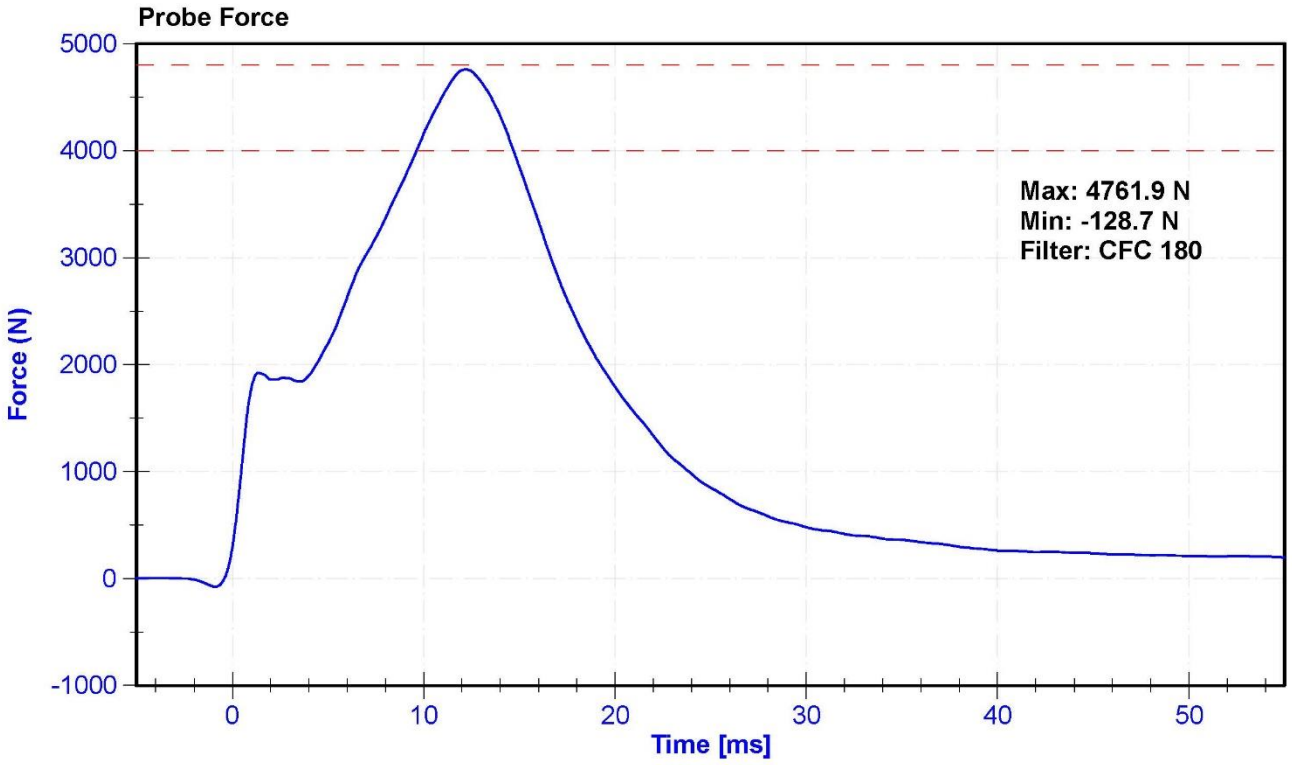
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	F033	Laboratory Supervisor	K.Brogan

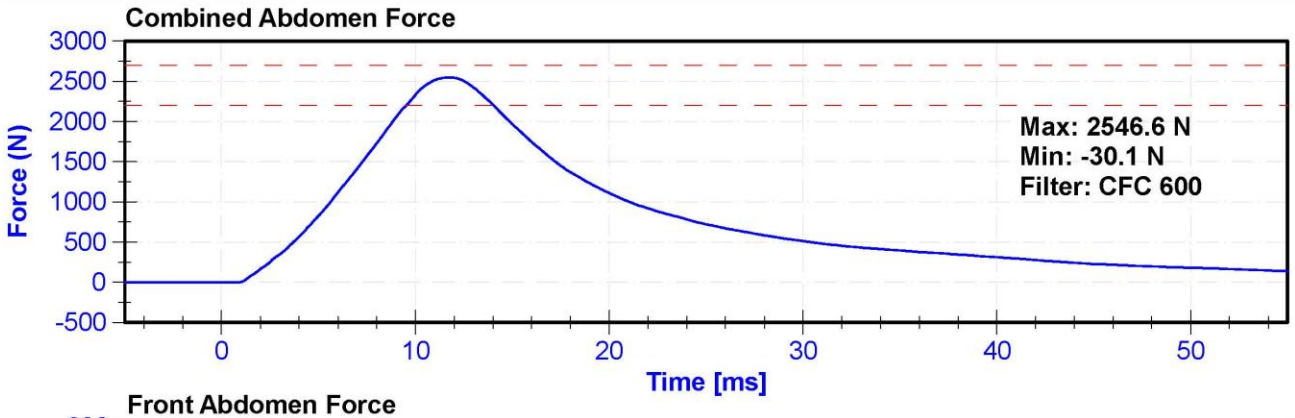
Results

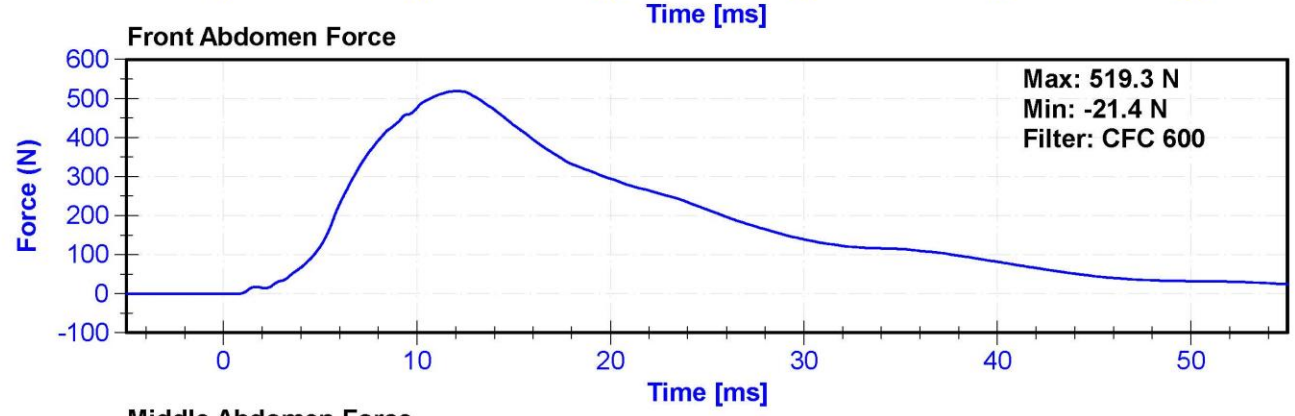
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	56	Pass
Velocity	3.9	4.1	m/s	4.10	Pass
Combined Abdomen Force	2200	2700	N	2546.6	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.75	Pass
Resistive Probe Force	4000	4800	N	4761.9	Pass
Time at Peak Resistive Force	10.6	13.0	ms	12.20	Pass

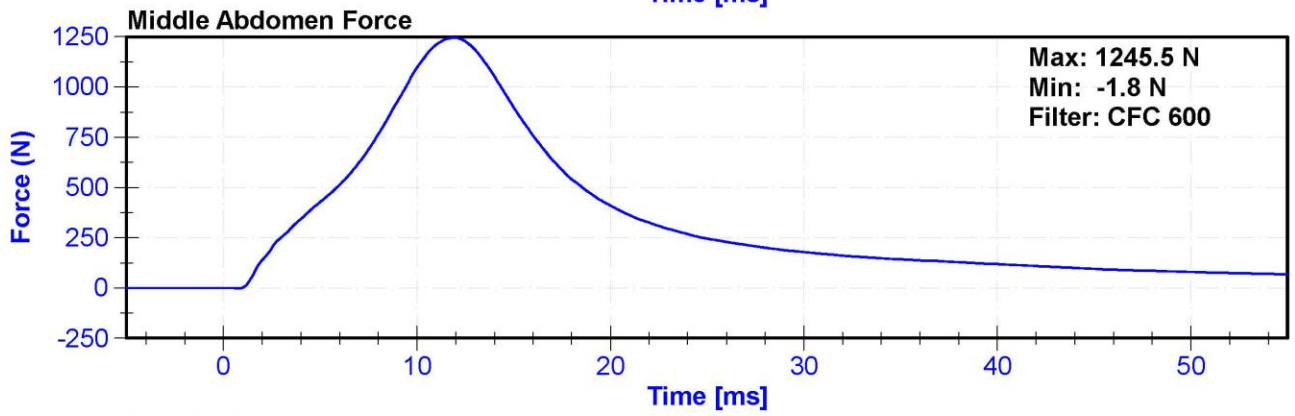
Transducer Calibrations

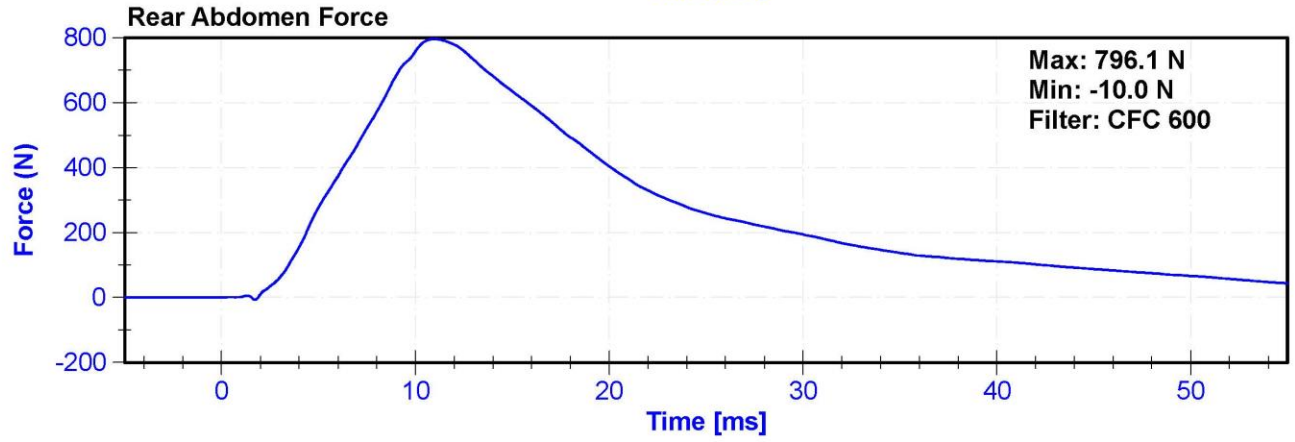
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51736	5/14/2021	5/14/2022
Front Abdomen Load Cell	FTSS 2631	LC-1509	11/10/2020	11/10/2021
Middle Abdomen Load Cell	DENTON 2631	LC-1508	11/10/2020	11/10/2021
Rear Abdomen Load Cell	FTSS 2631	LC-1507	11/10/2020	11/10/2021




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2546.6 N
Min: -30.1 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 519.3 N
Min: -21.4 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1245.5 N
Min: -1.8 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 796.1 N
Min: -10.0 N
Filter: CFC 600

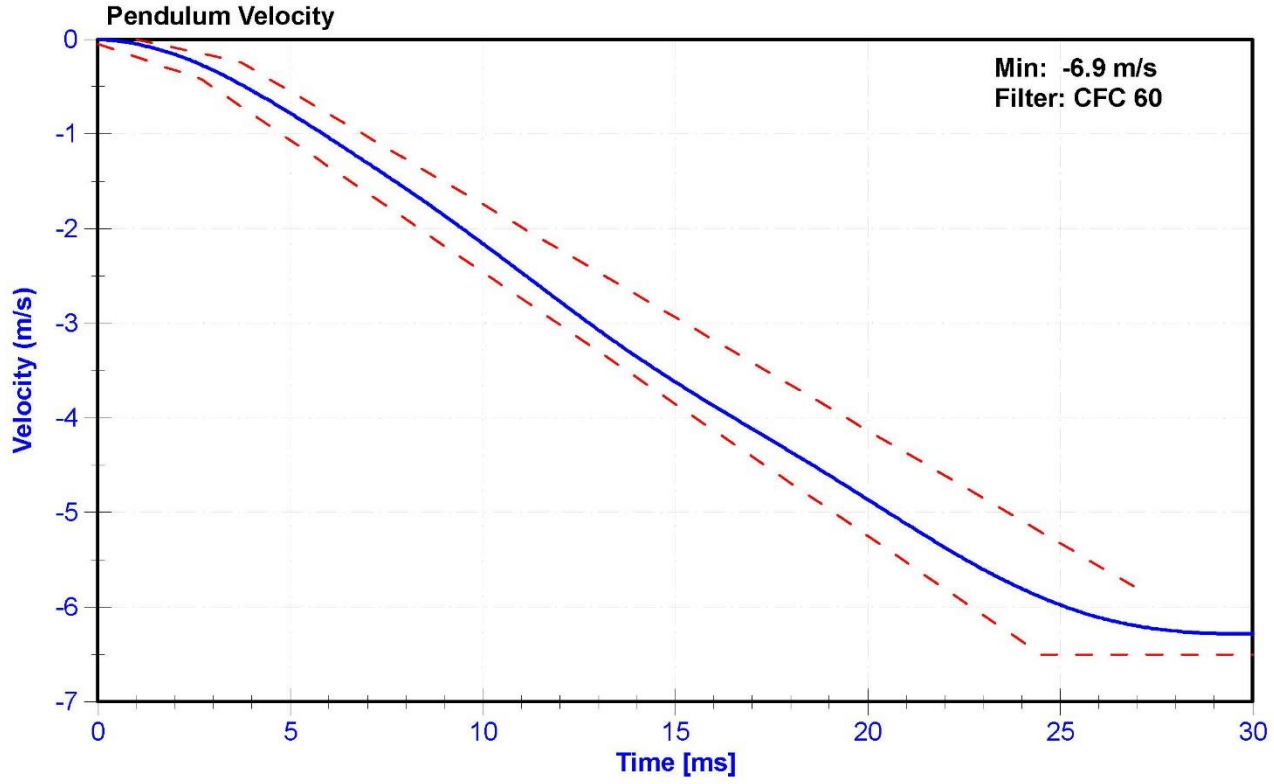
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

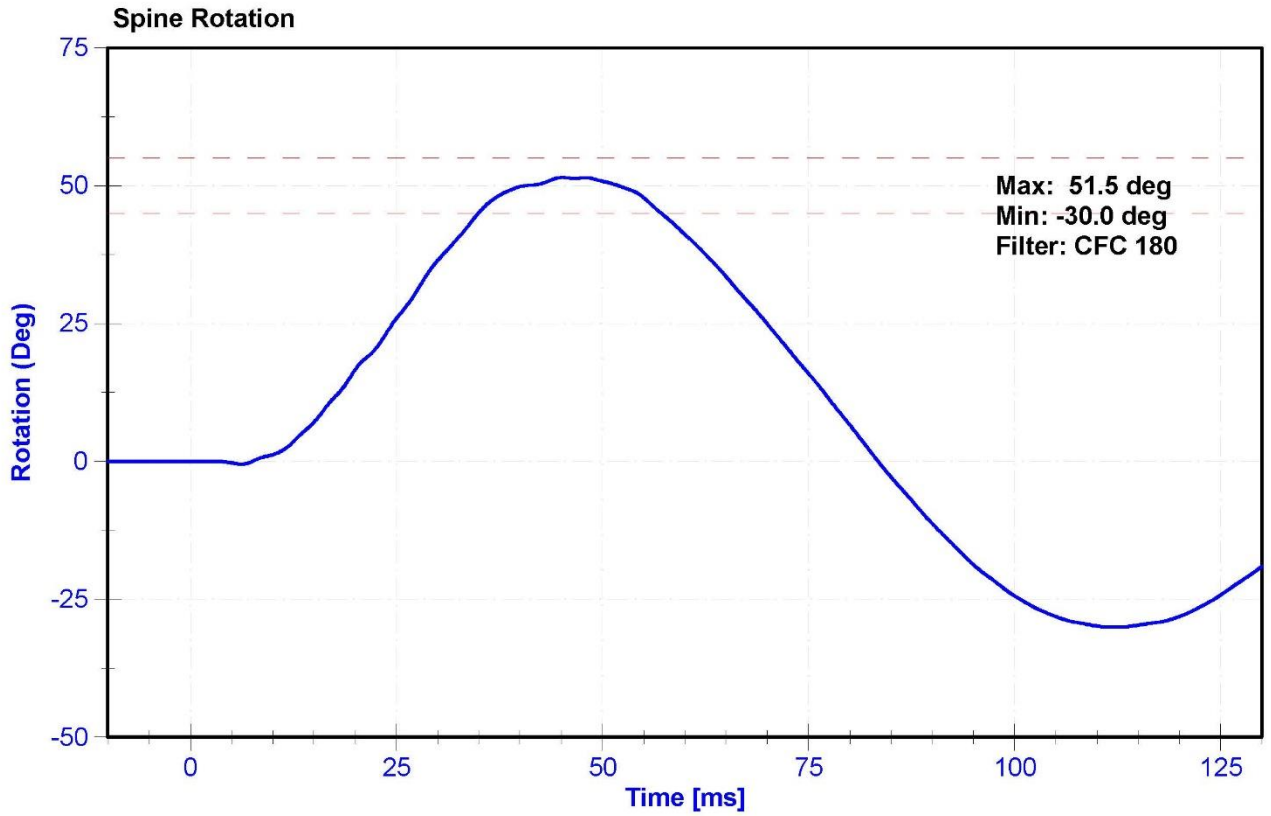
Results

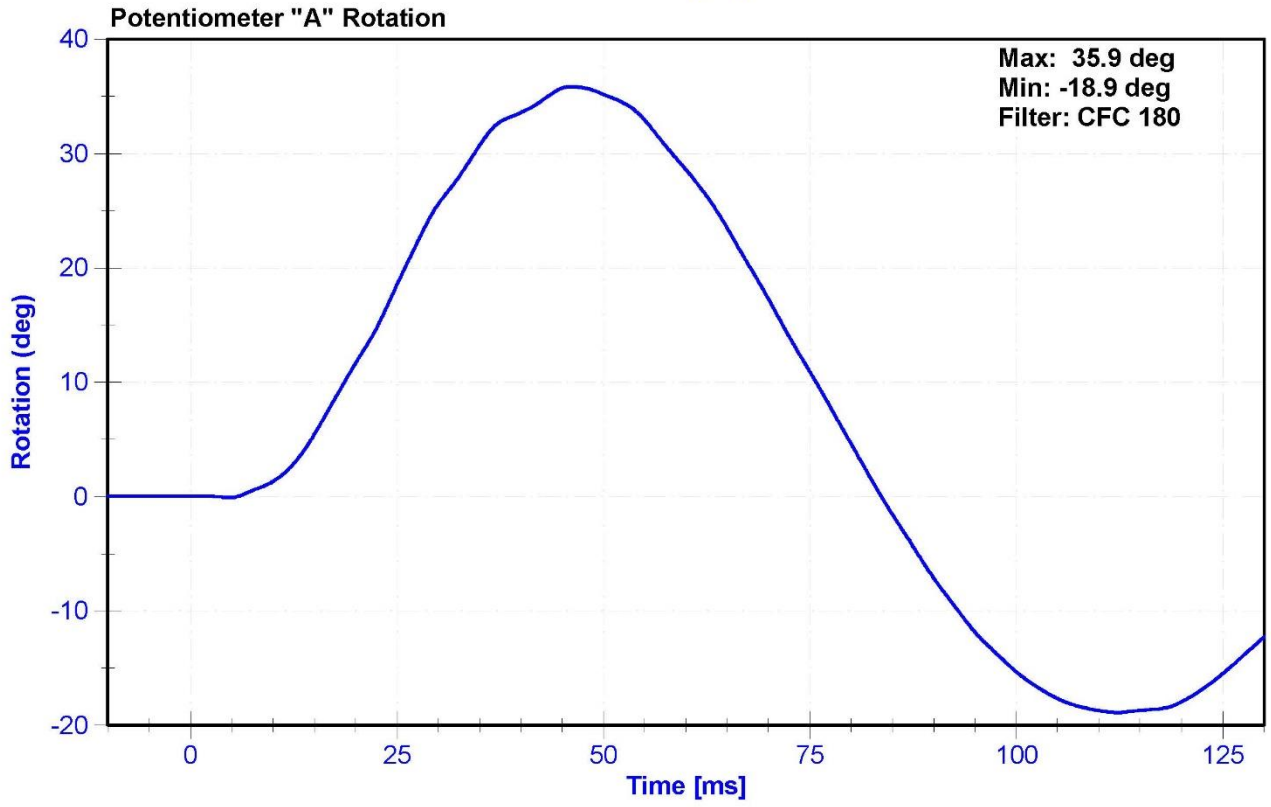
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	58.6	Pass
Velocity	5.95	6.15	m/s	5.995	Pass
Lateral Spine Rotation	45	55	deg	51.5	Pass
Time at Maximum Rotation	39	53	ms	45.1	Pass
Time of Decay to Zero Degrees	37	57	ms	38.3	Pass

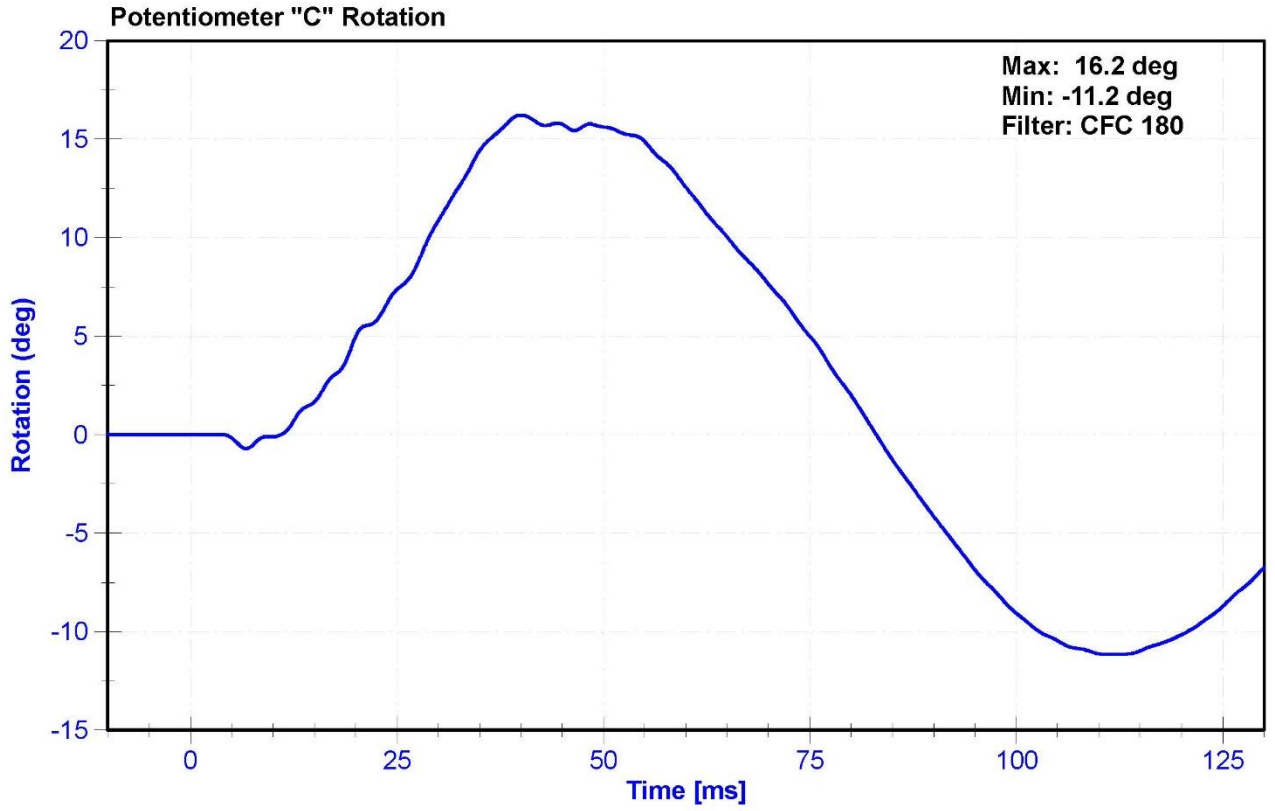
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum "A" Potentiometer	SP22G	DS-094	8/18/2020	8/18/2021
Condyle "B" Potentiometer	SP22G	DS-095	8/18/2020	8/18/2021




Spine Rotation
Max: 51.5 deg
Min: -30.0 deg
Filter: CFC 180
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 35.9 deg
Min: -18.9 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]


Potentiometer "C" Rotation
Max: 16.2 deg
Min: -11.2 deg
Filter: CFC 180
Rotation (deg)
20
15
10
5
0
-5
-10
-15
0
25
50
75
100
125
Time [ms]

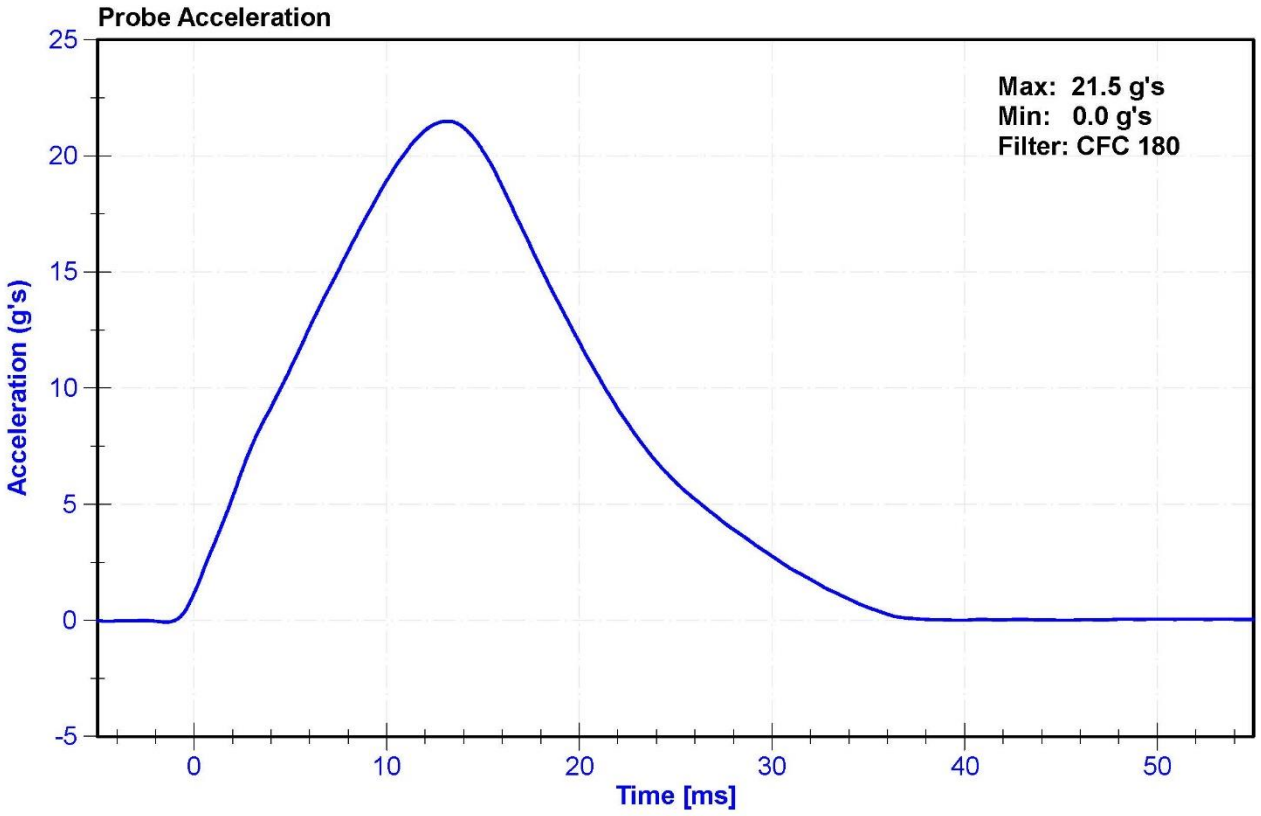
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

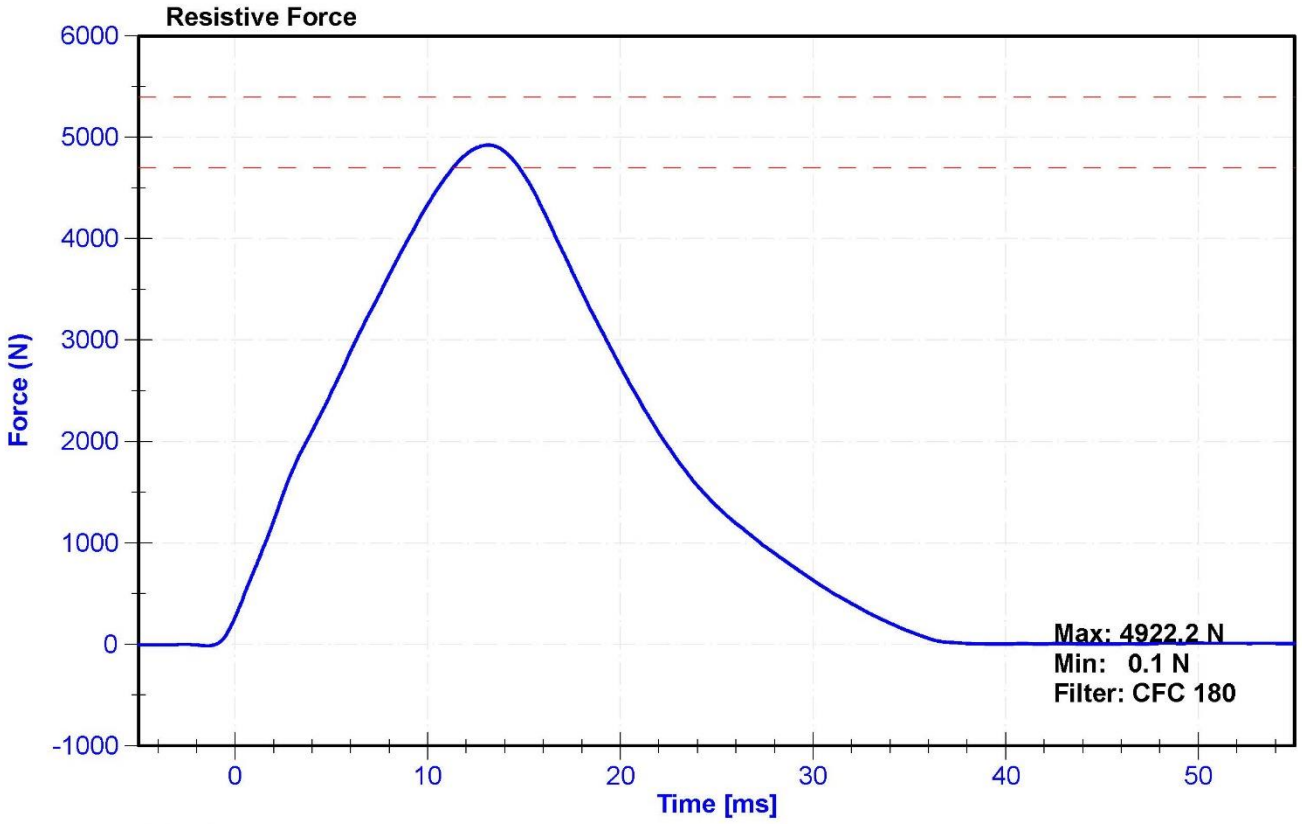
Results

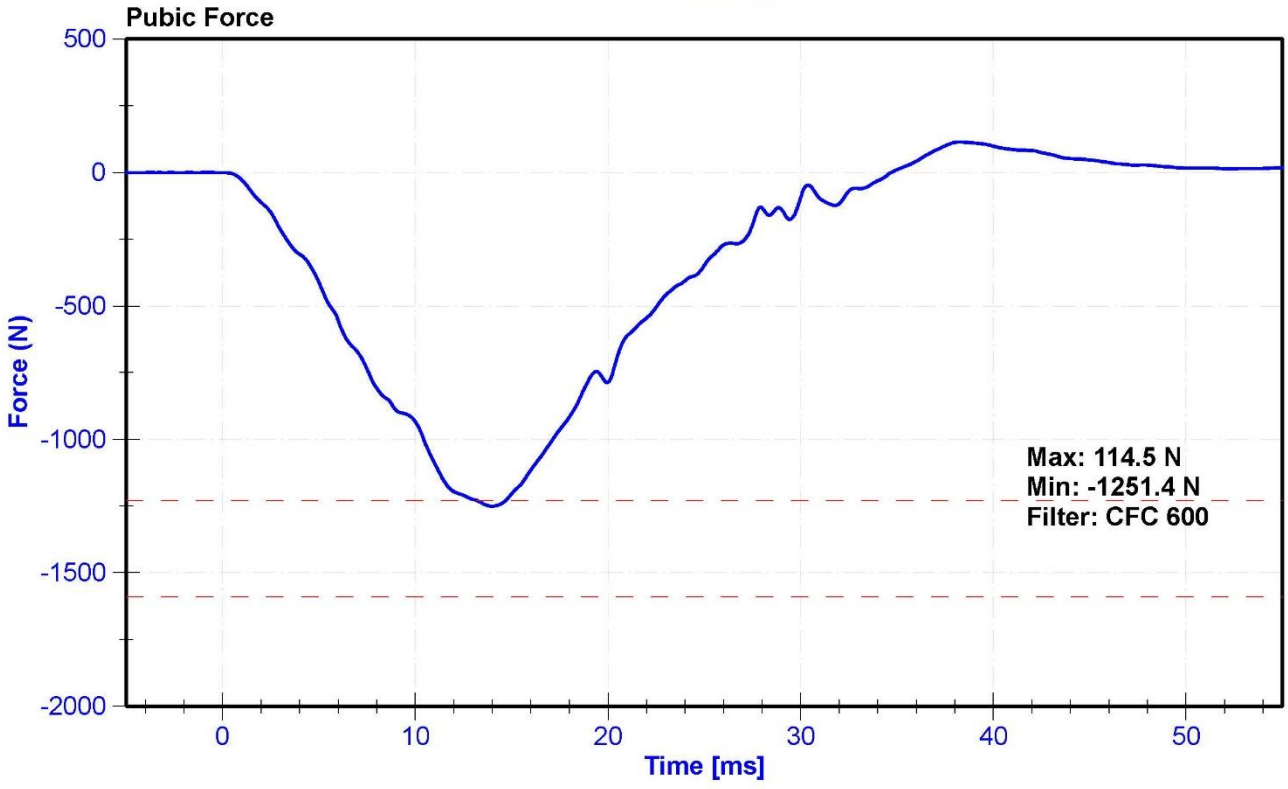
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	56.0	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Resistive Force	4700	5400	N	4922.2	Pass
Time at Peak Resistive Force	11.8	16.1	ms	13.15	Pass
Pubic Force	-1590	-1230	N	-1251.4	Pass
Time at Peak Pubic Force	12.2	17.0	ms	14.00	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51736	5/14/2021	5/14/2022
Pubic Load Cell	FTSS 3096	LC-458	11/10/2020	11/10/2021




Resistive Force
6000
5000
4000
3000
2000
1000
0
-1000
Force (N)
0
10
20
30
40
50
Time [ms]
Max: 4922.2 N
Min: 0.1 N
Filter: CFC 180


Pubic Force
500
0
-500
-1000
-1500
-2000
Force (N)
0
10
20
30
40
50
Time [ms]
Max: 114.5 N
Min: -1251.4 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

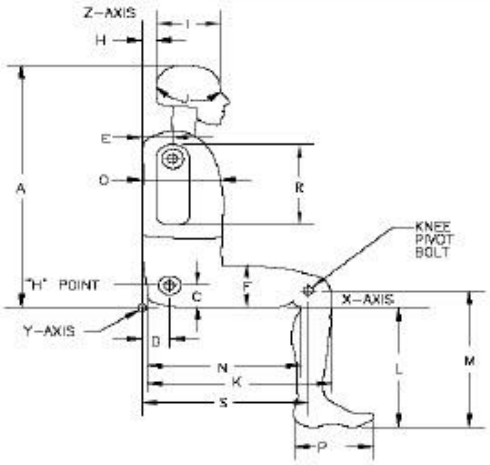
SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD

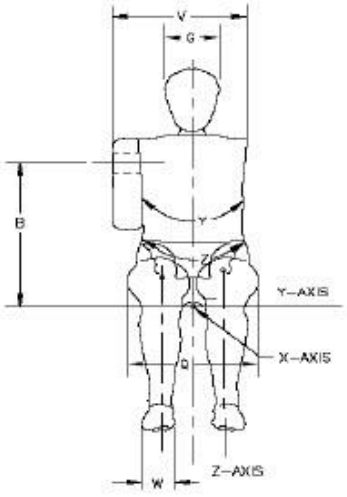
SERIAL No: 300

External Measurements - SID-IIs

Technician: J.Pericak Date: 7/7/2021

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	785	Pass
B	Shoulder Pivot Height	437	453	448	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	103	Pass
F	Thigh Clearance	119	135	123	Pass
G	Head Breadth	140	148	146	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	185	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	531	Pass
L	Popliteal Height	343	369	362	Pass
M	Knee Pivot to floor height	392	409	402	Pass
N	Buttock Popliteal Length	416	442	431	Pass
O	Chest Depth w/o jacket	195	211	203	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	318	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	487	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	84	Pass
Y	Chest Circumference w/jacket	851	881	879	Pass
Z	Waist Circumference	761	791	772	Pass

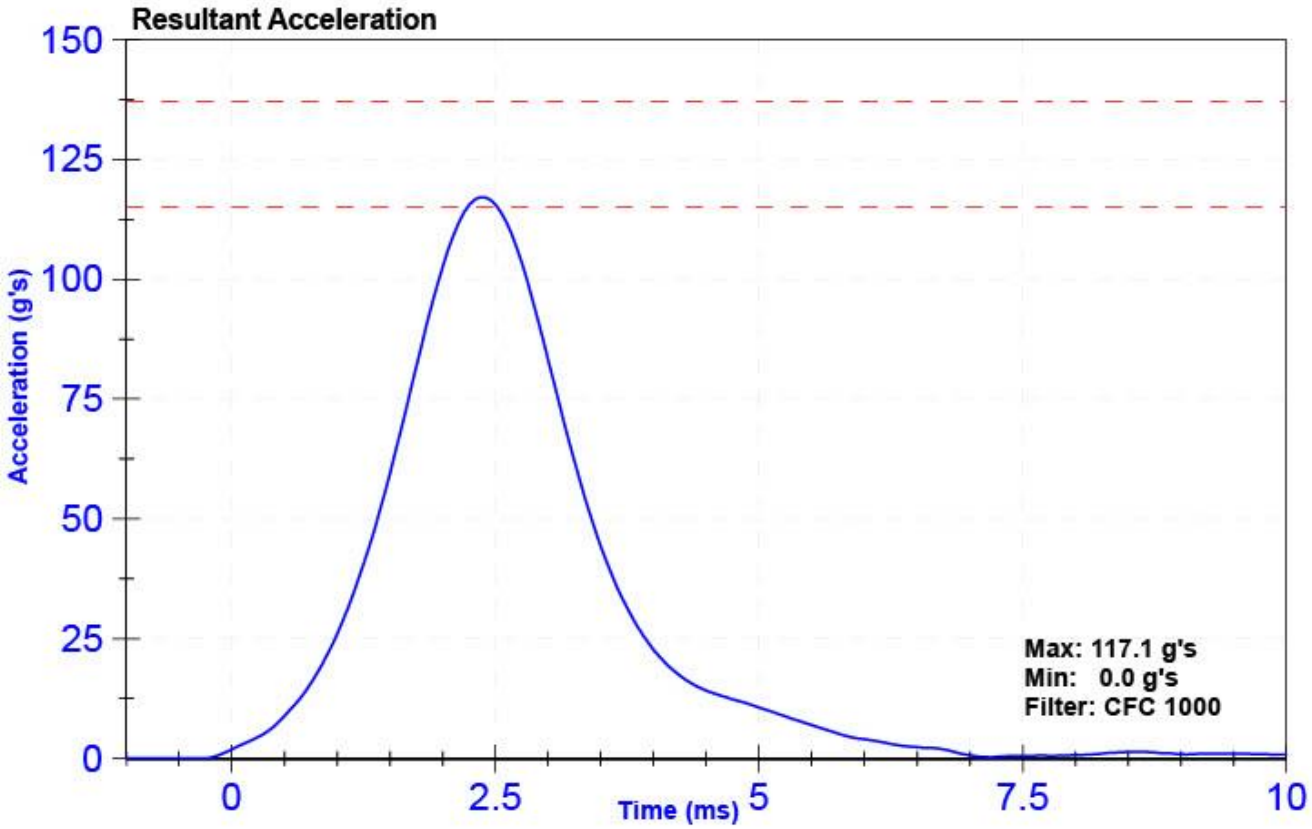
ATD Manufacturer	FTSS	Test Technician	E. Helenbrook
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

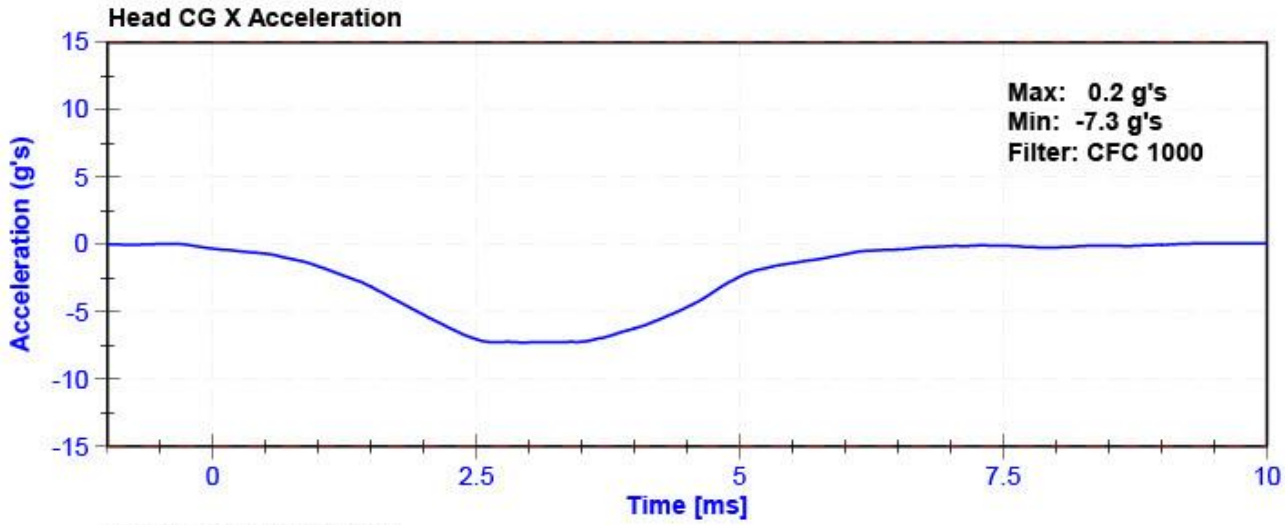
Results

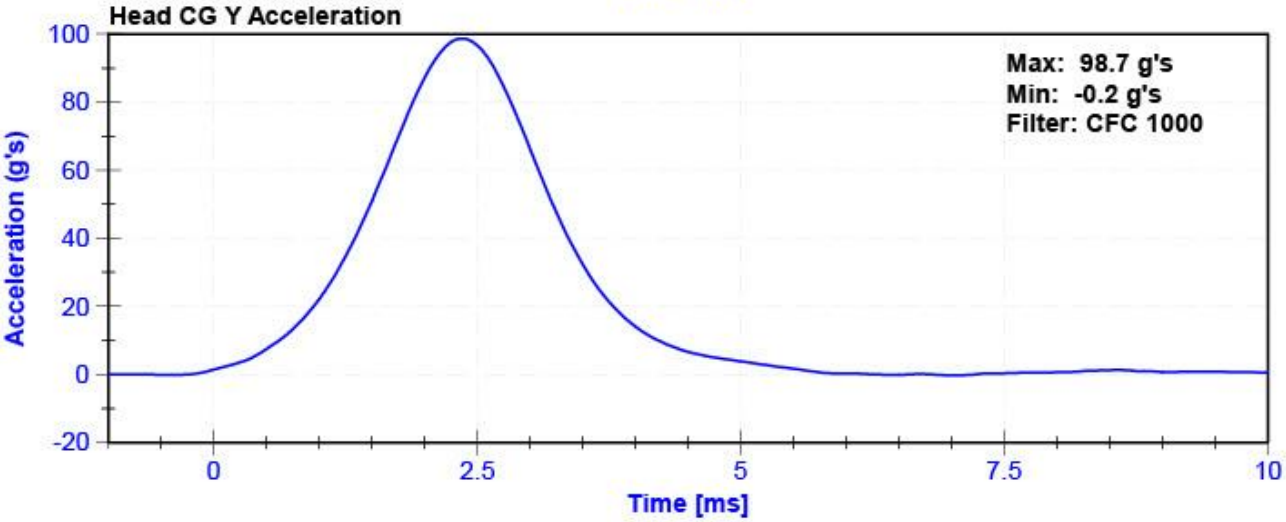
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	63.2	Pass
Resultant Acceleration	115	137	g's	117.1	Pass
Oscillation	0	15	%	1.2	Pass
Fore-Aft Acceleration	-15	15	g's	-7.3	Pass

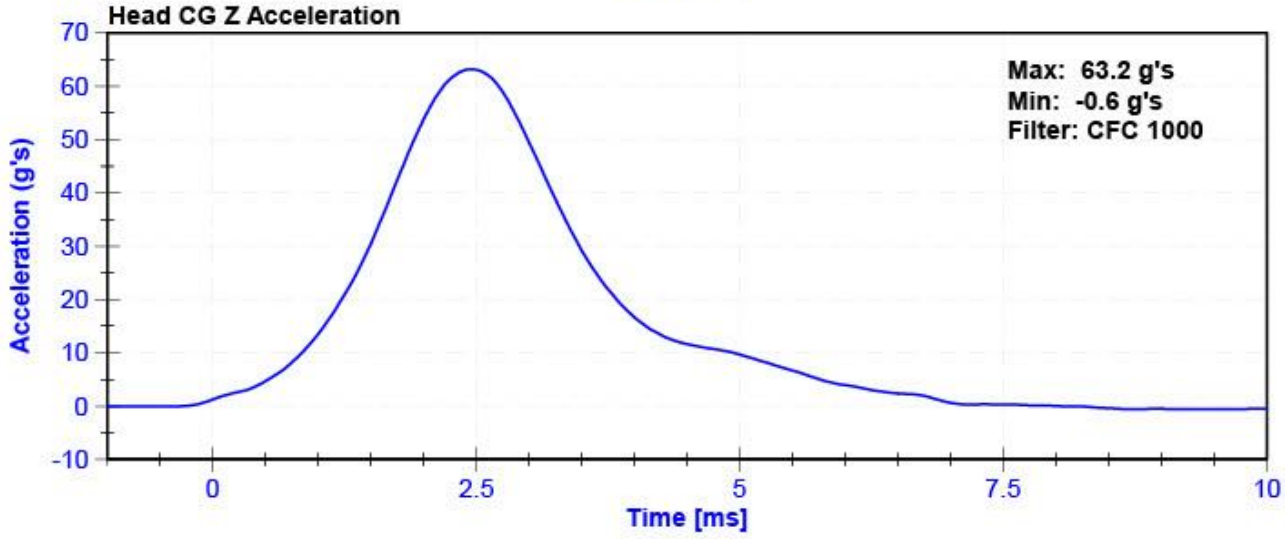
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P59018	5/11/2021	11/9/2021
Y Accelerometer	ENDEVCO 7264	AC-P79189	5/11/2021	11/9/2021
Z Accelerometer	ENDEVCO 7264CT	AC-P58777	5/11/2021	11/9/2021




Head CG X Acceleration
Max: 0.2 g's
Min: -7.3 g's
Filter: CFC 1000
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]


Head CG Y Acceleration
Max: 98.7 g's
Min: -0.2 g's
Filter: CFC 1000
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 63.2 g's
Min: -0.6 g's
Filter: CFC 1000
Acceleration (g's)
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]

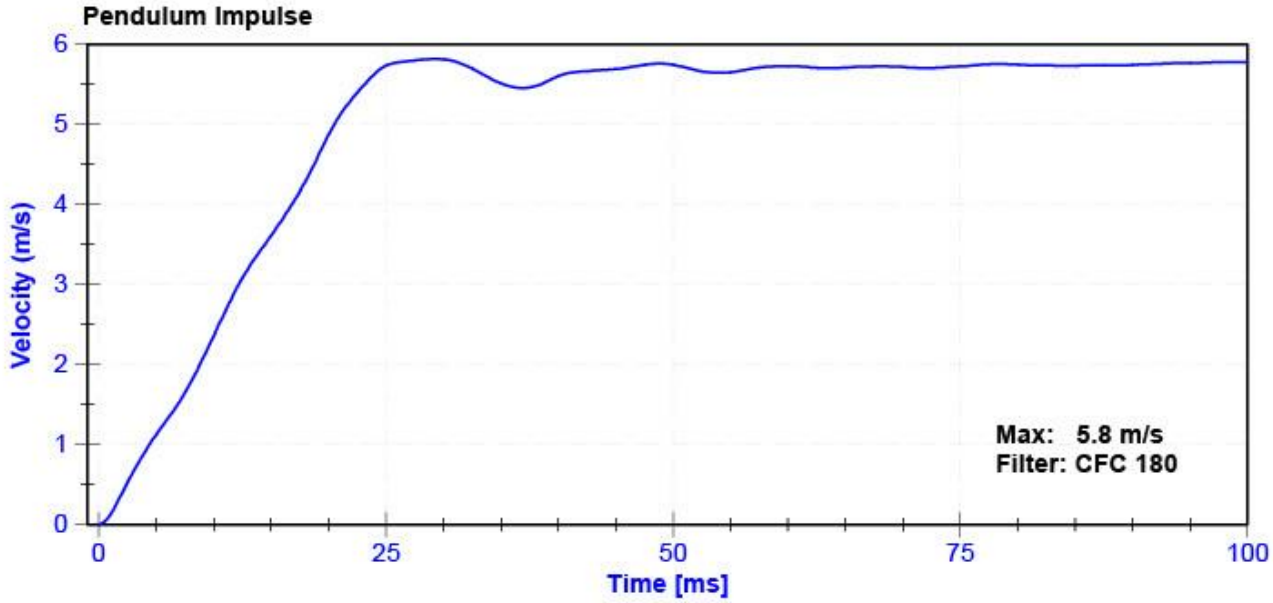
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

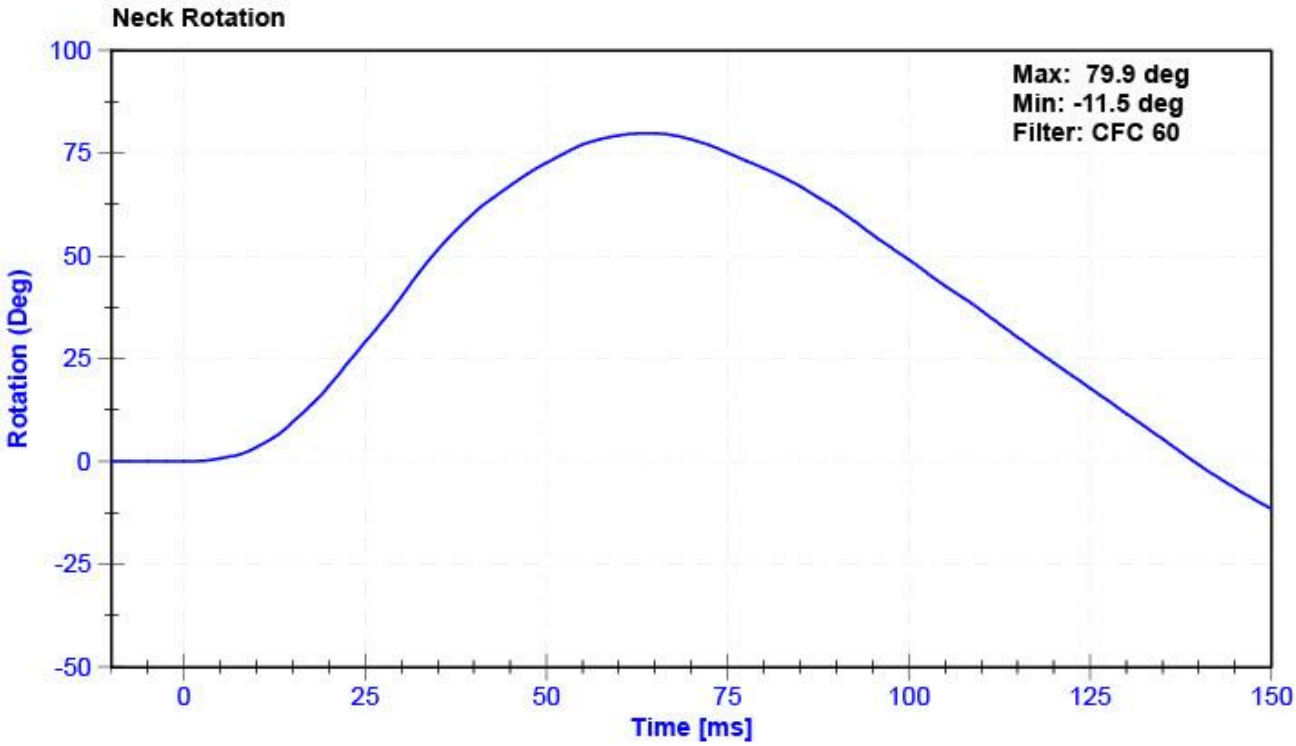
Results

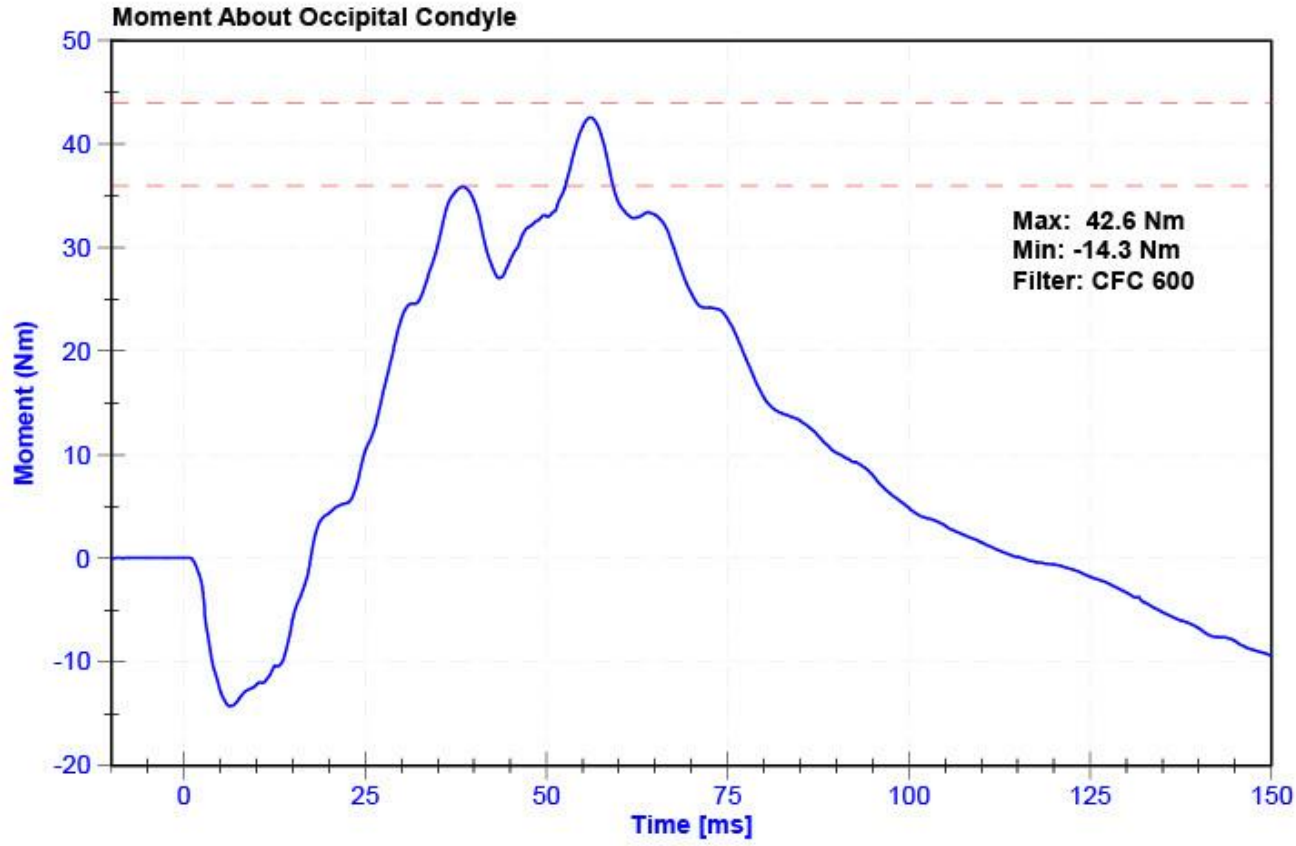
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	32	Pass
Velocity	5.51	5.63	m/s	5.552	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.36	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.61	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.87	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.73	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.81	Pass
Neck Rotation	71	81	deg	79.9	Pass
Time at Maximum Rotation	50	70	ms	63.9	Pass
Moment about the OC	36	44	Nm	42.6	Pass
Moment Decay to 0 Nm	102	126	ms	115.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-C16503 Striker	2/5/2021	2/5/2022
Pendulum Potentiometer	Denton 78051-342	DS-366-Rotary	7/12/2021	7/12/2022
Condyle Potentiometer	Denton 78051-342	DS-185Pend	11/6/2020	11/6/2021
Upper Neck Load Cell	Denton 1716AJ	17162187-FY	8/12/2020	8/12/2021




Neck Rotation
Max: 79.9 deg
Min: -11.5 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 42.6 Nm
Min: -14.3 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

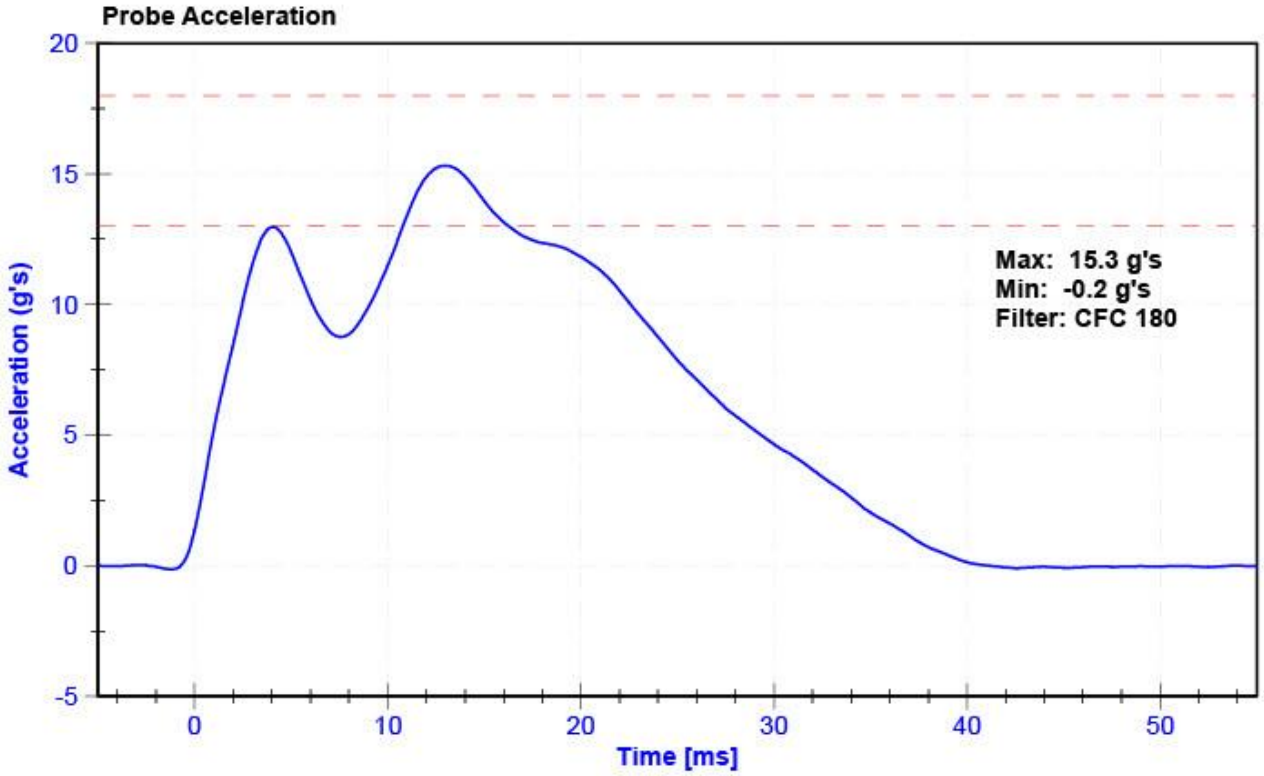
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

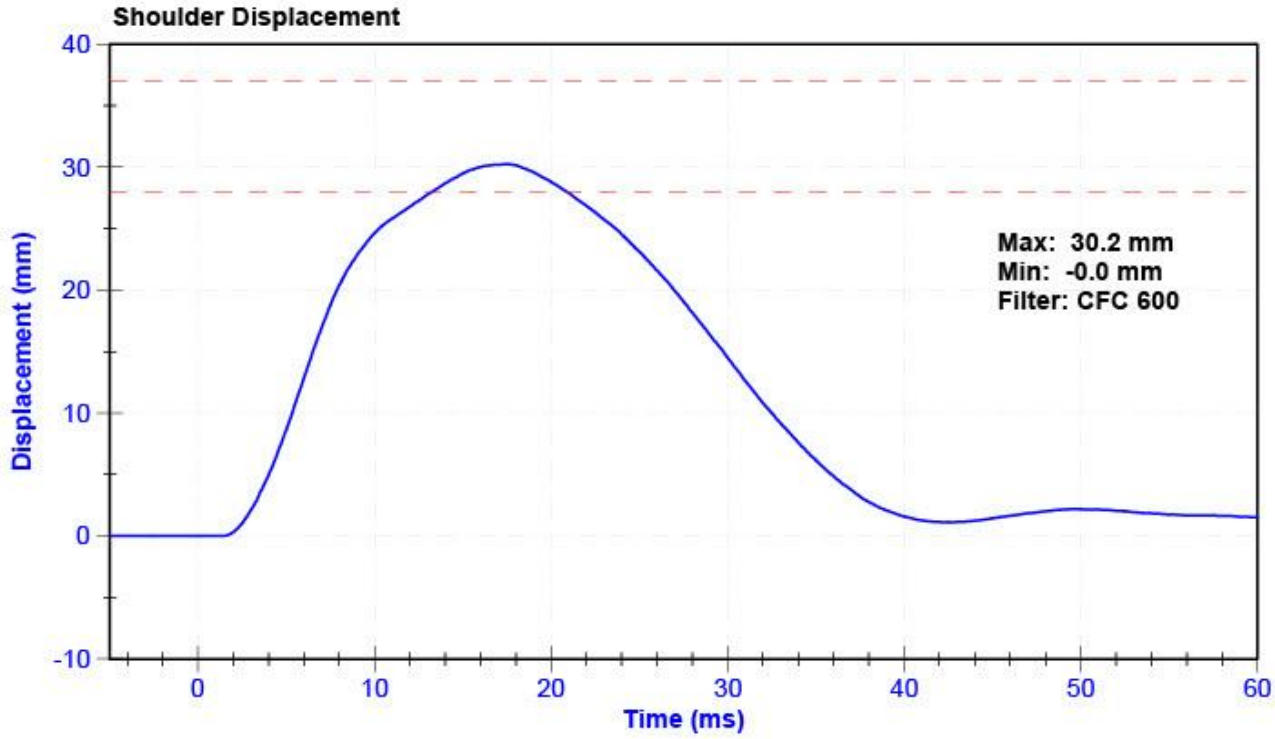
Results

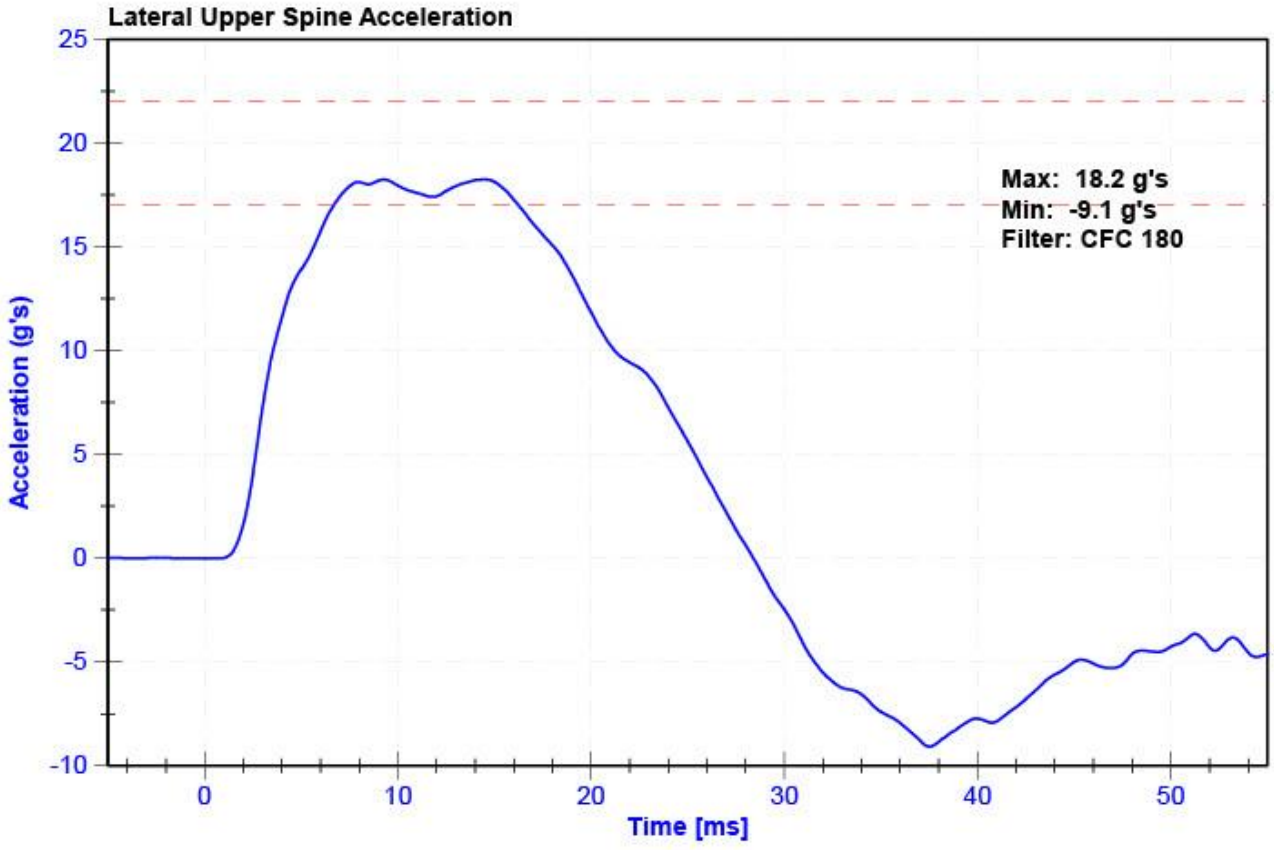
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	58	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	13	18	g's	15.3	Pass
Shoulder Deflection	28	37	mm	30.2	Pass
Lateral Upper Spine Acceleration	17	22	g's	18.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	5/12/2021	11/10/2021
Upper Spine Y Accelerometer	Endevco 7264C-2KTZ-2-240	T20880	5/13/2021	11/11/2021




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 30.2 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 18.2 g's
Min: -9.1 g's
Filter: CFC 180

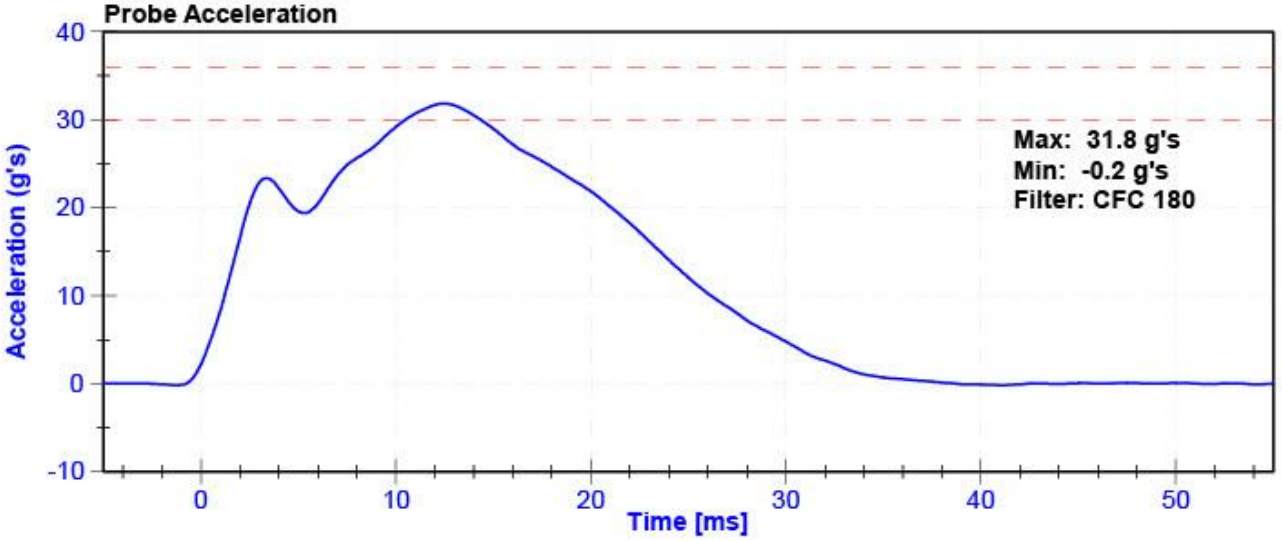
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

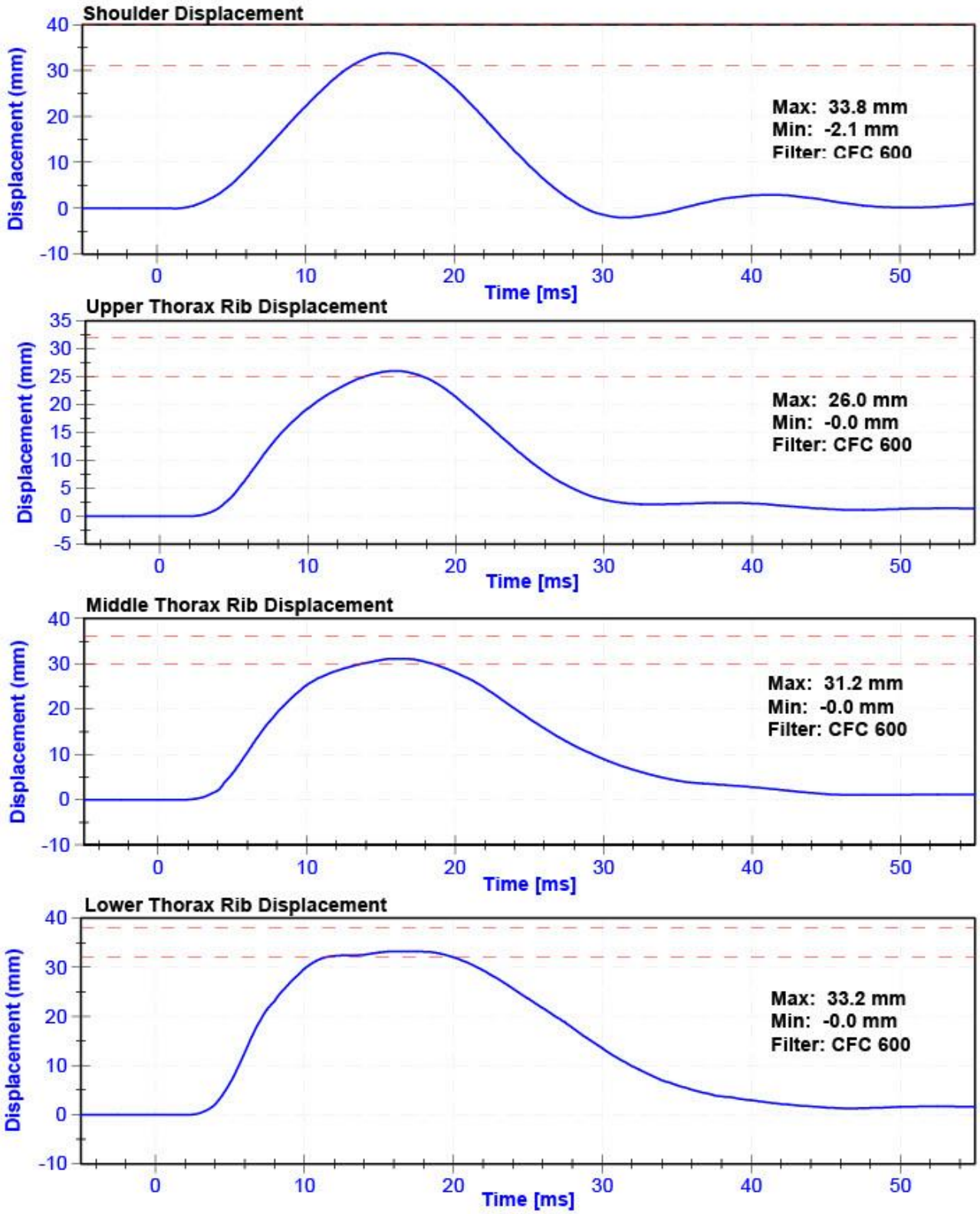
Results

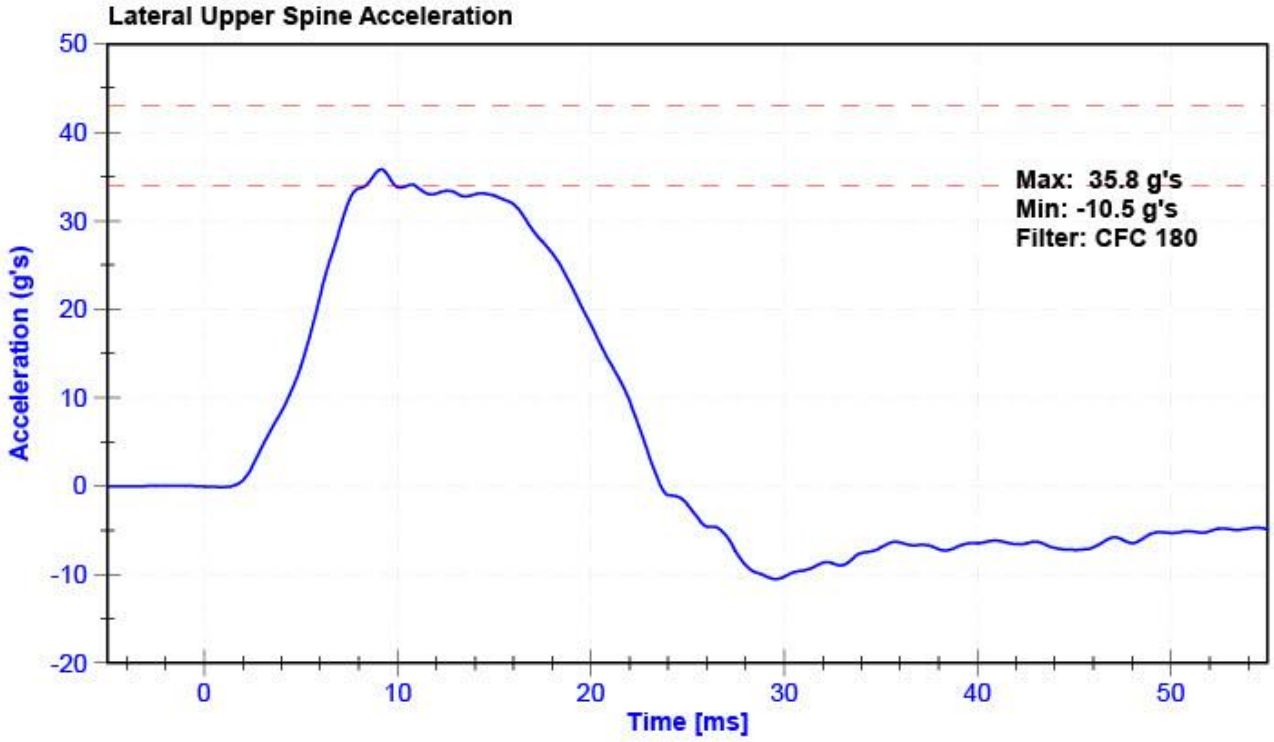
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	58.0	Pass
Velocity	6.6	6.8	m/s	6.73	Pass
Probe Acceleration after 5 ms	30	36	g's	31.8	Pass
Lateral Upper Spine Acceleration	34	43	g's	35.8	Pass
Lateral Lower Spine Acceleration	29	37	g's	30.0	Pass
Shoulder Deflection	31	40	mm	33.8	Pass
Upper Thorax Rib Deflection	25	32	mm	26.0	Pass
Mid Thorax Rib Deflection	30	36	mm	31.2	Pass
Lower Thorax Rib Deflection	32	38	mm	33.2	Pass

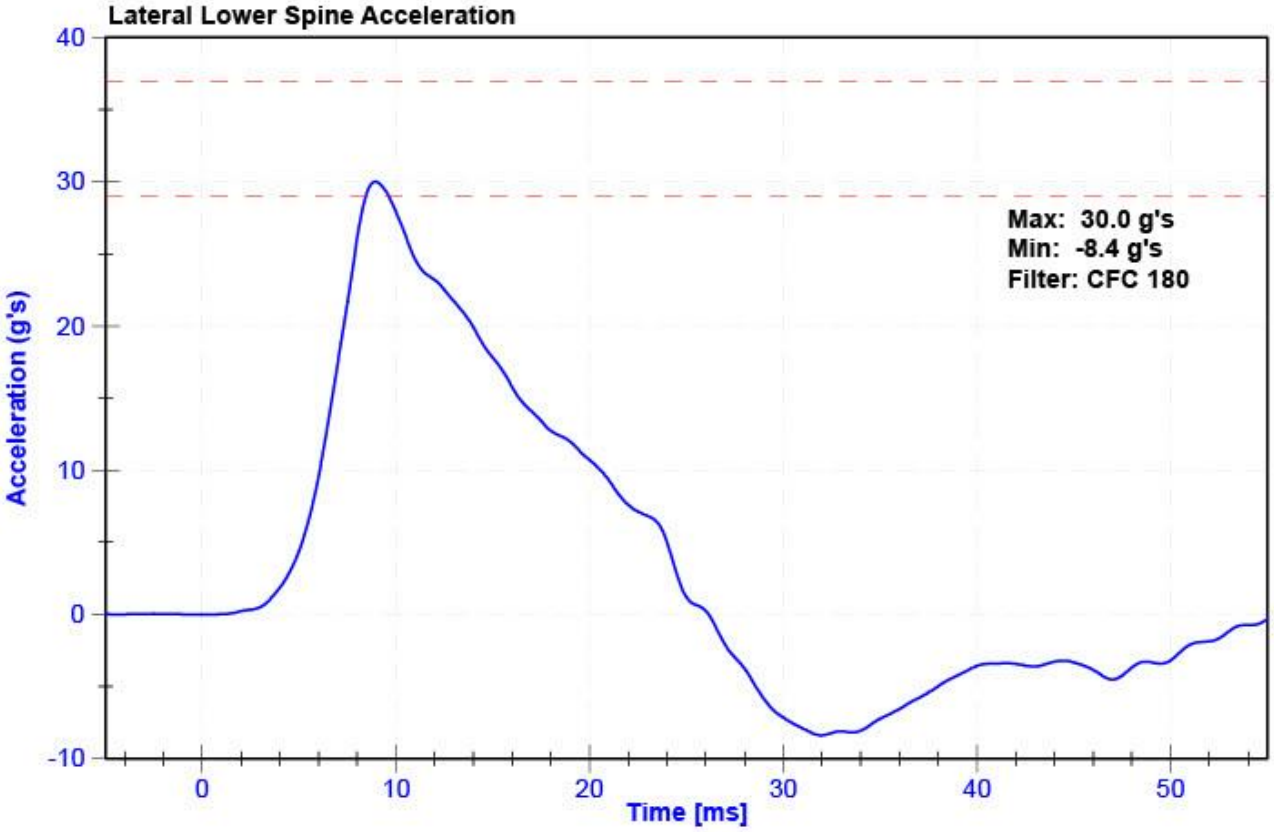
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Upper Spine T1 Y Accelerometer	Endevco 7264C-2KTZ-2-240	T20880	5/13/2021	11/11/2021
Upper Spine T12 Y Accelerometer	Endevco 7264C-2KTZ-2-240	P52071	5/24/2021	11/22/2021
Shoulder Potentiometer	Servo 08CT1-3725	DS-053 GFE	5/12/2021	11/10/2021
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	5/12/2021	11/10/2021
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	5/12/2021	11/10/2021
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	5/12/2021	11/10/2021




Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 33.8 mm
Min: -2.1 mm
Filter: CFC 600
Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.0 mm
Min: -0.0 mm
Filter: CFC 600
Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 31.2 mm
Min: -0.0 mm
Filter: CFC 600
Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.2 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Max: 35.8 g's
Min: -10.5 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Lateral Lower Spine Acceleration
Max: 30.0 g's
Min: -8.4 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50

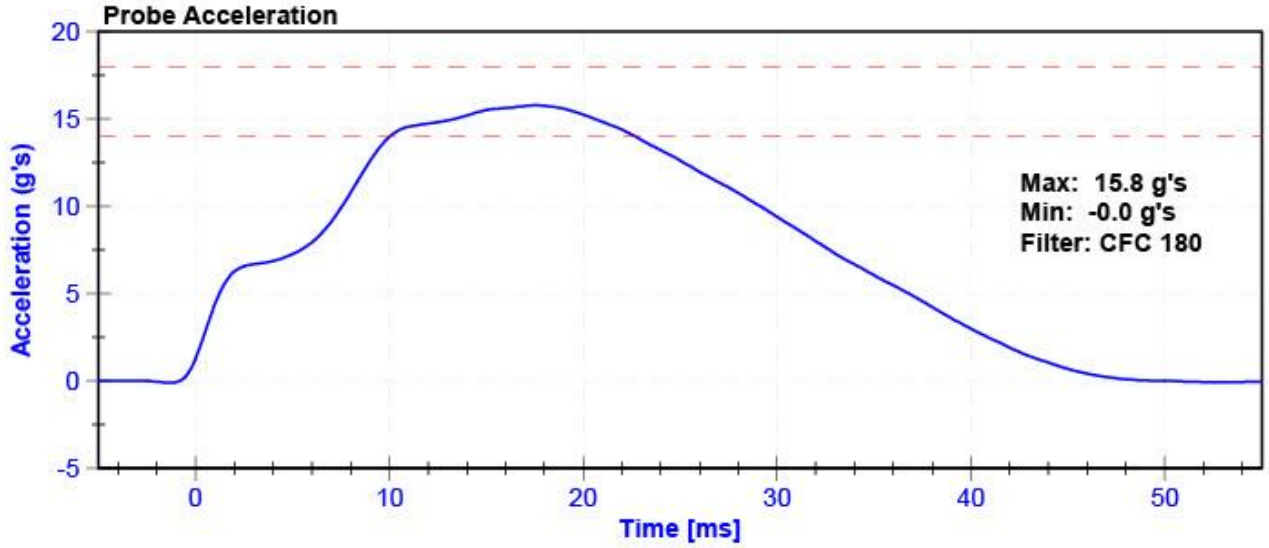
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

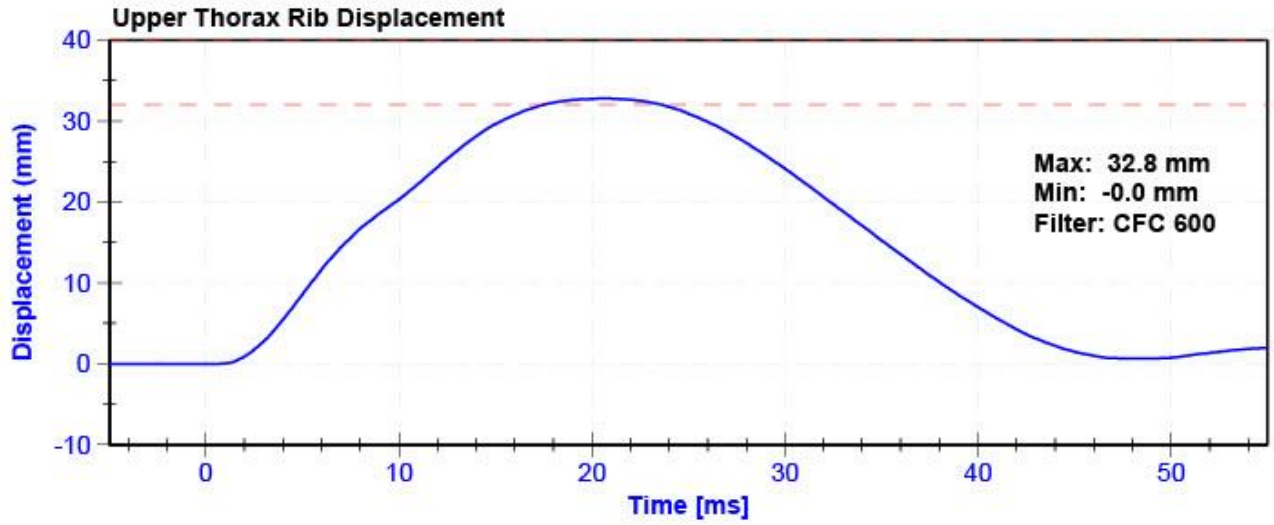
Results

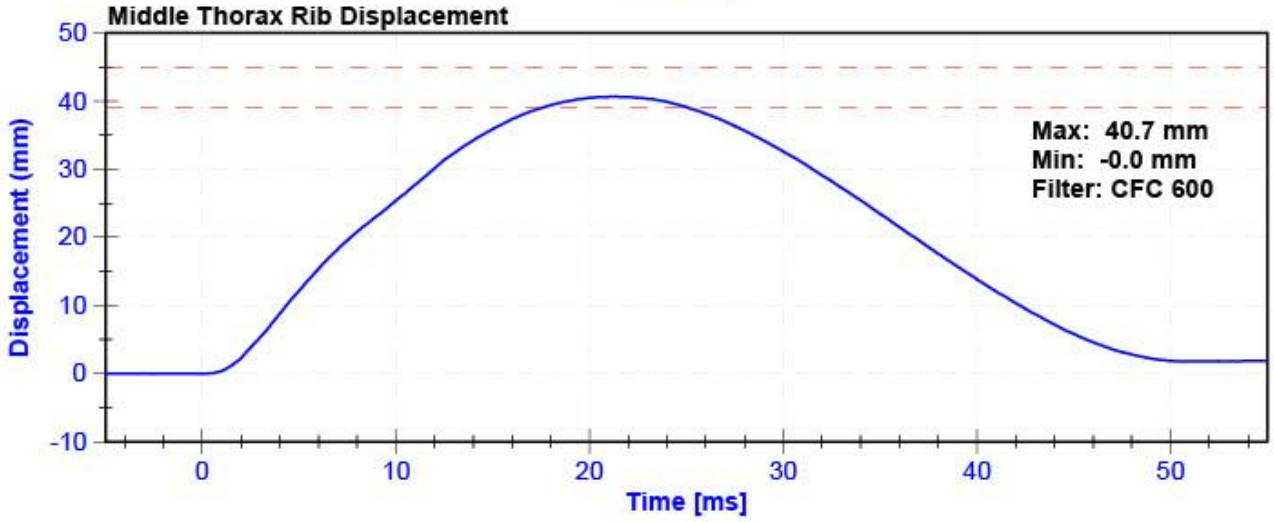
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	58	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Probe Acceleration	14	18	g's	15.8	Pass
Lateral Upper Spine Acceleration	13	17	g's	13.9	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.5	Pass
Upper Thorax Rib Deflection	32	40	mm	32.8	Pass
Middle Thorax Rib Deflection	39	45	mm	40.7	Pass
Lower Thorax Rib Deflection	35	43	mm	39.3	Pass

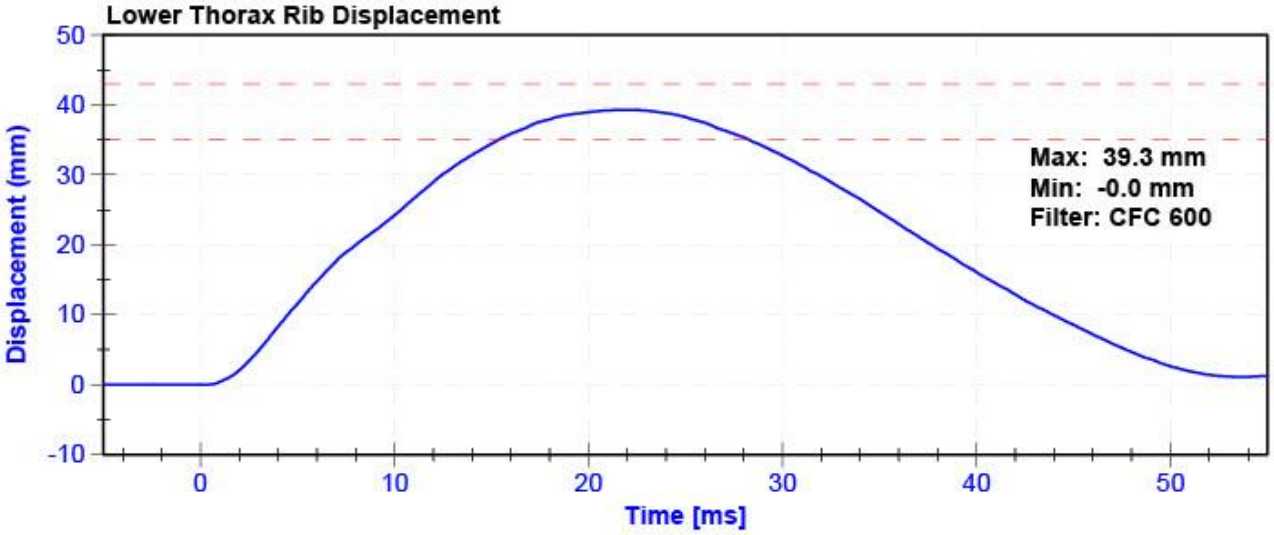
Transducer Calibrations

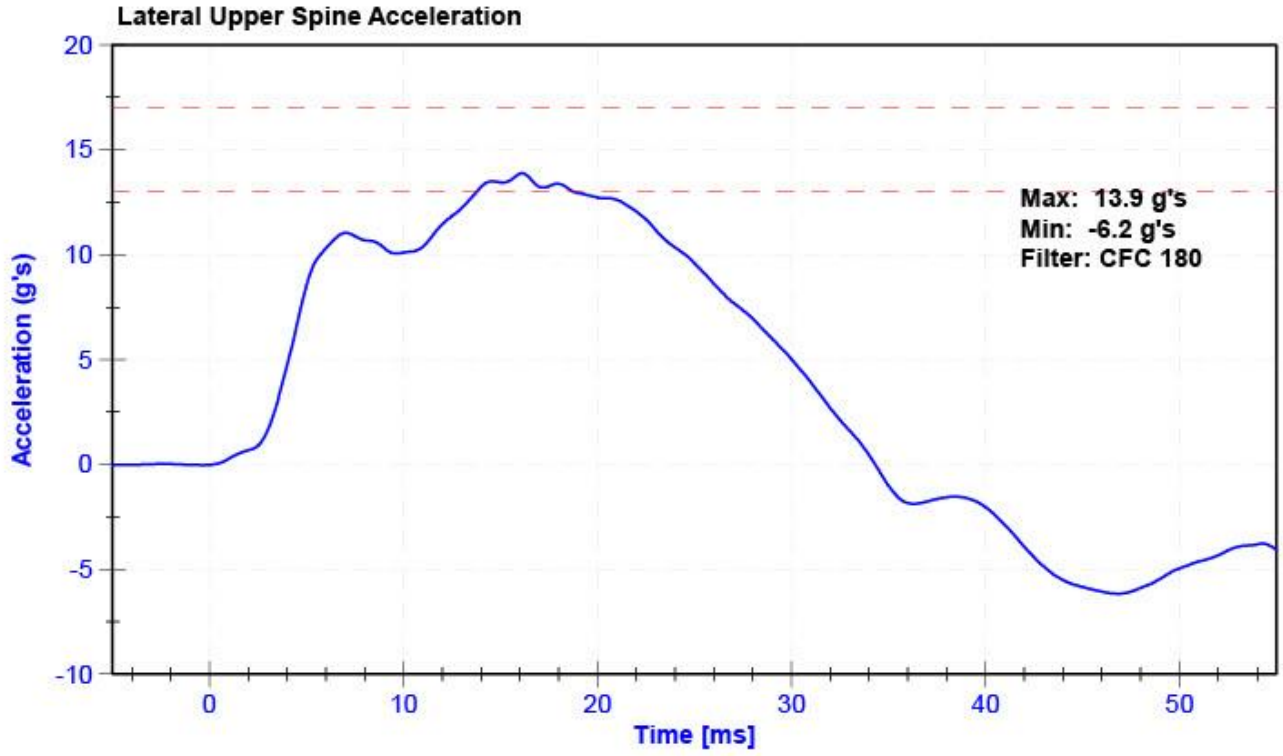
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Upper Spine Y Accelerometer	Endevco 7264C-2KTZ-2-240	T20880	5/13/2021	11/11/2021
Lower Spine Y Accelerometer	Endevco 7264C-2KTZ-2-240	P52071	5/24/2021	11/22/2021
Upper Thorax Rib Potentiometer	Servo 08CT1-3725	DS-451GFE	5/12/2021	11/10/2021
Middle Thorax Rib Potentiometer	Servo 08TC1-3745	DS-040GFE	5/12/2021	11/10/2021
Lower Thorax Rib Potentiometer	Servo 08TC1-3725	DS-1156GFE	5/12/2021	11/10/2021

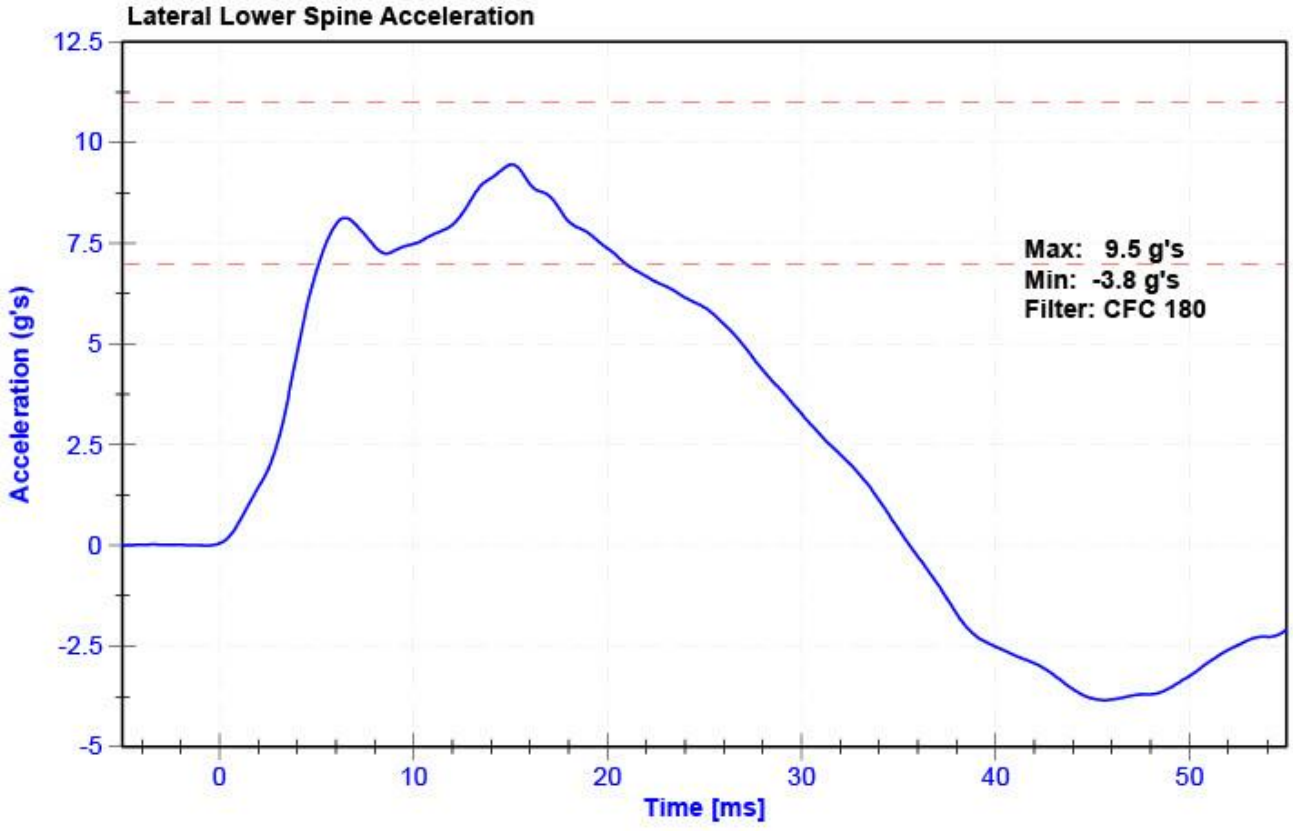



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.8 mm
Min: -0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.7 mm
Min: -0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.3 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 13.9 g's
Min: -6.2 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.5 g's
Min: -3.8 g's
Filter: CFC 180

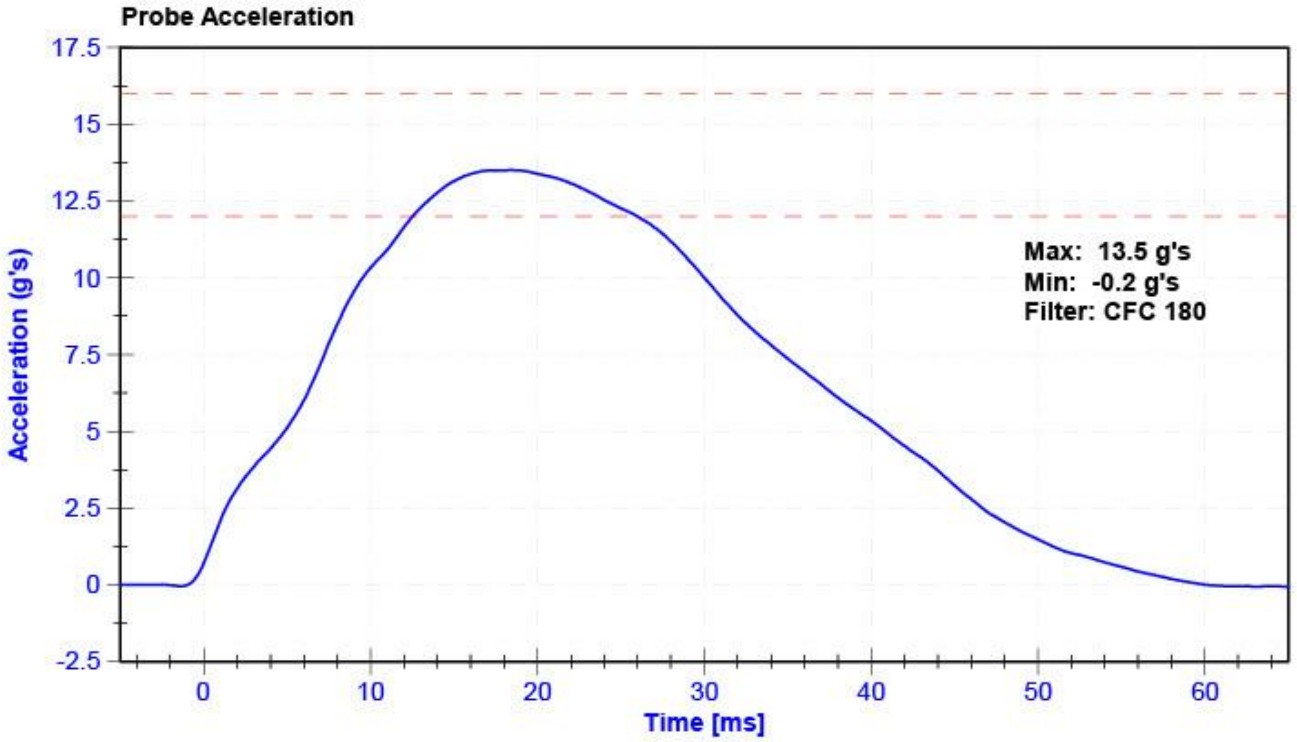
ATD Manufacturer	FTSS	Test Technician	M. Dudek
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

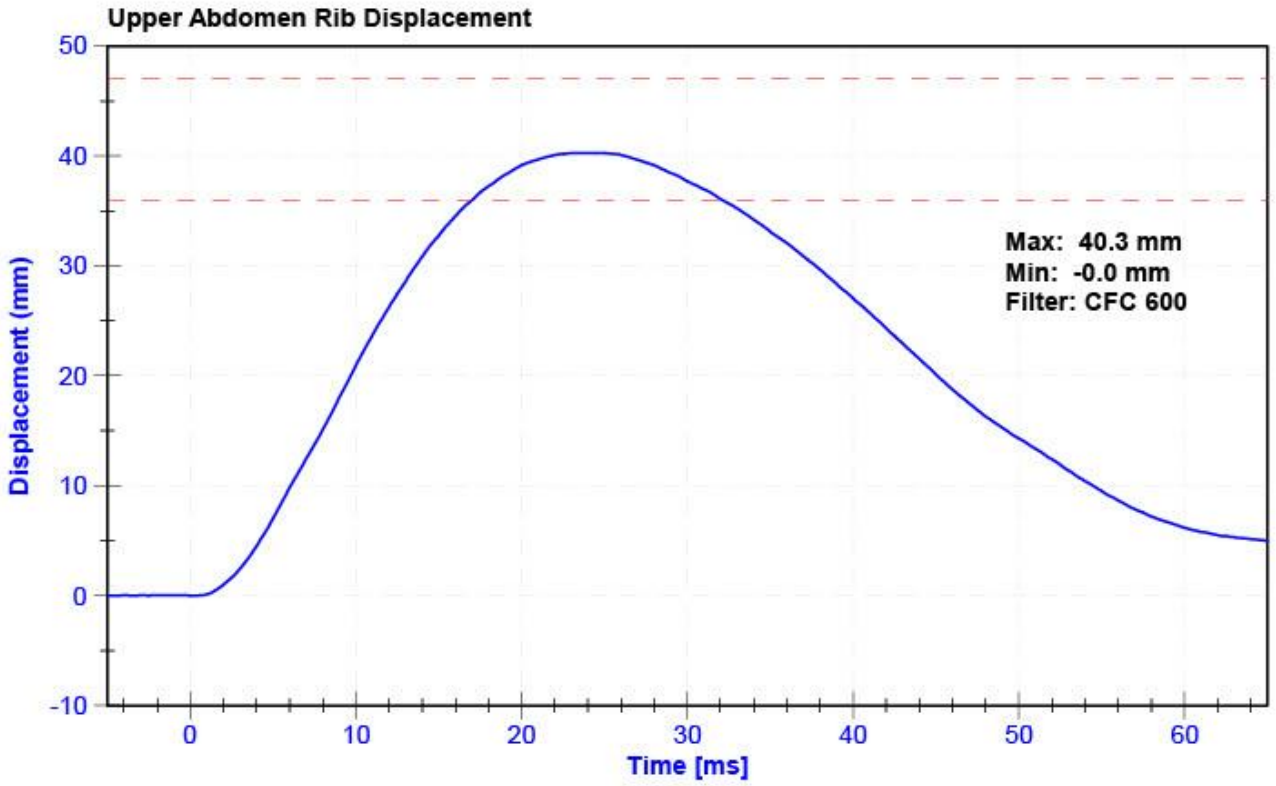
Results

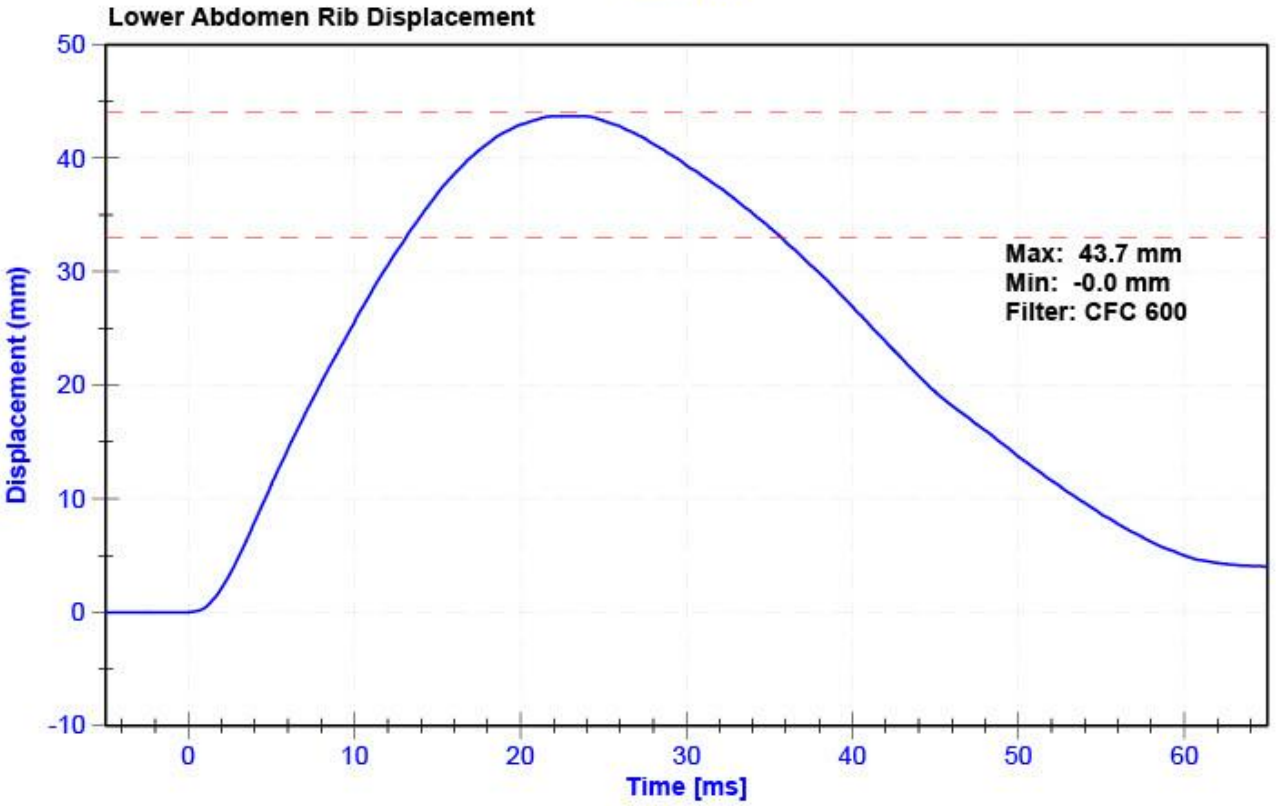
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	58.0	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	12	16	g's	13.5	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.1	Pass
Upper Abdomen Rib Deflection	36	47	mm	40.3	Pass
Lower Abdomen Rib Deflection	33	44	mm	43.7	Pass

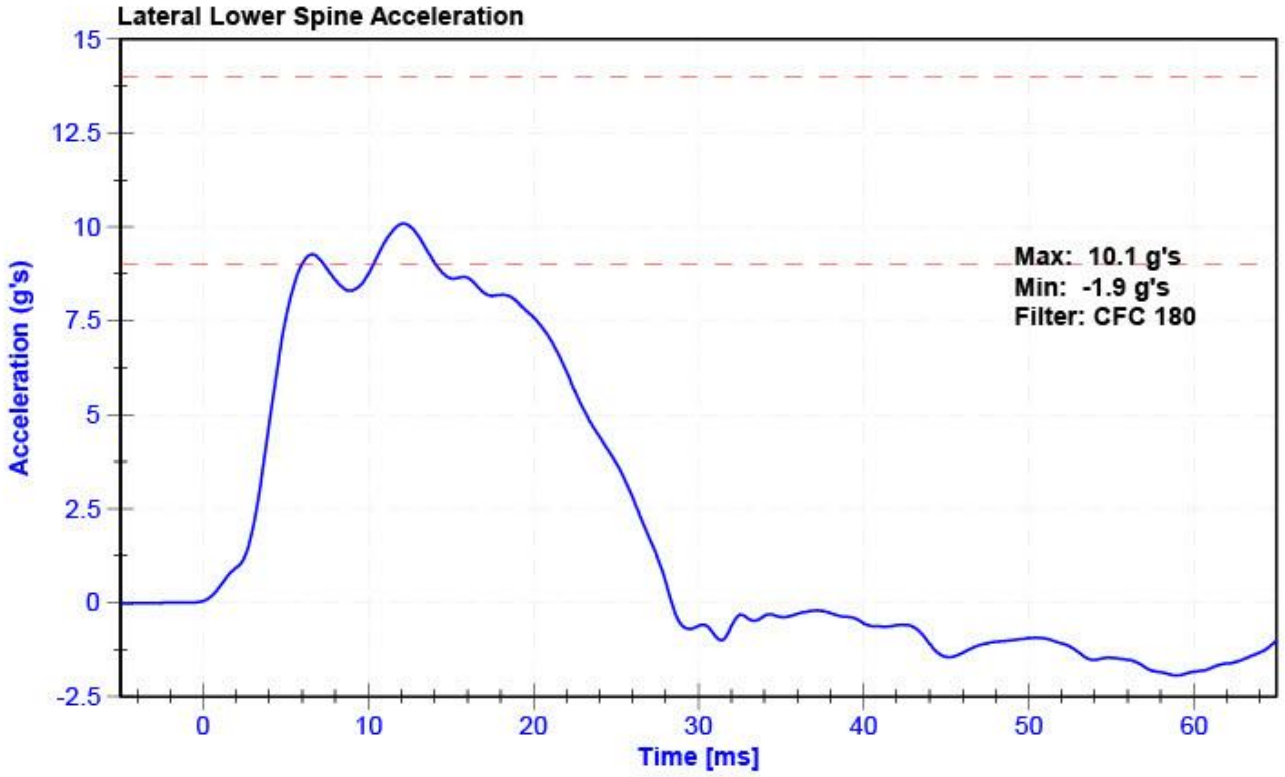
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Lower Spine Y Accelerometer	Endevco 7264C-2KTZ-2-240	P52071	5/24/2021	11/22/2021
Upper Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-307GFE	5/12/2021	11/10/2021
Lower Abdomen Rib Potentiometer	Servo 08CT1-3725	DS-308GFE	5/12/2021	11/10/2021




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.3 mm
Min: -0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 43.7 mm
Min: -0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
0
10
20
30
40
50
60
Time [ms]
Max: 10.1 g's
Min: -1.9 g's
Filter: CFC 180

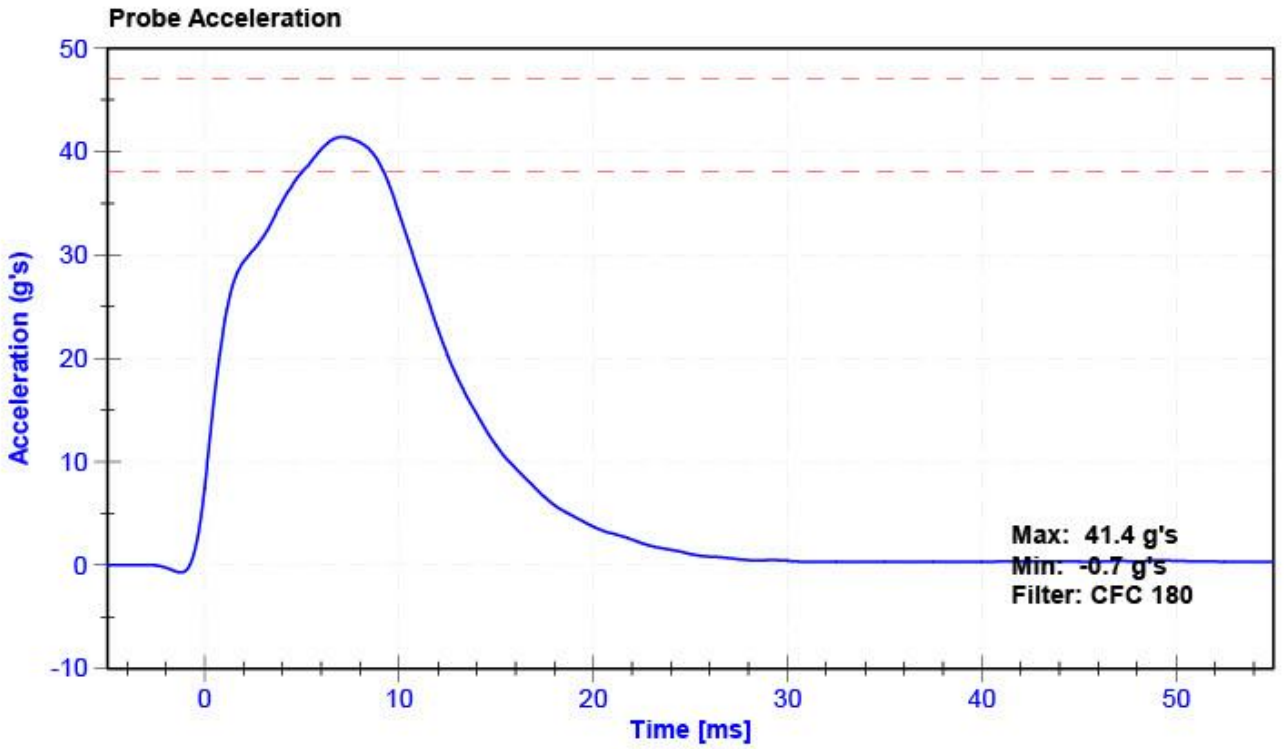
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

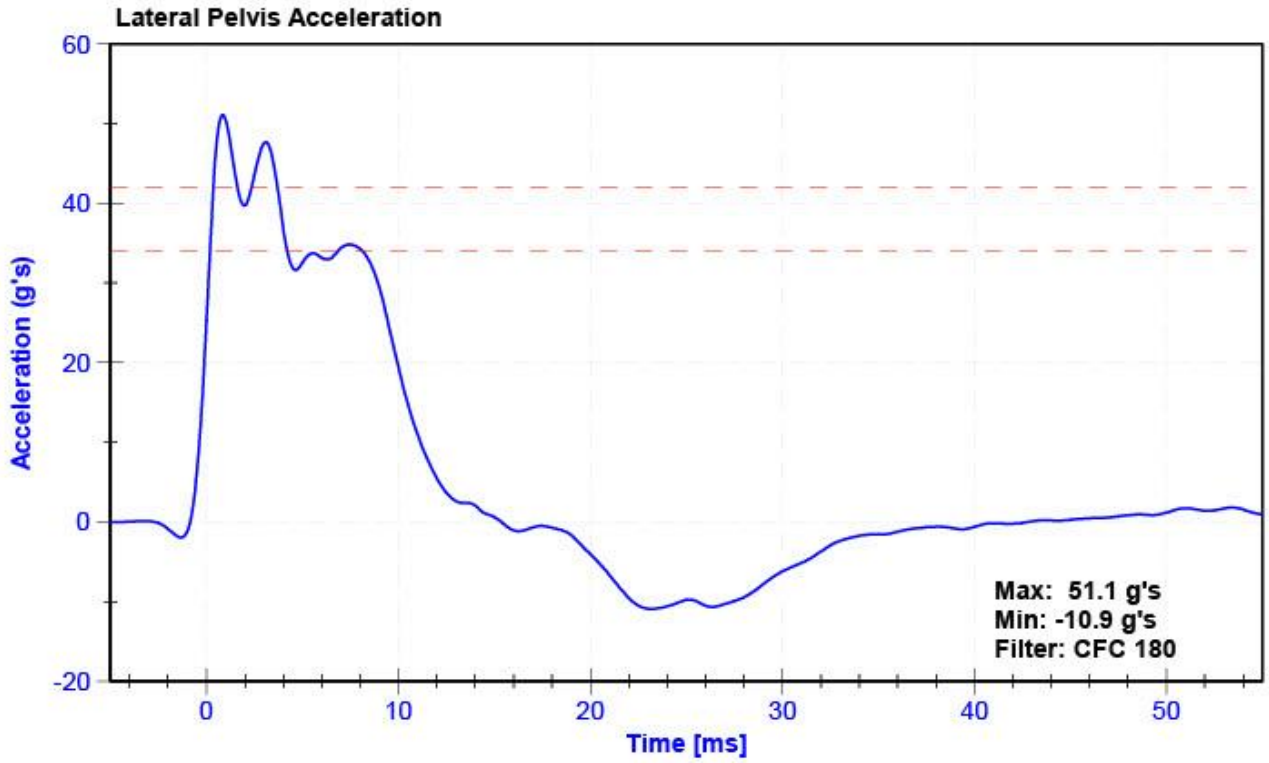
Results

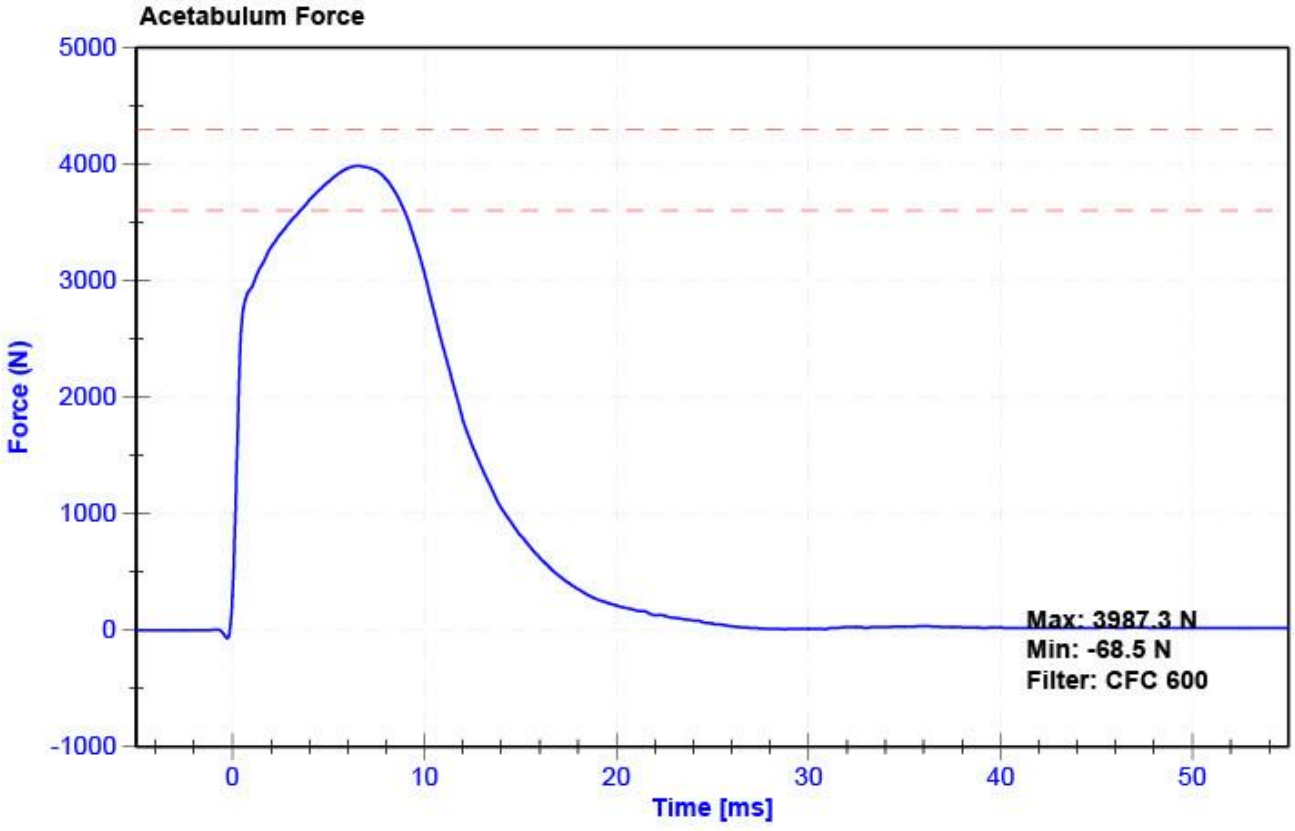
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	63.2	Pass
Velocity	6.6	6.8	m/s	6.78	Pass
Probe Acceleration	38	47	g's	41.4	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	34.8	Pass
Acetabulum Force	3600	4300	N	3987.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Pelvis Y Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51731	5/13/2021	11/11/2021
Acetabulum Load Cell	DENTON 3249J	LC-275Fy	11/23/2020	11/23/2021
Certification Plug	Humanetics	13874	5/20/2020	N/A
Crash Test Plug	Humanetics	13050	7/30/2019	N/A




Lateral Pelvis Acceleration
Acceleration (g's)
60
40
20
0
-20
0
10
20
30
40
50
Time [ms]
Max: 51.1 g's
Min: -10.9 g's
Filter: CFC 180


Acetabulum Force
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 3987.3 N
Min: -68.5 N
Filter: CFC 600

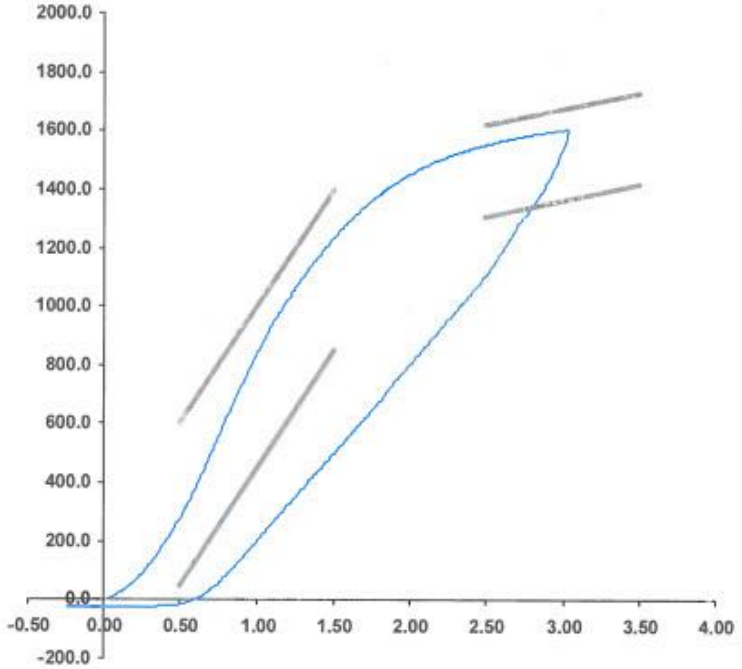
300
CRASH
7/9/2021

SID-IIs Pelvis Plug Certification Test

Plug S/N 13050
Test Number 10370
Report Number 10405
Test Date 7/30/2019 2:27:07 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	282	50	600
Force @ 1.5 mm (N)	1,235	850	1,400
Force @ 2.5 mm (N)	1,554	1,306	1,618
Force @ 3.0 mm (N)	1,604	1,361	1,673

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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

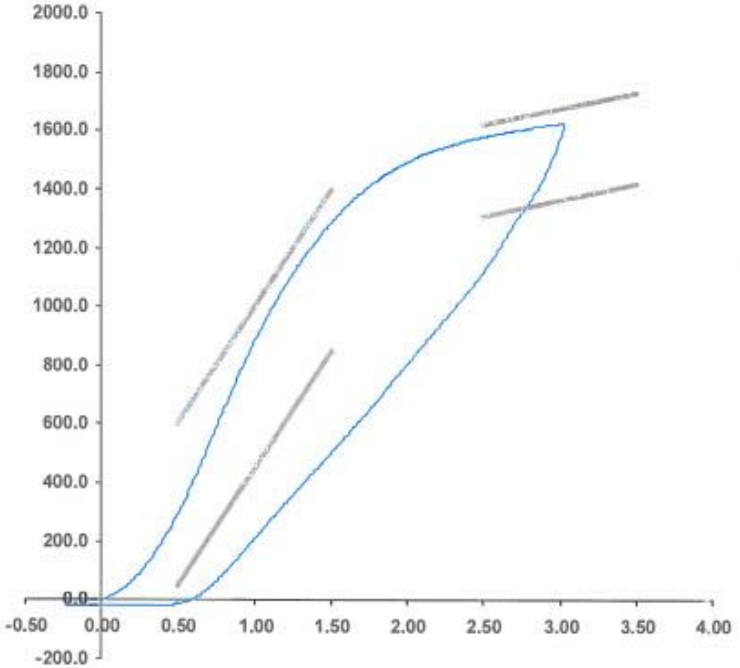
300
Non-Impact Crash Plug
7/9/2021

SID-IIs Pelvis Plug Certification Test

Plug S/N 13065
Test Number 10385
Report Number 10420
Test Date 7/30/2019 2:45:40 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	297	50	600
Force @ 1.5 mm (N)	1,288	850	1,400
Force @ 2.5 mm (N)	1,579	1,306	1,618
Force @ 3.0 mm (N)	1,622	1,361	1,673

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), 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

SACO RESEARCH

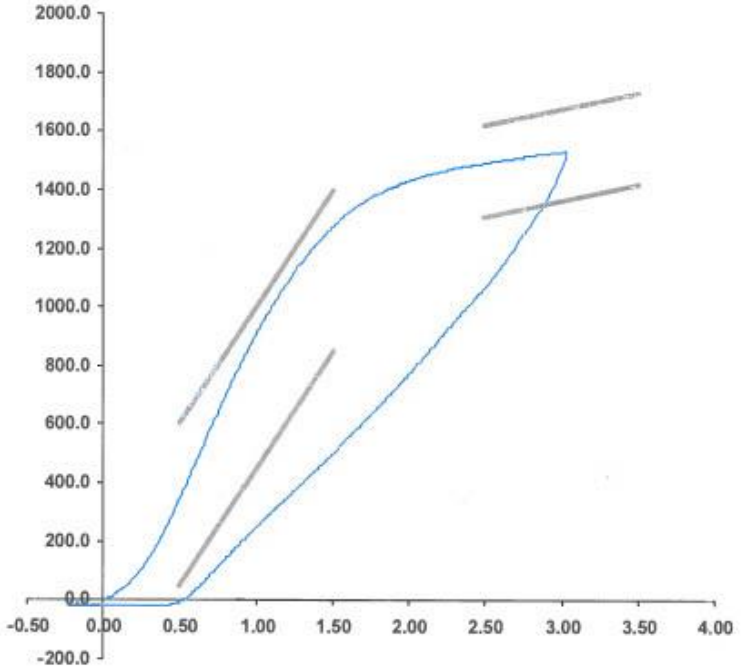
3.0° Left 7/9 (Final Hit)

SID-IIs Pelvis Plug Certification Test

Plug S/N 13874
Test Number 13348
Report Number 13393
Test Date 5/20/2020 6:58:39 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	351	50	600
Force @ 1.5 mm (N)	1,274	850	1,400
Force @ 2.5 mm (N)	1,492	1,306	1,618
Force @ 3.0 mm (N)	1,528	1,361	1,673

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS) 1000
Preload Value (-N) 22.24
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

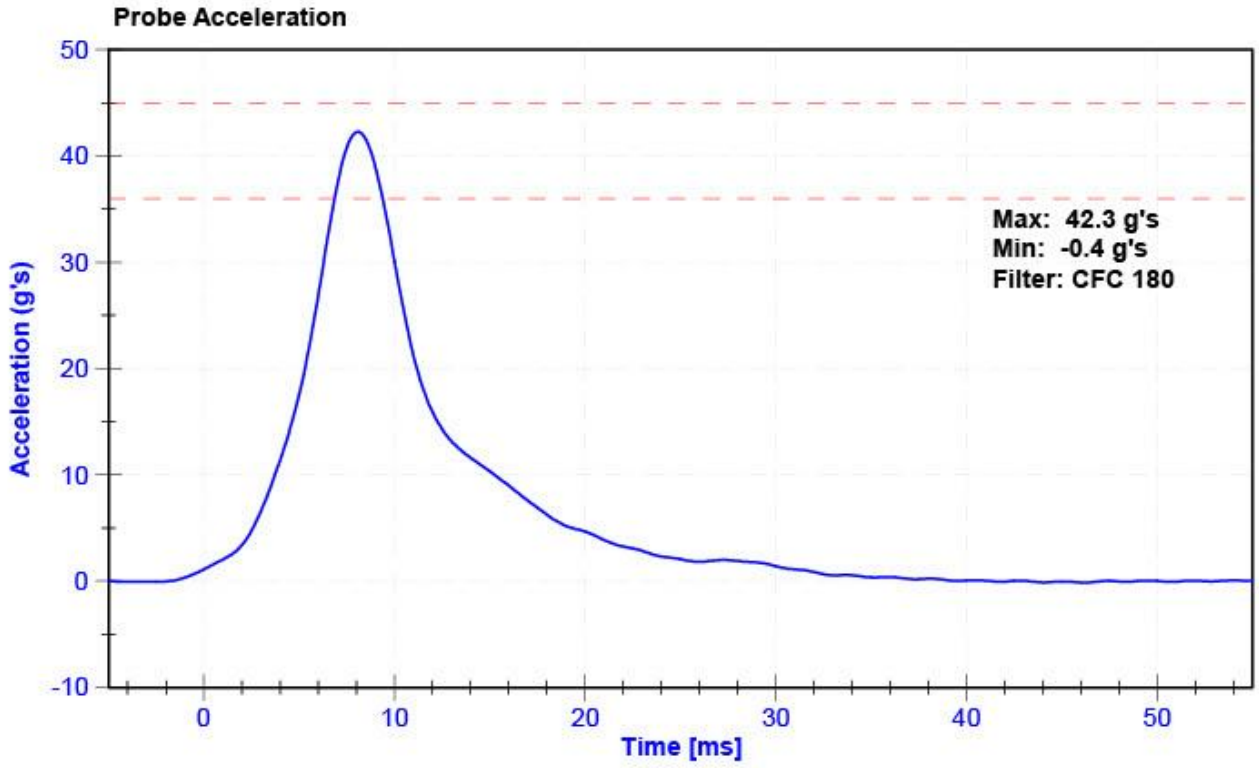
ATD Manufacturer	FTSS	Test Technician	S. Vacanti
ATD Serial Number	300	Laboratory Supervisor	K. Brogan

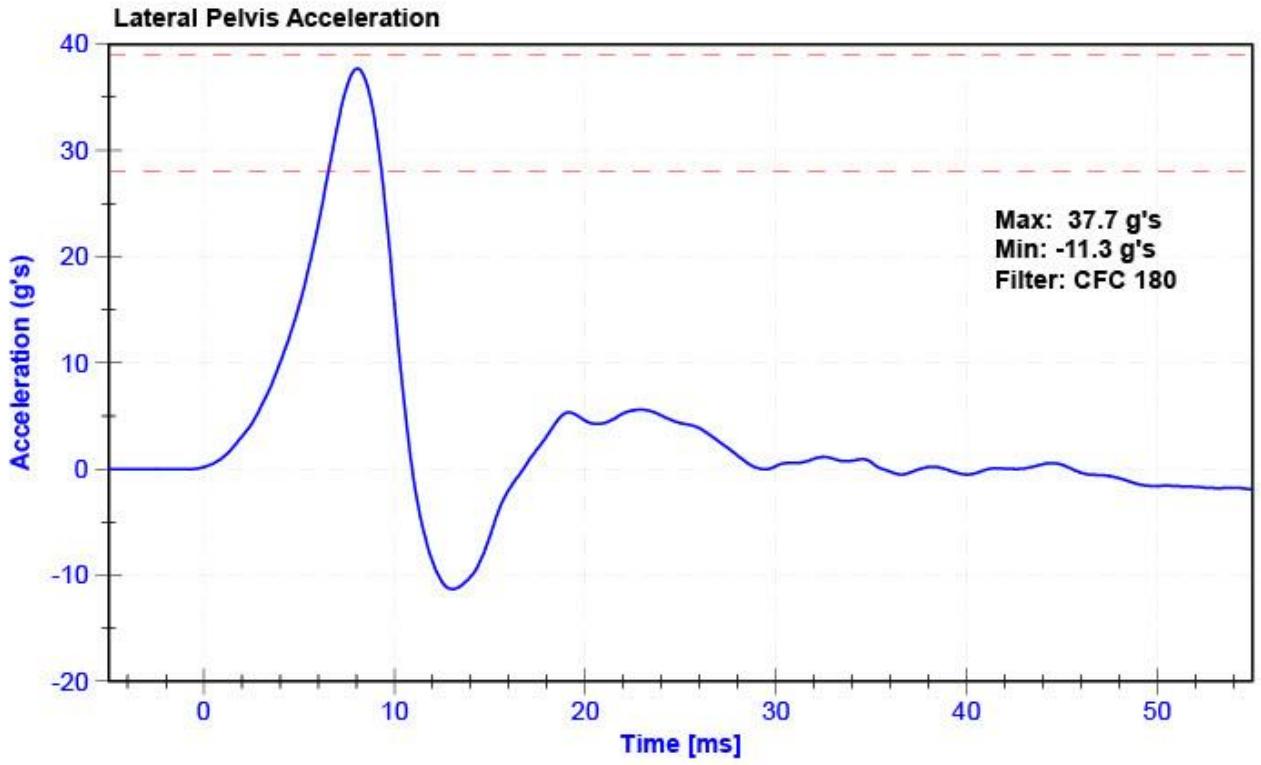
Results

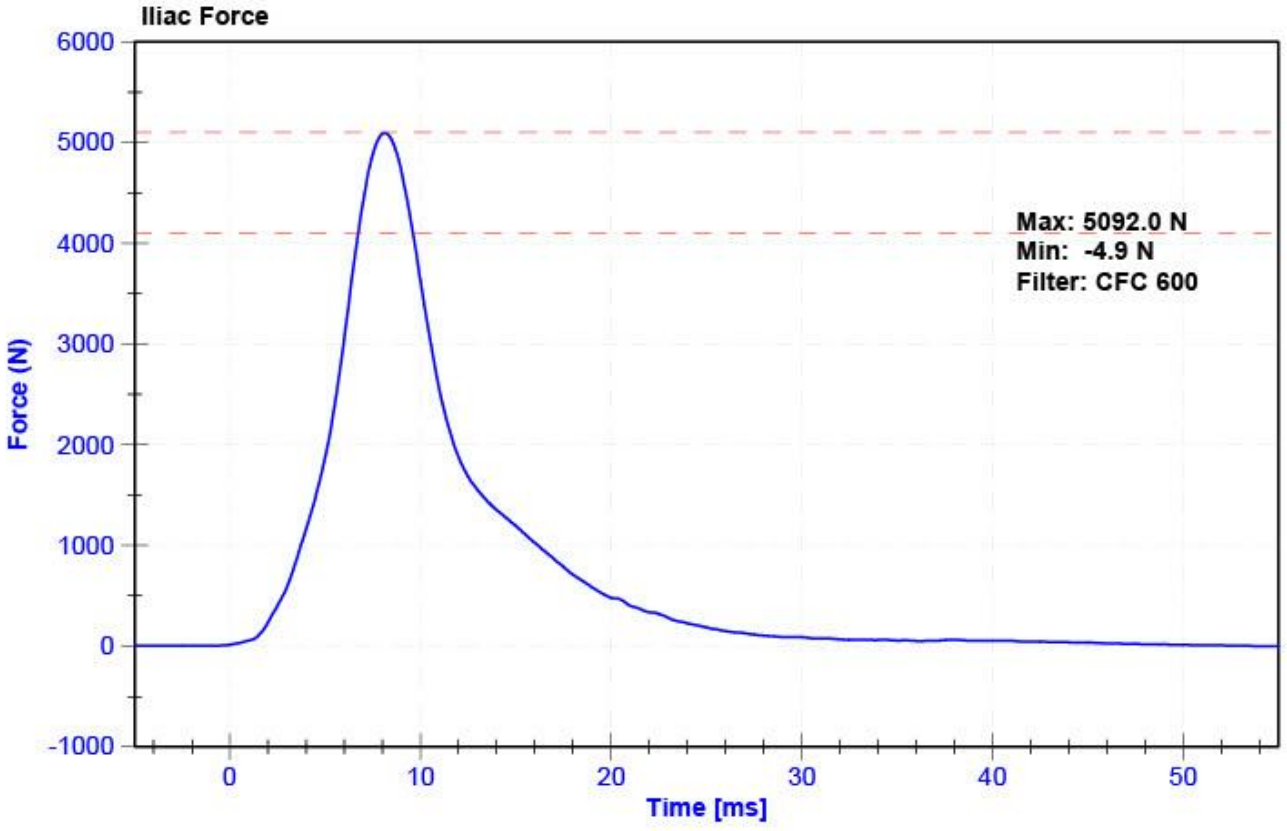
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.5	Pass
Humidity	10	70	%	55	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	36	45	g's	42.3	Pass
Lateral Pelvis Acceleration	28	39	g's	37.7	Pass
Iliac Force	4100	5100	N	5092.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264C-2K-TZ2	T25885	2/2/2021	2/2/2022
Pelvis Y Accelerometer	ENDEVCO 7264C-2K-TZ2	AC-P51731	5/13/2021	11/11/2021
Iliac Load Cell	DENTON 3228J	LC-279Fy	11/23/2020	11/23/2021




Lateral Pelvis Acceleration
Max: 37.7 g's
Min: -11.3 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
-20
0
10
20
30
40
50


Iliac Force
Max: 5092.0 N
Min: -4.9 N
Filter: CFC 600
Force (N)
Time [ms]
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50

APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

Table 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N: F033		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X	AC-P63861	ENDEVCO	6/18/2021
		Y	AC-P49216	ENDEVCO	6/18/2021
		Z	AC-P51303	ENDEVCO	6/18/2021
	Redundant	X	AC-P58868	ENDEVCO	6/18/2022
		Y	AC-P16755	ENDEVCO	6/7/2021
		Z	AC-P52132	ENDEVCO	6/18/2021
Thorax Rib Displacement Potentiometers	Upper	Y	DS-179GFE	Honeywell	6/17/2021
	Middle	Y	DS-185GFE	Honeywell	6/17/2021
	Lower	Y	DS-178GFE	Honeywell	6/17/2021
Abdomen Load Cells	Forward	Y	LC-1509	FTSS	11/10/2020
	Middle	Y	LC-1508	Denton	11/10/2020
	Rear	Y	LC-1507	Denton	11/10/2020
Lower Spine Accelerometers (T12)		X	AC-P52009	ENDEVCO	6/8/2021
		Y	AC-P49163	ENDEVCO	6/18/2021
		Z	AC-P52033	ENDEVCO	6/18/2021
Pubic Symphysis Load Cell		Y	LC-458	FTSS	11/10/2020

Table 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N: 300		
				Serial Number	Manufacturer	Calibration Date
Head Accelerometers		Primary	X	AC-P59018	ENDEVCO	5/11/2021
			Y	AC-P79189	ENDEVCO	5/11/2021
			Z	AC-P58777	ENDEVCO	5/11/2021
		Redundant	X	AC-P68057	ENDEVCO	5/11/2021
			Y	AC-P58986	ENDEVCO	5/11/2021
			Z	AC-P52025	ENDEVCO	5/11/2021
Displacement Potentiometers	Thoracic Rib	Upper	Y	DS-451GFE	Servo	5/12/2021
		Middle	Y	DS-040GFE	Servo	5/12/2021
		Lower	Y	DS-1156GFE	Servo	5/12/2021
	Abdominal Rib	Upper	Y	DS-307GFE	Servo	5/12/2021
		Lower	Y	DS-308GFE	Servo	5/12/2021
Lower Spine Accelerometers (T12)			X	AC-P64003	ENDEVCO	5/13/2021
			Y	P52071	ENDEVCO	5/24/2021
			Z	P17283	ENDEVCO	3/16/2021
Acetabulum Load Cell			Y	LC-275Fy	Denton	11/23/2020
Iliac Wing Load Cell			Y	LC-279Fy	Denton	11/23/2020
Pelvis Plug (struck side)				13683	SACO	9/26/2019
Pelvis Plug (non-struck side)				13088	SACO	7/30/2019

Table 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	1201-1000_A284379	Measurement Specialties	6/23/2021
	Vehicle Center of Gravity	Y	1201-1000_A284333	Measurement Specialties	6/23/2021
	Vehicle Center of Gravity	Z	1201-1000_A315771	Measurement Specialties	6/23/2021
2	Right Sill at Front Seat	X	1201-1000_A280373	Measurement Specialties	5/18/2021
	Right Sill at Front Seat	Y	1201-1000_A290907	Measurement Specialties	5/18/2021
	Right Sill at Front Seat	Z	1201-1000_A315747	Measurement Specialties	5/18/2021
3	Right Sill at Rear Seat	X	1201-1000_A280194	Measurement Specialties	3/11/2021
	Right Sill at Rear Seat	Y	1201-1000_A315184	Measurement Specialties	3/12/2021
	Right Sill at Rear Seat	Z	1201-1000_A315822	Measurement Specialties	3/11/2021
4	Left Sill at Front Door	Y	1201-1000_A280823	Measurement Specialties	3/23/2021
5	Left Sill at Rear Door	Y	1201-1000_A280347	Measurement Specialties	6/23/2021
6	Left A-Post Lower	Y	1201-1000_A282671	Measurement Specialties	6/22/2021
7	Left A-Post Middle	Y	1201-1000_A352362	Measurement Specialties	3/23/2021
8	Left B-Post Lower	Y	1201-1000_A315947	Measurement Specialties	6/23/2021
9	Left B-Post Middle	Y	1201-1000_A374306	Measurement Specialties	5/18/2021
10	Front Seat Track	Y	1201-1000_A315796	Measurement Specialties	1/27/2021
11	Rear Seat Track or Structure	Y	1201-1000_A281030	Measurement Specialties	4/16/2021
12	Right Rear Occ. Compartment	Y	1201-1000_A315948	Measurement Specialties	10/21/2020
13	Engine Block	X	1201-1000_A335431	Measurement Specialties	6/14/2021
	Engine Block	Y	1201-1000_A373207	Measurement Specialties	6/14/2021
14	Rear Floorpan Above Axle	X	1201-1000_A315893	Measurement Specialties	6/28/2021
	Rear Floorpan Above Axle	Y	1201-1000_A315897	Measurement Specialties	6/28/2021
	Rear Floorpan Above Axle	Z	1201-1000_A315898	Measurement Specialties	6/28/2021

Table 4 – MDB Instrumentation

MDB Instrumentation		**Serial Number**	**Manufacturer**	**Calibration Date**
MDB Center of Gravity	X	1201-1000_A373209	Measurement Specialties	3/12/2021
MDB Center of Gravity	Y	1201-1000_A374324	Measurement Specialties	3/12/2021
MDB Center of Gravity	Z	1201-1000_A374325	Measurement Specialties	3/12/2021
Left Frame at Rear Axle Centerline	X	1201-1000_A315965	Measurement Specialties	5/4/2021
Left Frame at Rear Axle Centerline	Y	1201-1000_A350918	Measurement Specialties	4/16/2021