REPORT NUMBER: SideNCAPMDB-CAL-24-009

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

KIA Corporation
2024 KIA EV9
5 Door SUV

NHTSA No: O20244221

PREPARED BY:
CALSPAN CORPORATION
P.O. BOX 400
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December 19, 2024

FINAL REPORT

PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
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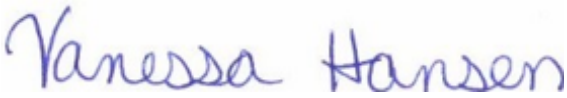
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Prepared by:  Date: December 19, 2024

Quinn Porzio, Test Engineer

Approved by:  Date: December 19, 2024

Vanessa Hansen, Operations Manager

FINAL REPORT ACCEPTANCE BY OCWS:

_____

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

Date: _____

_____

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

Date: _____

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Final Report of New Car Assessment Program Side Impact MDB Testing & FMVSS 305 Indicant Testing of a 2024 KIA EV9 5 Door SUV NHTSA No.: O20244221	December 19, 2024
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7. *Author(s)* Quinn Porzio, Test Engineer Vanessa Hansen, Operations Manager	8. *Performing Organization Report No.* CAL-DOT-2024-009
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.* 693JJ920D000016
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15. *Supplementary Notes*

16. *Abstract*

A 55/28, (61.90kph / 38.5 mph), 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2024 KIA EV9 5 Door 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 August 29, 2024.

The impact velocity of the Moving Deformable Barrier (MDB) was 62.26 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle was 21°C. The target vehicle's maximum post-test static crush was 170 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 (HIC36)		1000	25.276
Maximum Thorax Rib Deflection	mm	44	13.626
Total Abdominal Force	N	2500	389.217
Pubic Symphysis Force	N	6000	885.293
Lower Spine (T12) Resultant Acceleration	G	82*	15.214

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	32.624
Maximum Thorax Rib Deflection	mm	38*	12.448
Lower Spine (T12) Resultant Acceleration	G	82	19.799
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	927.884
Maximum Abdominal Rib Deflection	mm	45*	10.055

**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*	18. *Distribution Statement*
New Car Assessment Program (NCAP) Side Impact MDB ES-2re SID-IIs	Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave. SE Washington, D.C. 20590

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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2024 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number 693JJ920D000016. The purpose of this test is to generate comparative side impact performance in a 2024 KIA EV9 5 Door 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 2024 KIA EV9 5 Door 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 62.26 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 August 29, 2024. 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
Pubic 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	IARV	Result
Head Injury Criteria (HIC36)		1000	25.276
Maximum Thorax Rib Deflection	mm	44	13.626
Total Abdominal Force	N	2500	389.217
Pubic Symphysis Force	N	6000	885.293
Lower Spine (T12) Resultant Acceleration	G	82*	15.214

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	32.624
Maximum Thorax Rib Deflection	mm	38*	12.448
Lower Spine (T12) Resultant Acceleration	G	82	19.799
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	927.884
Maximum Abdominal Rib Deflection	mm	45*	10.055

*Proposed IARV

SUPPLEMENTAL RESTRAINT INFORMATION

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

GENERAL COMMENTS:

1. P1 serial number – F033
2. P4 serial number – DG8012

Data Anomalies:

The following channel was questionable for:

- Left B-Pillar Lower Y Acceleration, Exceeded calibration range at 12.8 ms

SECTION 3

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

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

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

Data Sheet No. 3 - Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 - Dummy Lateral Clearance Dimensions

Data Sheet No. 5 - Camera and Instrumentation Data

Data Sheet No. 6 - 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

Data Sheet No. 13 - Vehicle and MDB Damage Profile Distances

Data Sheet No. 14 - FMVSS No. 301 Static Rollover Results

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

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

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

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

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

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

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 KIA EV9 5 Door SUV
NHTSA No.: O20244221
Test Program: NCAP Side MDB Impact Test
Test Date: 08/29/2024

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	O20244221
Model Year	2024
Make	KIA
Model	EV9
Body Style	SUV
VIN	KNDAA5S24R6037656
Body Color	Aurora Black Pearl
Odometer Reading (km/mi)	49 mi
Engine Displacement (L)	N/A
Type / No. Cylinders	N/A
Engine Placement	N/A
Transmission Type	Automatic
Transmission Speeds	Direct Drive
Overdrive	No
Final Drive	Rear Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

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

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

DATA FROM CERTIFICATION LABEL

Manufactured By	KIA Corporation
Date of Manufacture	12/23
Vehicle Type	MPV

GVWR (KG)	2910
GVWR Front (KG)	1440
GVWR Rear (KG)	1860

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	2	7	
Vehicle Capacity Weight (VCW) (kg)				560	(A)
DSC x 68.0 kg				476	(B)
Cargo Weight (RCLW) (kg)				84	(A-B)

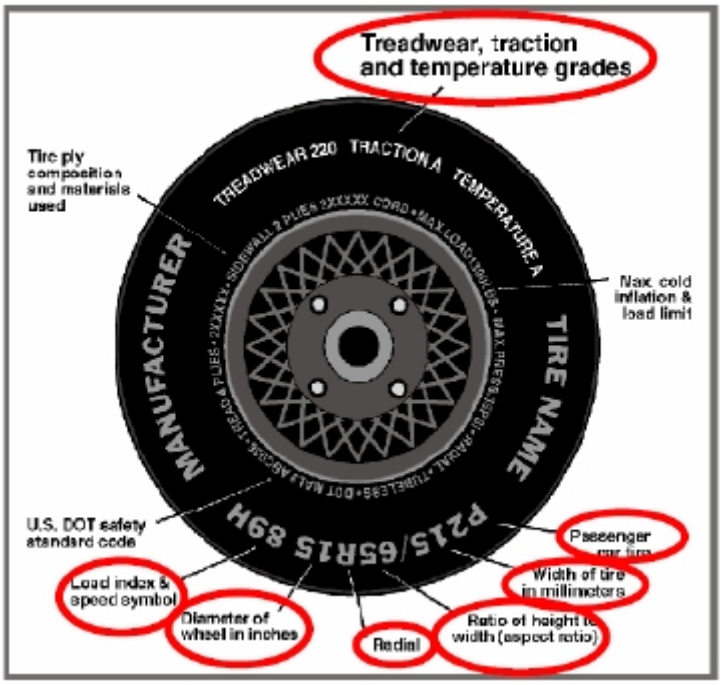
VEHICLE SEAT TYPE

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

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

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

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



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	340	340
Cold Pressure (kPa)	260	260
Recommended Tire Size	255/60R19	255/60R19
Tire Size on Vehicle	255/60R19	255/60R19
Tire Manufacturer	KUMHO	KUMHO
Tire Model	Crugen EV HP71	Crugen EV HP71
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 1 Polyamide	2 Steel, 2 Polyester, 1 Polyamide
Load Index / Speed Symbol	113V	113V
Tire Material	Rubber	Rubber
DOT Safety Code Left	1H2KMYC8E	1H2KMYC8E
DOT Safety Code Right	1H2KMYC8E	1H2KMYC8E

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

Test Vehicle: 2024 KIA EV9 5 Door SUV | NHTSA No.: O20244221
Test Program: NCAP Side MDB Impact Test | Test Date: 08/29/2024

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	272	270	271	272
Tire Placard	kPa	260	260	260	260
Owner's Manual	kPa	260	260	260	260
As Tested	kPa	260	260	260	260

MDB TIRE SPECIFICATIONS

	Units	Requirements	LF	RF	LR	RR
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21	207	207	207	207

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	566	606		606	689		605	705	
Right	kg	520	642		556	687		529	705	
Ratio	%	46.5	53.5		45.8	54.2		44.6	55.4	
Totals	kg	1086	1248	2334	1162	1376	2538	1134	1410	2544

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	2334	(A)
Sum of Actual Weight of 1 ES2re and 1 P572 ATD (SID-IIs)	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	84	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2545	(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 Rqmt***
LF	mm	971	962	Yes
RF	mm	985	975	Yes
RR	mm	1000	992	Yes
LR	mm	994	988	Yes
Vehicle CG (Aft of Front Axle)	mm	1720	1688	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	24	18	

****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:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Carpeting	8
Ballast / Equipment Added	15.3

TEST SURFACE MARKINGS

	Distance from 63° Impact Location Line (mm)
Fore 25 mm target	970
Aft 25 mm target	971
Pre-Impact Angle Line	235

Parallel Track Target	X Location (mm)	Y Location (mm)
A	0	0
B	2955	1555
C	2955	3355
D	0	3000

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

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

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 passenger's seats should be set to the rear-most, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL(°)		
	Max	Min	Mid
Driver Seat	19.0	11.8	15.4
Front Passenger Seat	18.8	11.7	15.3
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore / Aft	Forward-Most
Driver Seat	15.4	7	Max	71	77	83
			Mid	36	42	48
			Min	1	7	13
Front Passenger Seat	15.3	7	Max	71	77	83
			Mid	36	42	48
			Min	1	7	13
Front Center Seat*			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Non-Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Rear Center Seat*	Fixed	Fixed	Max			
			Mid			
			Min			

**If applicable*

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

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

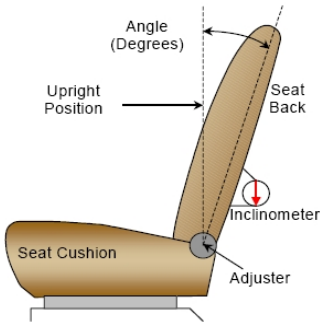
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detents*
Driver Seat	260	Power	130	Power
Front Passenger Seat	260	Power	130	Power
Front Center Seat				
Struck Side Rear Seat	135	10 (0-9)	135	9
Non-Struck Side Rear Seat	135	10 (0-9)	135	9
Rear Center Seat	135	10 (0-9)	135	9

**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	64.0	Power	2.6	Power
Front Passenger Seat	64.5	Power	2.6	Power
Front Center Seat*				
Struck Side Rear Seat w/ Seated Dummy	28	15 (0-14)	0.35	0
Non-Struck Side Rear Seat	28	15 (0-14)	0.35	0
Rear Center Seat*	28	15 (0-14)	0.35	0

**if applicable*

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

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

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.

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

HEAD RESTRAINT ADJUSTMENT

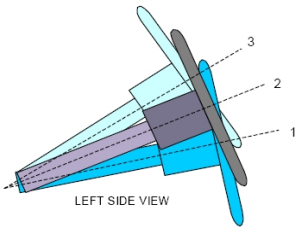
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

Seat	Total # of Positions	Placed in Position #
Driver Seat	6 (0-5)	Uppermost
Rear Seat	4 (0-3)	Lowermost

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 No. 1	22.8	
Geometric center - Position No. 2	25.2	
Uppermost - Position No. 3	27.5	
Telescoping Steering Wheel Travel		60
Test Position	25.2	30

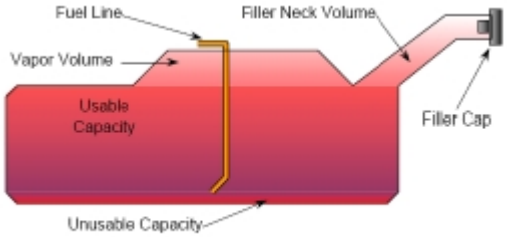


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

The vehicle is an electric vehicle. The charge port is on the right rear of the vehicle.



VEHICLE FUEL TANK ASSEMBLY

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

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

FUEL TANK CAPACITY

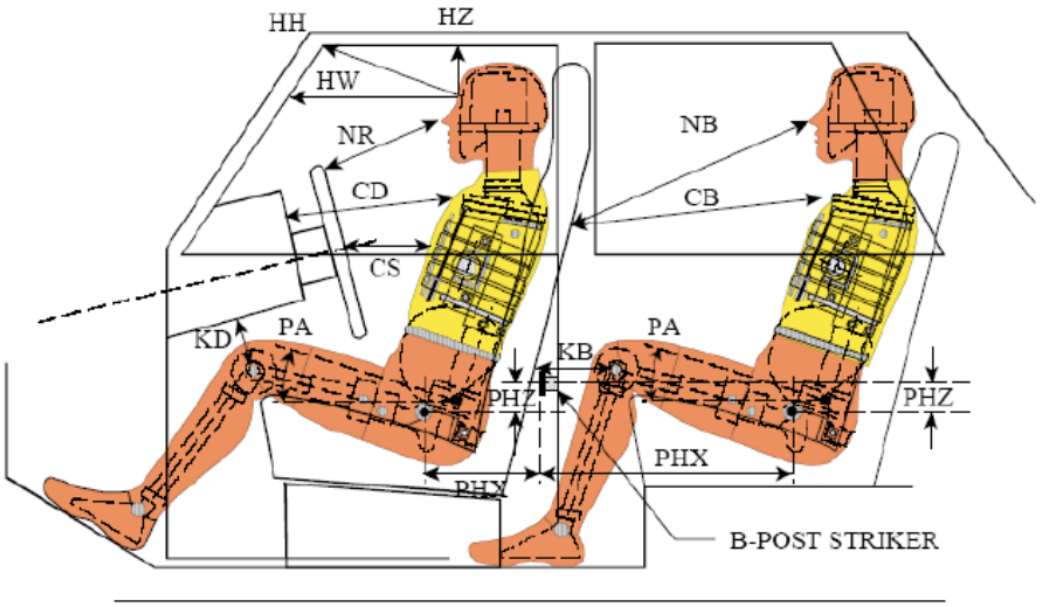
Description	Liters
Usable Capacity of “Standard Tank” (see Form No. 1)	
Usable Capacity of “Optional Tank” (see Form No. 1)	
Usable Capacity of “Standard Tank” (see Owner’s Manual)	
Usable Capacity of “Optional Tank” (see Owner’s Manual)	
93% of Usable Capacity	
Actual Amount of Solvent Used in Test	Electric Vehicle
1/3 of Usable Capacity	

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** [X] **N/A**

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION



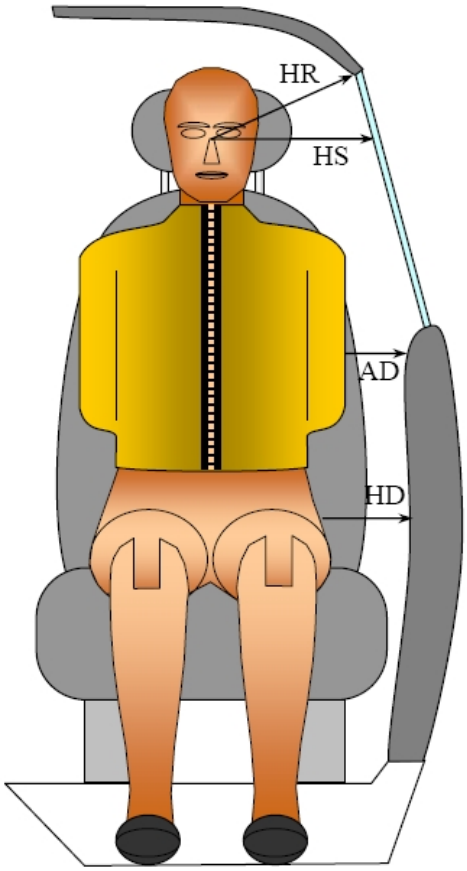
NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

LEFT SIDE VIEW

Driver Code	Pass. Code	Description	Driver (Serial No. F033)		Left Rear Passenger (Serial No. DG8012)	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Header to Header	480			
HW		Header to Windshield	715			
HZ	HZ	Head to Roof Liner	256		339	
NR	NB	Nose to Rim/Seat Back	485		530	
CD	CB	Chest to Dash/Seat Back	688		579	
CS		Chest to Steering Wheel	427			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	222	26.6	346	7.9
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	204	25.5	342	12.0
PAX°	PAX°	Pelvic Tilt Angle X		22.4		19.45
	PAY°	Pelvic Tilt Angle Y				0.3
PHX	PHX	Hip Point to Striker (X-Axis)	193		341	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	186		133	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024



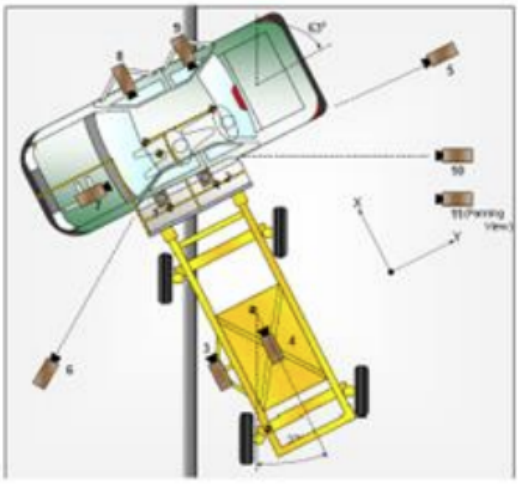
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F033)	Left Rear Passenger (Serial No. DG8012)
HR	Head to Side Header	mm	262	296
HS	Head to Side Window	mm	377	382
AD	Arm to Door	mm	105	157
HD	Hip Point to Door	mm	190	201

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2024 KIA EV9 5 Door SUV NHTSA No.: O20244221
Test Program: NCAP Side MDB Impact Test Test Date: 08/29/2024



CAMERA LOCATIONS AND DATA

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Overhead Overall	0	-310	-9220	12.5	1000
2	Overhead Close-up	0	0	-9220	24	1000
3	Left Impact Point (MDB)	-1470	0	-847	25	1000
4	Side Overall (MDB)	-1140	878	-1587	8	1000
5	Rear	578	8935	-1464	28	1000
6	Left Front	-3245	-9953	-1561	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	60
11	Real-time In Run				Zoom	60

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.*

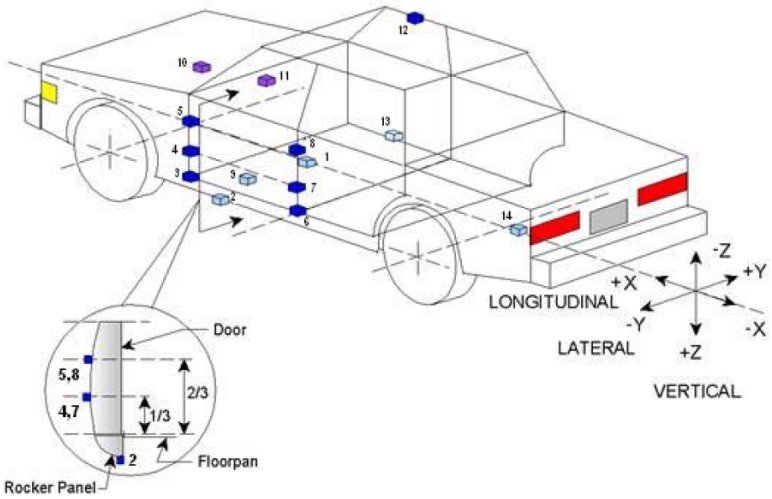
If applicable, explain why camera(s) did not operate as intended: All cameras operated as intended.

INSTRUMENTATION

Description	Number of Channels
Driver Dummy Channels	16
Passenger Dummy Channels	16
Vehicle Structure Accelerometers	23
MDB Accelerometers	7
Total	62

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024



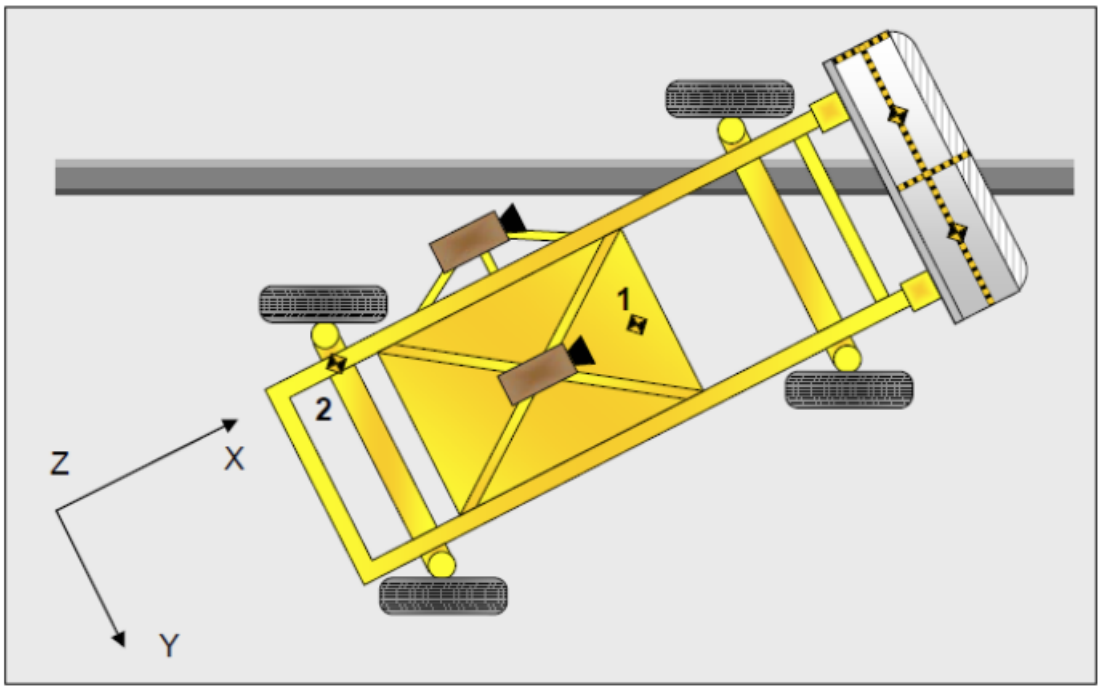
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2954	13	-418
2	Right Sill at Front Seat	3197	709	36
3	Right Sill at Rear Seat	2152	723	20
4	Left Sill at Front Door	3193	-708	34
5	Left Sill at Rear Door	2183	-707	28
6	A-Post Lower	3610	-672	-212
7	A-Post Middle	3462	-693	-715
8	B-Post Lower	2483	-734	-268
9	B-Post Middle	2430	-716	-687
10	Front Seat Track	2710	-617	1
11	Rear Seat Structure	1941	-539	12
12	Rt. Rear Occ. Compartment	2348	400	109
13	Engine Block	4181	-40	-141
14	Rear Above Axle	763	-11	-172

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:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024



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): 1515

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2024 KIA EV9 5 Door SUV | NHTSA No.: O20244221
Test Program: NCAP Side MDB Impact Test | Test Date: 08/29/2024

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	None
Top of Head	Curtain Airbag	Curtain Airbag
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag & Headrest	Curtain Airbag & Headrest
Left Shoulder	Curtain Airbag & Torso/Pelvis Airbag	Seatback & Torso/Pelvis Airbag
Upper Torso	Seatback	Seatback
Lower Torso	Seatback	Seatback & Torso/Pelvis Airbag
Left Hip	Seat Pan & Torso/Pelvis Airbag	Seat Pan & Torso/Pelvis Airbag
Left Knee	Driver Door	Passenger Door

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	B-Pillar & C-Pillar Buckled
Sill Separation	None
Windshield Damage	None
Side Window Damage	None
Other Notable Effects	None

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

Test Vehicle: 2024 KIA EV9 5 Door SUV | NHTSA No.: O20244221
Test Program: NCAP Side MDB Impact Test | Test Date: 08/29/2024

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		3104
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		508
Actual Impact Point (Aft of Frontal Axle)	mm		509
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	-1
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	-1

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1250
Overall Length Including Honeycomb Frame	4120
Wheelbase of Framework Carriage	2591
CG Location of Front Axle	1122

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	396	291.5	687.5
Right	kg	377.5	301	678.5
Ratio	%	56.6	43.4	100
Totals	kg	773.5	592.5	1366

SPEED AND ANGLE AT IMPACT DATA

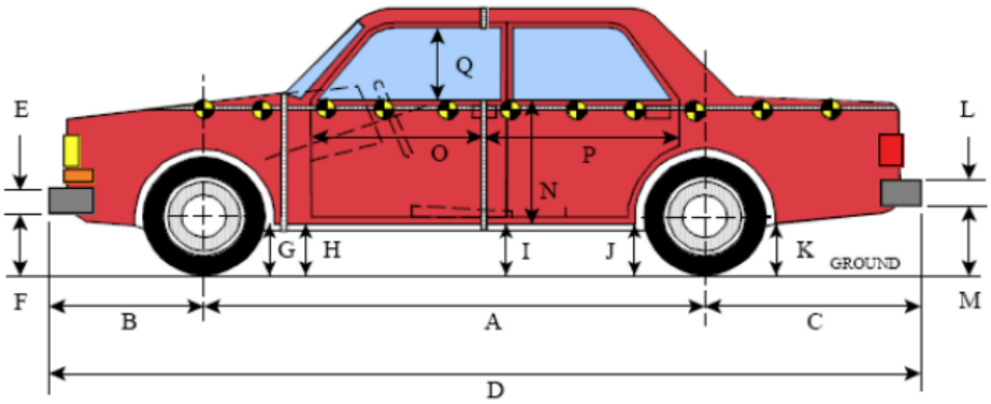
Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.10 to 62.70	62.26
Trap No. 2 Velocity (Redundant)	km/h	61.10 to 62.70	62.20
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed angle 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	432	800	Right	286
B	Top of Bumper	533	200	Right	180
C	Mid-Level	686	200	Right	187
D	Top of Stack	813	200	Right	224

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024



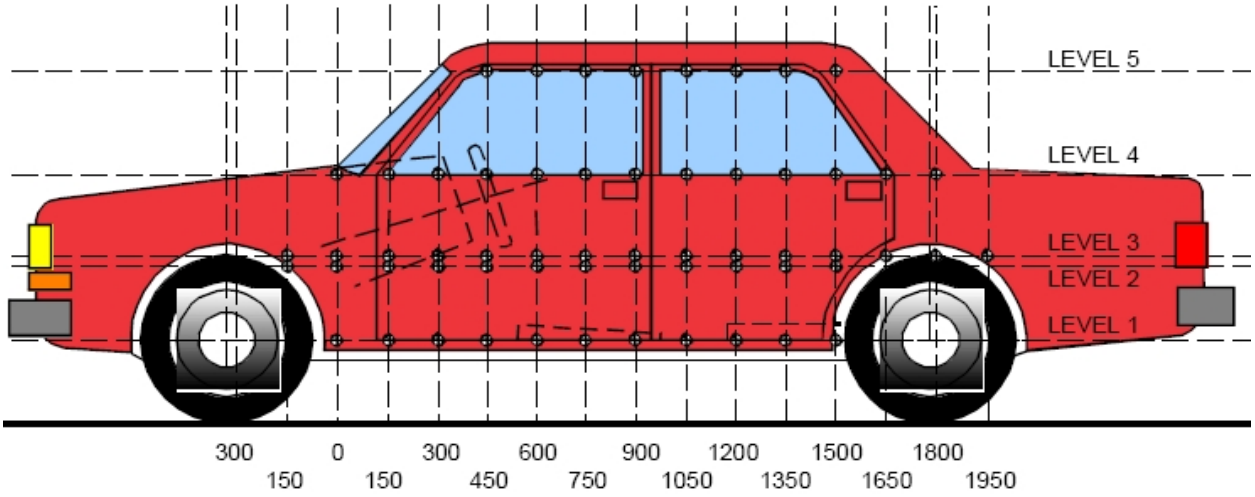
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code.	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	3104	3105	1
B	Front Axle to FSOV	874	869	-5
C	Rear Axle to RSOV	1036	1036	0
D2	Total Length at Centerline	5011	5010	-1
E	Front Bumper Thickness	130	130	0
F	Front Bumper Bottom to Ground	492	495	3
G	Sill Height at Front Wheel Well	247	258	11
H	Sill Height at Front Door Leading Edge	247	260	13
I	Sill Height at B Pillar	260	264	4
J1	Sill Height at Rear Wheel Well	288	295	7
J2	Pinch Weld Height at Rear Wheel Well	253	263	10
K	Sill Height Aft of Rear Wheel Well	279	292	13
L	Rear Bumper Thickness	195	195	0
M	Rear Bumper Bottom to Ground	465	481	16
N	Sill Height to Bottom of Front Window Sill	911	890	-21
O	Front Door Leading Edge to Impact CL	759	759	0
P	Rear Door Trailing Edge to Impact CL	1489	1481	-8
Q	Front Window Opening	465	466	1
R	Right Side Length	4941	4939	-2
S	Left Side Length	4941	4941	0
T	Vehicle Width at B-Pillars	1988	1919	-69
U	Front Wheel Track Width	1699	1684	-15
V	Rear Wheel Track Width	1708	1686	-22

DATA SHEET NO.11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024



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	447	79	1500
2	Occupant H-Point	mm	729	164	1650
3	Mid-Door	mm	815	170	1500
4	Window Sill	mm	1145	15	1200
5	Window Top	mm	1656	3	1350

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: 2024 KIA EV9 5 Door SUV NHTSA No.: O20244221
Test Program: NCAP Side MDB Impact Test Test Date: 08/29/2024

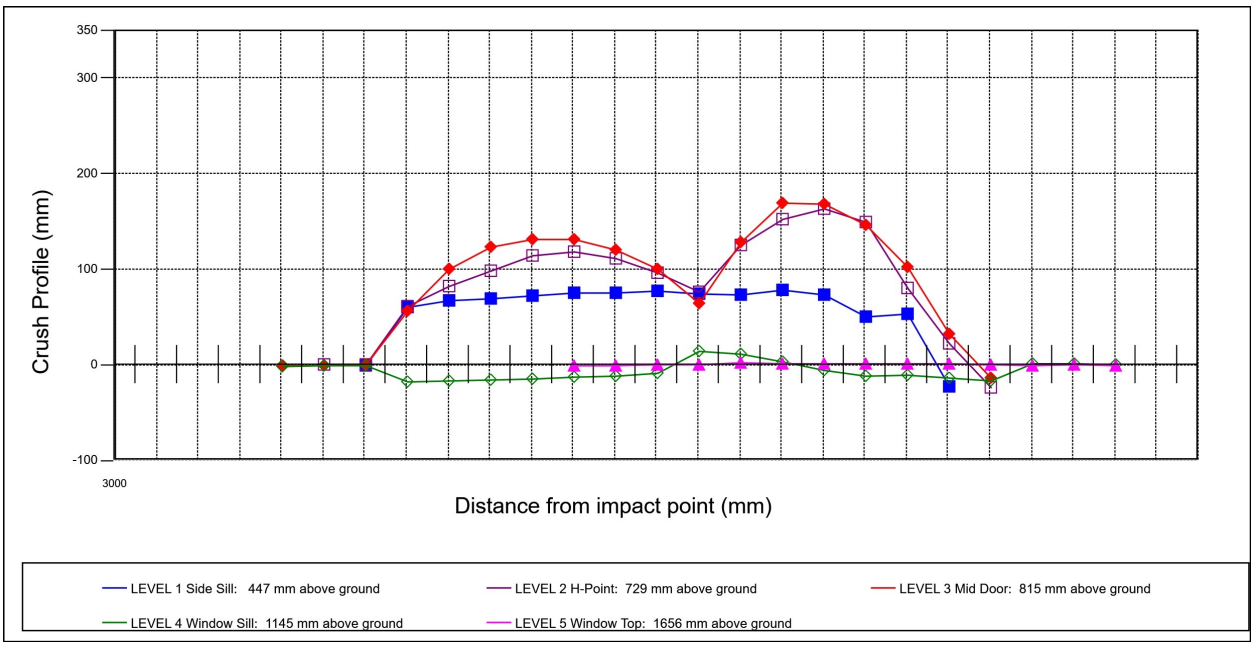
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Crush				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300			987	860				987	861				0	-1	
-150		987	984	866			986	984	866			1	0	0	
0	972	977	977	864		972	976	977	864		0	1	0	0	
150	950	968	966	862		889	906	909	879		61	62	57	-17	
300	962	972	973	871		894	889	872	887		68	83	101	-16	
450	966	976	980	880		896	877	856	895		70	99	124	-15	
600	970	980	985	888		897	865	853	902		73	115	132	-14	
750	972	983	988	894	709	896	864	856	906	709	76	119	132	-12	0
900	973	984	991	899	714	897	872	870	910	714	76	112	121	-11	0
1050	974	985	992	903	717	896	888	891	911	716	78	97	101	-8	1
1200	974	984	992	904	717	899	907	927	889	716	75	77	65	15	1
1350	974	982	992	905	718	900	856	863	893	715	74	126	129	12	3
1500	973	980	990	904	716	894	827	820	900	714	79	153	170	4	2
1650	972	977	987	902	714	898	813	818	907	712	74	164	169	-5	2
1800	971	976	984	900	710	920	826	837	911	708	51	150	147	-11	2
1950	964	985	985	909	705	910	904	882	919	703	54	81	103	-10	2
2100	978	984	984	911	698	1000	961	951	924	696	-22	23	33	-13	2
2250		991	992	909	691		1014	1005	925	690		-23	-13	-16	1
2400				907	682				905	682				2	0
2550				904	673				902	672				2	1
2700				898	661				897	661				1	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

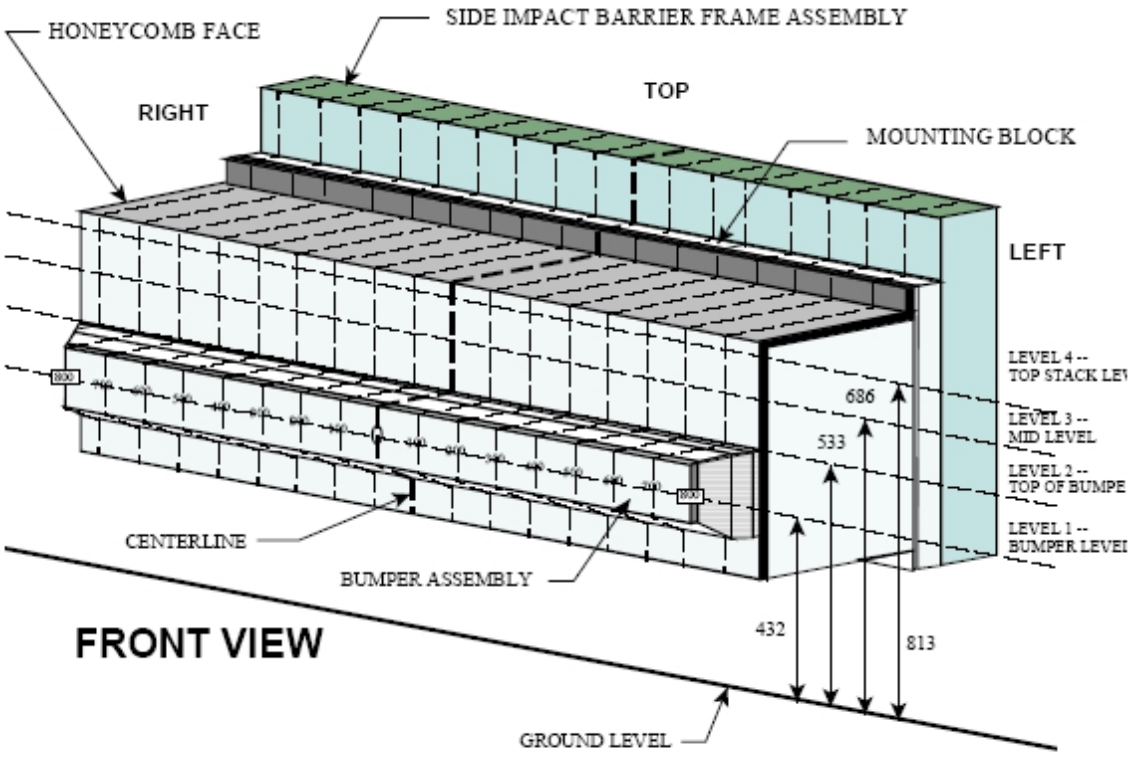
Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO.12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024



NOTE: Dimensions are shown in millimeters, mm

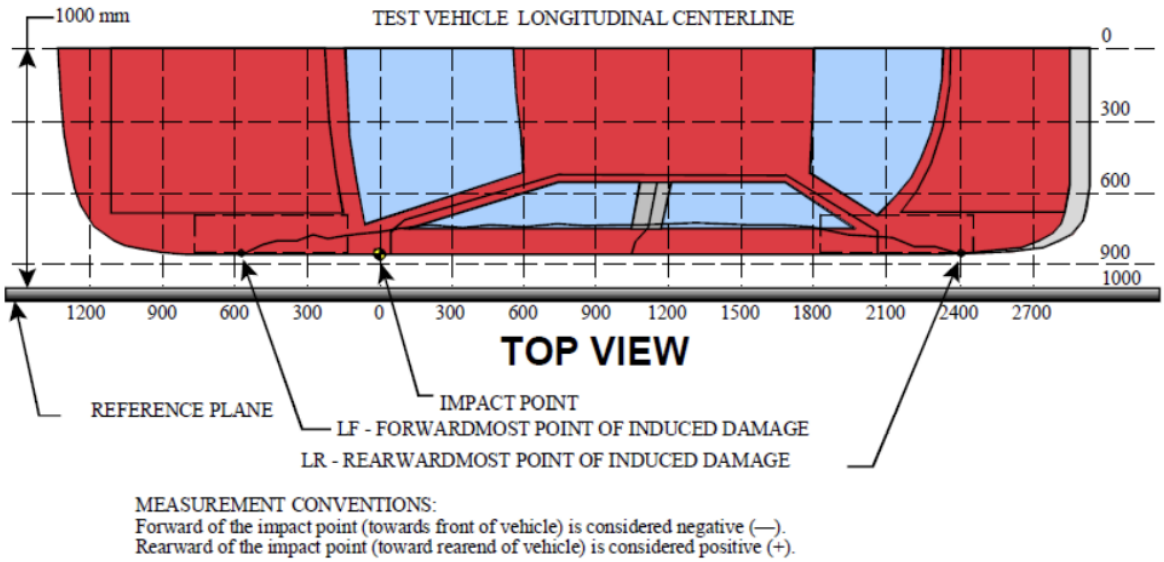
DEFORMABLE BARRIER STATIC CRUSH

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	286	284	281	281	282	281	281	280	276	271	269	266	265	263	261	260	262
2	168	170	173	173	170	174	180	175	170	172	160	157	154	152	151	150	159
3	136	105	95	103	125	156	187	176	160	131	110	97	91	92	101	121	157
4	141	118	106	127	162	197	224	191	153	133	117	108	108	115	127	150	176

DATA SHEET NO.13
VEHICLE AND MDB DAMAGE PROFILE DISTANCE

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

For guidance regarding damage profile distance measurements, please 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	0	3	23	22	1
2	450	3	144	20	124
3	900	3	130	9	121
4	1350	3	137	8	129
5	1800	3	163	16	147
6	2250	3	-5	8	-13

MDB DAMAGE PROFILE DISTANCES

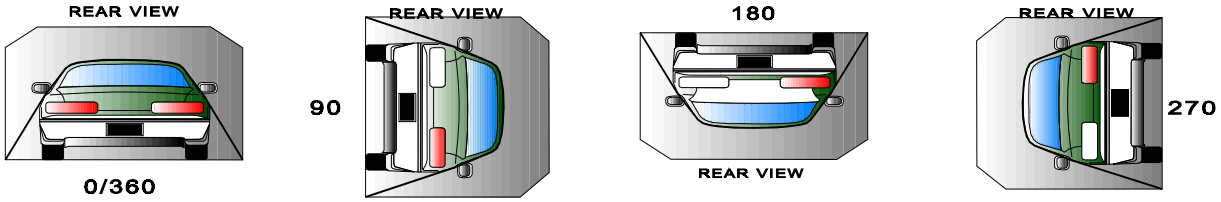
DPD	Distance From Center of MDB (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	800 mm left of center	1	243	505	-262
2	480 mm left of center	1	251	514	-263
3	160 mm left of center	1	244	514	-270
4	160 mm right of center	1	233	513	-280
5	480 mm right of center	1	232	513	-281
6	800 mm right of center	1	215	501	-286

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

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024
Test Time:	10:04 AM	Temperature:	21 °C

A. From impact until vehicle motion ceases: N/A oz
(Maximum allowable is 1 oz.)
B. For the 5-minute period after motion ceases: N/A oz
(Maximum allowable is 5 oz.)
C. For the following 25 minutes: N/A oz
(Maximum allowable is 1 oz.)

D. Spillage Detail: Electric Vehicle



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°			
90° to 180°			
180° to 270°			
270° to 360°			

FMVSS 301 SPILLAGE TABLE

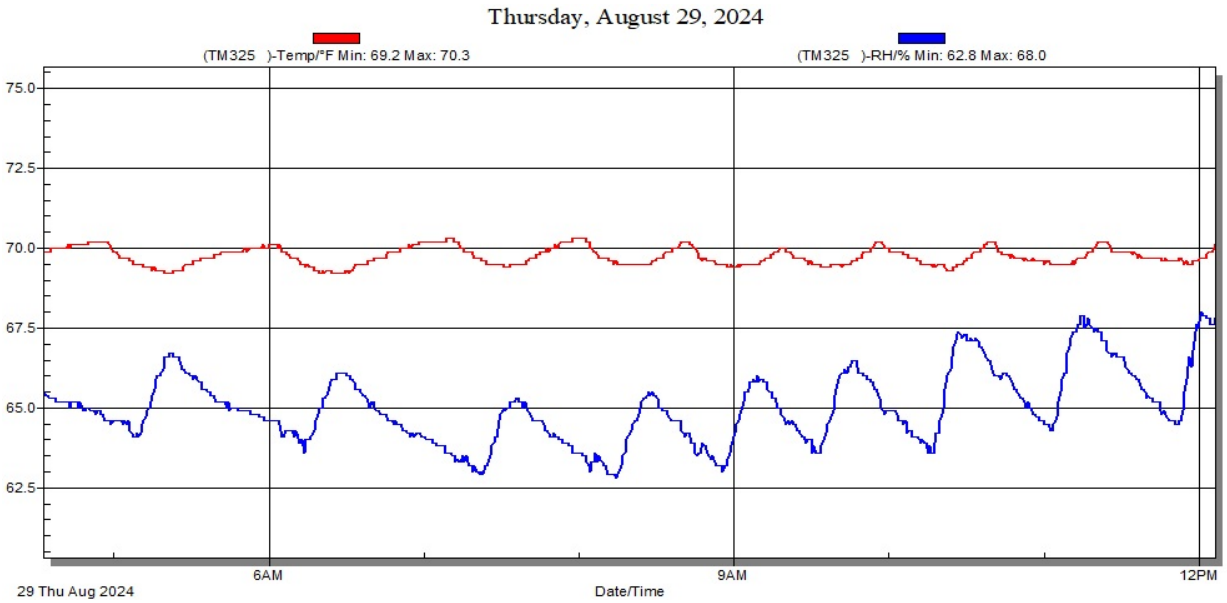
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°				
90° to 180°				
180° to 270°				
270° to 360°				

SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

DATA SHEET NO. 15
DUMMY / VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024



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:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

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)	552
Is this Vehicle equipped with an Automatic Propulsion Battery Disconnect?	Yes
Physical Location of Automatic Propulsion Battery Disconnect, if applicable	Inside Propulsion Battery
Auxiliary Battery Type	Lead-Acid

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED)

Measured Parameter	Value
Electrolyte Fluid Type	LiPF6 Salt, Carbonate Solvent
Electrolyte Fluid Specific Gravity	1.21 g/cm3
Electrolyte Fluid Kinematic Viscosity (centistokes)	3.87 cP @25 C
Electrolyte Fluid Color	Transparent & Pale Yellow
Propulsion Battery Coolant Type, Color and Specific Gravity (if applicable)	Water-Cooled, Pink
Location of Battery Modules (Inside or Outside of Passenger Compartment?)	Outside

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	380
Maximum State of Charge	V	654
95% of Maximum	V	621.3
Test Voltage *	V	716
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	
Maximum State of Charge	V	
95% of Maximum	V	
Test Voltage *	V	

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

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

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

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

Measured Parameter	Value
Details of Vehicle Chassis Ground Points & Locations	Located and the rear underside of vehicle body
Details of Propulsion Battery Components	High Voltage main cable is located at the rear side of the battery

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

Test Vehicle:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		51800115
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		06/20/2024

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	380-654
Propulsion Battery Voltage: (ready to drive position)	V_b	V	716.0
Propulsion Battery to Vehicle Chassis	V_1	V	518.0
Propulsion Battery to Vehicle Chassis	V_2	V	578.0
Propulsion Battery to Vehicle Chassis Across Known Resistor	R_o	Ω	400,000
Propulsion Battery to Vehicle Chassis with R_o installed	V_1'	V	107.4
Propulsion Battery to Vehicle Chassis with R_o installed	V_2'	V	107.2
$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$	R_{i1}	Ω	3,235,605
$R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$	R_{i2}	Ω	3,331,075
Lesser value of R_{i1} and R_{i2}	R_i	Ω	3,235,605
Electrical Isolation Value (Minimum E.I. Value is 500 Ω/V)	R_i/V_b	Ω/V	4,519

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

NOTES:

- *The measurement shall be made with the propulsion battery connected to the vehicle propulsion system, and the vehicle in the "ready-to-drive" (propulsion motor(s) activated) position.*
- *If the voltage measurement is not at the voltage or within the normal operating voltage range specified by the manufacturer, the battery must be charged.*
- *The known resistance 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:	2024 KIA EV9 5 Door SUV	NHTSA No.:	O20244221
Test Program:	NCAP Side MDB Impact Test	Test Date:	08/29/2024

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		51800115
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		06/20/2024

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_b =	13.9	V	Time:	1	Minutes	21	Seconds
V_1 =	9.3	V	Time:	1	Minutes	39	Seconds
V_2 =	7.5	V	Time:	1	Minutes	54	Seconds
R_o =	400,000	Ω					
V_1' =	0.0	V	Time:	2	Minutes	2	Seconds
V_2' =	0.5	V	Time:	2	Minutes	7	Seconds
R_{i1} =	Zero Volts	Ω	Time:	2	Minutes	2	Seconds
R_{i2} =	12,544,000	Ω	Time:	2	Minutes	7	Seconds
R_i =	12,544,000	Ω/V	Time:	2	Minutes	7	Seconds
R_i/V_b =	902,446	Ω/V	Time:	2	Minutes	7	Seconds

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

NOTES:

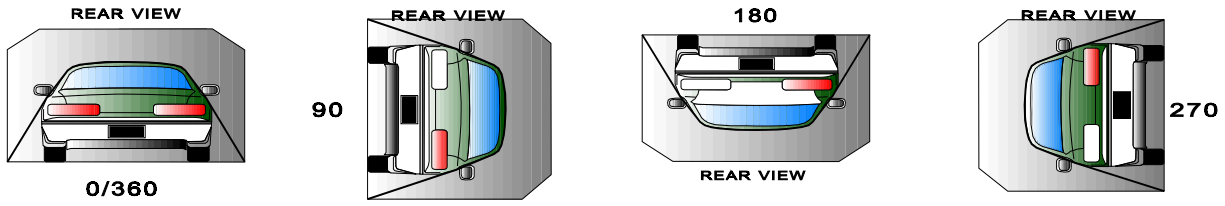
- *$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$, $R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$, R_i = Lesser value of R_{i1} and R_{i2}*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*
- *Minimum Electrical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

PROPULSION BATTERY SYSTEM COMPONENTS

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

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

Test Vehicle: 2024 KIA EV9 5 Door SUV
NHTSA No.: O20244221
Test Program: NCAP Side MDB Impact Test
Test Date: 08/29/2024



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	10	5	6	10	7
90° to 180°	1	2	5	6	2	7
180° to 270°	1	9	5	6	9	7
270° to 360°	1	7	5	6	7	7

ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

Rollover Stage	Propulsion Battery Electrolyte Spillage	Units	Spillage Location
0° to 90°	0	Liters	None
90° to 180°	0	Liters	None
180° to 270°	0	Liters	None
270° to 360°	0	Liters	None
Total Spillage	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
Serial No.		51800115
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		06/20/2024

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: 2024 KIA EV9 5 Door SUV NHTSA No.: O20244221
Test Program: NCAP Side MDB Impact Test Test Date: 08/29/2024

ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Parameter	Rollover Stage	Value	Units	R_o=400,000 Ω	Minutes	Seconds
V_b =	90°	13.9	V	Time:	7	23
	180°	13.9	V		14	2
	270°	0.1	V		22	1
	360°	0.0	V		27	40
V_1 =	90°	8.3	V	Time:	7	33
	180°	6.5	V		14	19
	270°	0.0	V		22	9
	360°	0.0	V		27	50
V_2 =	90°	7.4	V	Time:	7	38
	180°	9.2	V		14	26
	270°	0.0	V		22	30
	360°	0.0	V		28	1
V_1' =	90°	1.5	V	Time:	7	49
	180°	0.8	V		14	32
	270°	0.0	V		22	36
	360°	0.0	V		28	12
V_2' =	90°	0.6	V	Time:	7	55
	180°	0.5	V		14	38
	270°	0.0	V		22	40
	360°	0.0	V		28	16
R_{i1} =	90°	3,430,040	Ω	Time:	7	49
	180°	6,883,846	Ω		14	32
	270°	Zero Volts	Ω		22	36
	360°	Zero Volts	Ω		28	12
R_{i2} =	90°	9,618,018	Ω	Time:	7	55
	180°	11,877,391	Ω		14	38
	270°	Zero Volts	Ω		22	40
	360°	Zero Volts	Ω		28	16
R_i =	90°	3,430,040	Ω/V	Time:	7	49
	180°	6,883,846	Ω/V		14	32
	270°	Zero Volts	Ω/V		22	40
	360°	Zero Volts	Ω/V		28	16
R_i/V_b =	90°	246,765	Ω/V	Time:	7	49
	180°	495,241	Ω/V		14	32
	270°	Zero Volts	Ω/V		22	40
	360°	Zero Volts	Ω/V		28	16

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

APPENDIX A

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Figure A-1: As Delivered Right Front ¾ View of Test Vehicle



Figure A-2: As Delivered Left Rear ¾ View of Test Vehicle



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



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



Figure A-5: Pre-Test Left Front ¾ View of Test Vehicle



Figure A-6: Post-Test Left Front ¾ View of Test Vehicle



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



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



Figure A-9: Pre-Test Left Rear ¾ View of Test Vehicle



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



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



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



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



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



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

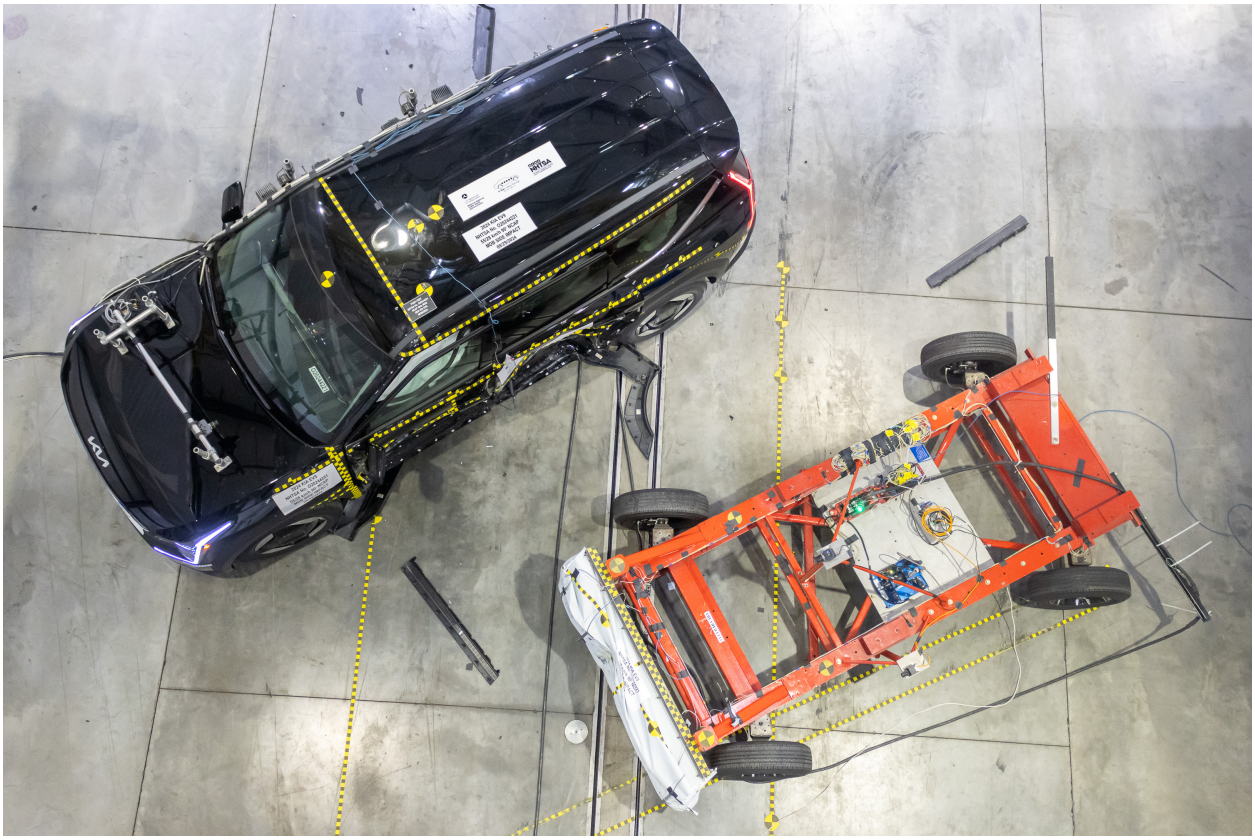


Figure A-16: Post-Test Overhead View of Test Area



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



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



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



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



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



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

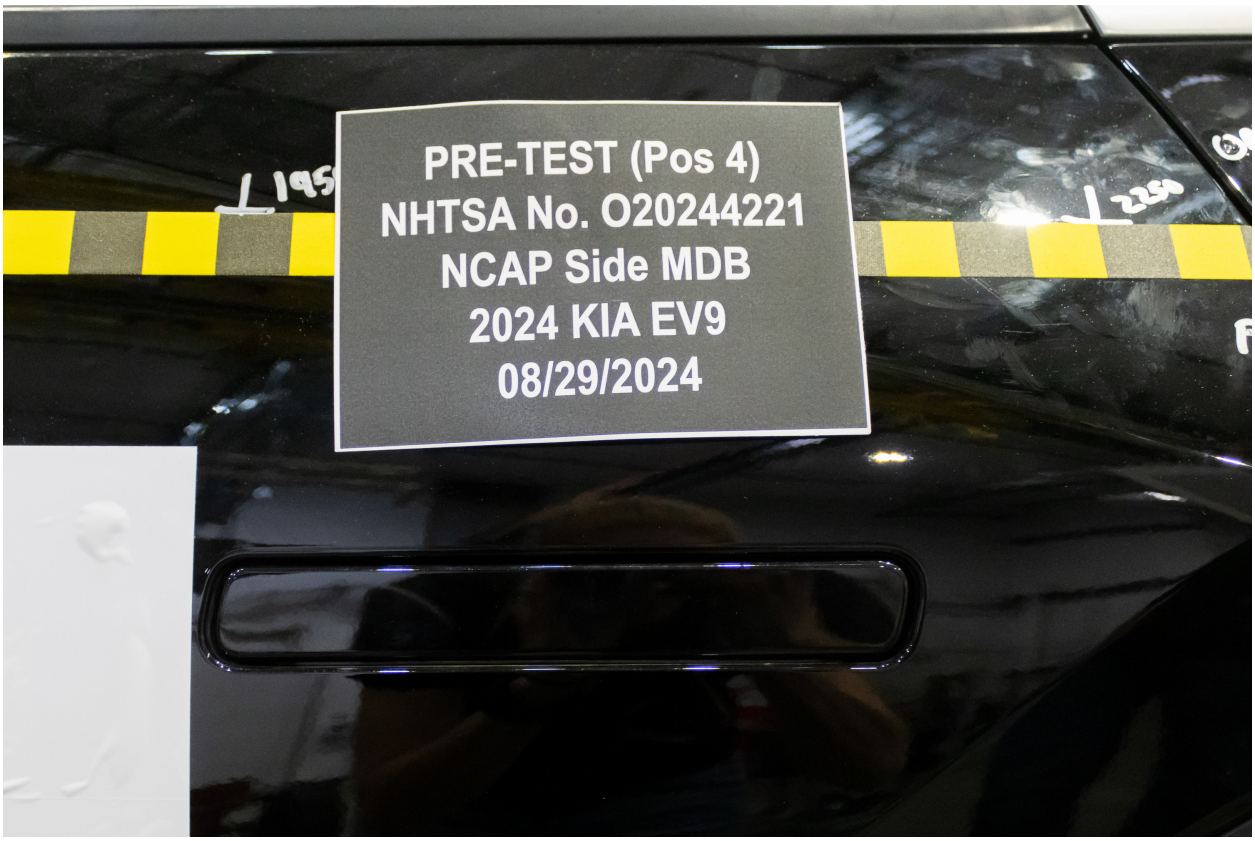


Figure A-23: Pre-Test Left Rear Door Latch Close-Up



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



Figure A-27: Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking



Figure A-28: Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View



Figure A-29: Post-Test Left Side View of Driver Dummy Shoulder and Door Top View



Figure A-30: Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning



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



Figure A-41: Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Figure A-42: Pre-Test Driver Dummy and Door Clearance View



Figure A-43: Post-Test Driver Dummy and Door Clearance View



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



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

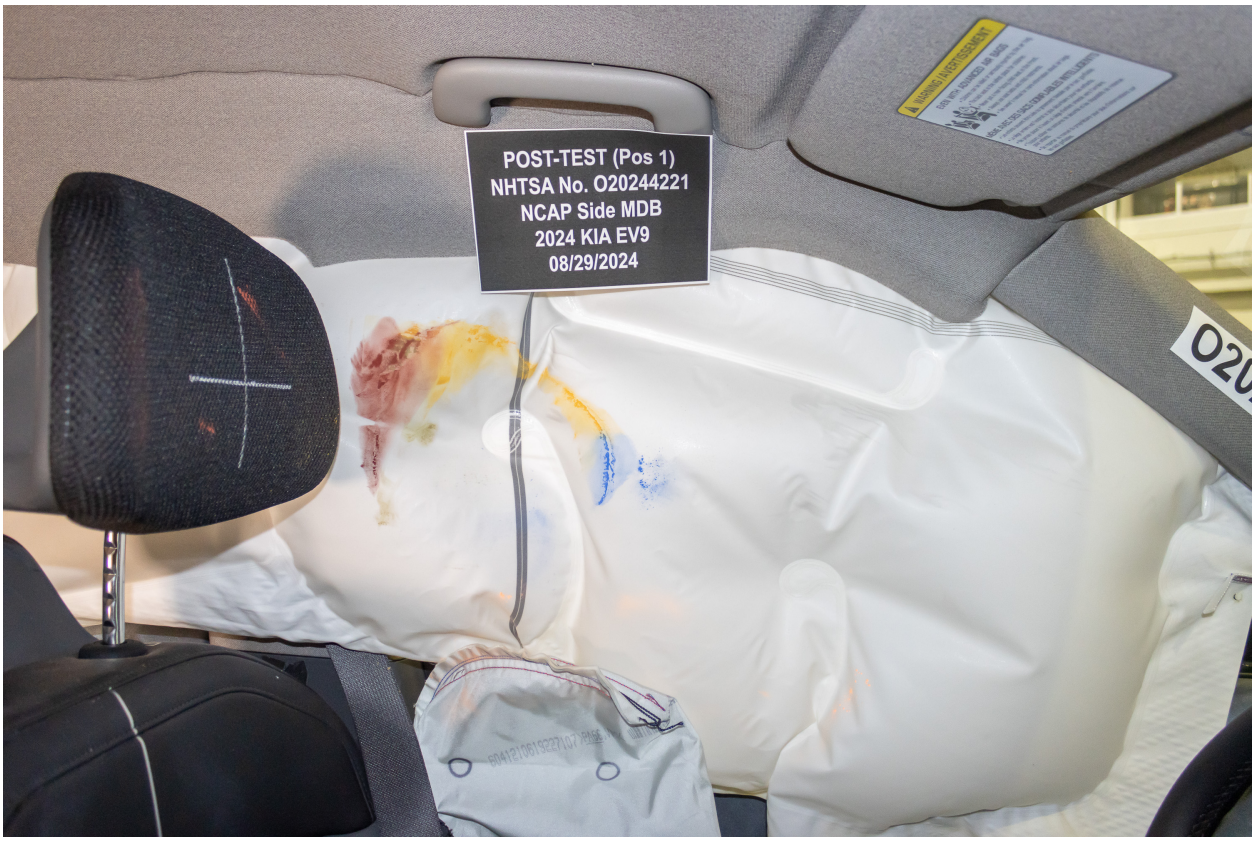


Figure A-49: Post-Test Driver Dummy Close-Up Head Contact with Side Air Bag View



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

Photo Not Applicable

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



Figure A-56: Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View



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



Figure A-61: Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan



Figure A-62: Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket



Figure A-63: Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level



Figure A-64: Pre-Test Placement of Rear Passenger Dummy's Feet



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



Figure A-71: Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



Figure A-72: Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



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



Figure A-77: Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View



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 Charging Port



Figure A-83: Post-Test Charging Port



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

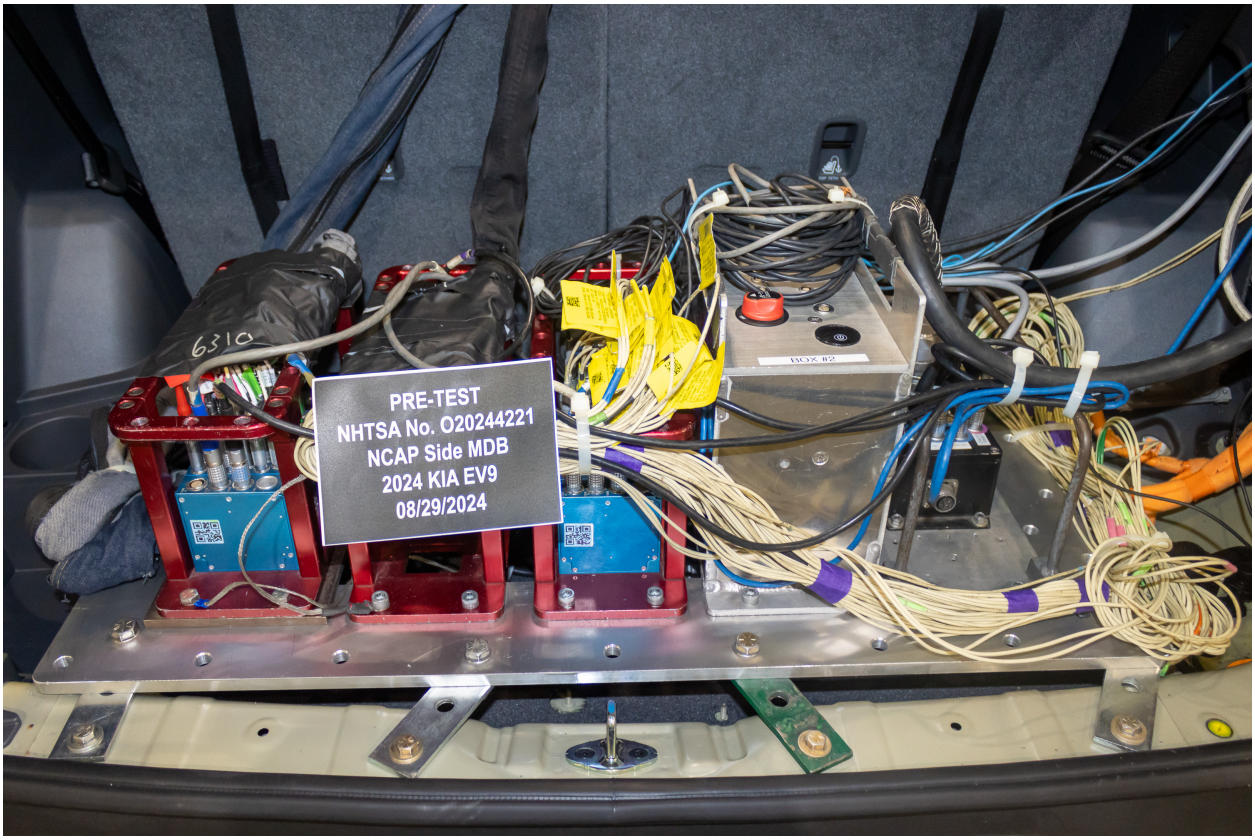


Figure A-94: Pre-Test Ballast View



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

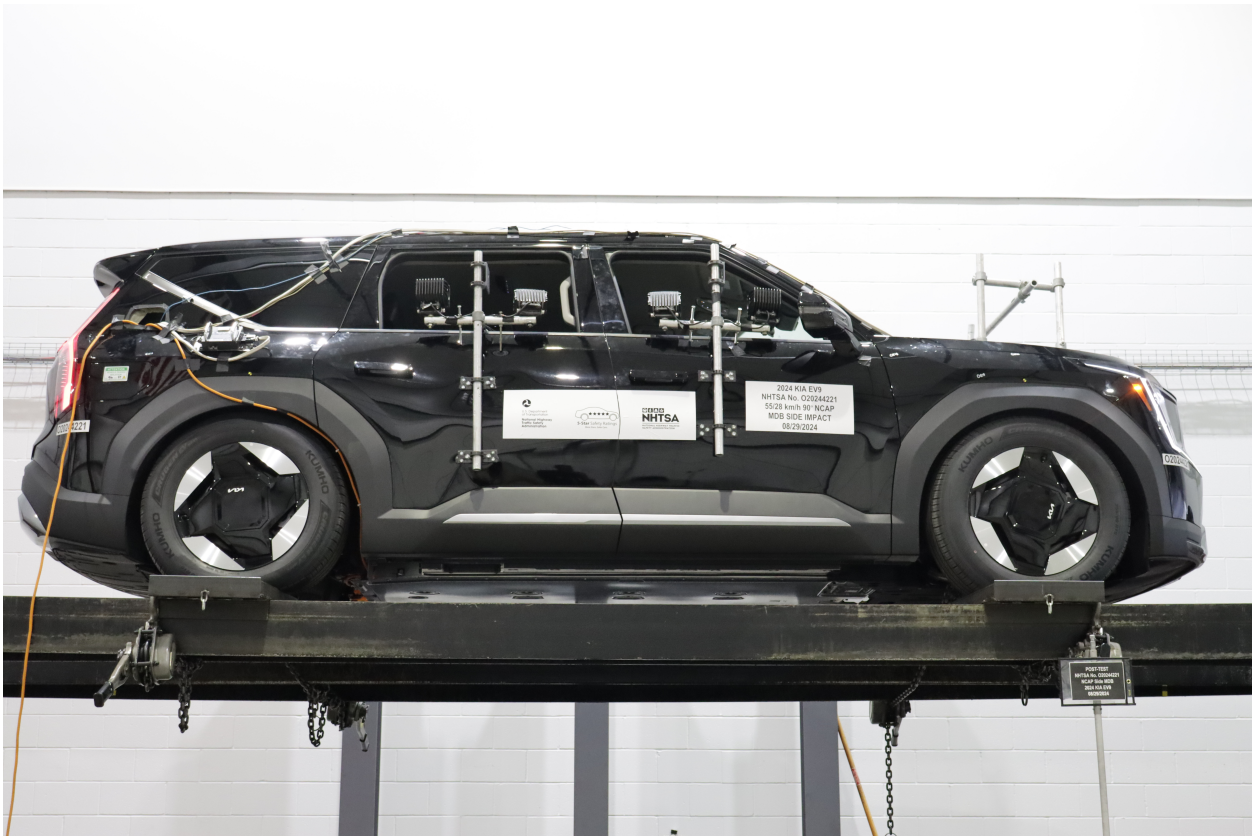


Figure A-96: FMVSS No. 301 Static Rollover 0 Degrees

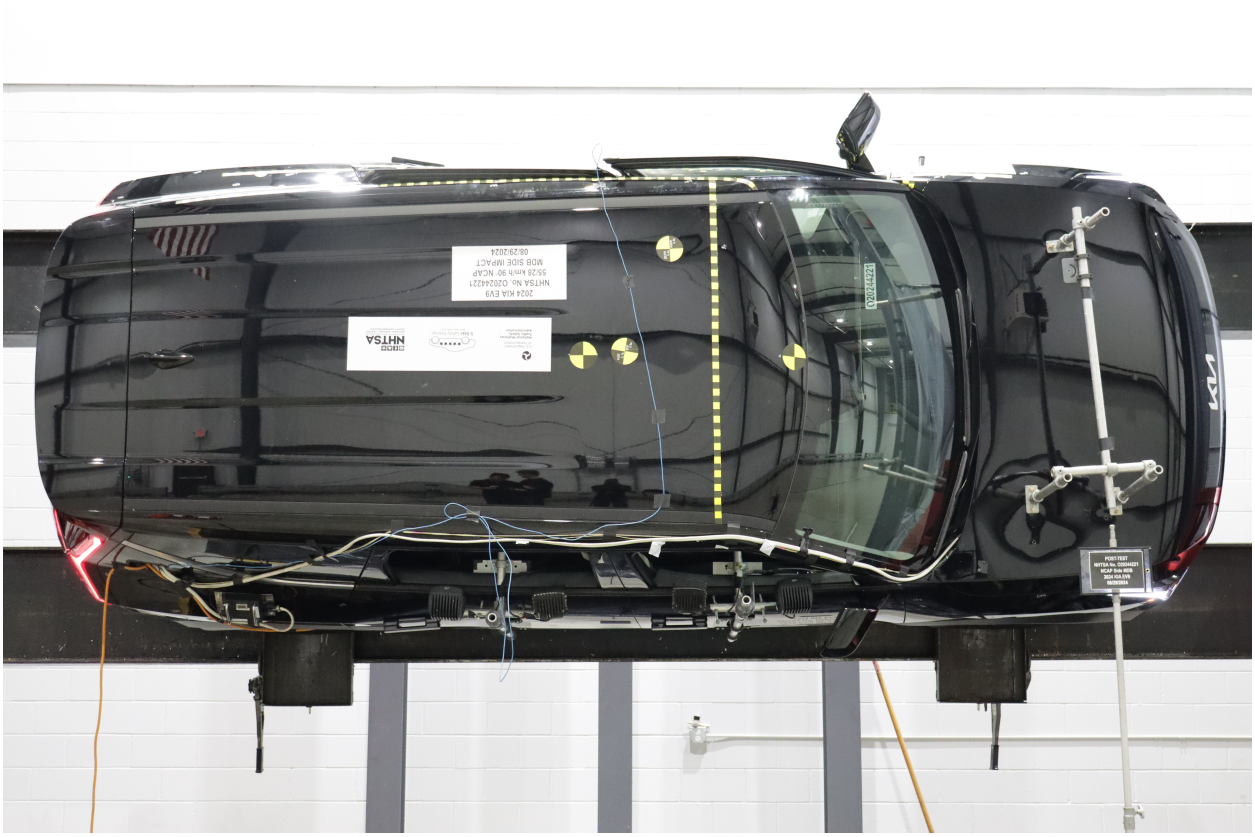


Figure A-97: FMVSS No. 301 Static Rollover 90 Degrees

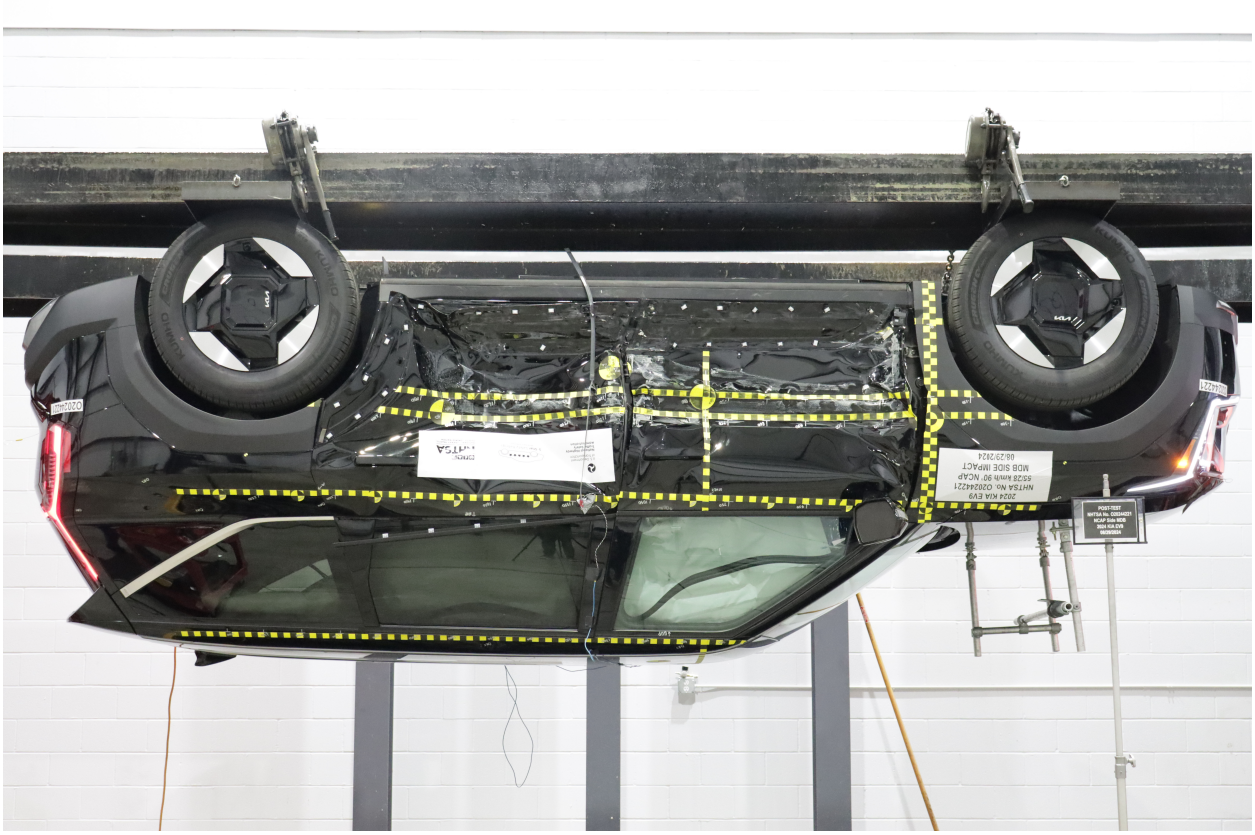


Figure A-98: FMVSS No. 301 Static Rollover 180 Degrees

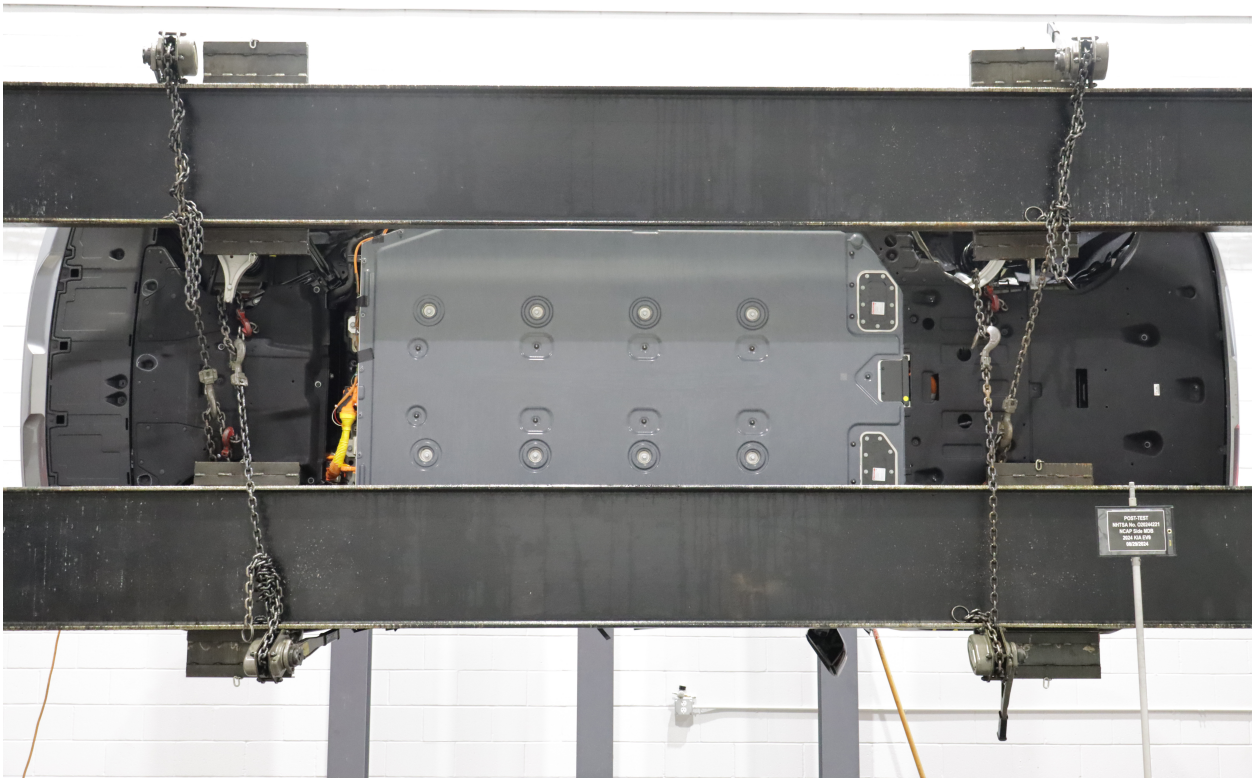


Figure A-99: FMVSS No. 301 Static Rollover 270 Degrees

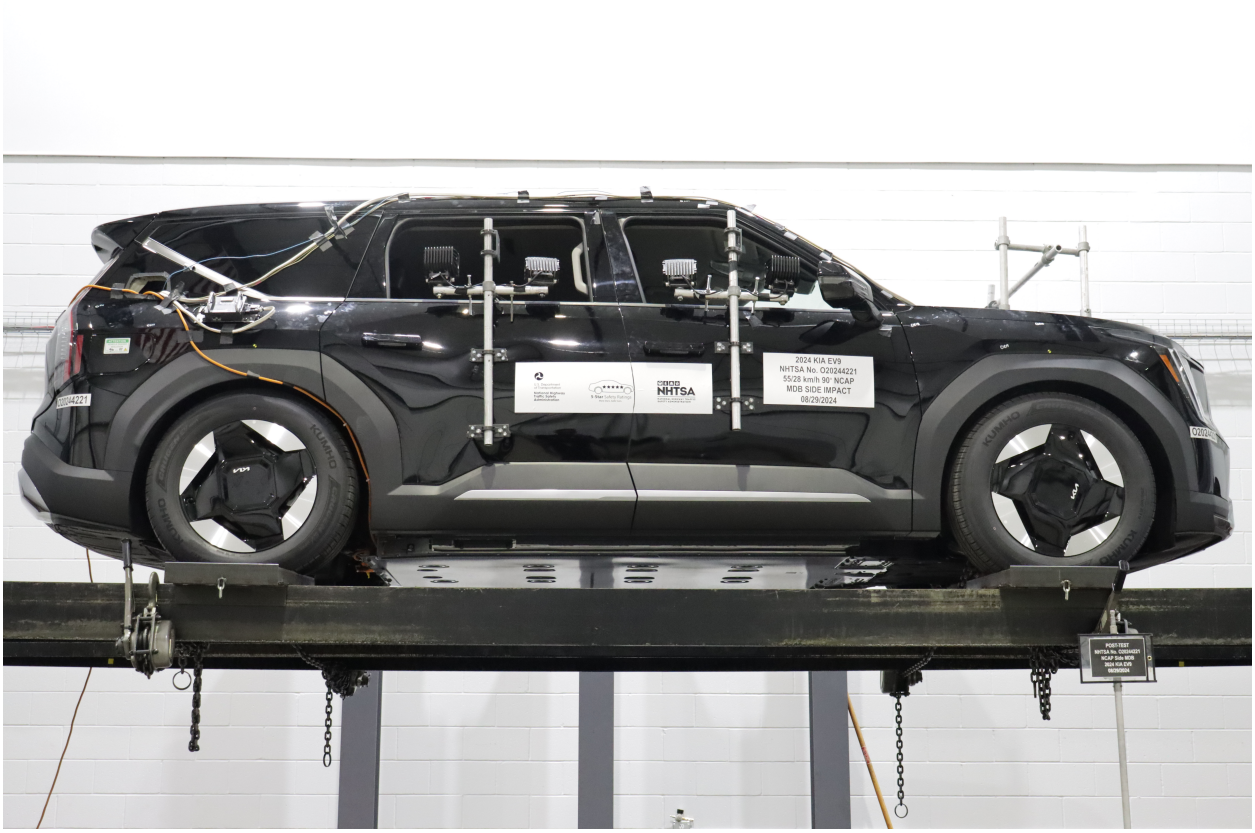


Figure A-100: FMVSS No. 301 Static Rollover 360 Degrees



Figure A-101: Impact Event

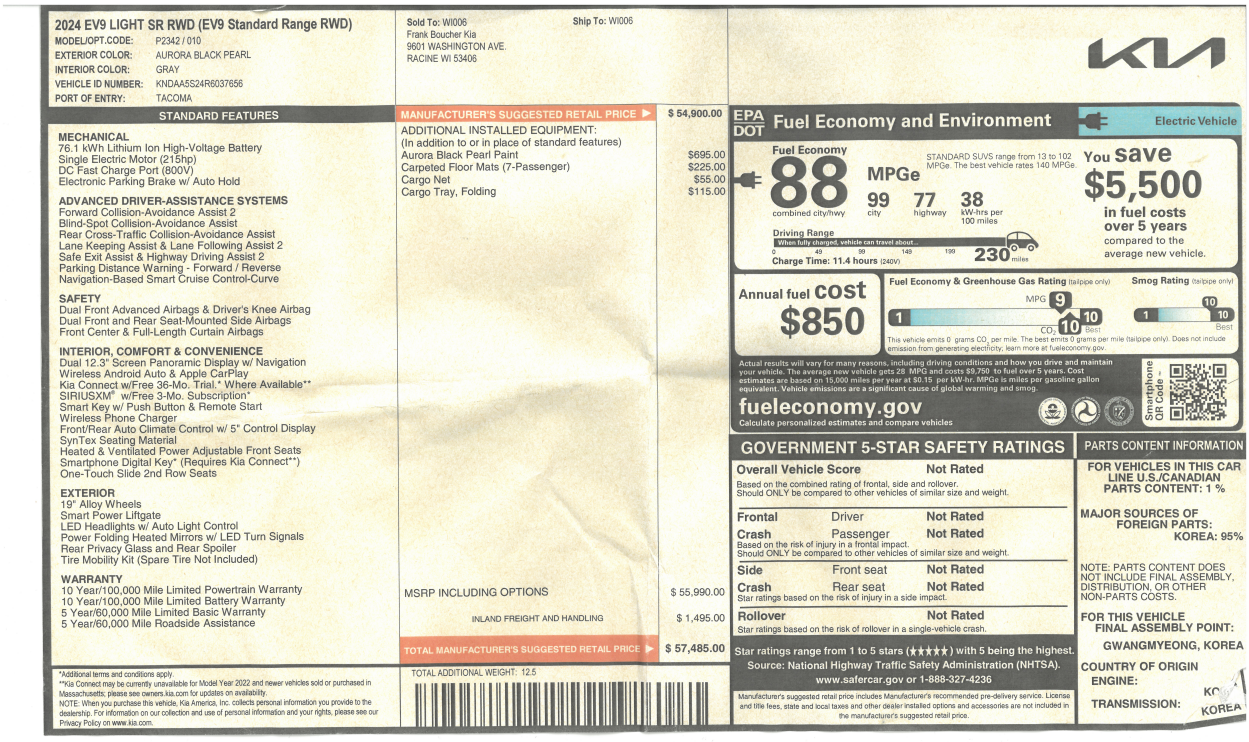


Figure A-102: Monroney Label

Safety features of your Kia

Seat

Adjusting the height up and down

To raise the headrest:

- Pull it up to the desired position (1).
- To lower the headrest, push and hold the release button (2) on the headrest support.
- Lower the headrest to the desired position (3).

NOTICE

If you move the seatback forward with the headrest and seat cushion raised, the headrest may contact the sun visor or other parts of the vehicle.

To remove the headrest:

1. Recline the seatback (2) with the recliner lever or switch (1).
2. Raise headrest to the maximum height.
3. Press the headrest release button (3) while pulling the headrest up (4).

WARNING

Removing headrest

NEVER allow anyone to ride in a seat with the headrest removed or reversed. Headrests can provide critical neck and head support in an accident.

Reinstalling headrest

To reinstall the headrest:

1. Put the headrest poles (2) into the holes while pressing the release button (1).
2. Recline the seatback (4) with the recliner lever or switch (3).
3. Adjust the headrest to the appropriate height.

WARNING

Headrest Reinstallation

To reduce the risk of injury to the head or neck, always make sure the headrest

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

Safety features of your Kia

Seat

Headrest for rear seat

The rear seat is equipped with headrests in all the seating positions for the occupant's safety and comfort.

The headrest not only provides comfort for passengers, but also helps protect the head and neck in the event of a collision.

To maximize the effectiveness in case of accidents, the headrest should be adjusted so the middle of the headrest is as high as the center of gravity of an occupant's head. Generally, the center of gravity of most people's heads is similar with the height as the top of their eyes. Also, adjust the headrest as close to your head as possible. For this reason, the use of a cushion that holds the body away from the seatback is not recommended.

Adjusting the height up and down

- To raise the headrest, pull it up to the desired position (1).
- To lower the headrest, push and hold the release button (2) on the headrest support and lower the headrest to the desired position (3).

Removal and reinstallation

- To remove the headrest, raise it as far as it can go then press the release button (1) while pulling the headrest upward (2).
- To reinstall the headrest, put the headrest poles (3) into the holes while pressing the release button (1).

Then adjust it to the appropriate height and ensure that it locks in position.

Wing-out headrest (if equipped)

For rear outboard passenger's comfort, the ends of the headrest can be adjusted inward.

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Figure A-104: Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

Photo Not Available

Figure 305-1: Auxiliary Power Module Warning Label



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(s) Related to Electrical Propulsion System



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



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



Figure 305-8: Manual High Voltage Service Disconnect Removed (Location where removed)



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)

Photo Not Applicable

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

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

Photo Not Applicable

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

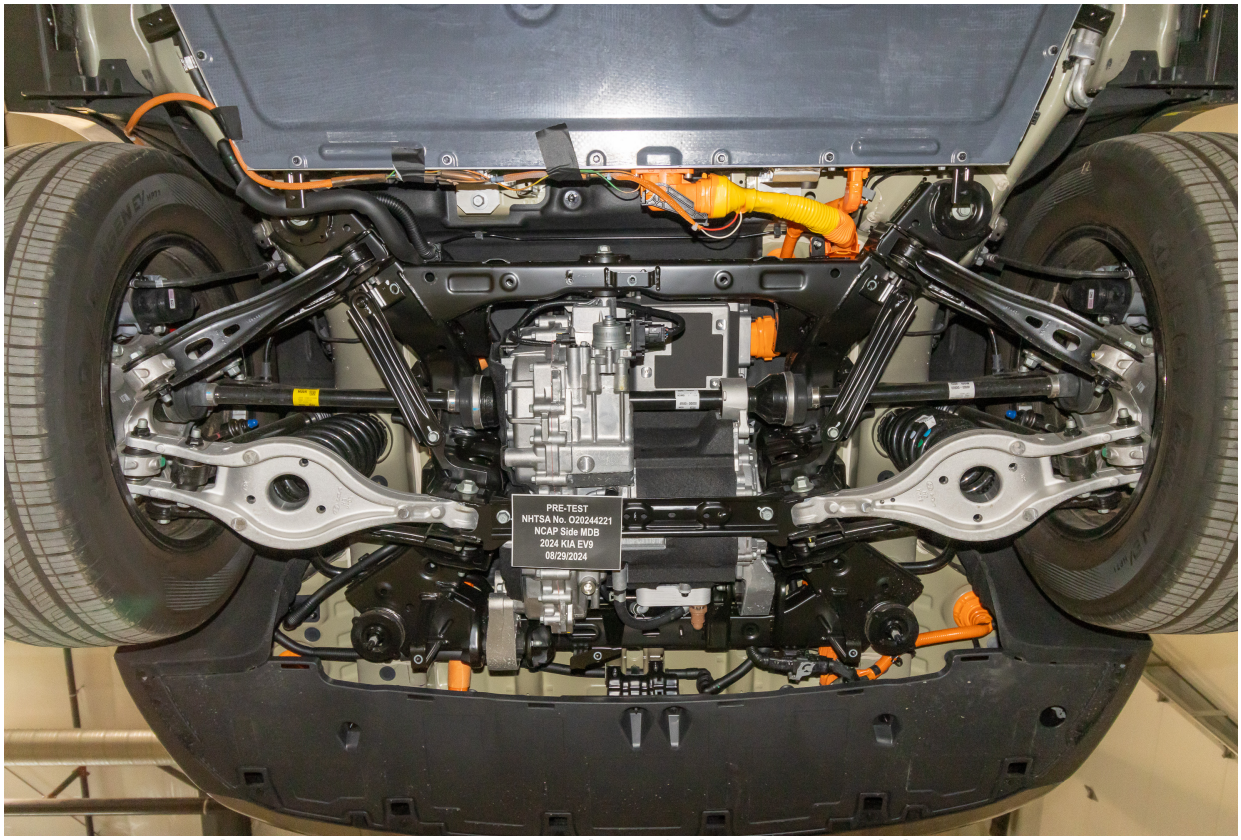


Figure 305-16: Pre-Impact View of Electric Propulsion Drive

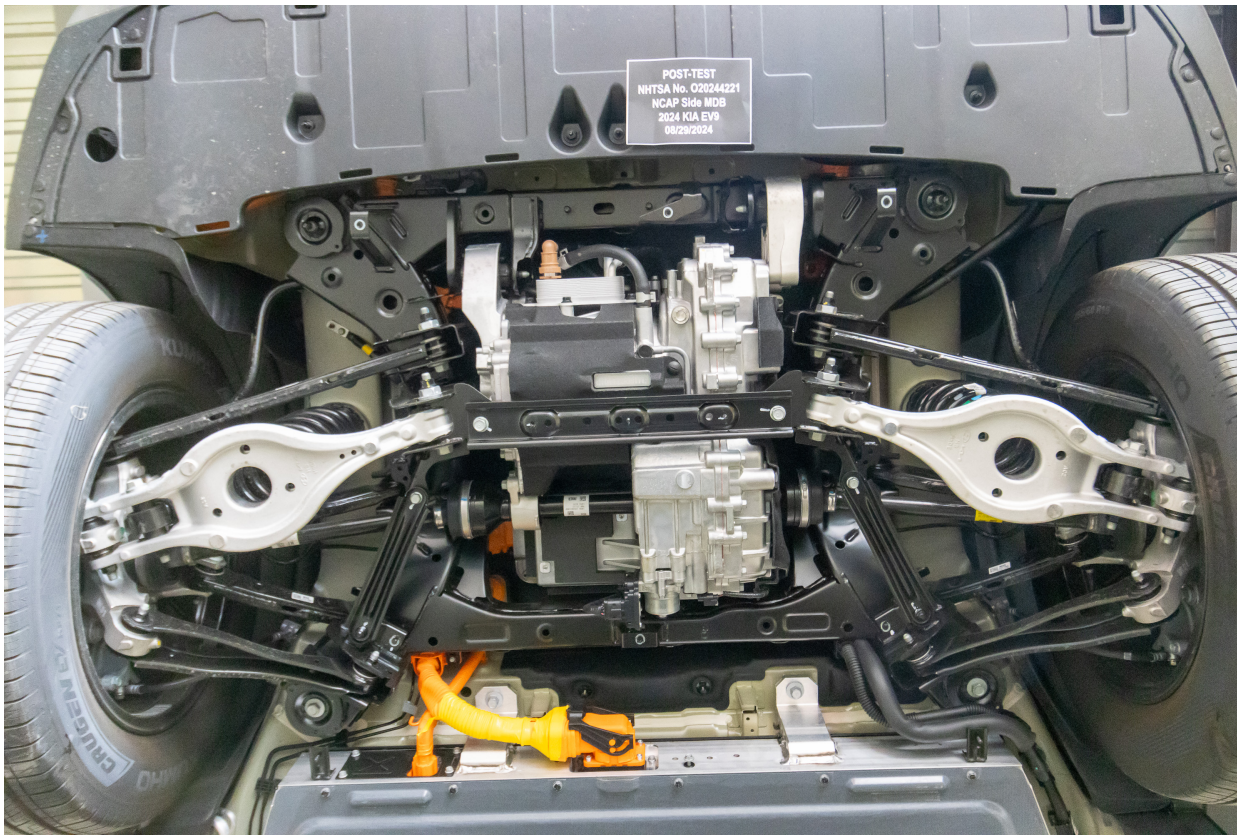


Figure 305-17: Post-Impact View of Electric Propulsion Drive



Figure 305-18: Pre-Impact View of High Voltage Interconnect(s)

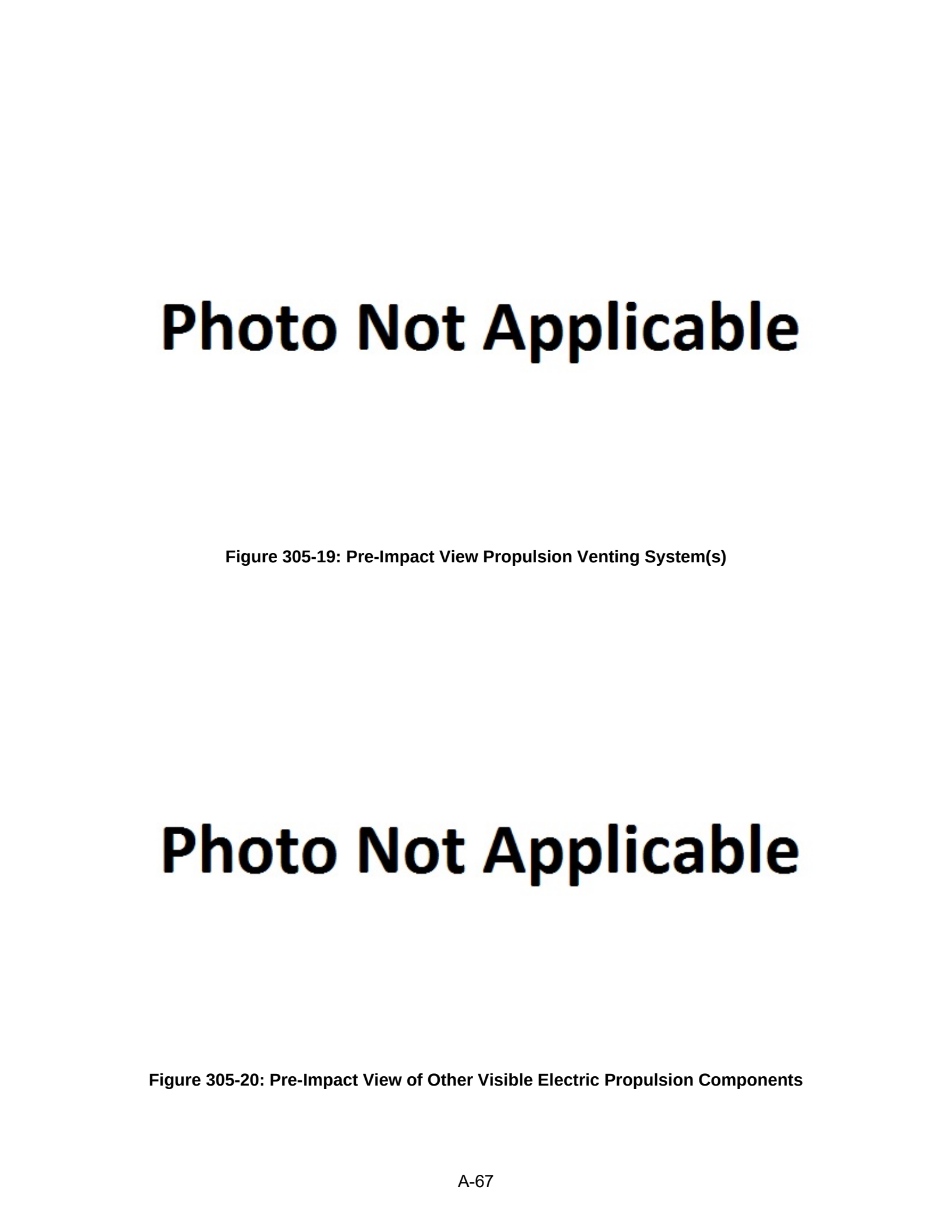


Figure 305-19: Pre-Impact View Propulsion Venting System(s)

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

Photo Not Applicable

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

Photo Not Applicable

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

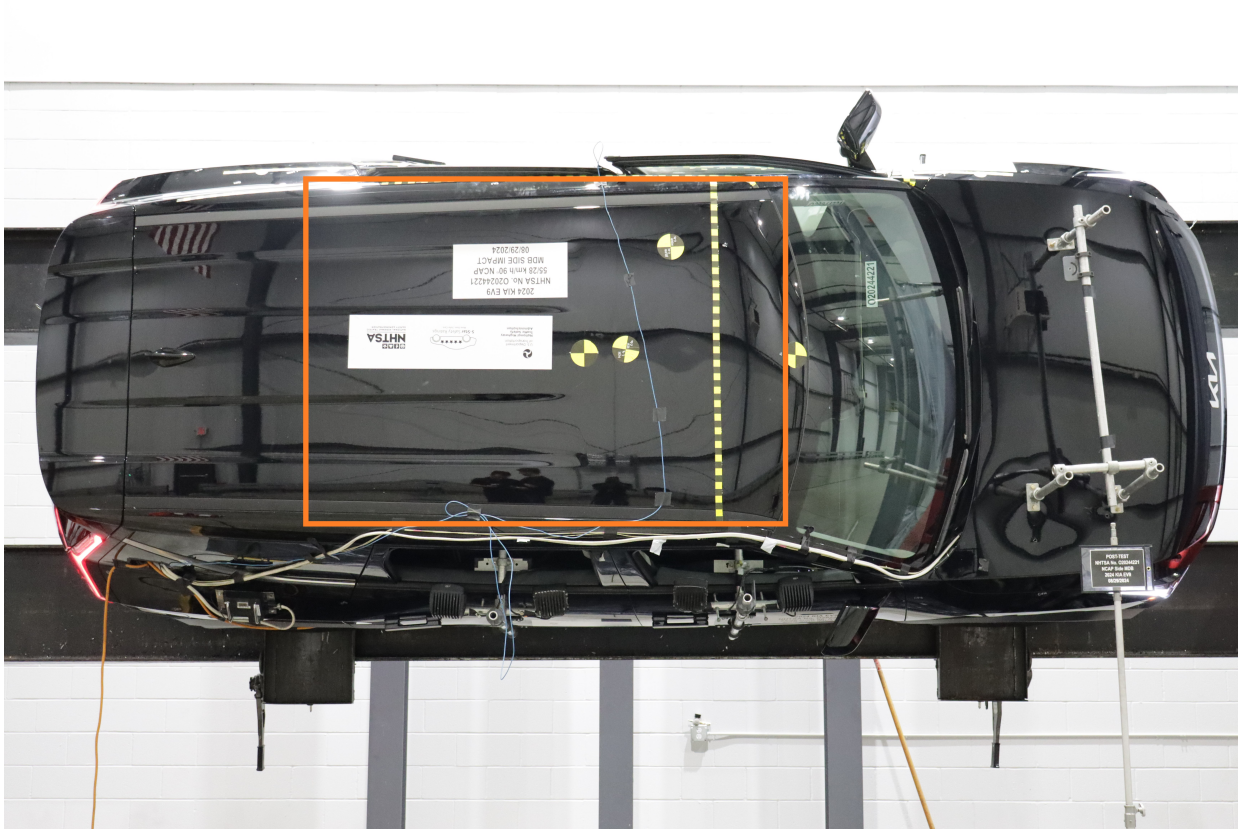


Figure 305-28: FMVSS No. 305 Static Rollover 90 Degrees

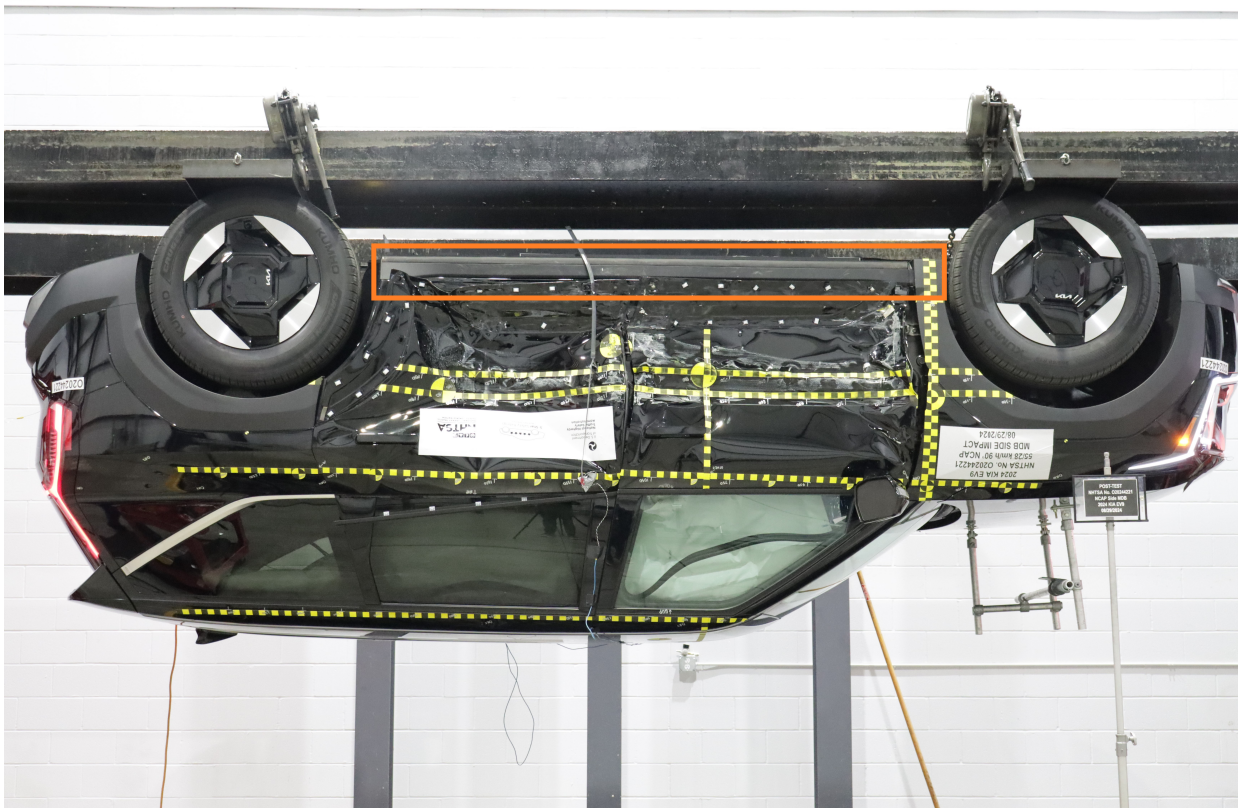


Figure 305-29: FMVSS No. 305 Static Rollover 180 Degrees

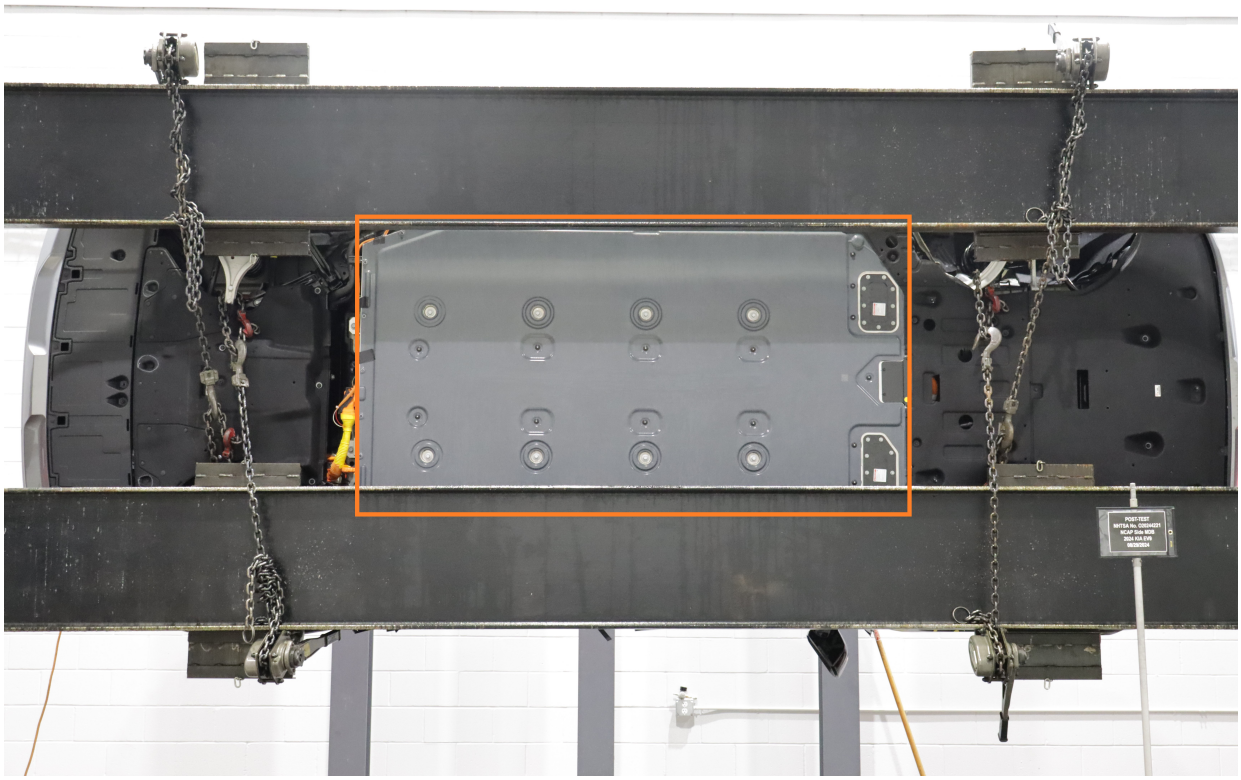


Figure 305-30: FMVSS No. 305 Static Rollover 270 Degrees

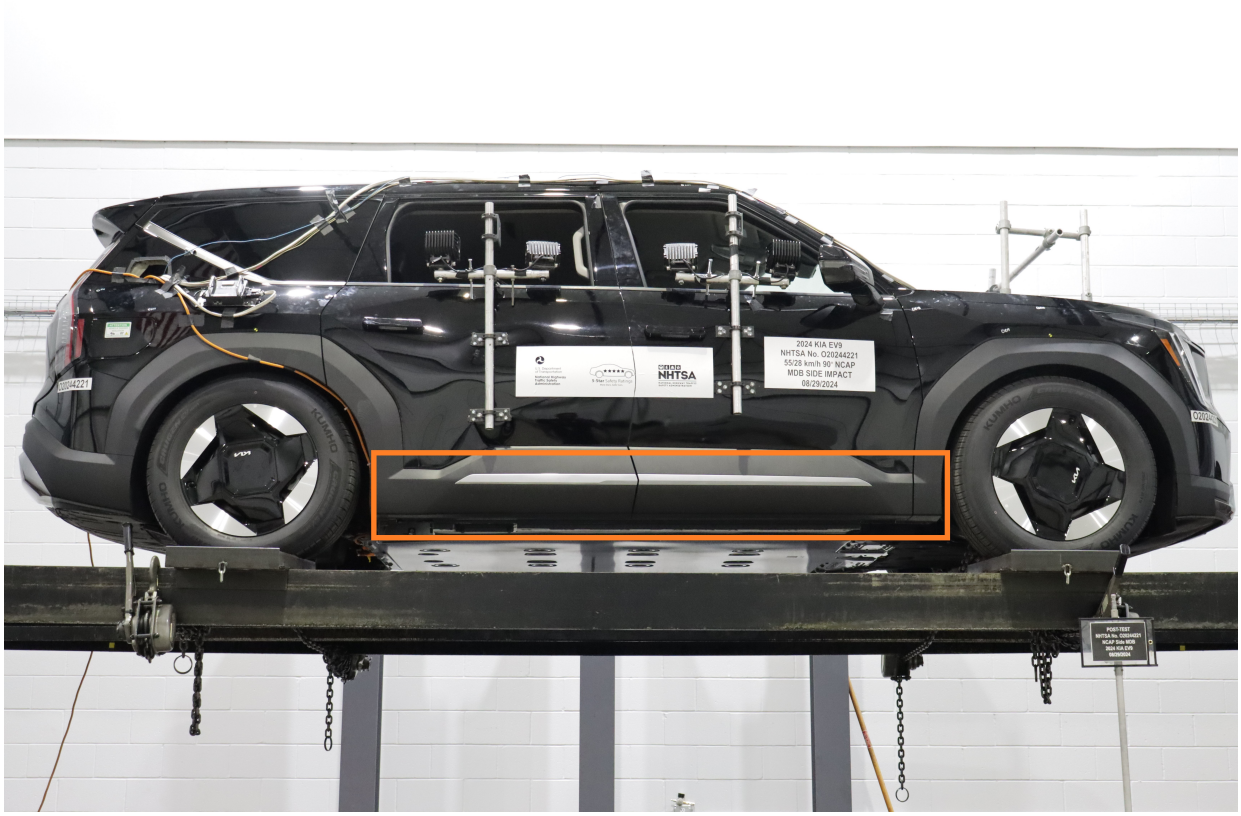


Figure 305-31: FMVSS No. 305 Static Rollover 360 Degrees



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



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

Photo Not Applicable

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

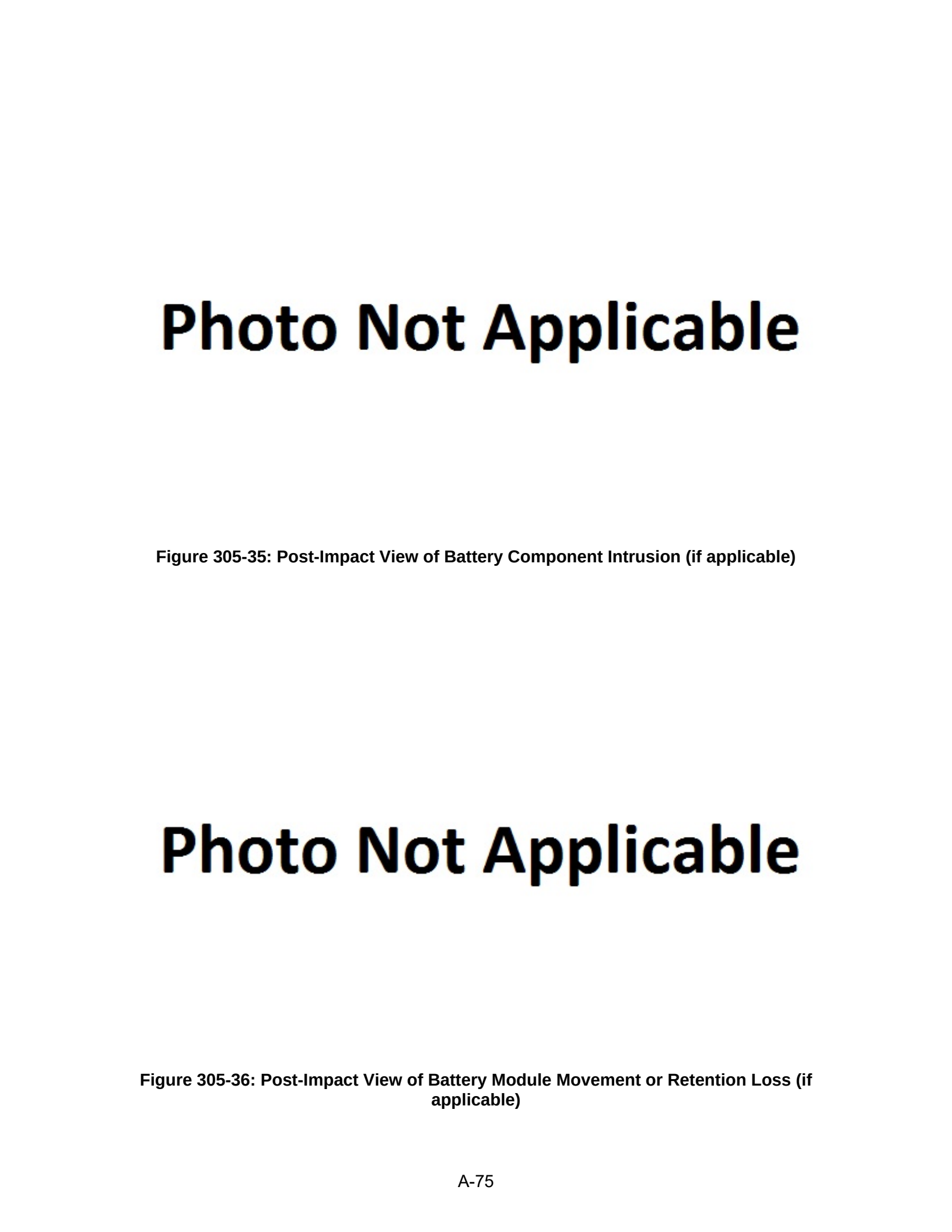


Figure 305-35: Post-Impact View of Battery Component Intrusion (if applicable)

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

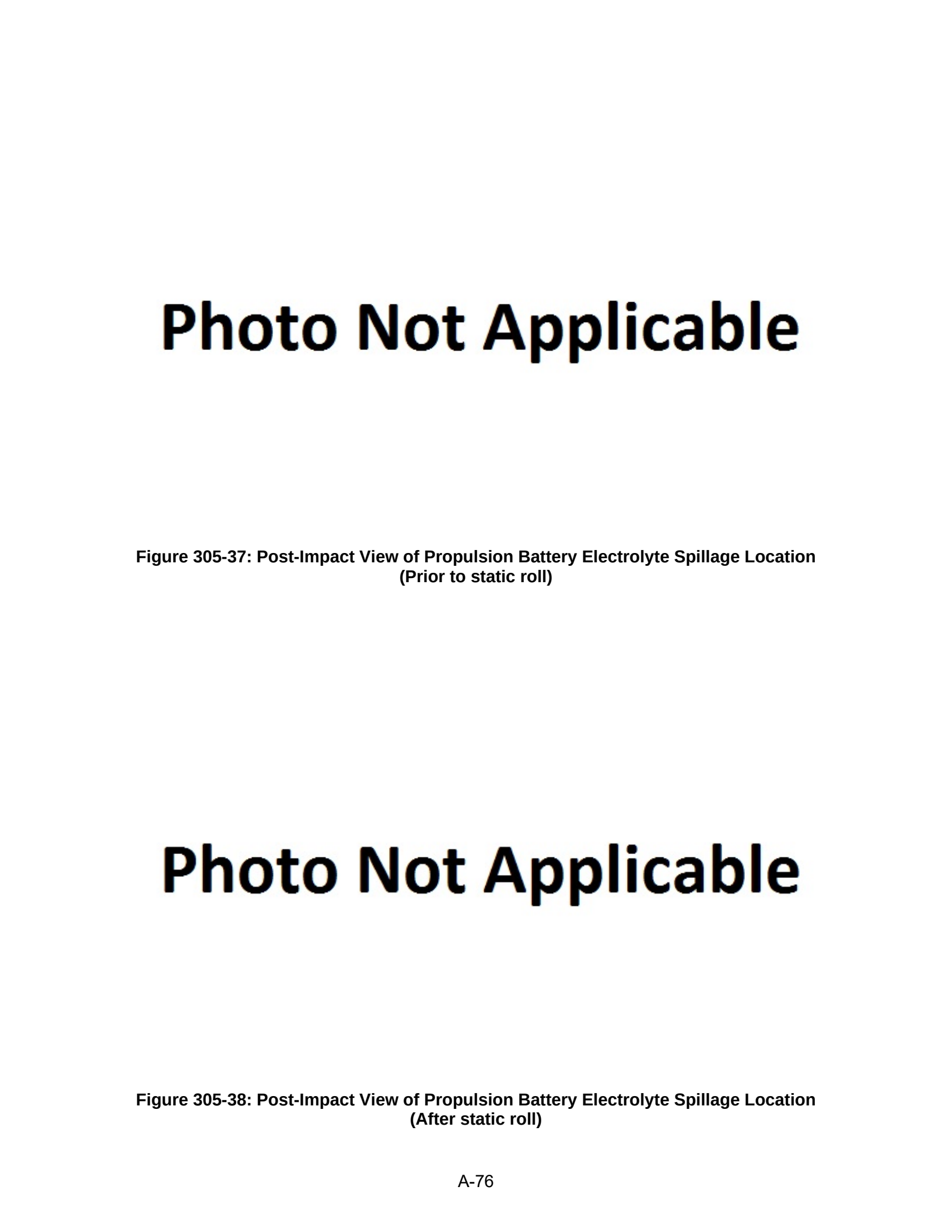


Figure 305-37: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (Prior to static roll)

Figure 305-38: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (After static roll)

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA TRACES

Table of Data Plots
Driver Dummy Instrumentation Plots

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Plot 1	Driver Head Acceleration (X) Primary vs. Time	B-5
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Plot 7	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-6
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Plot 22	Passenger Iliac Force on Impact Side (Y) vs. Time	B-10
Plot 23	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-10
Plot 24	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-10

The following additional dummy and vehicle response data 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)

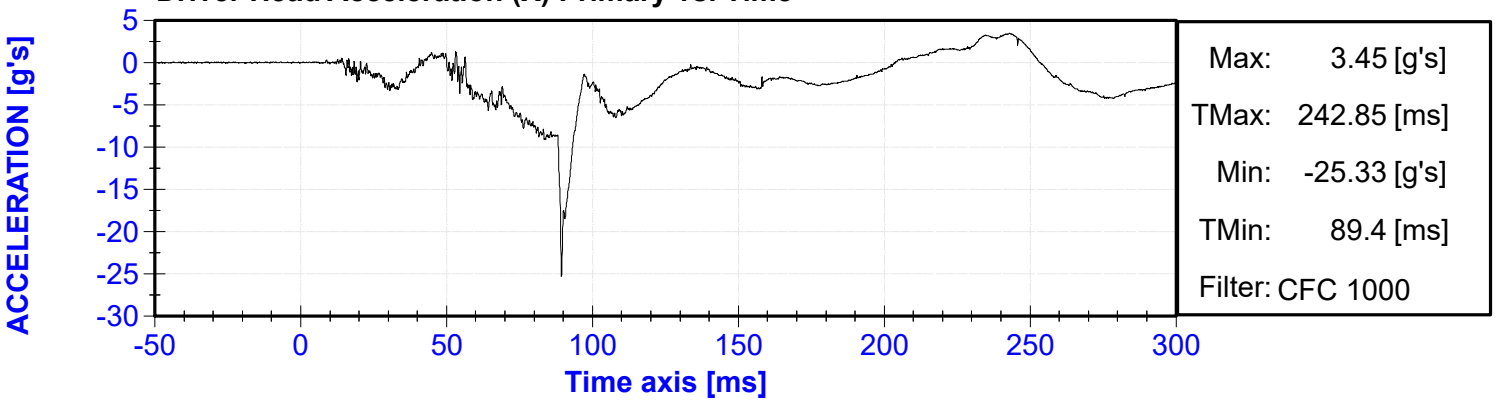
Vehicle Instrumentation Data

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)

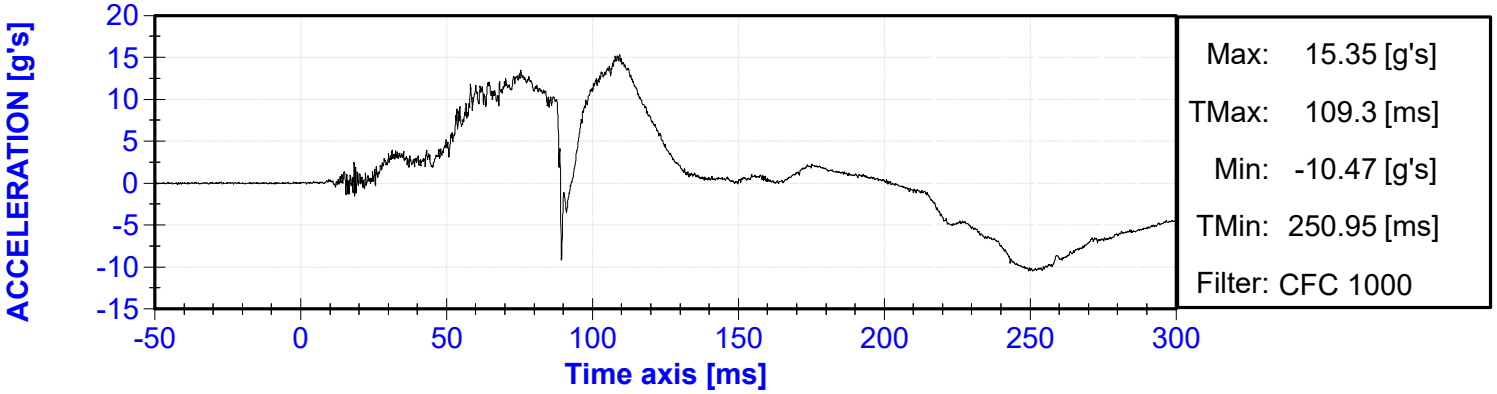
MDB Instrumentation Data

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

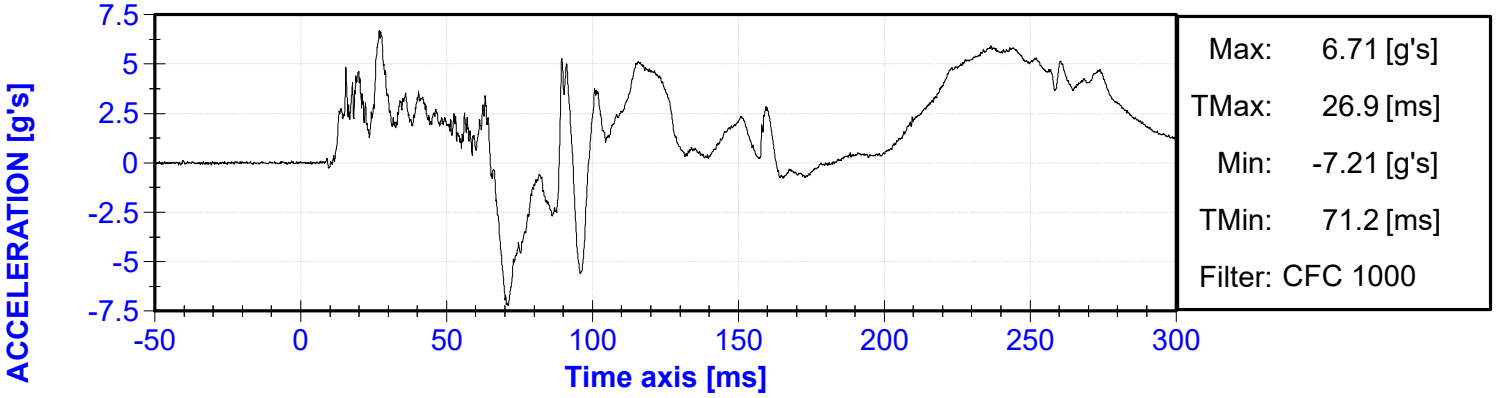
Driver Head Acceleration (X) Primary vs. Time



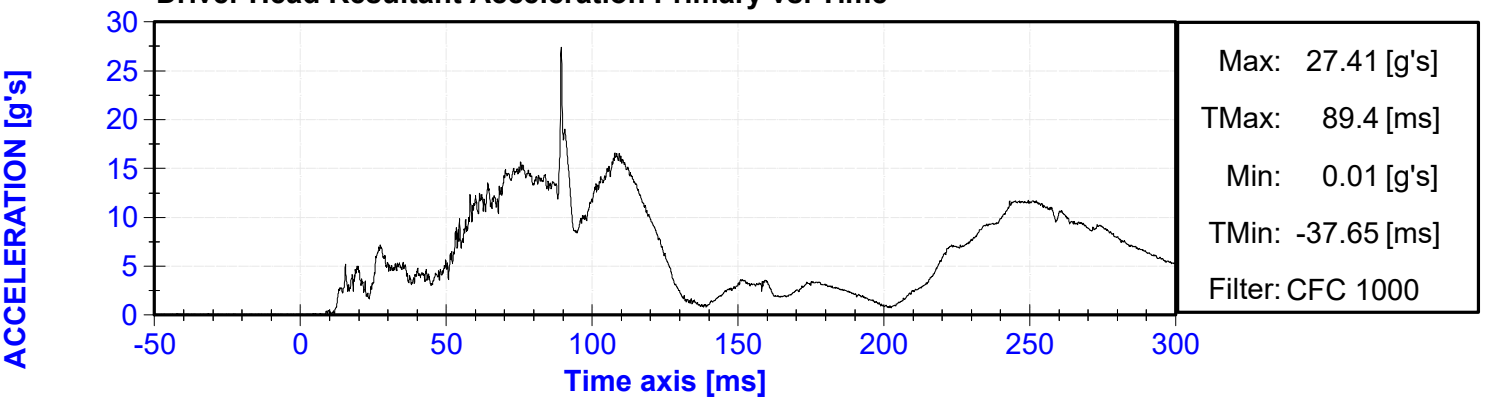
Driver Head Acceleration (Y) Primary vs. Time

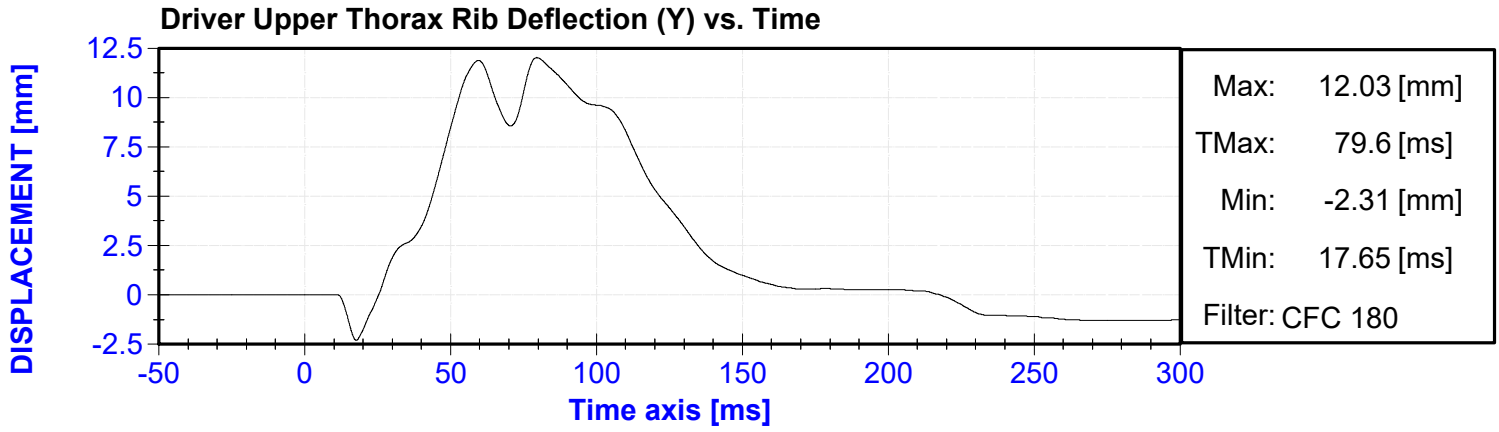


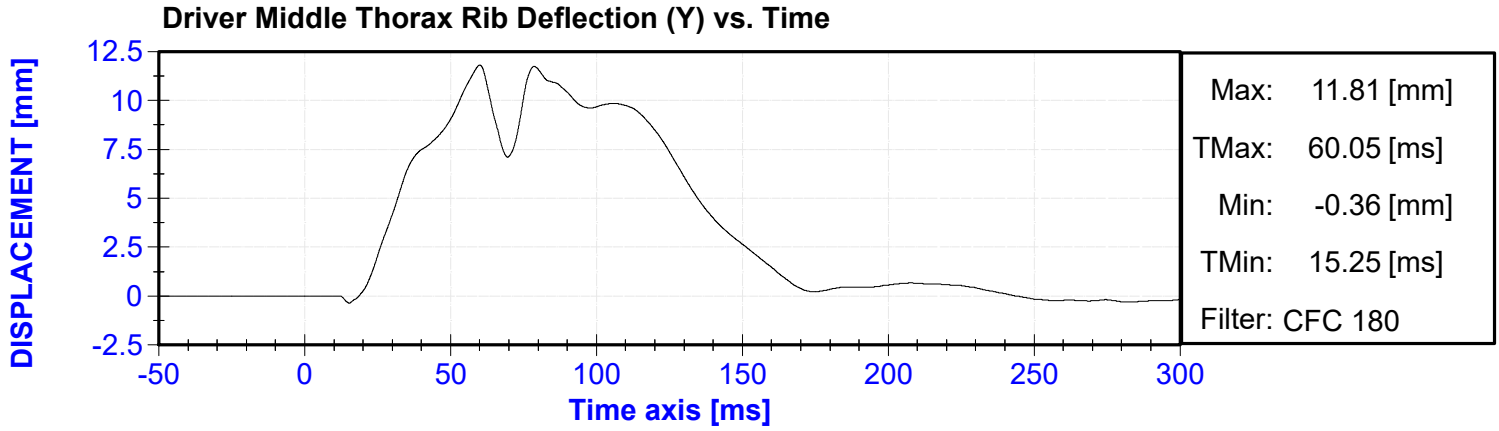
Driver Head Acceleration (Z) Primary vs. Time

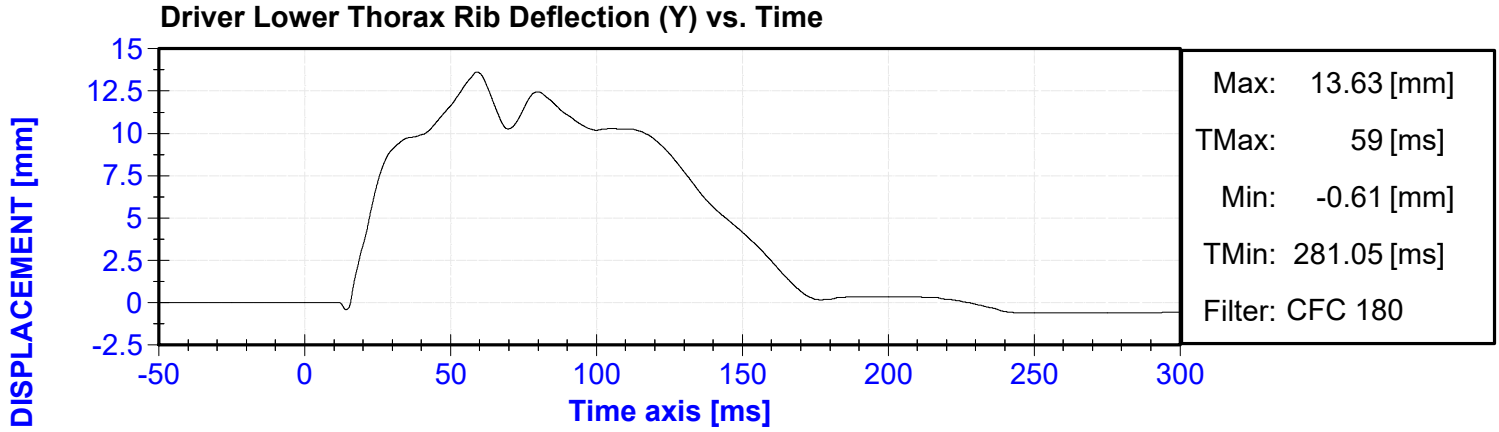


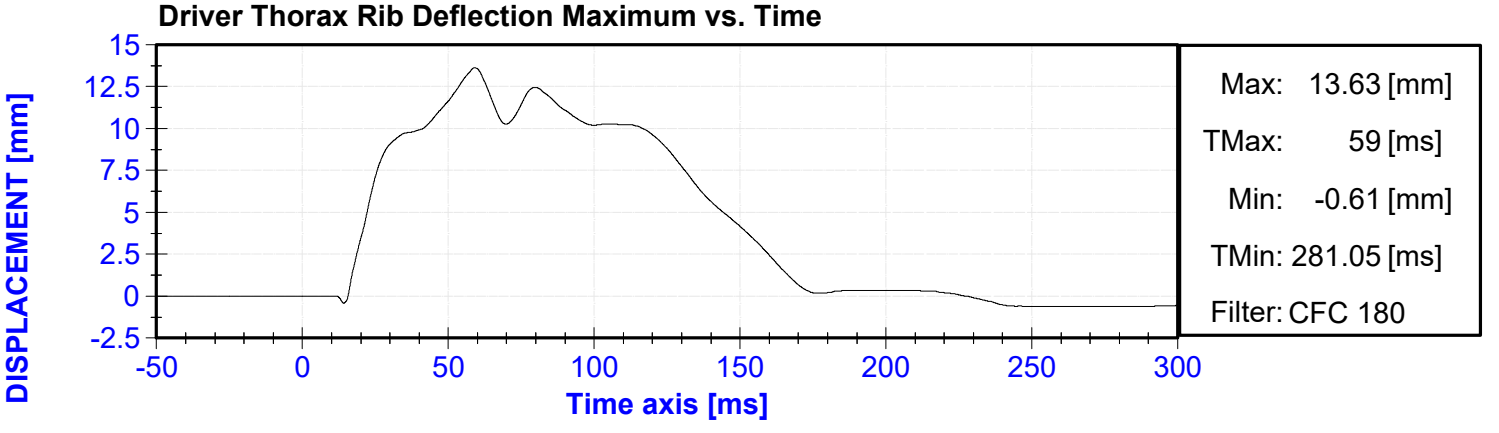
Driver Head Resultant Acceleration Primary vs. Time



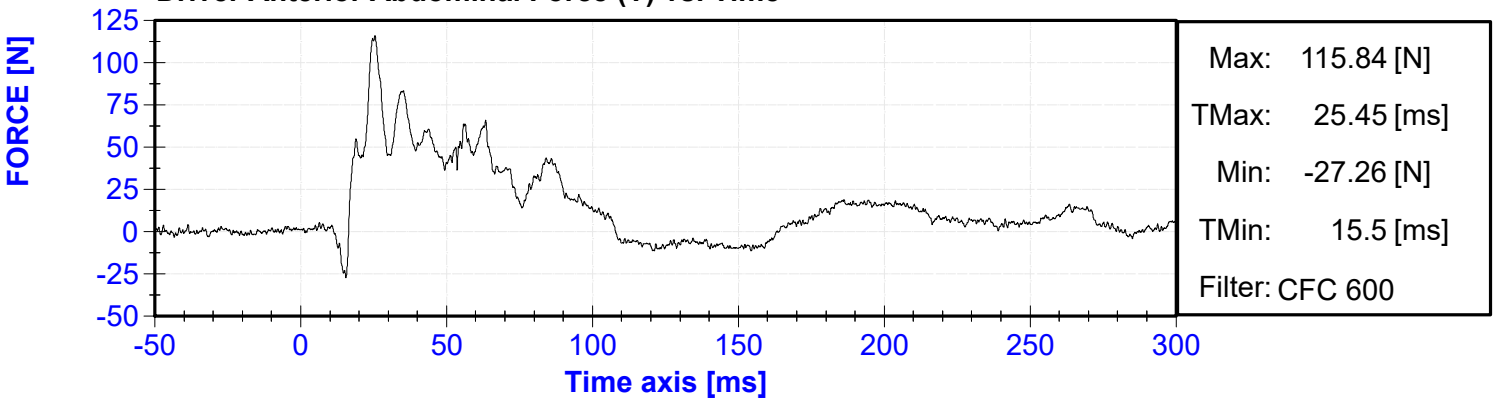

Driver Upper Thorax Rib Deflection (Y) vs. Time
DISPLACEMENT [mm]
12.5
10
7.5
5
2.5
0
-2.5
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 12.03 [mm]
TMax: 79.6 [ms]
Min: -2.31 [mm]
TMin: 17.65 [ms]
Filter: CFC 180


Driver Middle Thorax Rib Deflection (Y) vs. Time
DISPLACEMENT [mm]
12.5
10
7.5
5
2.5
0
-2.5
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 11.81 [mm]
TMax: 60.05 [ms]
Min: -0.36 [mm]
TMin: 15.25 [ms]
Filter: CFC 180

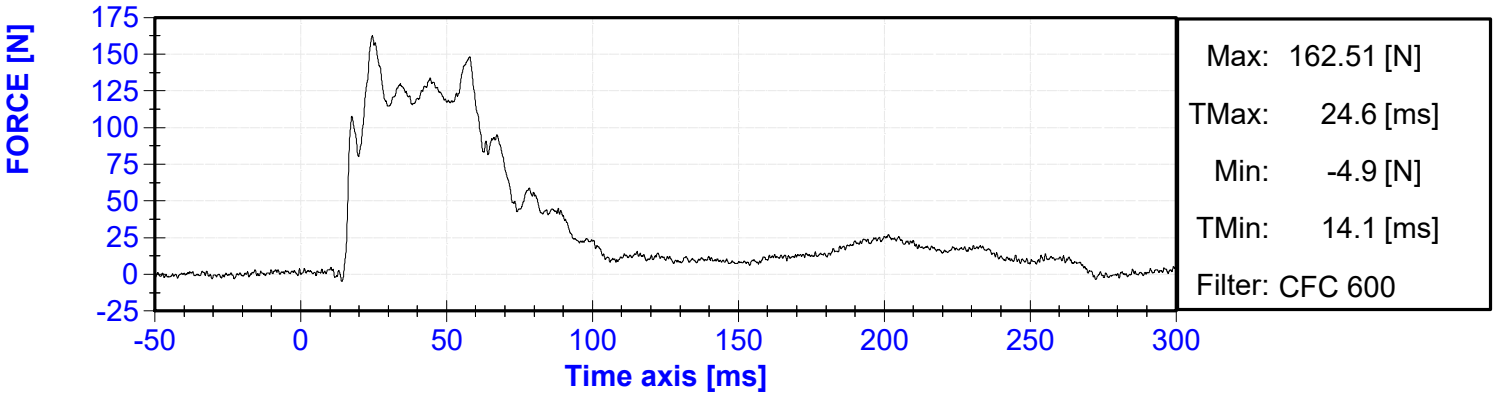

Driver Lower Thorax Rib Deflection (Y) vs. Time
DISPLACEMENT [mm]
15
12.5
10
7.5
5
2.5
0
-2.5
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 13.63 [mm]
TMax: 59 [ms]
Min: -0.61 [mm]
TMin: 281.05 [ms]
Filter: CFC 180


Driver Thorax Rib Deflection Maximum vs. Time
DISPLACEMENT [mm]
15
12.5
10
7.5
5
2.5
0
-2.5
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 13.63 [mm]
TMax: 59 [ms]
Min: -0.61 [mm]
TMin: 281.05 [ms]
Filter: CFC 180

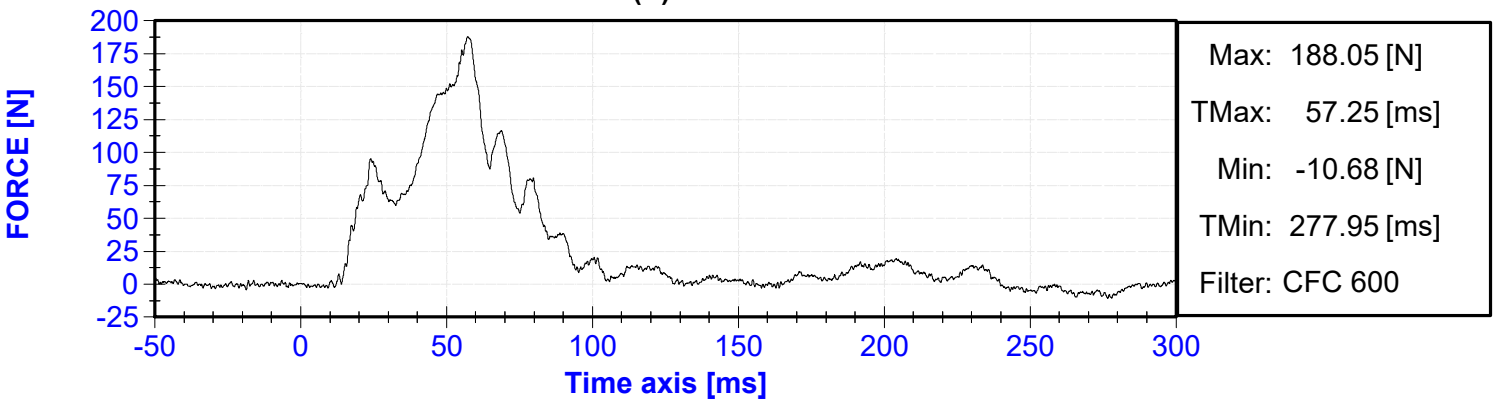
Driver Anterior Abdominal Force (Y) vs. Time



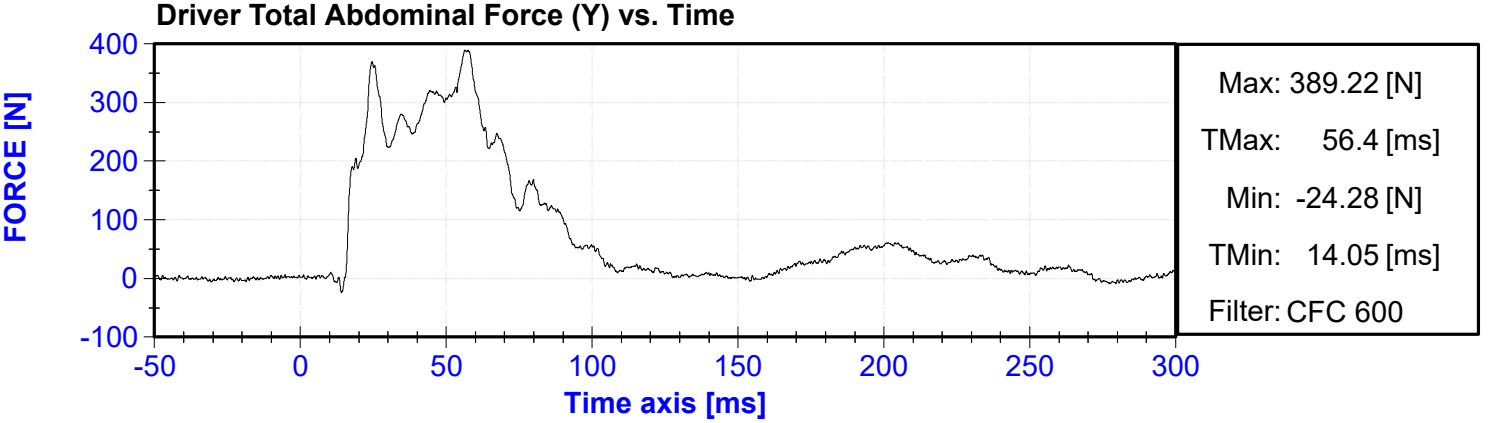
Driver Middle Abdominal Force (Y) vs. Time

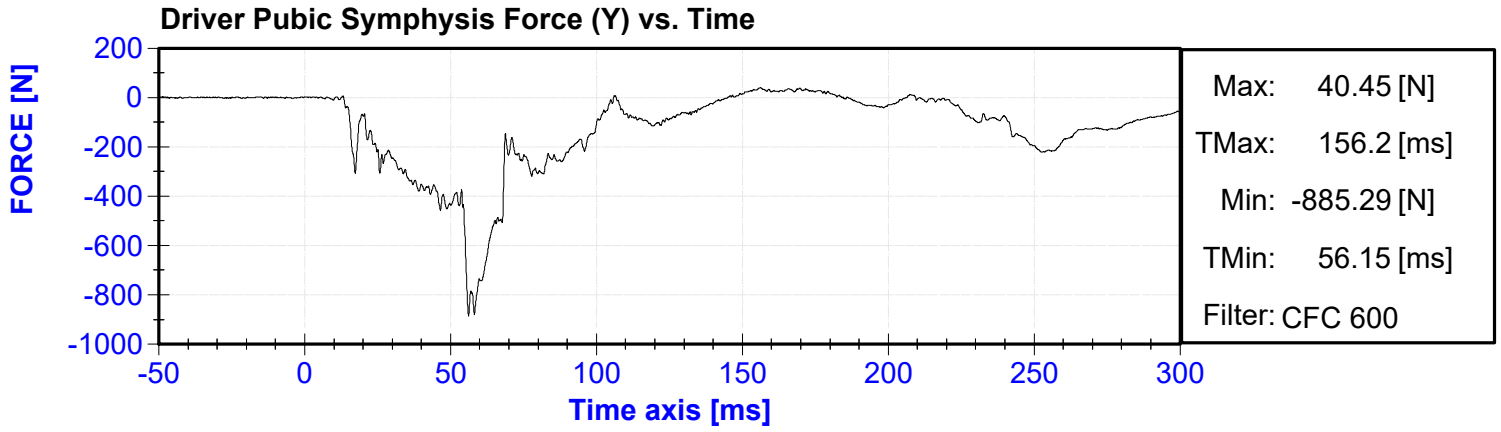


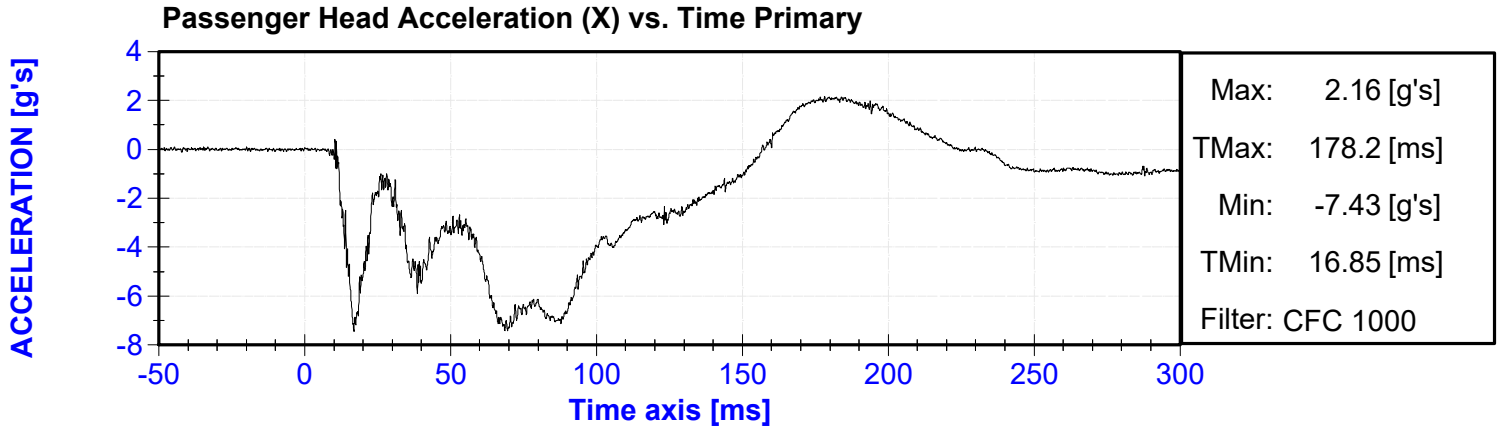
Driver Posterior Abdominal Force (Y) vs. Time

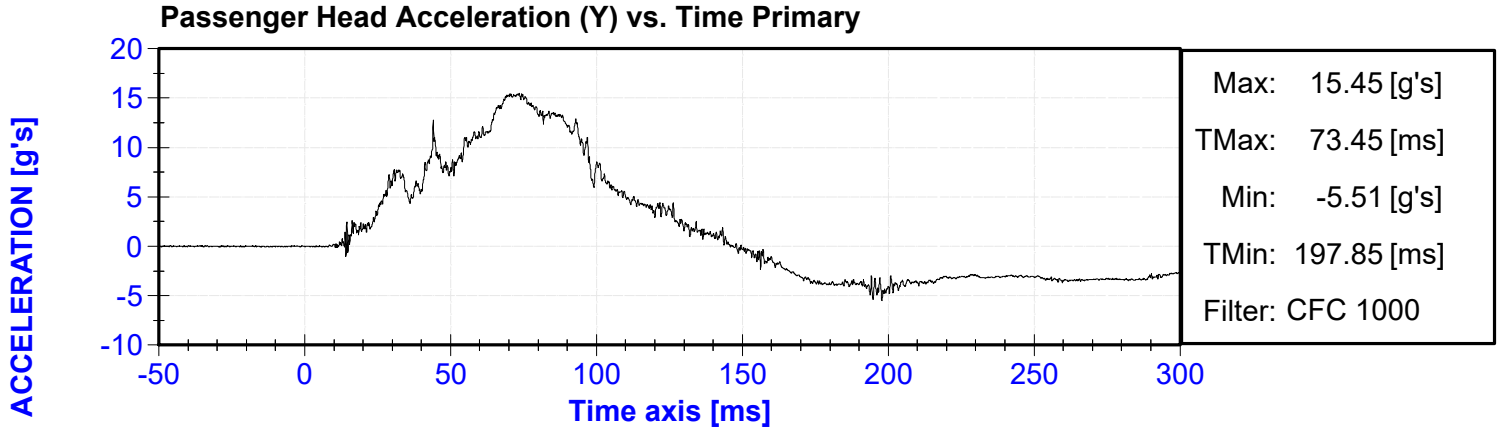


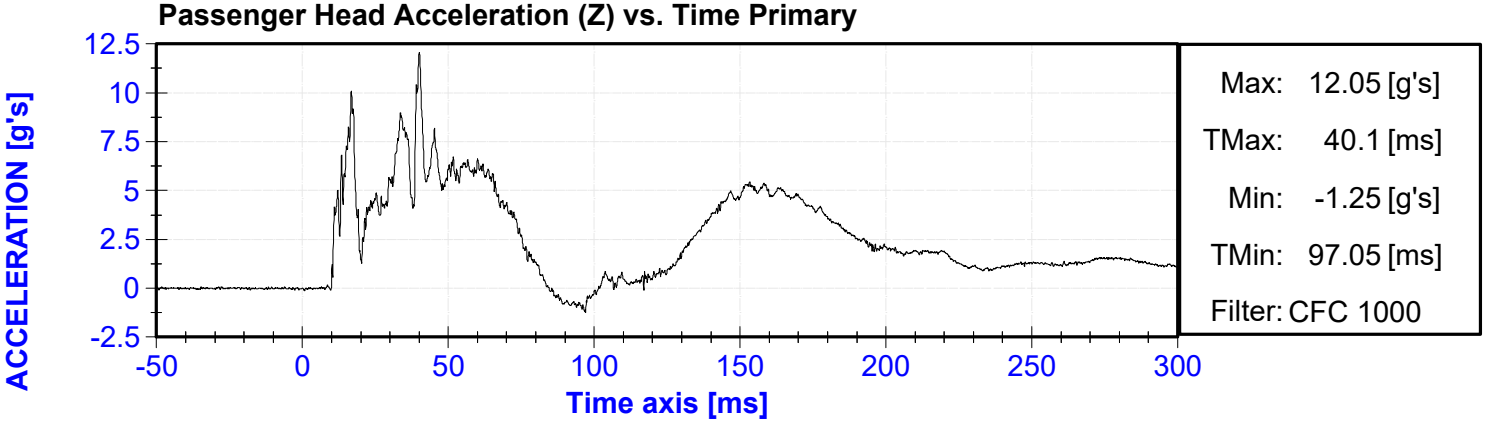
Driver Total Abdominal Force (Y) vs. Time

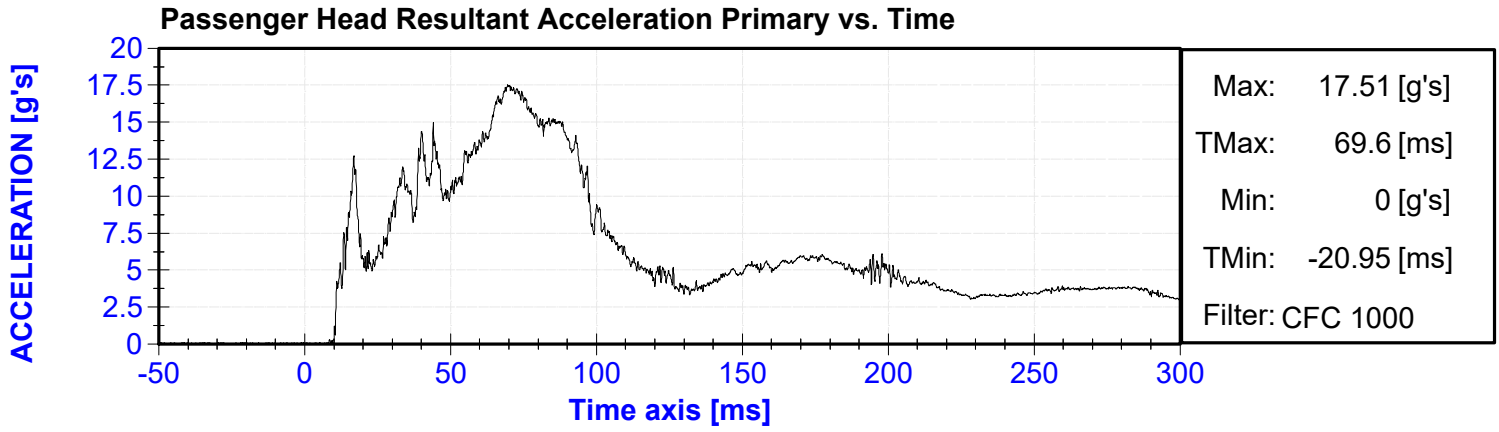


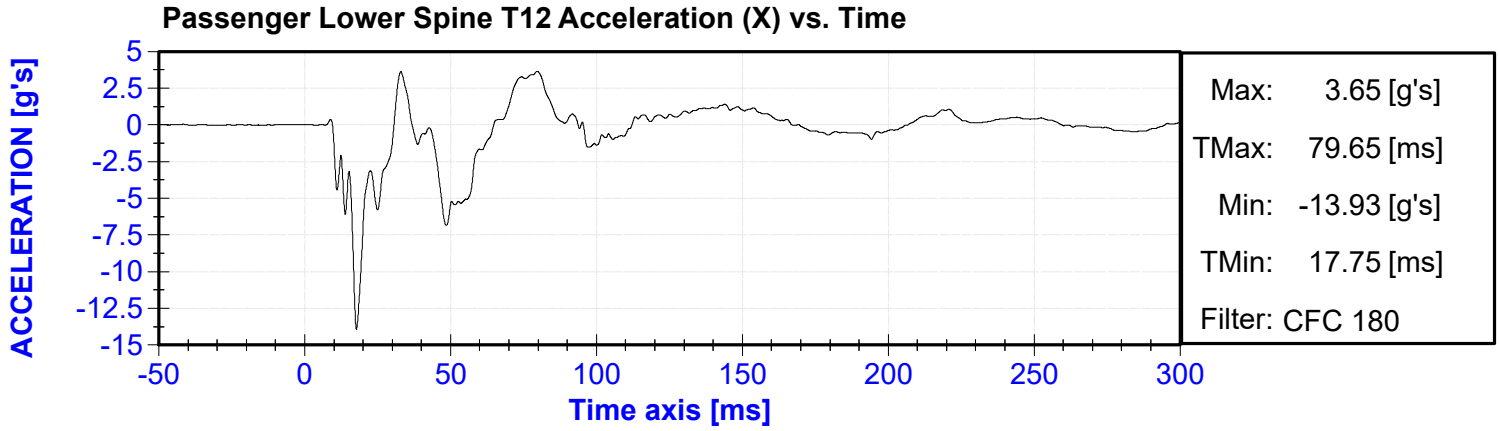

Driver Pubic Symphysis Force (Y) vs. Time
FORCE [N]
200
0
-200
-400
-600
-800
-1000
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 40.45 [N]
TMax: 156.2 [ms]
Min: -885.29 [N]
TMin: 56.15 [ms]
Filter: CFC 600

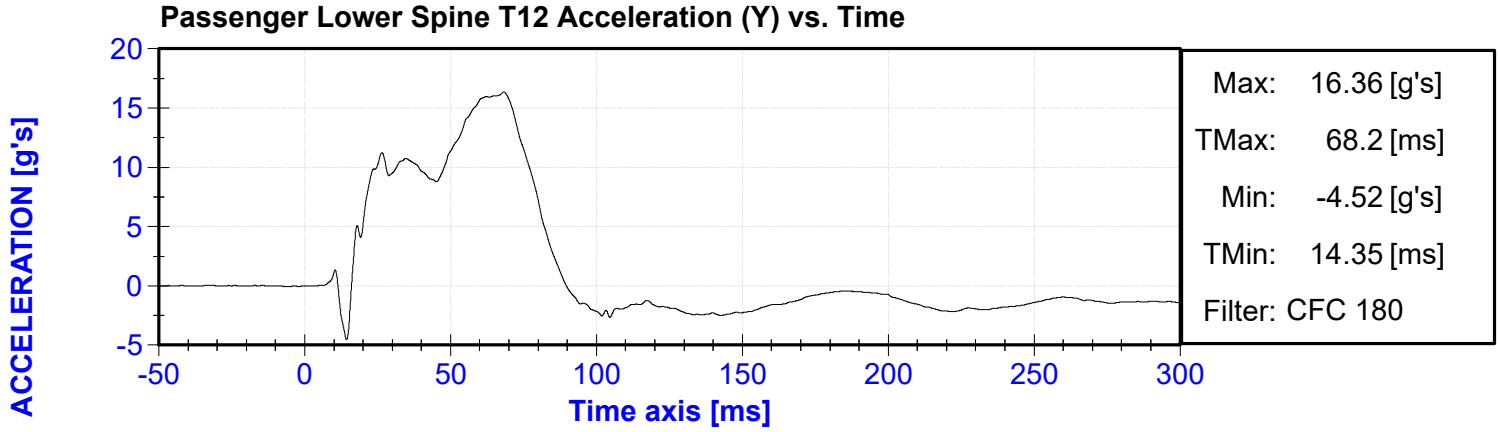

Passenger Head Acceleration (X) vs. Time Primary
ACCELERATION [g's]
4
2
0
-2
-4
-6
-8
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 2.16 [g's]
TMax: 178.2 [ms]
Min: -7.43 [g's]
TMin: 16.85 [ms]
Filter: CFC 1000

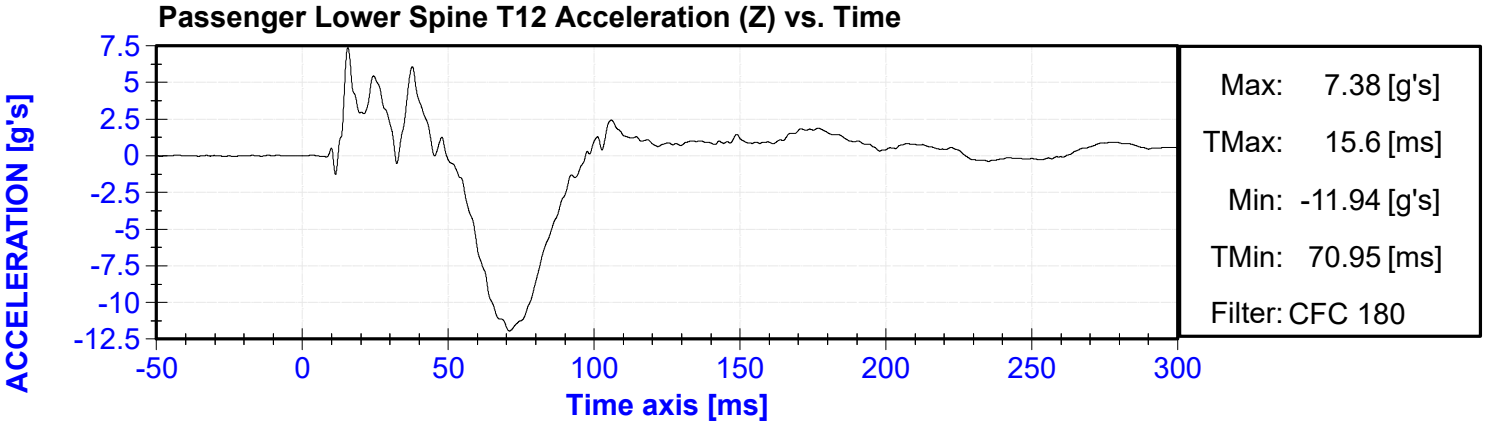

Passenger Head Acceleration (Y) vs. Time Primary
ACCELERATION [g's]
20
15
10
5
0
-5
-10
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 15.45 [g's]
TMax: 73.45 [ms]
Min: -5.51 [g's]
TMin: 197.85 [ms]
Filter: CFC 1000


Passenger Head Acceleration (Z) vs. Time Primary
ACCELERATION [g's]
12.5
10
7.5
5
2.5
0
-2.5
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 12.05 [g's]
TMax: 40.1 [ms]
Min: -1.25 [g's]
TMin: 97.05 [ms]
Filter: CFC 1000

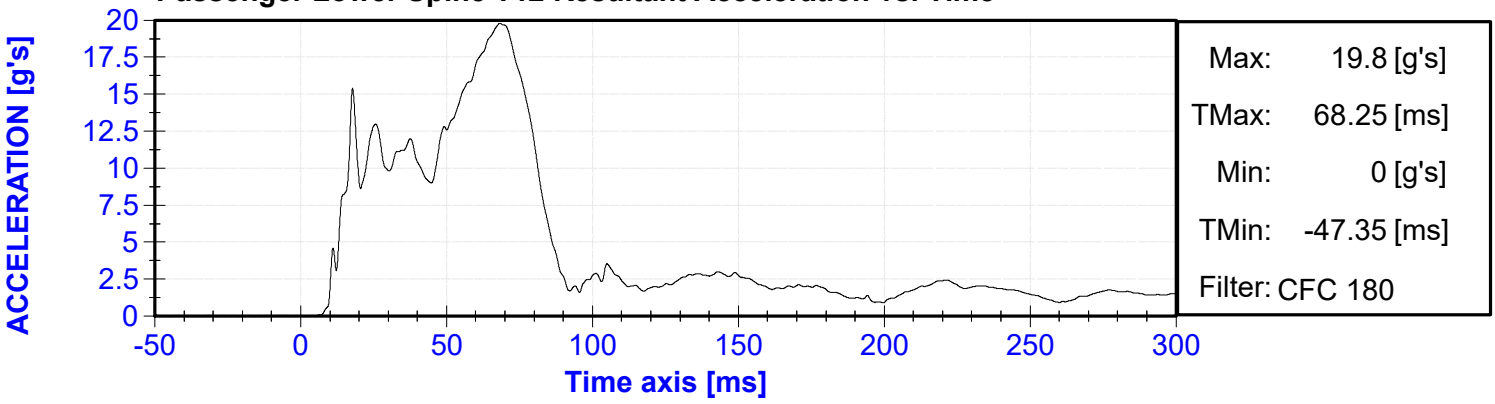

Passenger Head Resultant Acceleration Primary vs. Time
ACCELERATION [g's]
Time axis [ms]
Max: 17.51 [g's]
TMax: 69.6 [ms]
Min: 0 [g's]
TMin: -20.95 [ms]
Filter: CFC 1000


Passenger Lower Spine T12 Acceleration (X) vs. Time
ACCELERATION [g's]
Time axis [ms]
Max: 3.65 [g's]
TMax: 79.65 [ms]
Min: -13.93 [g's]
TMin: 17.75 [ms]
Filter: CFC 180

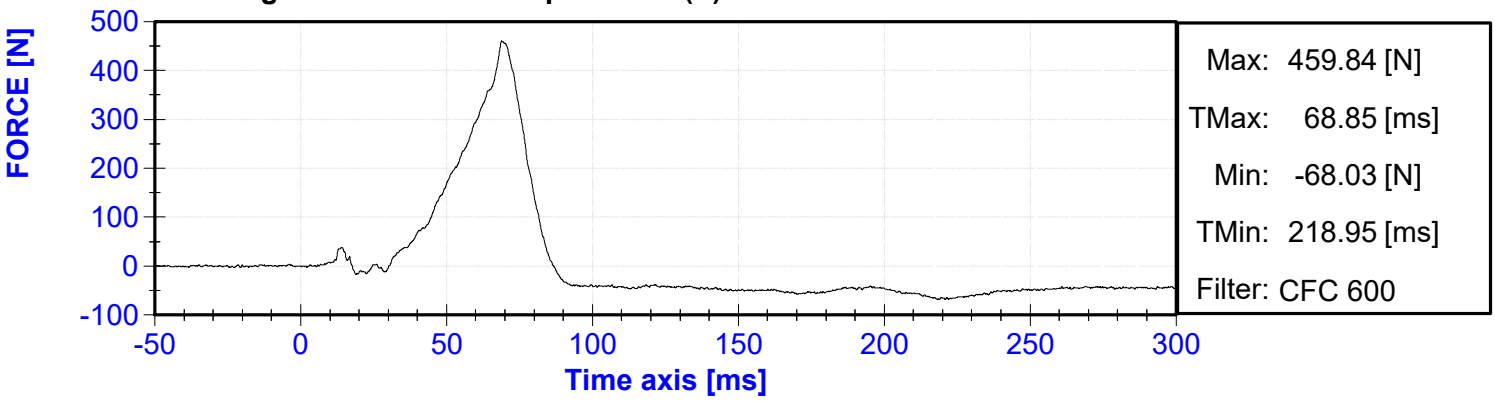

Passenger Lower Spine T12 Acceleration (Y) vs. Time
ACCELERATION [g's]
Time axis [ms]
Max: 16.36 [g's]
TMax: 68.2 [ms]
Min: -4.52 [g's]
TMin: 14.35 [ms]
Filter: CFC 180


Passenger Lower Spine T12 Acceleration (Z) vs. Time
ACCELERATION [g's]
Time axis [ms]
Max: 7.38 [g's]
TMax: 15.6 [ms]
Min: -11.94 [g's]
TMin: 70.95 [ms]
Filter: CFC 180

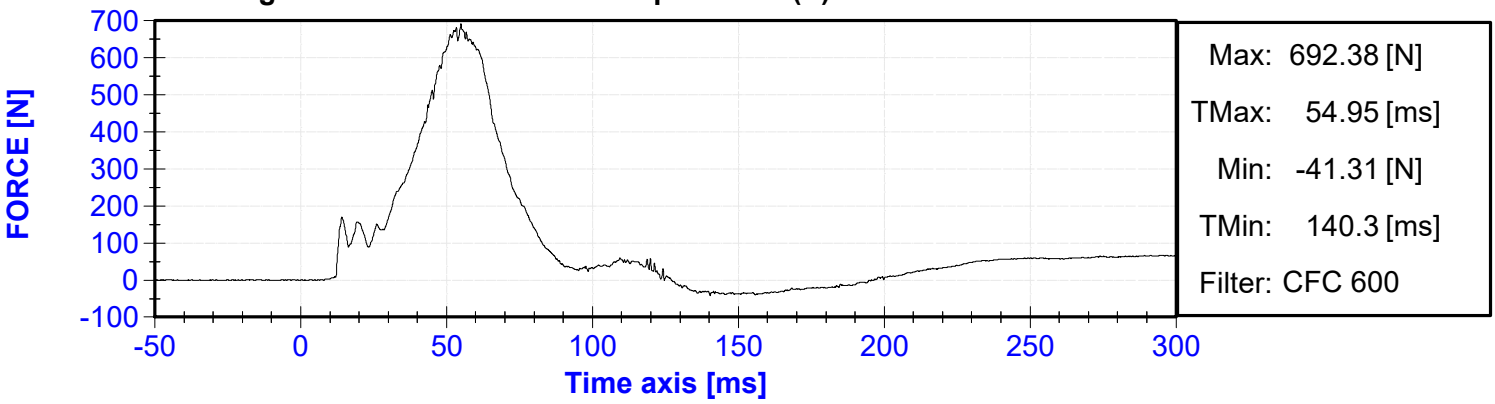
Passenger Lower Spine T12 Resultant Acceleration vs. Time



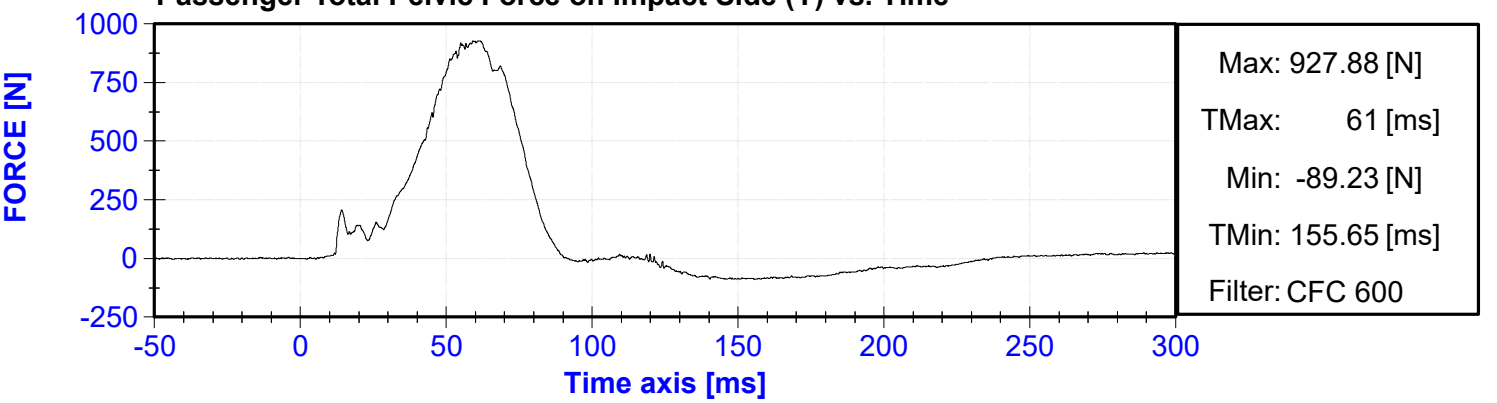
Passenger Iliac Force on Impact Side (Y) vs. Time



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



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



APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

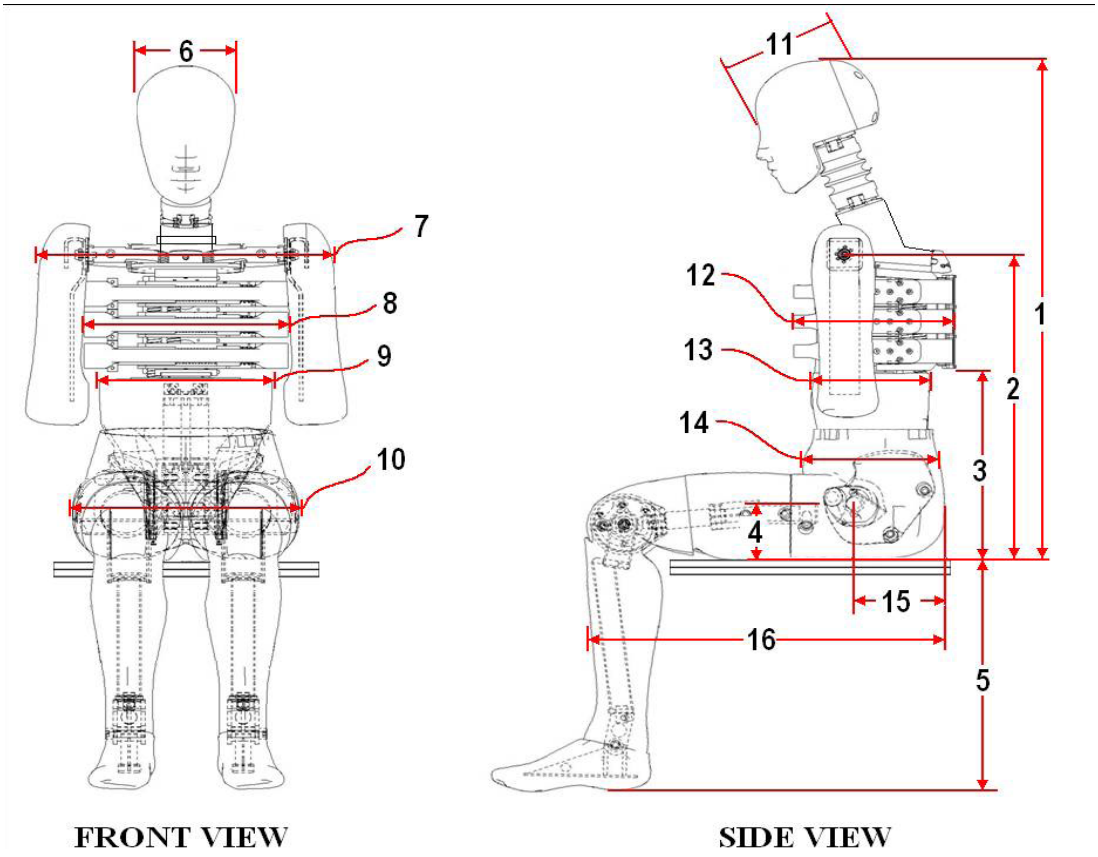
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - EuroSID-2re

Technician: T. Roseman Date: 7/18/2024

Dummy Serial Number: F033



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	915	Pass
2	Seat to Shoulder Joint	558	572	567	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	352	Pass
4	Seat to Hip Joint (center of bolt)	97	103	99	Pass
5	Sole to Seat, Sitting	333	451	429	Pass
6	Head Width	152	158	156	Pass
7	Shoulder/Arm Width	461	479	472	Pass
8	Thorax Width	322	332	330	Pass
9	Abdomen Width	273	287	282	Pass
10	Pelvis Lap Width	359	373	370	Pass
11	Head Depth	196	206	200	Pass
12	Thorax Depth	262	272	269	Pass
13	Abdomen Depth	194	204	201	Pass
14	Pelvis Depth	235	245	241	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	155	Pass
16	Back of Buttocks to Front Knee	597	615	611	Pass

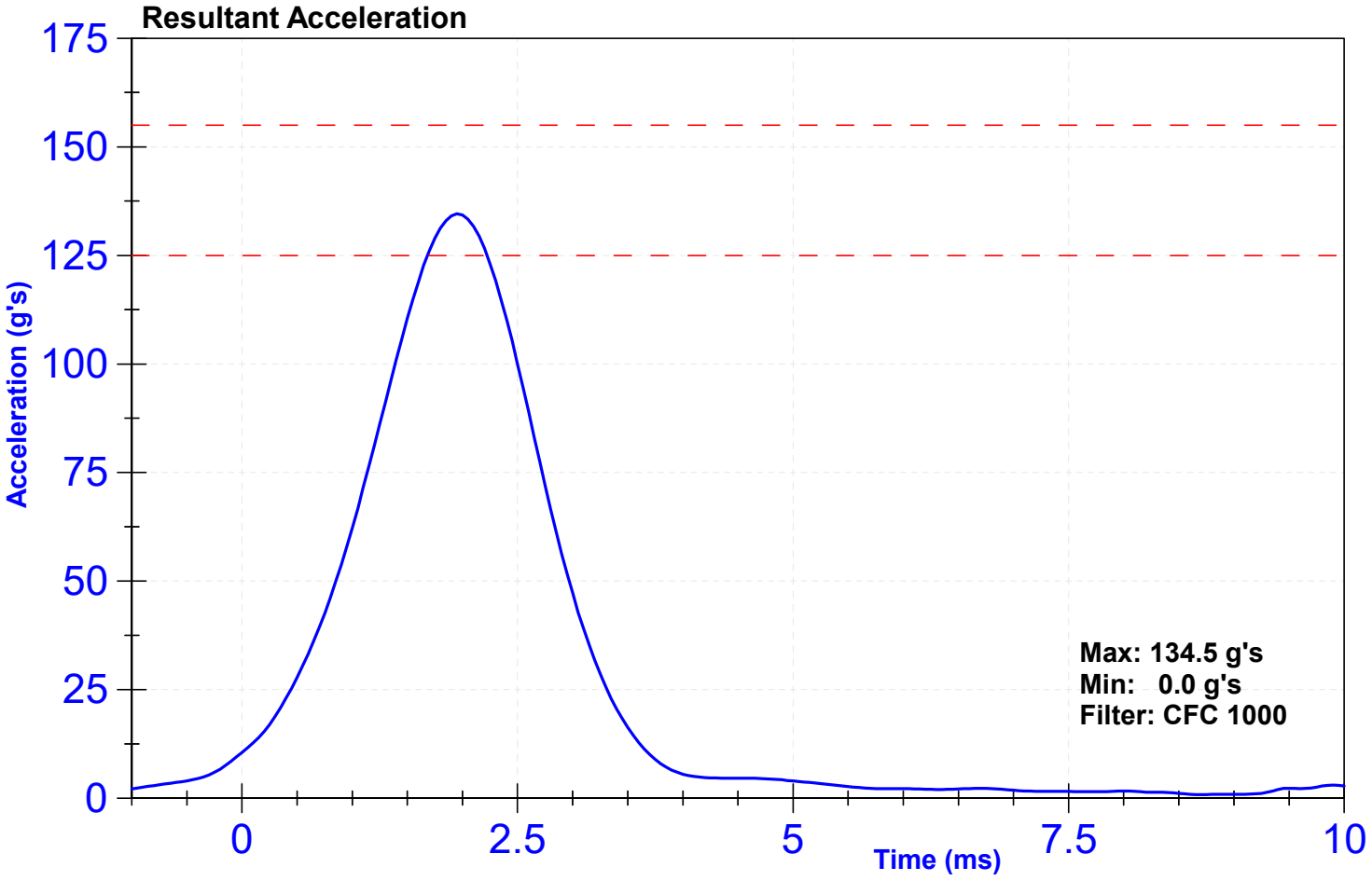
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

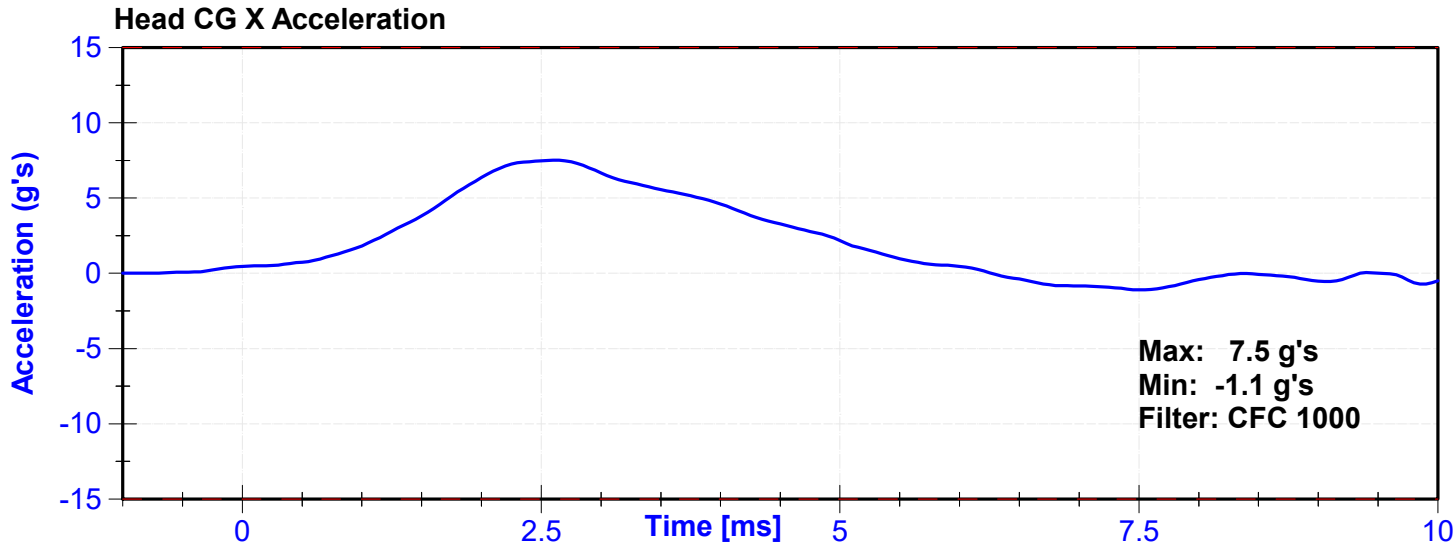
Results

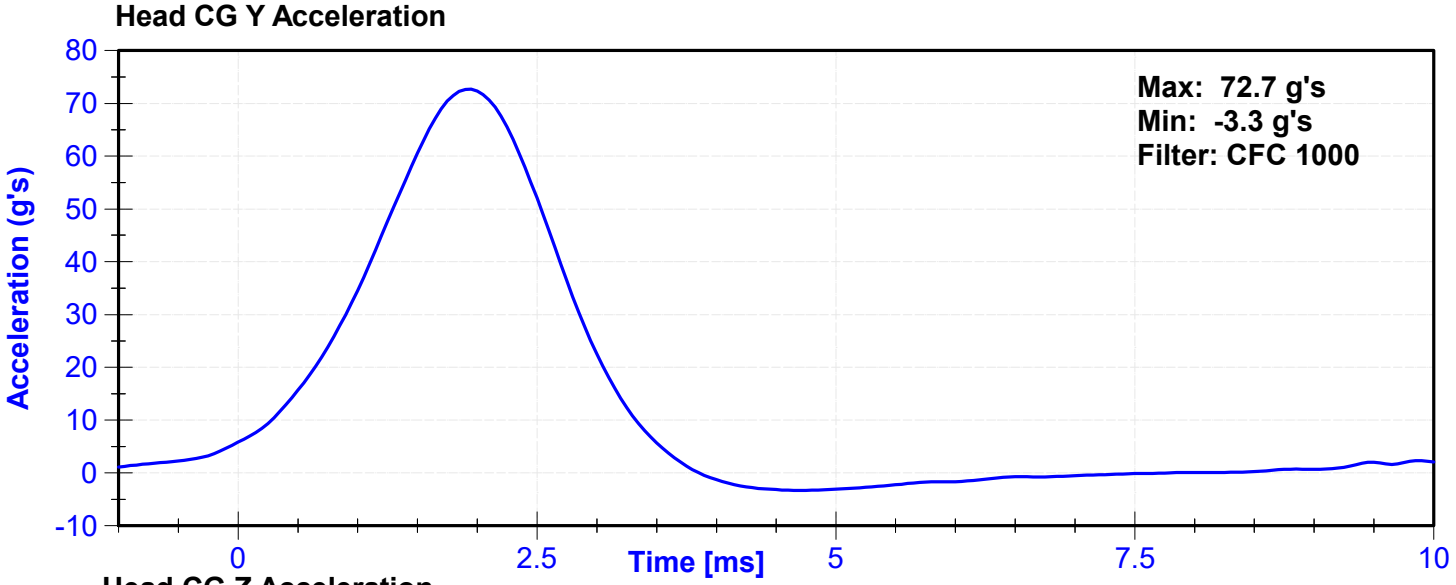
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	60	Pass
Resultant Acceleration	125	155	g's	134.5	Pass
Oscillation	0	15	%	2.45	Pass
Fore-Aft Acceleration	-15	15	g's	7.5	Pass

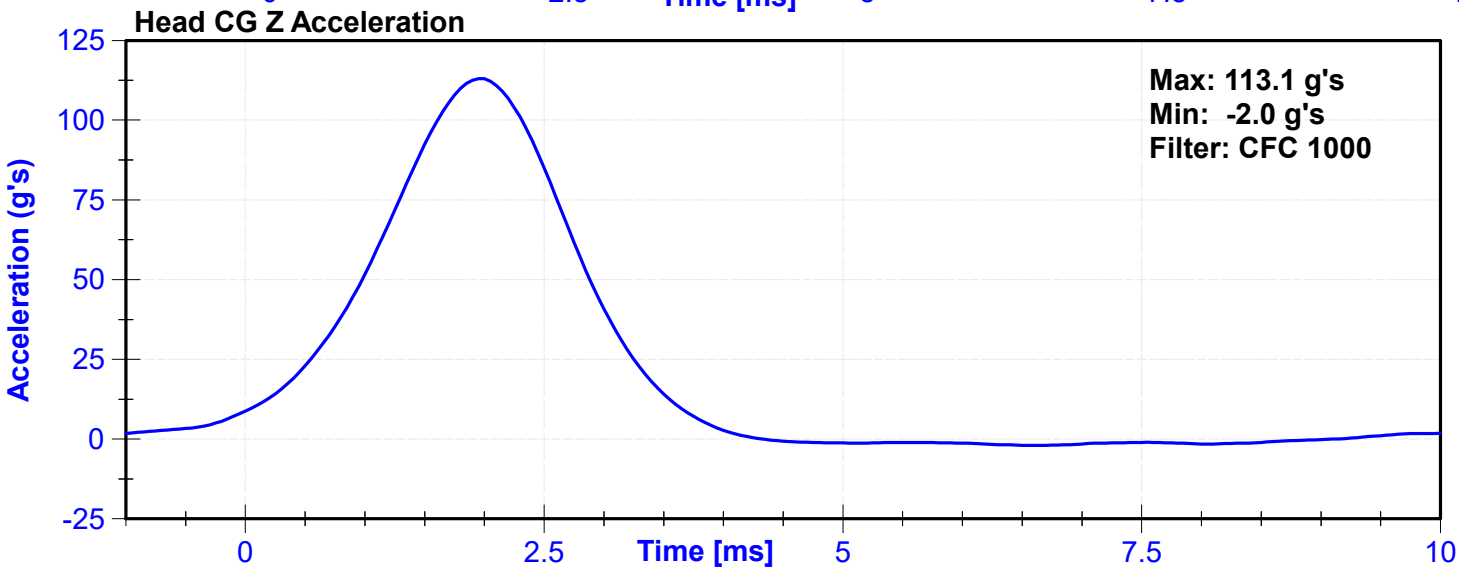
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P63861	5/6/2024	11/2/2024
Y Accelerometer	Endevco	P49216	5/6/2024	11/2/2024
Z Accelerometer	Endevco	P51303	5/6/2024	11/2/2024




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


Head CG Y Acceleration
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
Time [ms]
5
7.5
10
Max: 72.7 g's
Min: -3.3 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
Time [ms]
5
7.5
10
Max: 113.1 g's
Min: -2.0 g's
Filter: CFC 1000

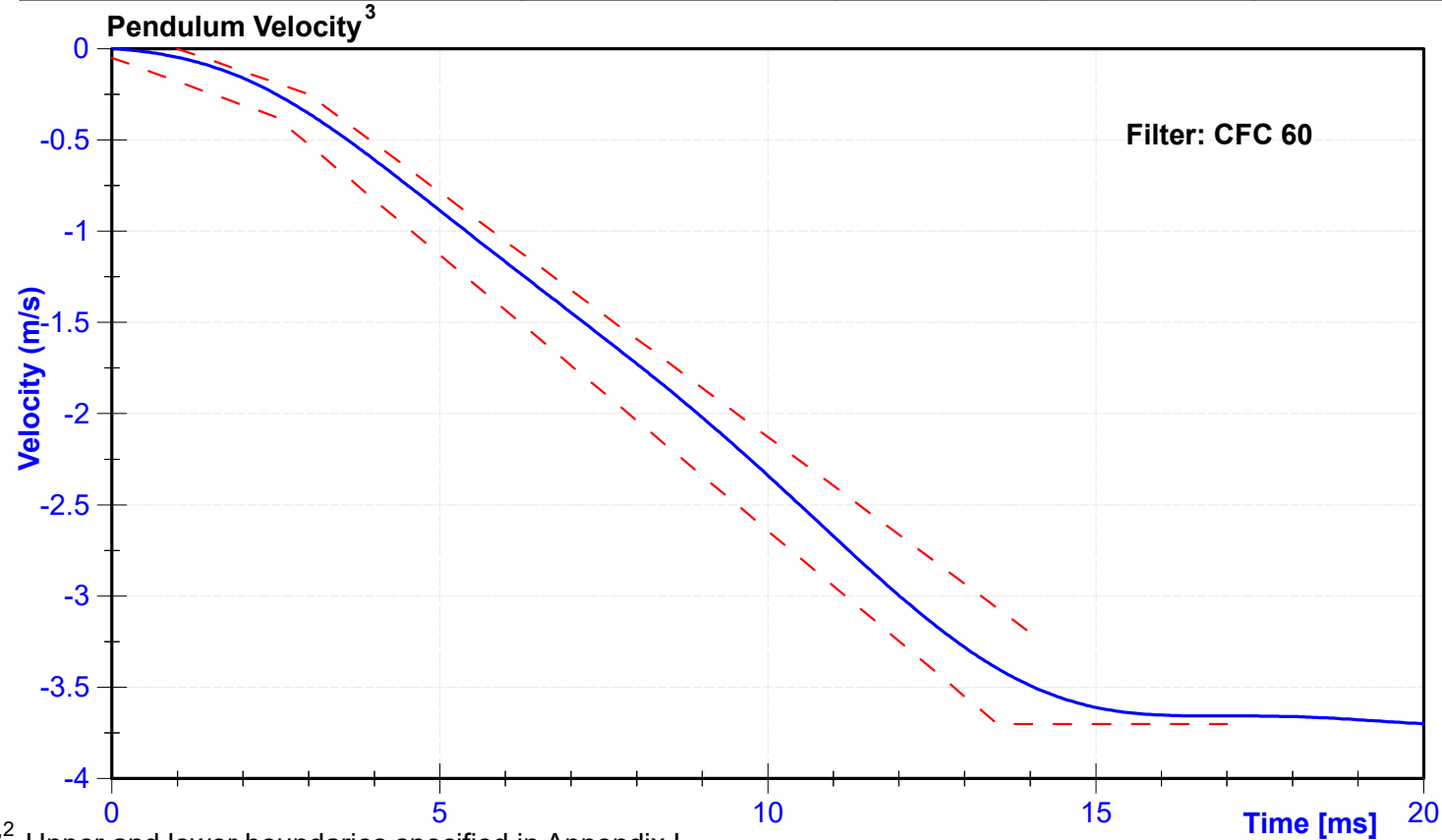
ATD Manufacturer	Denton	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

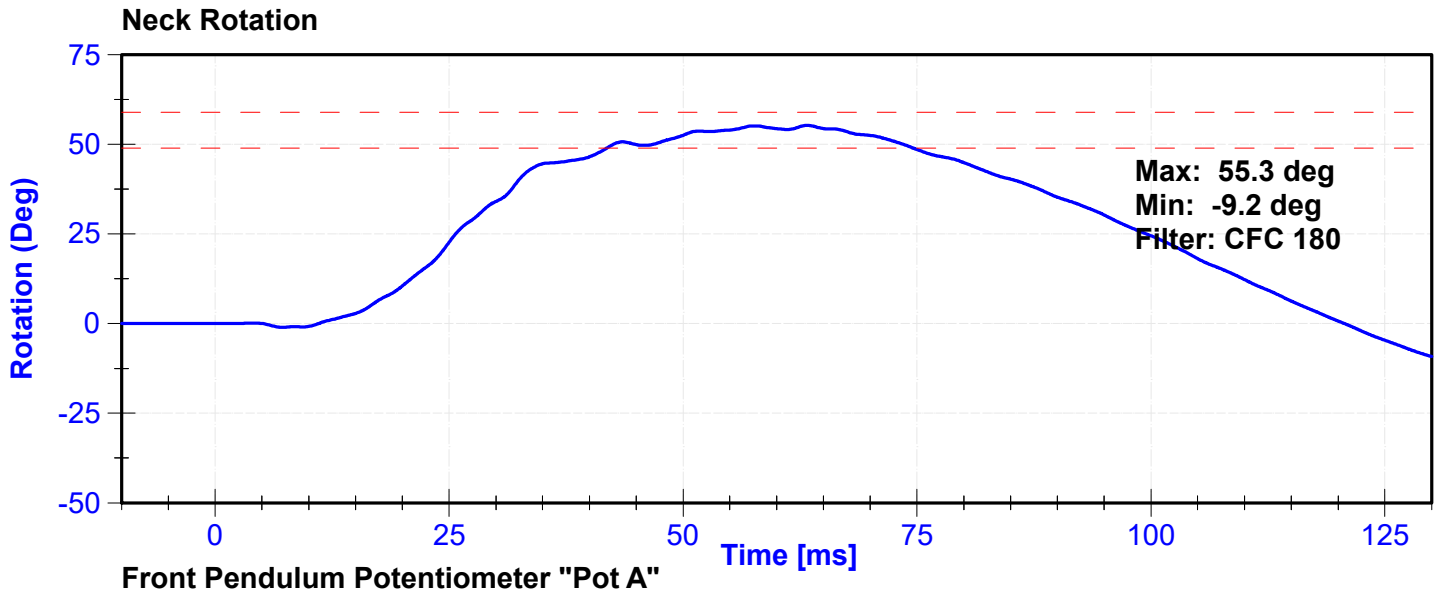
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	57	Pass
Velocity	3.3	3.5	m/s	3.46	Pass
Lateral Neck Rotation	49	59	deg	55.3	Pass
Time at Maximum Rotation	54	66	ms	63.3	Pass
Time of Rotation Decay from Maximum	53	88	ms	57.5	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

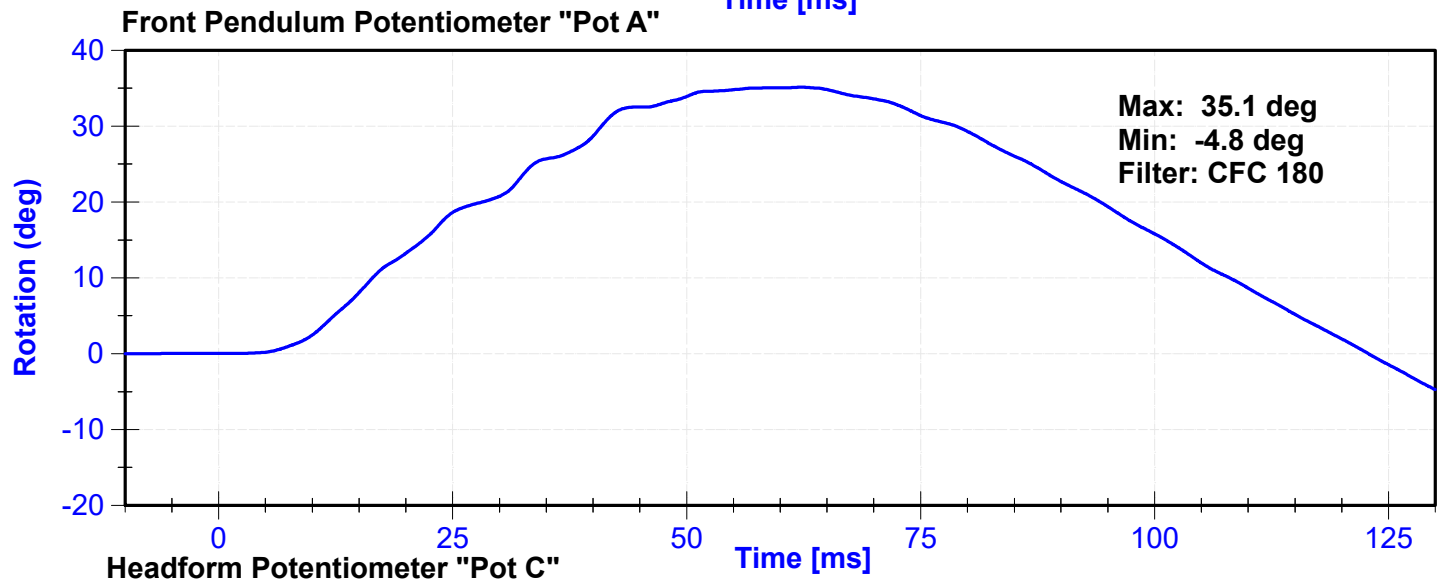
Transducer Calibrations

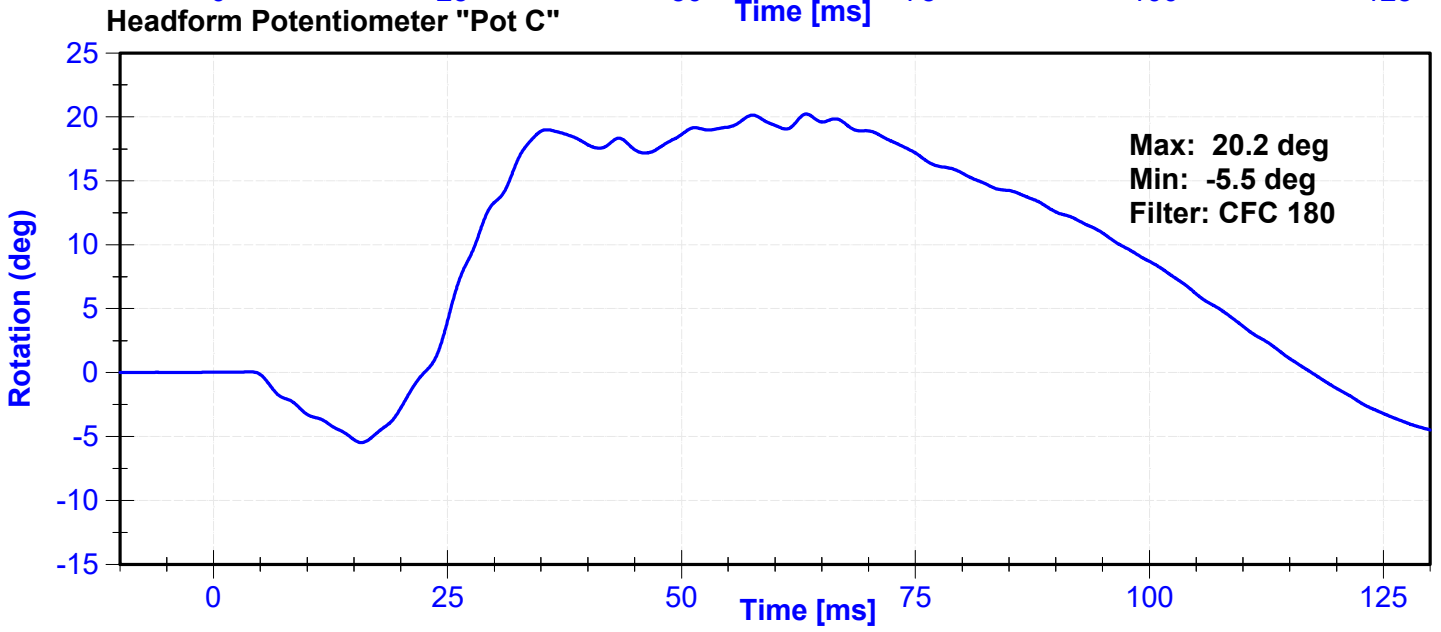
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	4/29/2024	10/26/2024
Front Pendulum Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Headform Potentiometer	Sfernice	095	9/29/2023	9/28/2024



[1,2] Upper and lower boundaries specified in Appendix I


Neck Rotation
Rotation (Deg)
Time [ms]
Max: 55.3 deg
Min: -9.2 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 35.1 deg
Min: -4.8 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 20.2 deg
Min: -5.5 deg
Filter: CFC 180

Appendix I

[2] Upper Boundary Corridor		[1] Lower Boundary Corridor	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.25	2.5	-0.375
14.0	-3.20	13.5	-3.7
		17.0	-3.7

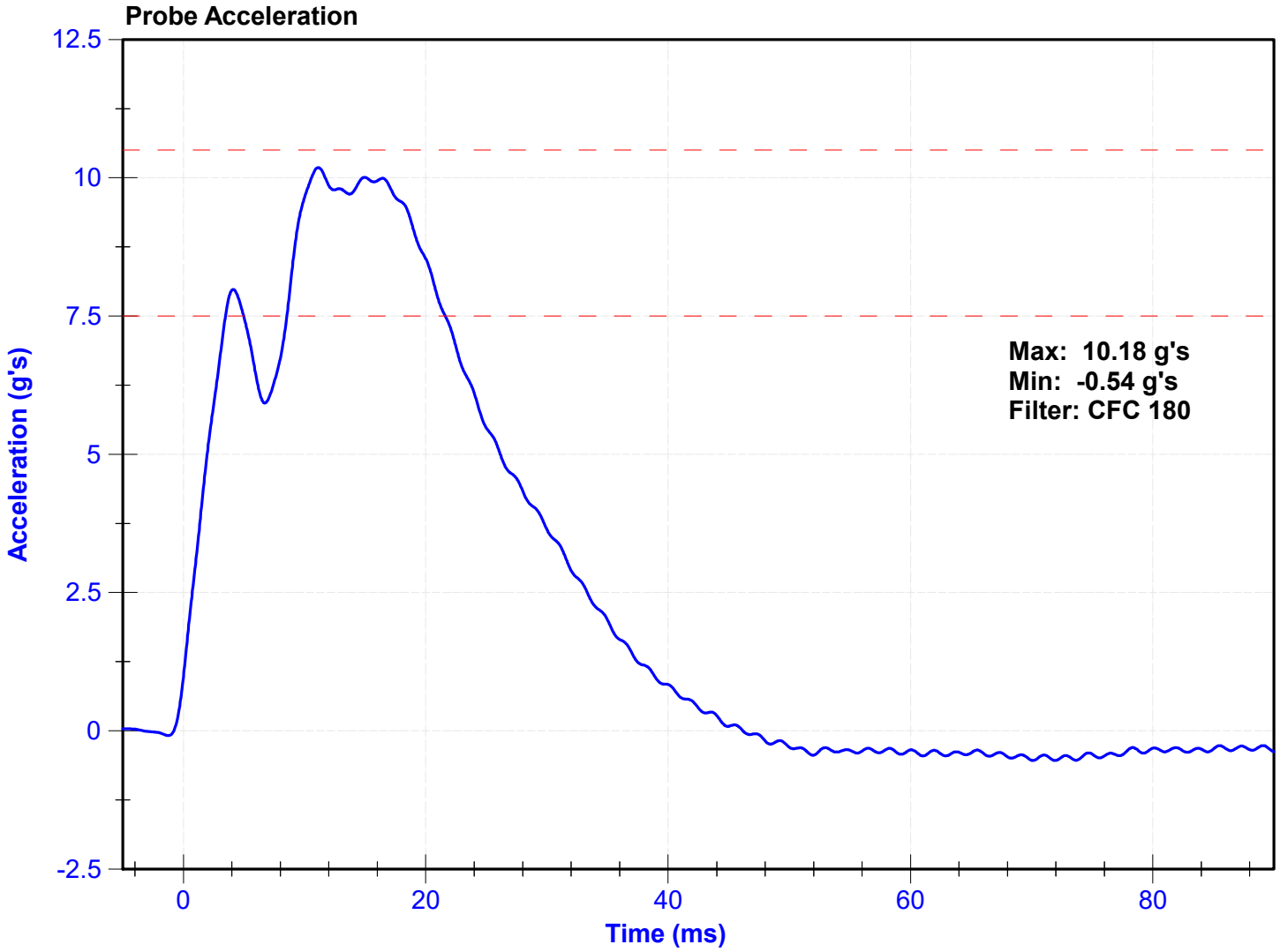
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	54	Pass
Velocity	4.2	4.4	m/s	4.26	Pass
Probe Acceleration	7.5	10.5	g's	10.18	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18619	3/29/2024	9/25/2024



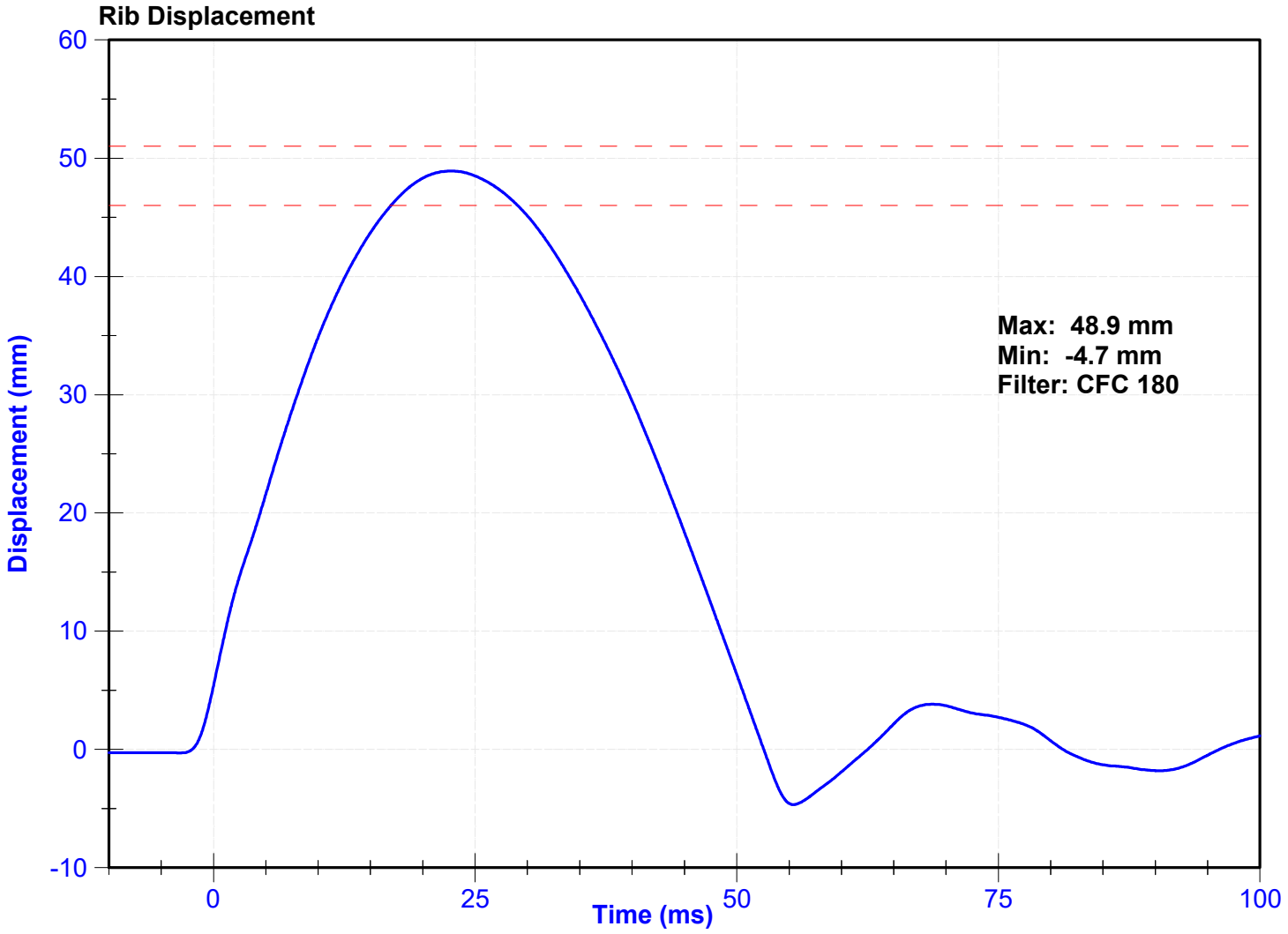
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Rib Displacement	46	51	mm	48.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	5/6/2024	11/4/2024



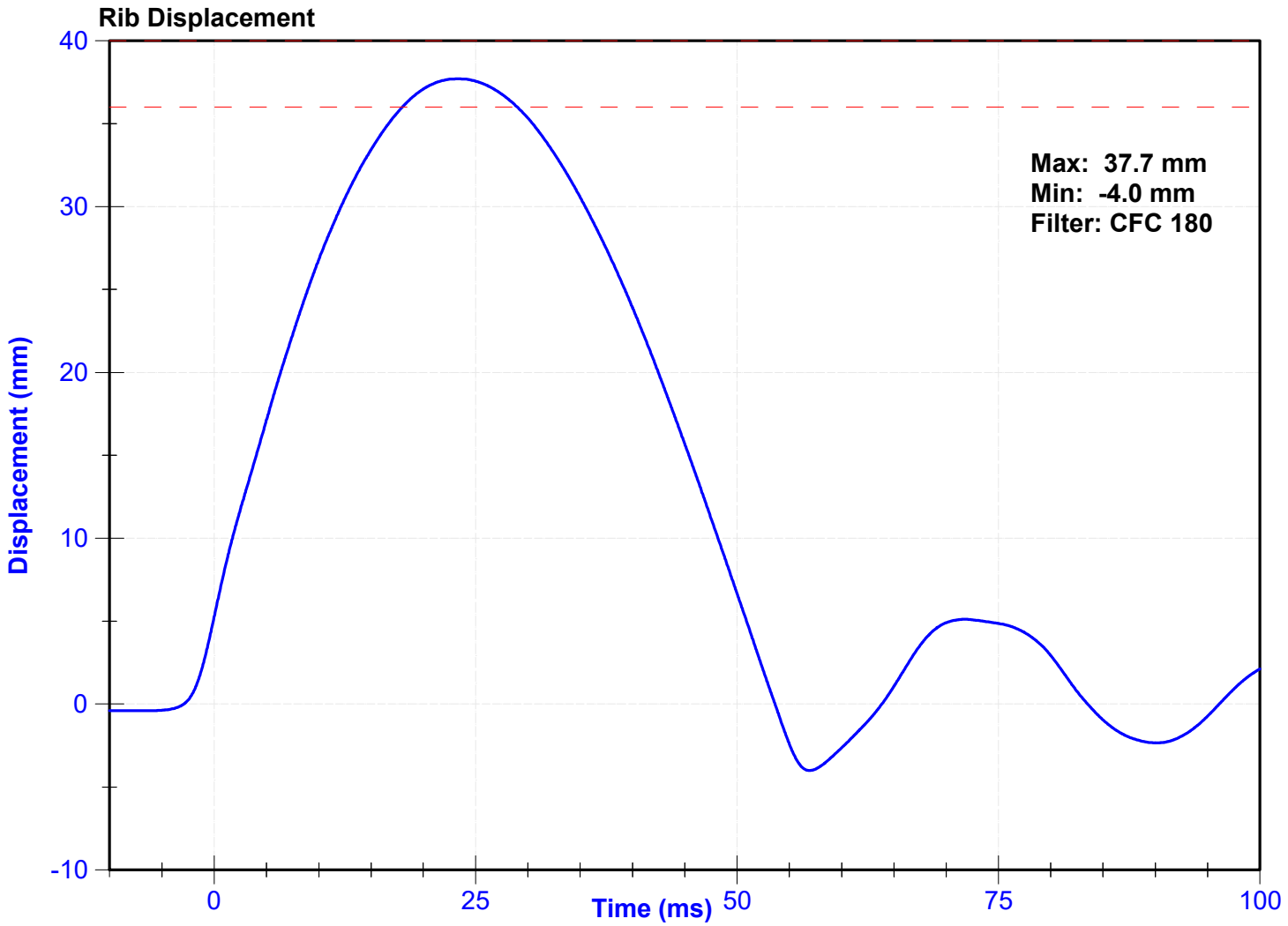
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Rib Displacement	36	40	mm	37.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	5/6/2024	11/4/2024



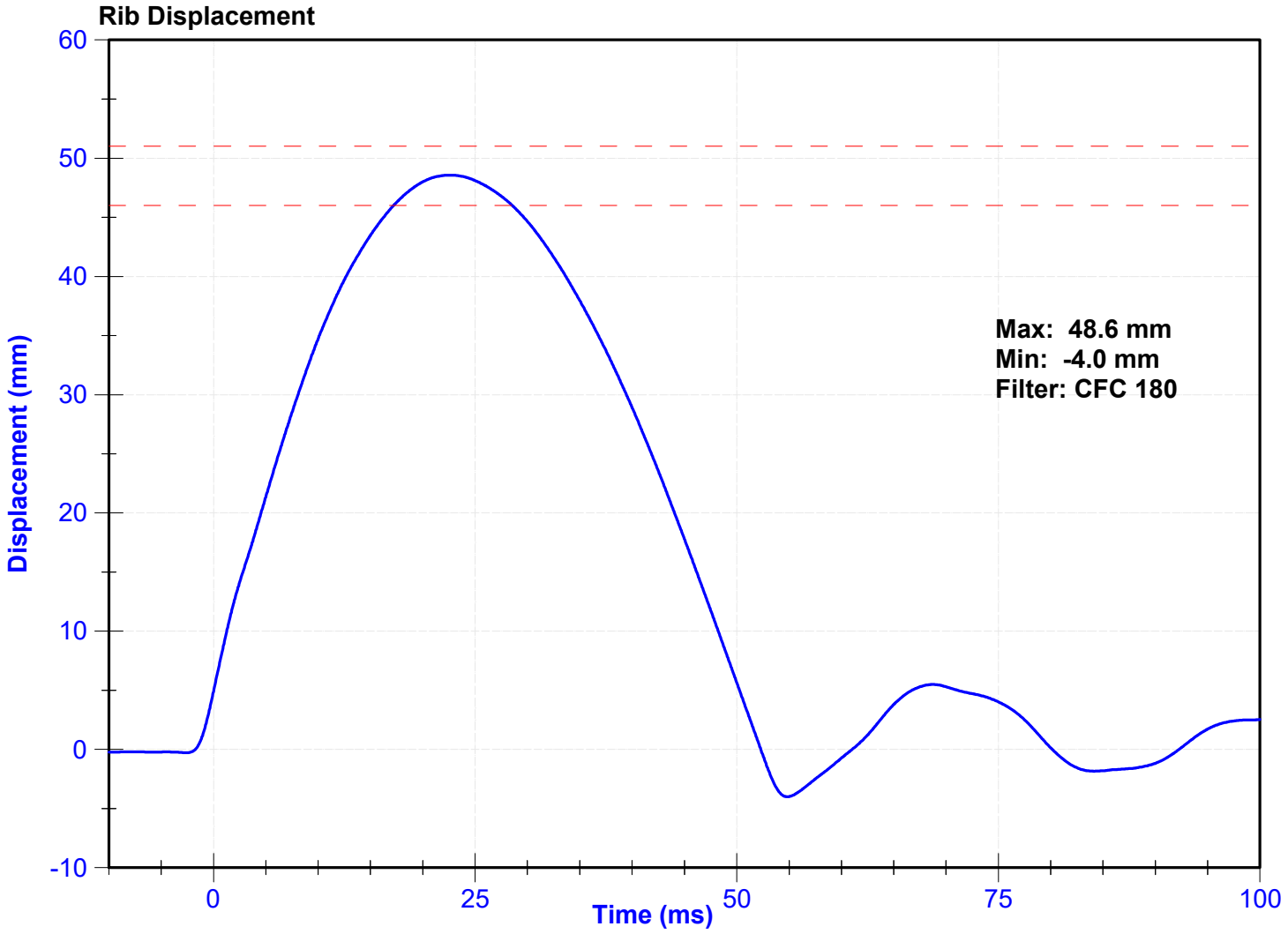
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Rib Displacement	46	51	mm	48.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	5/6/2024	11/4/2024



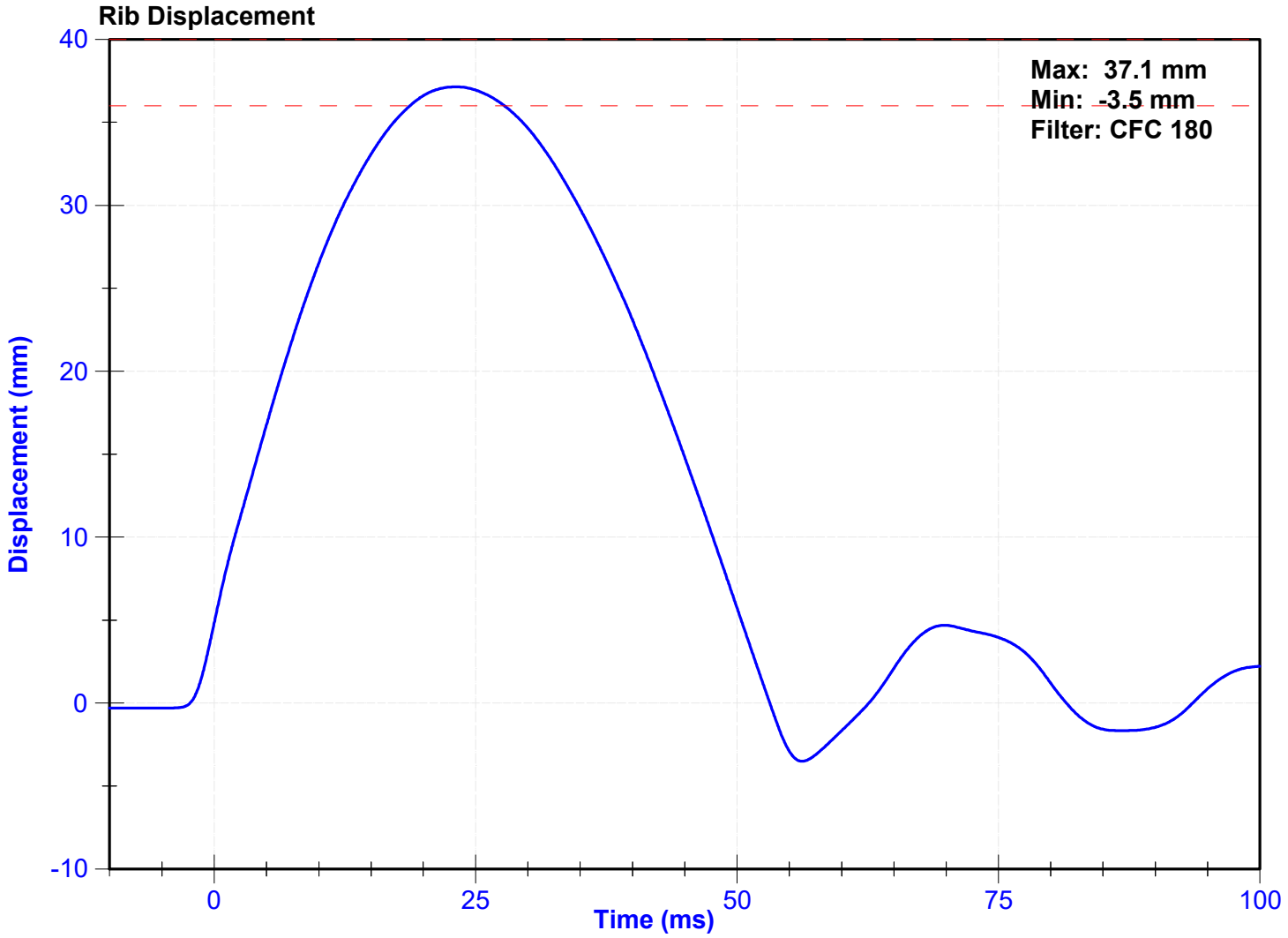
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Rib Displacement	36	40	mm	37.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	5/6/2024	11/4/2024



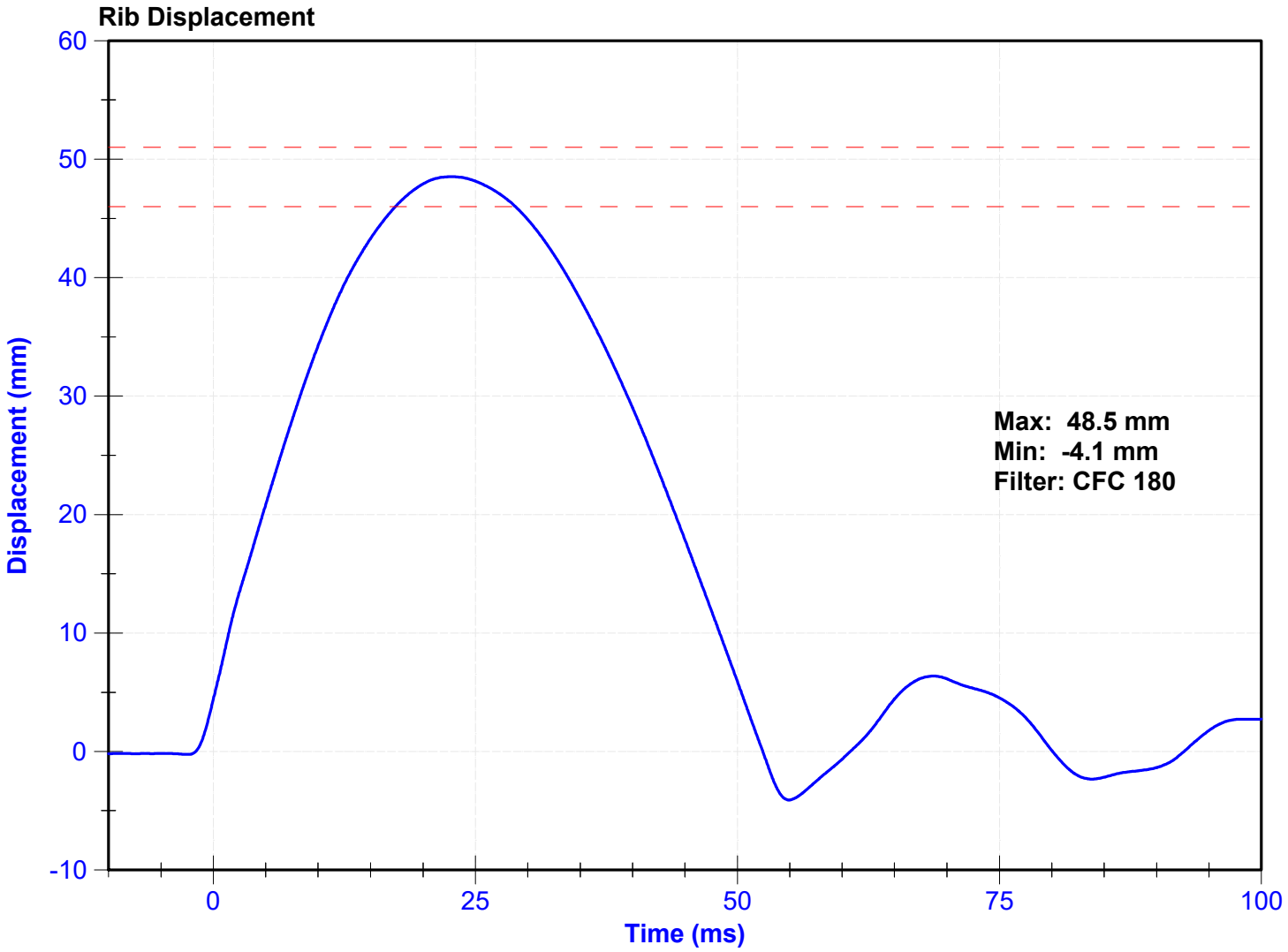
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Rib Displacement	46	51	mm	48.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	5/6/2024	11/4/2024



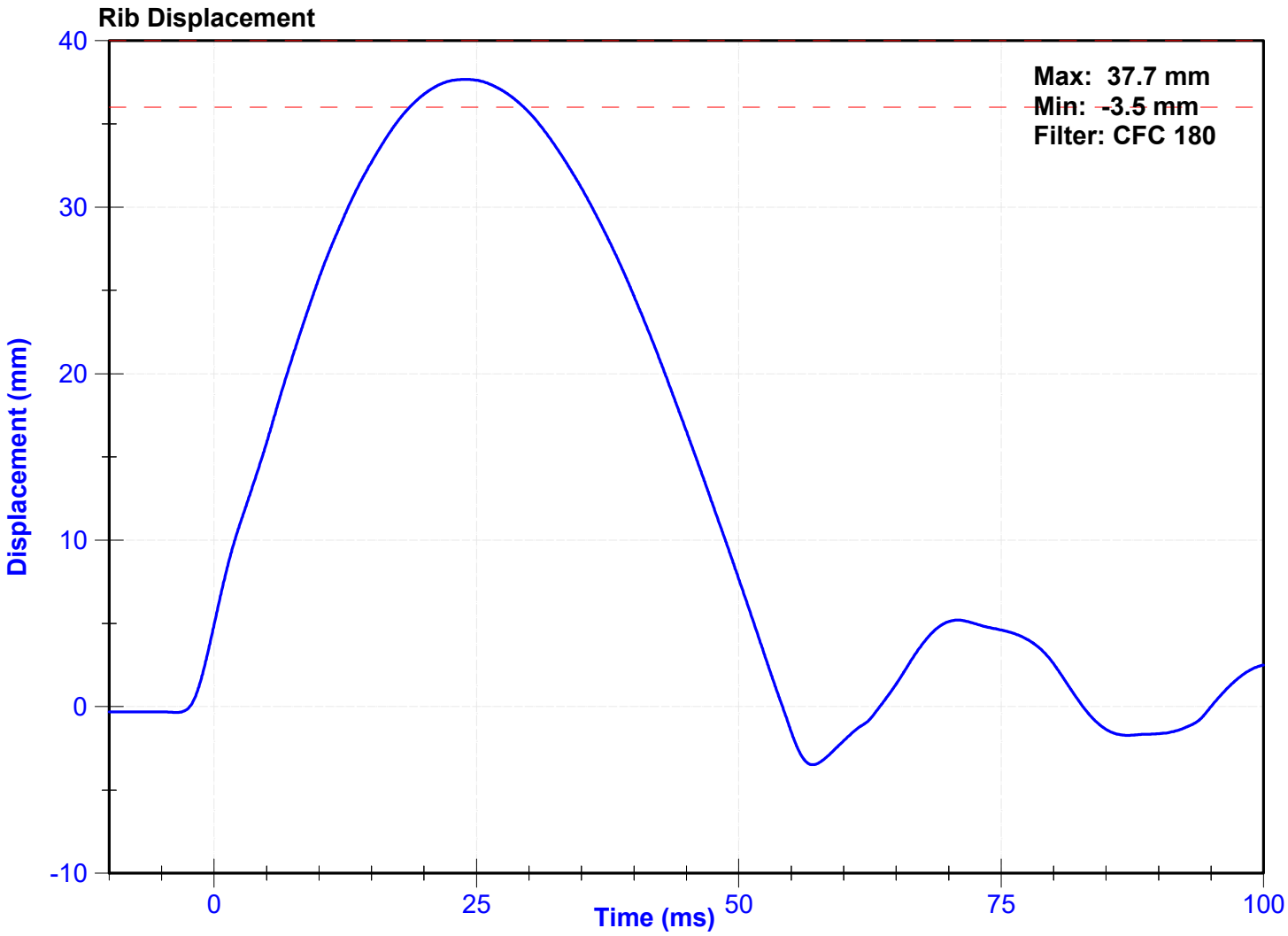
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Rib Displacement	36	40	mm	37.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	5/6/2024	11/4/2024



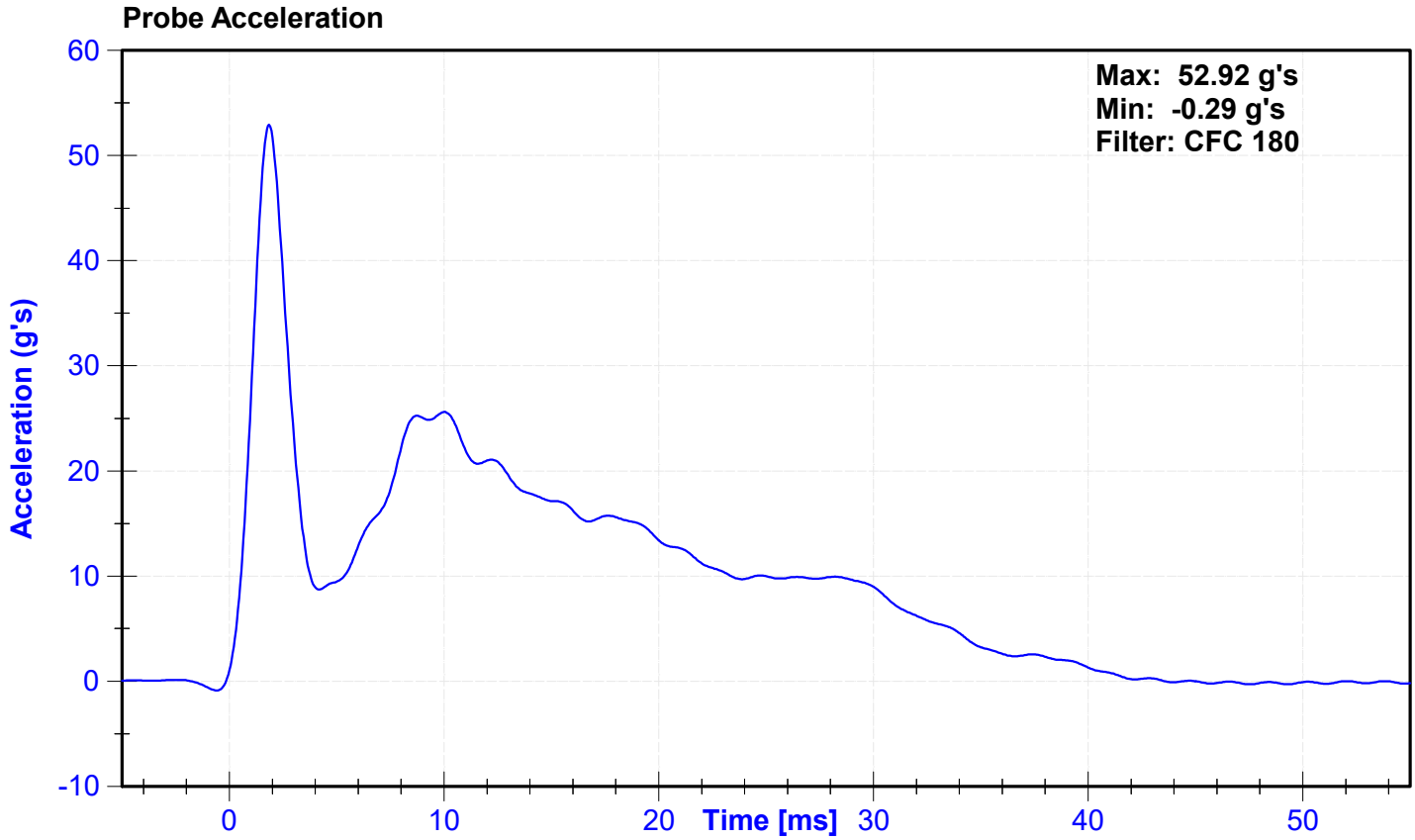
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

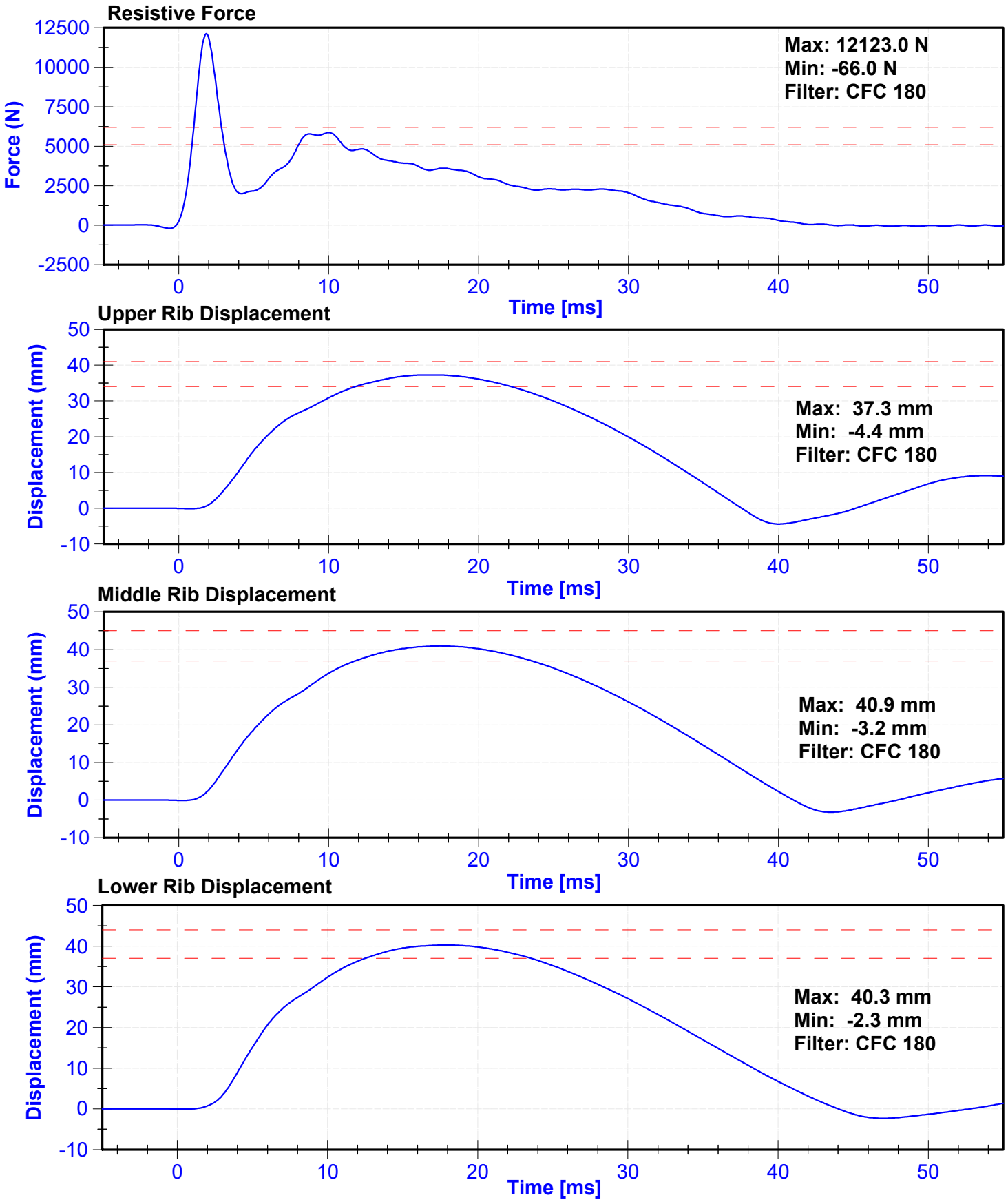
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	54	Pass
Velocity	5.4	5.6	m/s	5.52	Pass
Resistive Force after 6ms	5100	6200	N	5865.9	Pass
Upper Thorax Rib Deflection	34	41	mm	37.3	Pass
Mid Thorax Rib Deflection	37	45	mm	40.9	Pass
Lower Thorax Rib Deflection	37	44	mm	40.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18619	3/29/2024	9/25/2024
Upper Thorax Rib Potentiometer	Honeywell	179GFE	5/6/2024	11/4/2024
Middle Thorax Rib Potentiometer	Honeywell	185GFE	5/6/2024	11/4/2024
Lower Thorax Rib Potentiometer	Honeywell	178GFE	5/6/2024	11/4/2024




Resistive Force
Force (N)
12500
10000
7500
5000
2500
0
-2500
Max: 12123.0 N
Min: -66.0 N
Filter: CFC 180
0
10
20
30
40
50
Time [ms]
Upper Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
Max: 37.3 mm
Min: -4.4 mm
Filter: CFC 180
Time [ms]
Middle Rib Displacement
Max: 40.9 mm
Min: -3.2 mm
Filter: CFC 180
Time [ms]
Lower Rib Displacement
Max: 40.3 mm
Min: -2.3 mm
Filter: CFC 180
Time [ms]

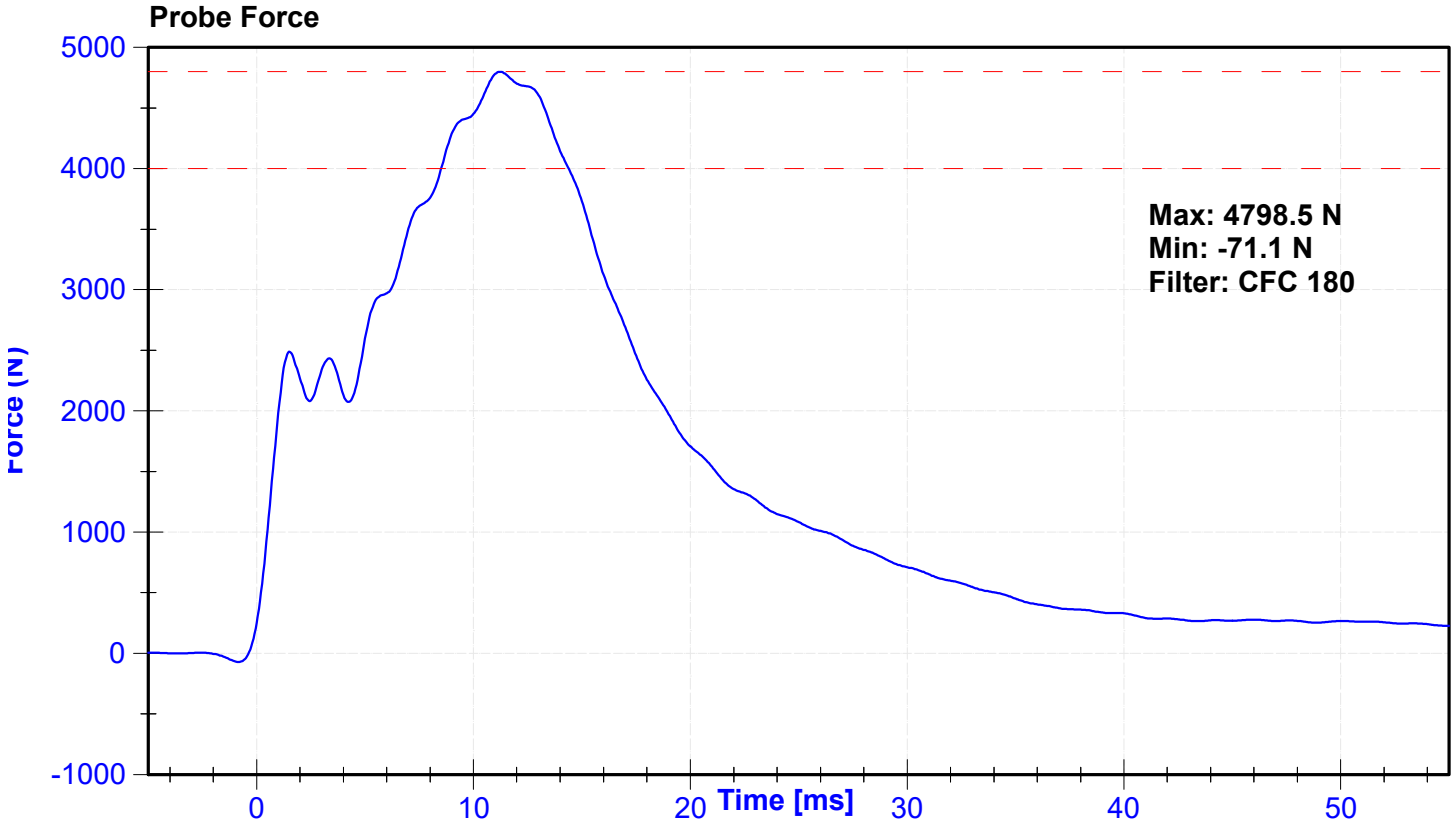
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

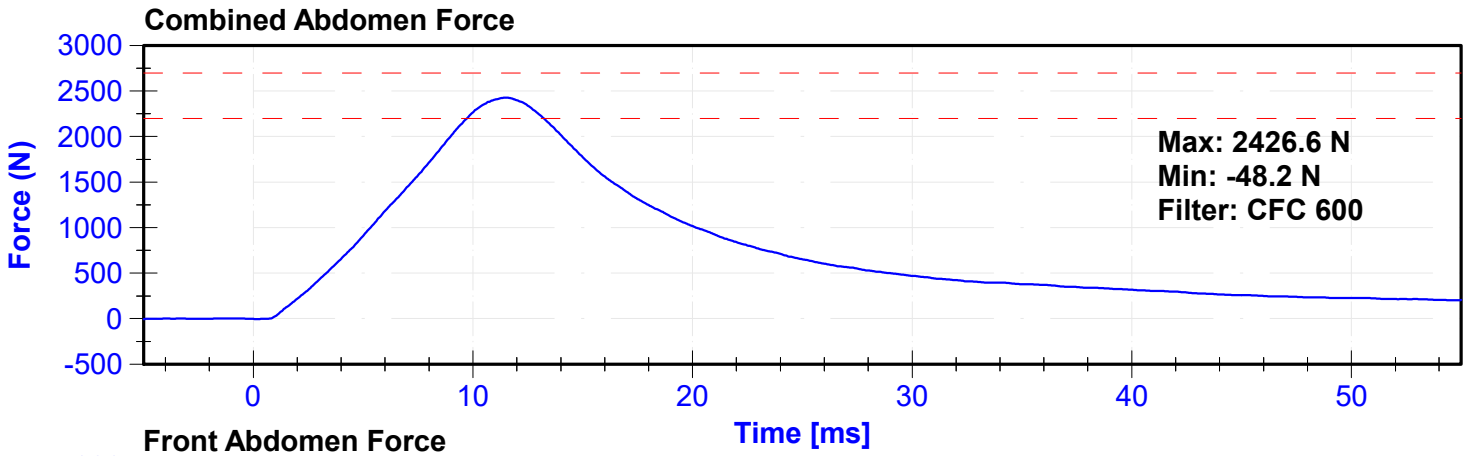
Results

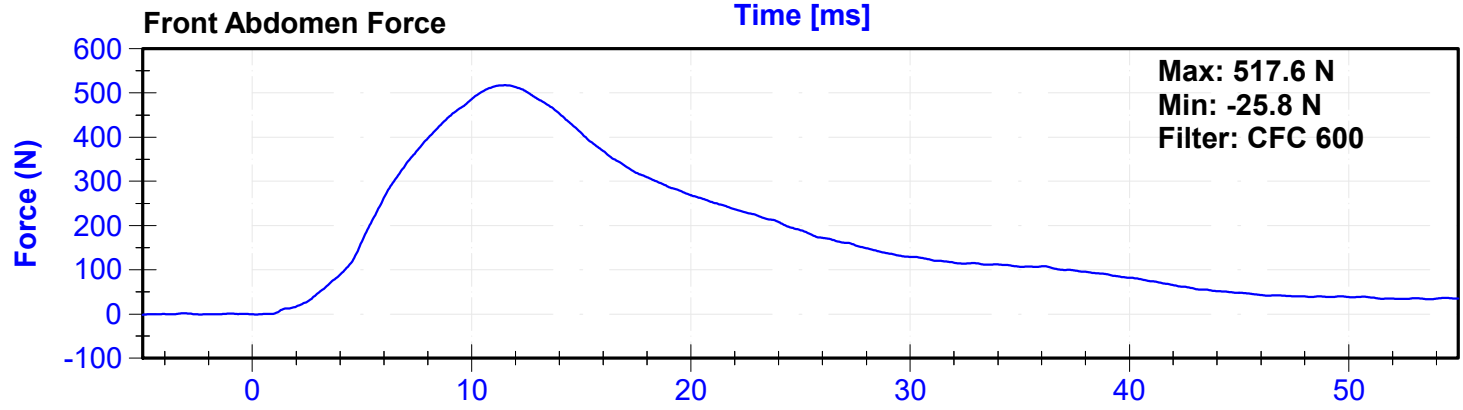
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	54	Pass
Velocity	3.9	4.1	m/s	4.00	Pass
Combined Abdomen Force	2200	2700	N	2426.6	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.50	Pass
Resistive Probe Force	4000	4800	N	4798.5	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.20	Pass

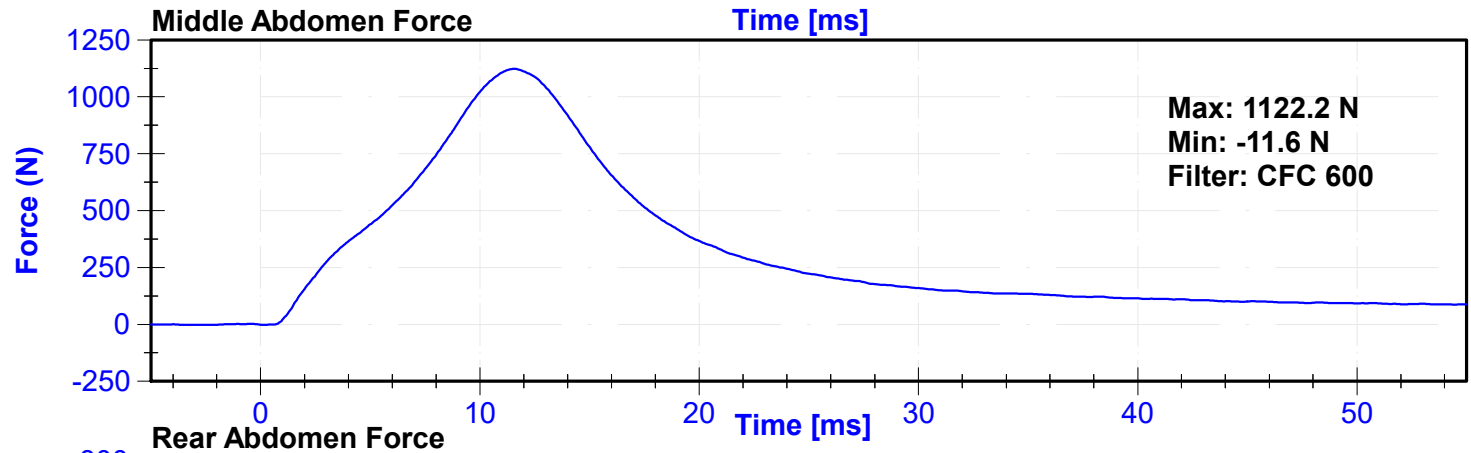
Transducer Calibrations

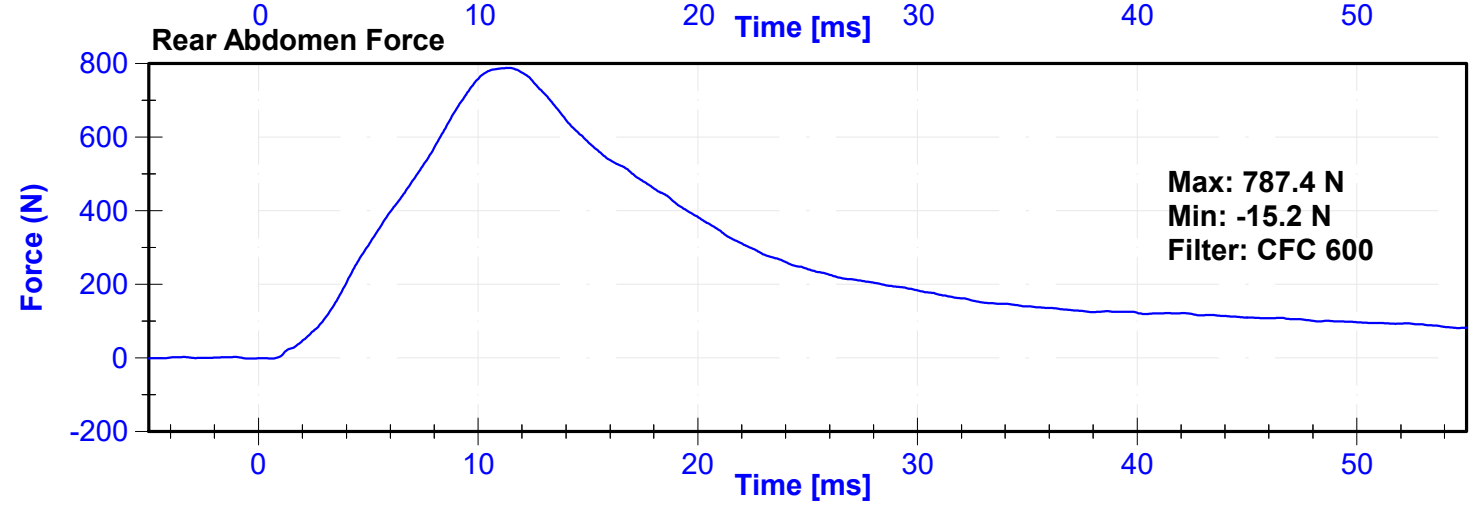
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	3/29/2024	9/25/2024
Front Abdomen Load Cell	Denton	1509	9/12/2023	9/11/2024
Middle Abdomen Load Cell	Denton	1508	9/12/2023	9/11/2024
Rear Abdomen Load Cell	Denton	1507	9/12/2023	9/11/2024




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2426.6 N
Min: -48.2 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 517.6 N
Min: -25.8 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1122.2 N
Min: -11.6 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 787.4 N
Min: -15.2 N
Filter: CFC 600

ATD Manufacturer	Denton	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

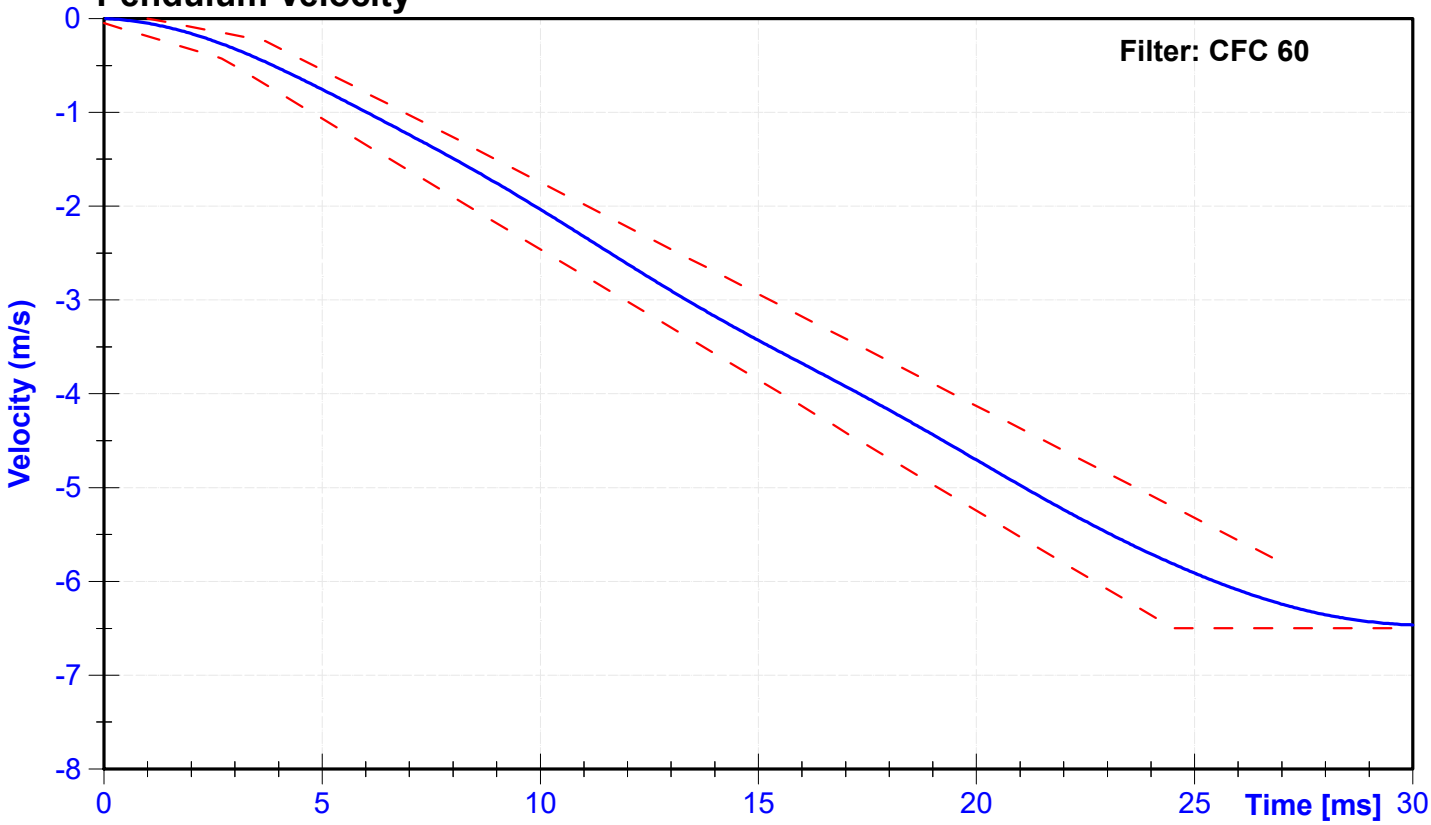
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	57	Pass
Velocity	5.95	6.15	m/s	6.082	Pass
Lateral Spine Rotation	45	55	deg	48.4	Pass
Time at Maximum Rotation	39	53	ms	43.7	Pass
Time of Decay to Zero Degrees	37	57	ms	38.1	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Fail

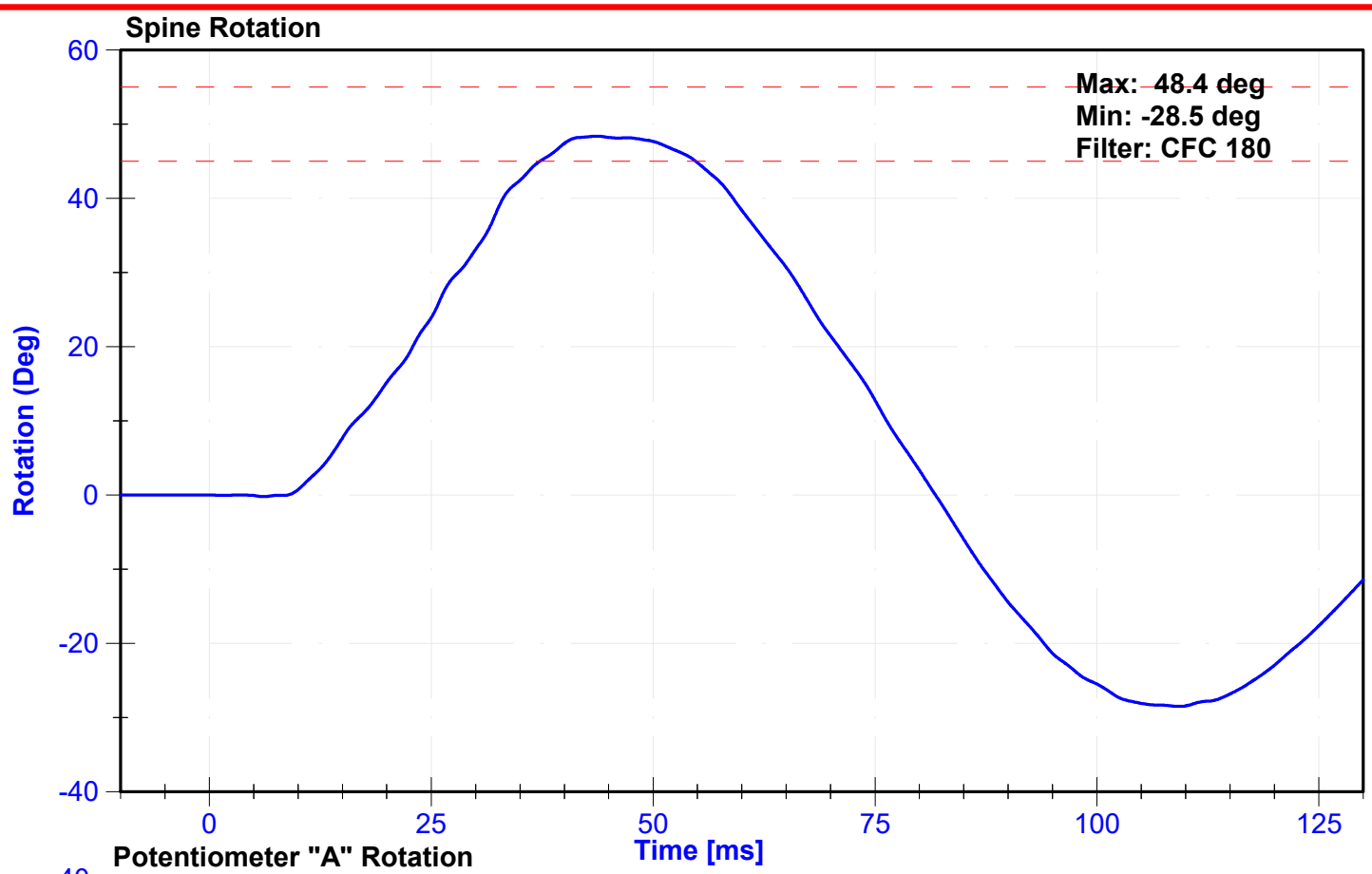
Transducer Calibrations

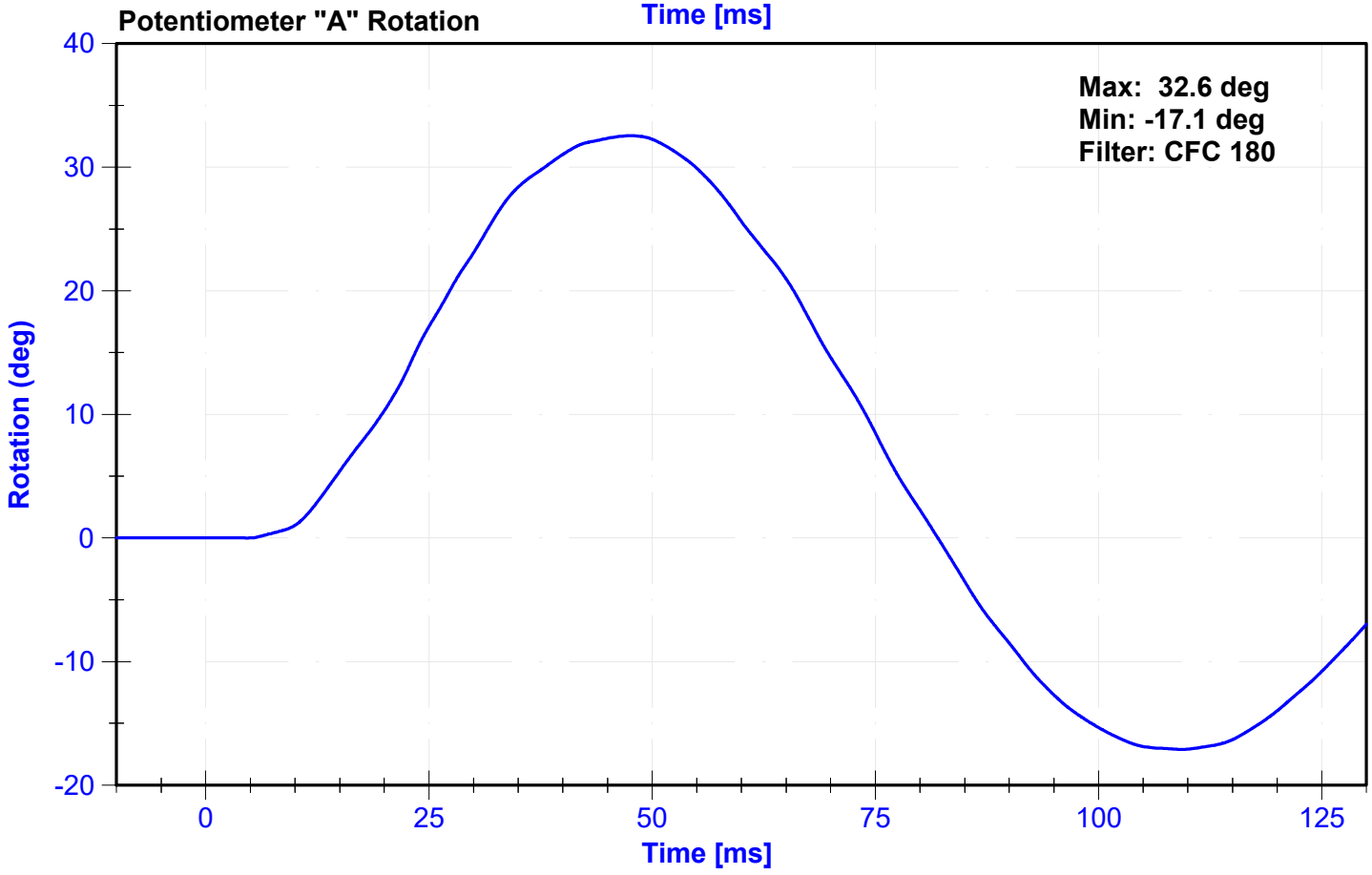
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	4/29/2024	10/26/2024
Pendulum "A" Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Condyle "B" Potentiometer	Sfernice	095	9/29/2023	9/28/2024

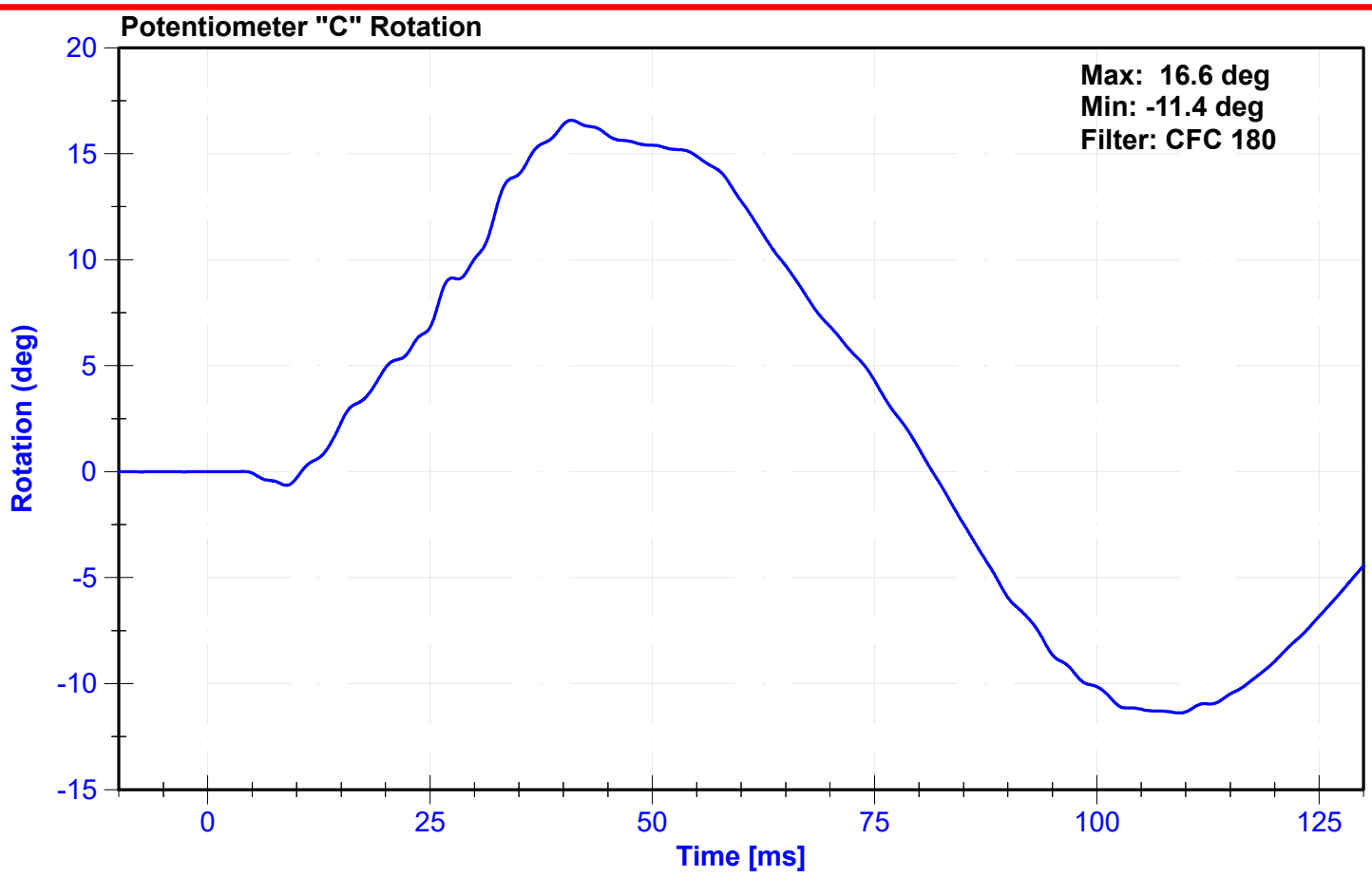
Pendulum Velocity[3]



[1,2] Upper and lower boundaries specified in Appendix I


Spine Rotation
Max: 48.4 deg
Min: -28.5 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 32.6 deg
Min: -17.1 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]



Appendix I

[2] Upper Boundary Corridor		[1] Lower Boundary Corridor	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.7	-0.24	2.7	-0.425
27.0	-5.80	24.5	-6.5
		30.0	-6.5

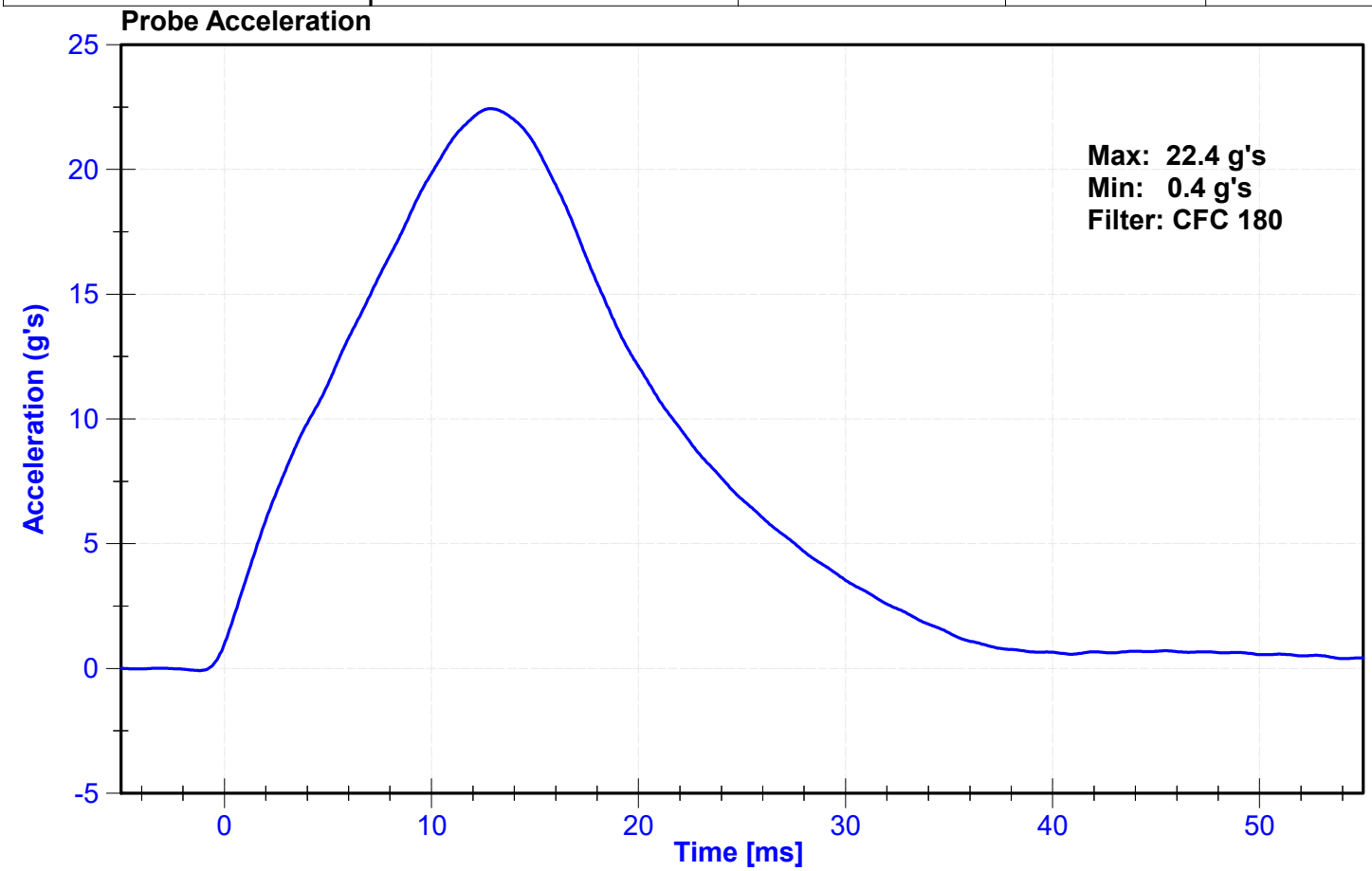
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

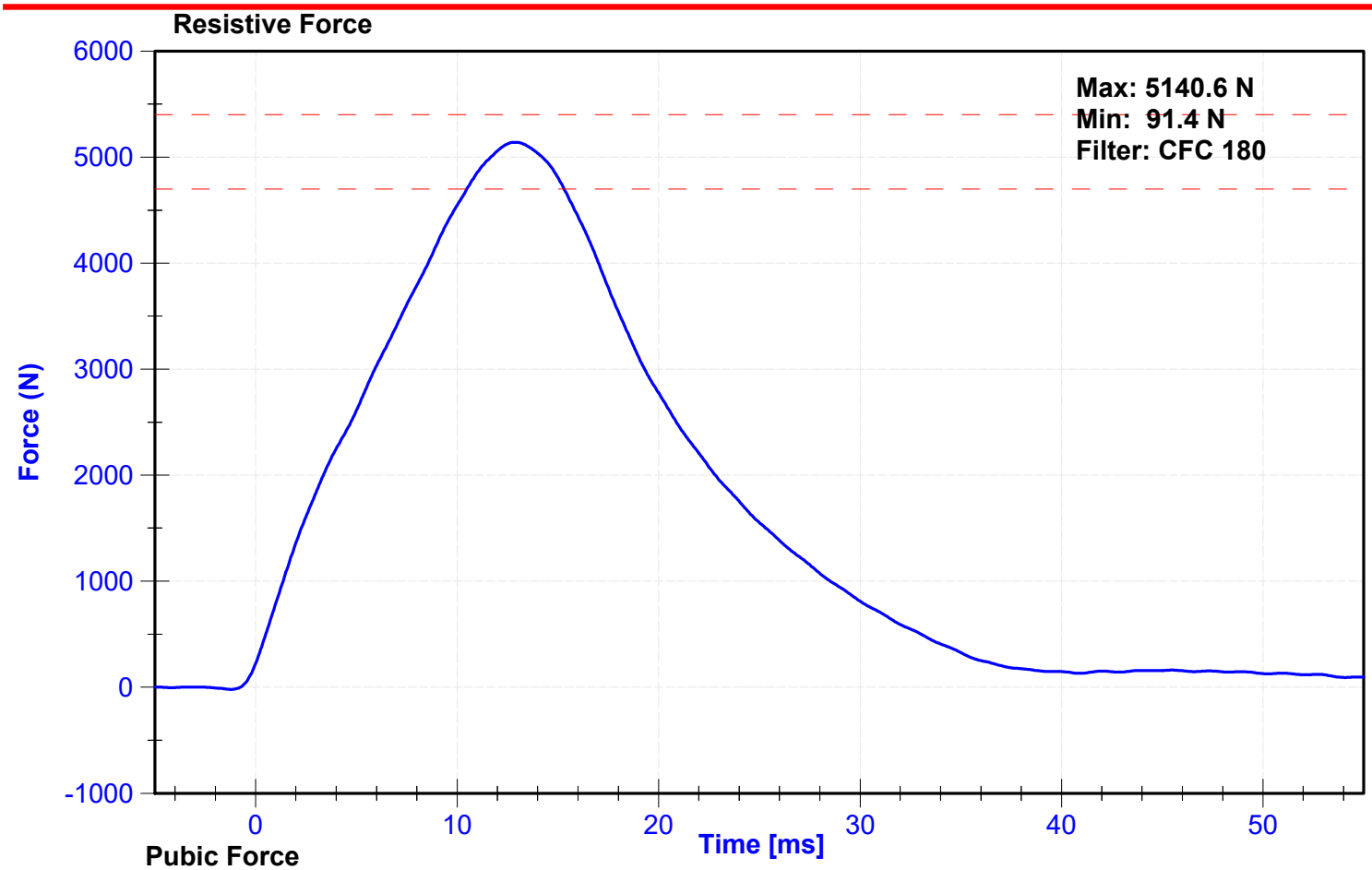
Results

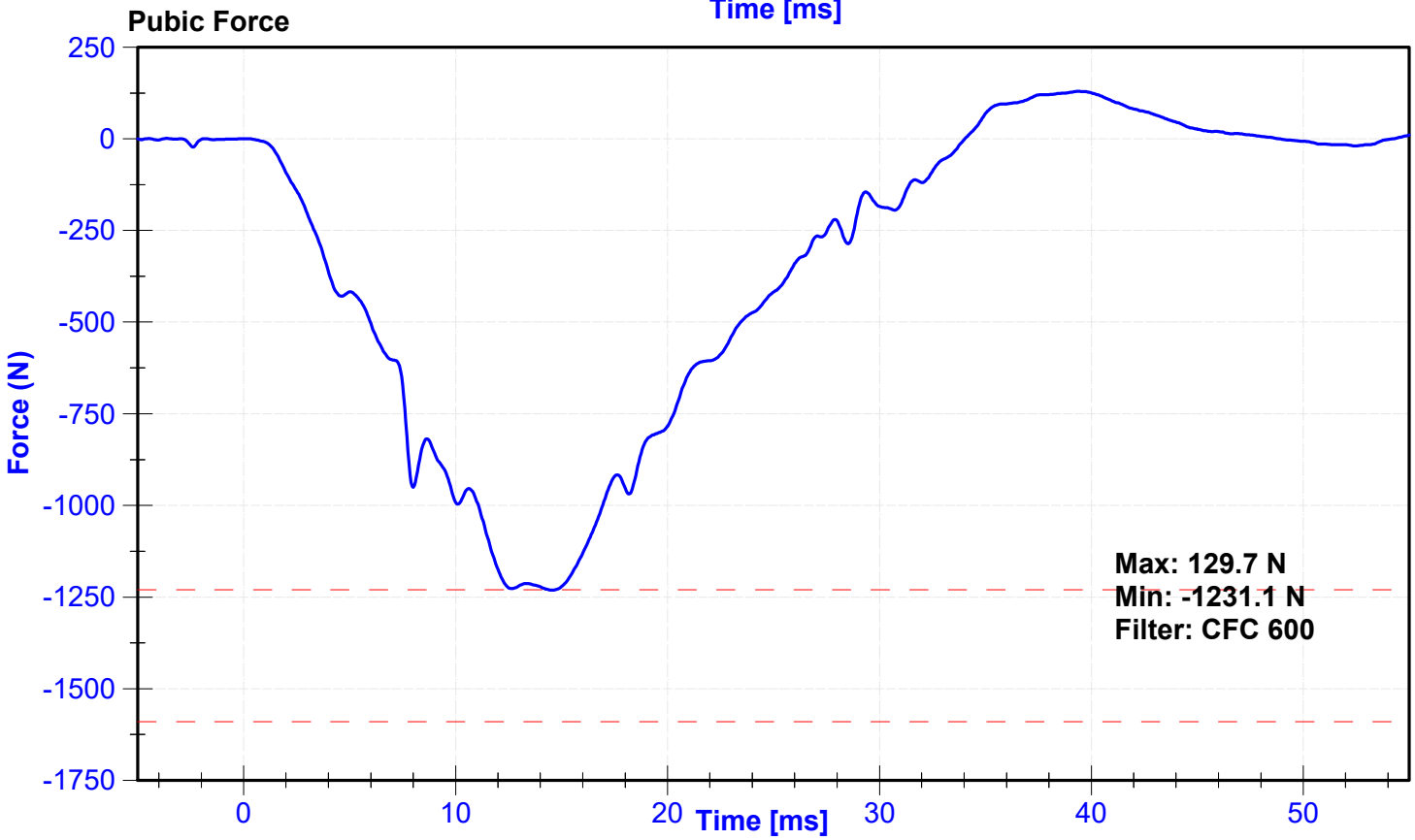
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	54	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Resistive Force	4700	5400	N	5140.6	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.85	Pass
Pubic Force	-1590	-1230	N	-1231.1	Pass
Time at Peak Pubic Force	12.2	17.0	ms	14.55	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	3/29/2024	9/25/2024
Pubic Load Cell	Denton	458-FY	12/5/2023	12/4/2024




Resistive Force
Max: 5140.6 N
Min: 91.4 N
Filter: CFC 180
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]


Pubic Force
Max: 129.7 N
Min: -1231.1 N
Filter: CFC 600
Force (N)
250
0
-250
-500
-750
-1000
-1250
-1500
-1750
0
10
20
30
40
50
Time [ms]

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE – PASSENGER ATD

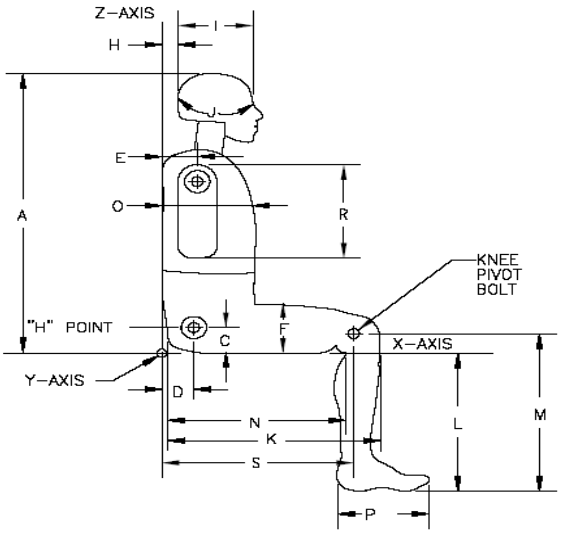
SERIAL NO:DG8012

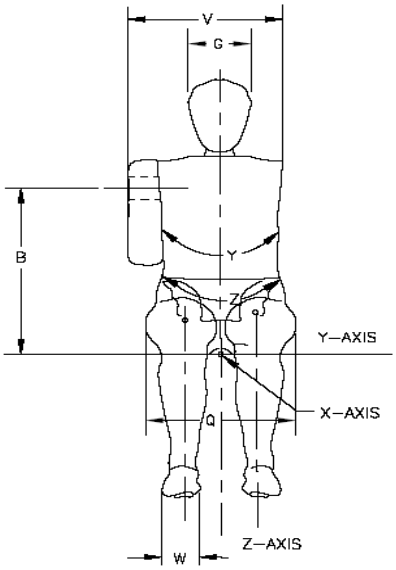
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: T. Roseman Date: 07/18/2024

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	780	Pass
B	Shoulder Pivot Height	437	453	447	Pass
C	H-point Height	79	89	87	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	105	Pass
F	Thigh Clearance	119	135	129	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	183	Pass
J	Head Circumference	541	551	545	Pass
K	Buttock to Knee Length	514	540	530	Pass
L	Popliteal Height	343	369	364	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	438	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	220	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	255	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	354	Pass
W	Foot Width	78	94	86	Pass
Y	Chest Circumference w/jacket	851	881	869	Pass
Z	Waist Circumference	761	791	782	Pass

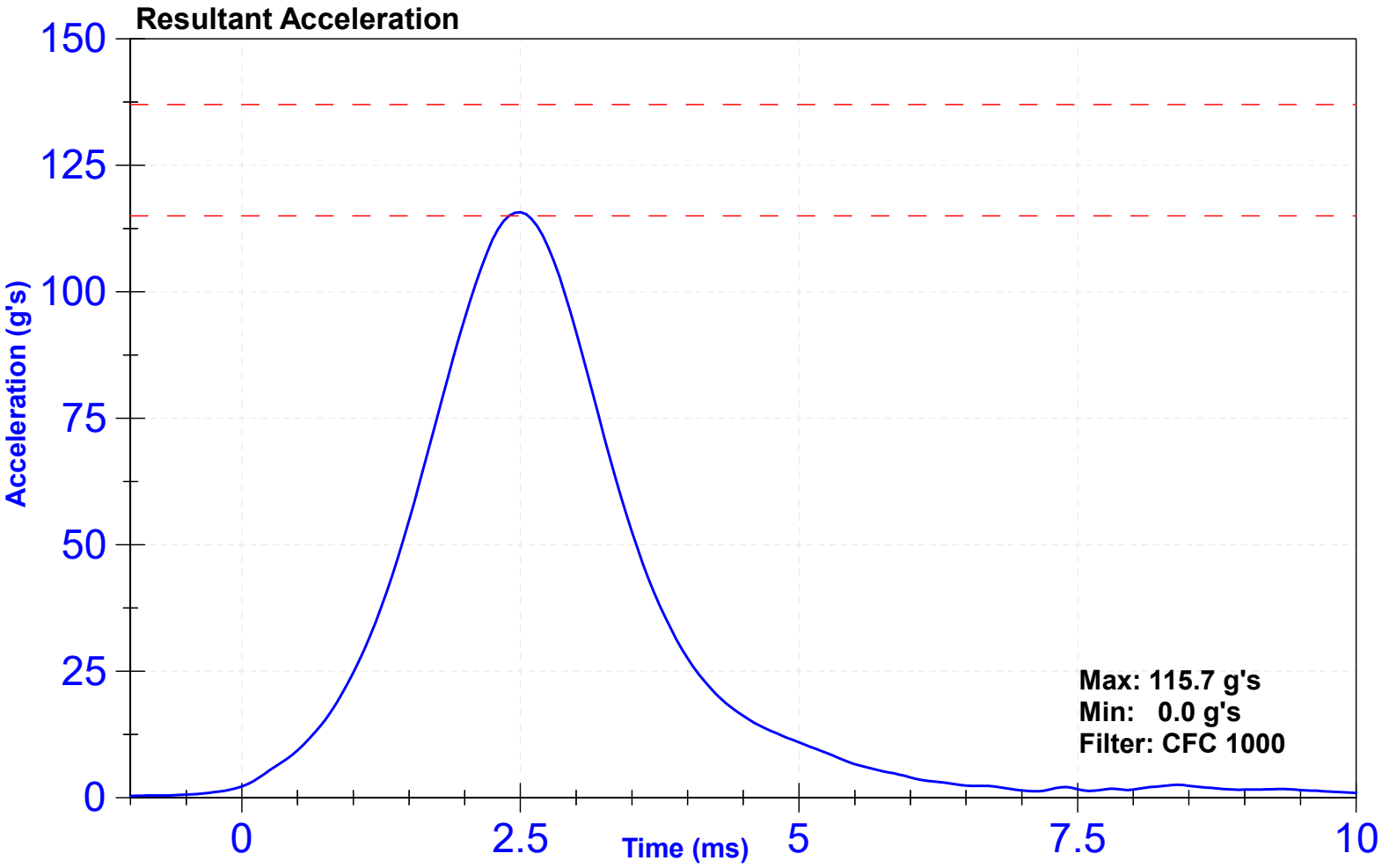
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

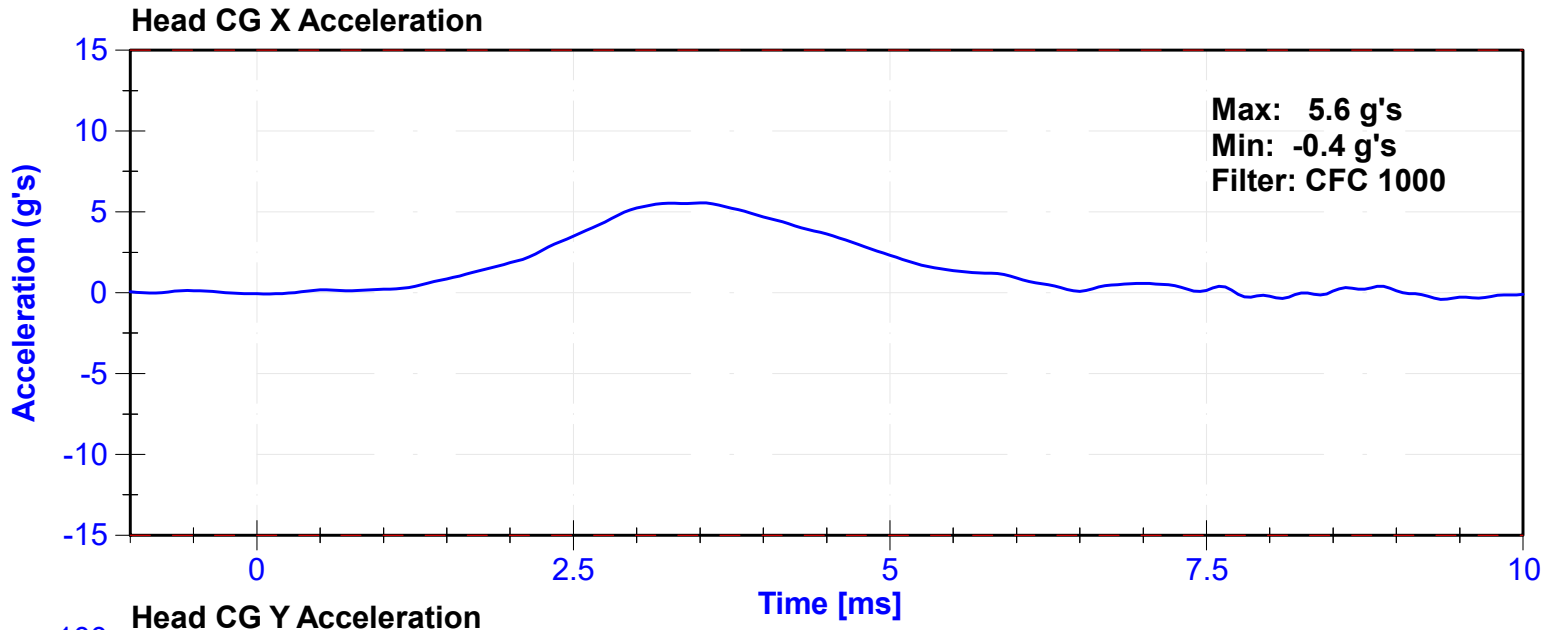
Results

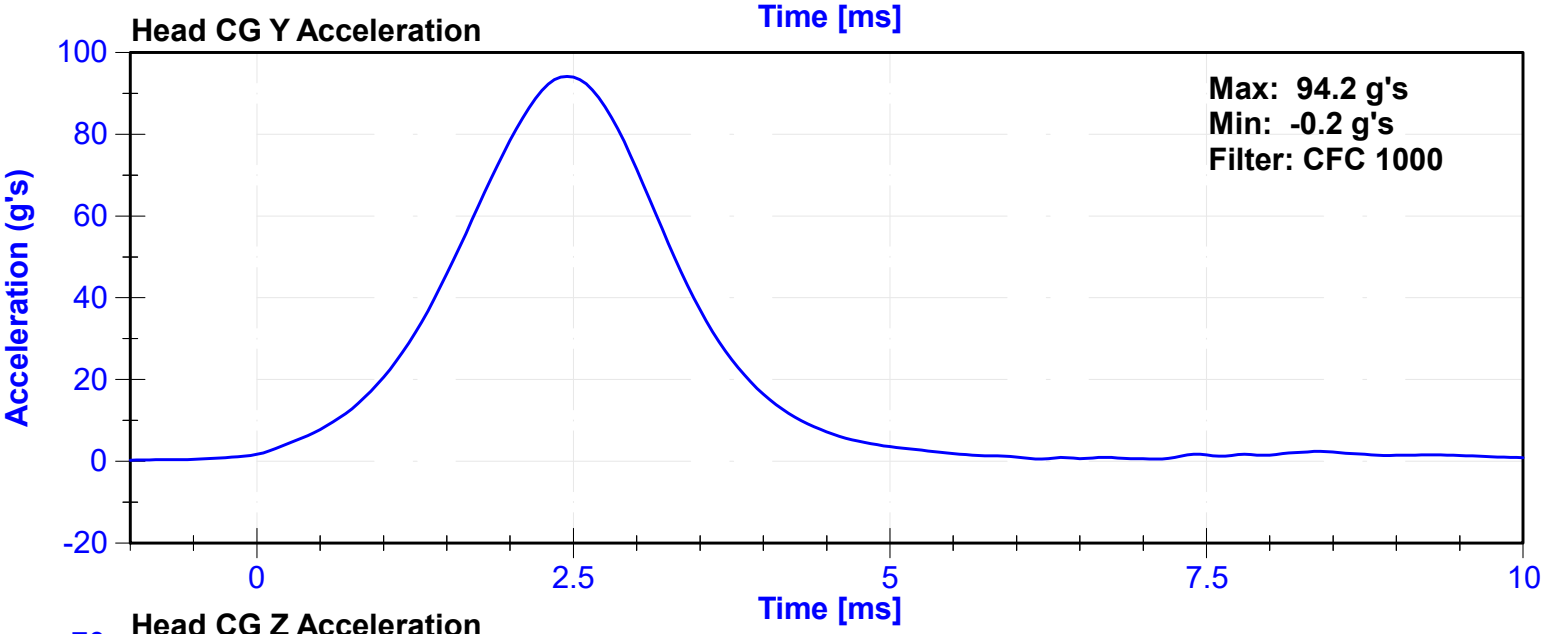
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	61	Pass
Resultant Acceleration	115	137	g's	115.7	Pass
Oscillation	0	15	%	2.1	Pass
Fore-Aft Acceleration	-15	15	g's	5.6	Pass

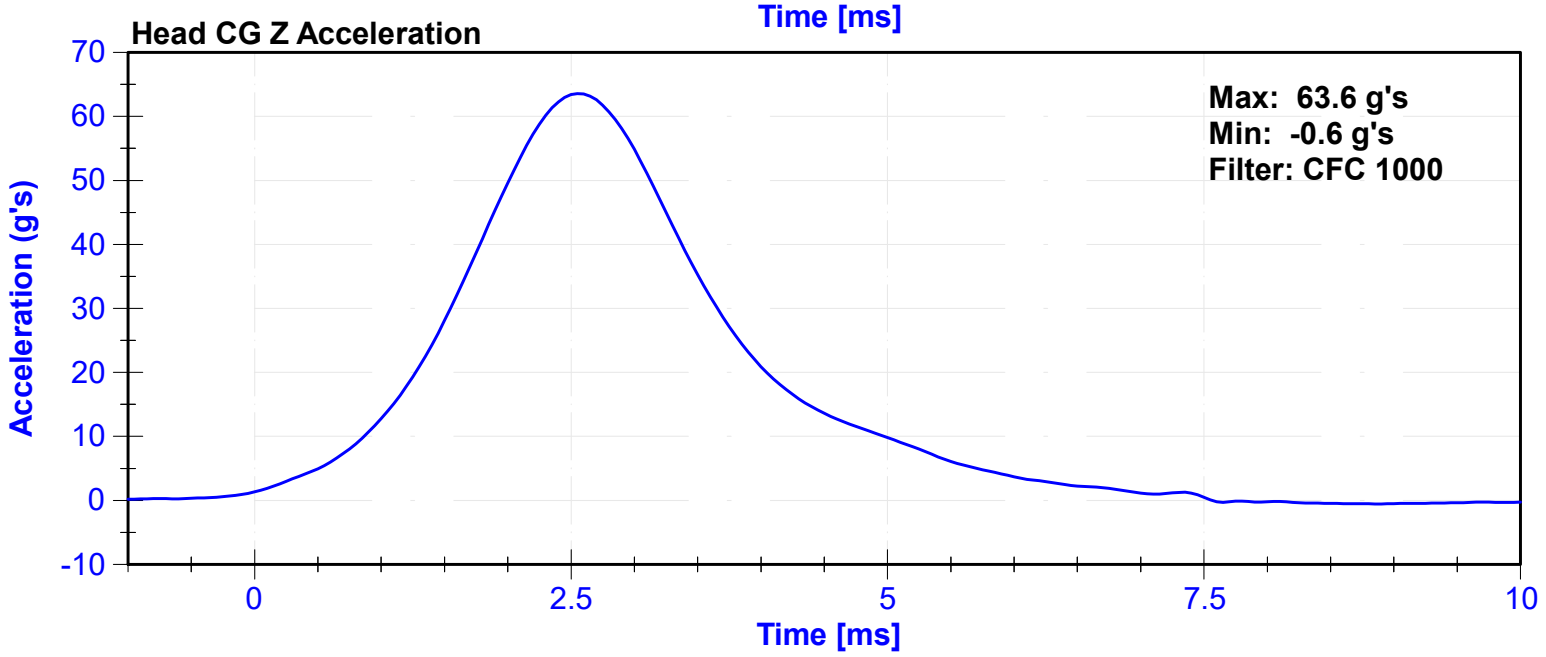
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	T21184	5/6/2024	11/2/2024
Y Accelerometer	Endevco	P51668	5/6/2024	11/2/2024
Z Accelerometer	Endevco	P83319	5/6/2024	11/2/2024




Head CG X Acceleration
Max: 5.6 g's
Min: -0.4 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 94.2 g's
Min: -0.2 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 63.6 g's
Min: -0.6 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

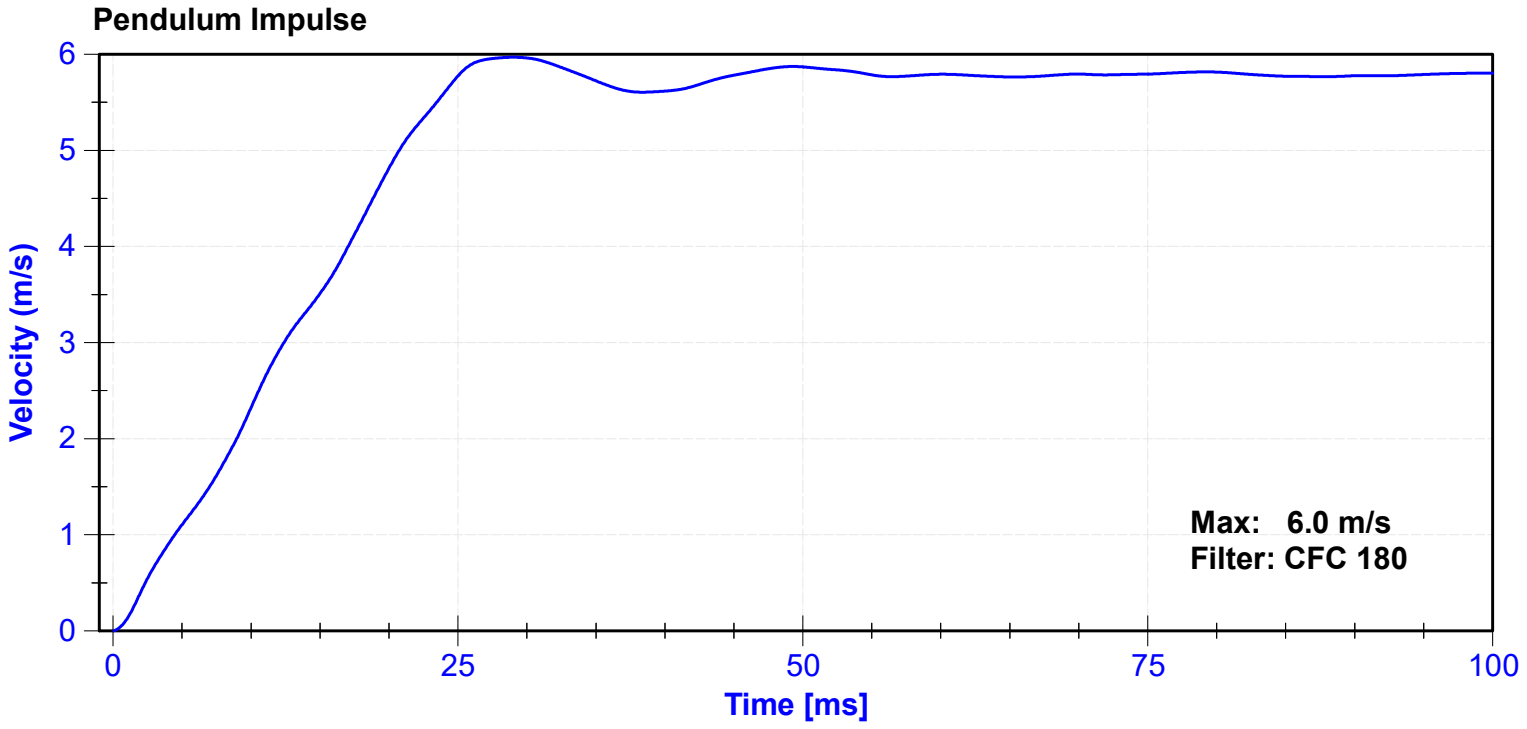
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

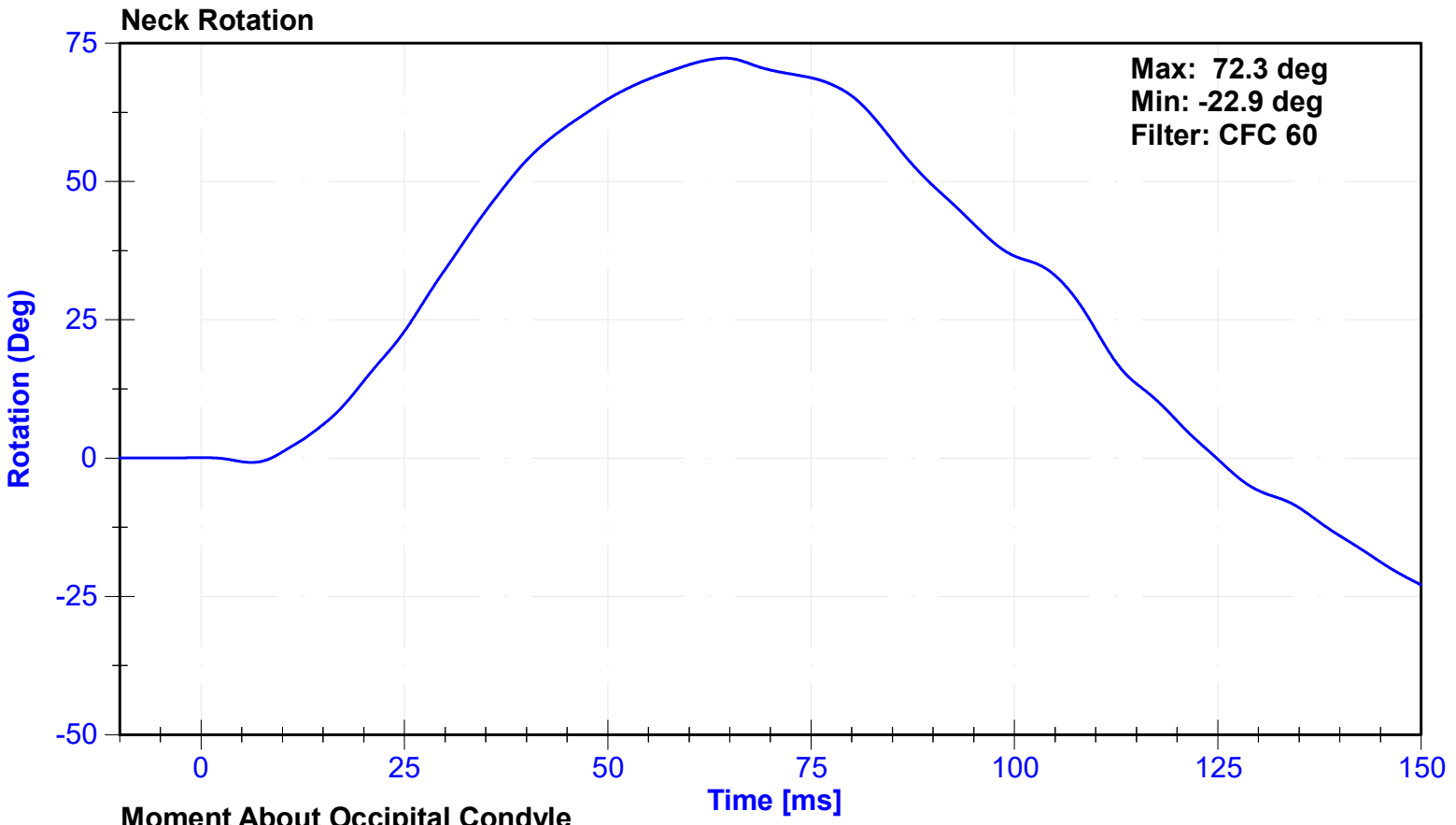
Results

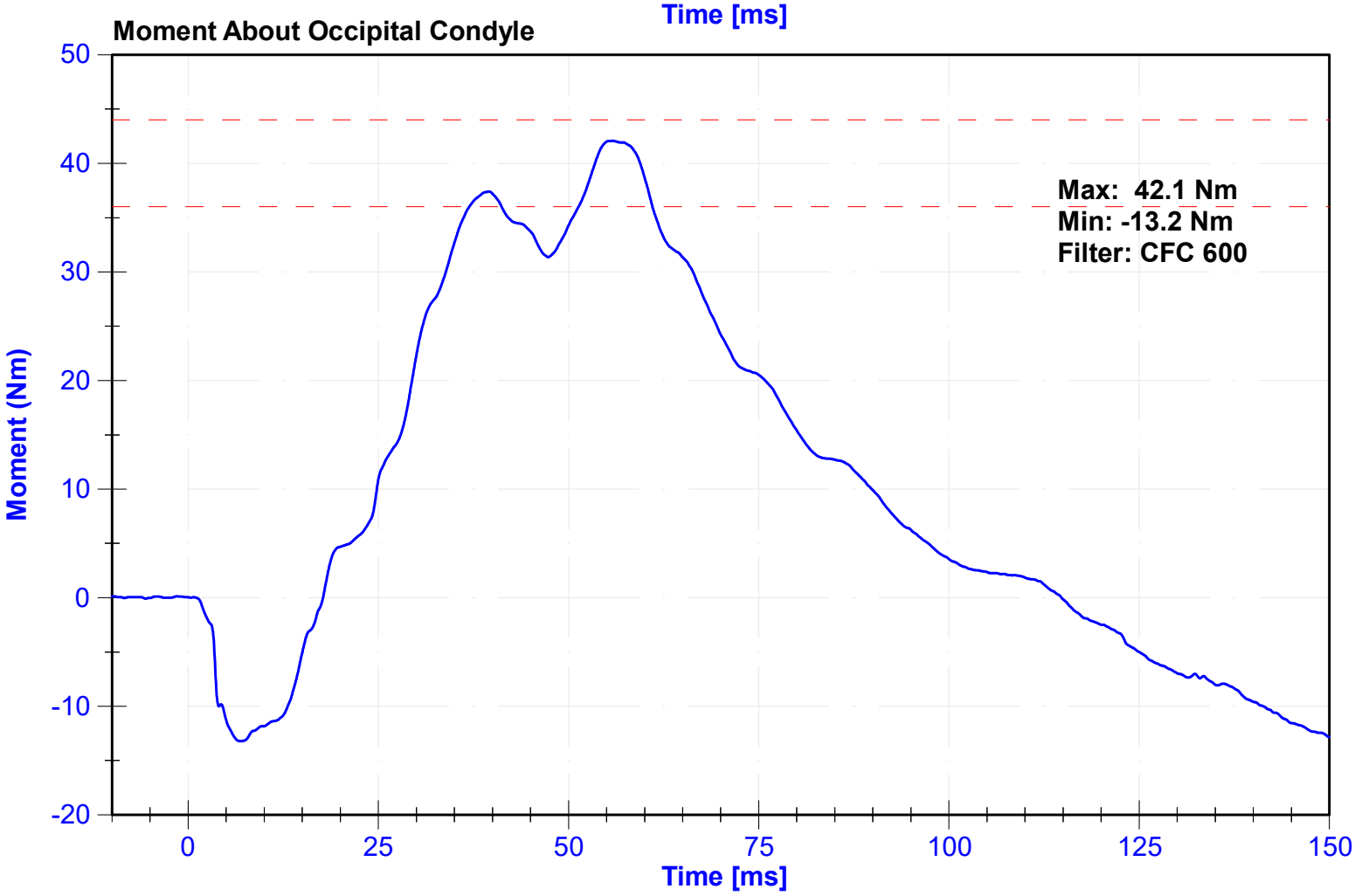
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	62	Pass
Velocity	5.51	5.63	m/s	5.548	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.32	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.51	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.81	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.77	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.97	Pass
Neck Rotation	71	81	deg	72.3	Pass
Time at Maximum Rotation	50	70	ms	64.4	Pass
Moment about the OC	36	44	Nm	42.1	Pass
Moment Decay to 0 Nm	102	126	ms	114.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	4/29/2024	10/26/2024
Pendulum Potentiometer	Servo	4961	10/2/2023	10/1/2024
Condyle Potentiometer	Servo	DS185	10/2/2023	10/1/2024
Upper Neck Load Cell	Denton	1716A_2187-FY	12/5/2023	12/4/2024




Neck Rotation
Max: 72.3 deg
Min: -22.9 deg
Filter: CFC 60
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 42.1 Nm
Min: -13.2 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

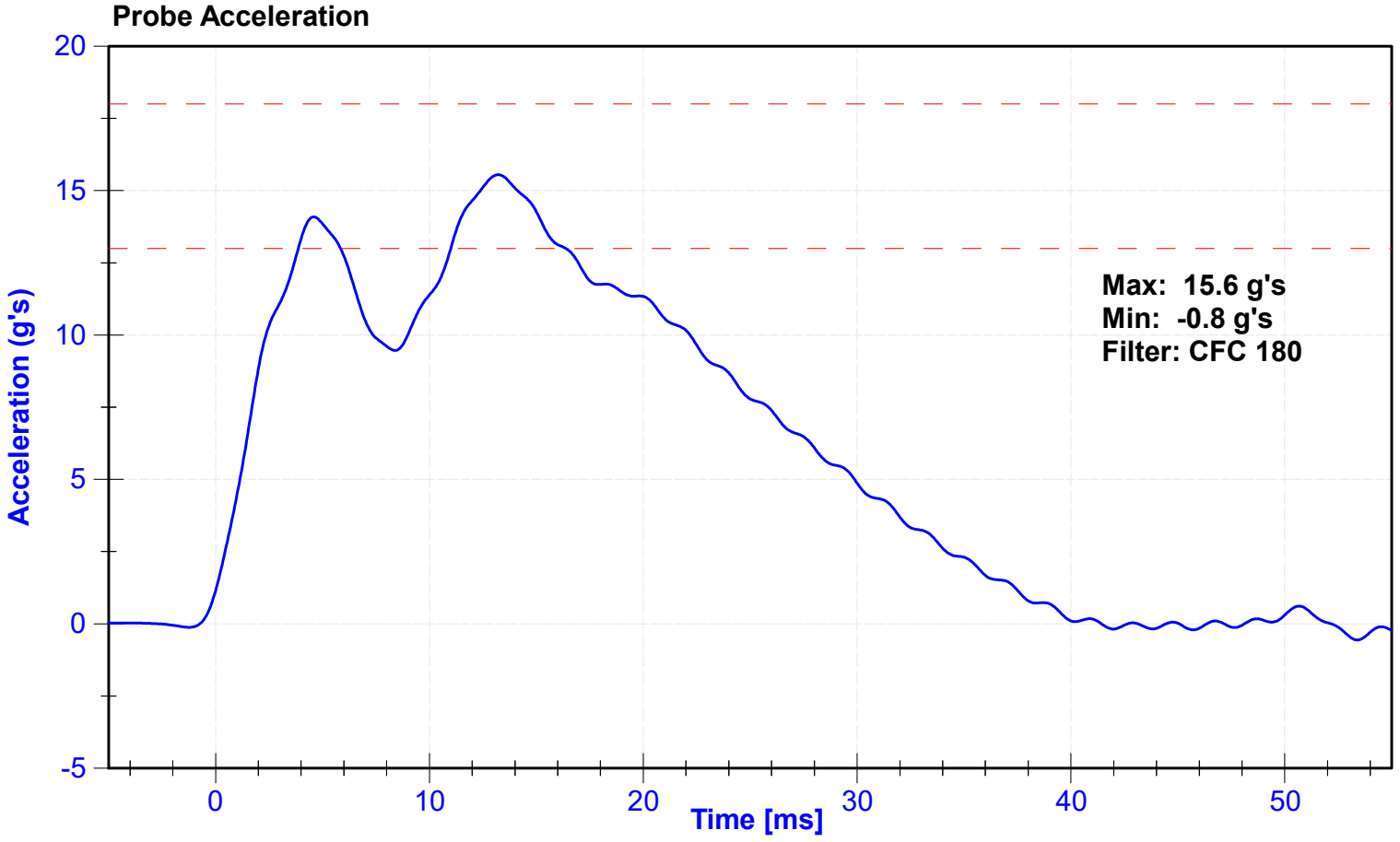
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

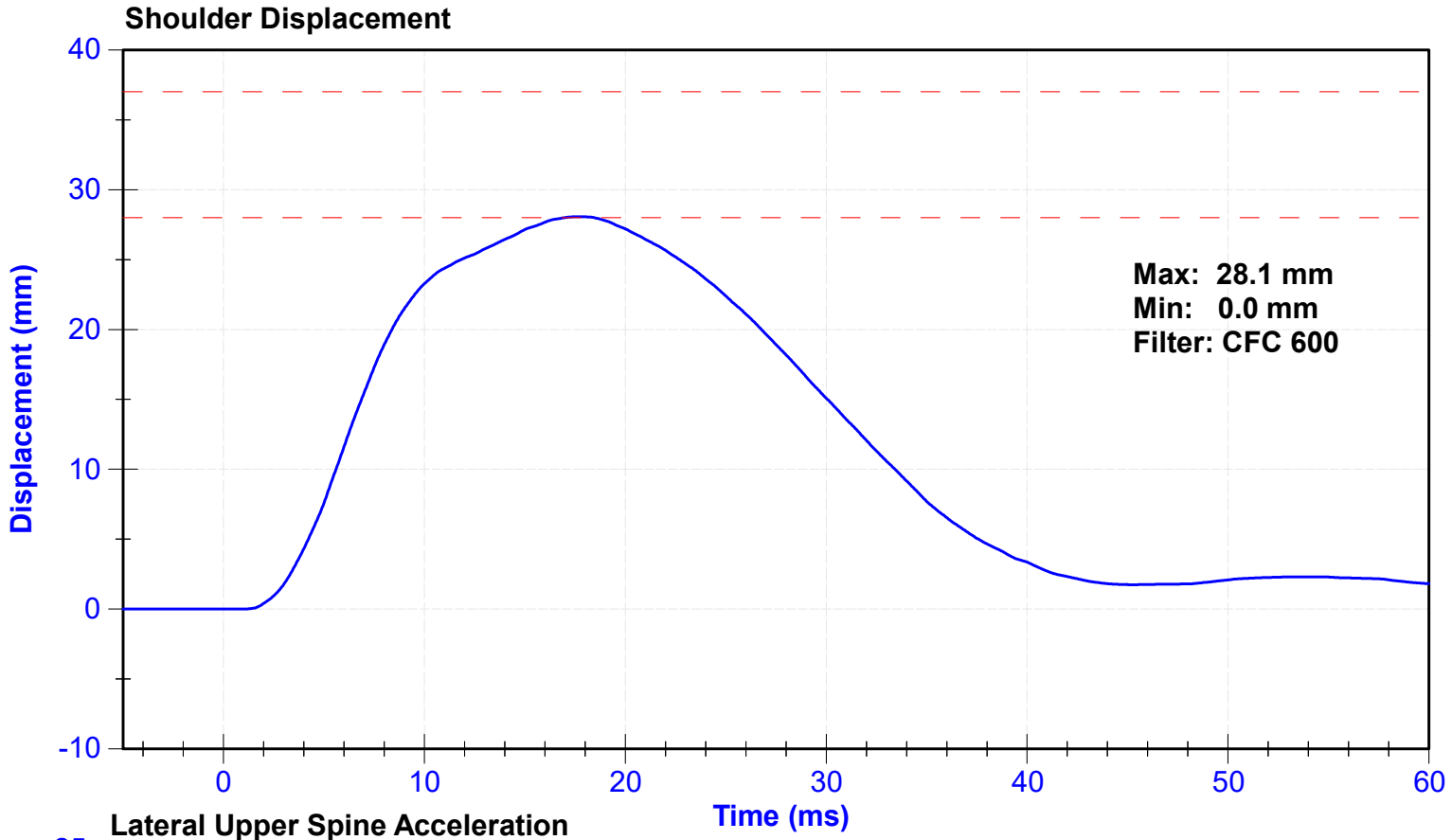
Results

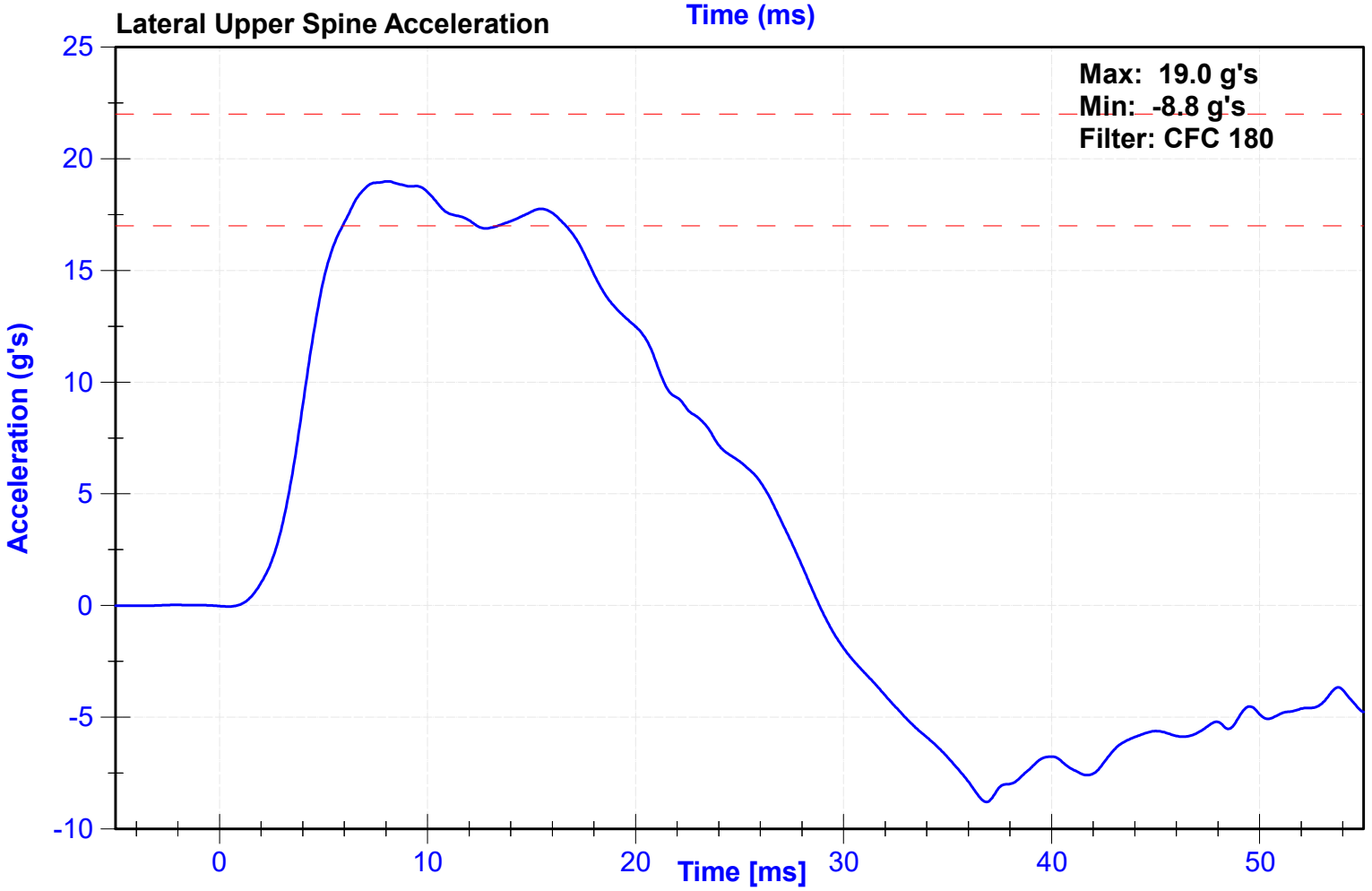
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	63	Pass
Velocity	4.2	4.4	m/s	4.24	Pass
Probe Acceleration	13	18	g's	15.6	Pass
Shoulder Deflection	28	37	mm	28.1	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	3/29/2024	9/25/2024
Shoulder Potentiometer	Servo	1274GFE	5/6/2024	11/4/2024
Upper Spine Y Accelerometer	Endevco	P64148	5/6/2024	11/2/2024




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 28.1 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 19.0 g's
Min: -8.8 g's
Filter: CFC 180

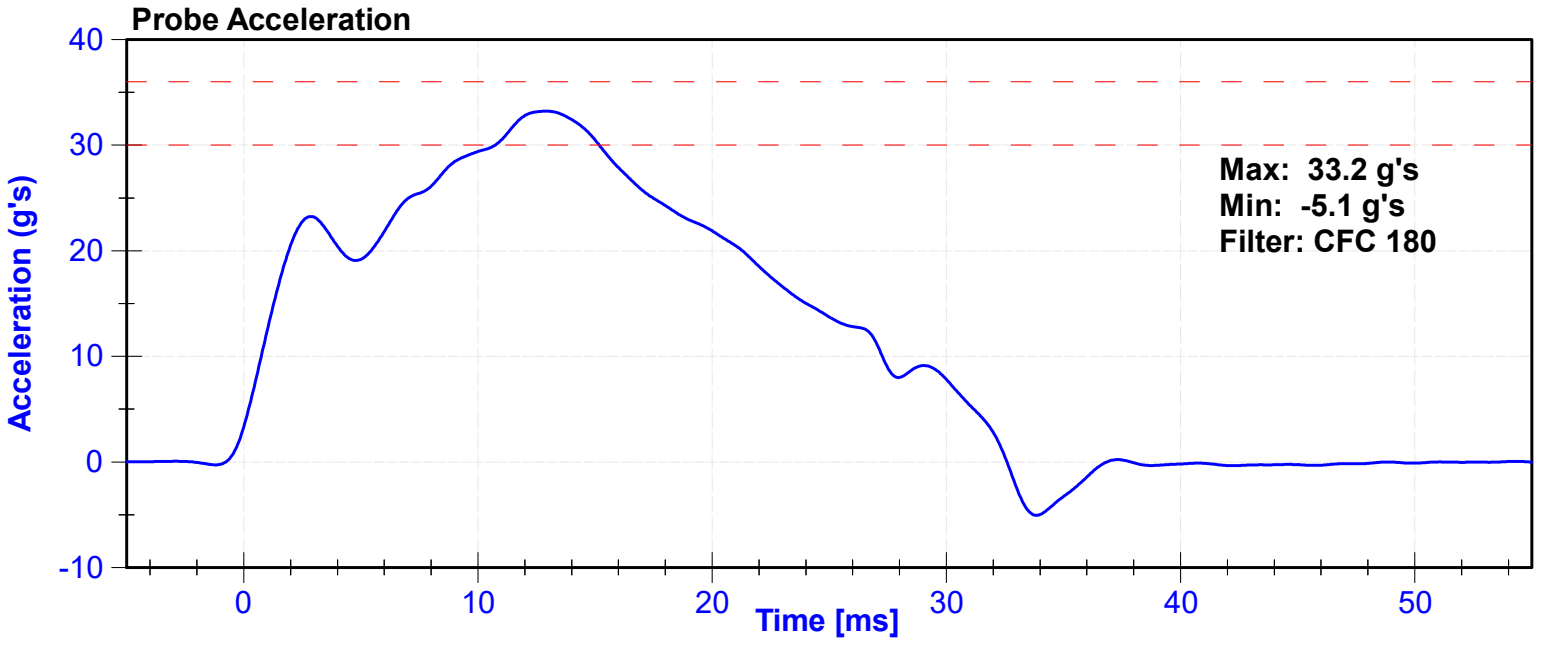
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

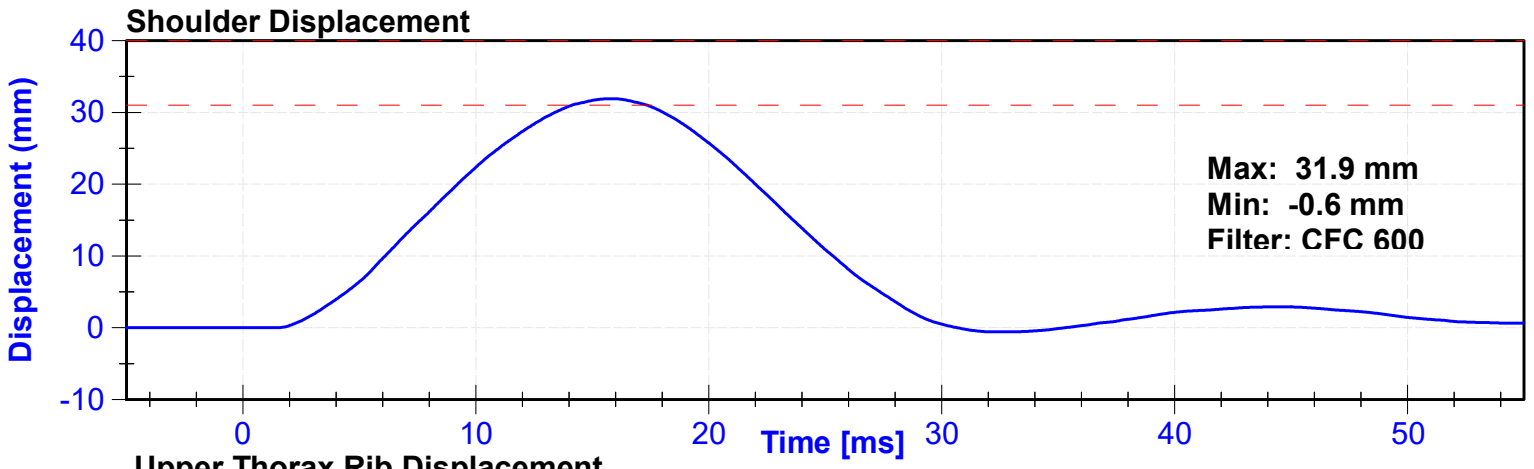
Results

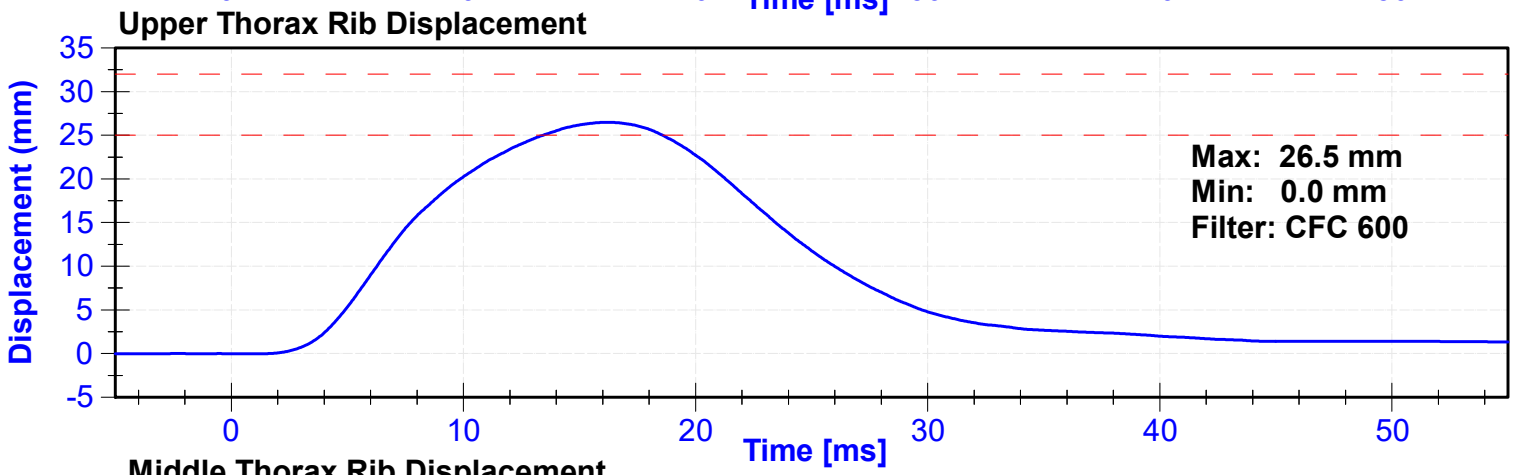
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	63	Pass
Velocity	6.6	6.8	m/s	6.64	Pass
Probe Acceleration after 5 ms	30	36	g's	33.2	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.1	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.0	Pass
Shoulder Deflection	31	40	mm	31.9	Pass
Upper Thorax Rib Deflection	25	32	mm	26.5	Pass
Mid Thorax Rib Deflection	30	36	mm	31.5	Pass
Lower Thorax Rib Deflection	32	38	mm	34.9	Pass

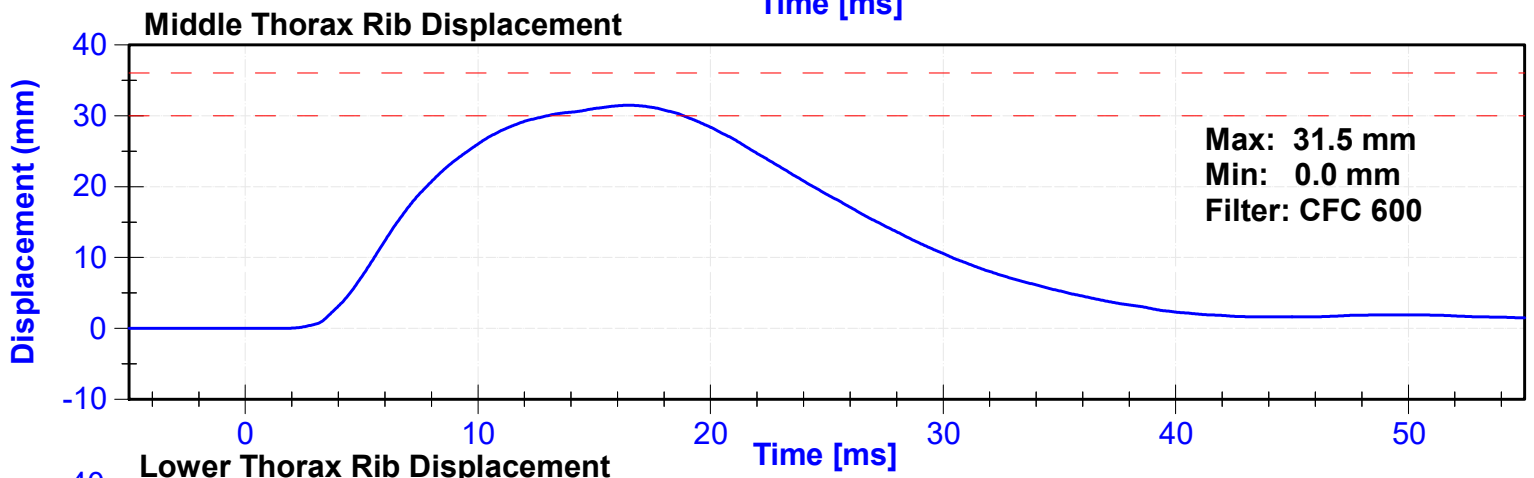
Transducer Calibrations

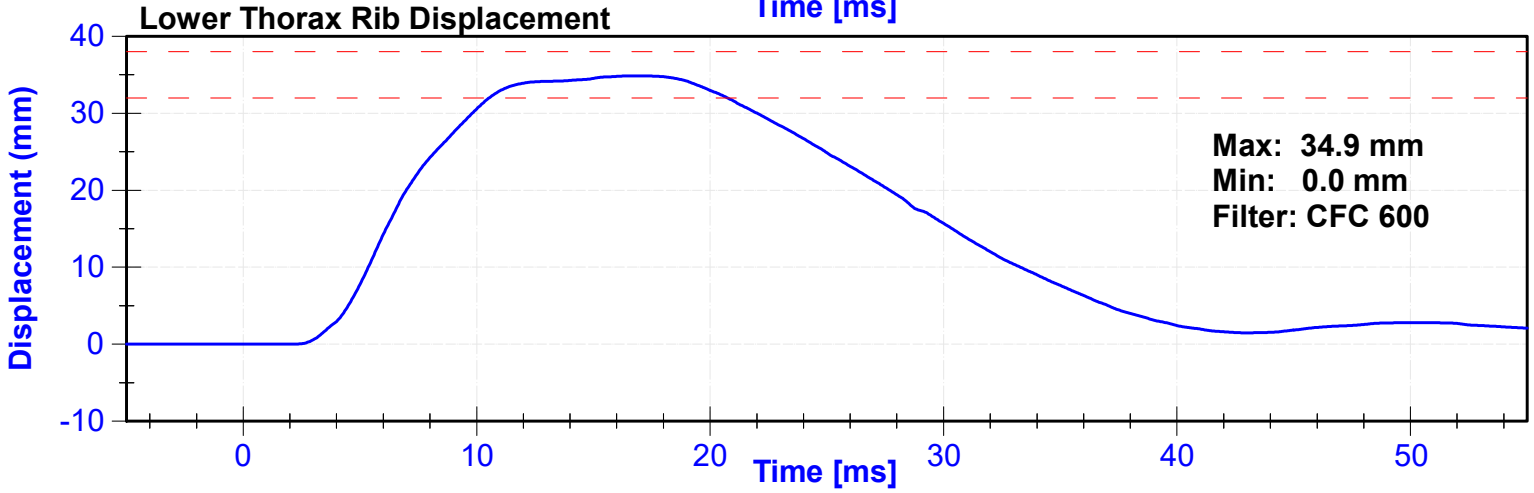
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	3/29/2024	9/25/2024
Upper Spine T1 Y Accelerometer	Endevco	P64148	5/6/2024	11/2/2024
Upper Spine T12 Y Accelerometer	Endevco	P51327	5/6/2024	11/2/2024
Shoulder Potentiometer	Servo	1274GFE	5/6/2024	11/4/2024
Upper Thorax Rib Potentiometer	Servo	1199GFE	5/6/2024	11/4/2024
Middle Thorax Rib Potentiometer	Servo	1246GFE	5/6/2024	11/4/2024
Lower Thorax Rib Potentiometer	Servo	011GFE	5/6/2024	11/4/2024

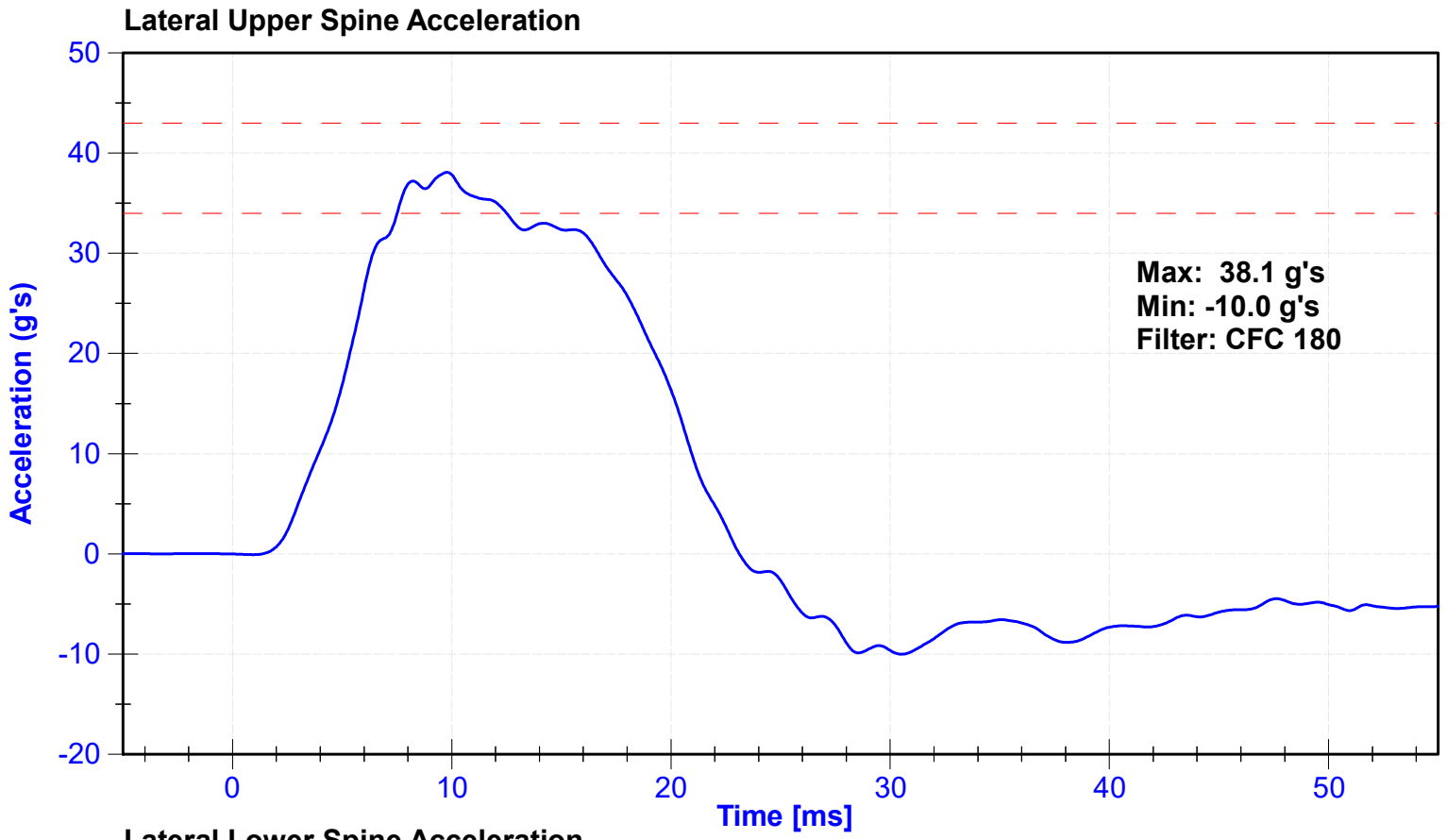


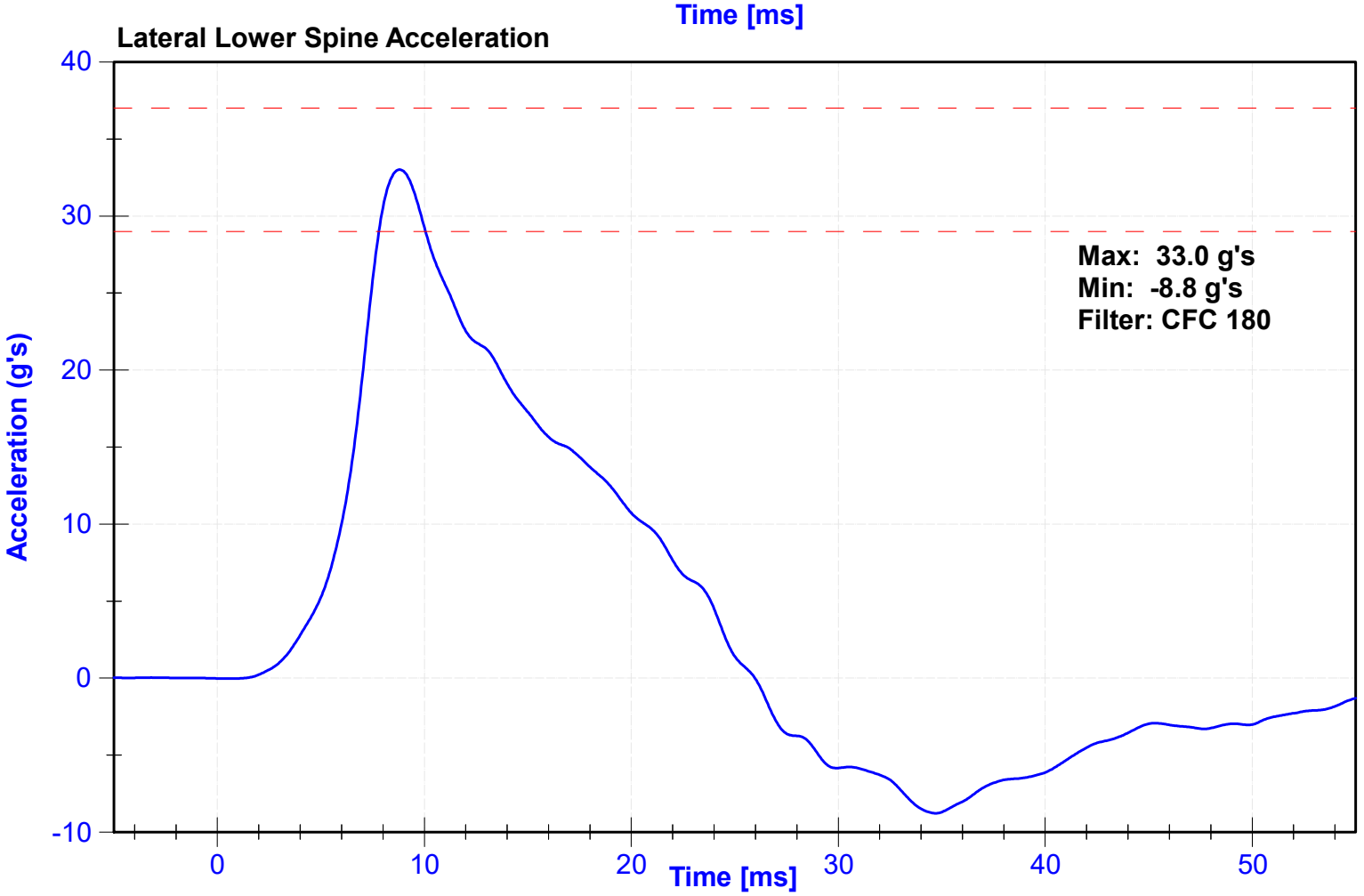

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 31.9 mm
Min: -0.6 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.5 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 31.5 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.9 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 38.1 g's
Min: -10.0 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 33.0 g's
Min: -8.8 g's
Filter: CFC 180

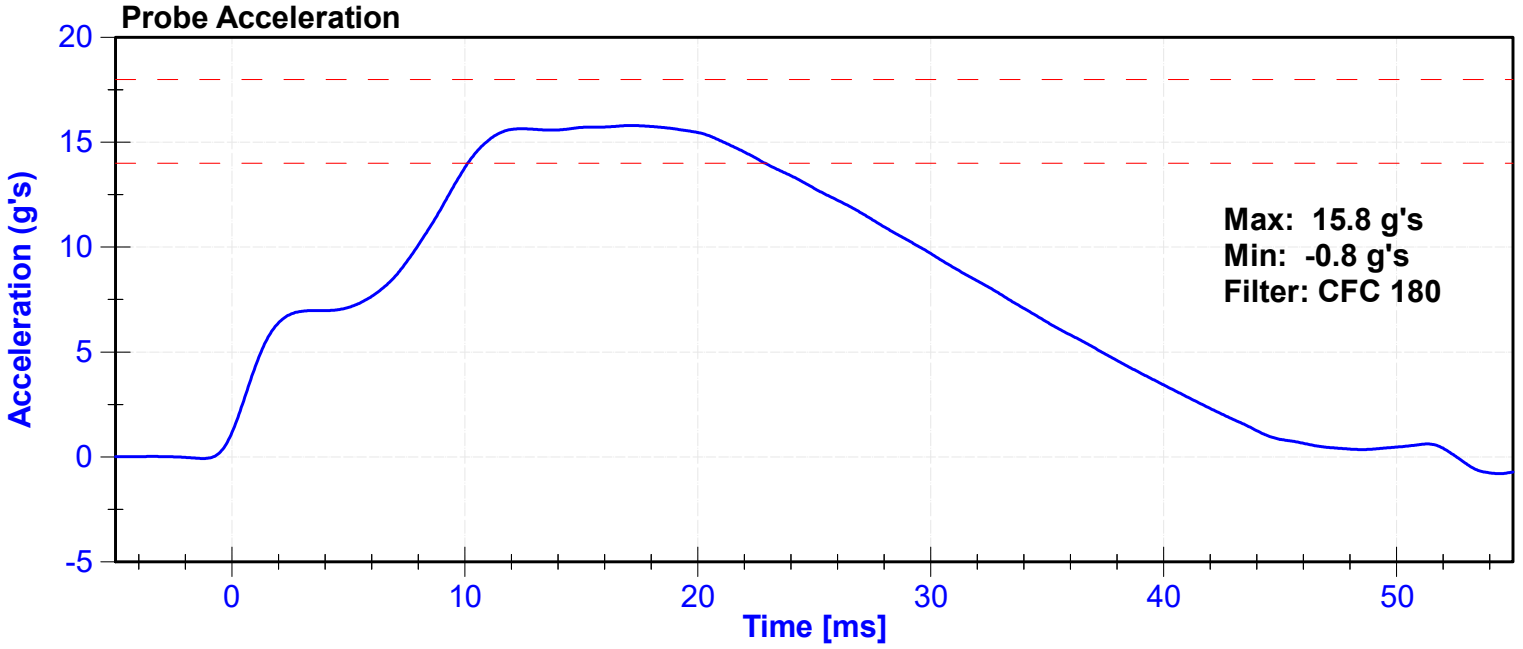
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

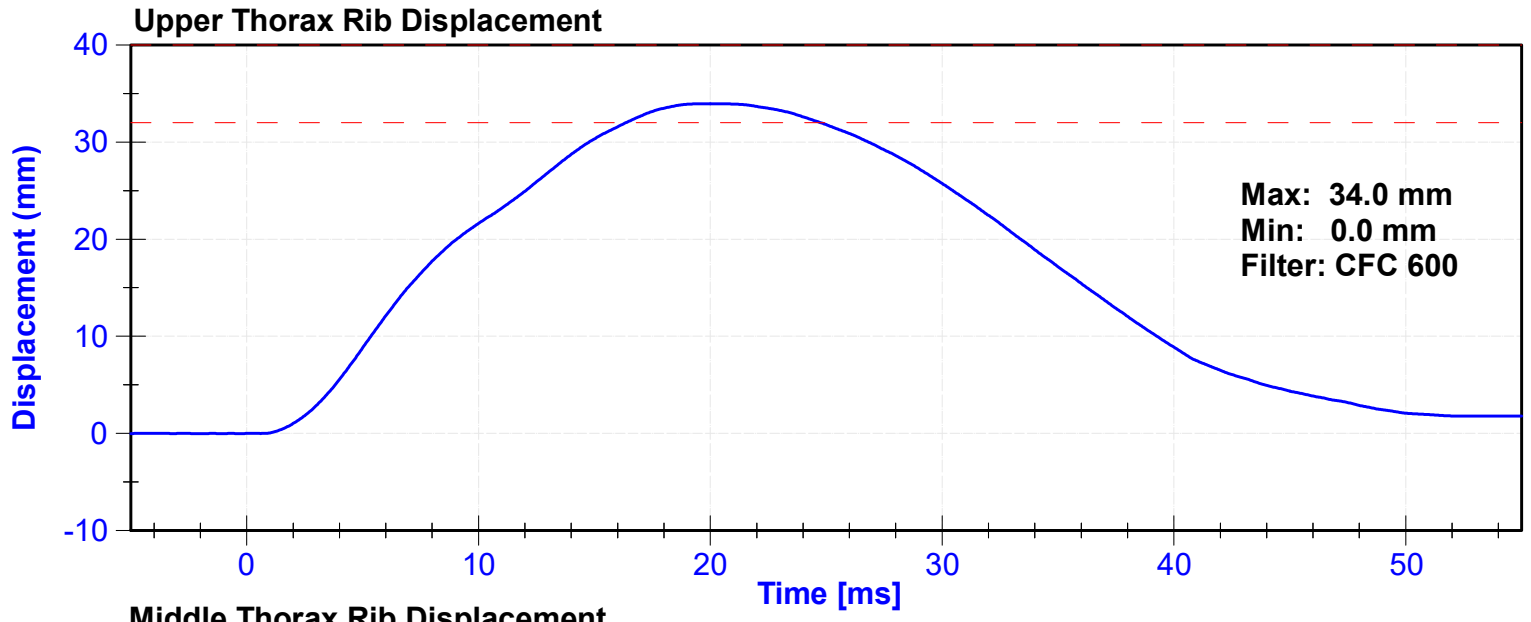
Results

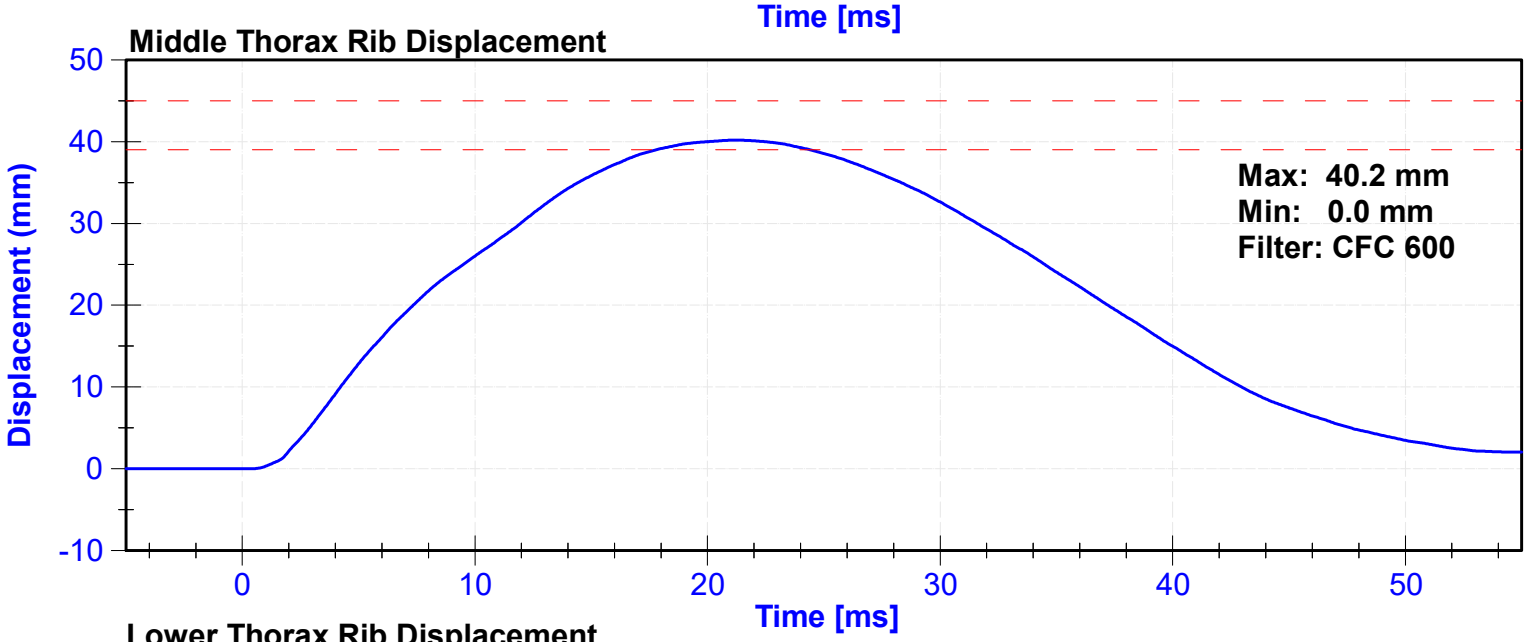
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	63	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	14	18	g's	15.8	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.4	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.4	Pass
Upper Thorax Rib Deflection	32	40	mm	34.0	Pass
Middle Thorax Rib Deflection	39	45	mm	40.2	Pass
Lower Thorax Rib Deflection	35	43	mm	39.4	Pass

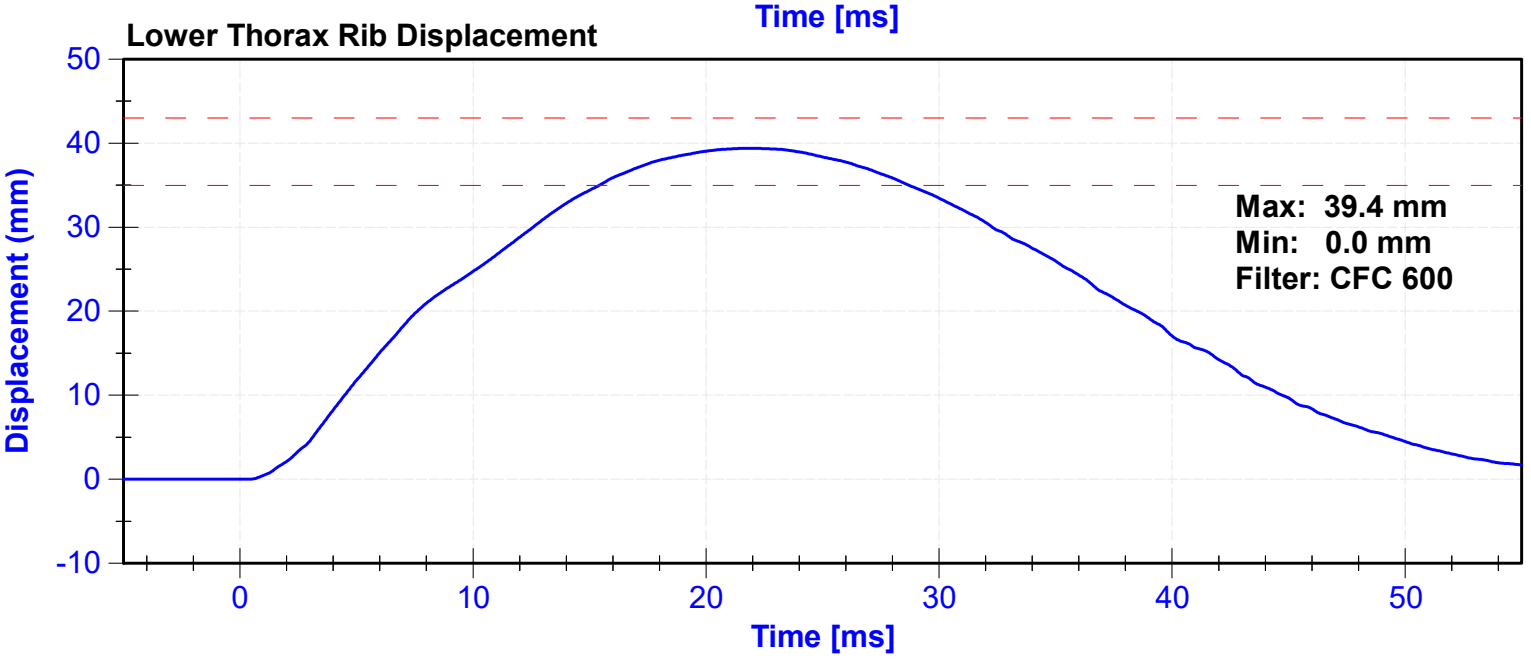
Transducer Calibrations

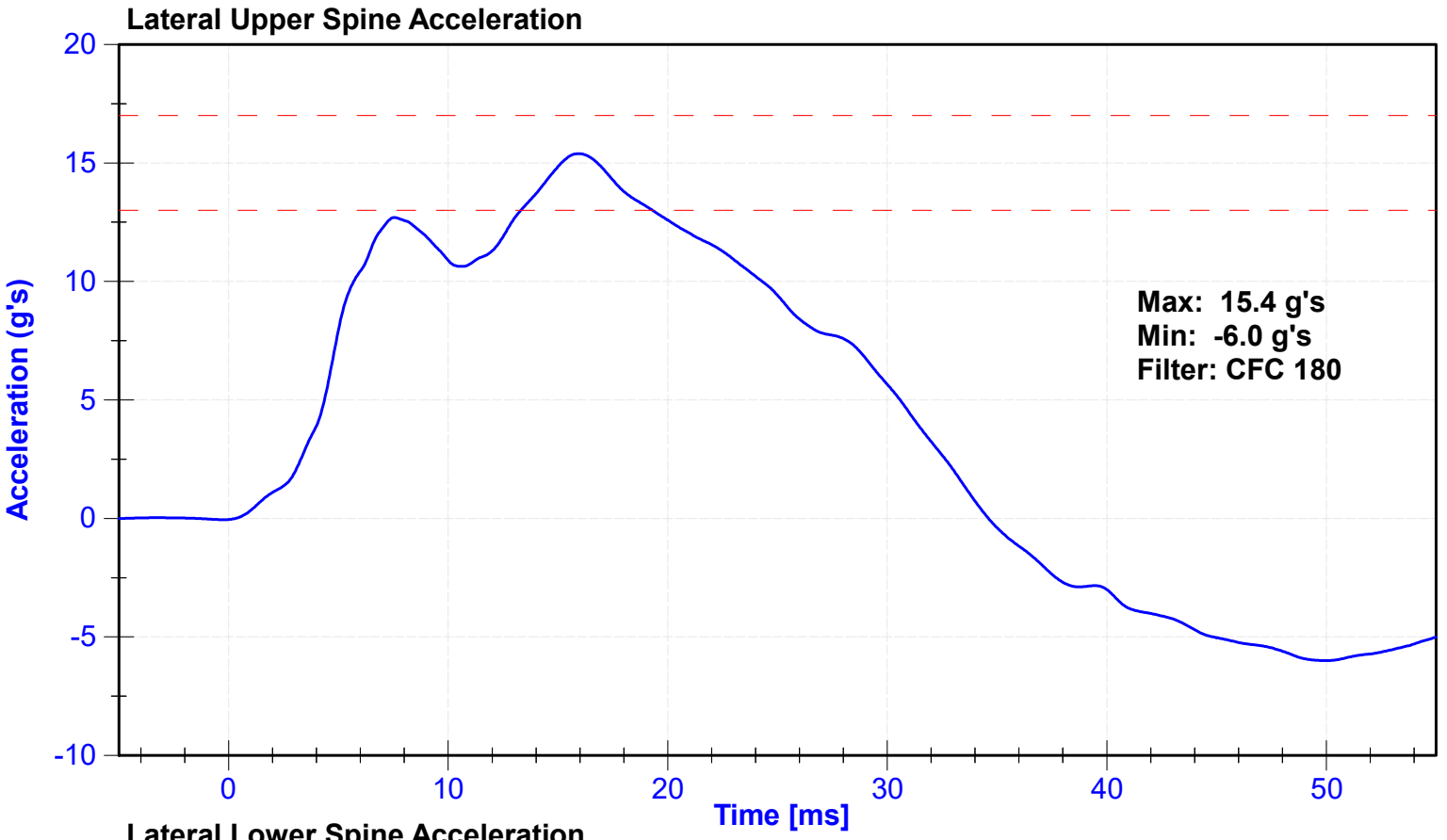
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	3/29/2024	9/25/2024
Upper Spine Y Accelerometer	Endevco	P64148	5/6/2024	11/2/2024
Lower Spine Y Accelerometer	Endevco	P51327	5/6/2024	11/2/2024
Upper Thorax Rib Potentiometer	Servo	1199GFE	5/6/2024	11/4/2024
Middle Thorax Rib Potentiometer	Servo	1246GFE	5/6/2024	11/4/2024
Lower Thorax Rib Potentiometer	Servo	011GFE	5/6/2024	11/4/2024

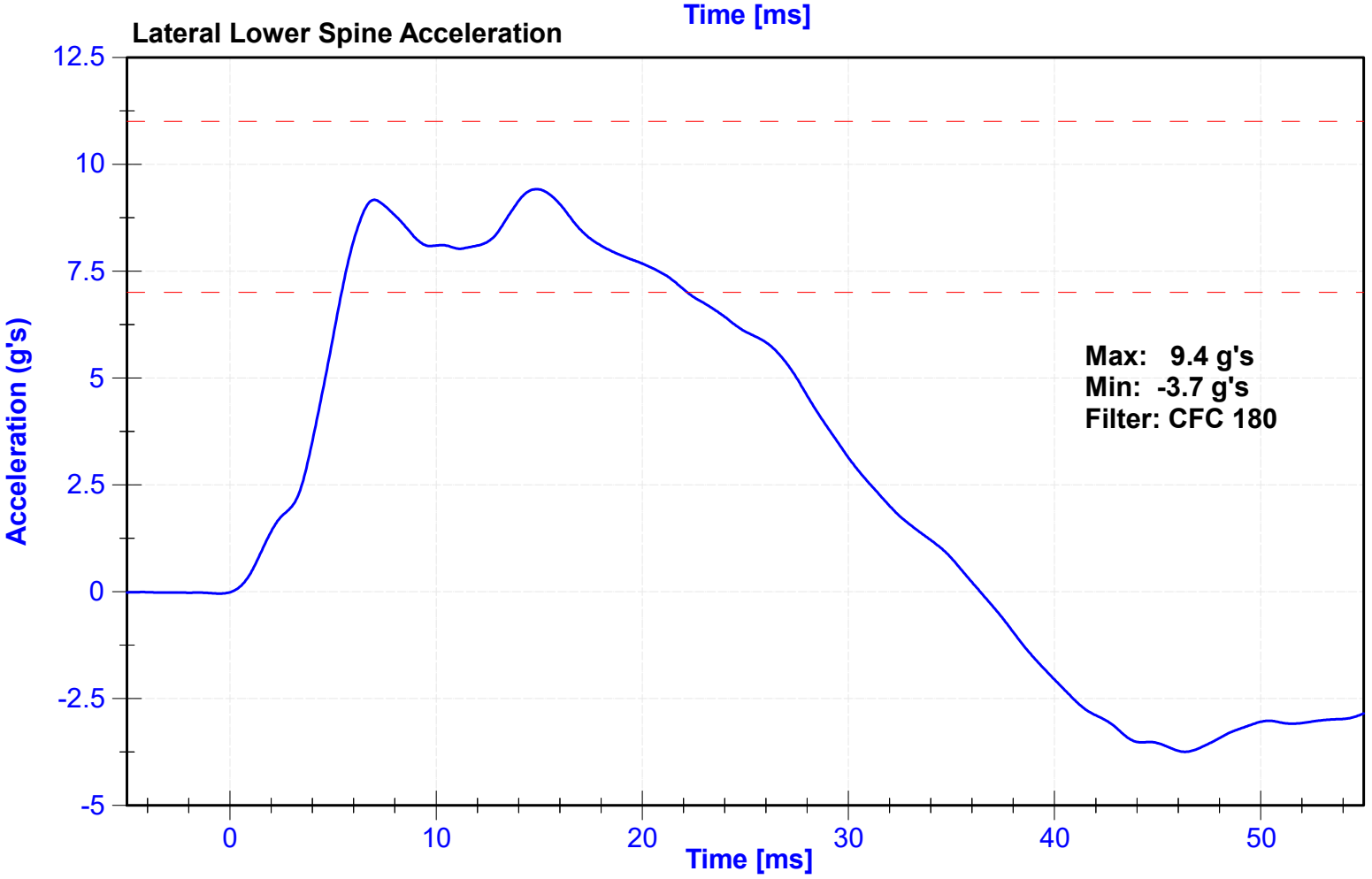



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.0 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.2 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.4 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 15.4 g's
Min: -6.0 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.4 g's
Min: -3.7 g's
Filter: CFC 180

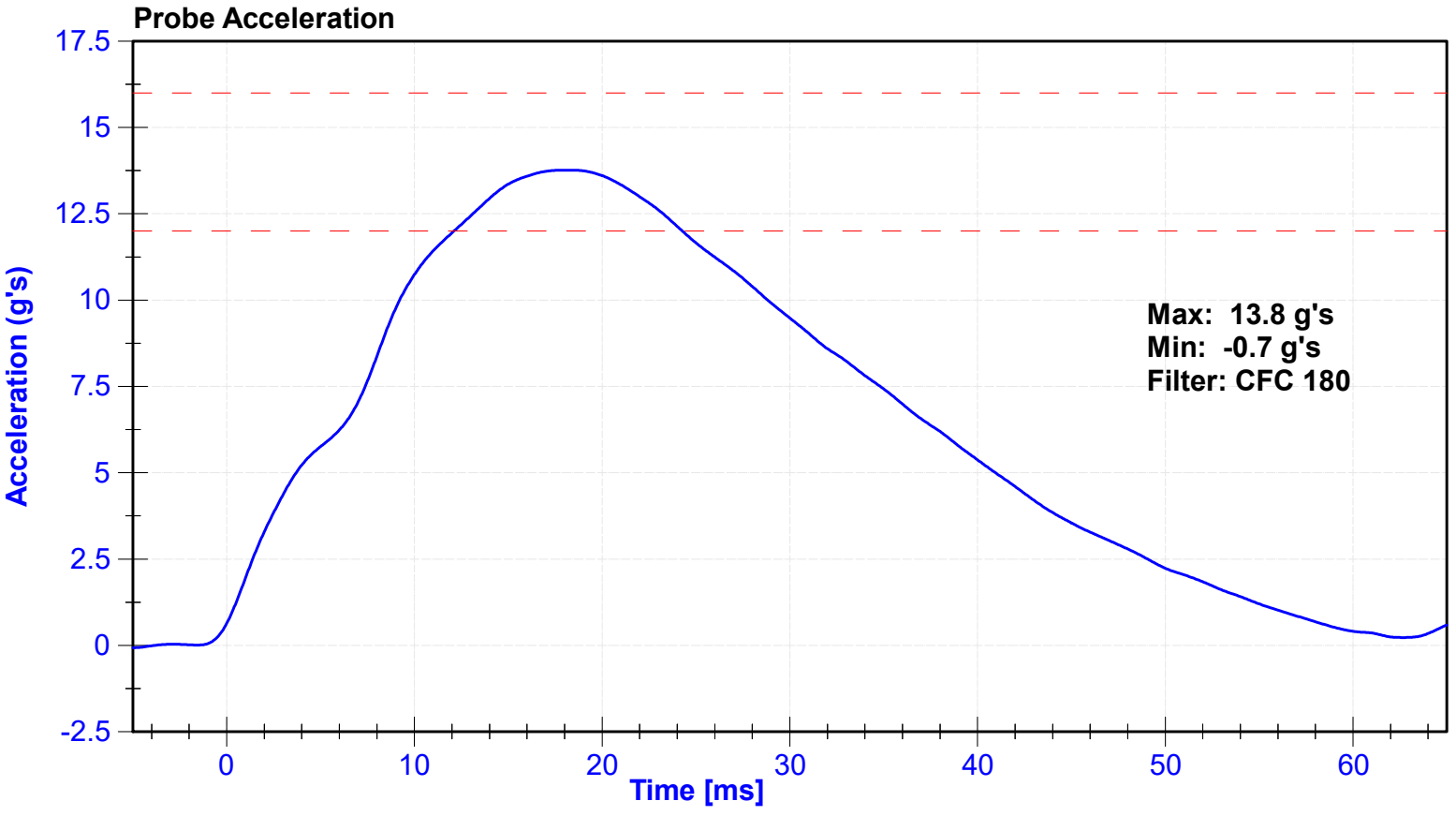
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

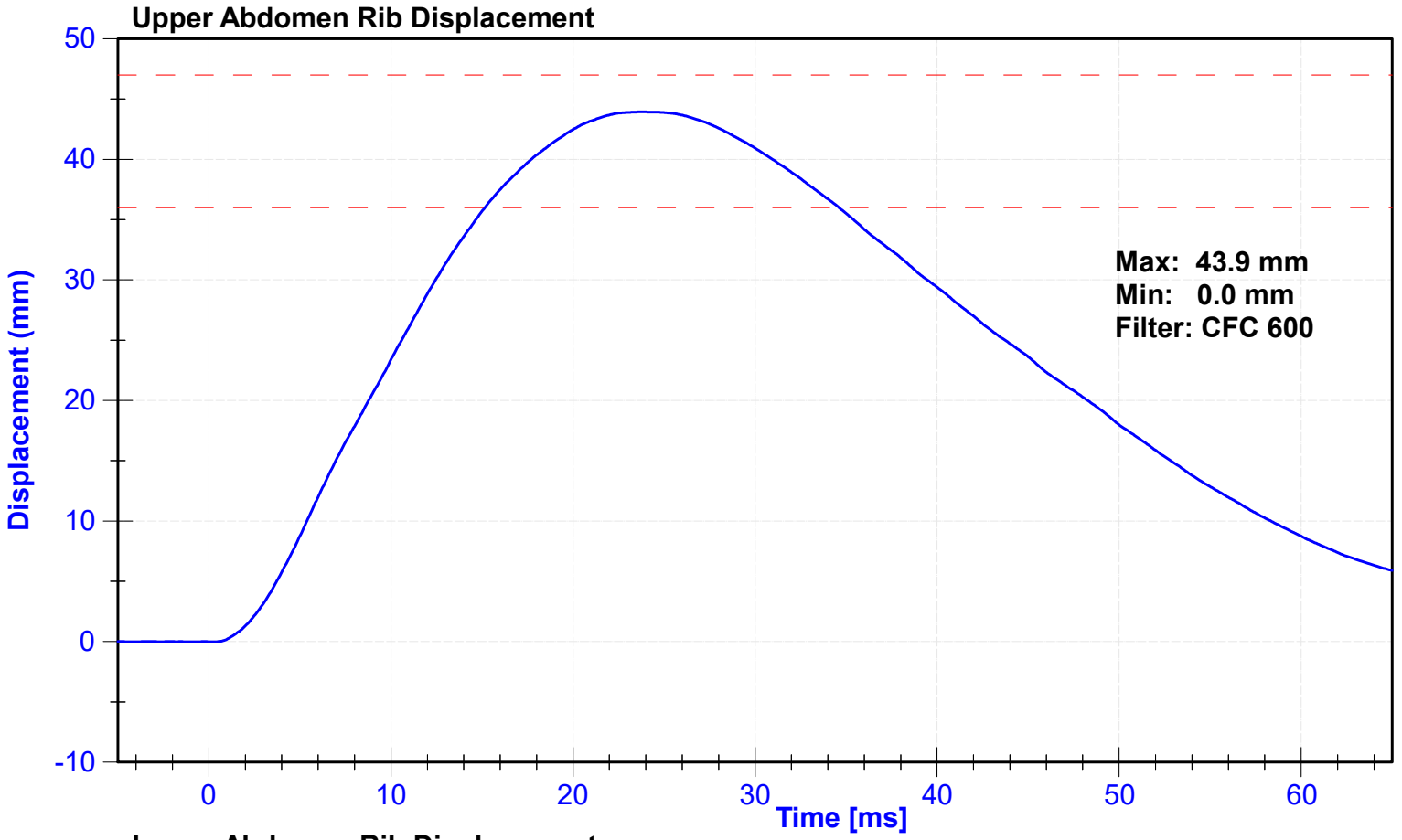
Results

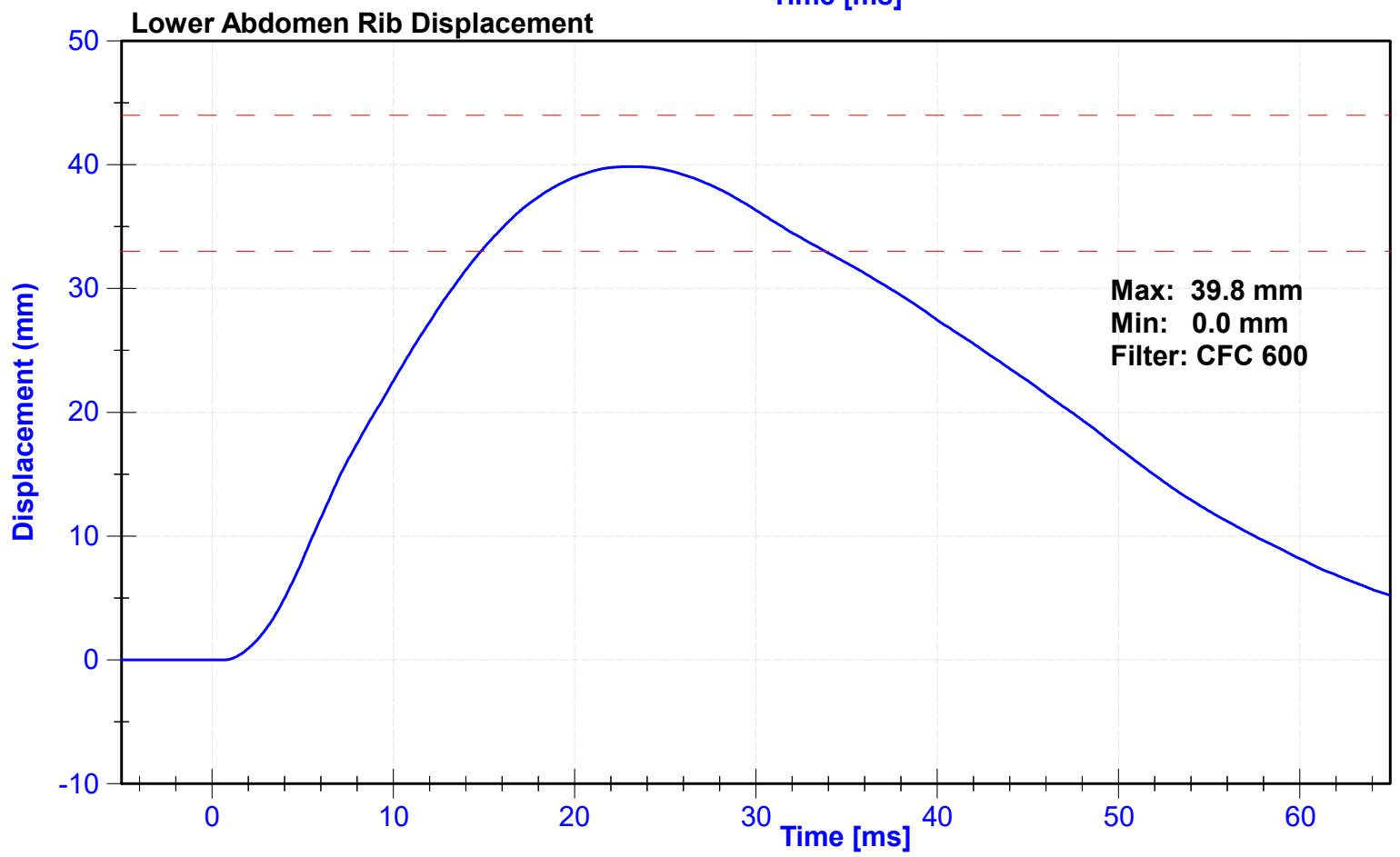
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	63	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	12	16	g's	13.8	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.3	Pass
Upper Abdomen Rib Deflection	36	47	mm	43.9	Pass
Lower Abdomen Rib Deflection	33	44	mm	39.8	Pass

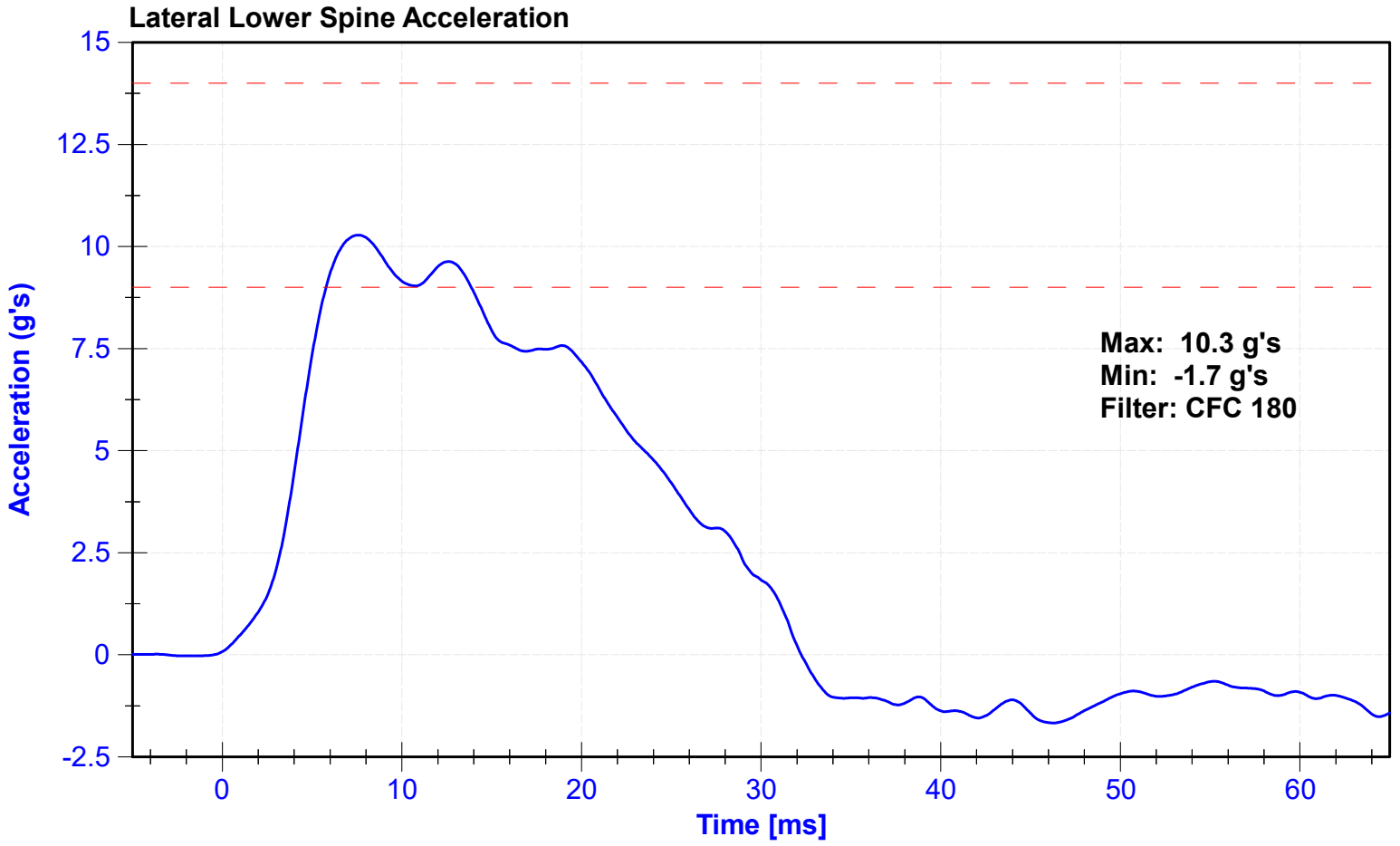
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18619	3/29/2024	9/25/2024
Lower Spine Y Accelerometer	Endevco	P51327	5/6/2024	11/2/2024
Upper Abdomen Rib Potentiometer	Servo	008GFE	5/6/2024	11/4/2024
Lower Abdomen Rib Potentiometer	Servo	046GFE	5/6/2024	11/4/2024




Upper Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 43.9 mm
Min: 0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 39.8 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: 10.3 g's
Min: -1.7 g's
Filter: CFC 180

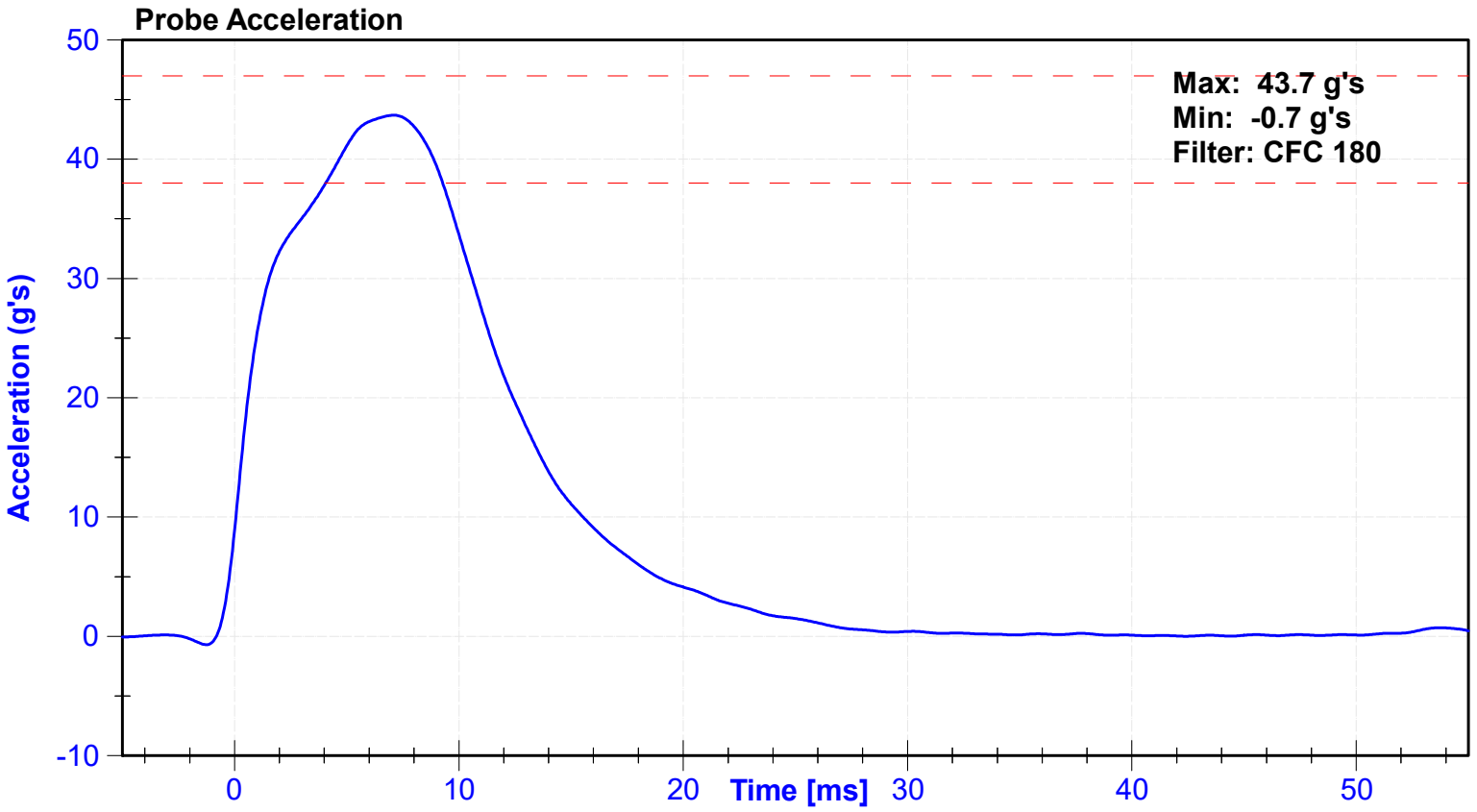
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

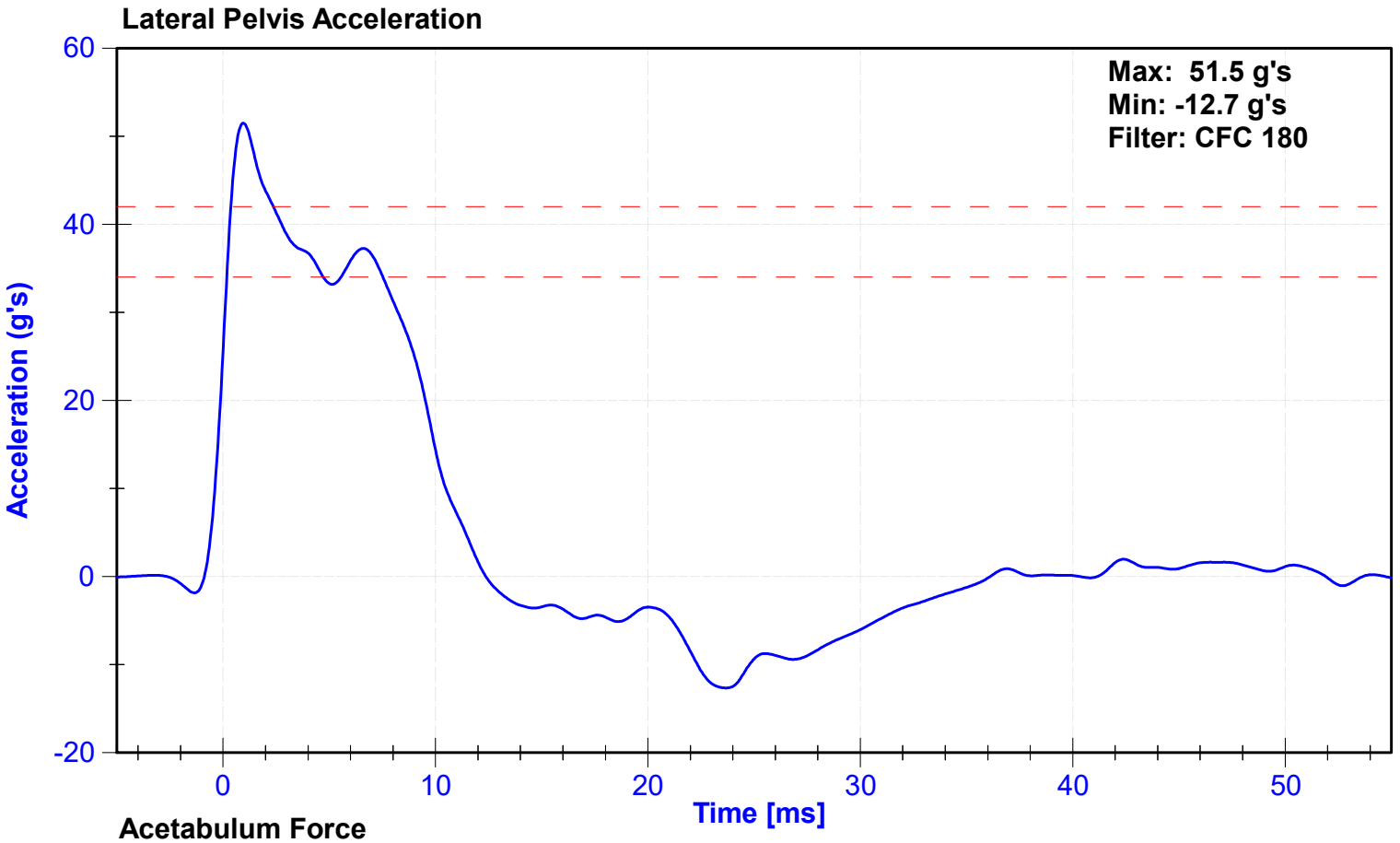
Results

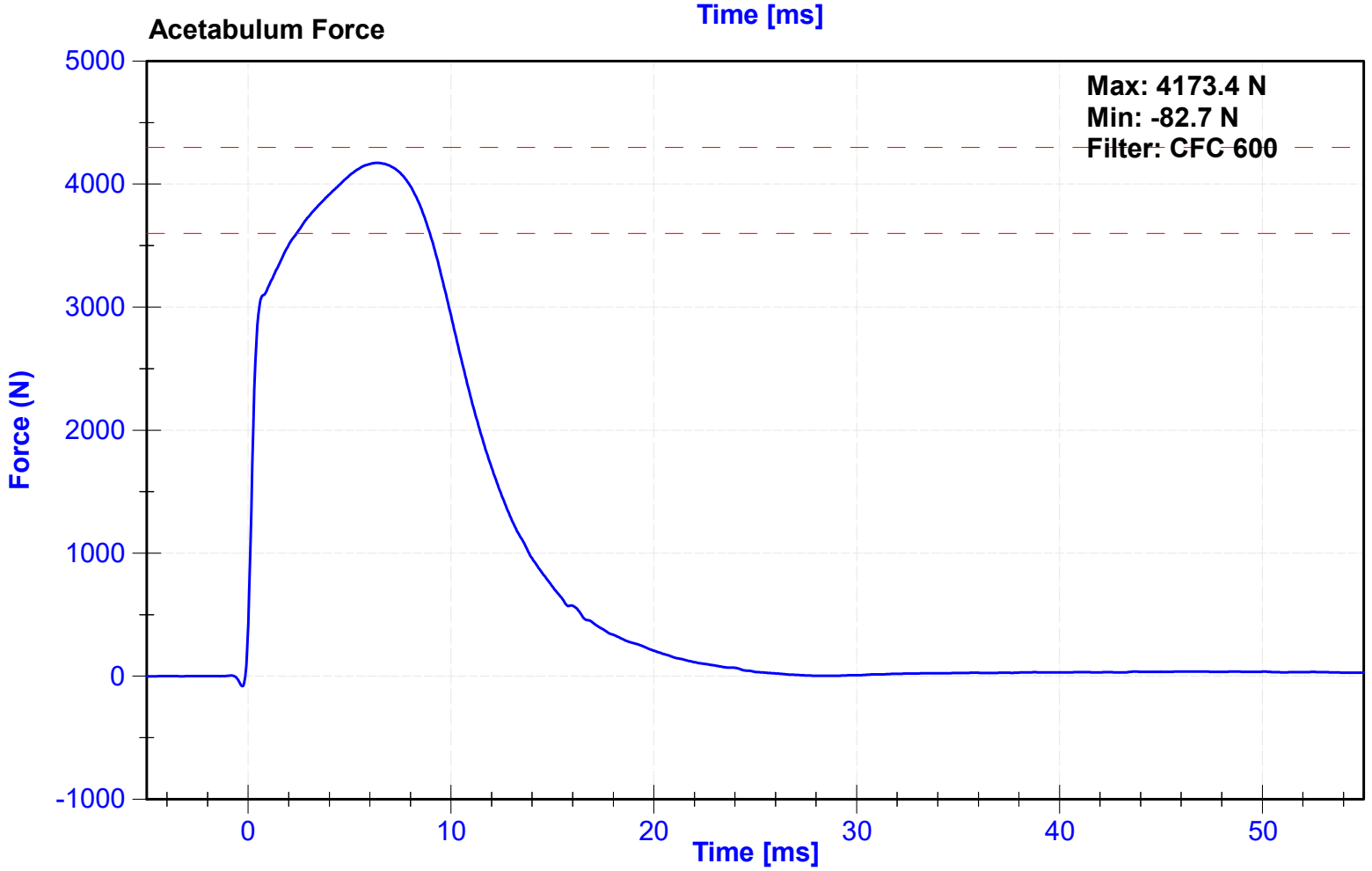
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	63	Pass
Velocity	6.6	6.8	m/s	6.66	Pass
Probe Acceleration	38	47	g's	43.7	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	37.3	Pass
Acetabulum Force	3600	4300	N	4173.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	3/29/2024	9/25/2024
Pelvis Y Accelerometer	Endevco	P50078	5/6/2024	11/2/2024
Acetabulum Load Cell	Denton	270-FY	9/11/2023	9/10/2024
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 51.5 g's
Min: -12.7 g's
Filter: CFC 180
Acceleration (g's)
60
40
20
0
-20
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 4173.4 N
Min: -82.7 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

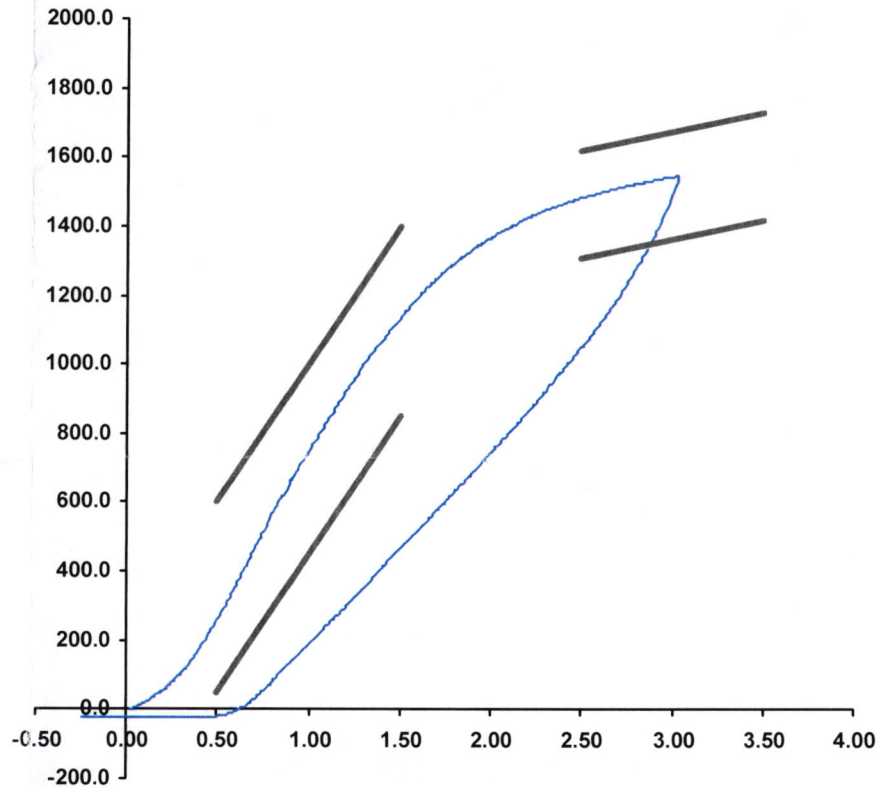
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 15784
Test Number 20684
Report Number 20738
Test Date 10/15/2021 8:23:47 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	266	50	600
Force @ 1.5 mm (N)	1,141	850	1,400
Force @ 2.5 mm (N)	1,486	1,306	1,618
Force @ 3.0 mm (N)	1,546	1,361	1,673

Force (-N) vs Extension (-mm)



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

(3-44)

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

Notes: Cert Plug 07/18/24 DG&VR

Operator

Part Number 180-4450

Template No 107 15-Oct-21
SACO Research

By : DC Date : 10/15/21

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

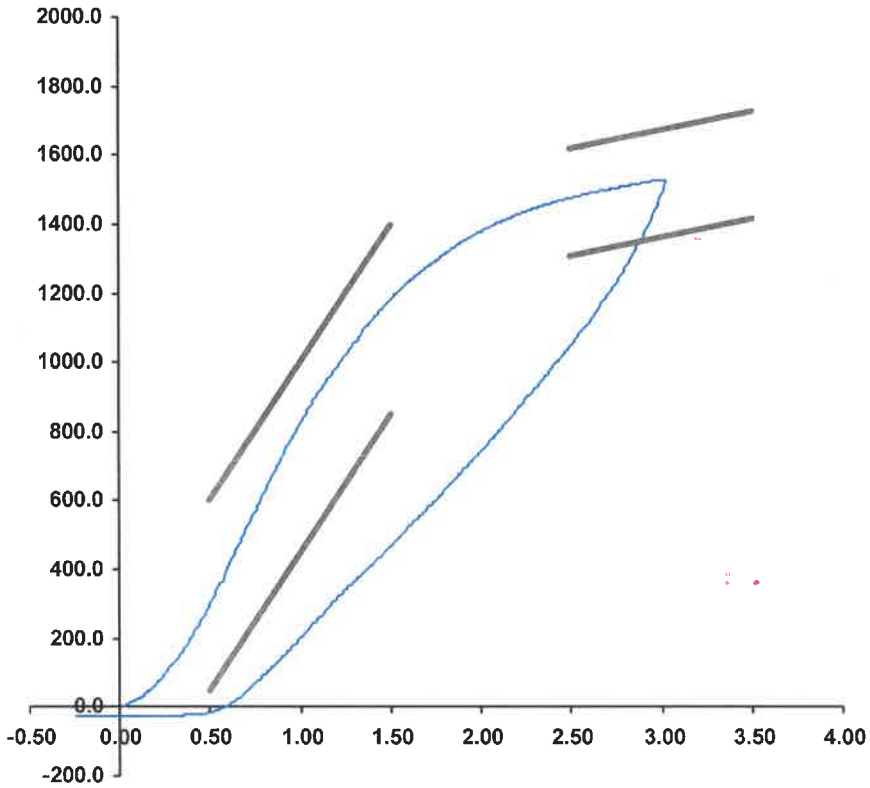
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16382
Test Number 22949
Report Number 23006
Test Date 5/20/2022 2:33:40 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	310	50	600
Force @ 1.5 mm (N)	1,182	850	1,400
Force @ 2.5 mm (N)	1,477	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

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

Notes: CLASH D6801Z 7/19/24

Operator

Part Number 180-4450

Template No 107 20-May-22
SACO Research

By : DC Date : 5/20/2022

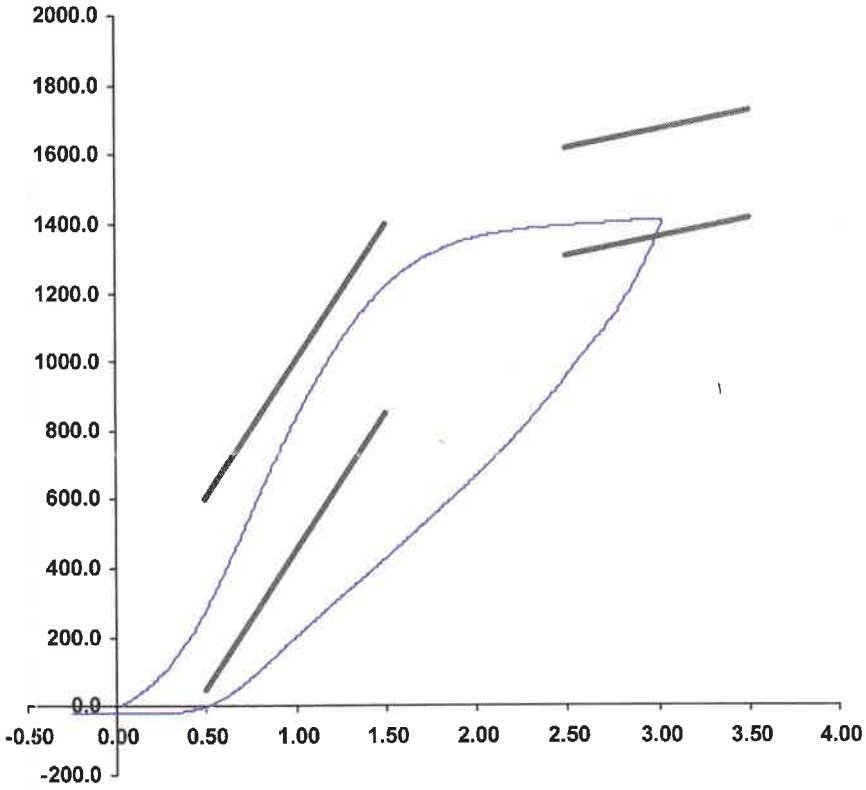
SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

SID-IIs Pelvis Plug Certification Test

Plug S/N 14233
Test Number 14373
Report Number 14417
Test Date 7/3/2020 9:26:13 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	284.74	50.00	600.00
Force @ 1.5 mm (N)	1,220.38	850.00	1,400.00
Force @ 2.5 mm (N)	1,394.72	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,411.52	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 Rat 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes: NON-IMPACT DG8017

7/19/24

Operator

Part Number 180-4450

Template No 107 03-Jul-20
SACO Research

By : DC Date : 7/3/2020

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

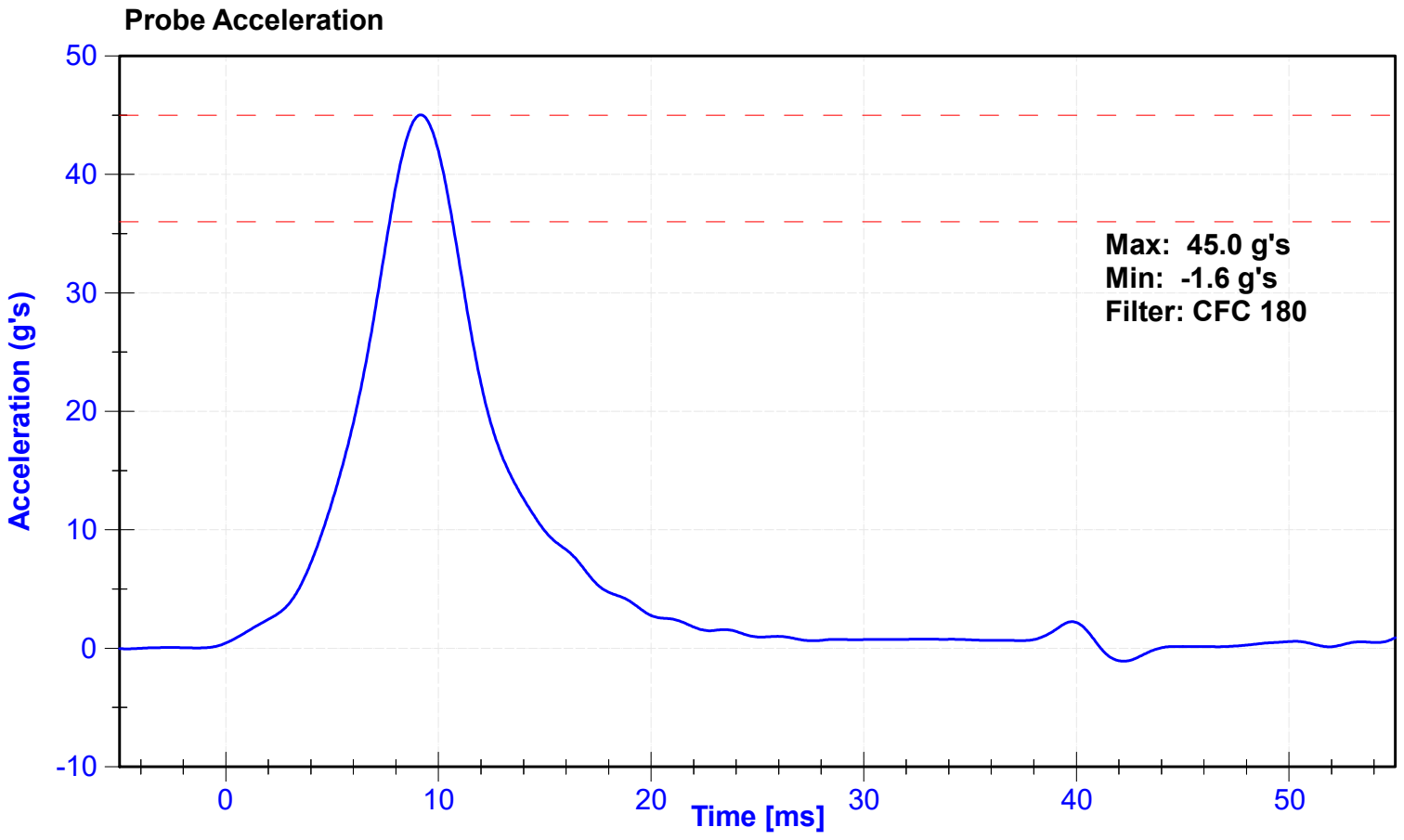
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

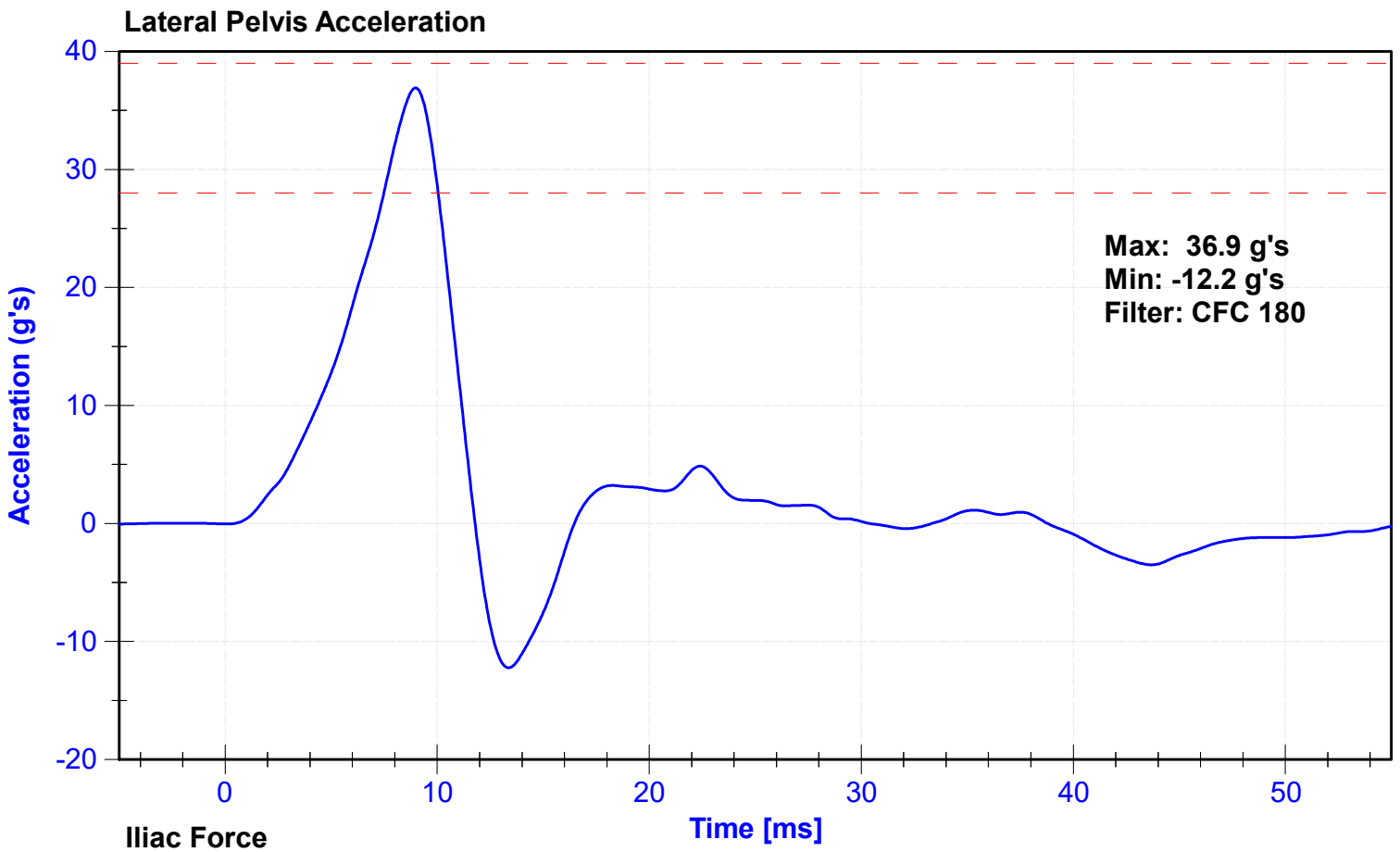
Results

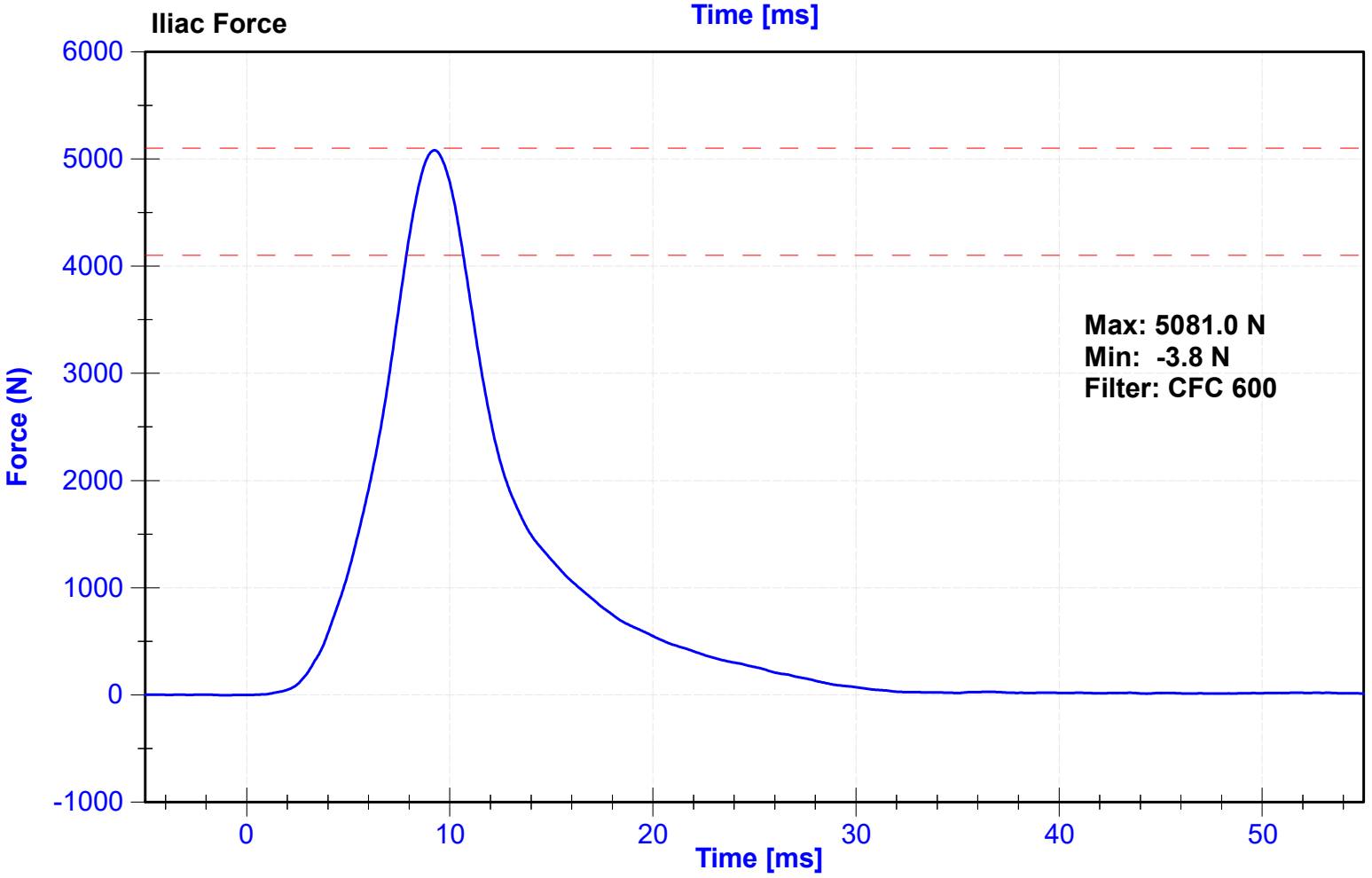
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	63	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	36	45	g's	45.0	Pass
Lateral Pelvis Acceleration	28	39	g's	36.9	Pass
Iliac Force	4100	5100	N	5081.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18619	3/29/2024	9/25/2024
Pelvis Y Accelerometer	Endevco	P50078	5/6/2024	11/2/2024
Iliac Load Cell	Denton	280-FY	9/11/2023	9/10/2024




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 36.9 g's
Min: -12.2 g's
Filter: CFC 180


Iliac Force
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 5081.0 N
Min: -3.8 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

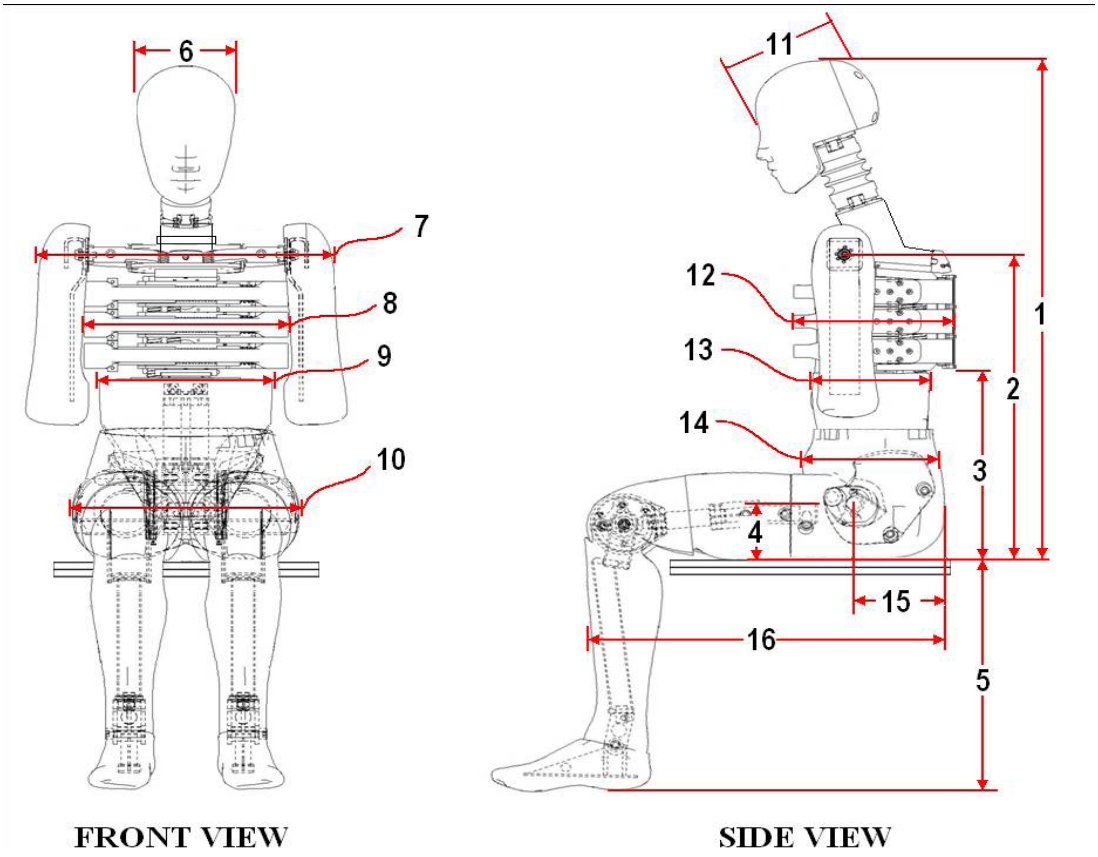
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - EuroSID-2re

Technician: J. Rios Date: 9/4/2024

Dummy Serial Number: F033



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	913	Pass
2	Seat to Shoulder Joint	558	572	565	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	352	Pass
4	Seat to Hip Joint (center of bolt)	97	103	98	Pass
5	Sole to Seat, Sitting	333	451	417	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	472	Pass
8	Thorax Width	322	332	328	Pass
9	Abdomen Width	273	287	282	Pass
10	Pelvis Lap Width	359	373	371	Pass
11	Head Depth	196	206	199	Pass
12	Thorax Depth	262	272	269	Pass
13	Abdomen Depth	194	204	200	Pass
14	Pelvis Depth	235	245	241	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	154	Pass
16	Back of Buttocks to Front Knee	597	615	610	Pass

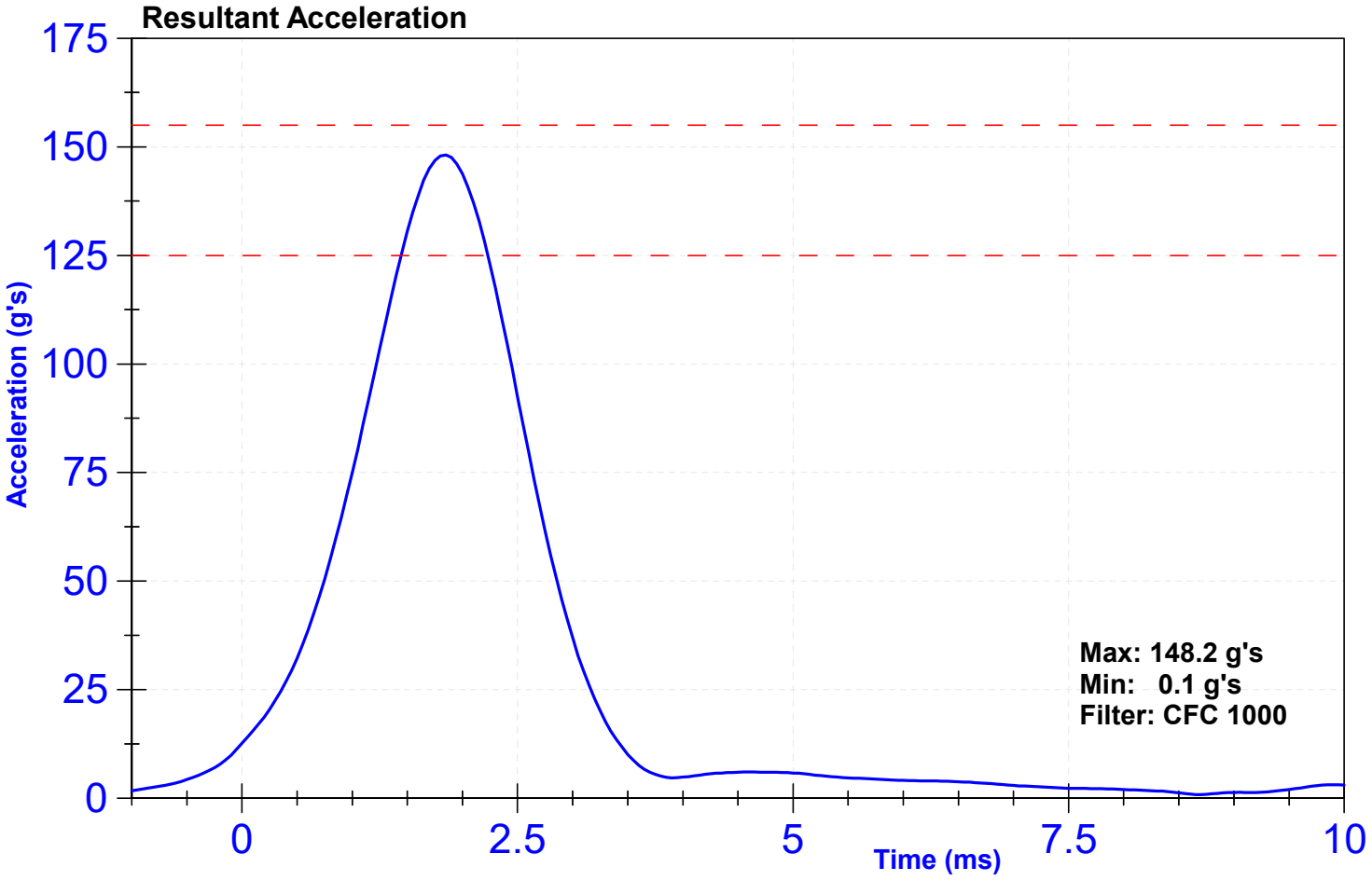
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

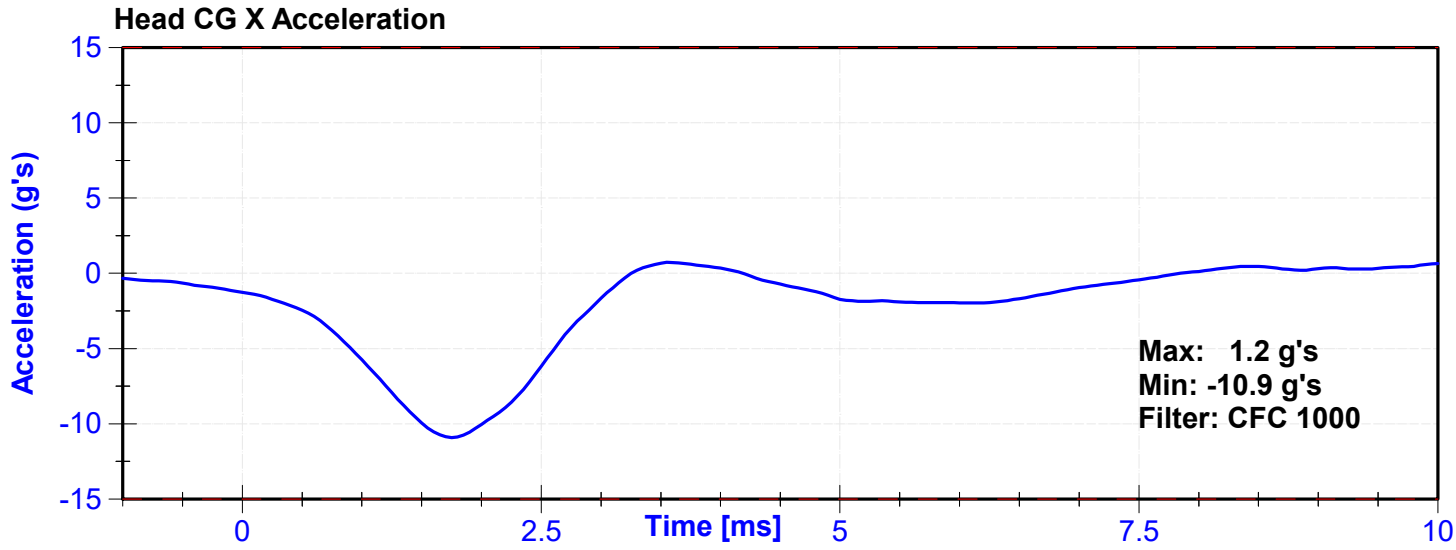
Results

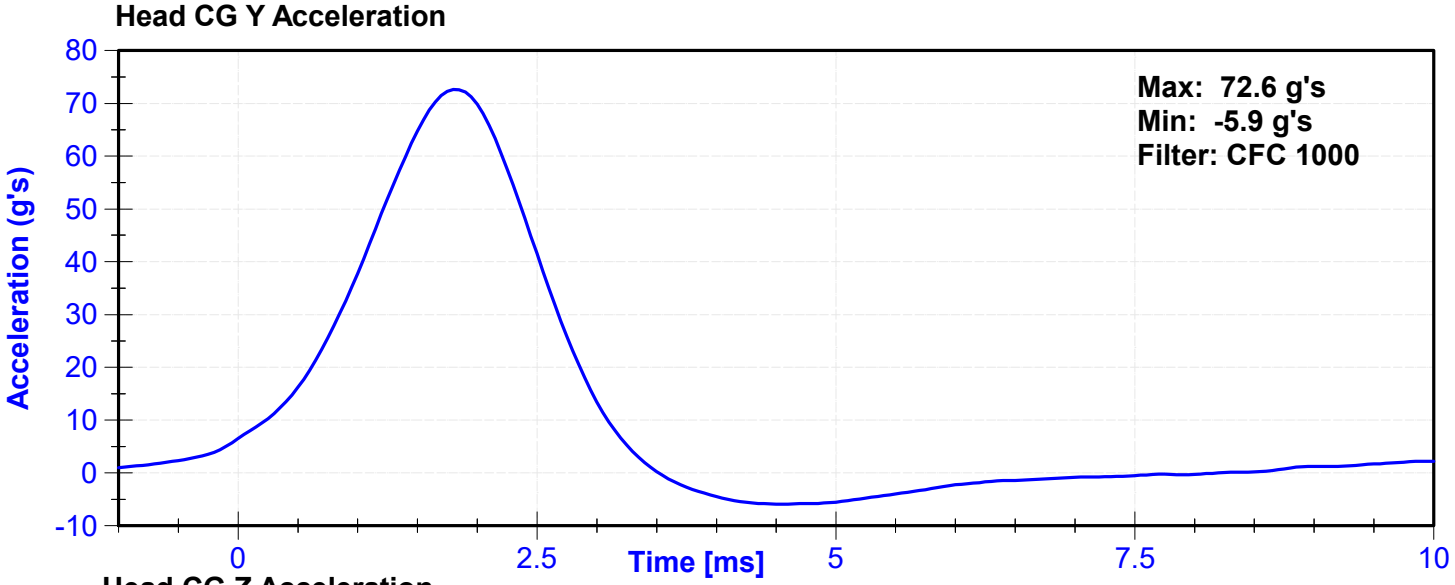
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	60	Pass
Resultant Acceleration	125	155	g's	148.2	Pass
Oscillation	0	15	%	4.05	Pass
Fore-Aft Acceleration	-15	15	g's	-10.9	Pass

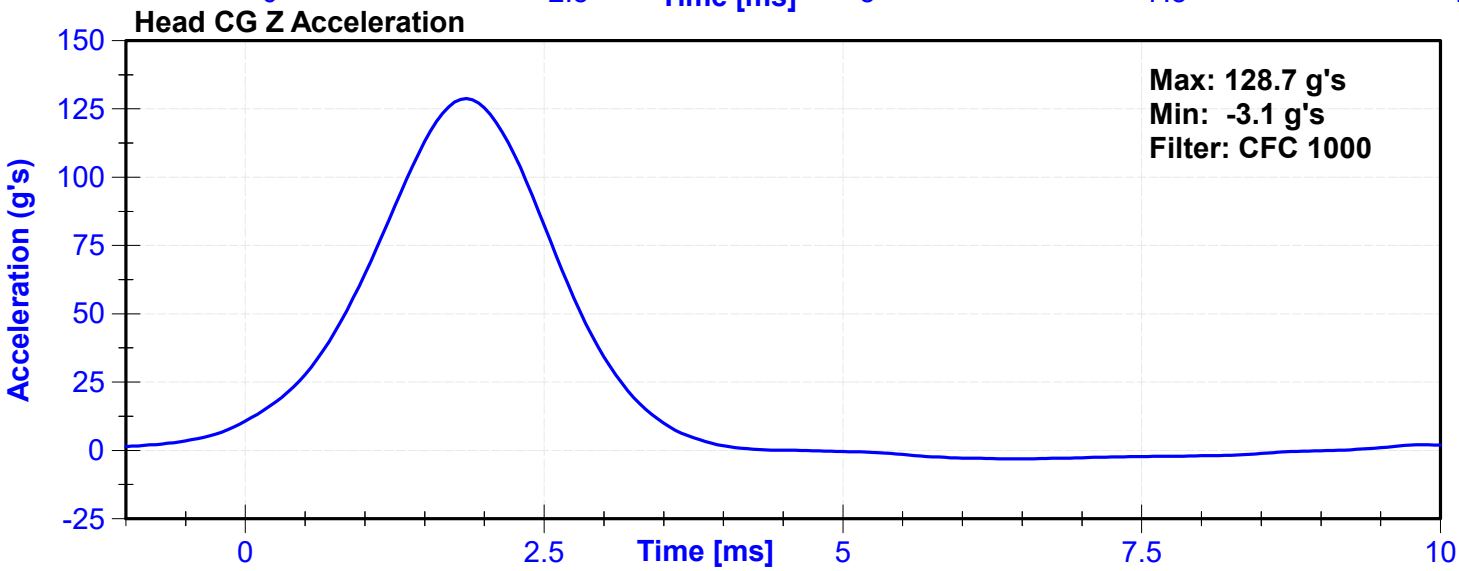
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P63861	5/6/2024	11/2/2024
Y Accelerometer	Endevco	P49216	5/6/2024	11/2/2024
Z Accelerometer	Endevco	P51303	5/6/2024	11/2/2024




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
Time [ms]
5
7.5
10
Max: 1.2 g's
Min: -10.9 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
Time [ms]
5
7.5
10
Max: 72.6 g's
Min: -5.9 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
150
125
100
75
50
25
0
-25
0
2.5
Time [ms]
5
7.5
10
Max: 128.7 g's
Min: -3.1 g's
Filter: CFC 1000

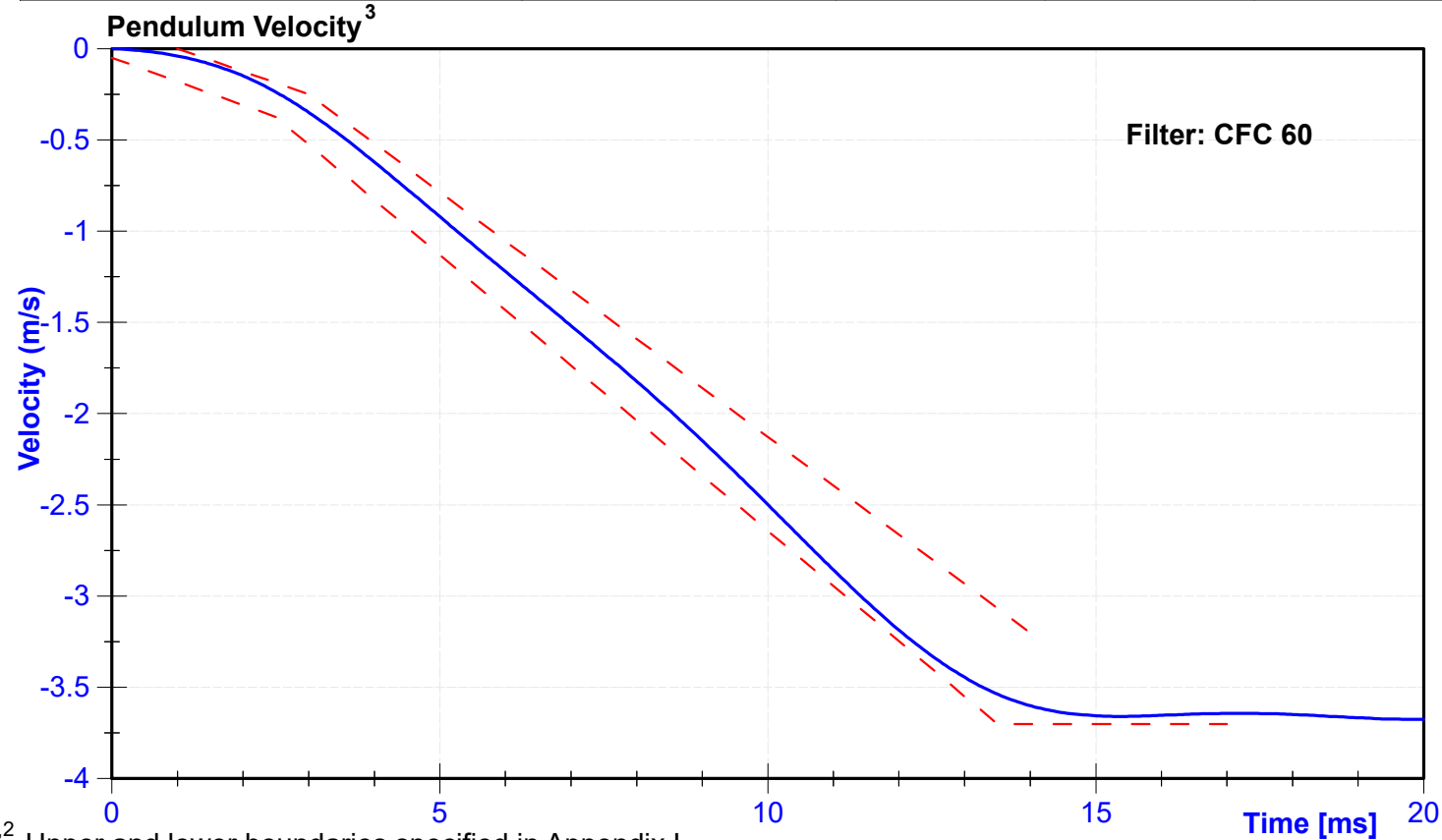
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

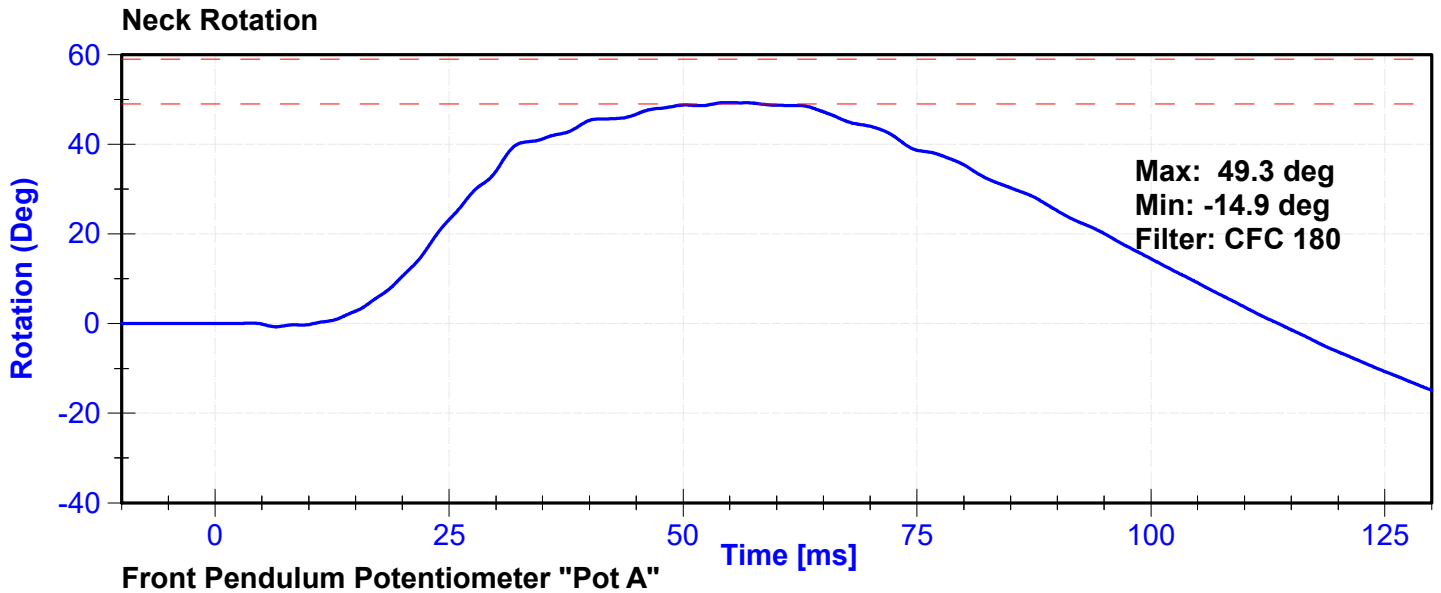
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	53.0	Pass
Velocity	3.3	3.5	m/s	3.43	Pass
Lateral Neck Rotation	49	59	deg	49.3	Pass
Time at Maximum Rotation	54	66	ms	54.7	Pass
Time of Rotation Decay from Maximum	53	88	ms	59.0	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

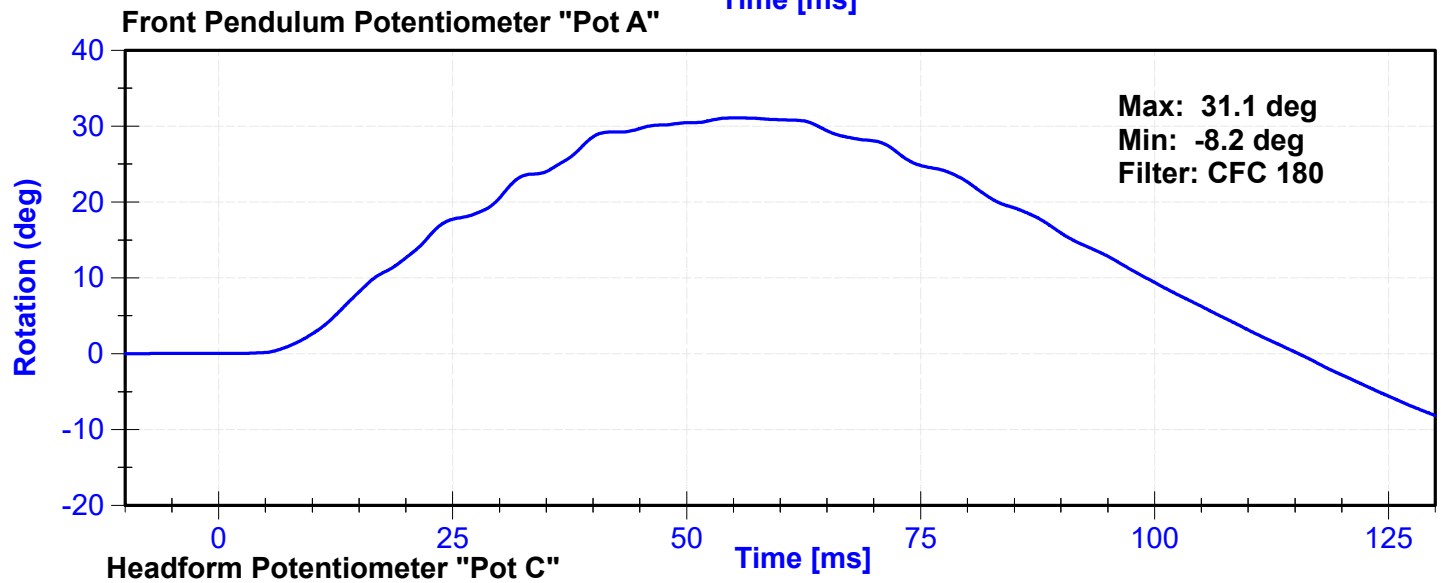
Transducer Calibrations

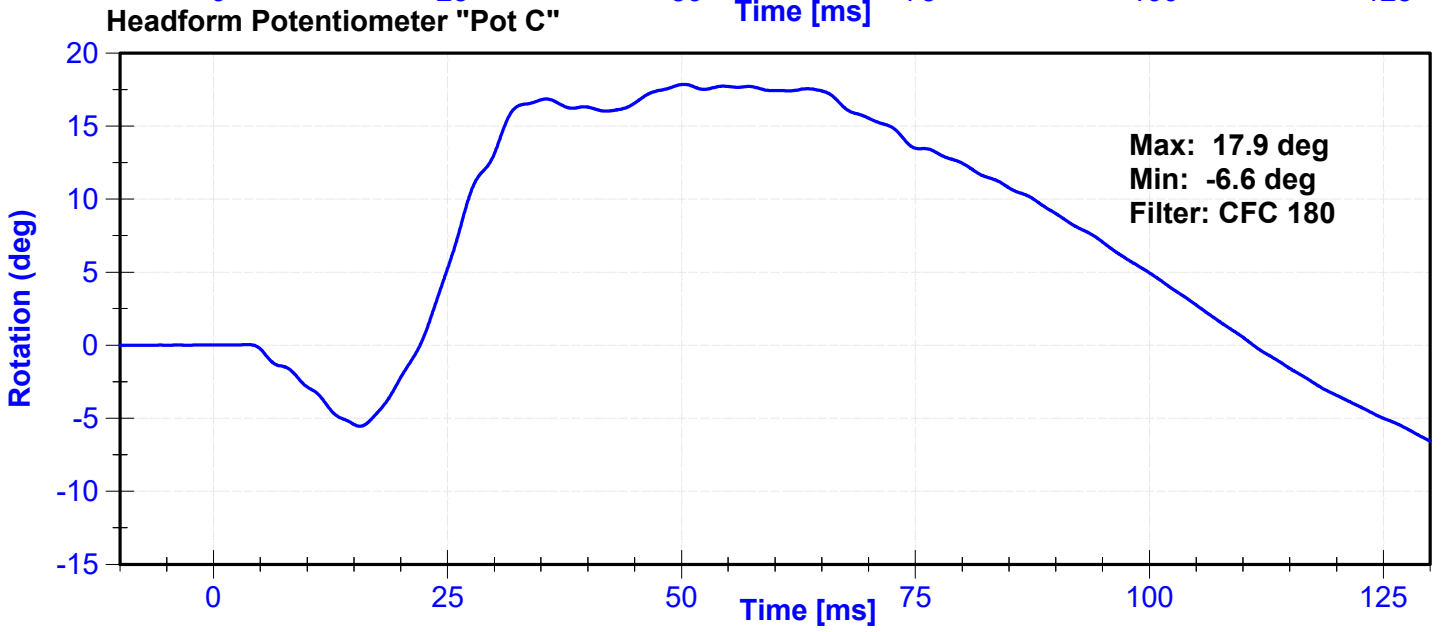
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	10/31/2023	10/30/2024
Front Pendulum Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Headform Potentiometer	Sfernice	095	9/29/2023	9/28/2024



[1,2] Upper and lower boundaries specified in Appendix I


Neck Rotation
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]
Max: 49.3 deg
Min: -14.9 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]
Max: 31.1 deg
Min: -8.2 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
20
15
10
5
0
-5
-10
-15
0
25
50
75
100
125
Time [ms]
Max: 17.9 deg
Min: -6.6 deg
Filter: CFC 180

Appendix I

[2] Upper Boundary Corridor		[1] Lower Boundary Corridor	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.25	2.5	-0.375
14.0	-3.20	13.5	-3.7
		17.0	-3.7

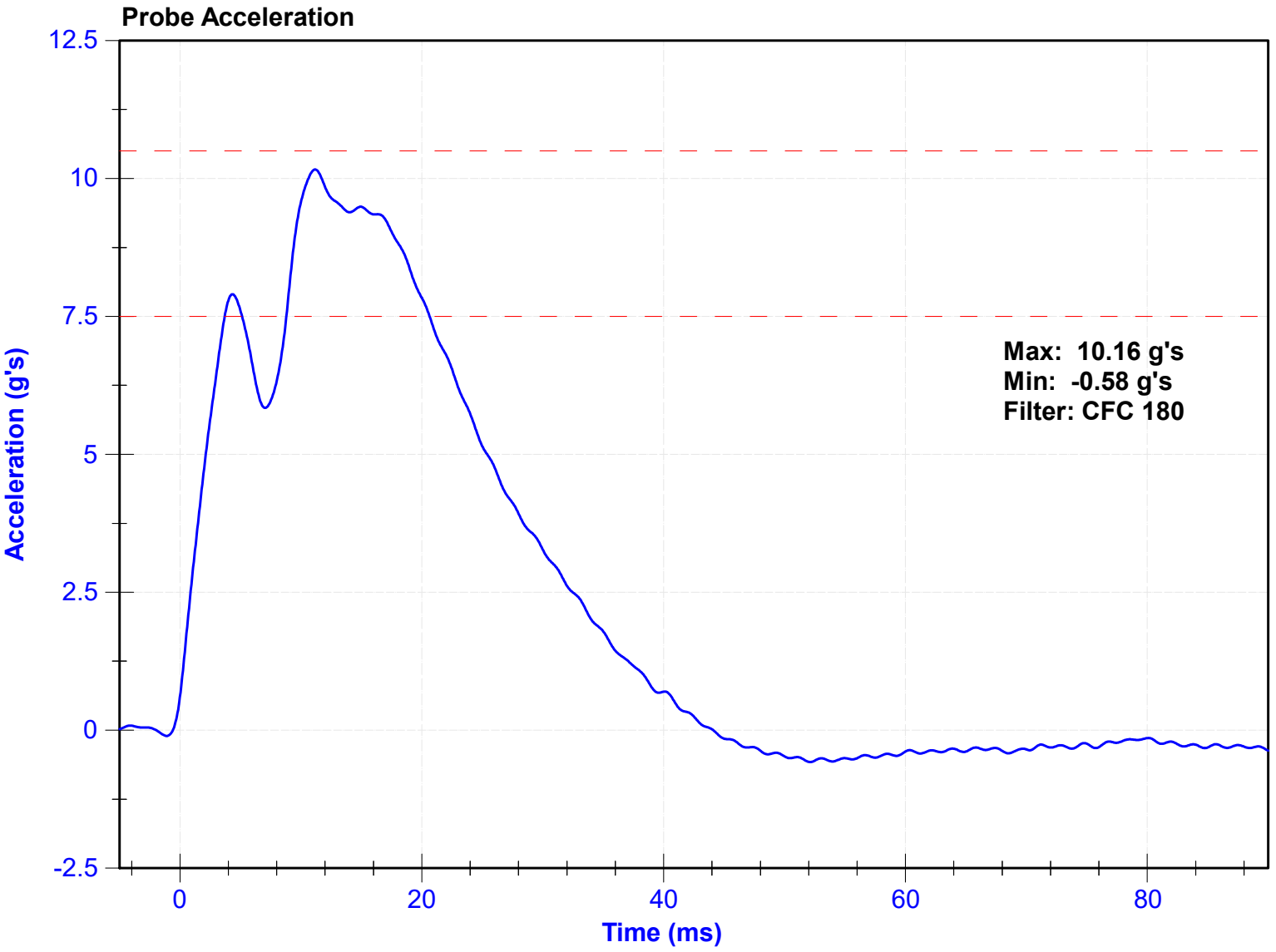
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	55	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	7.5	10.5	g's	10.16	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18587	11/20/2023	11/19/2024



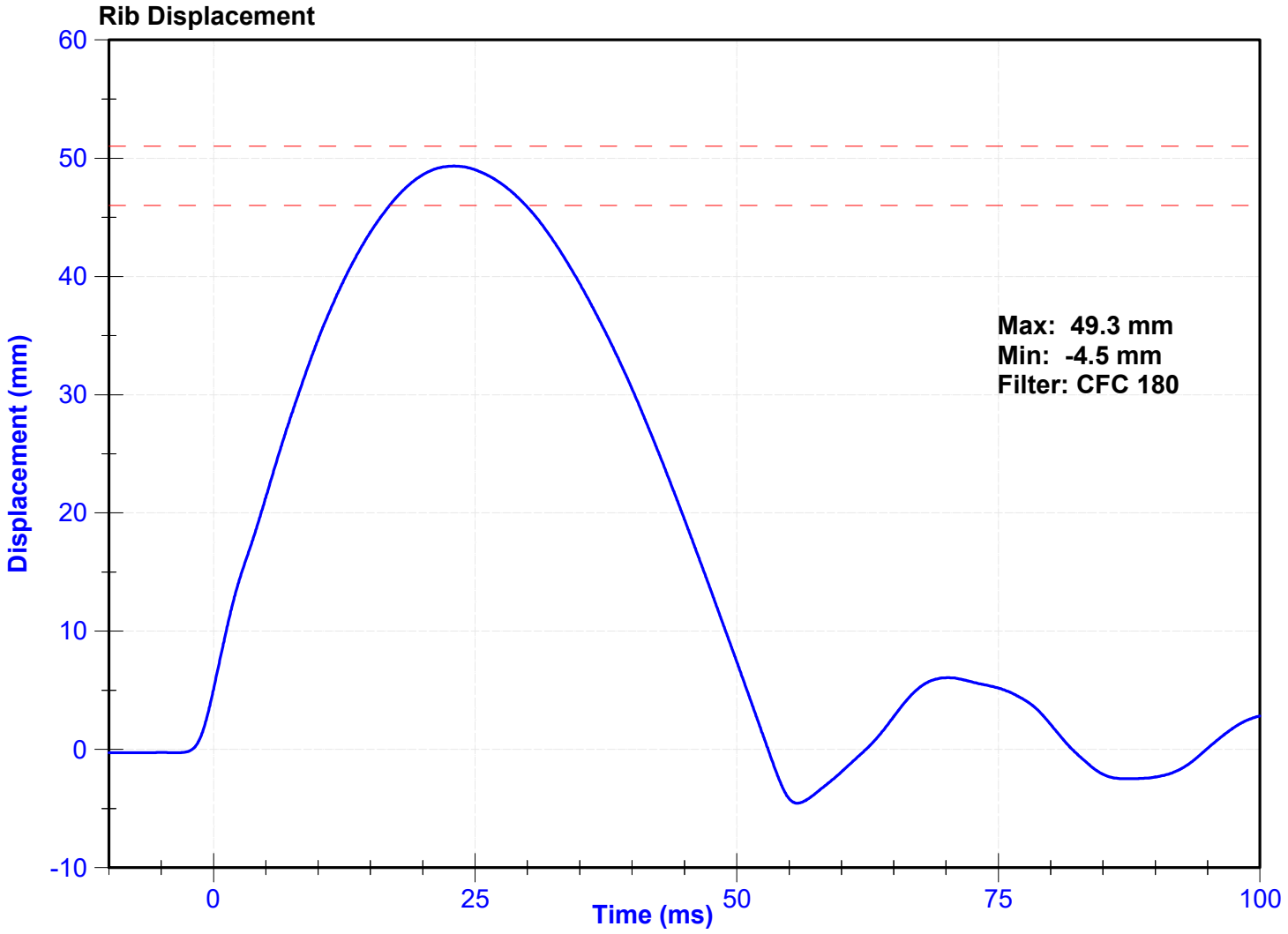
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Rib Displacement	46	51	mm	49.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	5/6/2024	11/4/2024



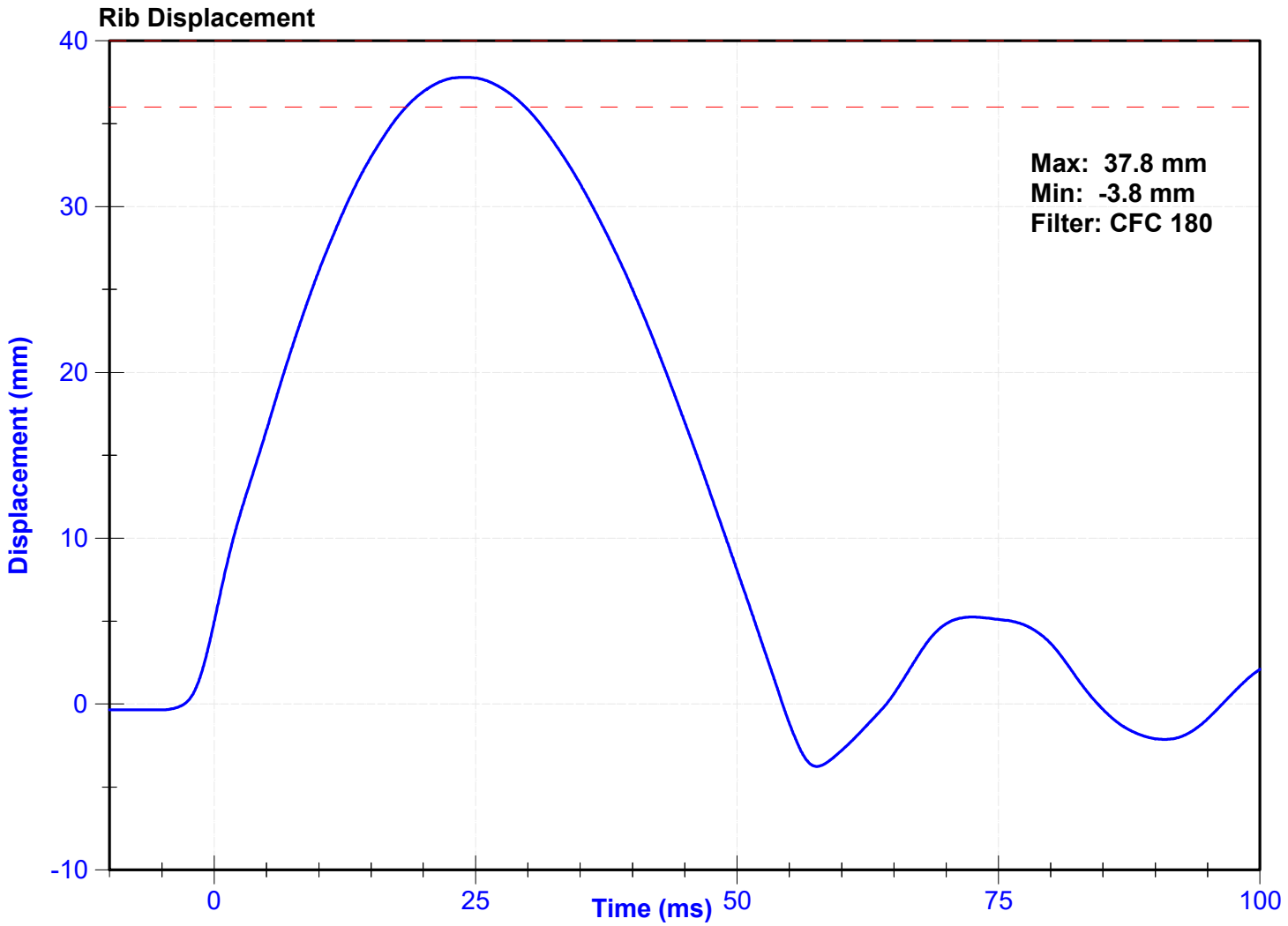
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Rib Displacement	36	40	mm	37.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	5/6/2024	11/4/2024



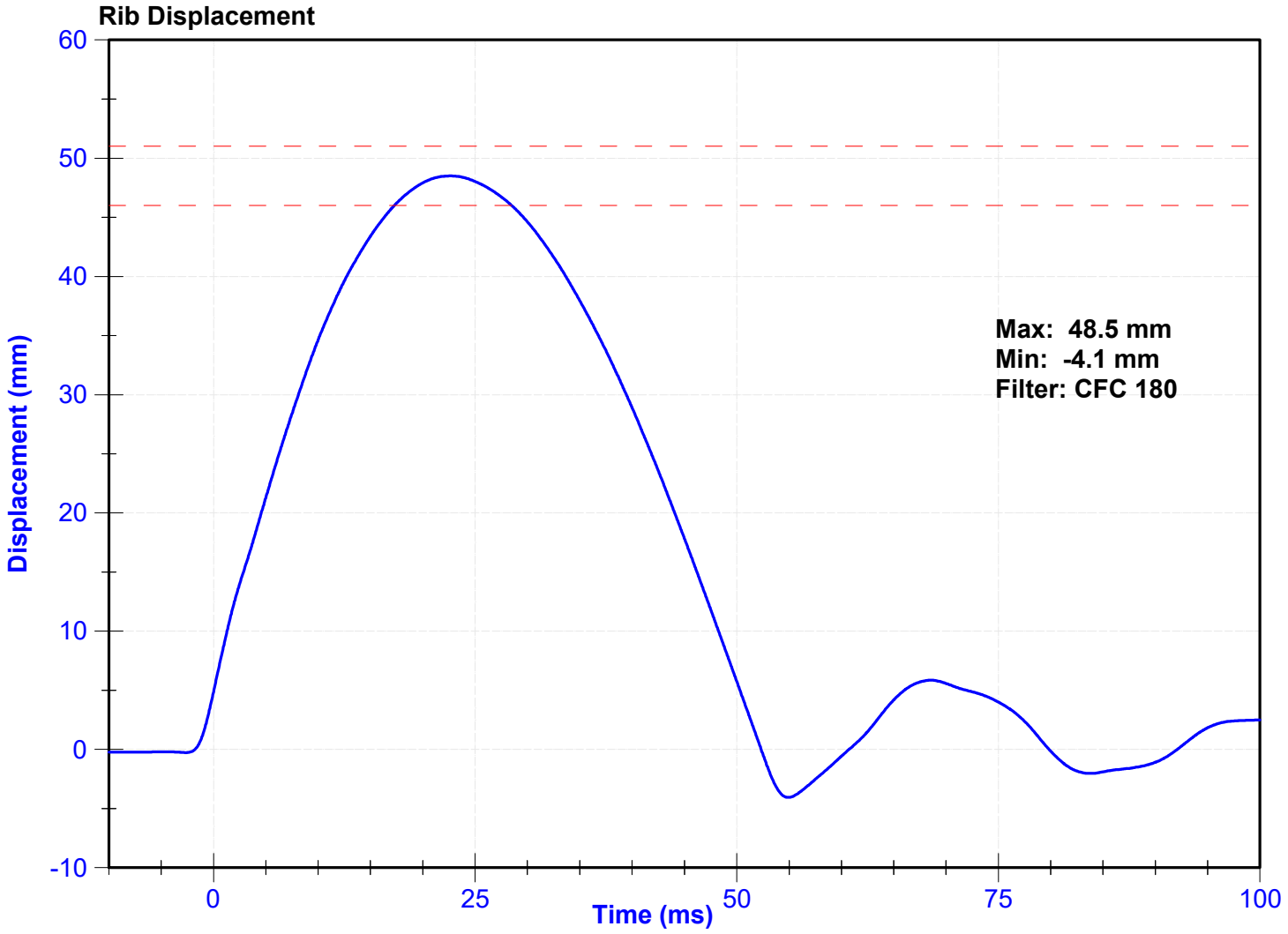
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Rib Displacement	46	51	mm	48.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	5/6/2024	11/4/2024



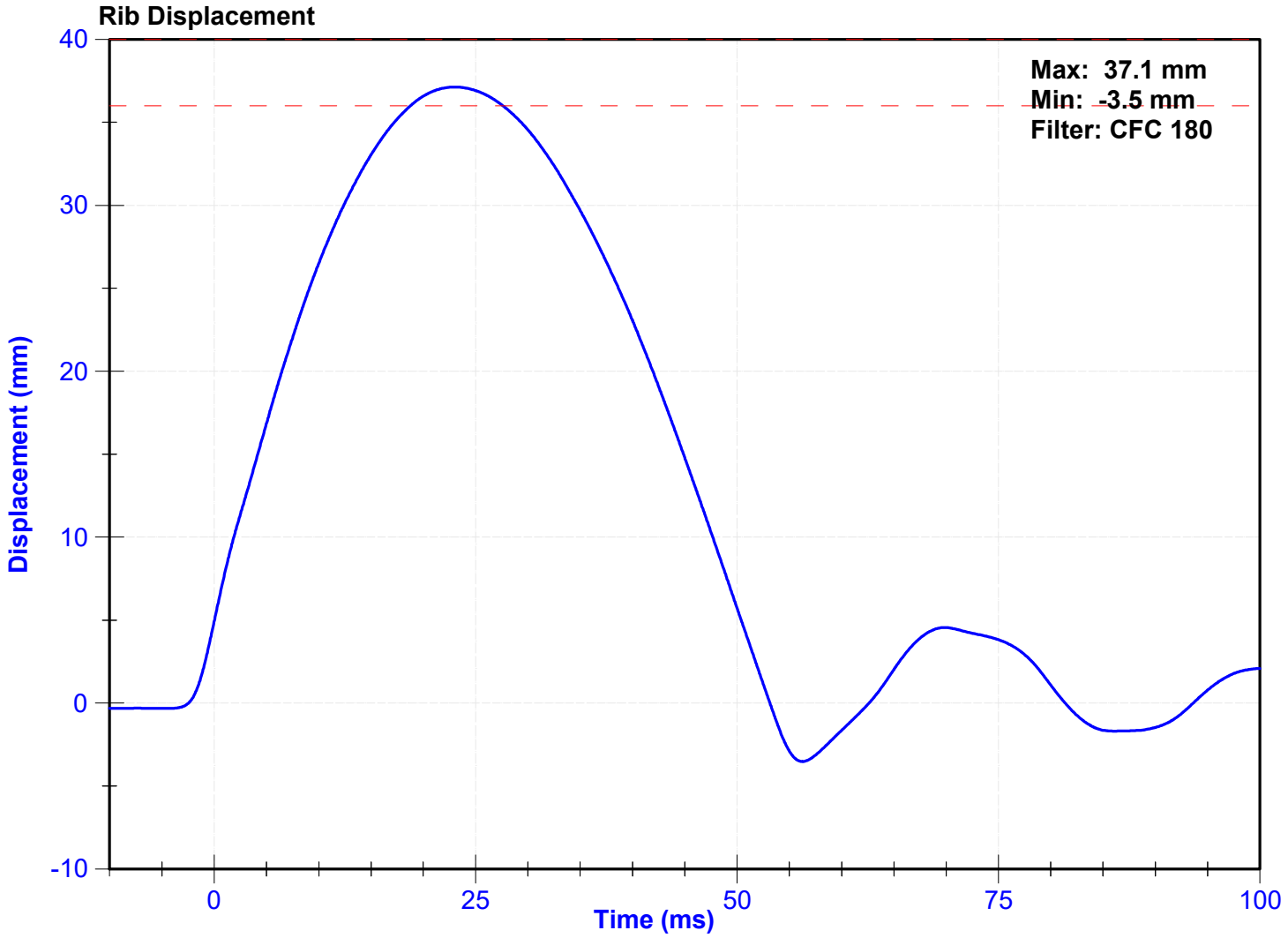
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Rib Displacement	36	40	mm	37.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	5/6/2024	11/4/2024



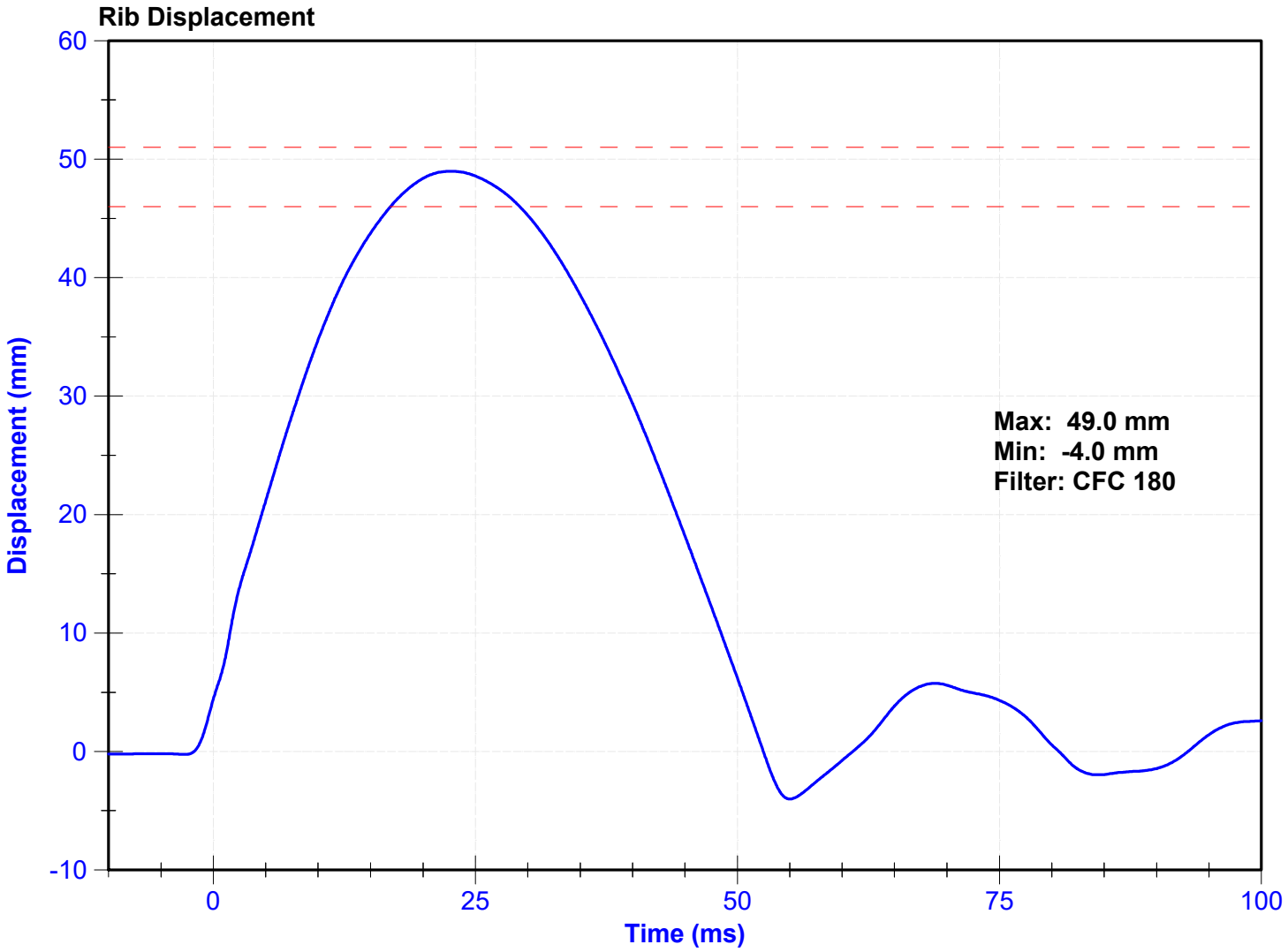
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Rib Displacement	46	51	mm	49.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	5/6/2024	11/4/2024



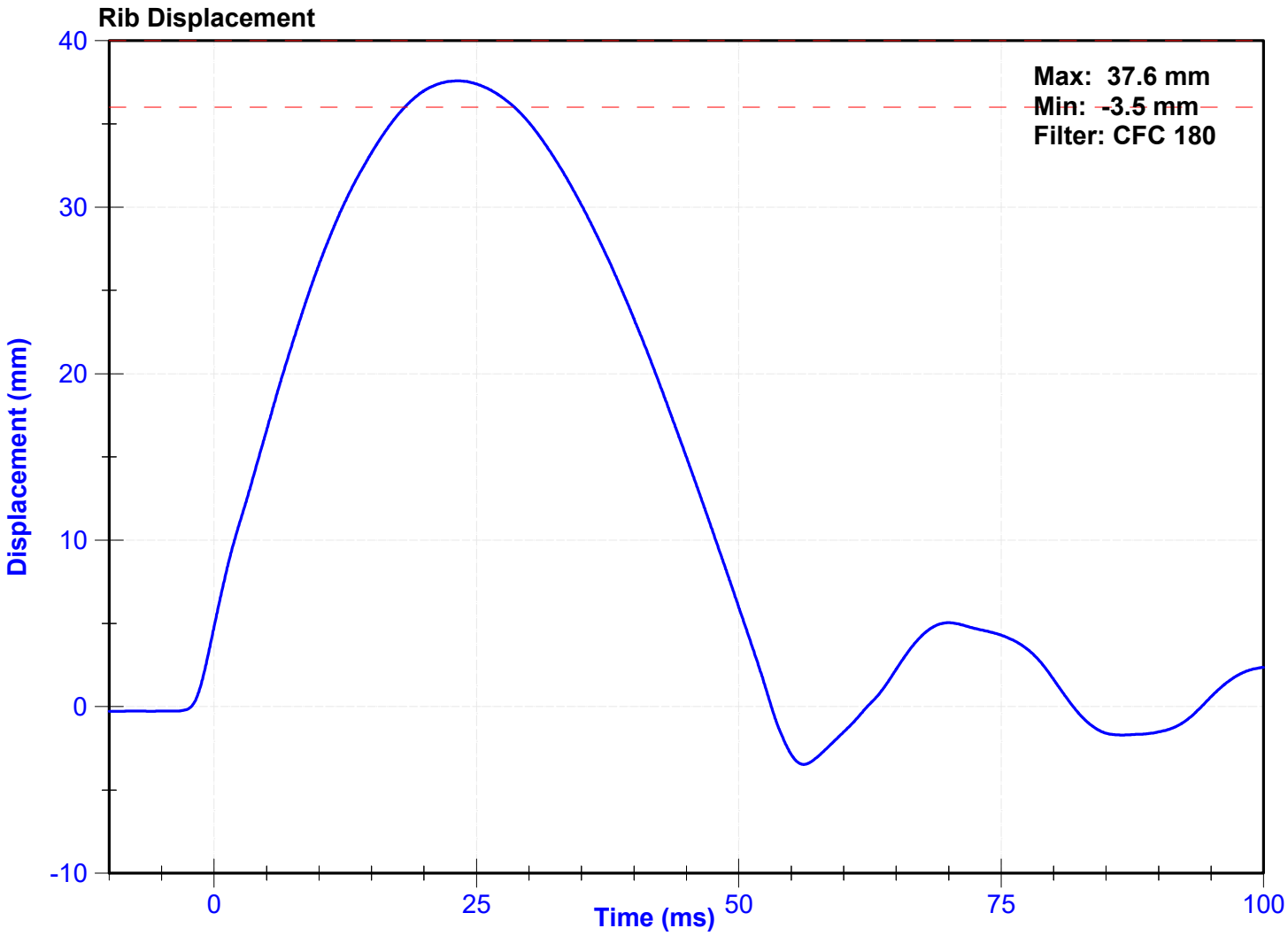
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Rib Displacement	36	40	mm	37.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	5/6/2024	11/4/2024



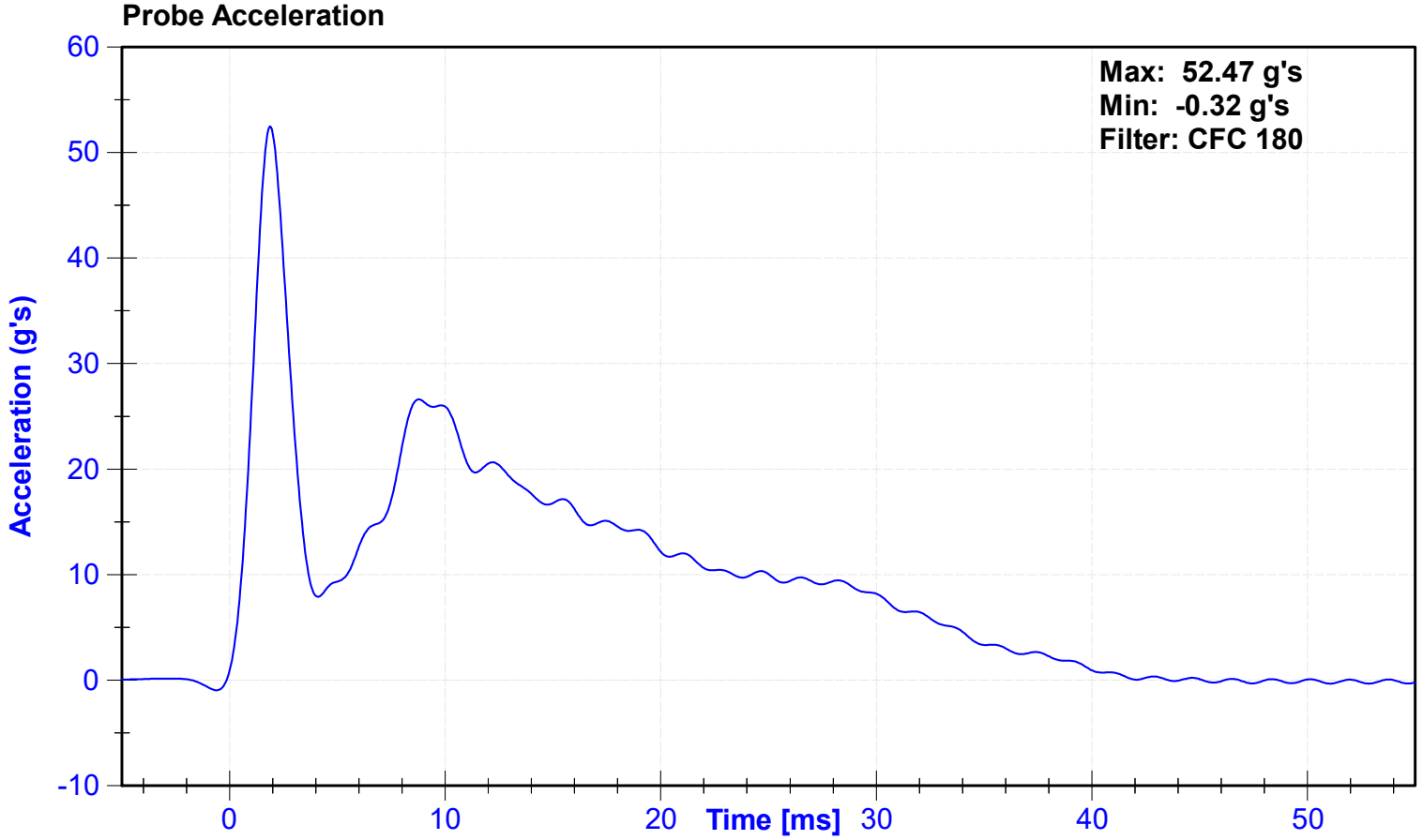
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

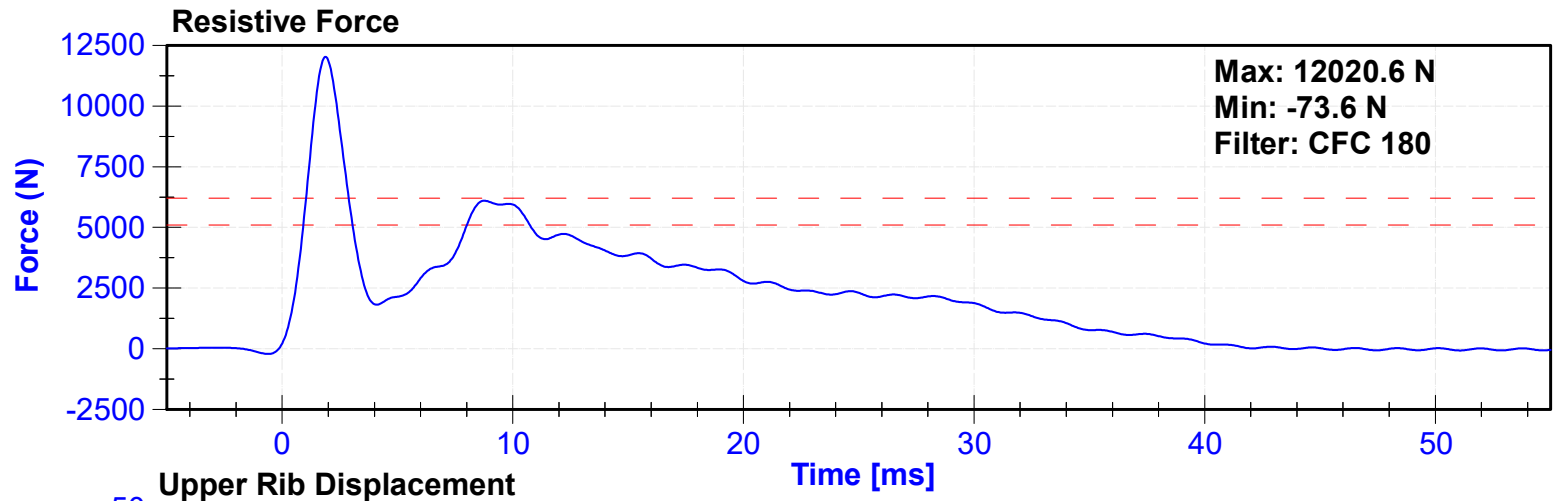
Results

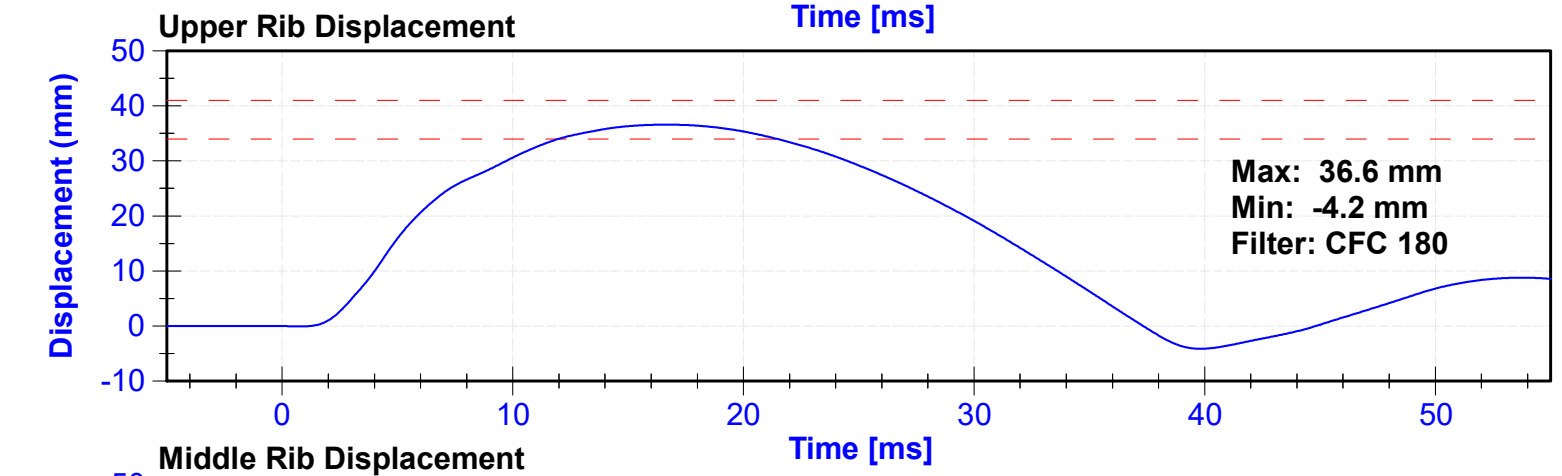
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	55	Pass
Velocity	5.4	5.6	m/s	5.53	Pass
Resistive Force after 6ms	5100	6200	N	6097.4	Pass
Upper Thorax Rib Deflection	34	41	mm	36.6	Pass
Mid Thorax Rib Deflection	37	45	mm	40.7	Pass
Lower Thorax Rib Deflection	37	44	mm	40.4	Pass

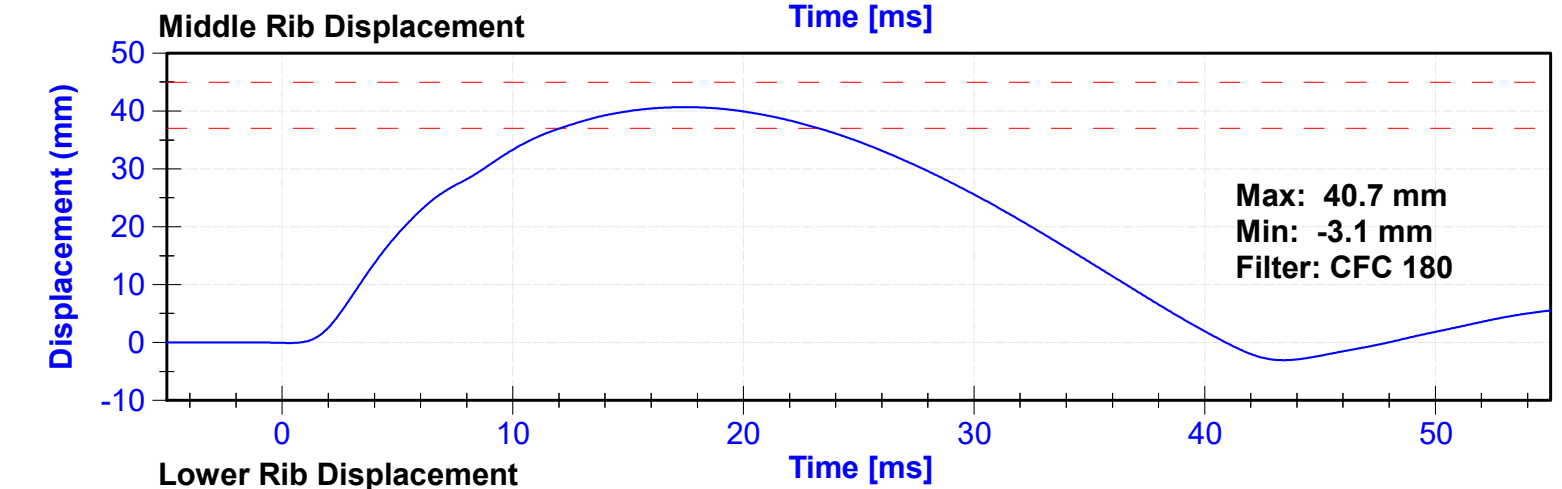
Transducer Calibrations

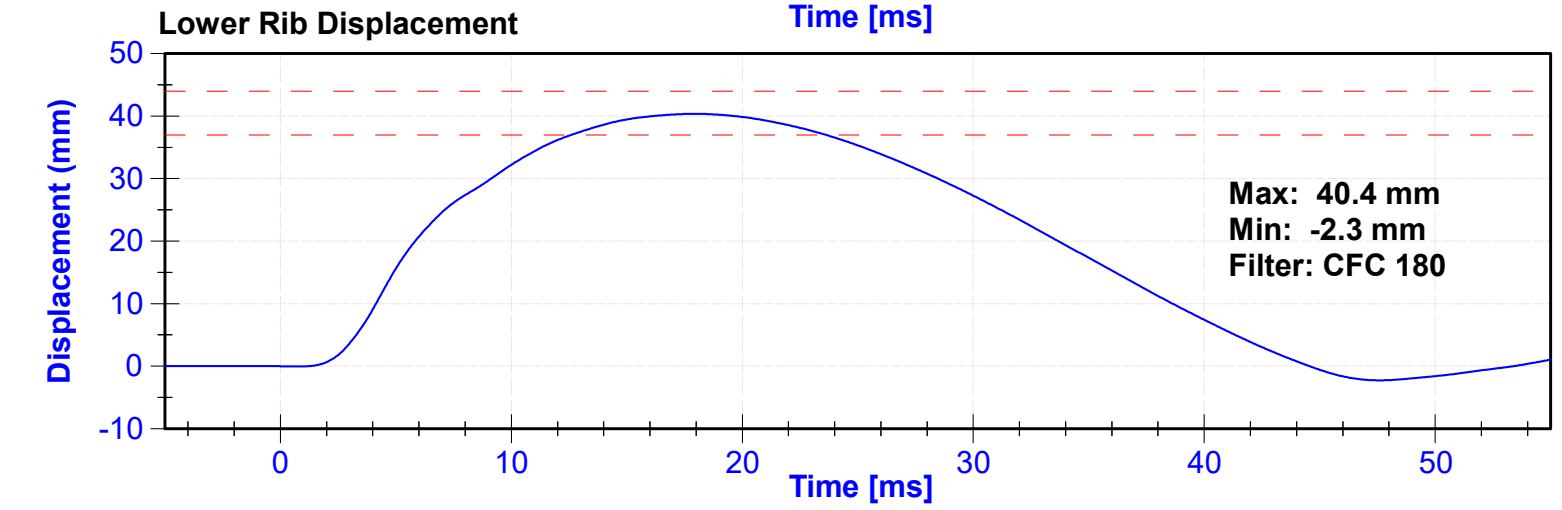
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Upper Thorax Rib Potentiometer	Honeywell	179GFE	5/6/2024	11/4/2024
Middle Thorax Rib Potentiometer	Honeywell	185GFE	5/6/2024	11/4/2024
Lower Thorax Rib Potentiometer	Honeywell	178GFE	5/6/2024	11/4/2024




Resistive Force
Max: 12020.6 N
Min: -73.6 N
Filter: CFC 180
Force (N)
12500
10000
7500
5000
2500
0
-2500
0
10
20
30
40
50
Time [ms]


Upper Rib Displacement
Max: 36.6 mm
Min: -4.2 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]


Middle Rib Displacement
Max: 40.7 mm
Min: -3.1 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]


Lower Rib Displacement
Max: 40.4 mm
Min: -2.3 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]

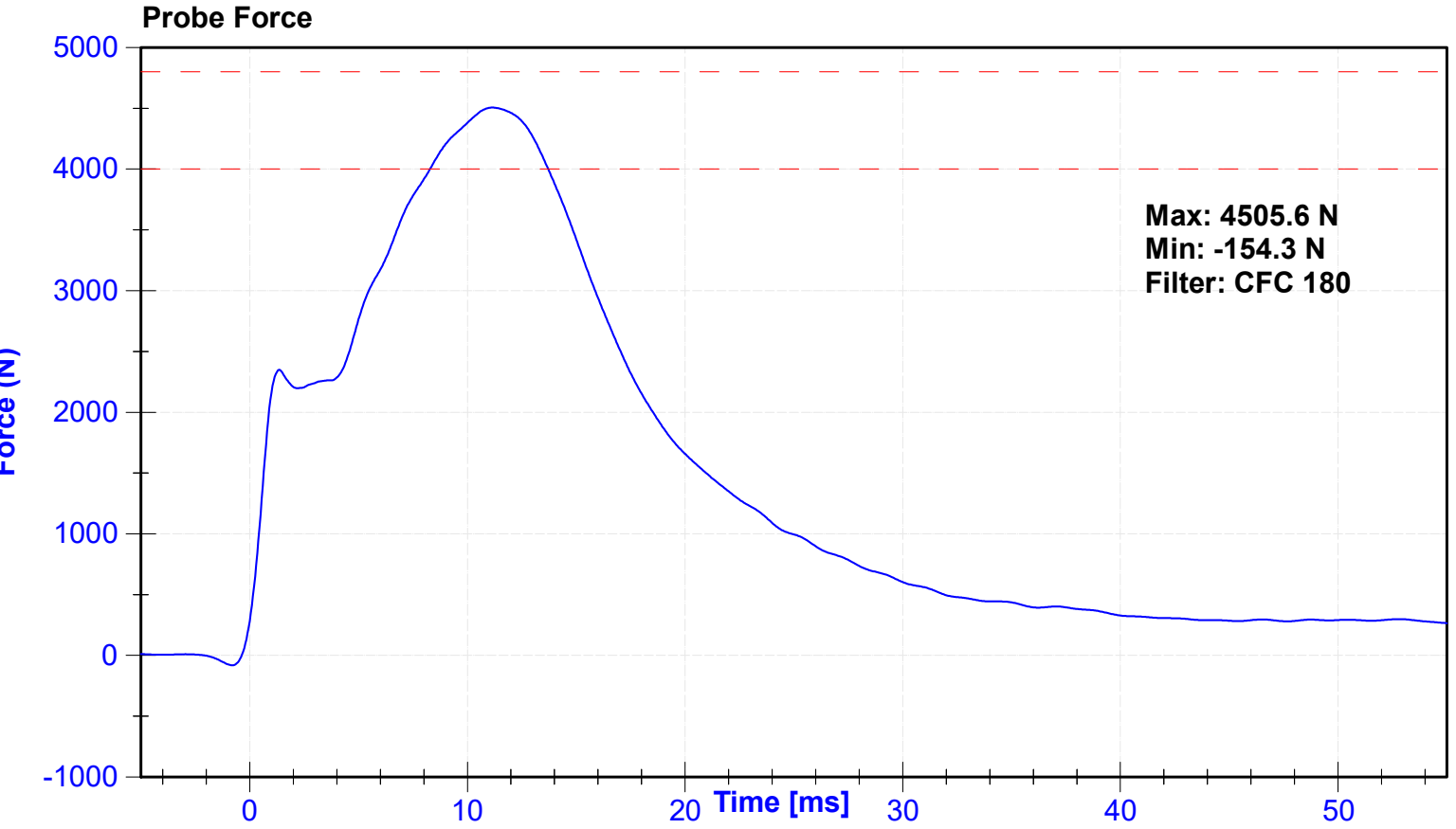
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

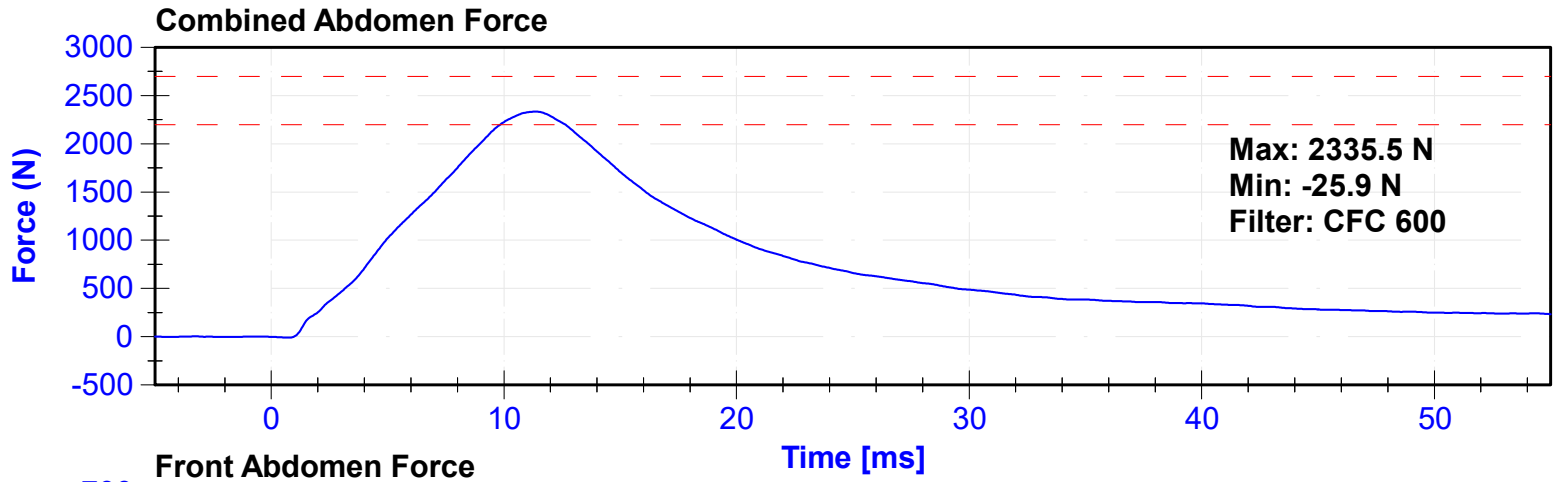
Results

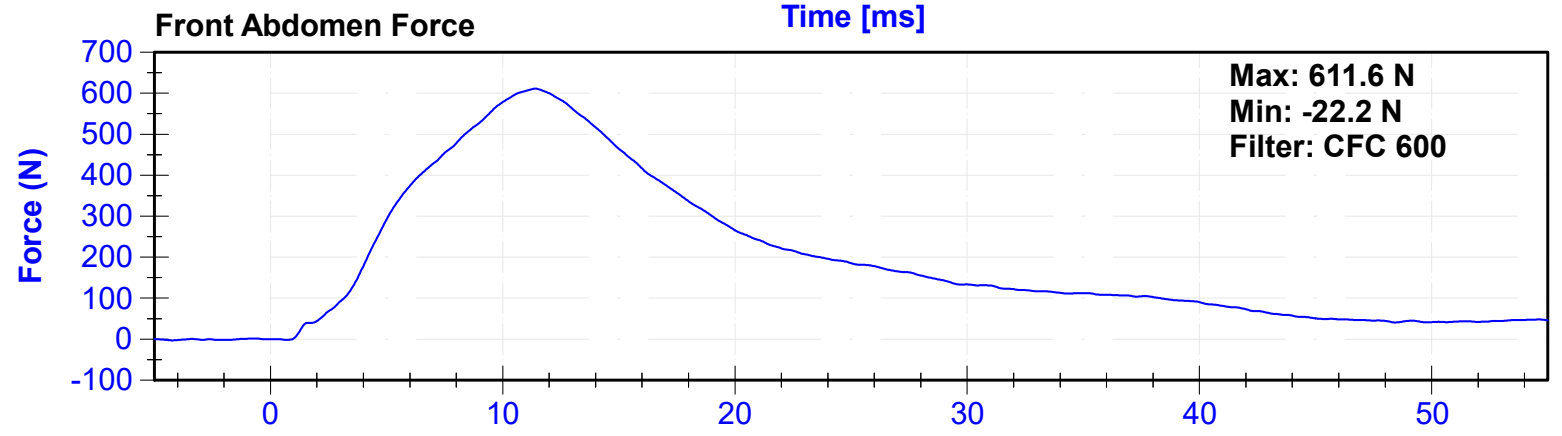
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	55	Pass
Velocity	3.9	4.1	m/s	4.01	Pass
Combined Abdomen Force	2200	2700	N	2335.5	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.35	Pass
Resistive Probe Force	4000	4800	N	4505.6	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.15	Pass

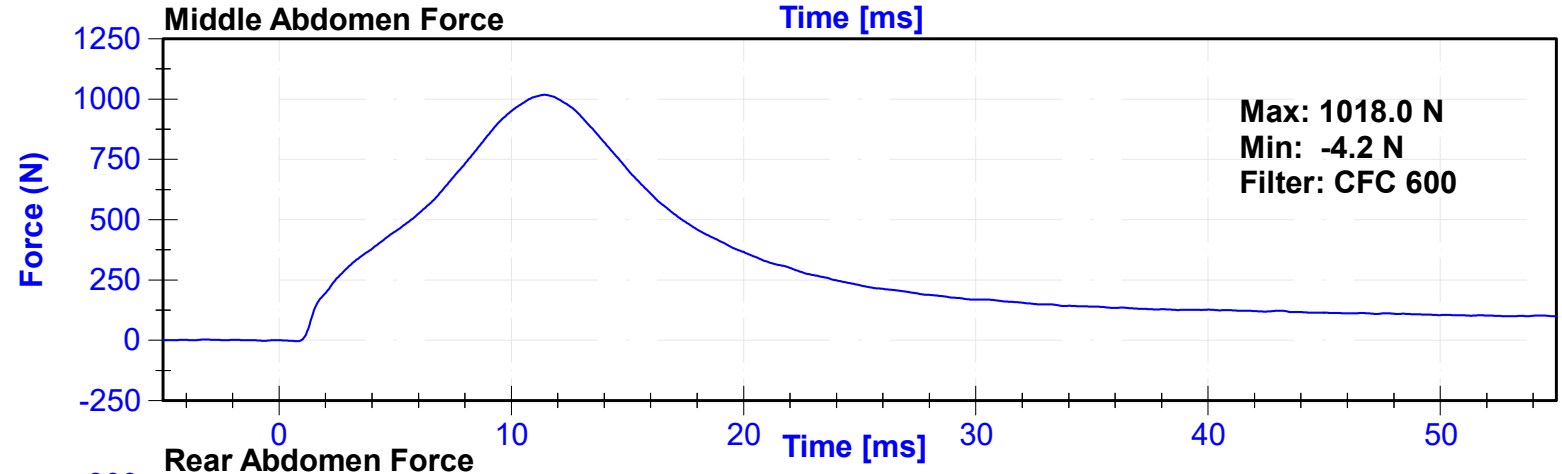
Transducer Calibrations

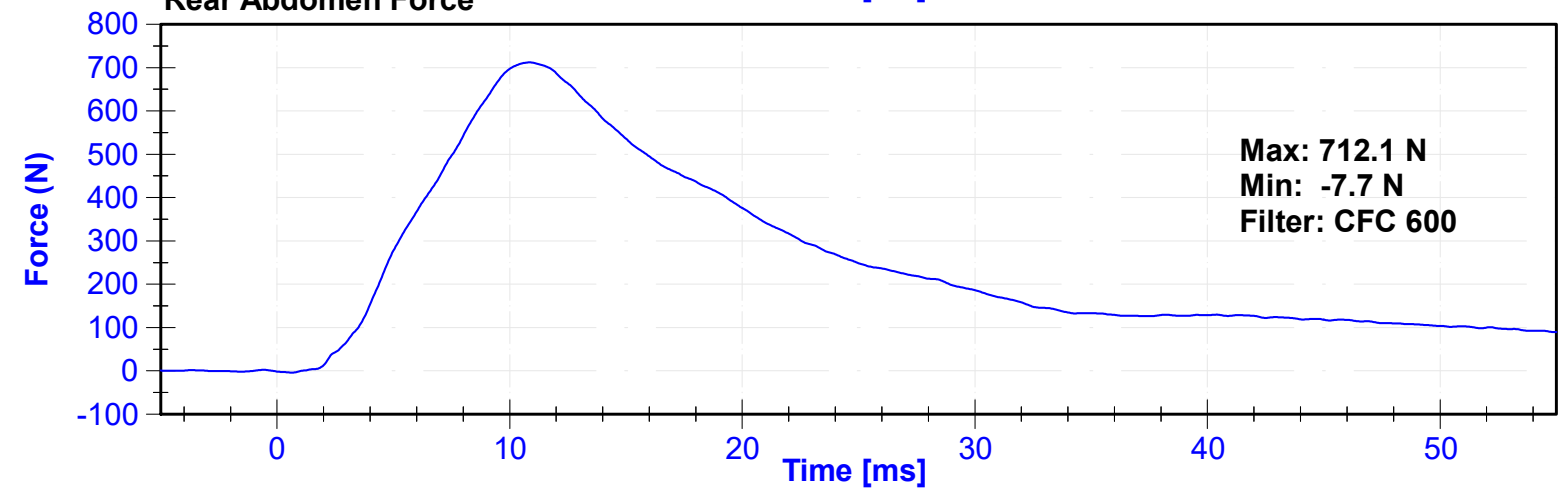
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Front Abdomen Load Cell	Denton	1523	12/5/2023	12/4/2024
Middle Abdomen Load Cell	Denton	1524	12/5/2023	12/4/2024
Rear Abdomen Load Cell	Denton	1530	12/5/2023	12/4/2024




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2335.5 N
Min: -25.9 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 611.6 N
Min: -22.2 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1018.0 N
Min: -4.2 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 712.1 N
Min: -7.7 N
Filter: CFC 600

ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

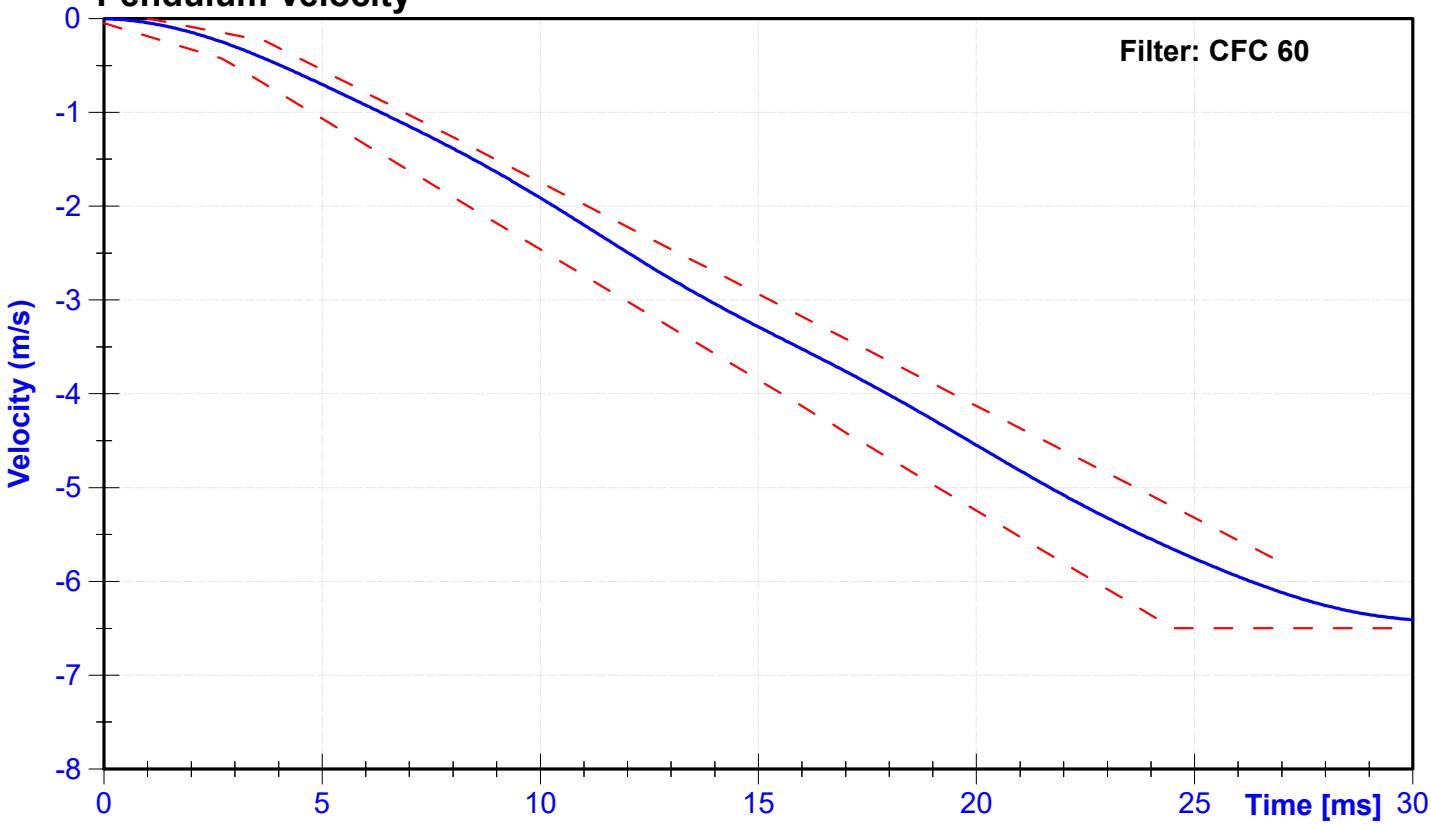
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	53.0	Pass
Velocity	5.95	6.15	m/s	6.082	Pass
Lateral Spine Rotation	45	55	deg	46.2	Pass
Time at Maximum Rotation	39	53	ms	44.0	Pass
Time of Decay to Zero Degrees	37	57	ms	37.1	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

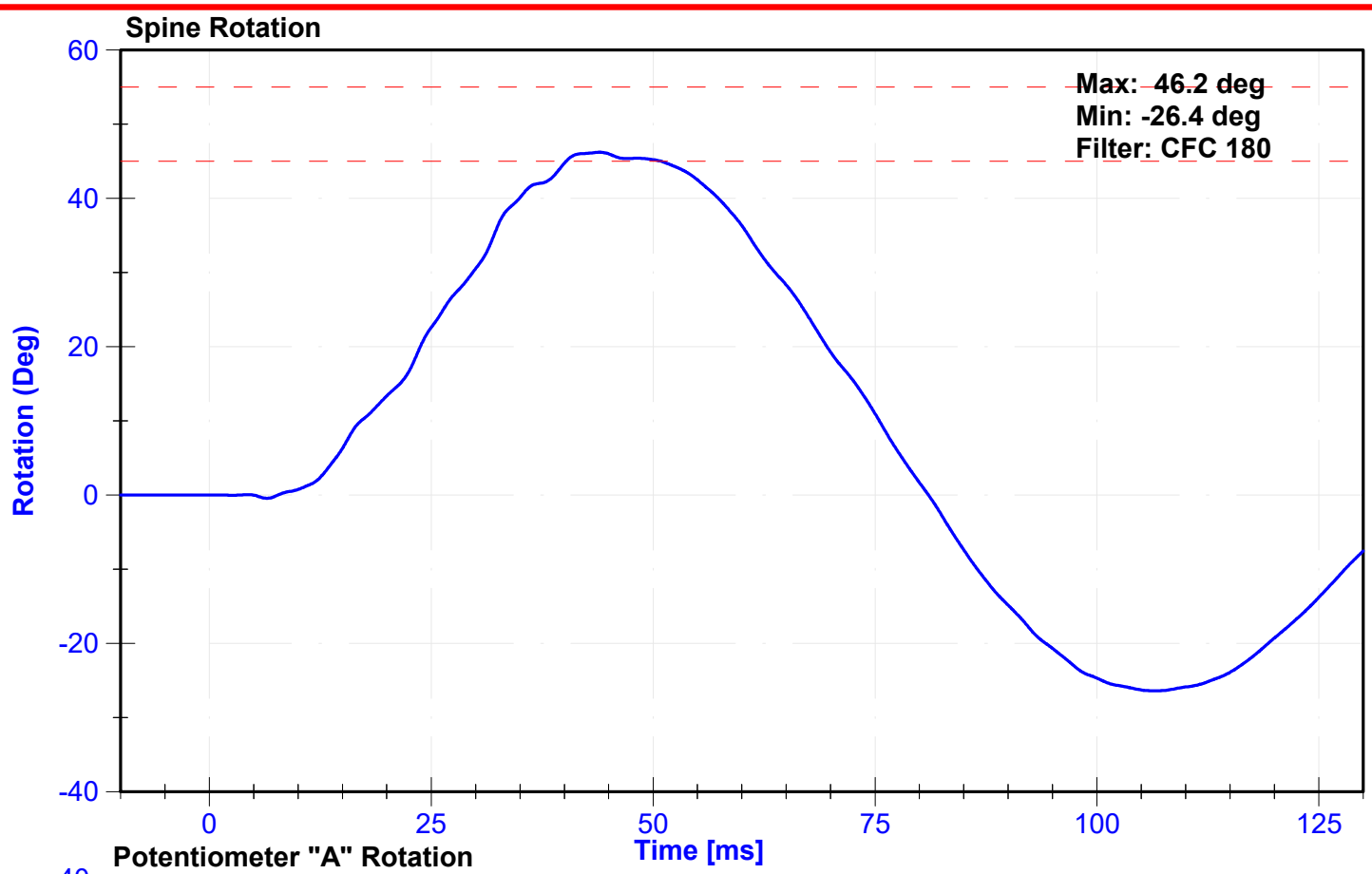
Transducer Calibrations

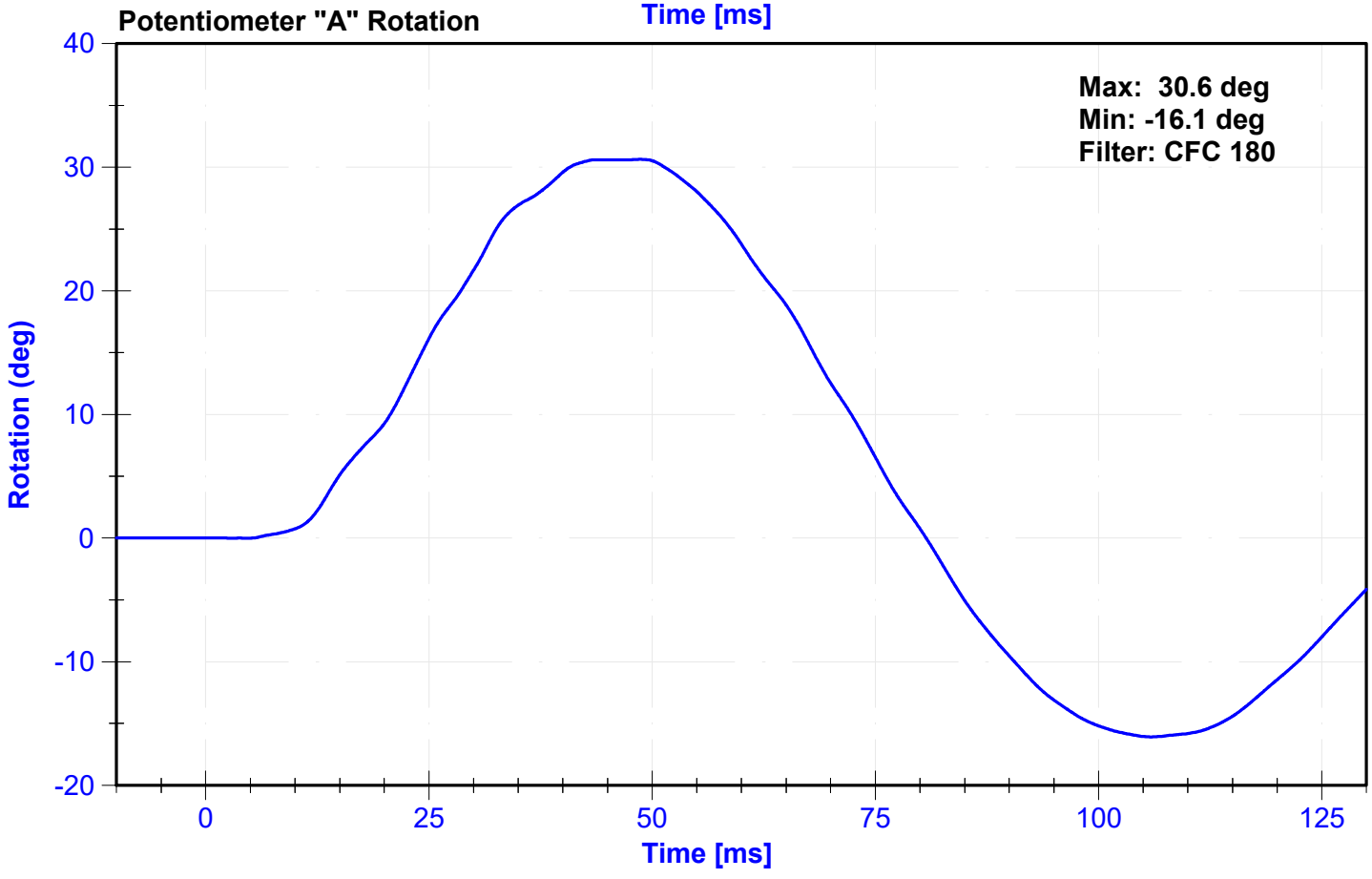
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	10/31/2023	10/30/2024
Pendulum "A" Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Condyle "B" Potentiometer	Sfernice	095	9/29/2023	9/28/2024

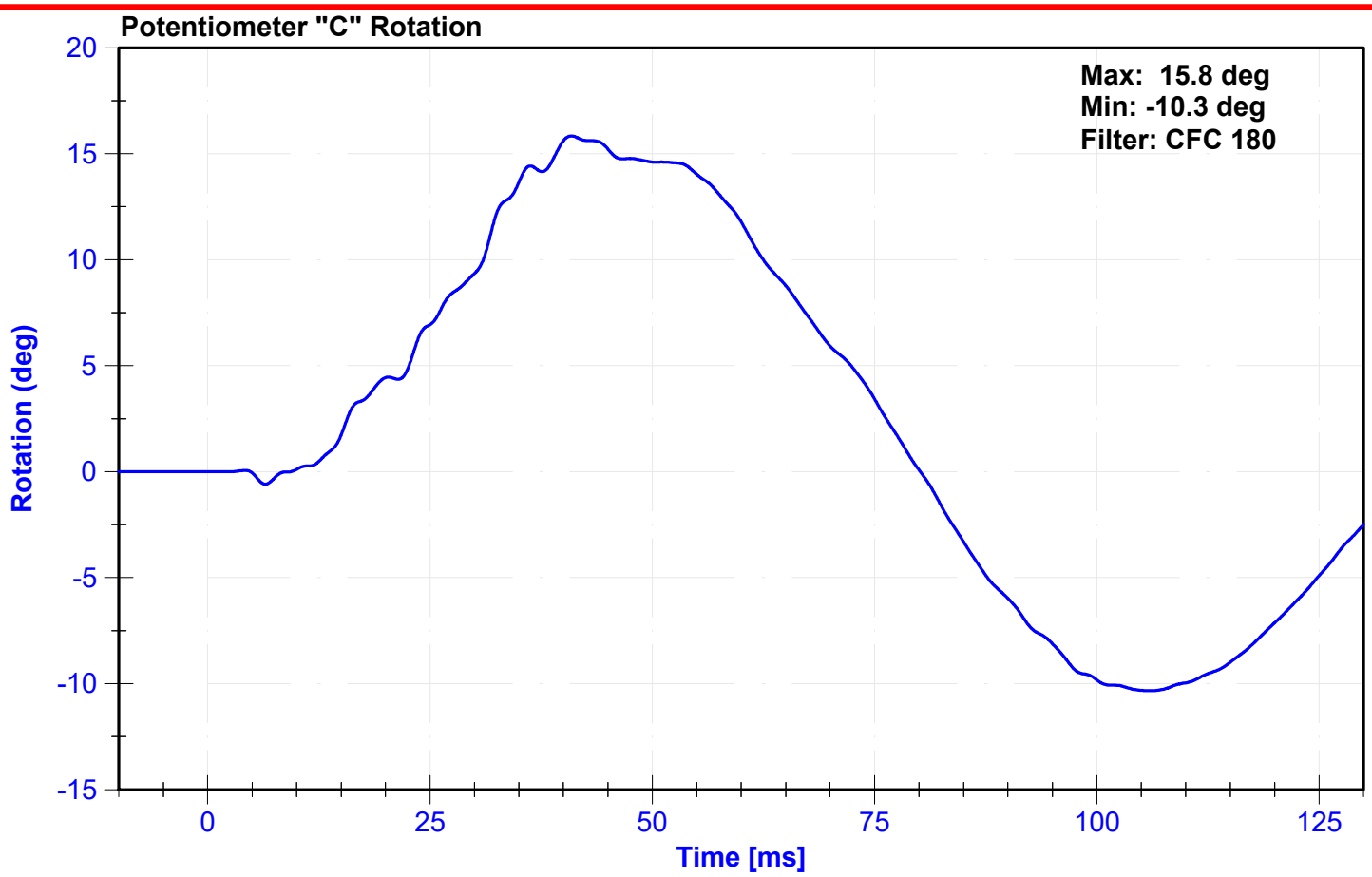
Pendulum Velocity[3]



[1,2] Upper and lower boundaries specified in Appendix I


Spine Rotation
Max: 46.2 deg
Min: -26.4 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 30.6 deg
Min: -16.1 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]



Appendix I

[2] Upper Boundary Corridor		[1] Lower Boundary Corridor	
Time (ms)	Velocity (m/s)	Time (ms)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.7	-0.24	2.7	-0.425
27.0	-5.80	24.5	-6.5
		30.0	-6.5

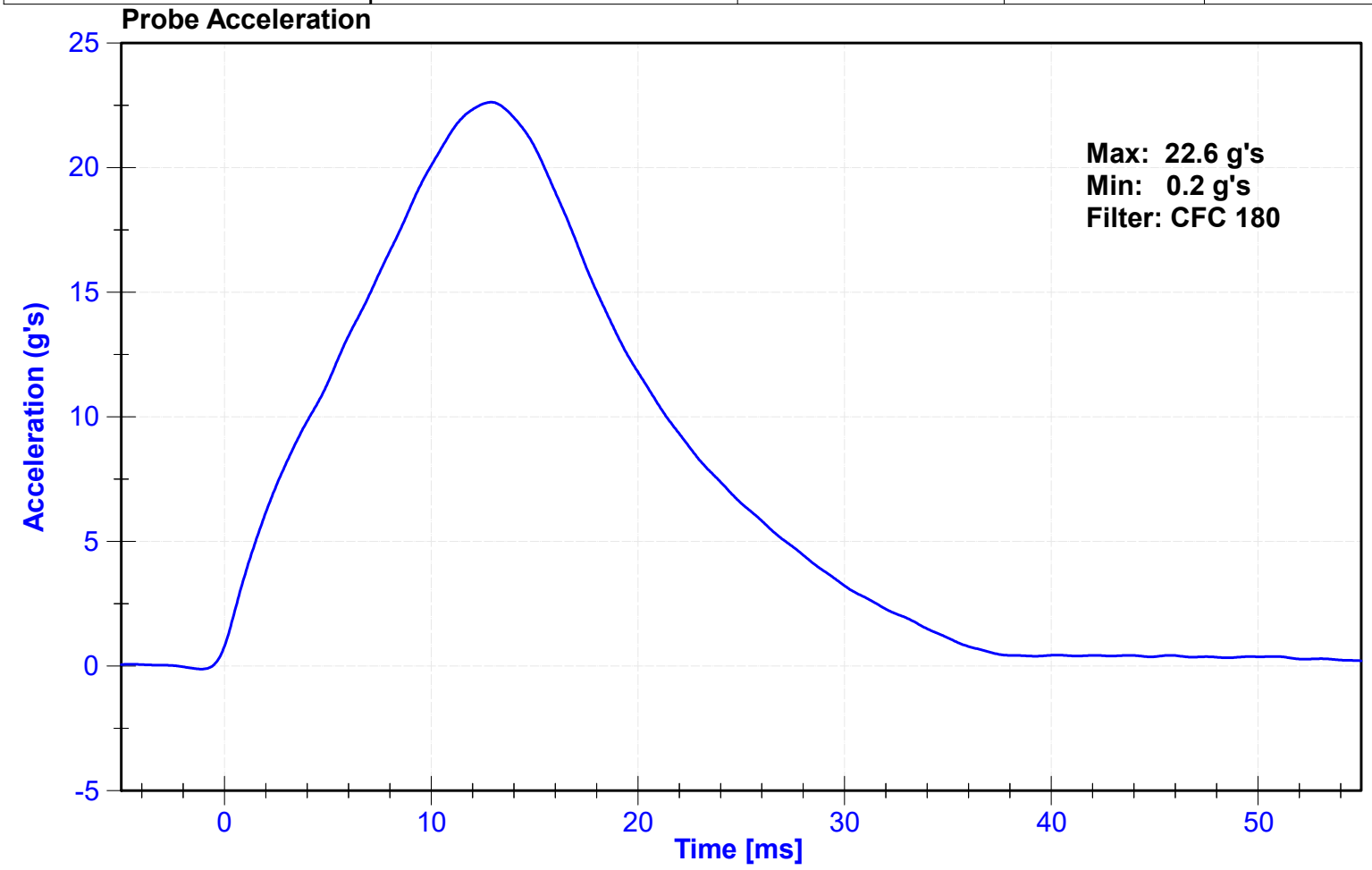
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

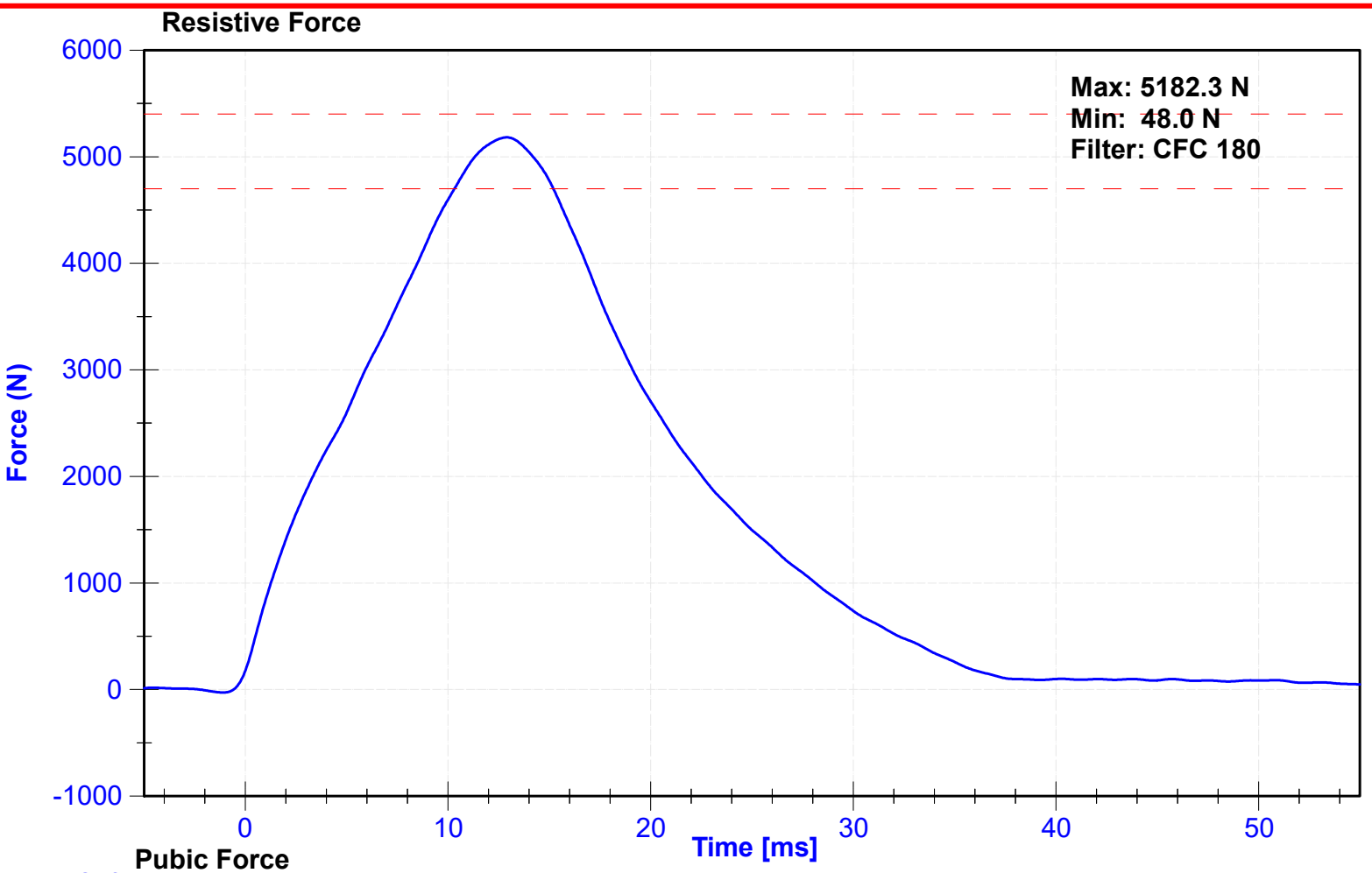
Results

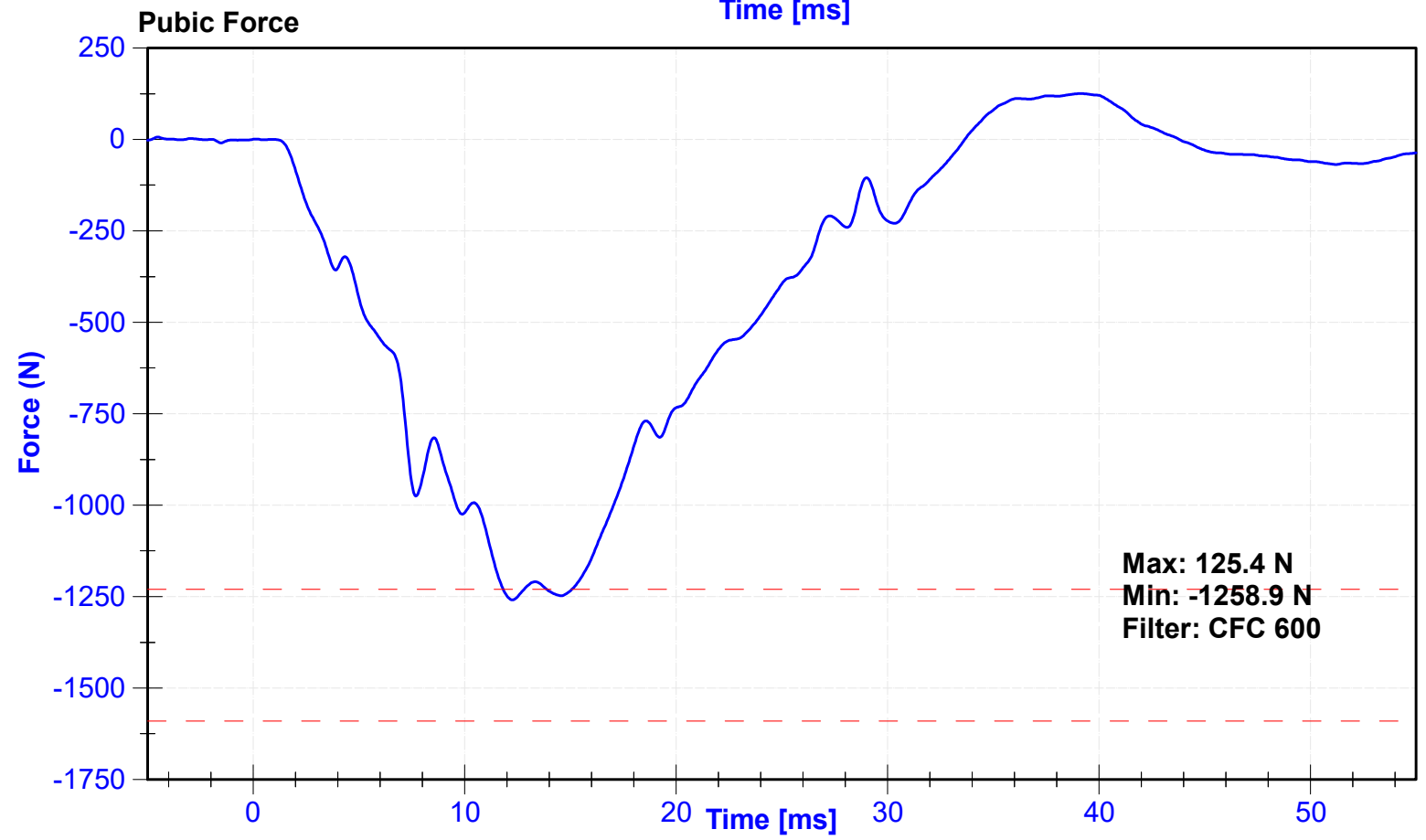
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	55	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Resistive Force	4700	5400	N	5182.3	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.90	Pass
Pubic Force	-1590	-1230	N	-1258.9	Pass
Time at Peak Pubic Force	12.2	17.0	ms	12.25	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Pubic Load Cell	Denton	458-FY	12/5/2023	12/4/2024




Resistive Force
Max: 5182.3 N
Min: 48.0 N
Filter: CFC 180
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]


Pubic Force
Max: 125.4 N
Min: -1258.9 N
Filter: CFC 600
Force (N)
250
0
-250
-500
-750
-1000
-1250
-1500
-1750
0
10
20
30
40
50
Time [ms]

CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE – PASSENGER ATD

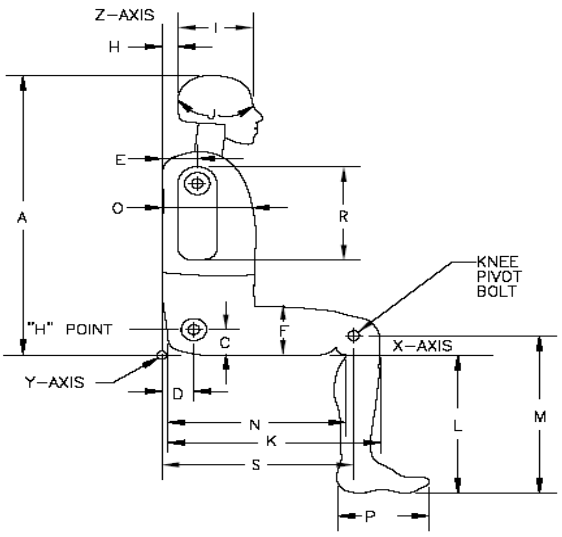
SERIAL NO:DG8012

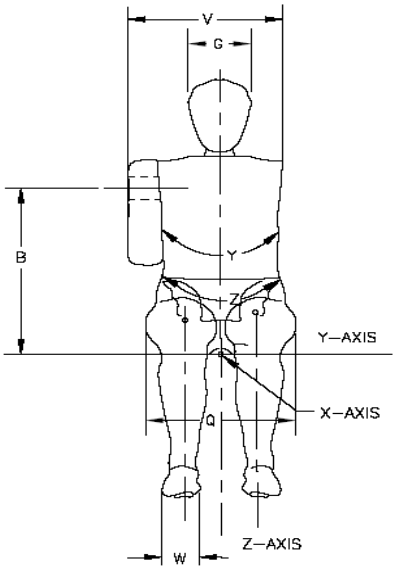
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: J. Rios Date: 08/30/2024

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	783	Pass
B	Shoulder Pivot Height	437	453	447	Pass
C	H-point Height	79	89	83	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	105	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	183	Pass
J	Head Circumference	541	551	545	Pass
K	Buttock to Knee Length	514	540	530	Pass
L	Popliteal Height	343	369	362	Pass
M	Knee Pivot to floor height	392	409	401	Pass
N	Buttock Popliteal Length	416	442	438	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	220	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	317	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	354	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	778	Pass

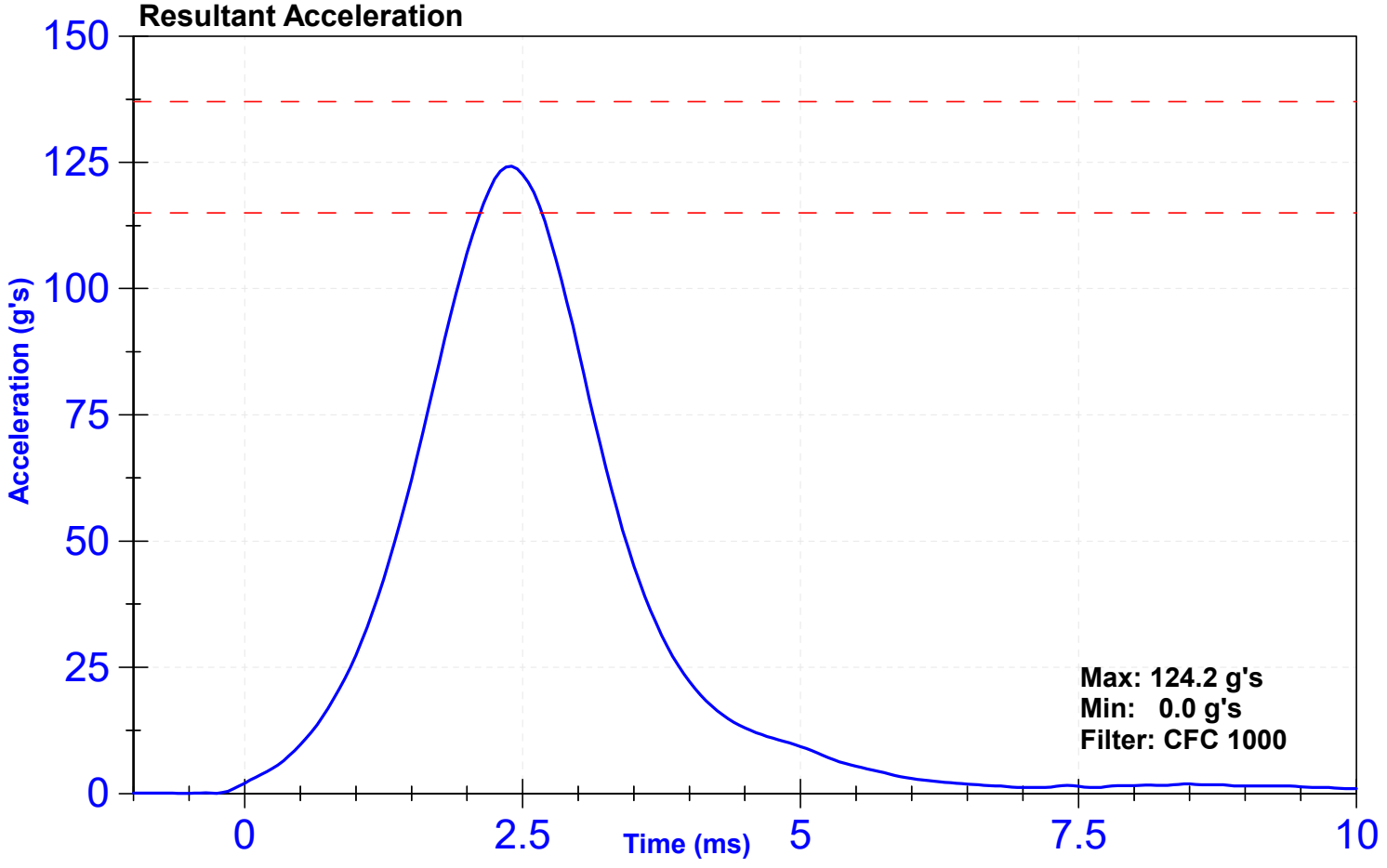
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

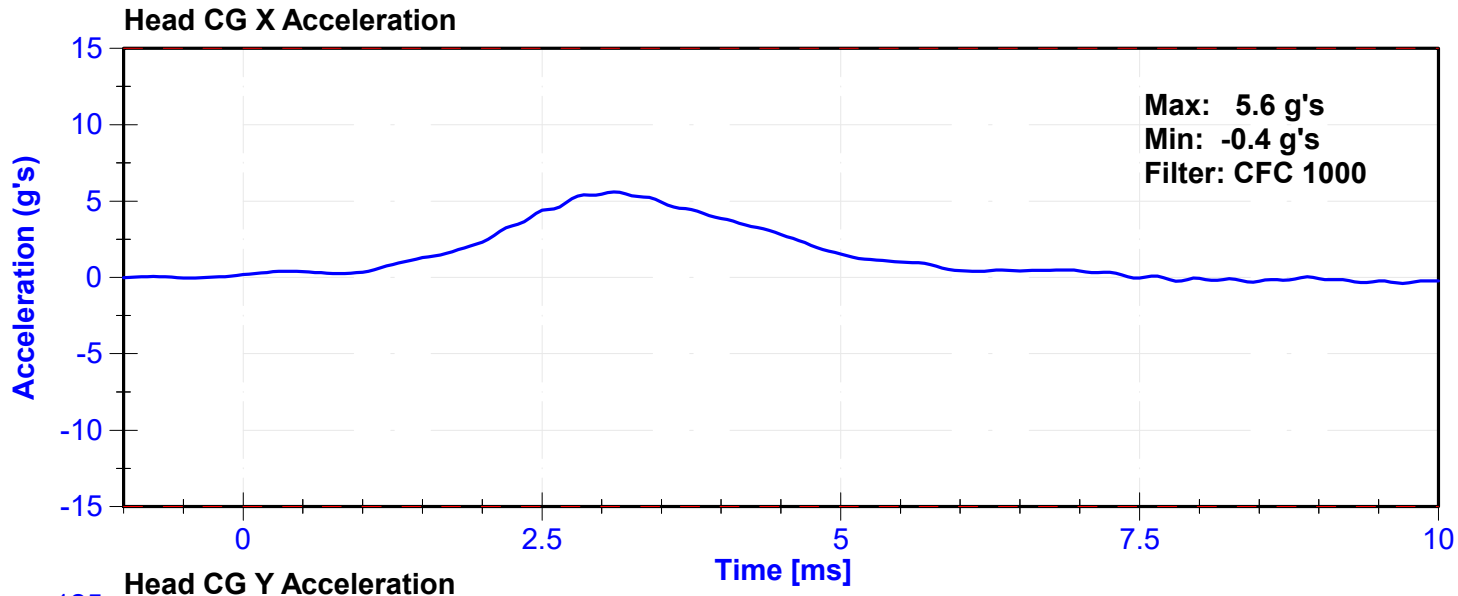
Results

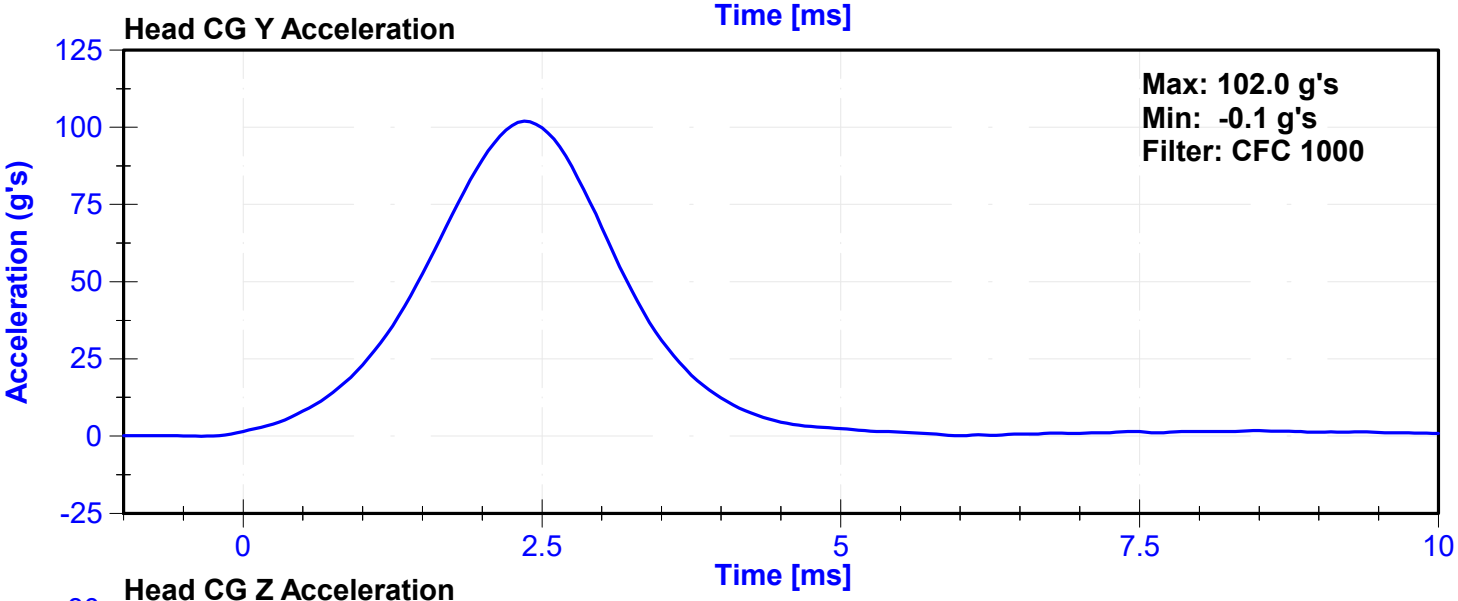
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	61	Pass
Resultant Acceleration	115	137	g's	124.2	Pass
Oscillation	0	15	%	1.5	Pass
Fore-Aft Acceleration	-15	15	g's	5.6	Pass

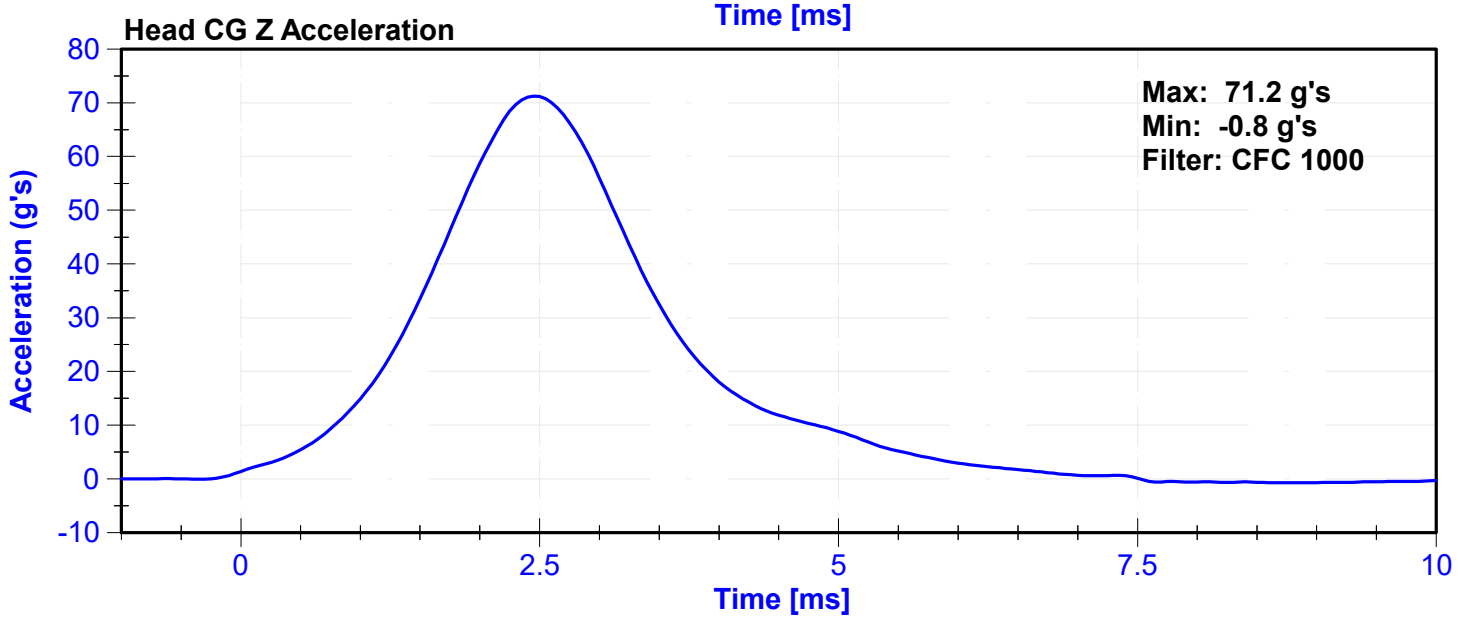
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	T21184	5/6/2024	11/2/2024
Y Accelerometer	Endevco	P51668	5/6/2024	11/2/2024
Z Accelerometer	Endevco	P83319	5/6/2024	11/2/2024




Head CG X Acceleration
Max: 5.6 g's
Min: -0.4 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: 102.0 g's
Min: -0.1 g's
Filter: CFC 1000
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 71.2 g's
Min: -0.8 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]

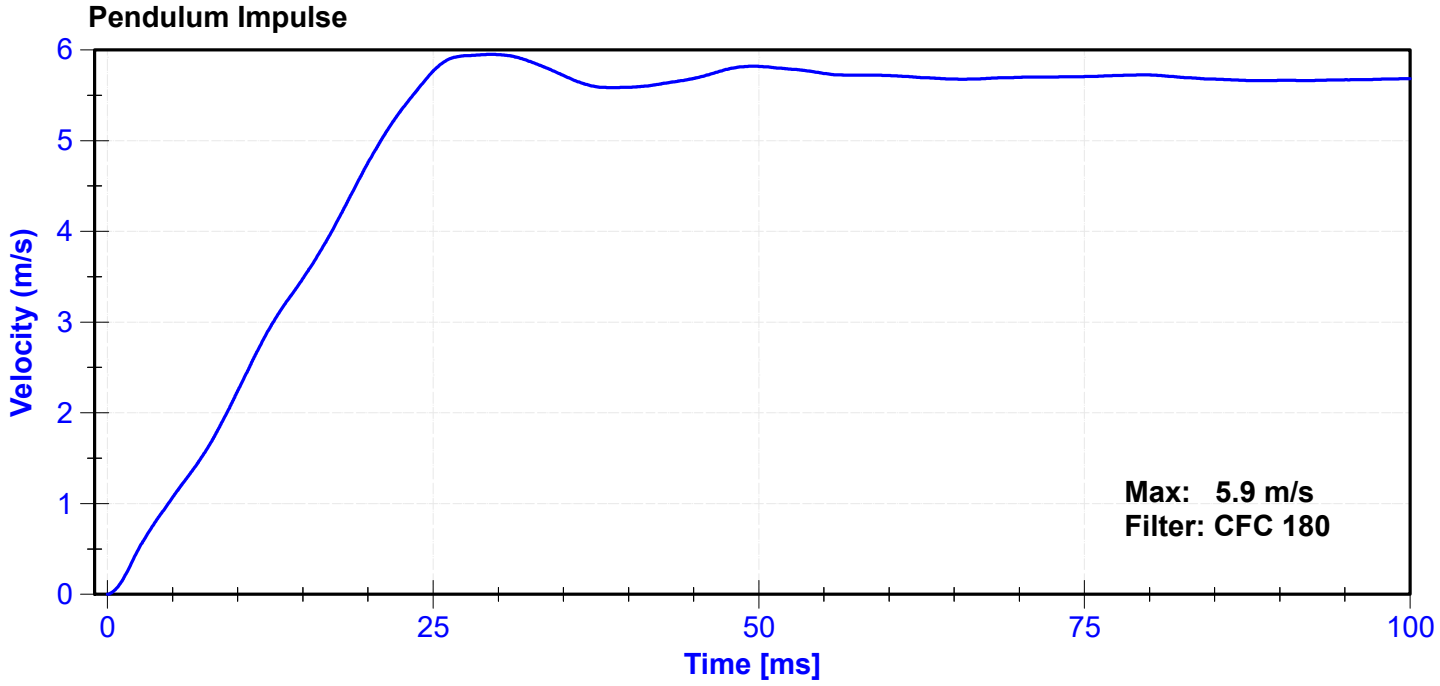
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

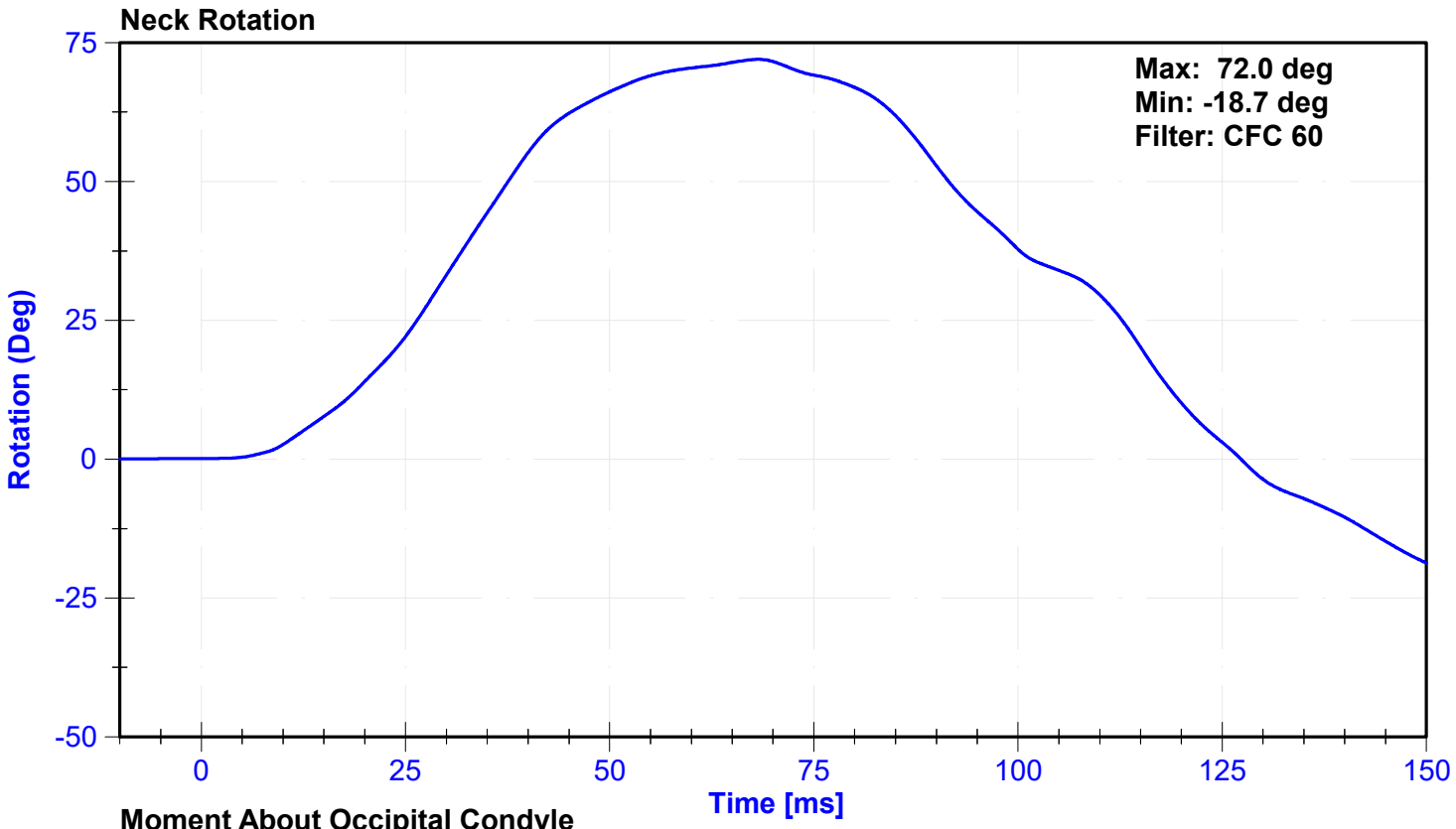
Results

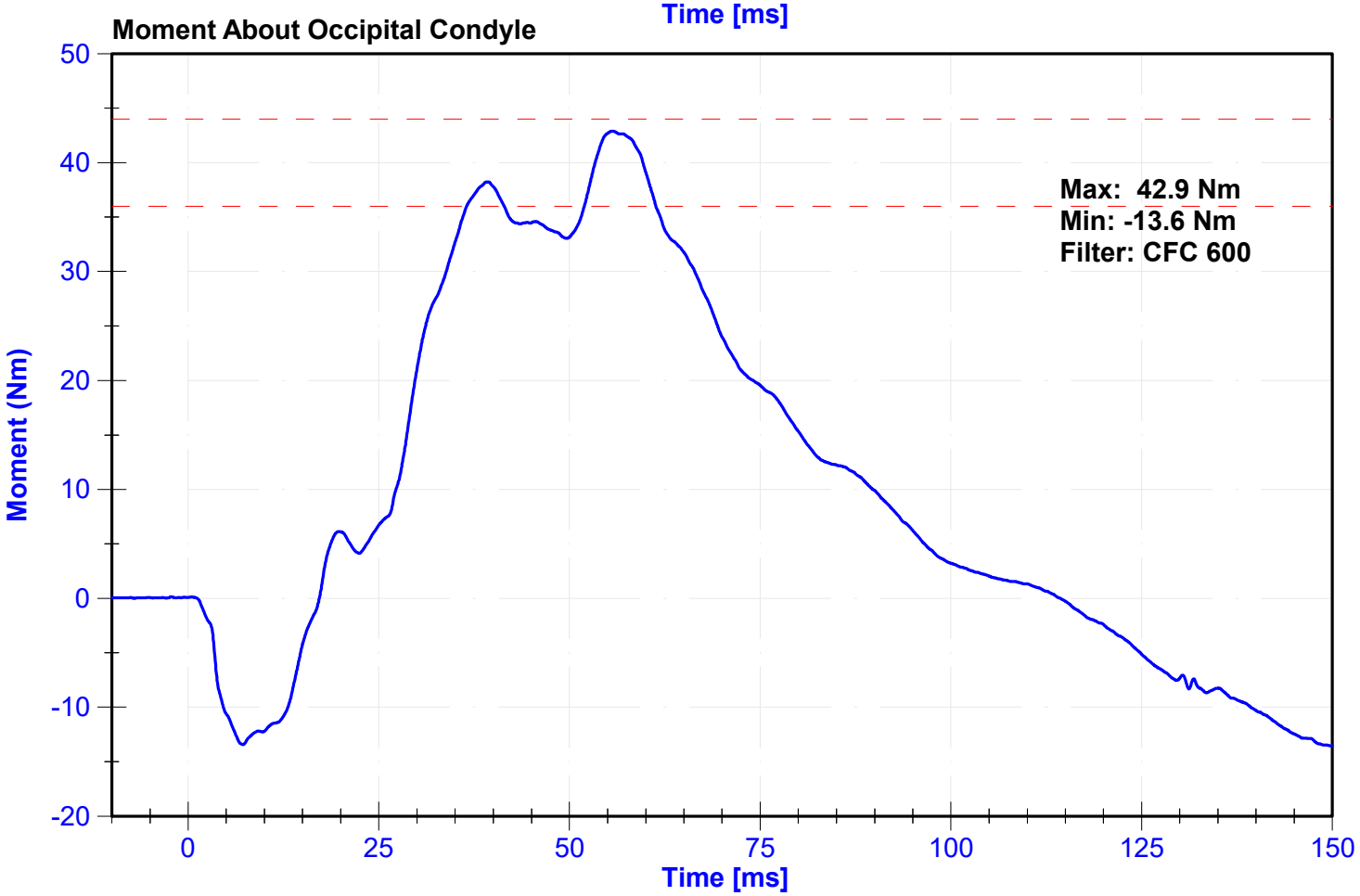
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	58	Pass
Velocity	5.51	5.63	m/s	5.554	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.24	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.48	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.76	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.77	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.95	Pass
Neck Rotation	71	81	deg	72.0	Pass
Time at Maximum Rotation	50	70	ms	68.2	Pass
Moment about the OC	36	44	Nm	42.9	Pass
Moment Decay to 0 Nm	102	126	ms	114.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	4/29/2024	10/26/2024
Pendulum Potentiometer	Servo	4961	10/2/2023	10/1/2024
Condyle Potentiometer	Servo	DS185	10/2/2023	10/1/2024
Upper Neck Load Cell	Denton	1716A_2187-FY	12/5/2023	12/4/2024




Neck Rotation
Max: 72.0 deg
Min: -18.7 deg
Filter: CFC 60
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 42.9 Nm
Min: -13.6 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

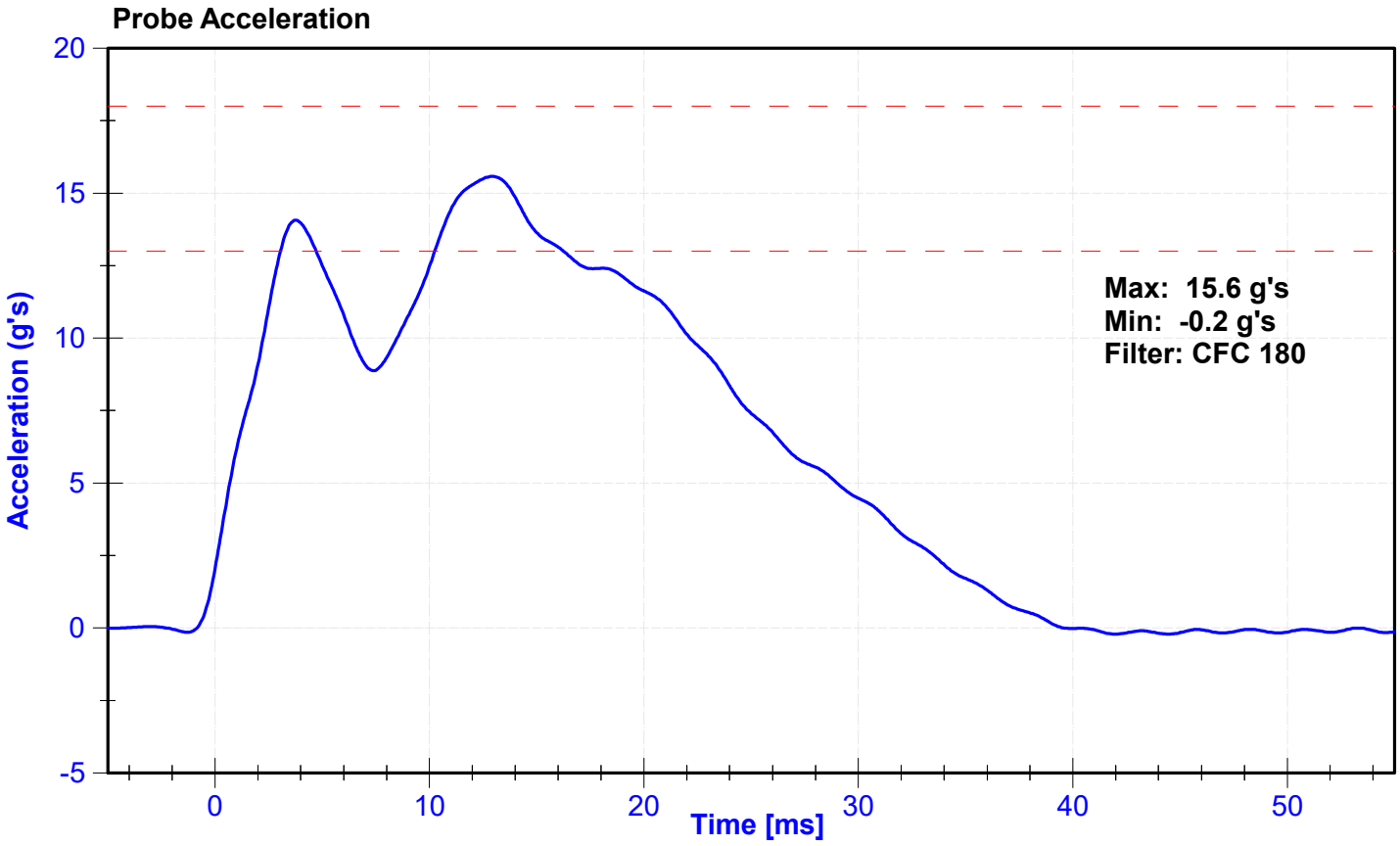
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

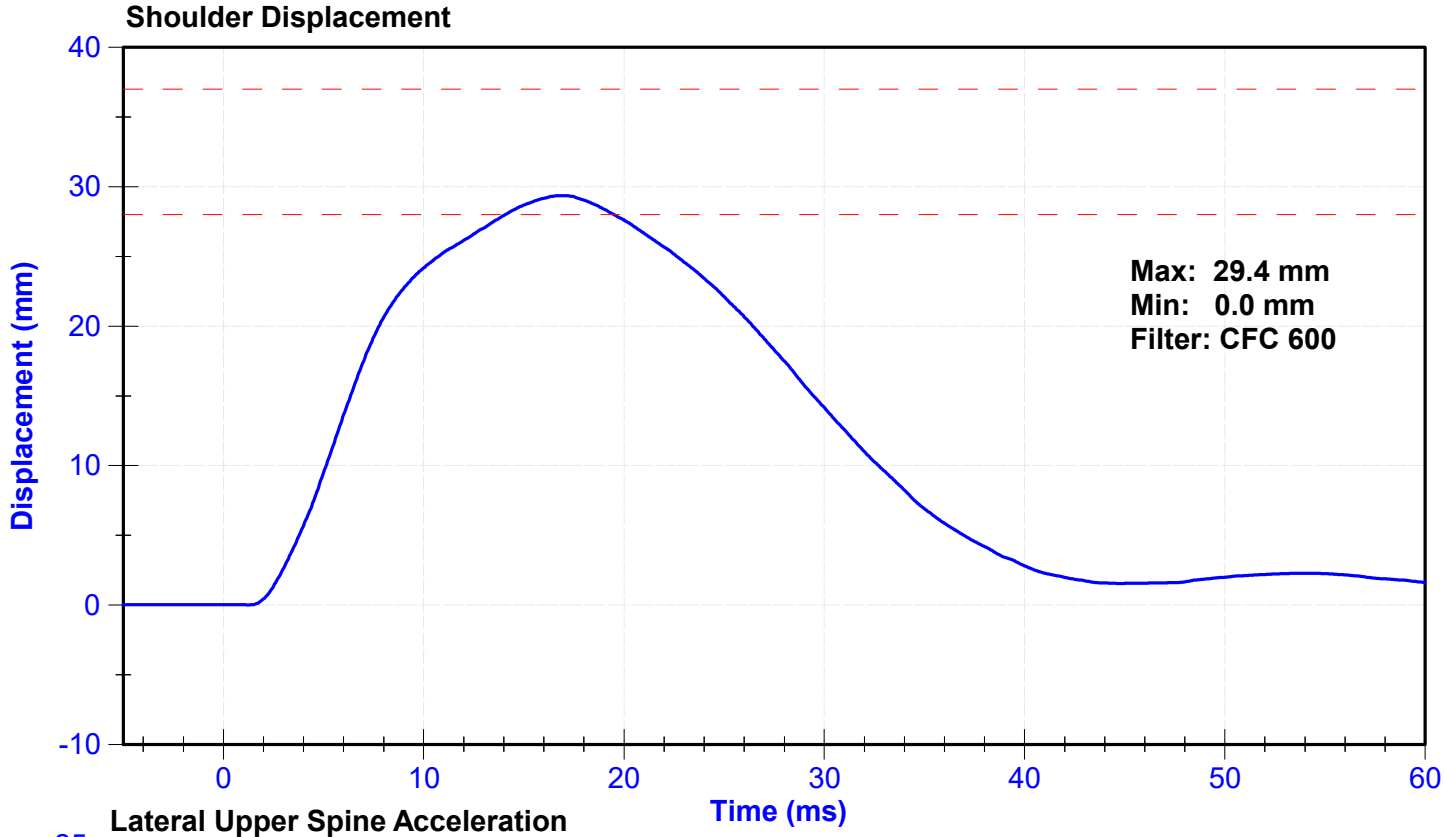
Results

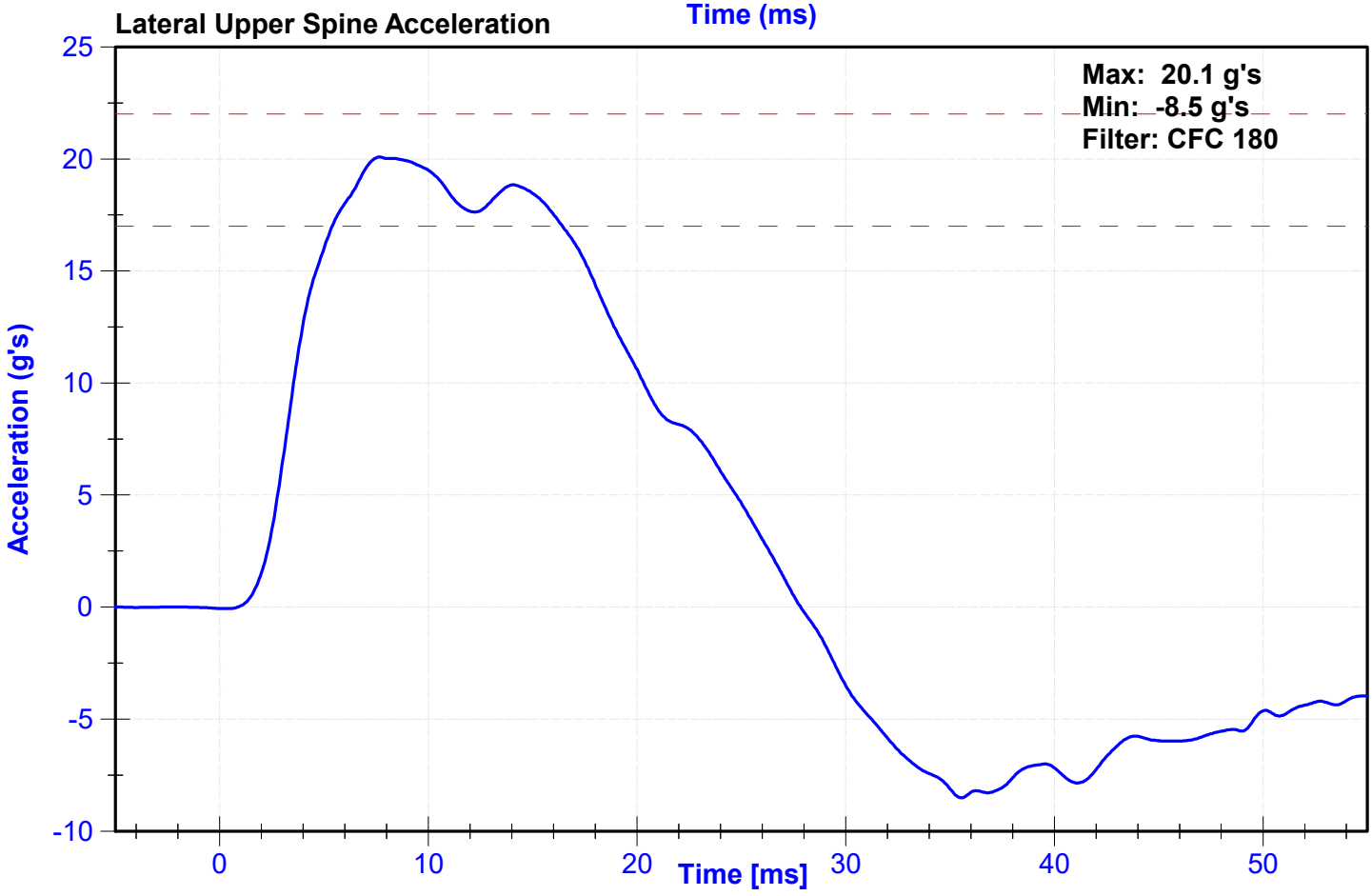
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	54	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	13	18	g's	15.6	Pass
Shoulder Deflection	28	37	mm	29.4	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Shoulder Potentiometer	Servo	1274GFE	5/6/2024	11/4/2024
Upper Spine Y Accelerometer	Endevco	P64148	5/6/2024	11/2/2024




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: 20.1 g's
Min: -8.5 g's
Filter: CFC 180

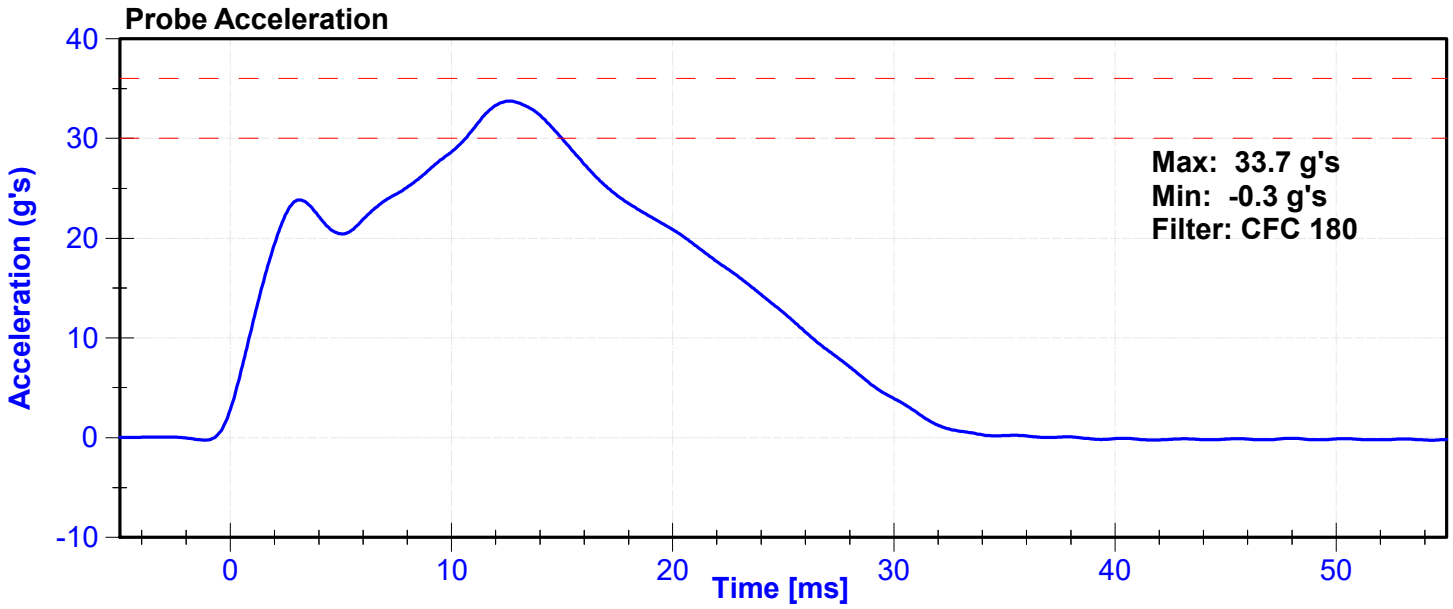
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

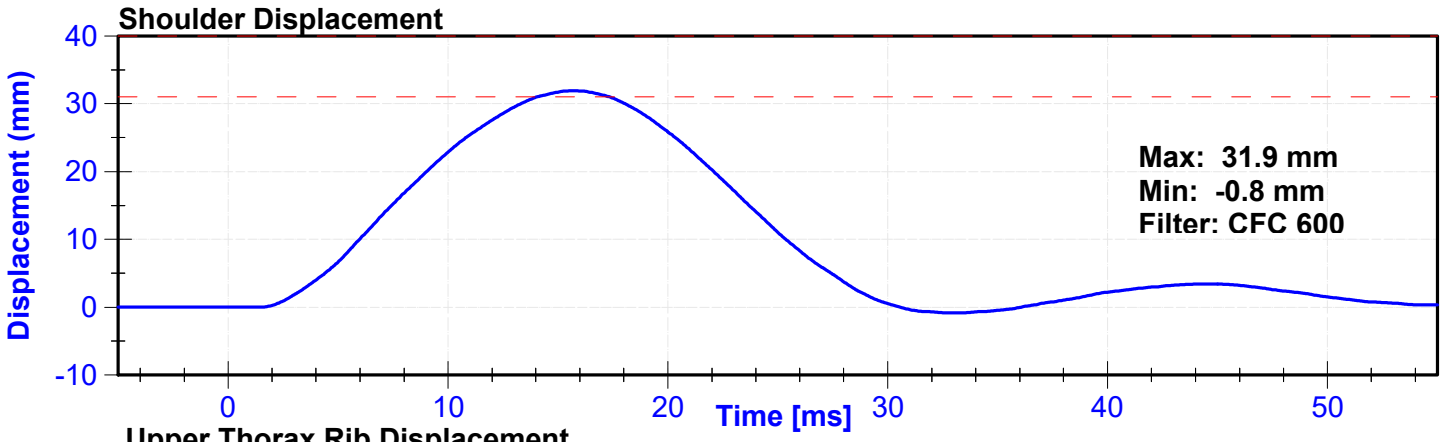
Results

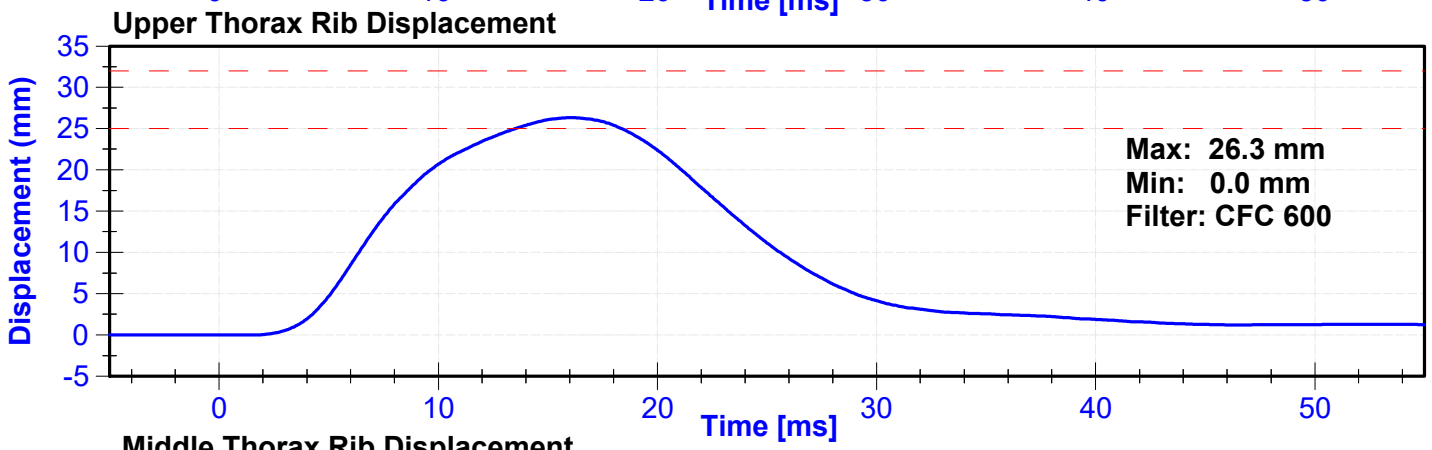
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	54	Pass
Velocity	6.6	6.8	m/s	6.65	Pass
Probe Acceleration after 5 ms	30	36	g's	33.7	Pass
Lateral Upper Spine Acceleration	34	43	g's	37.9	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.0	Pass
Shoulder Deflection	31	40	mm	31.9	Pass
Upper Thorax Rib Deflection	25	32	mm	26.3	Pass
Mid Thorax Rib Deflection	30	36	mm	30.9	Pass
Lower Thorax Rib Deflection	32	38	mm	33.8	Pass

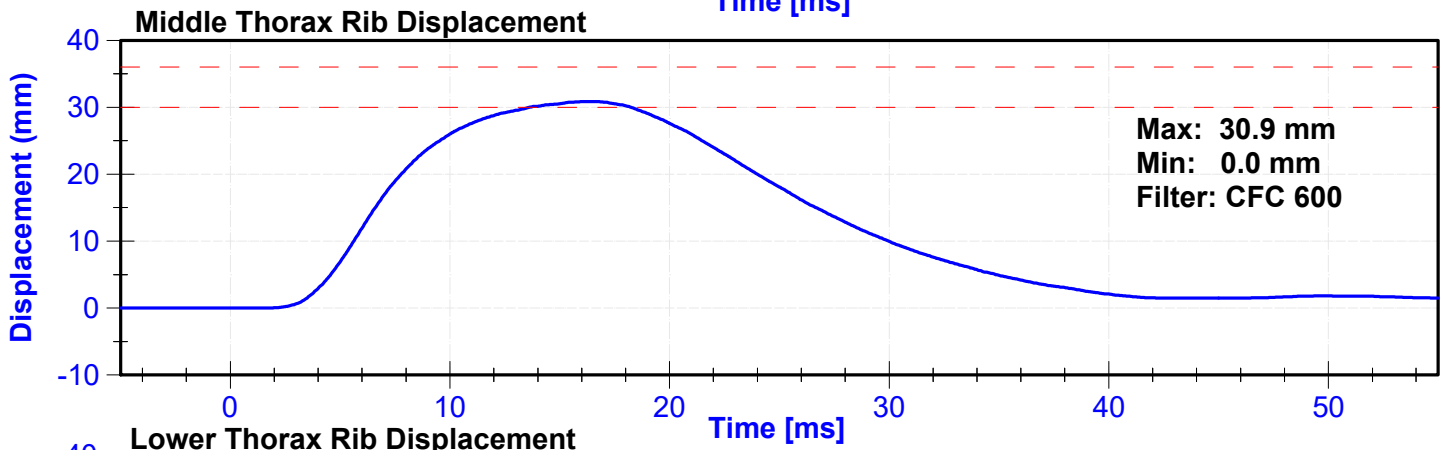
Transducer Calibrations

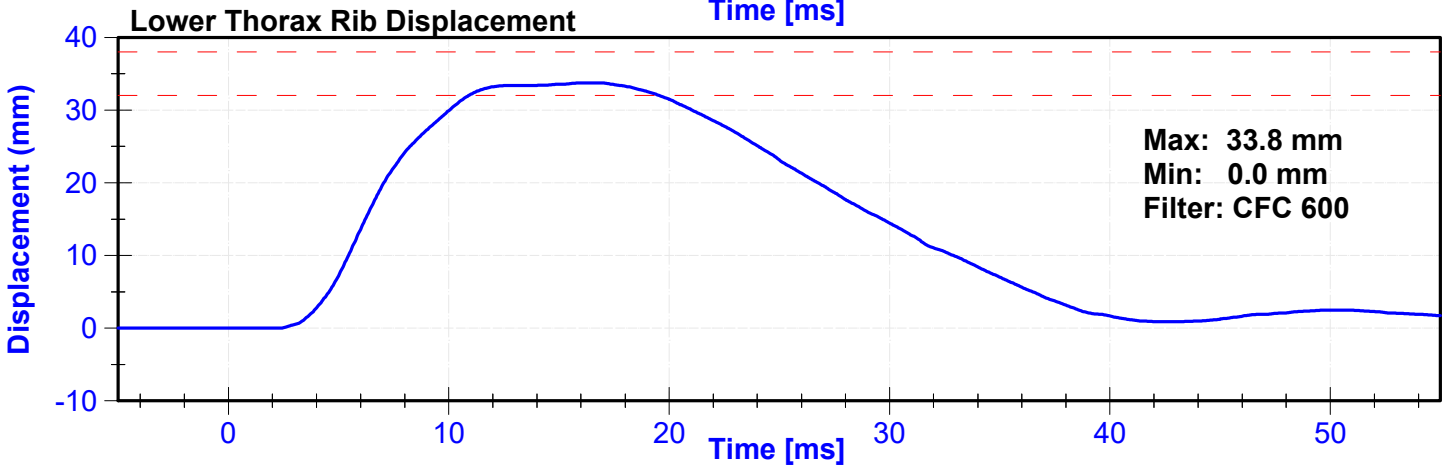
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Upper Spine T1 Y Accelerometer	Endevco	P64148	5/6/2024	11/2/2024
Upper Spine T12 Y Accelerometer	Endevco	P51327	5/6/2024	11/2/2024
Shoulder Potentiometer	Servo	1274GFE	5/6/2024	11/4/2024
Upper Thorax Rib Potentiometer	Servo	1199GFE	5/6/2024	11/4/2024
Middle Thorax Rib Potentiometer	Servo	1246GFE	5/6/2024	11/4/2024
Lower Thorax Rib Potentiometer	Servo	011GFE	5/6/2024	11/4/2024

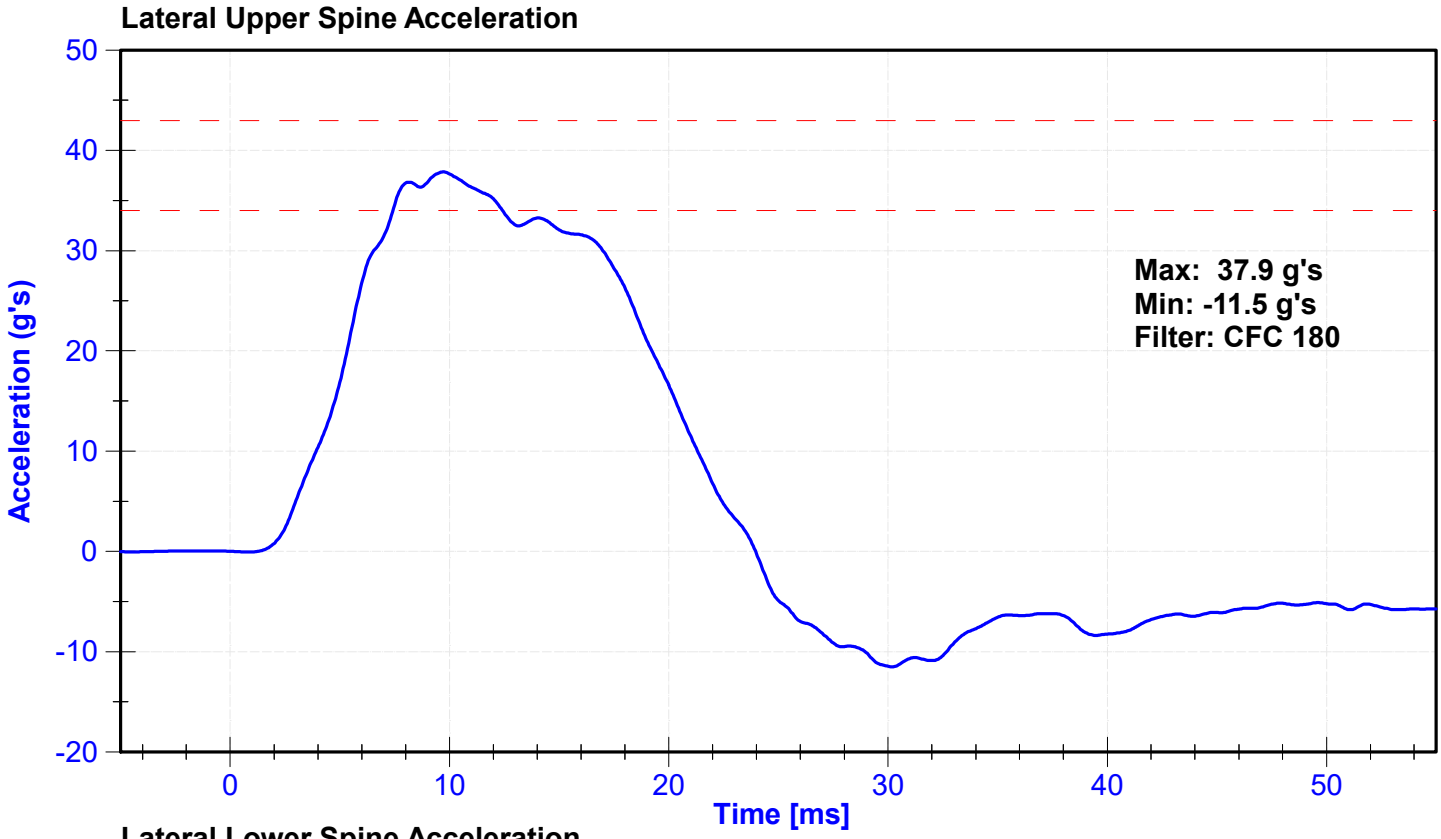


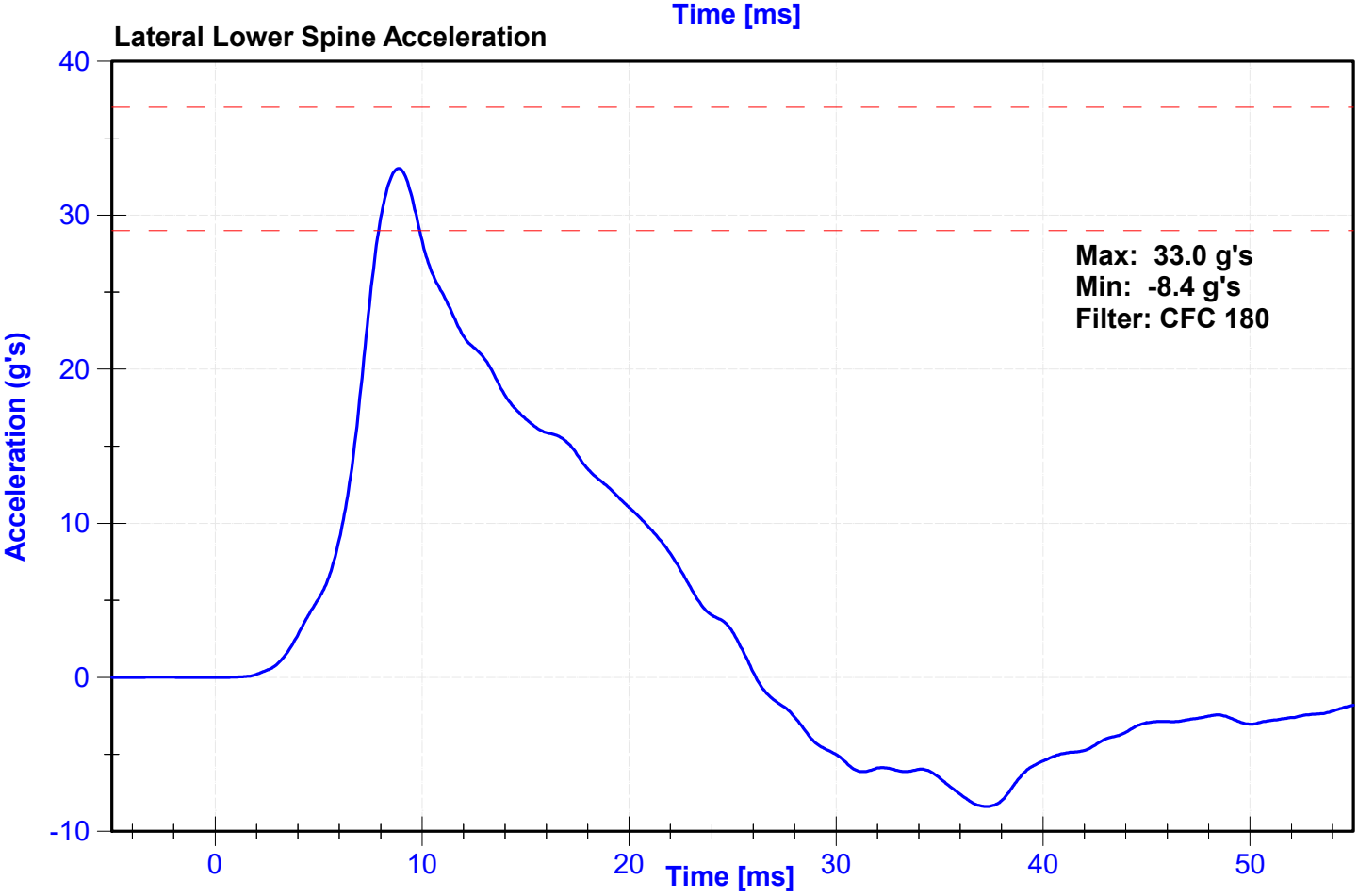

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 31.9 mm
Min: -0.8 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.3 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: 33.8 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 37.9 g's
Min: -11.5 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 33.0 g's
Min: -8.4 g's
Filter: CFC 180

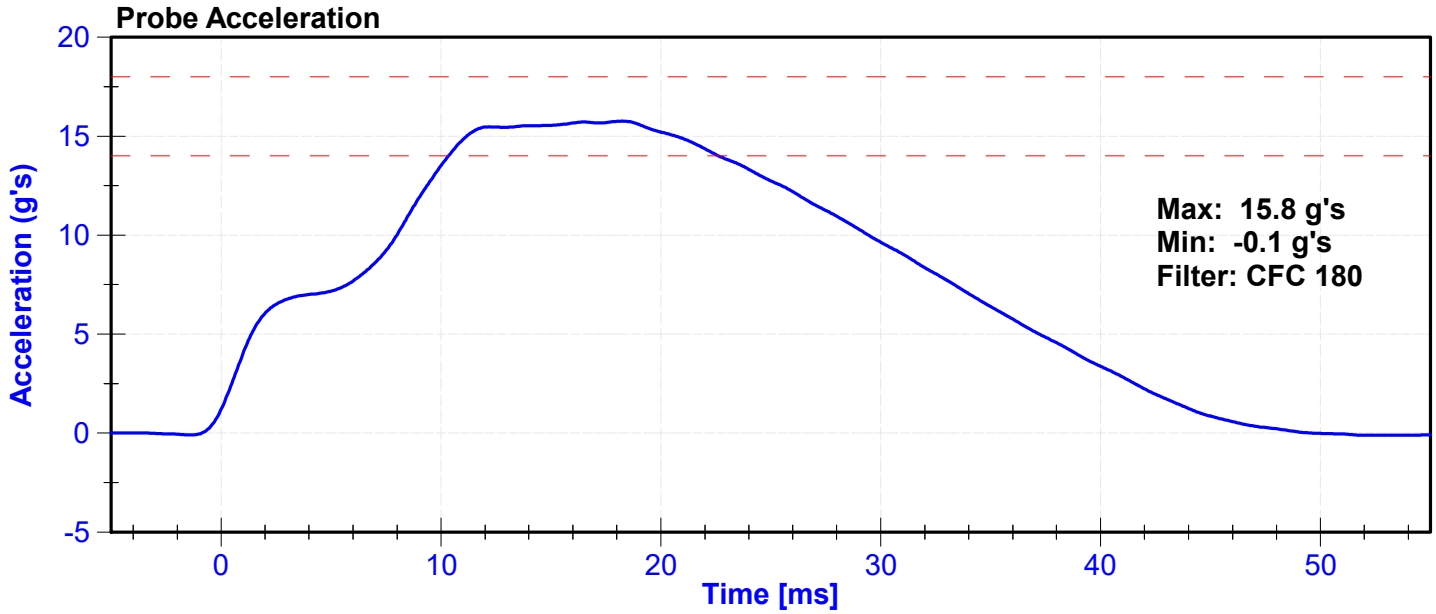
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

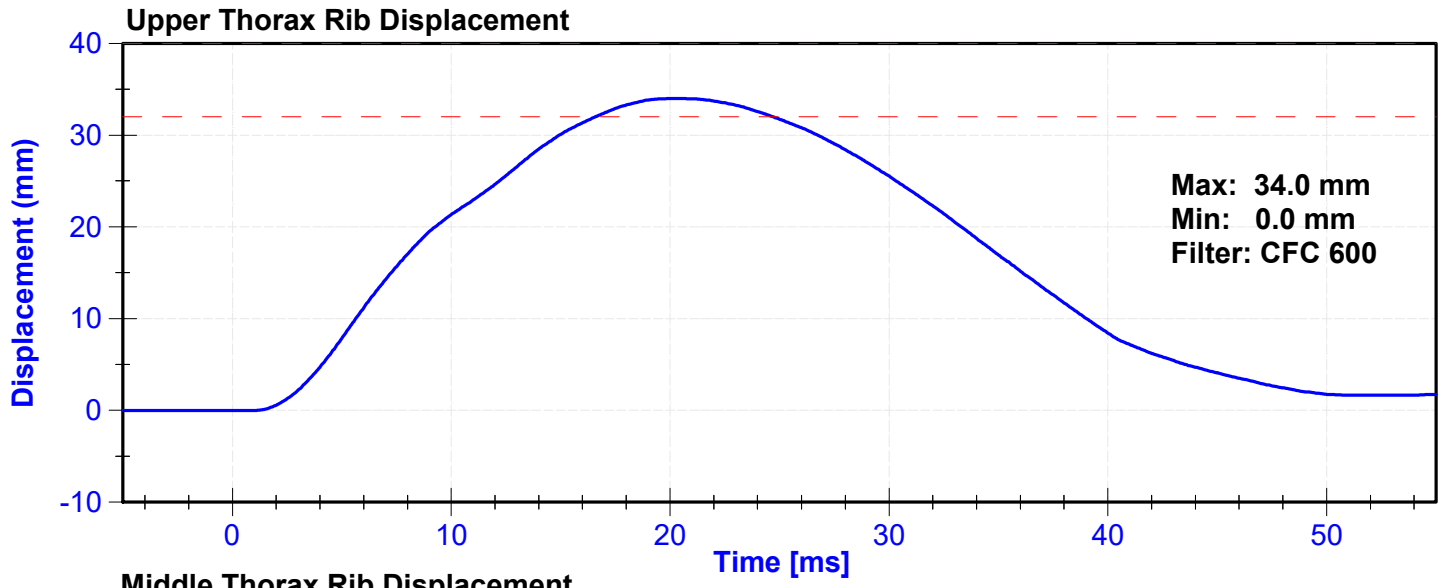
Results

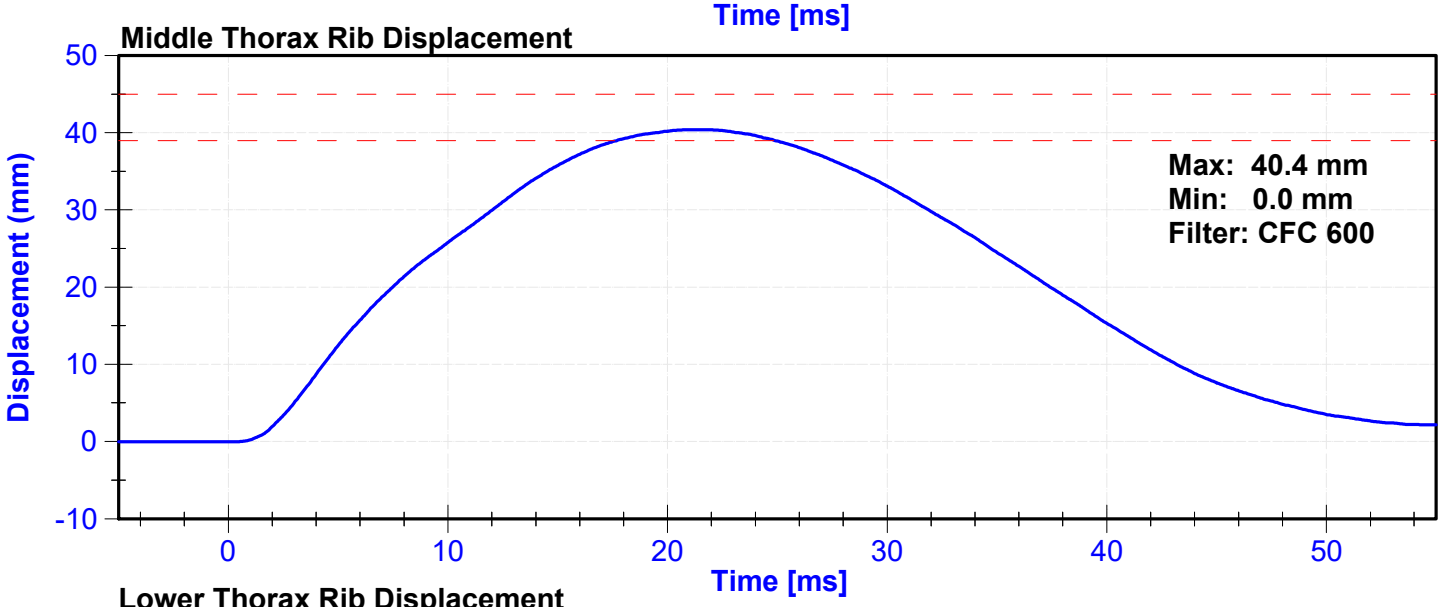
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	54	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	14	18	g's	15.8	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.3	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.0	Pass
Upper Thorax Rib Deflection	32	40	mm	34.0	Pass
Middle Thorax Rib Deflection	39	45	mm	40.4	Pass
Lower Thorax Rib Deflection	35	43	mm	40.3	Pass

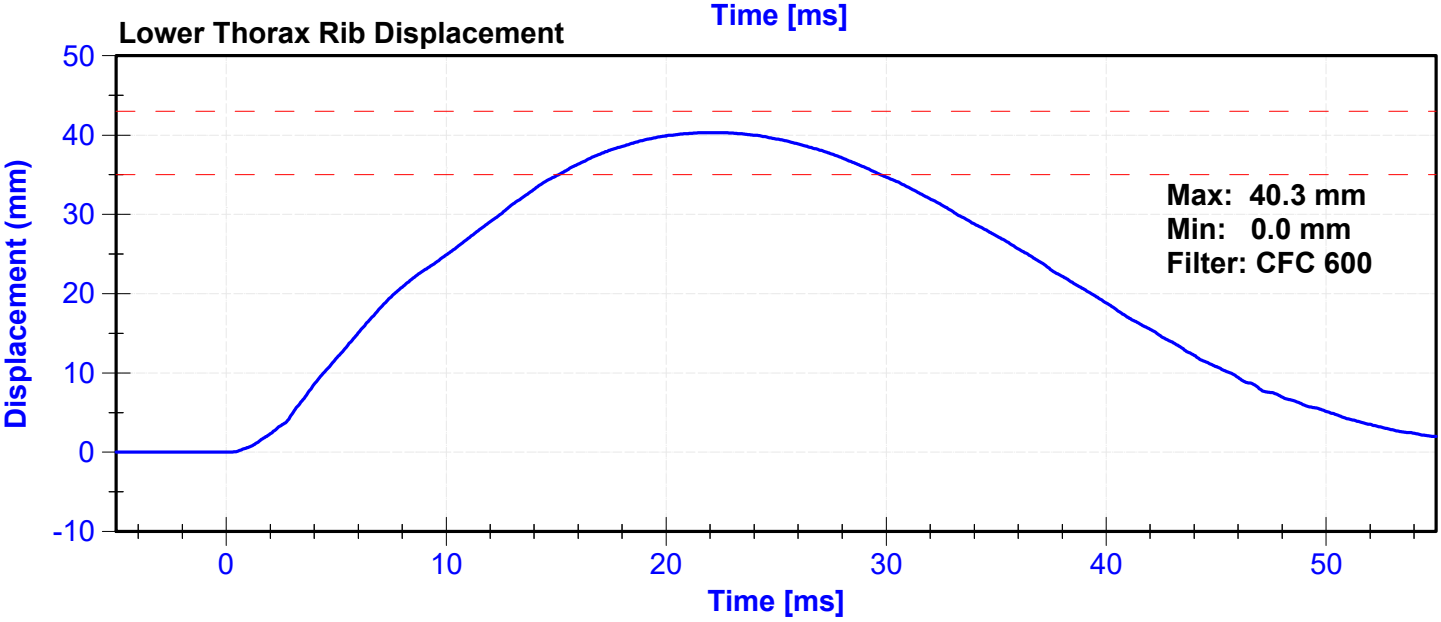
Transducer Calibrations

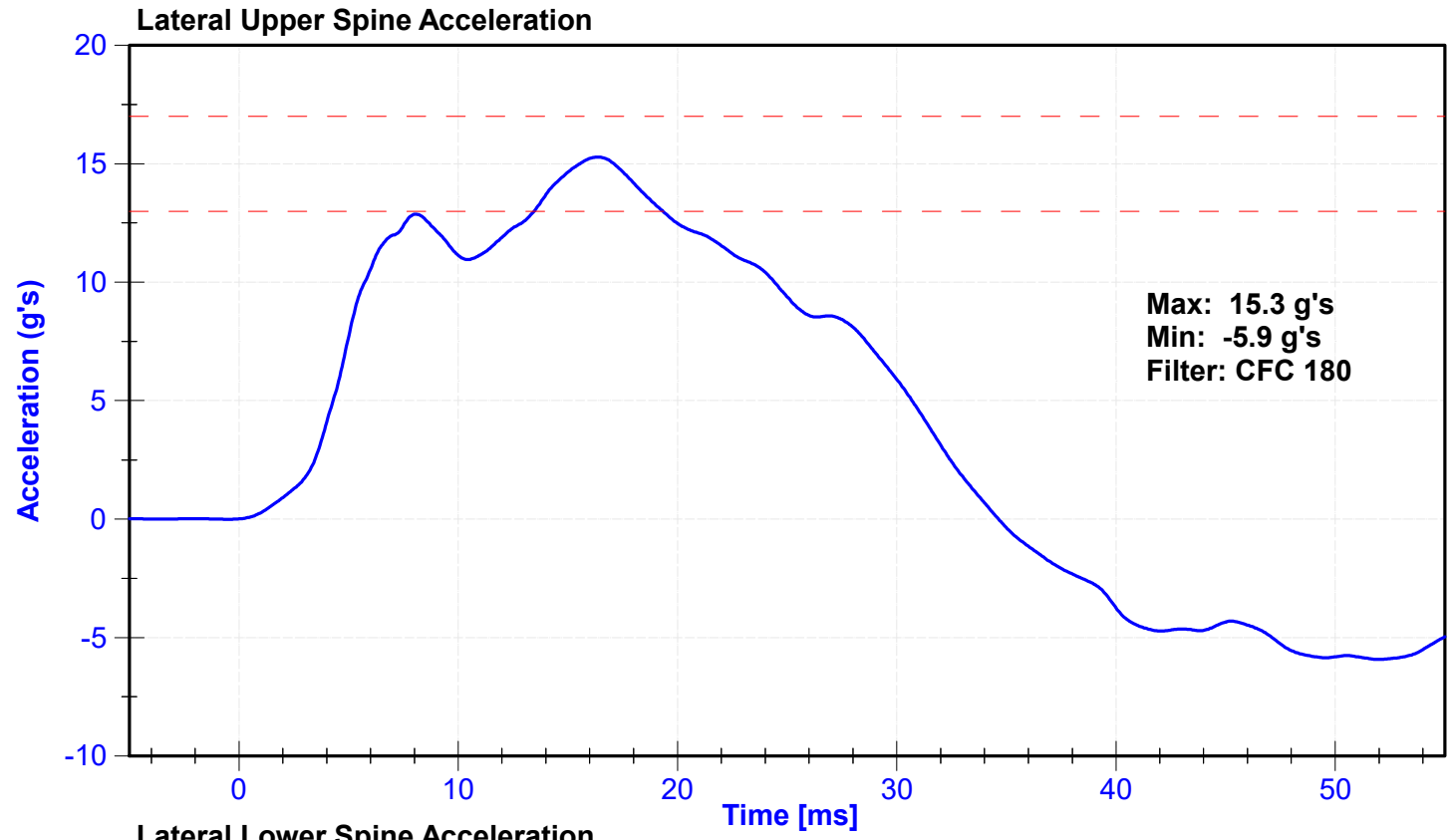
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Upper Spine Y Accelerometer	Endevco	P64148	5/6/2024	11/2/2024
Lower Spine Y Accelerometer	Endevco	P51327	5/6/2024	11/2/2024
Upper Thorax Rib Potentiometer	Servo	1199GFE	5/6/2024	11/4/2024
Middle Thorax Rib Potentiometer	Servo	1246GFE	5/6/2024	11/4/2024
Lower Thorax Rib Potentiometer	Servo	011GFE	5/6/2024	11/4/2024

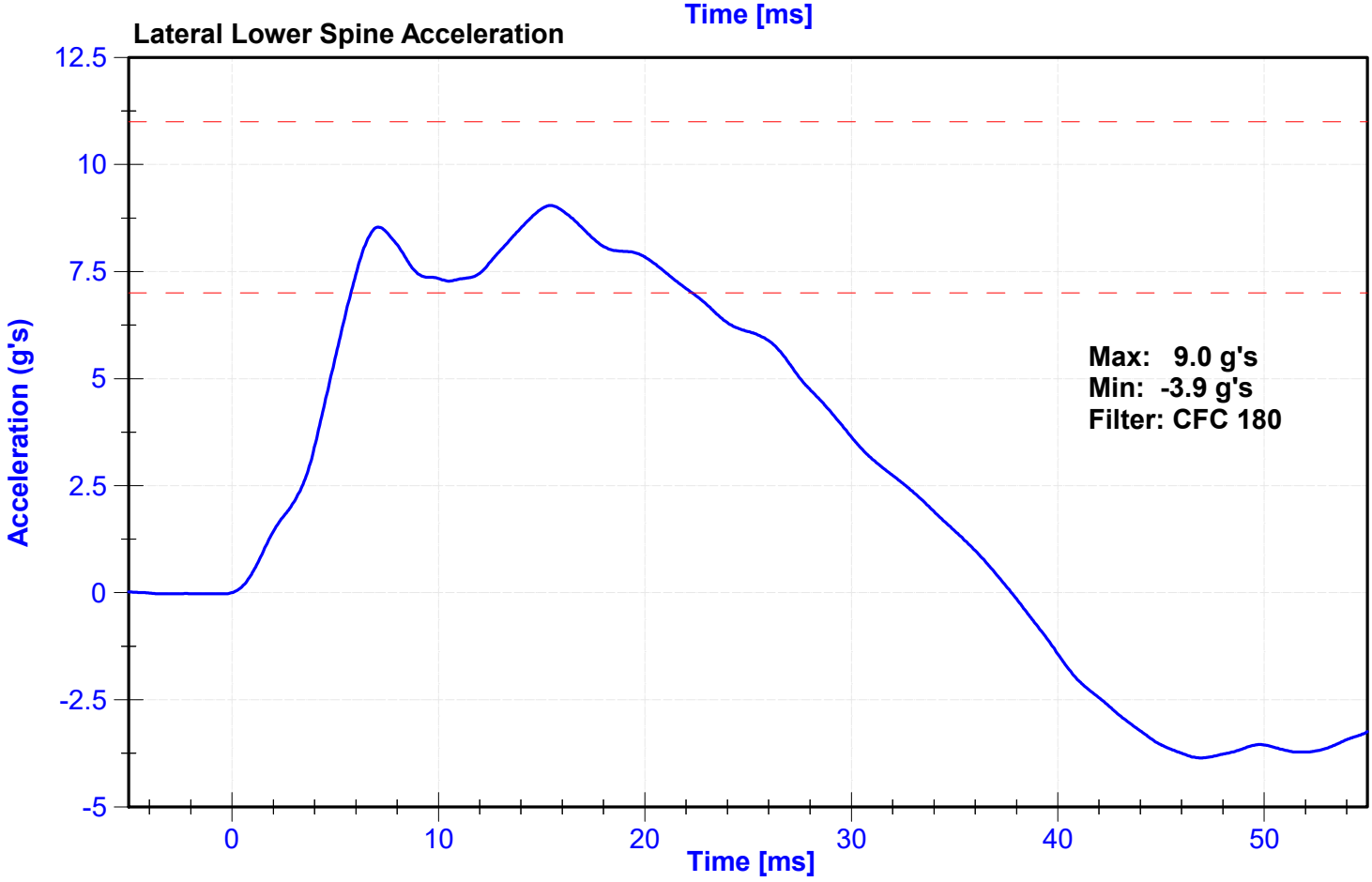



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.0 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.4 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.3 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 15.3 g's
Min: -5.9 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.0 g's
Min: -3.9 g's
Filter: CFC 180

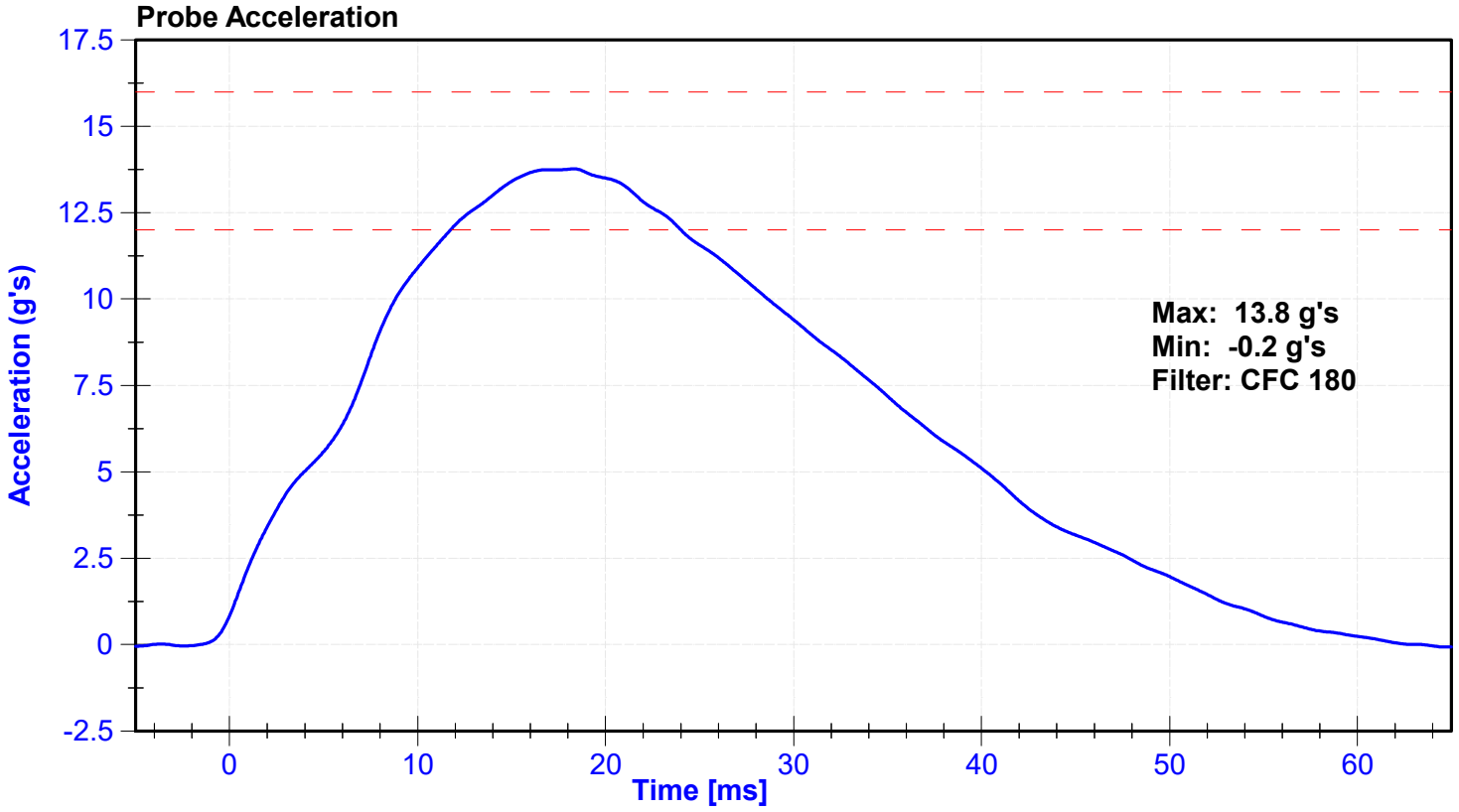
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

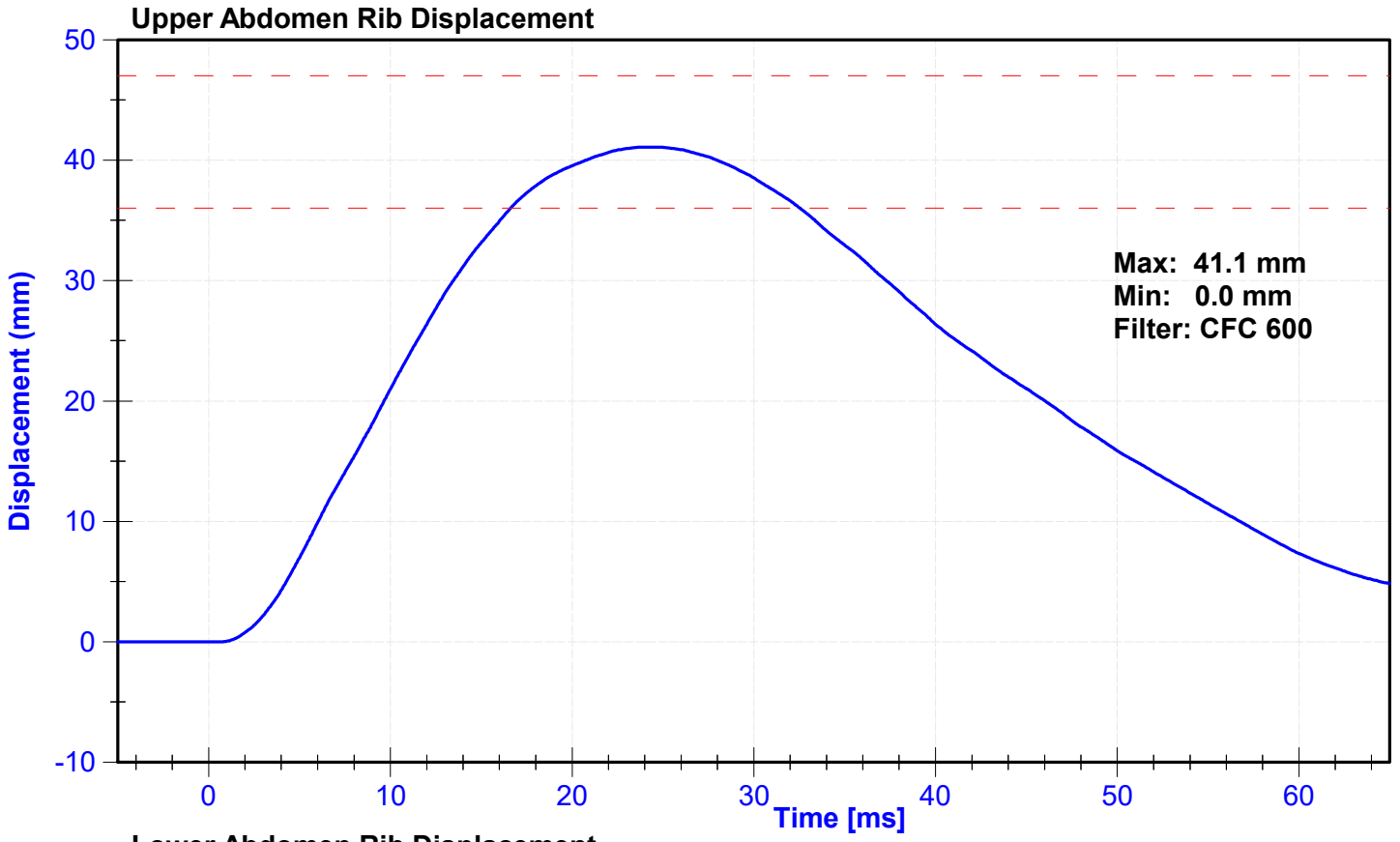
Results

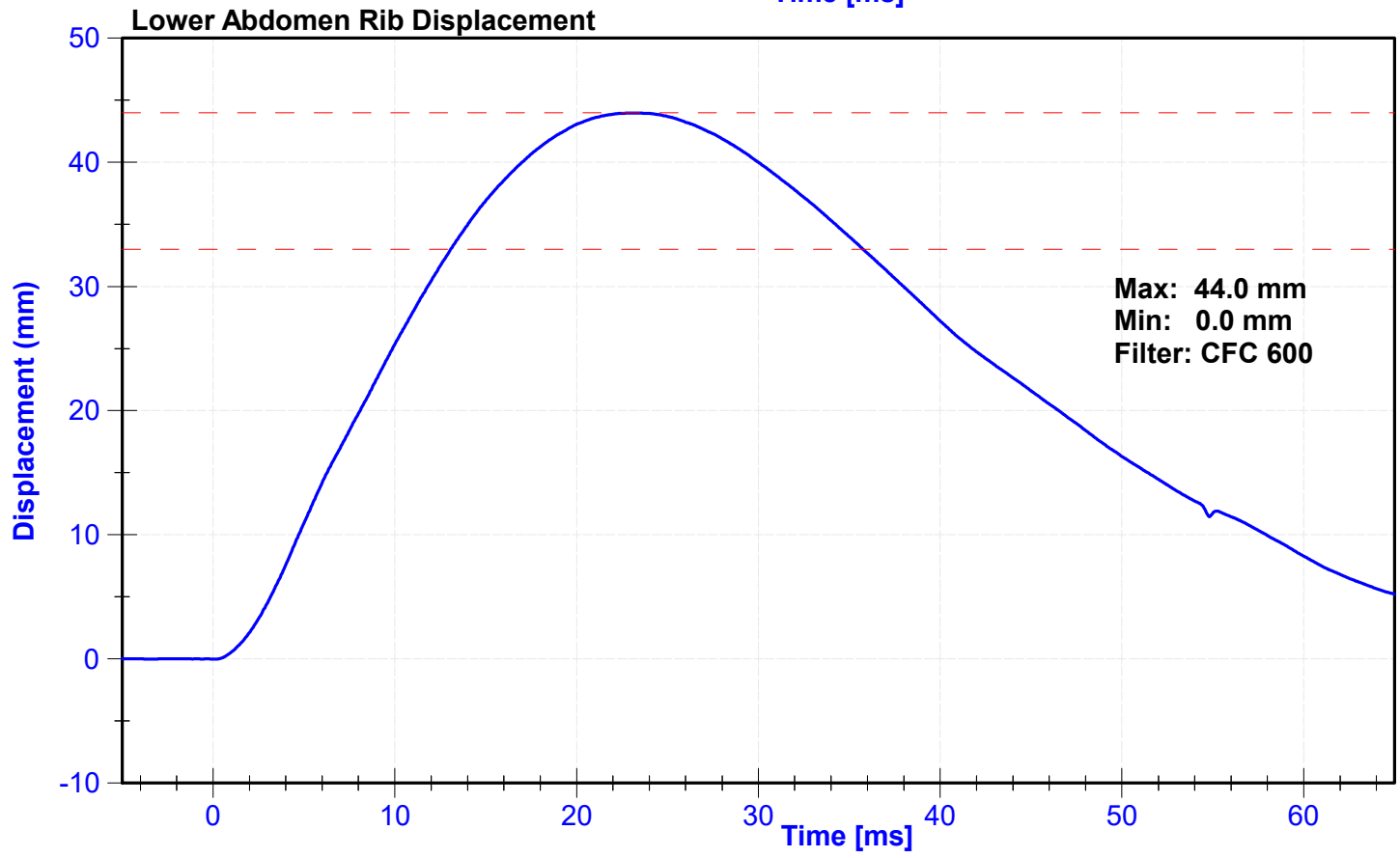
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	54	Pass
Velocity	4.2	4.4	m/s	4.24	Pass
Probe Acceleration	12	16	g's	13.8	Pass
Lateral Lower Spine Acceleration	9	14	g's	9.7	Pass
Upper Abdomen Rib Deflection	36	47	mm	41.1	Pass
Lower Abdomen Rib Deflection	33	44	mm	44.0	Pass

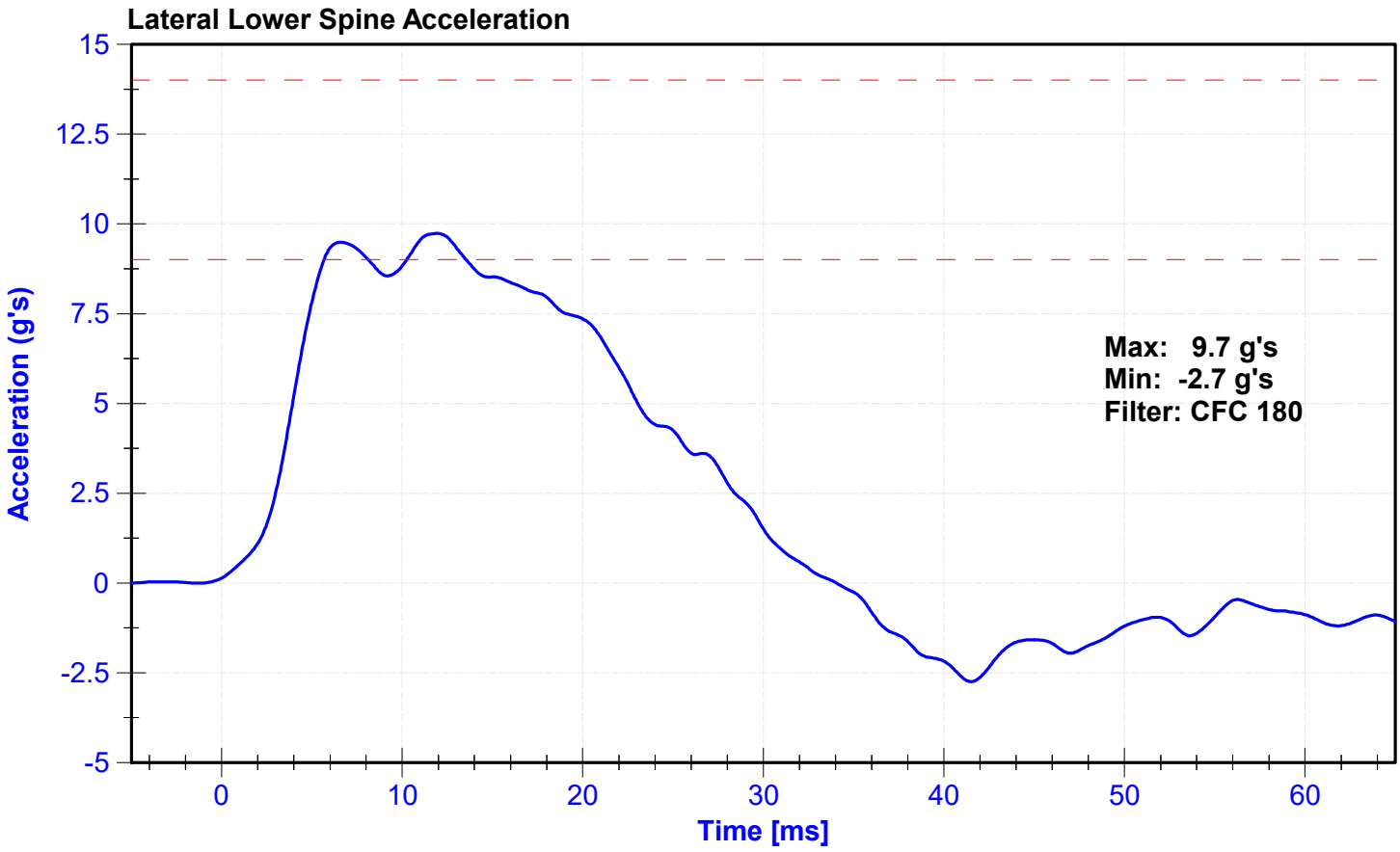
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Lower Spine Y Accelerometer	Endevco	P51327	5/6/2024	11/2/2024
Upper Abdomen Rib Potentiometer	Servo	008GFE	5/6/2024	11/4/2024
Lower Abdomen Rib Potentiometer	Servo	046GFE	5/6/2024	11/4/2024




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.1 mm
Min: 0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 44.0 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
-5
0
10
20
30
40
50
60
Time [ms]
Max: 9.7 g's
Min: -2.7 g's
Filter: CFC 180

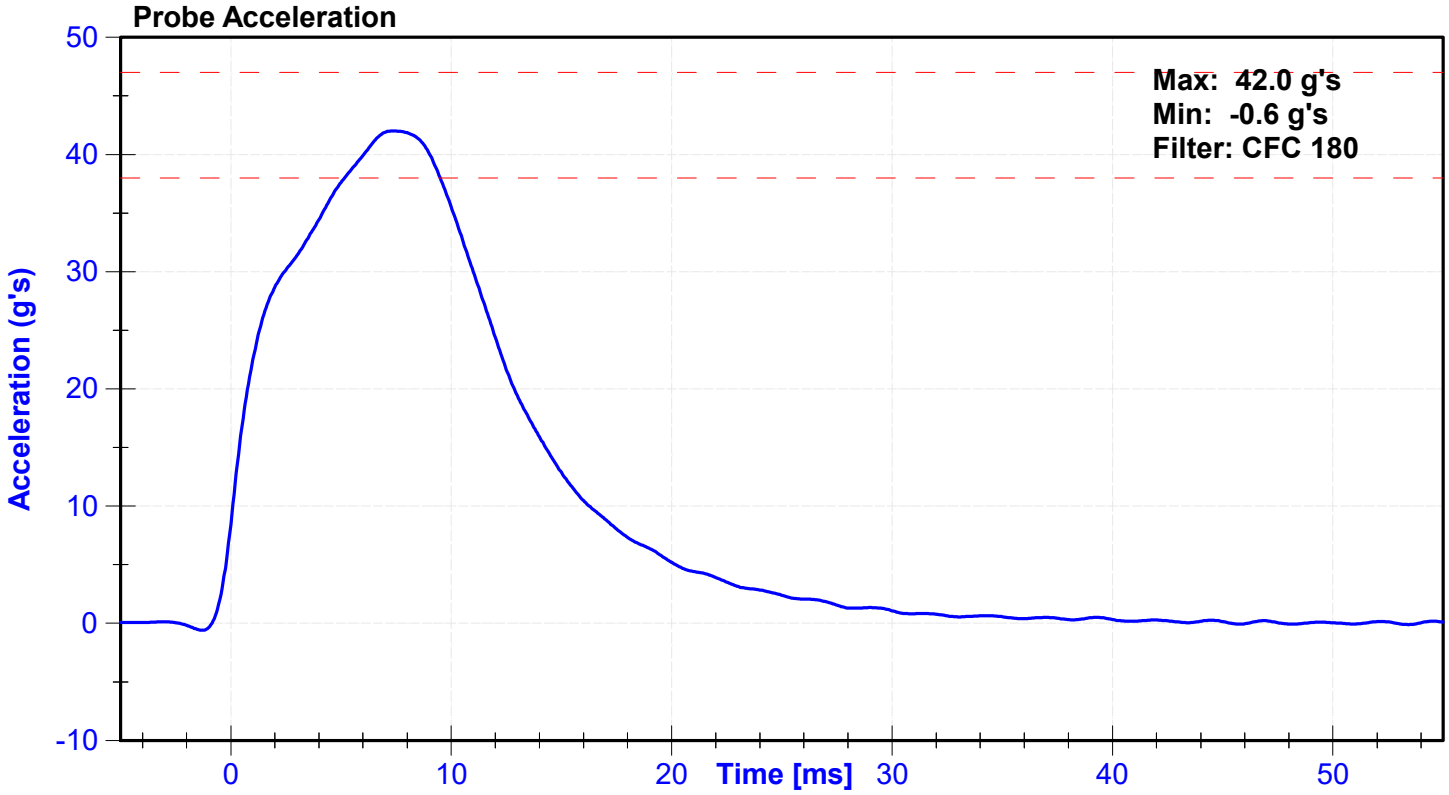
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

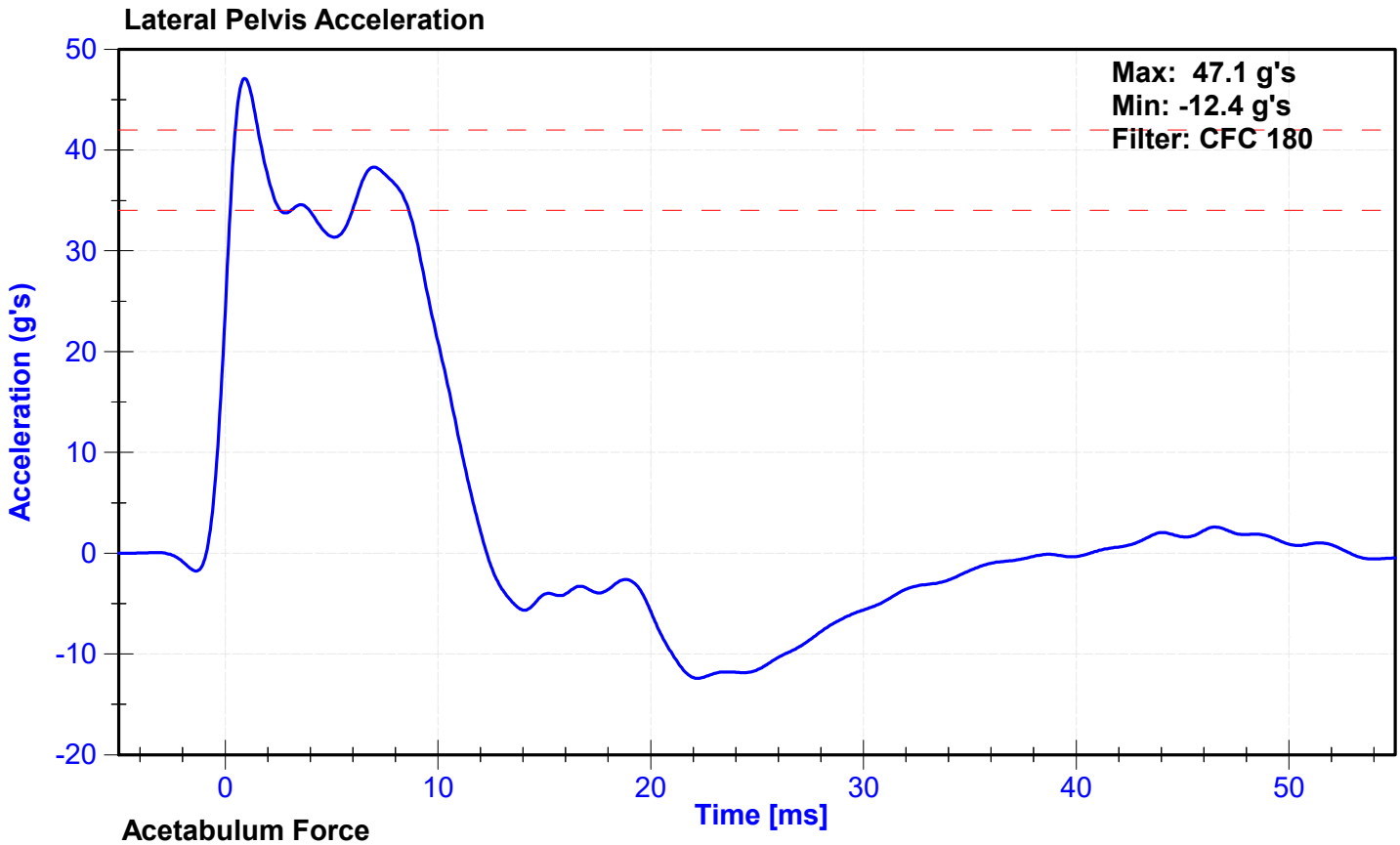
Results

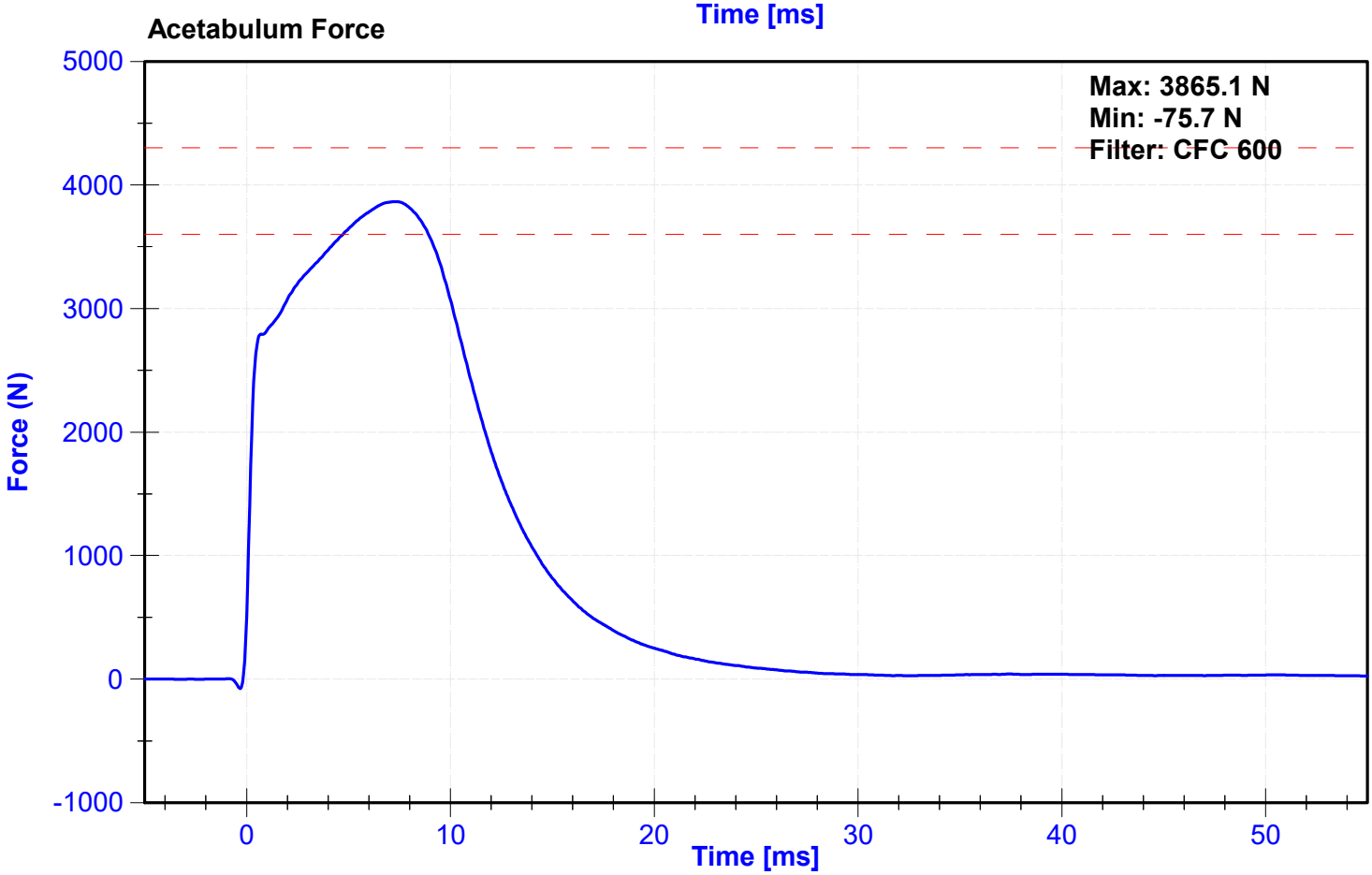
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	54	Pass
Velocity	6.6	6.8	m/s	6.65	Pass
Probe Acceleration	38	47	g's	42.0	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	38.3	Pass
Acetabulum Force	3600	4300	N	3865.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Pelvis Y Accelerometer	Endevco	P50078	5/6/2024	11/2/2024
Acetabulum Load Cell	Denton	270-FY	9/11/2023	9/10/2024
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 47.1 g's
Min: -12.4 g's
Filter: CFC 180
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 3865.1 N
Min: -75.7 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

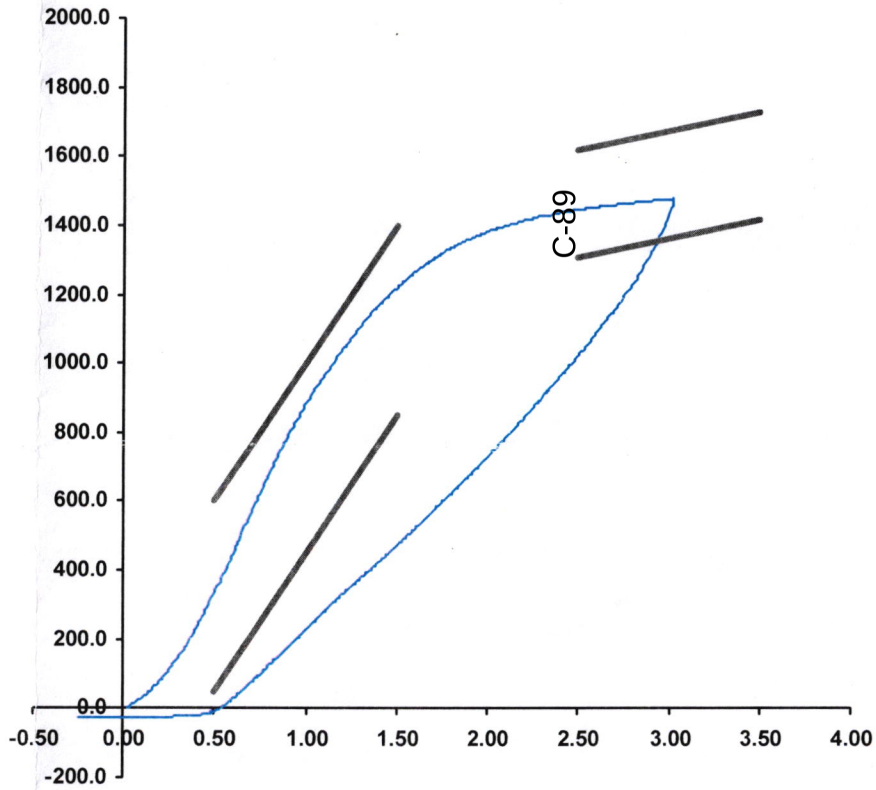
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16440
Test Number 23009
Report Number 23067
Test Date 5/23/2022 11:37:17 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	335	50	600
Force @ 1.5 mm (N)	1,221	850	1,400
Force @ 2.5 mm (N)	1,445	1,306	1,618
Force @ 3.0 mm (N)	1,476	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:
Cert Plug 05/30/2024 DG8012

Operator

Part Number 180-4450

Template No 107 23-May-22
SACO Research

By : DC Date : 5/23/2022

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

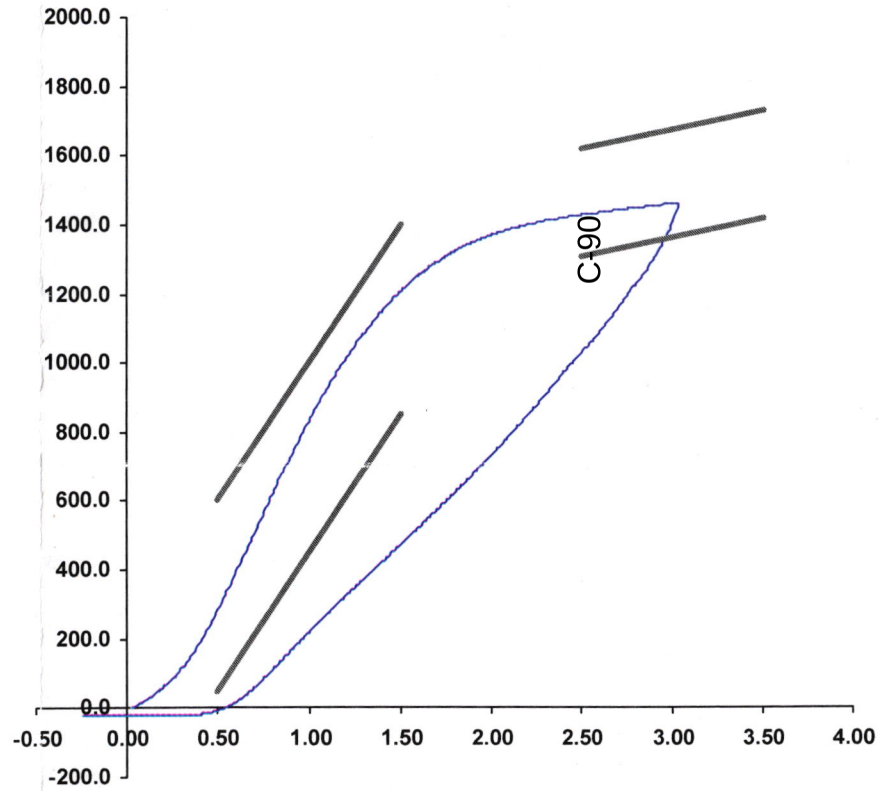
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13807
Test Number 13241
Report Number 13286
Test Date 5/8/2020 11:46:54 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	292.98	50.00	600.00
Force @ 1.5 mm (N)	1,205.74	850.00	1,400.00
Force @ 2.5 mm (N)	1,426.36	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,456.47	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:
Impact Plug DG8012 08/30/2024

Operator

Part Number 180-4450

Template No 107 08-May-20
SACO Research

By : DC Date : 5/8/2020

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

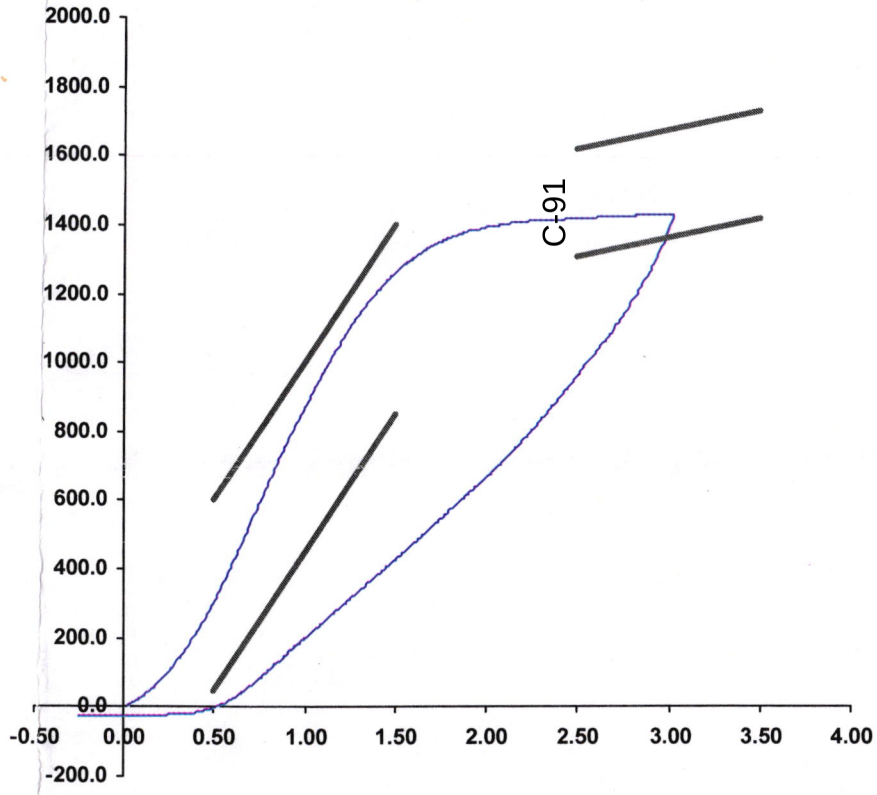
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 14200
Test Number 14340
Report Number 14384
Test Date 7/3/2020 8:39:36 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	307.70	50.00	600.00
Force @ 1.5 mm (N)	1,263.15	850.00	1,400.00
Force @ 2.5 mm (N)	1,416.54	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,430.49	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 Rat 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:
NON IMPACT DG8012 08/30/2024

Operator

Part Number 180-4450

Template No 107 03-Jul-20
SACO Research

By : DC Date : 7/3/2020

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

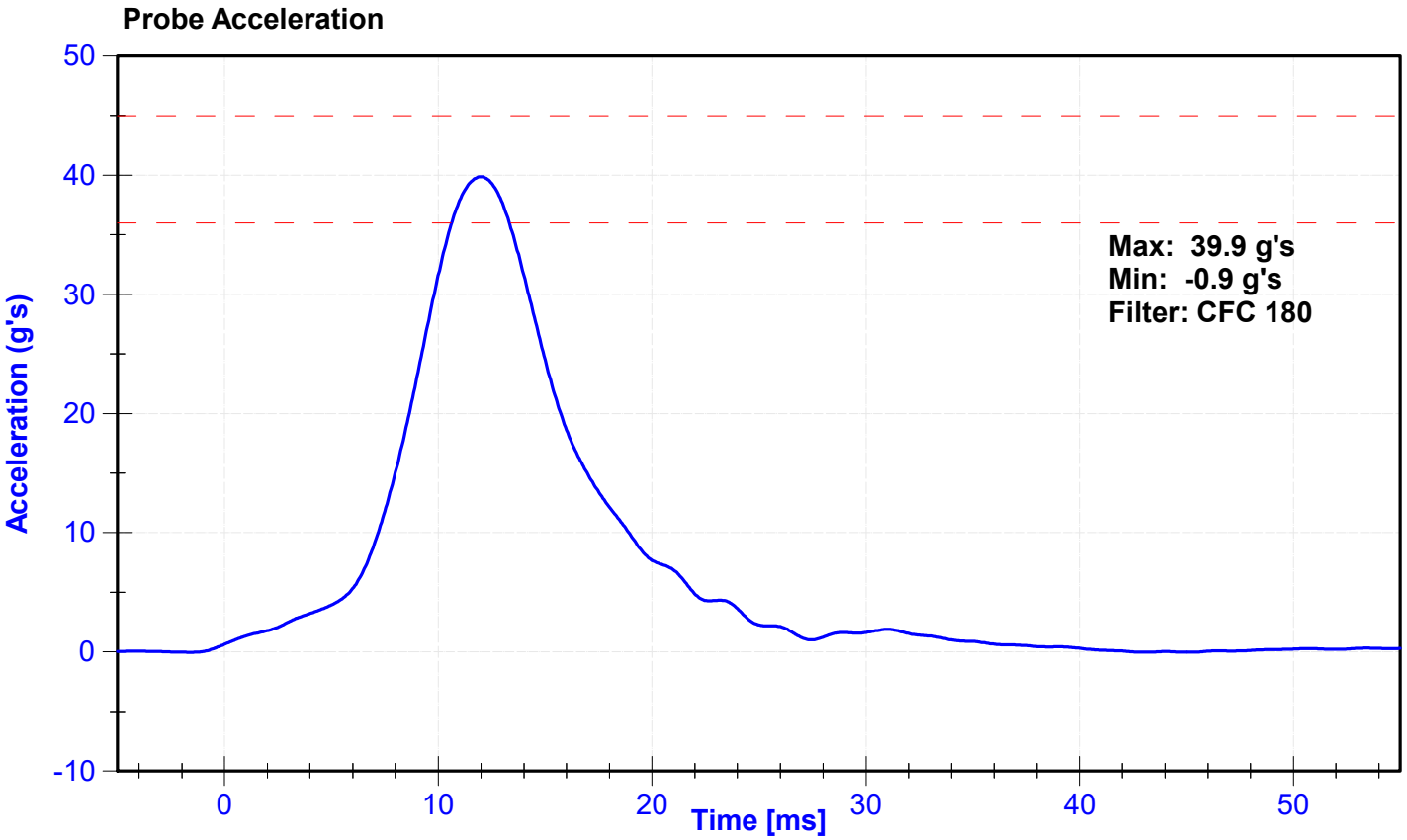
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

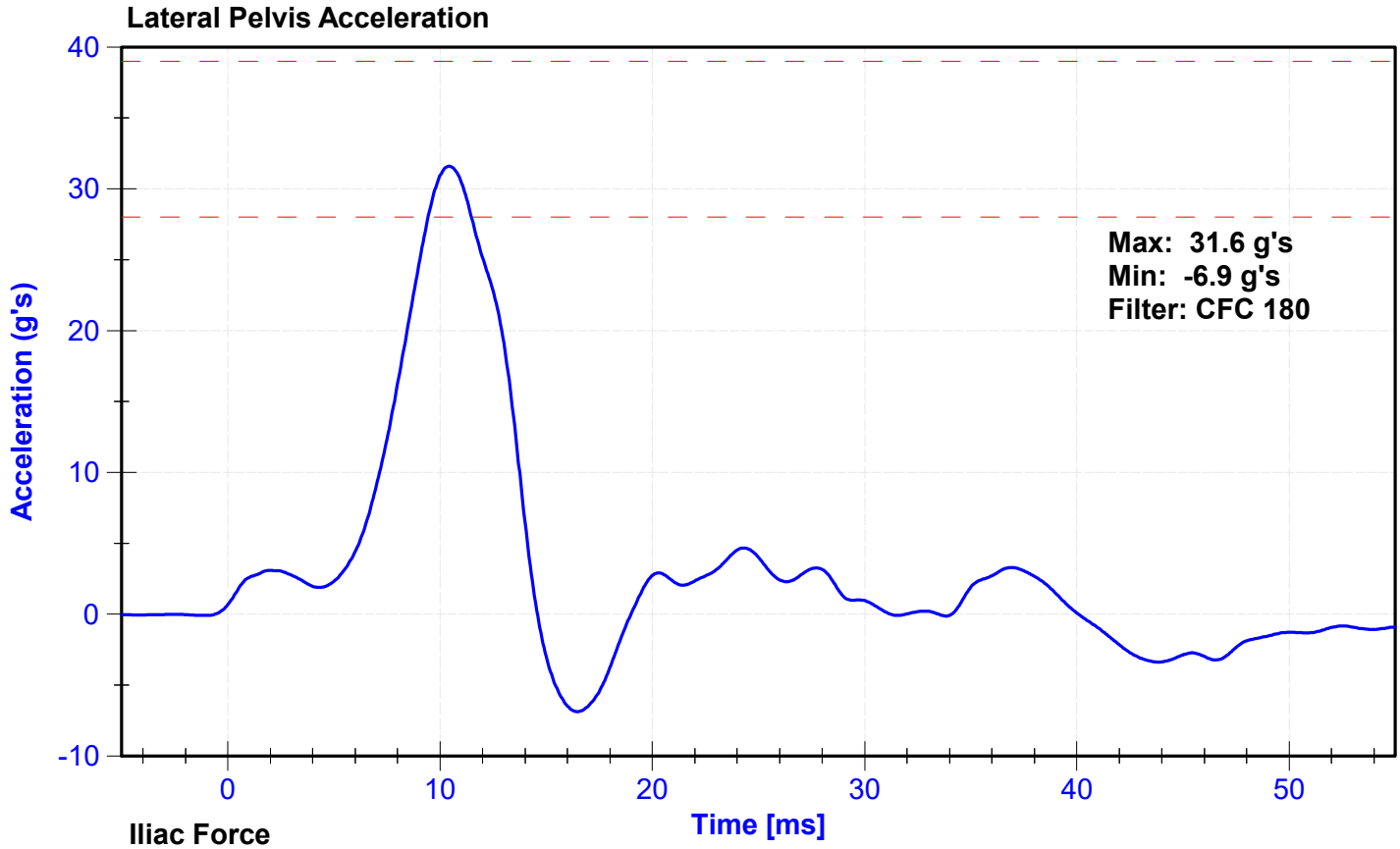
Results

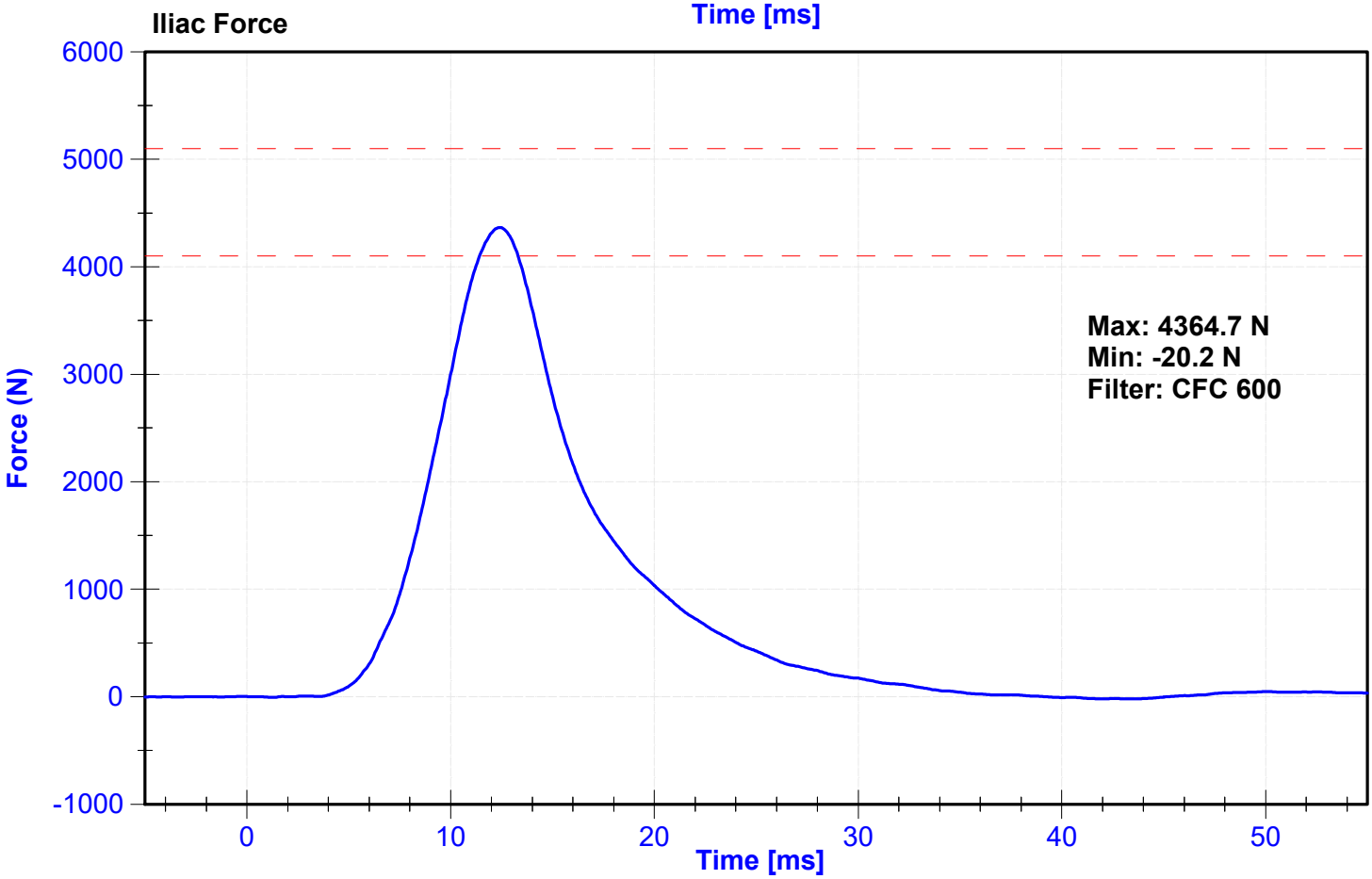
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	54	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	36	45	g's	39.9	Pass
Lateral Pelvis Acceleration	28	39	g's	31.6	Pass
Iliac Force	4100	5100	N	4364.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Pelvis Y Accelerometer	Endevco	P50078	5/6/2024	11/2/2024
Iliac Load Cell	Denton	280-FY	9/11/2023	9/10/2024




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 31.6 g's
Min: -6.9 g's
Filter: CFC 180


Iliac Force
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]
Max: 4364.7 N
Min: -20.2 N
Filter: CFC 600

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	P63861	Endevco	05/06/2024
		Y	P49216	Endevco	05/06/2024
		Z	P51303	Endevco	05/06/2024
	Redundant	X	P58868	Endevco	05/06/2024
		Y	P59020	Endevco	05/06/2024
		Z	P52132	Endevco	05/06/2024
Thorax Rib Displacement Potentiometers	Upper	Y	179GFE	Honeywell	05/06/2024
	Middle	Y	185GFE	Honeywell	05/06/2024
	Lower	Y	178GFE	Honeywell	05/06/2024
Abdomen Load Cells	Forward	Y	1509	Denton	09/12/2023
	Middle	Y	1508	Denton	09/12/2023
	Rear	Y	1507	Denton	09/12/2023
Lower Spine Accelerometers (T12)		X	P35790	Endevco	05/06/2024
		Y	T31029	Endevco	05/06/2024
		Z	P52033	Endevco	05/06/2024
Pubic Symphysis Load Cell		Y	458-FY	Denton	12/05/2023

TABLE 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N __DG8012__		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers		Primary	X	T21184	Endevco	05/06/2024
			Y	P51668	Endevco	05/06/2024
			Z	P83319	Endevco	05/06/2024
		Redundant	X	T21354	Endevco	05/06/2024
			Y	P52155	Endevco	05/06/2024
			Z	P83322	Endevco	05/06/2024
Displacement Potentiometers	Thoracic Rib	Upper	Y	1199GFE	Servo	05/06/2024
		Middle	Y	1246GFE	Servo	05/06/2024
		Lower	Y	011GFE	Servo	05/06/2024
	Abdominal Rib	Upper	Y	008GFE	Servo	05/06/2024
		Lower	Y	046GFE	Servo	05/06/2024
Lower Spine Accelerometers (T12)			X	P71272	Endevco	05/06/2024
			Y	P51327	Endevco	05/06/2024
			Z	P52067	Endevco	05/06/2024
Acetabulum Load Cell			Y	270-FY	Denton	09/11/2023
Iliac Wing Load Cell			Y	280-FY	Denton	09/11/2023
Pelvis Plug (struck side)				16382	SACO	05/20/2022
Pelvis Plug (non-struck side)				14233	SACO	07/03/2020

TABLE 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	G24042	Endevco	07/26/2024
	Vehicle Center of Gravity	Y	G24043	Endevco	07/26/2024
	Vehicle Center of Gravity	Z	G24047	Endevco	07/26/2024
2	Right Sill at Front Seat	X	G25247	Endevco	03/04/2024
	Right Sill at Front Seat	Y	G25265	Endevco	03/04/2024
	Right Sill at Front Seat	Z	G25268	Endevco	03/04/2024
3	Right Sill at Rear Seat	X	A400757	Measurement Specialties	05/01/2024
	Right Sill at Rear Seat	Y	A400762	Measurement Specialties	05/01/2024
	Right Sill at Rear Seat	Z	G22665	Endevco	05/01/2024
4	Left Sill at Front Door	Y	A399981	Measurement Specialties	08/01/2024
5	Left Sill at Rear Door	Y	G22600	Endevco	04/24/2024
6	Left A-Post Lower	Y	G22717	Endevco	03/20/2024
7	Left A-Post Middle	Y	A282707	Measurement Specialties	06/13/2024
8	Left B-Post Lower	Y	A431217	Measurement Specialties	05/03/2024
9	Left B-Post Middle	Y	A431373	Measurement Specialties	05/03/2024
10	Front Seat Track	Y	G22911	Endevco	05/03/2024
11	Rear Seat Track or Structure	Y	A373203	Measurement Specialties	05/02/2024
12	Right Rear Occ. Compartment	Y	A335437	Measurement Specialties	04/29/2024
13	Engine Block	X	A315958	Measurement Specialties	07/30/2024
	Engine Block	Y	A373233	Measurement Specialties	07/30/2024
14	Rear Floorpan Above Axle	X	G23680	Endevco	07/26/2024
	Rear Floorpan Above Axle	Y	G24049	Endevco	07/26/2024
	Rear Floorpan Above Axle	Z	G24211	Endevco	07/26/2024

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	A374299	Measurement Specialties	08/01/2024
MDB Center of Gravity	Y	A399983	Measurement Specialties	08/01/2024
MDB Center of Gravity	Z	G23881	Endevco	08/01/2024
Left Frame at Rear Axle Centerline	X	A372851	Measurement Specialties	08/01/2024
Left Frame at Rear Axle Centerline	Y	A413581	Measurement Specialties	08/01/2024