REPORT NUMBER: SPNCAP-CAL-23-004

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

KIA Corporation
2023 KIA Sportage Hybrid
5 Door SUV

NHTSA No: M20234208

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

January 16, 2024

FINAL REPORT

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

This final test report was prepared for the U.S. Department of Transportation, National Highway Traffic Safety Administration, in response to Contract Number 693JJ920D000016.

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof.

If trade or manufacturers' names or products are mentioned it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared by: _____ Date: January 16, 2024
Quinn Porzio, Test Engineer

Approved by: _____ Date: January 16, 2024
Matthew Pronko, Test Engineer

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. *Report No.* SPNCAP-CAL-23-004	***2. Government Accession No.***	***3. Recipient's Catalog No.***
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing & FMVSS 305 Indicant Testing of a 2023 KIA Sportage Hybrid 5 Door SUV NHTSA No.: M20234208		***5. Report Date*** January 16, 2024 ***6. Performing Organization Code*** CAL
7. Author(s) Quinn Porzio, Test Engineer Matthew Pronko, Test Engineer		***8. Performing Organization Report No.*** CAL-DOT-2023-004
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
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NRM-110) 1200 New Jersey Ave., SE Washington, D.C. 20590		***13. Type of Report and Period Covered:*** Final Test Report February 15, 2023 - January 16, 2024 ***14. Sponsoring Agency Code*** NRM-110

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 2023 KIA Sportage Hybrid 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 February 15, 2023.

The impact velocity of the Moving Deformable Barrier (MDB) was 61.98 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 208 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	64.323
Maximum Thorax Rib Deflection	mm	44	21.840
Total Abdominal Force	N	2500	1060.370
Pubic Symphysis Force	N	6000	1155.624
Lower Spine (T12) Resultant Acceleration	G	82*	29.079

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	118.084
Maximum Thorax Rib Deflection	mm	38*	9.955
Lower Spine (T12) Resultant Acceleration	G	82	48.424
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2531.778
Maximum Abdominal Rib Deflection	mm	45*	39.162

**Proposed IARV*

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

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

19. Security Class. (of this report)	***20. Security Class. (of this page)***	***21. No. of Pages***	***22. Price***
UNCLASSIFIED	UNCLASSIFIED	222	

TABLE OF CONTENTS

Section		Page
1	Test Purpose and Procedure	1-1
2	Summary of Test Results	2-1
3	Occupant and Vehicle Information	3-1

Data Sheet		Page
1	General Test and Vehicle Parameter Data	3-2
2	Seat, Seat Belt, Steering Wheel Adjustment and Fuel System Data	3-6
3	Dummy Longitudinal Clearance Dimensions	3-10
4	Dummy Lateral Clearance Dimensions	3-11
5	Camera and Instrumentation Data	3-12
6	Test Vehicle Accelerometer Location	3-13
7	MDB Accelerometer Locations	3-14
8	Post-Test Observations	3-15
9	MDB Summary Results	3-17
10	Test Vehicle Profile Measurements	3-18
11	Test Vehicle Exterior Crush Measurements	3-19
12	MDB Exterior Static Crush Measurements	3-22
13	Vehicle and MDB Damage Profile Distances	3-23
14	FMVSS No. 301 Static Rollover Results	3-24
15	Dummy / Vehicle Temperature and Humidity Stabilization Data	3-25
305-1	General Test and Vehicle Parameter Data for Indicant FMVSS No. 305 Testing	3-26
305-2	Pre-Impact Data for Indicant FMVSS No. 305 Testing	3-27
305-3	Pre-Impact Electrical Isolation Measurements and Calculations for Indicant FMVSS No. 305 Testing	3-28
305-4	Post-Impact Data for Indicant FMVSS No. 305 Testing	3-29
305-5	Static Rollover Test Data for Indicant FMVSS No. 305 Testing	3-30

Appendix		Page
A	Photographs	A-1
B	Vehicle and Dummy Response Data Plots	B-1
C	Dummy Configuration and Performance Verification Data	C-1
D	Test Equipment and Instrumentation Calibration Data	D-1

SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2023 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 2023 KIA Sportage Hybrid 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 2023 KIA Sportage Hybrid 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 61.98 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 February 15, 2023. Pre-test and post-test photographs of the test vehicle, the MDB and the dummies (ES-2re and SID-IIs) are included in this report.

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

The Dummies were instrumented in the following manner:

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

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

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

DUMMY INJURY VALUES

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	64.323
Maximum Thorax Rib Deflection	mm	44	21.840
Total Abdominal Force	N	2500	1060.370
Pubic Symphysis Force	N	6000	1155.624
Lower Spine (T12) Resultant Acceleration	G	82*	29.079

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	118.084
Maximum Thorax Rib Deflection	mm	38*	9.955
Lower Spine (T12) Resultant Acceleration	G	82	48.424
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2531.778
Maximum Abdominal Rib Deflection	mm	45*	39.162

*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	No	N/A		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 - Torso/Pelvis Airbag	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other	N/A	N/A	N/A	N/A

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 12.7 ms 23.4 ms
- Left B-Pillar Middle Y Acceleration,Exceeded calibration range and saturated at 11.9 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: 2023 KIA Sportage Hybrid 5 Door SUV
NHTSA No.: M20234208
Test Program: NCAP Side MDB Impact Test
Test Date: 02/15/2023

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20234208
Model Year	2023
Make	KIA
Model	Sportage
Body Style	SUV
VIN	KNDPU3AG6P7044652
Body Color	Gray
Odometer Reading (km/mi)	12 miles
Engine Displacement (L)	1.6
Type / No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6-Speed
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

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

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

DATA FROM CERTIFICATION LABEL

Manufactured By	KIA Corporation
Date of Manufacture	10/22
Vehicle Type	MPV

GVWR	2155
GVWR Front	1260
GVWR Rear	1200

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	3	N/A	5	
Vehicle Capacity Weight (VCW) (kg)				420	(A)
DSC x 68.04 kg				340.2	(B)
Cargo Weight (RCLW) (kg)				79.8	(A-B)

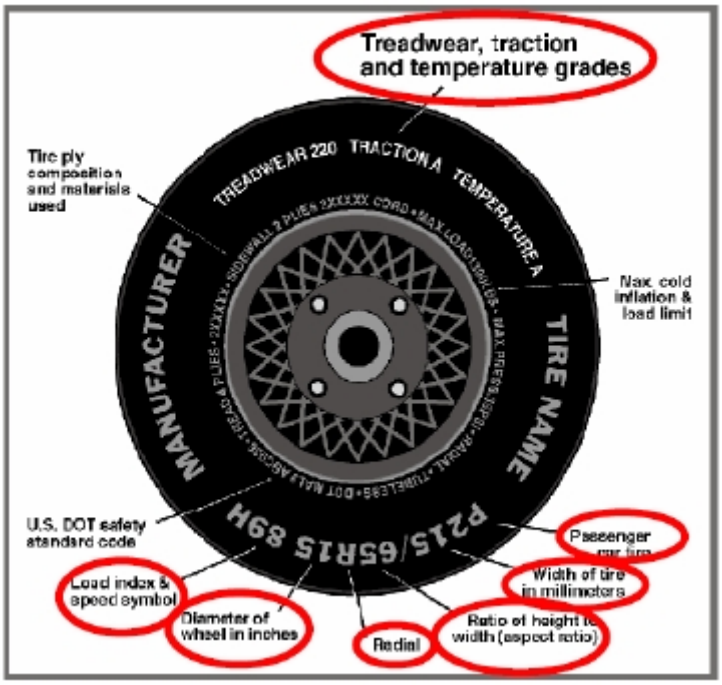
VEHICLE SEAT TYPE

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	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023

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)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	235/65R17	235/65R17
Tire Size on Vehicle	235/65R17	235/65R17
Tire Manufacturer	Hankook	Hankook
Tire Model	Dynapro HP2	Dynapro HP2
Treadwear	540	540
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester	2 Steel, 2 Polyester
Load Index / Speed Symbol	104H	104H
Tire Material	Rubber	Rubber
DOT Safety Code Left	15M8RBUHA3722	15M8RBUHA3722
DOT Safety Code Right	15M8RBUHA3722	15M8RBUHA3722

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

Test Vehicle: 2023 KIA Sportage Hybrid 5 Door SUV | NHTSA No.: M20234208
Test Program: NCAP Side MDB Impact Test | Test Date: 02/15/2023

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	240	240	240	240
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	240	240

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	499	318		534	405		528	422	
Right	kg	488	316		514	367		511	369	
Ratio	%	60.9	39.1		57.6	42.4		56.8	43.2	
Totals	kg	987	634	1621	1048	772	1820	1039	791	1830

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1621	(A)
Sum of Actual Weight of 1 ES2re and 1 P572 ATD (SID-IIs)	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	79.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1827.8	(A+B+C)

Does the measured As Test Vehicle Weight lie within the required weight range

(i.e. Calculated Test Vehicle Target Weight – 4.5 kg to – 9 kg)? [X] **Yes** [ ] **No**

TEST VEHICLE ATTITUDES AND CG

Measurement Description	Units	Fully Loaded	As Tested	Meets Rqmt***
LF	mm	839	835	Yes
RF	mm	844	836	Yes
RR	mm	855	854	Yes
LR	mm	846	849	Yes
Vehicle CG (Aft of Front Axle)	mm	1191	1169	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	31	26	

****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:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Truck Carpeting & Plastics	14
Air pump kit	1
Rear Tail Light	1.5
Ballast / Equipment Added	15

TEST SURFACE MARKINGS

	Distance from 63° Impact Location Line (mm)
Fore 25 mm target	910
Aft 25 mm target	908
Pre-Impact Angle Line	234

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:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023

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	15.6	12.3	13.95
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore / Aft	Forward-Most
Driver Seat	13.95	15	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	10	15	20
Front Passenger Seat	Fixed	Fixed	Max			
			Mid			
			Min			
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:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023

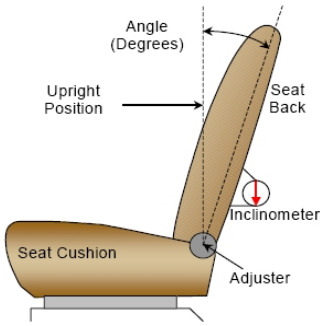
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detents*
Driver Seat	240	38 (0-37)	123	19
Front Passenger Seat	240	38 (0-37)	123	19
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

**if applicable*

SEAT BACK ANGLE ADJUSTMENT

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



FRONT SEAT ASSEMBLY

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/ Seated Dummy	60.1	30 (0-29)	10.5	5
Front Passenger Seat	60.0	30 (0-29)	10.5	5
Front Center Seat*				
Struck Side Rear Seat w/ Seated Dummy	28.7	15 (0-14)	3.2	1
Non-Struck Side Rear Seat	28.7	15 (0-14)	3.2	1
Rear Center Seat*	28.7	15 (0-14)	3.2	1

**if applicable*

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

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023

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

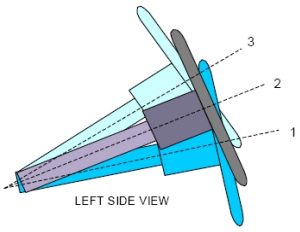
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

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	23.8	
Geometric center - Position No. 2	26.4	
Uppermost - Position No. 3	28.9	
Telescoping Steering Wheel Travel		54
Test Position	26.5	27

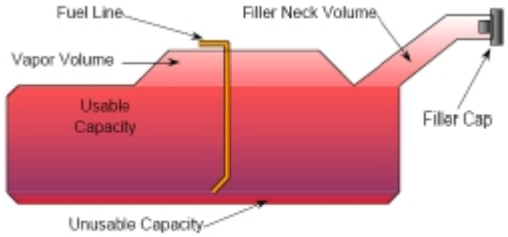


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

The vehicle is an gas-electric hybrid vehicle and is equipped with an electric fuel pump The fuel filler port is on the left side of the vehicle.The pump creates positive pressure in the fuel lines, pushing the gasoline to the engine. See form 1 for more information.



VEHICLE FUEL TANK ASSEMBLY

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

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023

FUEL TANK CAPACITY

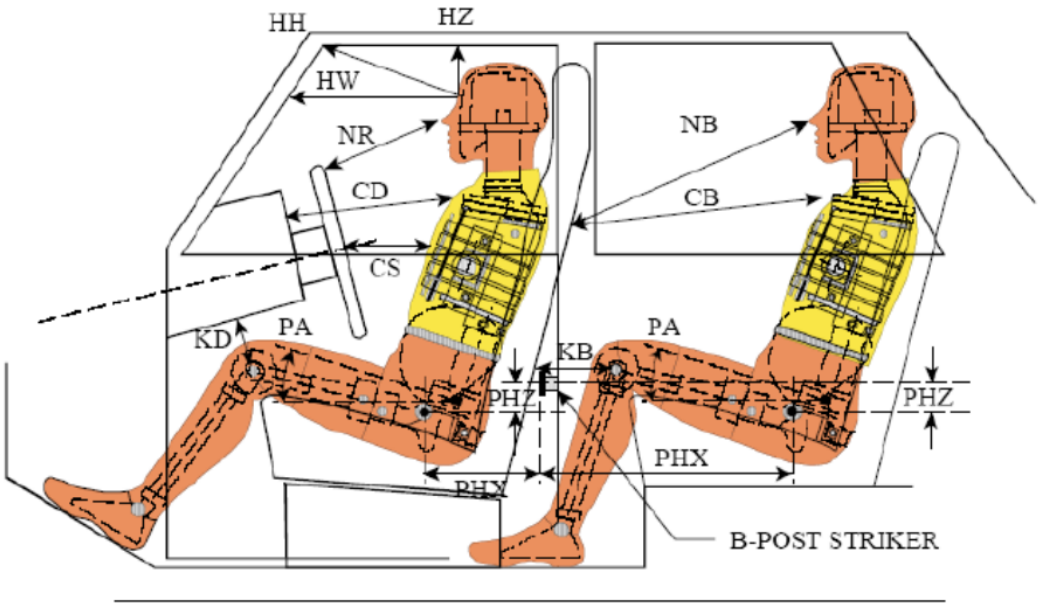
Description	Liters
Usable Capacity of “Standard Tank” (see Form No. 1)	54
Usable Capacity of “Optional Tank” (see Form No. 1)	N/A
Usable Capacity of “Standard Tank” (see Owner’s Manual)	54
Usable Capacity of “Optional Tank” (see Owner’s Manual)	N/A
93% of Usable Capacity	50.2
Actual Amount of Solvent Used in Test	50.2
1/3 of Usable Capacity	18

Is the Actual Amount of Solvent Used in the test equal to 93% ±1% of the Usable Capacity stated in Form No. 1? [X] **Yes** [ ] **No** [ ] **N/A**

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION



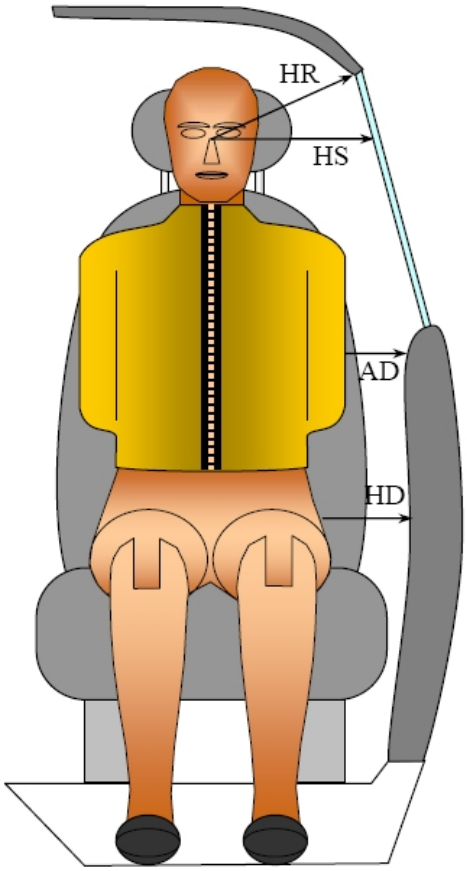
LEFT SIDE VIEW

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

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	314			
HW		Header to Windshield	584			
HZ	HZ	Head to Roof Liner	153		306	
NR	NB	Nose to Rim/Seat Back	405		569	
CD	CB	Chest to Dash/Seat Back	632		571	
CS		Chest to Steering Wheel	343			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	195	29.8	326	21.4
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	171	22.8	321	22.1
PAX°	PAX°	Pelvic Tilt Angle X		16.6		21.5
	PAY°	Pelvic Tilt Angle Y		0.3		0.1
PHX	PHX	Hip Point to Striker (X-Axis)	161		248	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	247		267	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023



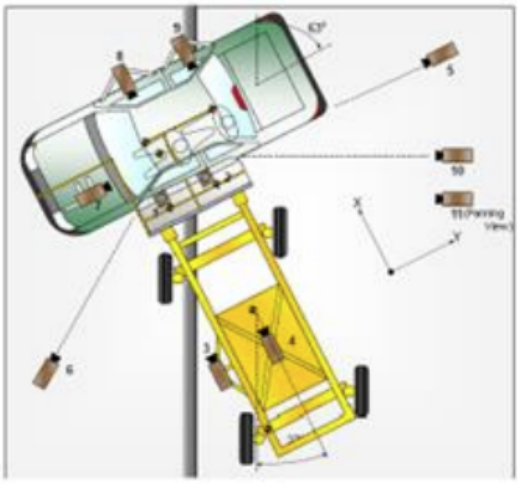
FRONT VIEW OF DUMMY

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	192	265
HS	Head to Side Window	mm	318	364
AD	Arm to Door	mm	110	176
HD	Hip Point to Door	mm	157	179

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2023 KIA Sportage Hybrid 5 Door SUV
NHTSA No.: M20234208
Test Program: NCAP Side MDB Impact Test
Test Date: 02/15/2023



CAMERA LOCATIONS AND DATA

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Overhead Overall	0	0	-8150	12.5	1000
2	Overhead Close-up	0	0	-8150	28	1000
3	Left Impact Point (MDB)	-1470	0	-847	25	1000
4	Side Overall (MDB)	-1140	878	-1587	8	1000
5	Rear	0	8613	-1469	28	1000
6	Left Front	-3266	-5386	-1616	24	1000
7	Driver Front (OB)				25	1000
8	Driver Side (OB)				12.5	1000
9	Passenger Side (OB)				12.5	1000
10	Real-time Left Rear				Zoom	30
11	Real-time In Run				Zoom	30

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

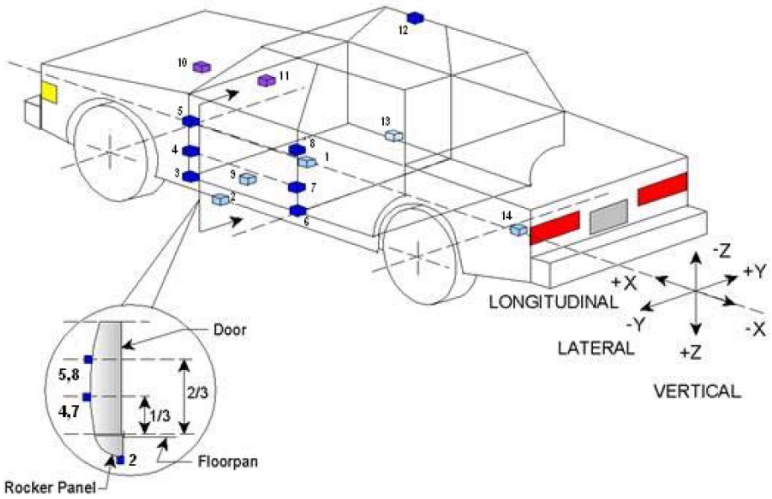
If applicable, explain why camera(s) did not operate as intended: All cameras operated as intended.

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:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023



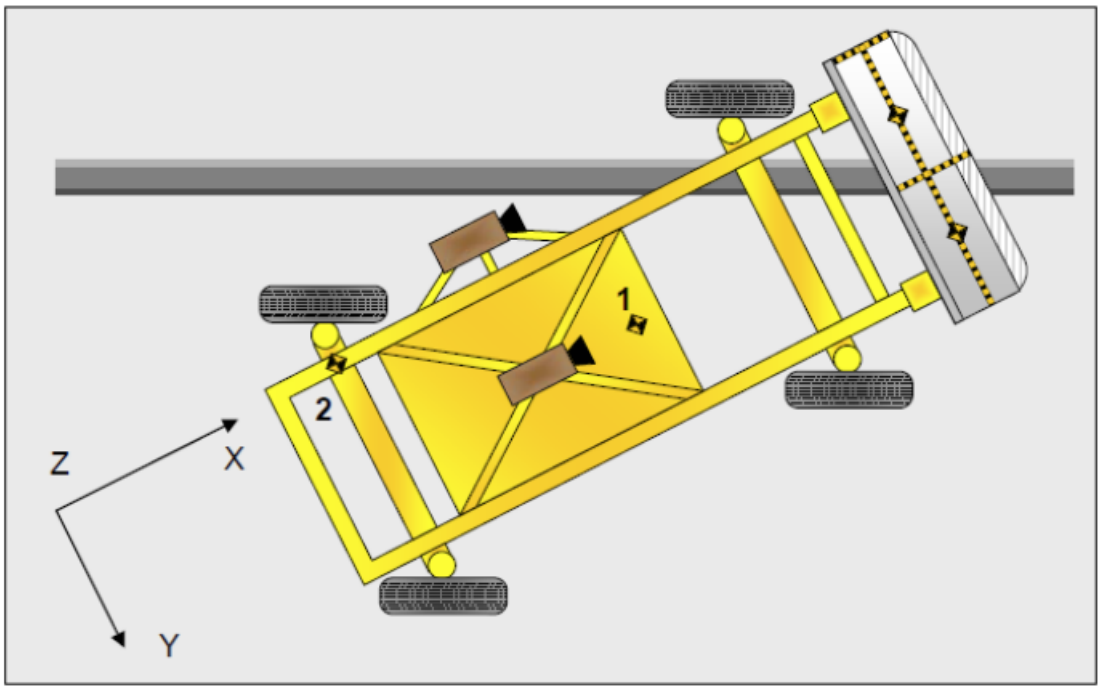
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2109	1	84
2	Right Sill at Front Seat	2840	670	75
3	Right Sill at Rear Seat	1912	664	70
4	Left Sill at Front Door	2946	-668	82
5	Left Sill at Rear Door	2051	-666	77
6	A-Post Lower	3337	-652	-151
7	A-Post Middle	3162	-654	-630
8	B-Post Lower	2226	-689	-123
9	B-Post Middle	2115	-672	-546
10	Front Seat Track	2374	-567	47
11	Rear Seat Structure	1849	-362	7
12	Rt. Rear Occ. Compartment	2048	388	168
13	Engine Block	3916	219	-410
14	Rear Above Axle	669	-25	19

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:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023



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): 1490

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2023 KIA Sportage Hybrid 5 Door SUV | NHTSA No.: M20234208
Test Program: NCAP Side MDB Impact Test | Test Date: 02/15/2023

TEST DUMMY INFORMATION AND CONTACT POINTS

Description	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag
Top of Head	Side Header	Curtain Airbag
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag, Side Header, & Headrest	Curtain Airbag, Seatback & Headrest
Left Shoulder	Torso/Pelvis Airbag	Passenger Door
Upper Torso	Seatback & Torso/Pelvis Airbag	Passenger Door
Lower Torso	Seatback & Torso/Pelvis Airbag	Passenger Door
Left Hip	Torso/Pelvis Airbag	Seat Pan & Pasenger Door
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)	N/A	N/A	N/A	N/A	N/A

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	B-Pillar & 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: 2023 KIA Sportage Hybrid 5 Door SUV
NHTSA No.: M20234208
Test Program: NCAP Side MDB Impact Test
Test Date: 02/15/2023

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2756
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		437
Actual Impact Point (Aft of Frontal Axle)	mm		427
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	+10
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	+2

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023

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

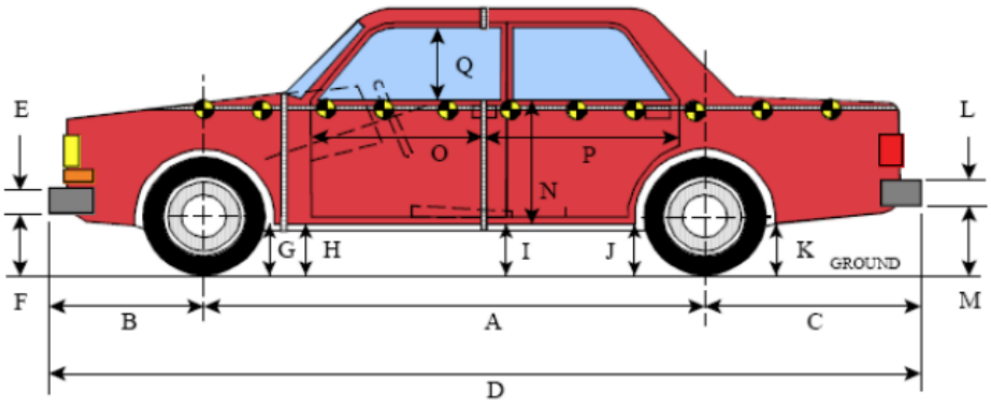
Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h		61.98
Trap No. 2 Velocity (Redundant)	km/h		61.96
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed angle to MDB Forward Line of Motion	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	249
B	Top of Bumper	533	800	Right	165
C	Mid-Level	686	800	Right	129
D	Top of Stack	813	800	Right	167

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023



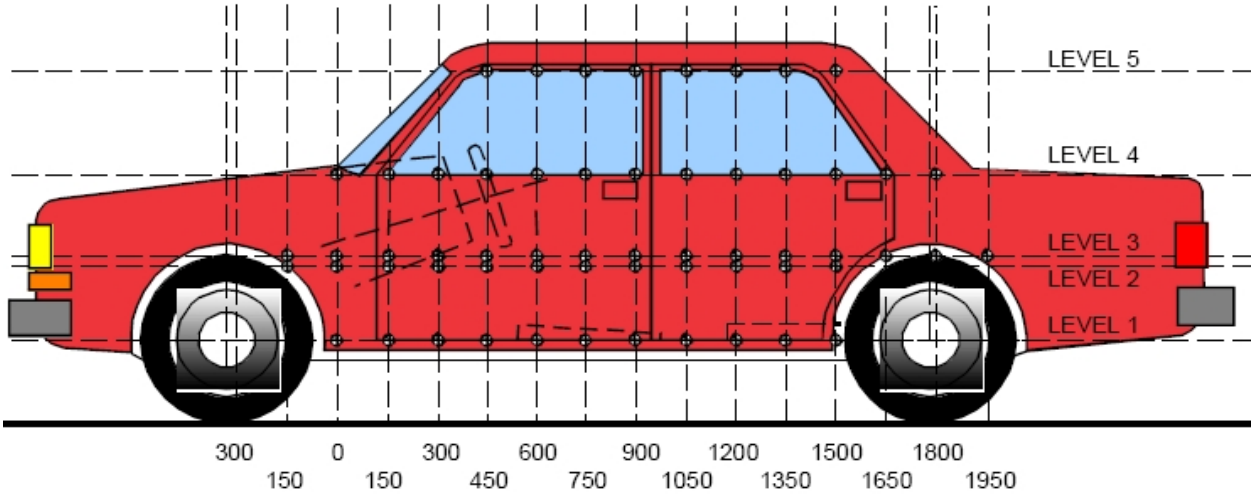
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code.	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	2756	2760	4
B	Front Axle to FSOV	902	903	1
C	Rear Axle to RSOV	1003	998	-5
D2	Total Length at Centerline	4661	4661	0
E	Front Bumper Thickness	145	145	0
F	Front Bumper Bottom to Ground	465	463	-2
G	Sill Height at Front Wheel Well	245	241	-4
H	Sill Height at Front Door Leading Edge	247	255	8
I	Sill Height at B Pillar	256	247	-9
J1	Sill Height at Rear Wheel Well	251	248	-3
J2	Pinch Weld Height at Rear Wheel Well	242	238	-4
K	Sill Height Aft of Rear Wheel Well	278	278	0
L	Rear Bumper Thickness	135	135	0
M	Rear Bumper Bottom to Ground	515	518	3
N	Sill Height to Bottom of Front Window Sill	905	880	-25
O	Front Door Leading Edge to Impact CL	729	729	0
P	Rear Door Trailing Edge to Impact CL	1385	1354	-31
Q	Front Window Opening	383	383	0
R	Right Side Length	4572	4573	1
S	Left Side Length	4572	4572	0
T	Vehicle Width at B-Pillars	1838	1712	-126
U	Front Wheel Track Width	1616	1616	0
V	Rear Wheel Track Width	1626	1630	4

DATA SHEET NO.11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023



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	342	43	1200
2	Occupant H-Point	mm	688	198	1650
3	Mid-Door	mm	751	208	1650
4	Window Sill	mm	1111	64	1200
5	Window Top	mm	1581	7	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: 2023 KIA Sportage Hybrid 5 Door SUV
NHTSA No.: M20234208
Test Program: NCAP Side MDB Impact Test
Test Date: 02/15/2023

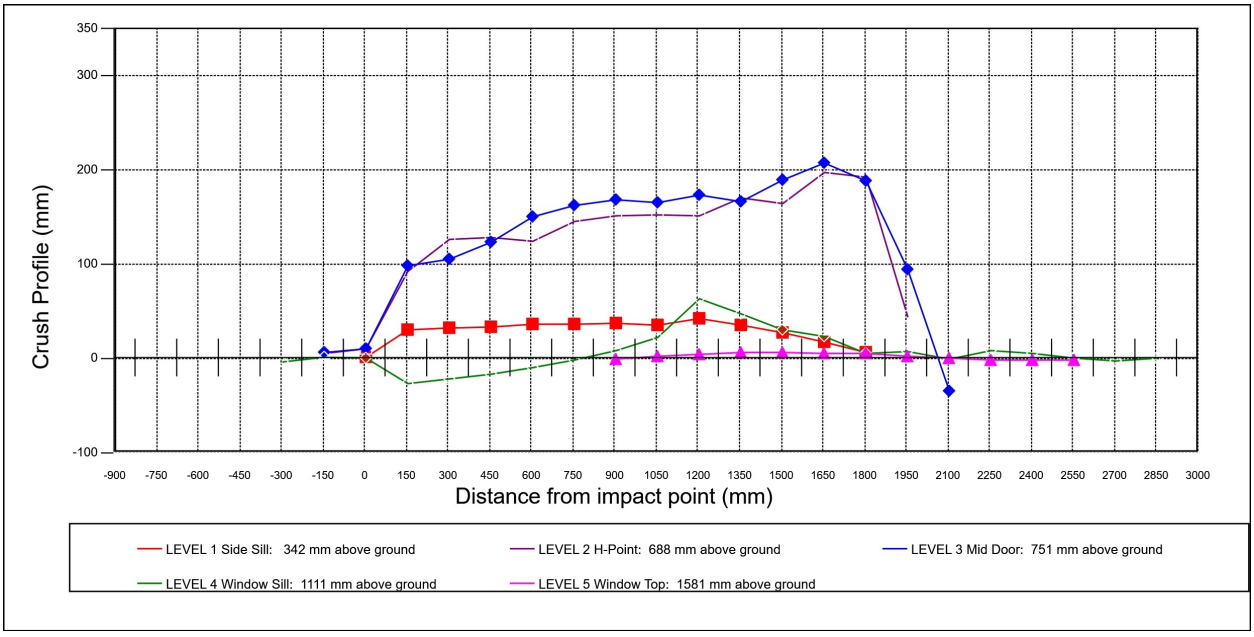
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	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				770					773					-3	
-150		930	923	785			924	916	783			6	7	2	
0	892	914	914	798		890	903	900	797		2	11	14	1	
150	888	900	901	808		857	807	802	834		31	93	99	-26	
300	887	897	901	813		854	770	795	834		33	127	106	-21	
450	889	898	903	821		855	769	779	837		34	129	124	-16	
600	893	900	904	830		856	775	753	839		37	125	151	-9	
750	894	902	906	837		857	756	743	838		37	146	163	-1	
900	894	902	906	843	623	856	750	737	834	623	38	152	169	9	0
1050	893	902	907	848	629	857	749	741	825	626	36	153	166	23	3
1200	891	901	905	850	630	848	749	731	786	625	43	152	174	64	5
1350	890	902	903	851	628	854	731	736	803	621	36	171	167	48	7
1500	889	908	904	850	626	861	743	714	819	619	28	165	190	31	7
1650	890	919	913	848	623	872	721	705	824	617	18	198	208	24	6
1800	895	931	926	846	620	888	738	737	840	614	7	193	189	6	6
1950		932	935	860	613		887	840	852	610		45	95	8	3
2100			935	875	604			969	875	603			-34	0	1
2250				882	593				873	594				9	-1
2400				880	576				874	577				6	-1
2550				869	549				868	550				1	-1
2700				855					857					-2	
2850				834					833					1	
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

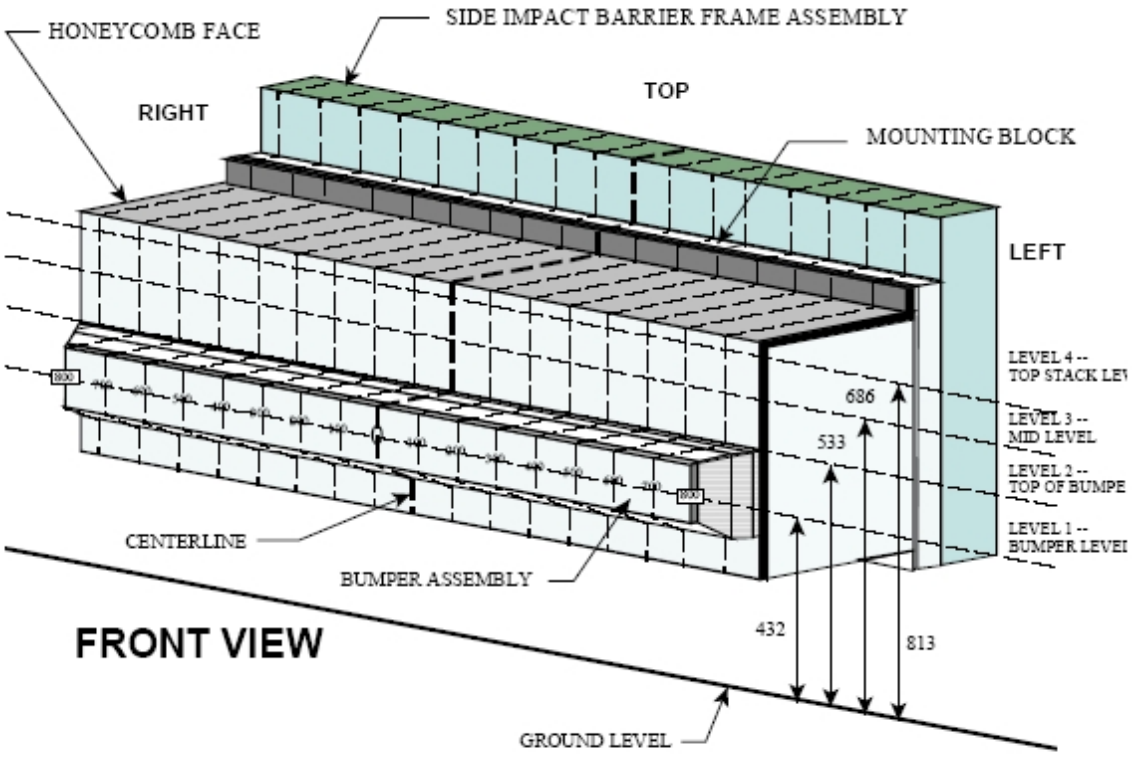
Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO.12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023



NOTE: Dimensions are shown in millimeters, mm

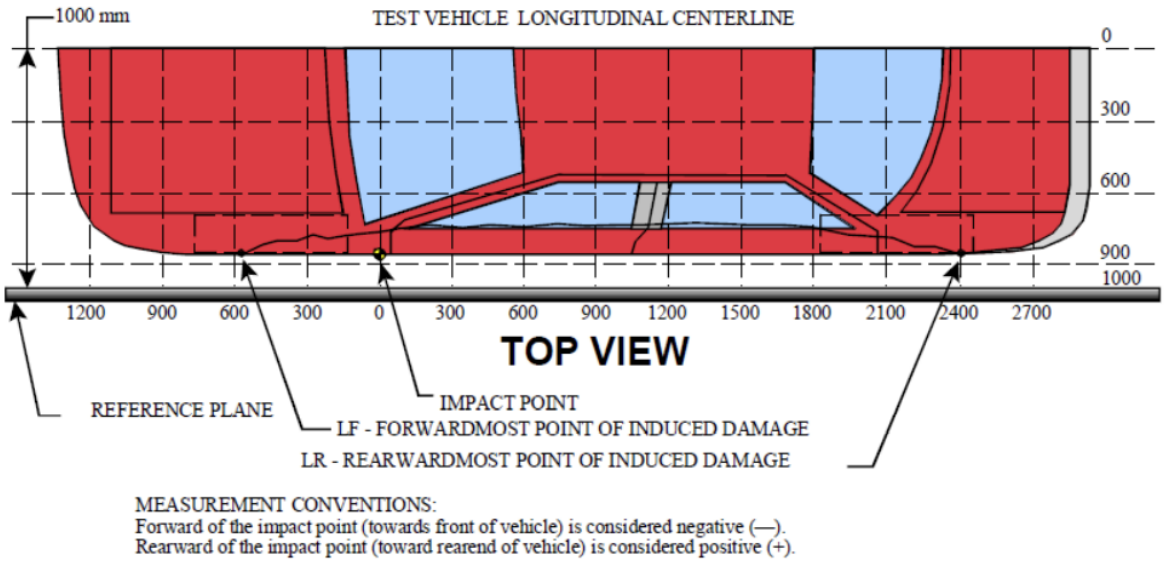
DEFORMABLE BARRIER STATIC CRUSH

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	249	234	230	228	227	225	224	224	227	226	227	228	224	222	219	219	219
2	165	135	127	125	124	120	119	119	122	124	126	126	124	123	121	121	119
3	129	92	79	67	58	50	44	41	40	44	46	50	41	45	55	51	56
4	167	133	110	92	76	70	63	64	61	63	51	38	27	17	17	30	42

DATA SHEET NO.13
VEHICLE AND MDB DAMAGE PROFILE DISTANCE

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023

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	-150	3	84	77	7
2	300	3	205	99	106
3	750	3	257	94	163
4	1200	3	269	95	174
5	1650	3	295	87	208
6	2100	3	31	65	-34

MDB DAMAGE PROFILE DISTANCES

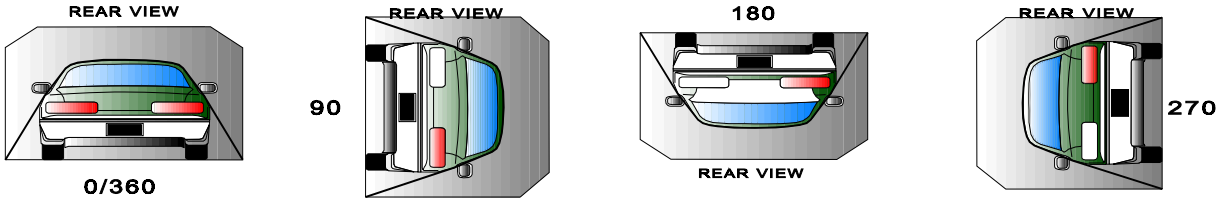
DPD	Distance From Center of MDB (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	800 mm left of center	1	286	505	-219
2	480 mm left of center	1	292	514	-222
3	160 mm leftt of center	1	287	514	-227
4	160 mm right of center	1	289	513	-224
5	480 mm right of center	1	285	513	-228
6	800 mm right of center	1	252	501	-249

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

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023
Test Time:	11:11 AM	Temperature:	21.1 °C

A. From impact until vehicle motion ceases: 0 oz
(Maximum allowable is 1 oz.)
B. For the 5-minute period after motion ceases: 0 oz
(Maximum allowable is 5 oz.)
C. For the following 25 minutes: 0 oz
(Maximum allowable is 1 oz.)

D. Spillage Detail: No Spillage Occurred



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	70	300	370
90° to 180°	66	300	366
180° to 270°	60	300	360
270° to 360°	68	300	368

FMVSS 301 SPILLAGE TABLE

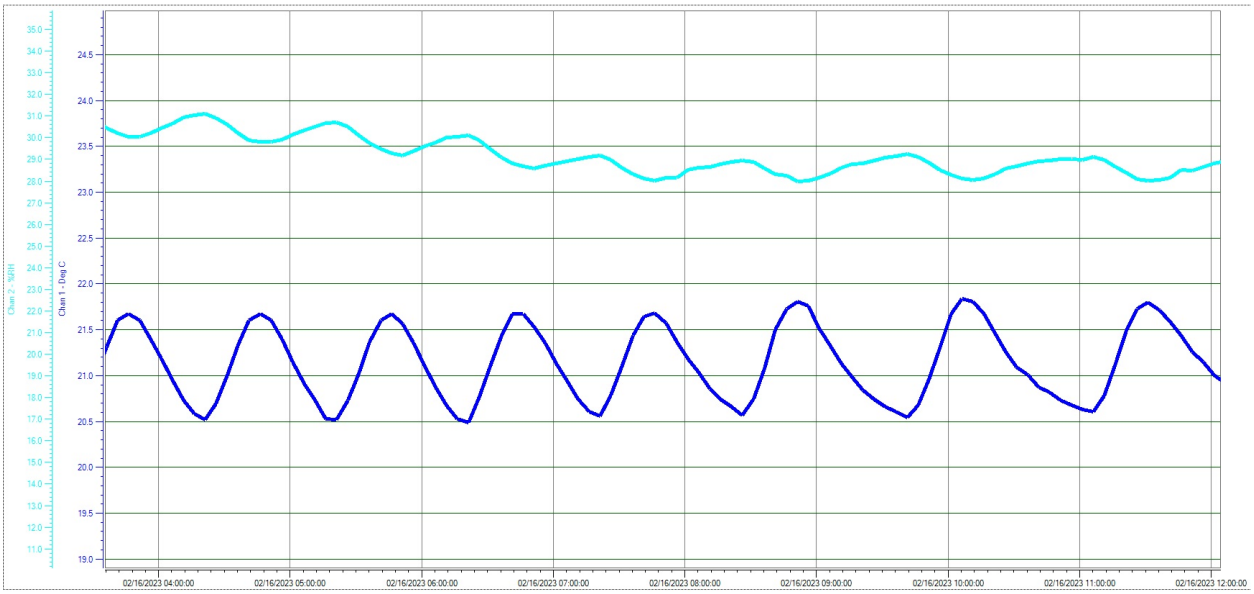
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

SOLVENT SPILLAGE LOCATION TABLE

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

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

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023



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: 2023 KIA Sportage Hybrid 5 Door SUV NHTSA No.: M20234208
Test Program: NCAP Side MDB Impact Test Test Date: 02/15/2023

ELECTRIC VEHICLE PROPULSION SYSTEM

Measured Parameter	Value
Type of Electric Vehicle (Electric/Gas-Electric Hybrid/Fuel Cell-Electric Hybrid)	Gas-Electric Hybrid
Propulsion Battery Type	Lithium-ion Polymer Battery
Nominal Voltage (Volts)	270
Is this Vehicle equipped with an Automatic Propulsion Battery Disconnect?	Yes
Physical Location of Automatic Propulsion Battery Disconnect, if applicable	Under 2nd Row Seat
Auxiliary Battery Type	N/A

PROPULSION BATTERY SYSTEM DATA (COTR SUPPLIED)

Measured Parameter	Value
Electrolyte Fluid Type	LiPF6 salt, Carbonate solvent
Electrolyte Fluid Specific Gravity	1.23 g/cm3
Electrolyte Fluid Kinematic Viscosity (centistokes)	3.03 mPa s @ 25˚C
Electrolyte Fluid Color	Transparent & Pale Yellow
Propulsion Battery Coolant Type, Color and Specific Gravity (if applicable)	Air Cooled
Location of Battery Modules (Inside or Outside of Passenger Compartment?)	Inside Passenger Compartment

PROPULSION BATTERY STATE OF CHARGE

Measured Parameter	Units	Value
For all battery types: Voltage Range corresponding to **useable energy** of the battery:		
Minimum State of Charge	V	
Maximum State of Charge	V	
95% of Maximum	V	
Test Voltage *	V	
For batteries that are rechargeable ONLY by an energy source on the vehicle: Voltage range corresponding to **useable energy** of the battery:		
Minimum State of Charge	V	180
Maximum State of Charge	V	309.6
95% of Maximum	V	294.12
Test Voltage *	V	262.8

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

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

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023

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

Measured Parameter	Value
Details of Vehicle Chassis Ground Points & Locations	The ground point is located under second row seat to the vehicle chassis
Details of Propulsion Battery Components	High Voltage battery is located under the second row seat.

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

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		58100115
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		4/28/2022

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 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	180-309.6
Propulsion Battery Voltage: (ready to drive position)	V_b	V	262.8
Propulsion Battery to Vehicle Chassis	V_1	V	185.0
Propulsion Battery to Vehicle Chassis	V_2	V	188.0
Propulsion Battery to Vehicle Chassis Across Known Resistor	R_o	Ω	200,000
Propulsion Battery to Vehicle Chassis with R_o installed	V_1'	V	25.7
Propulsion Battery to Vehicle Chassis with R_o installed	V_2'	V	26.0
$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$	R_{i1}	Ω	2,499,480
$R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$	R_{i2}	Ω	2,471,319
Lesser value of R_{i1} and R_{i2}	R_i	Ω	2,471,319
Electrical Isolation Value (Minimum E.I. Value is 500 Ω/V)	R_i/V_b	Ω/V	9,404

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:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023

VOLTMETER INFORMATION

Measured Parameter	Units	Value
Make & Model		Fluke 1587
Serial No.		58100115
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		4/28/2022

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 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 =	261.10	V	Time:	0	Minutes	30	Seconds
V_1 =	208.90	V	Time:	0	Minutes	37	Seconds
V_2 =	209.00	V	Time:	0	Minutes	44	Seconds
R_o =	200,000	Ω					
V_1' =	21.90	V	Time:	0	Minutes	51	Seconds
V_2' =	21.92	V	Time:	0	Minutes	58	Seconds
R_{i1} =	3,416,343	Ω	Time:	0	Minutes	51	Seconds
R_{i2} =	3,413,052	Ω	Time:	0	Minutes	58	Seconds
R_i =	3,413,052	Ω/V	Time:	0	Minutes	58	Seconds
R_i/V_b =	13,072	Ω/V	Time:	0	Minutes	58	Seconds

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

NOTES:

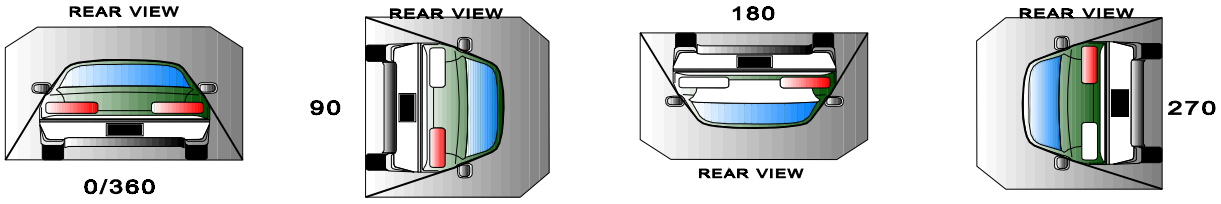
- *$R_{i1}= R_o*(1+V_2/V_1)*[(V_1-V_1')/V_1']$, $R_{i2}= R_o*(1+V_1/V_2)*[(V_2-V_2')/V_2']$, R_i = Lesser value of R_{i1} and R_{i2}*
- *If measured voltage is zero and results in a division by zero, record "Zero Volts." This "zero voltage" condition is considered as being compliant*
- *Minimum Electrical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

PROPULSION BATTERY SYSTEM COMPONENTS

Measured Parameter	Comments	Passed	Failed
Propulsion Battery Module movement within the passenger compartment	No Movement	X	
Intrusion of an outside Propulsion Battery Component into the passenger compartment	No Intrusion	X	
Is propulsion battery electrolyte spillage visible in the passenger compartment?	No Spillage	X	

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

Test Vehicle:	2023 KIA Sportage Hybrid 5 Door SUV	NHTSA No.:	M20234208
Test Program:	NCAP Side MDB Impact Test	Test Date:	02/15/2023



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	6	5	6	6	7
180° to 270°	1	0	5	6	0	7
270° to 360°	1	8	5	6	8	7

ACTUAL TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

Rollover Stage	Propulsion Battery Electrolyte Spillage	Units	Spillage Location
0° to 90°	0	Liters	No Spillage Occurred
90° to 180°	0	Liters	No Spillage Occurred
180° to 270°	0	Liters	No Spillage Occurred
270° to 360°	0	Liters	No Spillage Occurred
Total Spillage	0	Liters	No Spillage Occurred

** 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.		58100115
Internal Impedance Value	MΩ	10
Resolution	V	0.001
Last Calibration Date		4/28/2022

NOTES:

- *The voltmeter used in this test shall measure DC values and have an internal impedance of at least 10 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: 2023 KIA Sportage Hybrid 5 Door SUV NHTSA No.: M20234208
Test Program: NCAP Side MDB Impact Test Test Date: 02/15/2023

ELECTRICAL ISOLATION MEASUREMENTS & CALCULATIONS

Parameter	Rollover Stage	Value	Units	R_o=200,000	Minutes	Seconds
V_b =	90°	2.99	V	Time:	1	22
	180°	2.79	V		18	37
	270°	3.55	V		27	56
	360°	2.43	V		36	33
V_1 =	90°	2.99	V	Time:	1	30
	180°	3.27	V		18	45
	270°	2.86	V		28	3
	360°	2.05	V		36	40
V_2 =	90°	33.70	V	Time:	1	43
	180°	33.62	V		18	53
	270°	33.84	V		28	11
	360°	33.64	V		36	46
V_1' =	90°	0.04	V	Time:	1	51
	180°	0.05	V		19	0
	270°	0.05	V		28	18
	360°	0.04	V		36	52
V_2' =	90°	0.80	V	Time:	1	43
	180°	0.88	V		18	53
	270°	0.89	V		28	11
	360°	0.97	V		36	46
R_{i1} =	90°	180,995,819	Ω	Time:	1	51
	180°	145,303,731	Ω		19	0
	270°	144,233,566	Ω		28	18
	360°	174,968,049	Ω		36	52
R_{i2} =	90°	8,954,755	Ω	Time:	1	51
	180°	8,164,638	Ω		19	0
	270°	8,030,288	Ω		28	18
	360°	7,146,575	Ω		36	52
R_i =	90°	8,954,755	Ω/V	Time:	1	51
	180°	8,164,638	Ω/V		19	0
	270°	8,030,288	Ω/V		28	18
	360°	7,146,575	Ω/V		36	52
R_i/V_b =	90°	2,994,901	Ω/V	Time:	1	51
	180°	2,926,394	Ω/V		19	0
	270°	2,262,053	Ω/V		28	18
	360°	2,940,977	Ω/V		36	52

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

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Fig.	Description	Page
1	As-Delivered Right Front ¾ View of Test Vehicle	A-6
2	As-Delivered Left Rear ¾ View of Test Vehicle	A-6
3	Pre-Test Frontal View of Test Vehicle	A-7
4	Post-Test Frontal View of Test Vehicle	A-7
5	Pre-Test Left Front ¾ View of Test Vehicle	A-8
6	Post-Test Left Front ¾ View of Test Vehicle	A-8
7	Pre-Test Left Side View of Test Vehicle	A-9
8	Post-Test Left Side View of Test Vehicle	A-9
9	Pre-Test Left Rear ¾ View of Test Vehicle	A-10
10	Post-Test Left Rear ¾ View of Test Vehicle	A-10
11	Pre-Test Rear View of Test Vehicle	A-11
12	Post-Test Rear Side View of Test Vehicle	A-11
13	Pre-Test Right Side View of Test Vehicle	A-12
14	Post-Test Right Side View of Test Vehicle	A-12
15	Pre-Test Overhead View of Test Area	A-13
16	Post-Test Overhead View of Test Area	A-13
17	Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle	A-14
18	Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle	A-14
19	Pre-Test Close-Up View of Impact Point Target	A-15
20	Post-Test Close-Up View of Impact Point Target	A-15
21	Pre-Test Left Front Door Latch Close-Up	A-16
22	Post-Test Left Front Door Latch Close-Up	A-16
23	Pre-Test Left Rear Door Latch Close-Up	A-17
24	Post-Test Left Rear Door Latch Close-Up	A-17
25	Pre-Test Front Close-up View of Driver Dummy	A-18
26	Post-Test Front Close-up View of Driver Dummy	A-18
27	Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking	A-19
28	Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View	A-19
29	Post-Test Left Side View of Driver Dummy Shoulder and Door Top View	A-20
30	Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning	A-20
31	Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint	A-21
32	Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning	A-21
33	Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan	A-22
34	Pre-Test Placement of Driver Dummy’s Feet	A-22

Fig.	Description	Page
35	Pre-Test View of Belt Anchorage for Driver Dummy	A-23
36	Pre-Test Left Side View of Steering Wheel	A-23
37	View of Disengaged Parking Brake	A-24
38	Pre-Test View of Parking Brake	A-24
39	Pre-Test Close-Up Left Side View of Driver Seat Track	A-25
40	Pre-Test Close-Up Left Side View of Driver Seat Back	A-25
41	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-26
42	Pre-Test Driver Dummy and Door Clearance View	A-26
43	Post-Test Driver Dummy and Door Clearance View	A-27
44	Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment	A-27
45	Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment	A-28
46	Pre-Test Driver Inner Door Panel View	A-28
47	Post-Test Driver Inner Door Panel View	A-29
48	Post-Test Driver Dummy Close-Up Head Contact with Vehicle View	A-29
49	Post-Test Driver Dummy Close-Up Head Contact with Side Air Bag View	A-30
50	Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View	A-30
51	Post-Test Driver Dummy Close-Up Torso Contact with Side Air Bag View	A-31
52	Post-Test Driver Dummy Close-Up Pelvis Contact View	A-31
53	Post-Test Driver Dummy Close-Up Pelvis Contact with Side Air Bag View	A-32
54	Post-Test Driver Dummy Close-Up Knee Contact View	A-32
55	Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking	A-33
56	Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-33
57	Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-34
58	Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning	A-34
59	Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint	A-35
60	Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning	A-35
61	Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan	A-36
62	Pre-Test View of Rear Passenger Dummy’s Neck Showing Position of Adjustable Neck Bracket	A-36
63	Pre-Test View of Rear Passenger Dummy’s Head Showing Dummy’s Head is Level	A-37
64	Pre-Test Placement of Rear Passenger Dummy’s Feet	A-37
65	Pre-Test View of Belt Anchorage for Rear Passenger Dummy	A-38
66	Pre-Test Close-Up Left Side View of Rear Passenger Seat Track	A-38
67	Pre-Test Close-Up Left Side View of Rear Passenger Seat Back	A-39
68	Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint	A-39

Fig.	Description	Page
69	Pre-Test Rear Passenger Dummy and Door Clearance View	A-40
70	Post-Test Rear Passenger Dummy and Door Clearance View	A-40
71	Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-41
72	Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-41
73	Pre-Test Rear Passenger Inner Door Panel View	A-42
74	Post-Test Rear Passenger Inner Door Panel View Showing Rear Passenger Dummy Contact Locations	A-42
75	Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle View	A-43
76	Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Air Bag View	A-43
77	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View	A-44
78	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Air Bag View	A-44
79	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View	A-45
80	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Air Bag View	A-45
81	Post-Test Rear Passenger Dummy Close-Up Knee Contact View	A-46
82	Pre-Test Fuel Filler Cap	A-46
83	Post-Test Fuel Filler Cap	A-47
84	Pre-Test Front View of MDB Impactor Face	A-47
85	Post-Test Front View of MDB Impactor Face	A-48
86	Pre-Test Top View of MDB Impactor Face	A-48
87	Post-Test Top View of MDB Impactor Face	A-49
88	Pre-Test Left Side View of MDB Impactor Face	A-49
89	Post-Test Left Side View of MDB Impactor Face	A-50
90	Pre-Test Right Side View of MDB Impactor Face	A-50
91	Post-Test Right Side View of MDB Impactor Face	A-51
92	Close-Up View of Vehicle’s Certification Label	A-51
93	Close-Up View of Vehicle’s Tire Information Placard or Label	A-52
94	Pre-Test Ballast View	A-52
95	Post-Test Primary and Redundant Speed Trap Read-Out	A-53
96	FMVSS No. 301 Static Rollover 0 Degrees	A-53
97	FMVSS No. 301 Static Rollover 90 Degrees	A-54
98	FMVSS No. 301 Static Rollover 180 Degrees	A-54
99	FMVSS No. 301 Static Rollover 270 Degrees	A-55
100	FMVSS No. 301 Static Rollover 360 Degrees	A-55
101	Impact Event	A-56
102	Monroney Label	A-56
103	Driver Head Restraint Use and Adjustment Information from Vehicle Owner’s Manual	A-57
104	Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner’s Manual	A-57

Fig.	Description	Page
305-1	Auxiliary Power Module Warning Label	A-58
305-2	Power Inverter Warning Label	A-58
305-3	First Responder Warning Label	A-59
305-4	First Responder Warning Label Location	A-59
305-5	Other Vehicle Label(s) Related to Electrical Propulsion System	A-60
305-6	Manual High Voltage Service Disconnect in Place	A-60
305-7	Manual High Voltage Service Disconnect Removed (Plug)	A-61
305-8	Manual High Voltage Service Disconnect Removed (Location where removed)	A-61
305-9	Pre-Impact View of Propulsion Battery	A-62
305-10	Post-Impact Front View of Propulsion Battery	A-62
305-11	Post-Impact Rear View of Propulsion Battery (if any part of it is visible)	A-63
305-12	Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules	A-63
305-13	Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules	A-64
305-14	Pre-Impact View of Propulsion Battery Module(s)	A-64
305-15	Post-Impact View of Propulsion Battery Module(s)	A-65
305-16	Pre-Impact View of Electric Propulsion Drive	A-65
305-17	Post-Impact View of Electric Propulsion Drive	A-66
305-18	Pre-Impact View of High Voltage Interconnect(s)	A-66
305-19	Pre-Impact View Propulsion Venting System(s)	A-67
305-20	Pre-Impact View of Other Visible Electric Propulsion Components	A-67
305-21	Pre-Impact View of Ground Lead Attached	A-68
305-22	Pre-Impact View of High Voltage Leads Attached	A-68
305-23	Pre-Impact Close-Up View of High Voltage Leads Attached	A-69
305-24	Pre-Impact View of Installed Test Interface Port	A-69
305-25	Post-Impact View of Installed Test Interface Port	A-70
305-26	Pre-Impact View of Other Test Devices	A-70
305-27	Post-Impact View of Other Test Devices	A-71
305-28	FMVSS No. 305 Static Rollover 90 Degrees	A-71
305-29	FMVSS No. 305 Static Rollover 180 Degrees	A-72
305-30	FMVSS No. 305 Static Rollover 270 Degrees	A-72
305-31	FMVSS No. 305 Static Rollover 360 Degrees	A-73
305-32	Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery	A-73
305-33	Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery	A-74
305-34	Post-Impact Propulsion Battery System Mounting and/or Intrusion Failure(s)	A-74
305-35	Post-Impact View of Battery Component Intrusion	A-75
305-36	Post-Impact View of Battery Module Movement or Retention Loss	A-75
305-37	Post-Impact View of Propulsion Battery Electrolyte Spillage Location (Prior to static roll)	A-76
305-38	Post-Impact View of Propulsion Battery Electrolyte Spillage Location (After static roll)	A-76



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

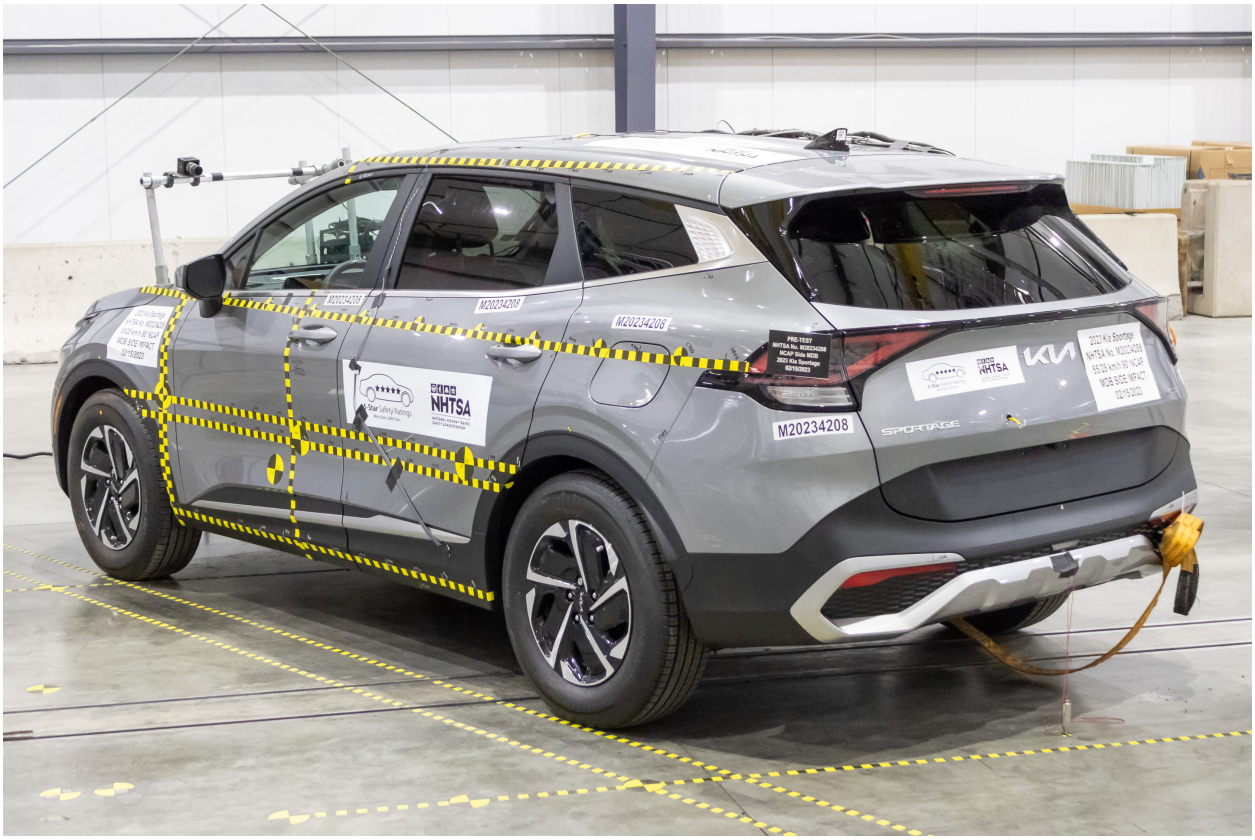


Figure A-9: Pre-Test Left Rear ¾ View of Test Vehicle



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

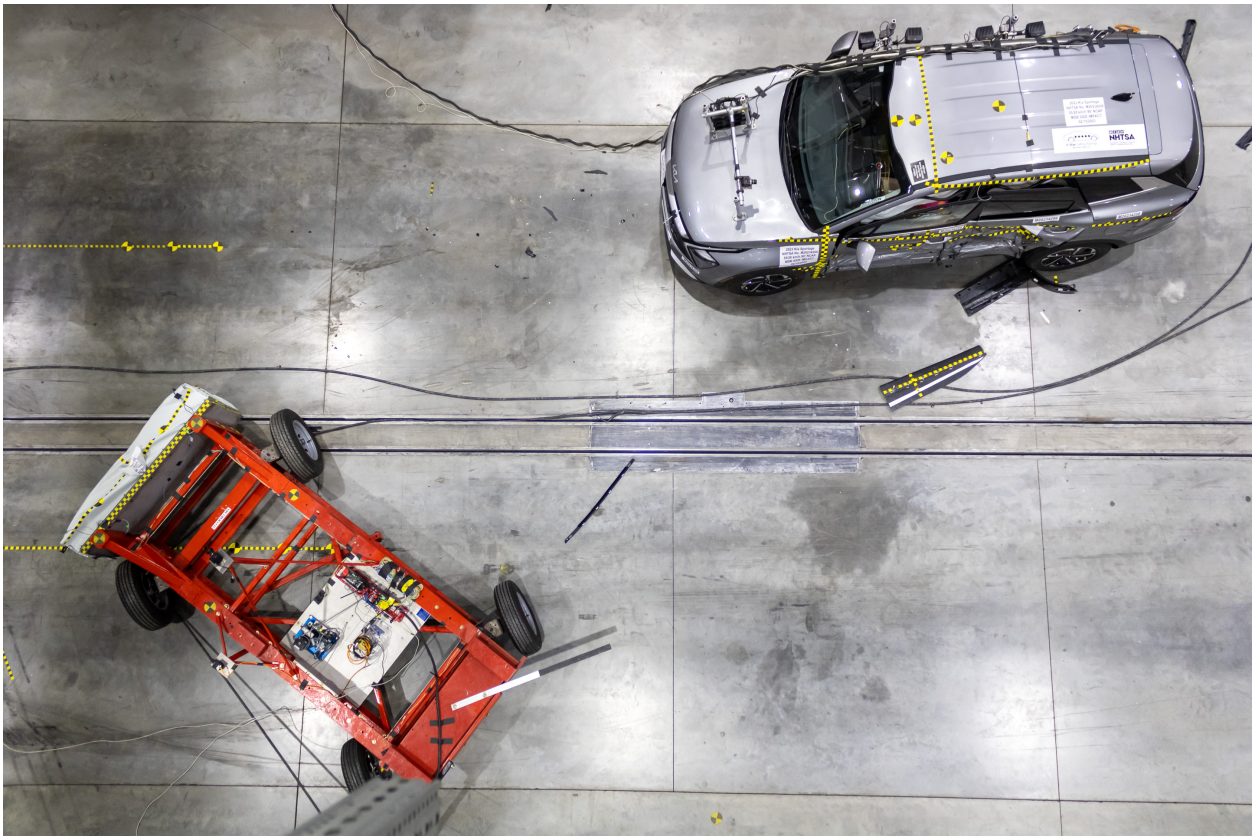


Figure A-16: Post-Test Overhead View of Test Area



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

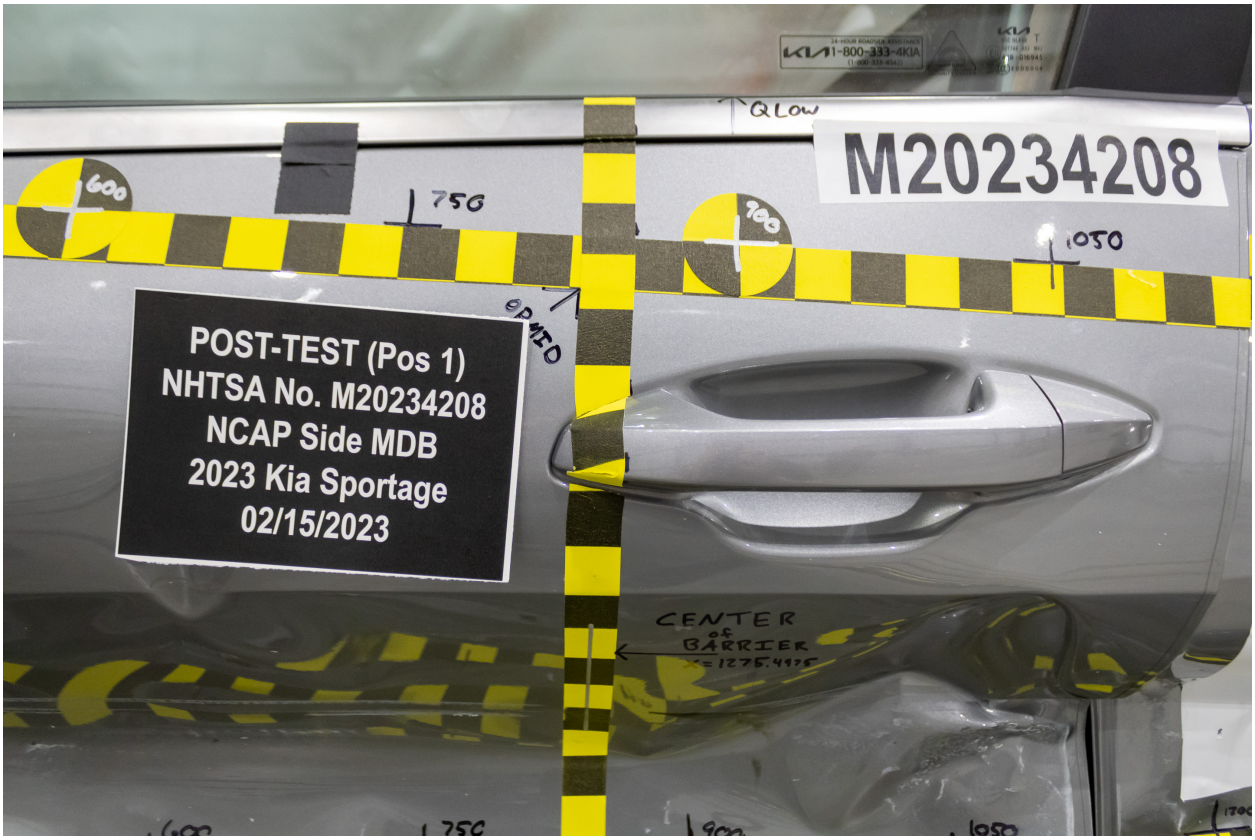


Figure A-22: Post-Test Left Front Door Latch Close-Up



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



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

Photo Not Applicable

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

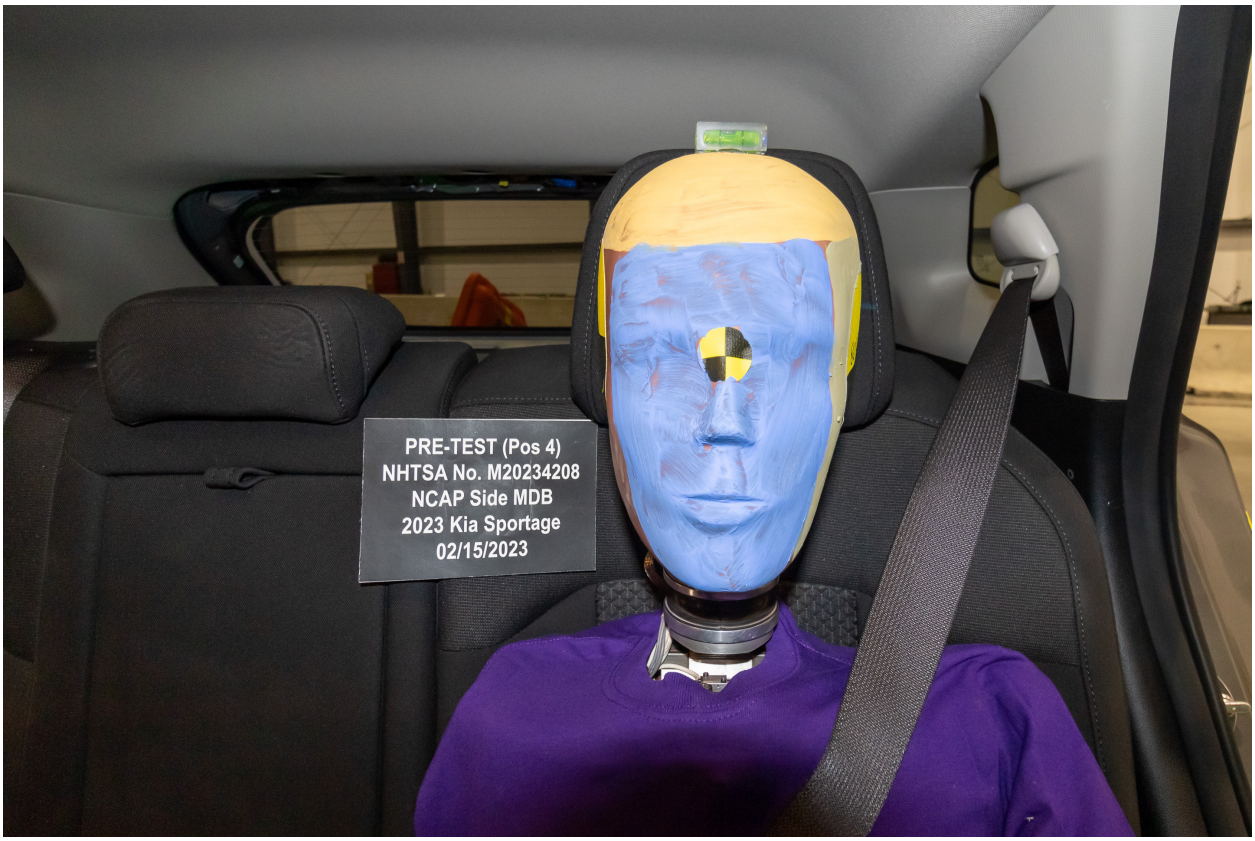


Figure A-59: Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint



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

Photo Not Applicable

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

Photo Not Applicable

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

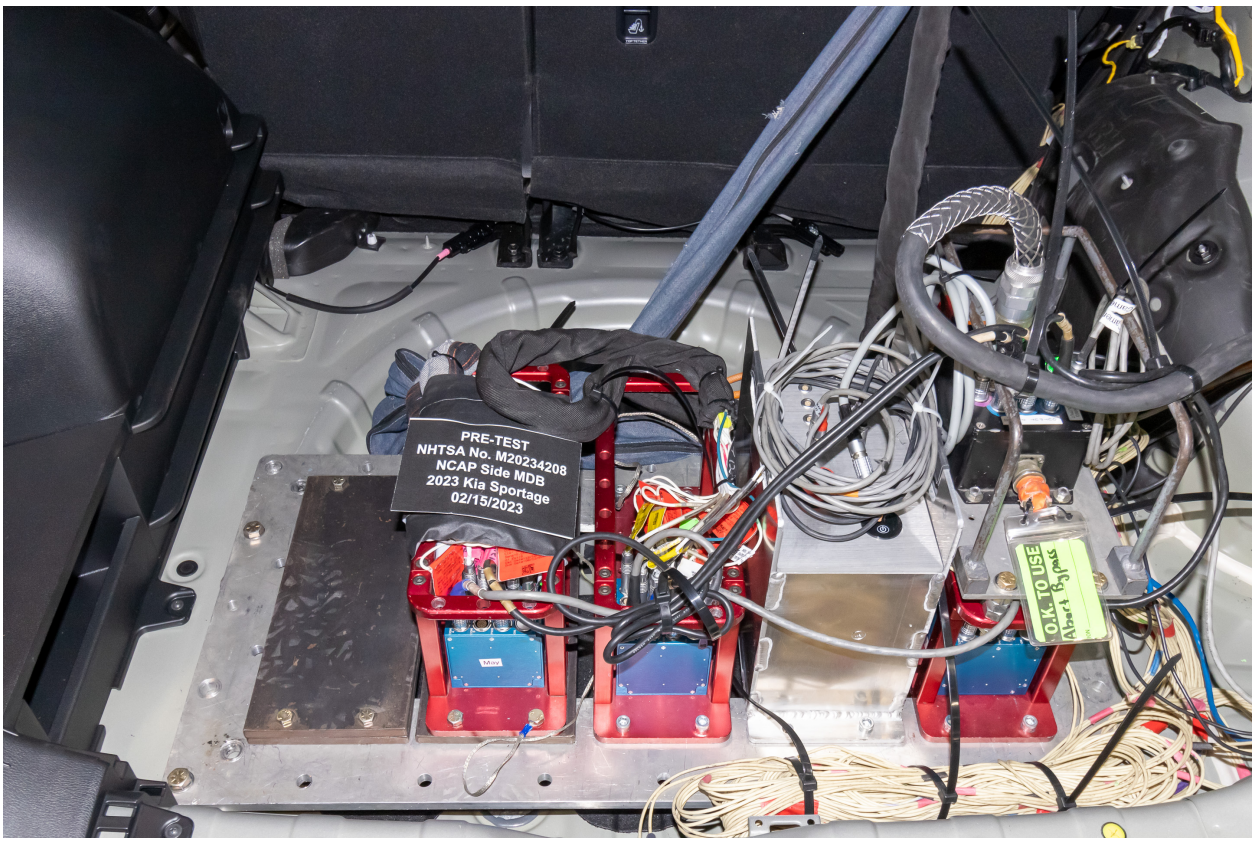


Figure A-94: Pre-Test Ballast View



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



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

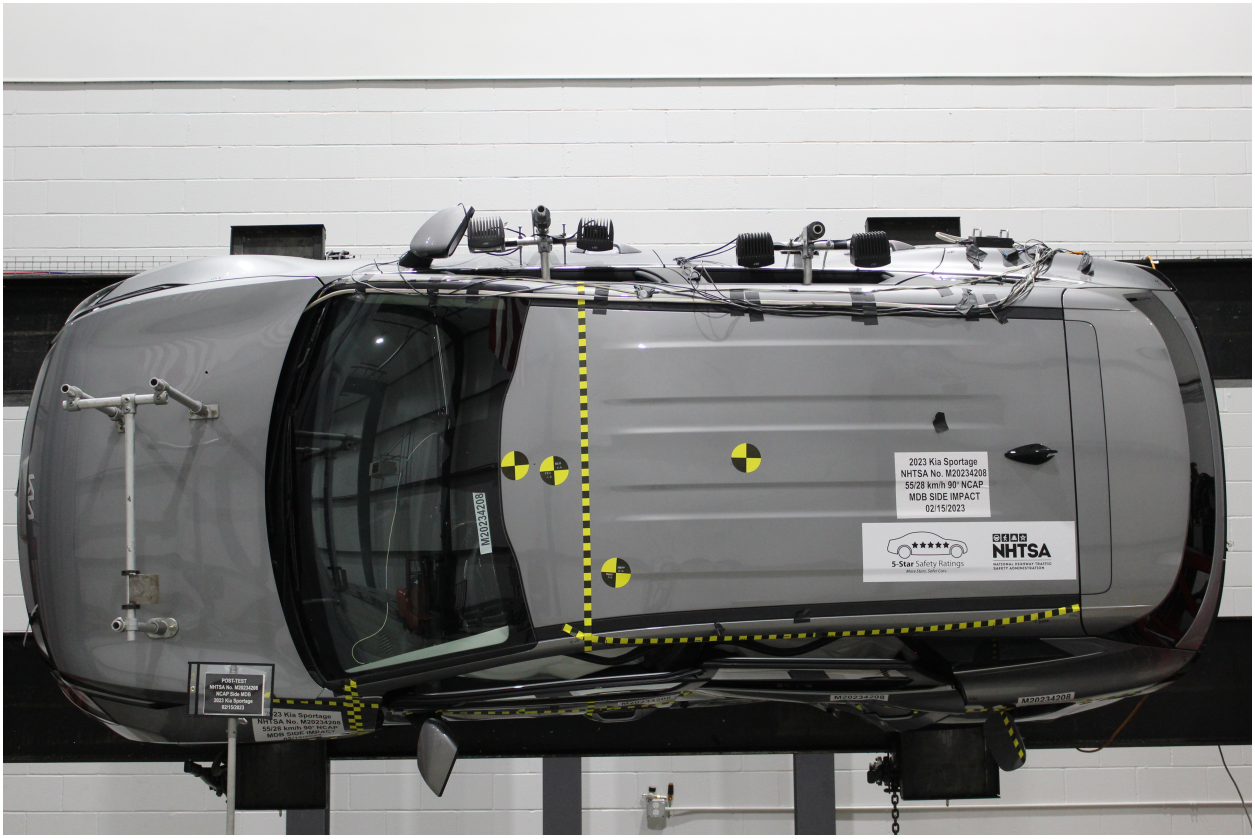


Figure A-97: FMVSS No. 301 Static Rollover 90 Degrees

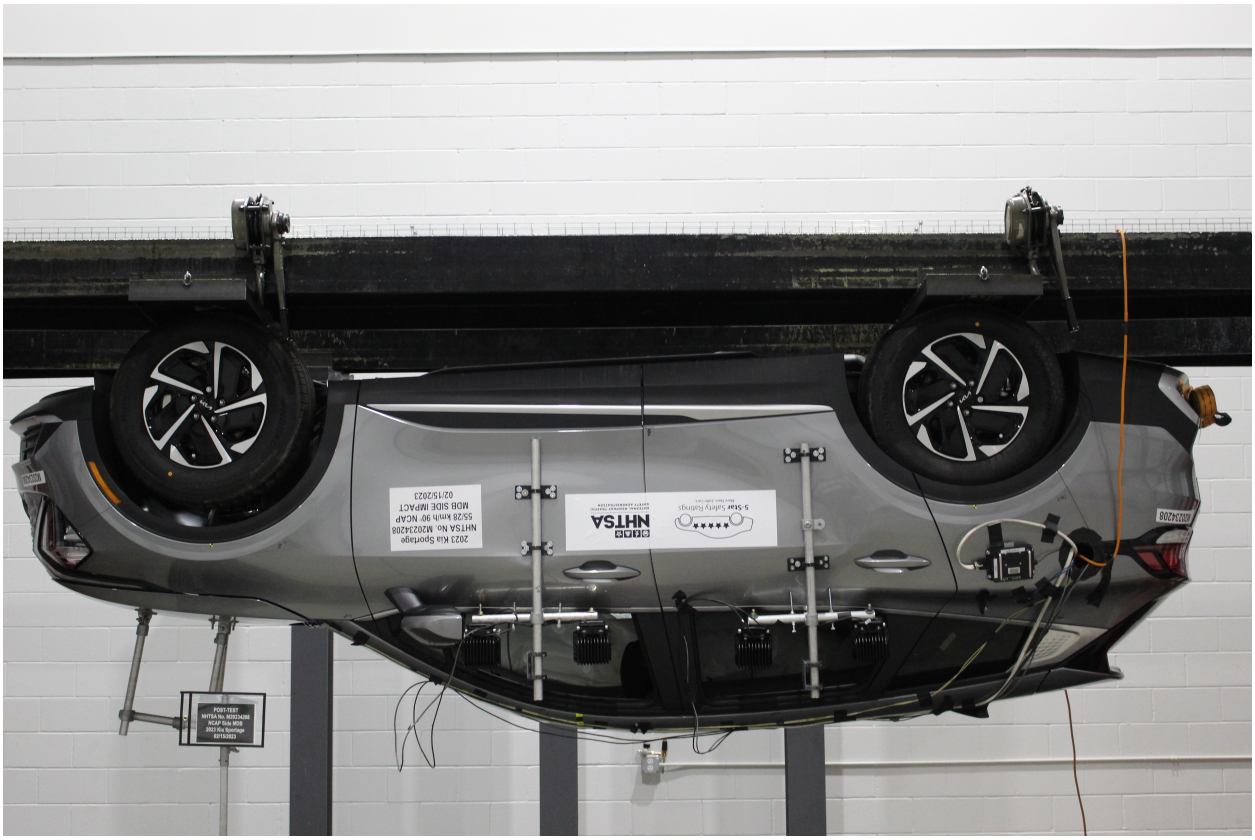


Figure A-98: FMVSS No. 301 Static Rollover 180 Degrees

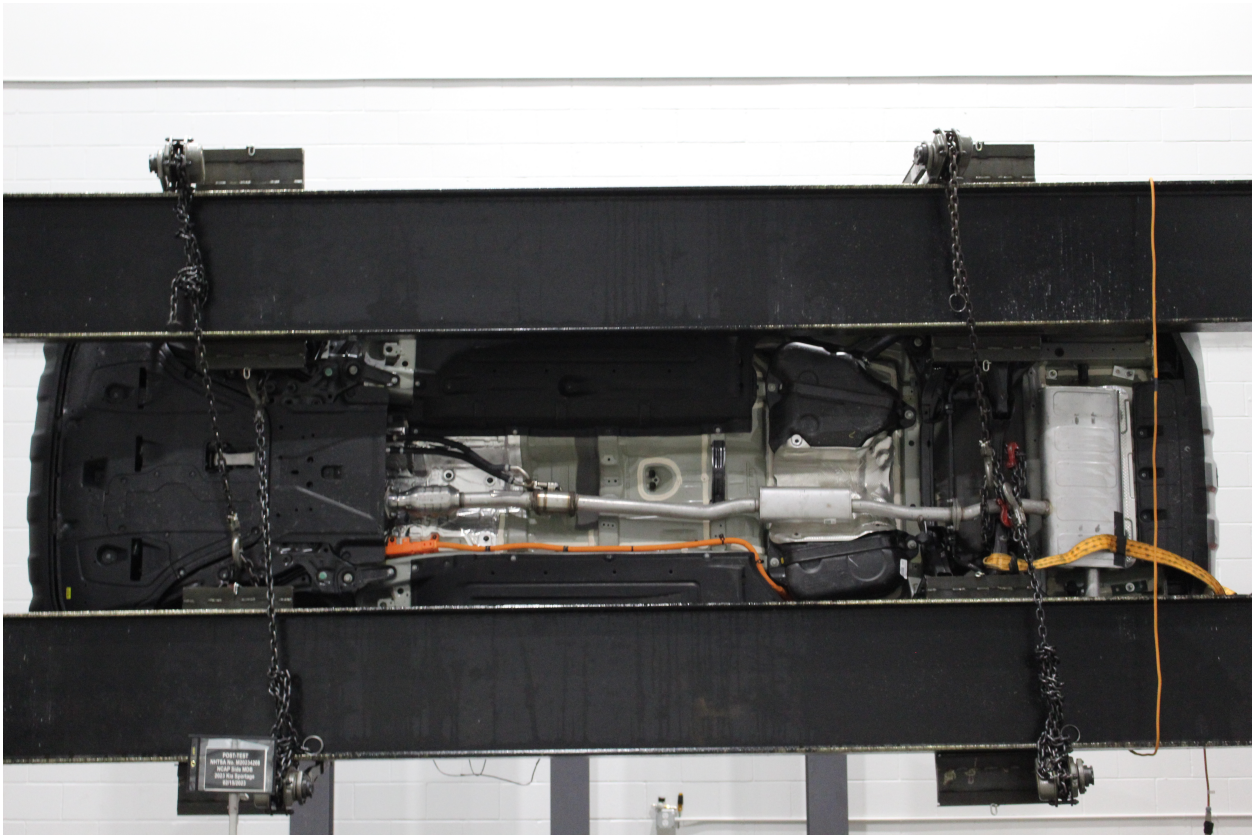


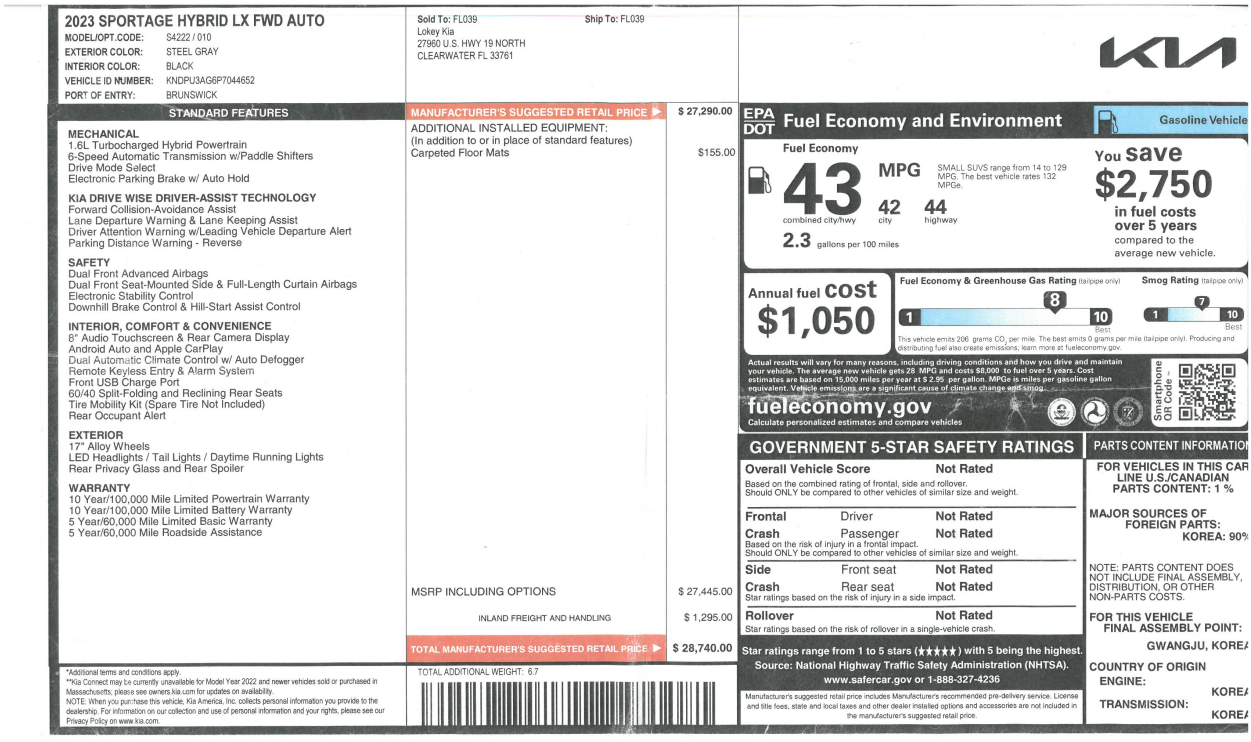
Figure A-99: FMVSS No. 301 Static Rollover 270 Degrees



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



Figure A-101: Impact Event



2023 SPORTAGE HYBRID LX FWD AUTO

MODEL/OPT.CODE: S4222 / 010
EXTERIOR COLOR: STEEL GRAY
INTERIOR COLOR: BLACK
VEHICLE ID NUMBER: KNDPU3AG6P7044652
PORT OF ENTRY: BRUNSWICK

Sold To: FL039 — Ship To: FL039
Lokey Kia
27960 U.S. HWY 19 NORTH
CLEARWATER FL 33761

KIA

STANDARD FEATURES

MECHANICAL
1.6L Turbocharged Hybrid Powertrain
6-Speed Automatic Transmission w/Paddle Shifters
Drive Mode Select
Electronic Parking Brake w/ Auto Hold

KIA DRIVE WISE DRIVER-ASSIST TECHNOLOGY
Forward Collision-Avoidance Assist
Lane Departure Warning & Lane Keeping Assist
Driver Attention Warning w/Leading Vehicle Departure Alert
Parking Distance Warning - Reverse

SAFETY
Dual Front Advanced Airbags
Dual Front Seat-Mounted Side & Full-Length Curtain Airbags
Electronic Stability Control
Downhill Brake Control & Hill-Start Assist Control

INTERIOR, COMFORT & CONVENIENCE
8" Audio Touchscreen & Rear Camera Display
Android Auto and Apple CarPlay
Dual Automatic Climate Control w/ Auto Defogger
Remote Keyless Entry & Alarm System
Front USB Charge Port
60/40 Split-Folding and Reclining Rear Seats
Tire Mobility Kit (Spare Tire Not Included)
Rear Occupant Alert

EXTERIOR
17" Alloy Wheels
LED Headlights / Tail Lights / Daytime Running Lights
Rear Privacy Glass and Rear Spoiler

WARRANTY
10 Year/100,000 Mile Limited Powertrain Warranty
10 Year/100,000 Mile Limited Battery Warranty
5 Year/60,000 Mile Limited Basic Warranty
5 Year/60,000 Mile Roadside Assistance

*Additional terms and conditions apply.
**Kia Connect may be currently unavailable for Model Year 2022 and newer vehicles sold or purchased in Massachusetts, please see owners.kia.com for updates on availability.
NOTE: When you purchase this vehicle, Kia America, Inc. collects personal information you provide to the dealership. For information on our collection and use of personal information and your rights, please see our Privacy Policy on www.kia.com.

MANUFACTURER'S SUGGESTED RETAIL PRICE ▶	$ 27,290.00
ADDITIONAL INSTALLED EQUIPMENT: (In addition to or in place of standard features) Carpeted Floor Mats	$155.00
MSRP INCLUDING OPTIONS	$ 27,445.00
INLAND FREIGHT AND HANDLING	$ 1,295.00
TOTAL MANUFACTURER'S SUGGESTED RETAIL PRICE ▶	$ 28,740.00

TOTAL ADDITIONAL WEIGHT: 67

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy: **43** MPG combined city/hwy (SMALL SUVS range from 14 to 129 MPG. The best vehicle rates 132 MPGe.)
42 city
44 highway
2.3 gallons per 100 miles

You save **$2,750** in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost **$1,050**

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 8 (1–10, Best)
Smog Rating (tailpipe only): 7 (1–10, Best)

This vehicle emits 206 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs $8,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $ 2.95 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score: Not Rated
Based on the combined rating of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash — Driver: Not Rated; Passenger: Not Rated
Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.

Side Crash — Front seat: Not Rated; Rear seat: Not Rated
Star ratings based on the risk of injury in a side impact.

Rollover: Not Rated
Star ratings based on the risk of rollover in a single-vehicle crash.

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest.
Source: National Highway Traffic Safety Administration (NHTSA).
www.safercar.gov or 1-888-327-4236

Manufacturer's suggested retail price includes Manufacturer's recommended pre-delivery service. License and title fees, state and local taxes and other dealer installed options and accessories are not included in the manufacturer's suggested retail price.

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CAR LINE U.S./CANADIAN PARTS CONTENT: 1 %

MAJOR SOURCES OF FOREIGN PARTS: KOREA: 90%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE FINAL ASSEMBLY POINT: GWANGJU, KOREA

COUNTRY OF ORIGIN
ENGINE: KOREA
TRANSMISSION: KOREA

Figure A-102: Monroney Label

3. Release the switch once the seat reaches the desired position.

Adjusting lumbar support for driver's seat (if equipped)

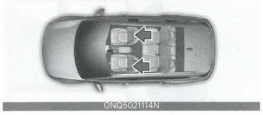


The lumbar support can be adjusted by pressing the lumbar support switch on the side of the seat.

1. Press the front portion (1) of the switch to increase support or the rear portion (2) of the switch to decrease support.
2. Release the switch once it reaches the desired position.

Headrest for front seat

The driver's and front passenger's seats are equipped with a headrest for the occupant's safety and comfort.



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

For maximum effectiveness in case of an accident, 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 head is similar with the height of 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.

⚠ WARNING

Headrest removal/adjustment

- Do not operate the vehicle with the headrests removed. Headrests can provide critical neck and head support in a crash.
- Do not adjust the headrest height while the vehicle is in motion. Driver may lose control of the vehicle.

⚠ CAUTION

Excessive pulling or pushing may damage the headrest.

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).

4

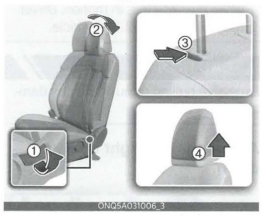
✻ NOTICE

If you recline the seatback towards the front with the headrest and seat cushion raised, the headrest may come in contact with the sun visor or other parts of the vehicle.

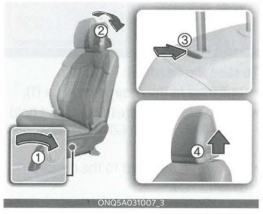


Removing headrest

Type A



Type B



To remove the headrest:

1. Recline the seatback (2) with the recline lever or switch (1).
2. Raise headrest as far as it can go.
3. Press the headrest release button (3) while pulling the headrest up (4).

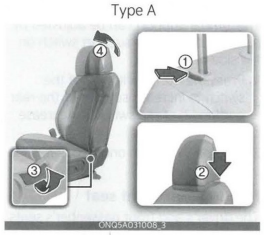
⚠ WARNING

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 a crash.

Reinstalling headrest

Type A



Type B

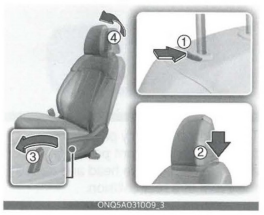


Figure A-103: Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

Safety features of your vehicle Seat

3. Release the switch once the seat reaches the desired position.

Adjusting lumbar support for driver's seat (if equipped)

The lumbar support can be adjusted by pressing the lumbar support switch on the side of the seat.

1. Press the front portion (1) of the switch to increase support or the rear portion (2) of the switch to decrease support.
2. Release the switch once it reaches the desired position.

Headrest for front seat

The driver's and front passenger's seats are equipped with a headrest for the occupant's safety and comfort.

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

For maximum effectiveness in case of an accident, 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 head is similar with the height of 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.

⚠ WARNING

Headrest removal/adjustment

- Do not operate the vehicle with the headrests removed. Headrests can provide critical neck and head support in a crash.
- Do not adjust the headrest height while the vehicle is in motion. Driver may lose control of the vehicle.

⚠ CAUTION

Excessive pulling or pushing may damage the headrest.

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).

4

✻ NOTICE

If you recline the seatback towards the front with the headrest and seat cushion raised, the headrest may come in contact with the sun visor or other parts of the vehicle.

Removing headrest

Type A

Type B

To remove the headrest:

1. Recline the seatback (2) with the recline lever or switch (1).
2. Raise headrest as far as it can go.
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 a crash.

Reinstalling headrest

Type A

Type B

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



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)

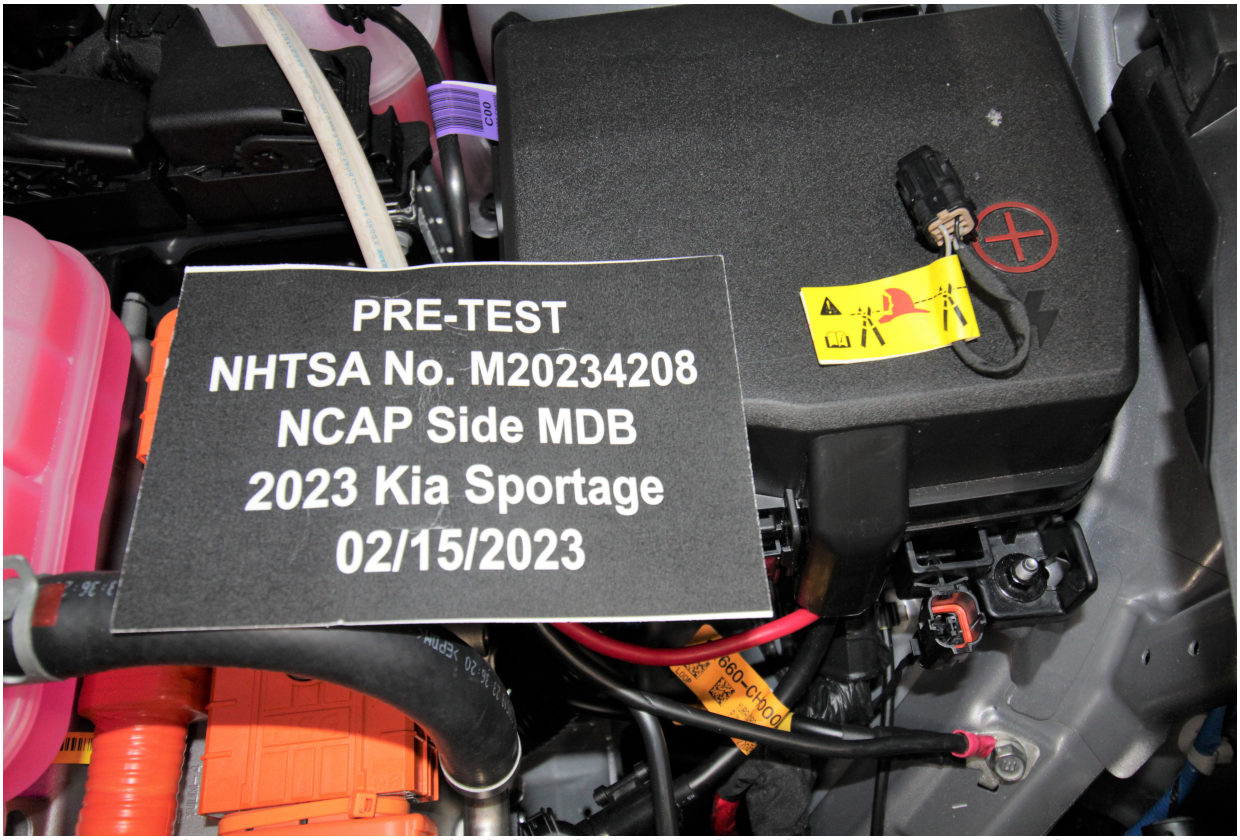


Figure 305-8: Manual High Voltage Service Disconnect Removed (Location where removed)

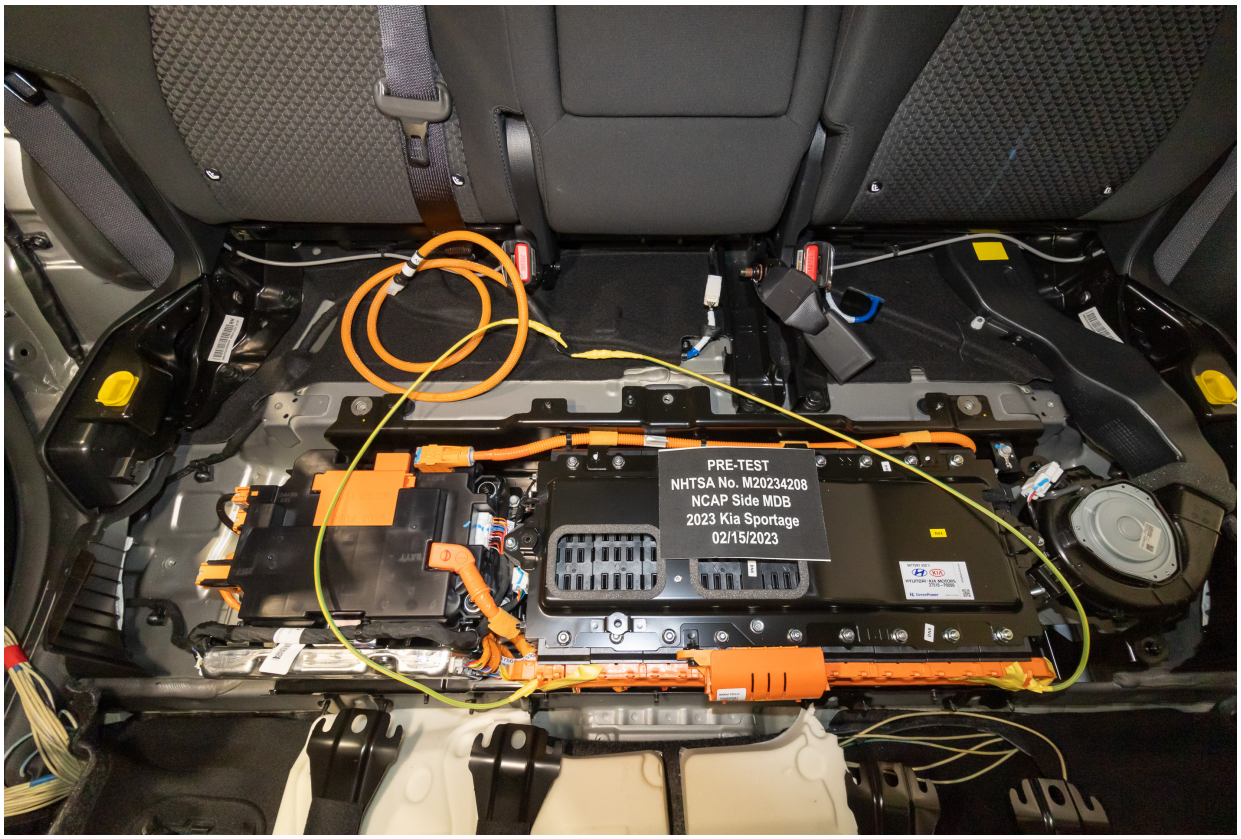


Figure 305-9: Pre-Impact View of Propulsion Battery



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

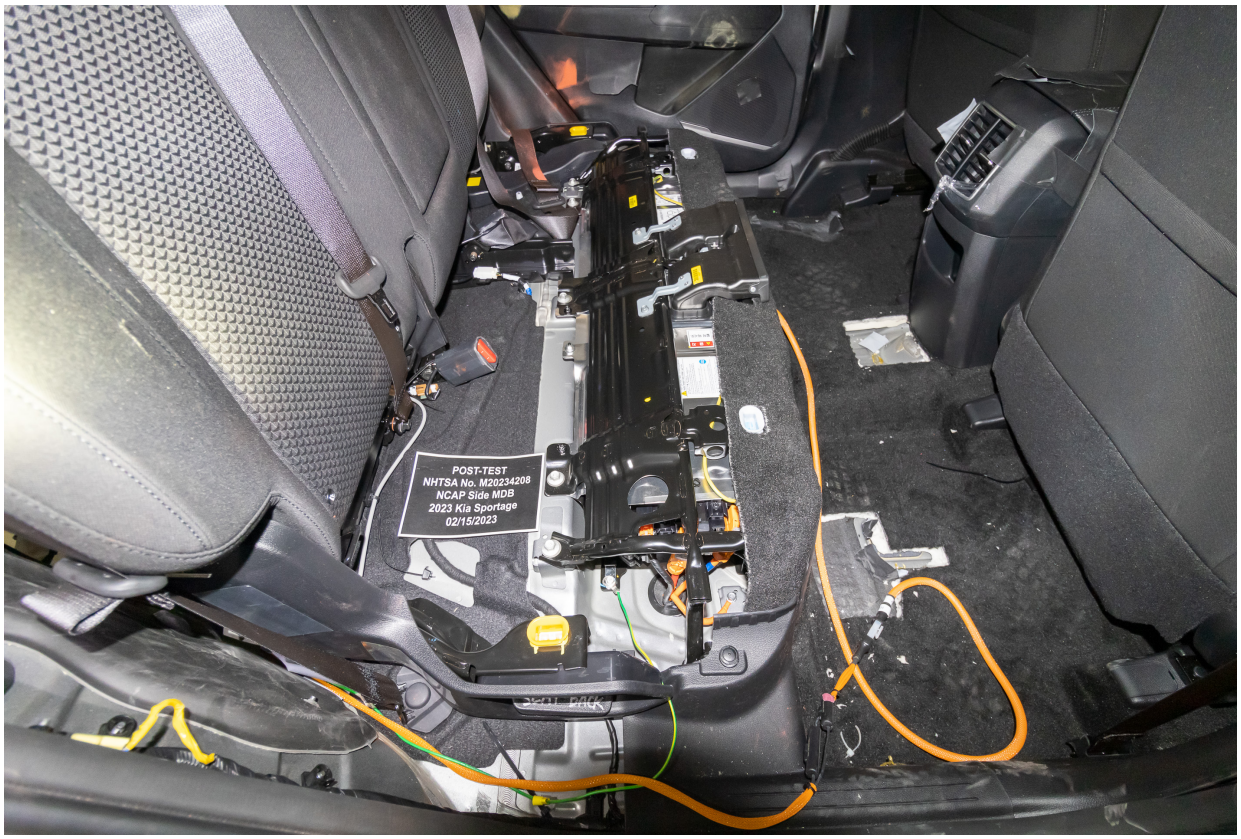


Figure 305-11: Post-Impact Rear View of Propulsion Battery (if any part of it is visible)

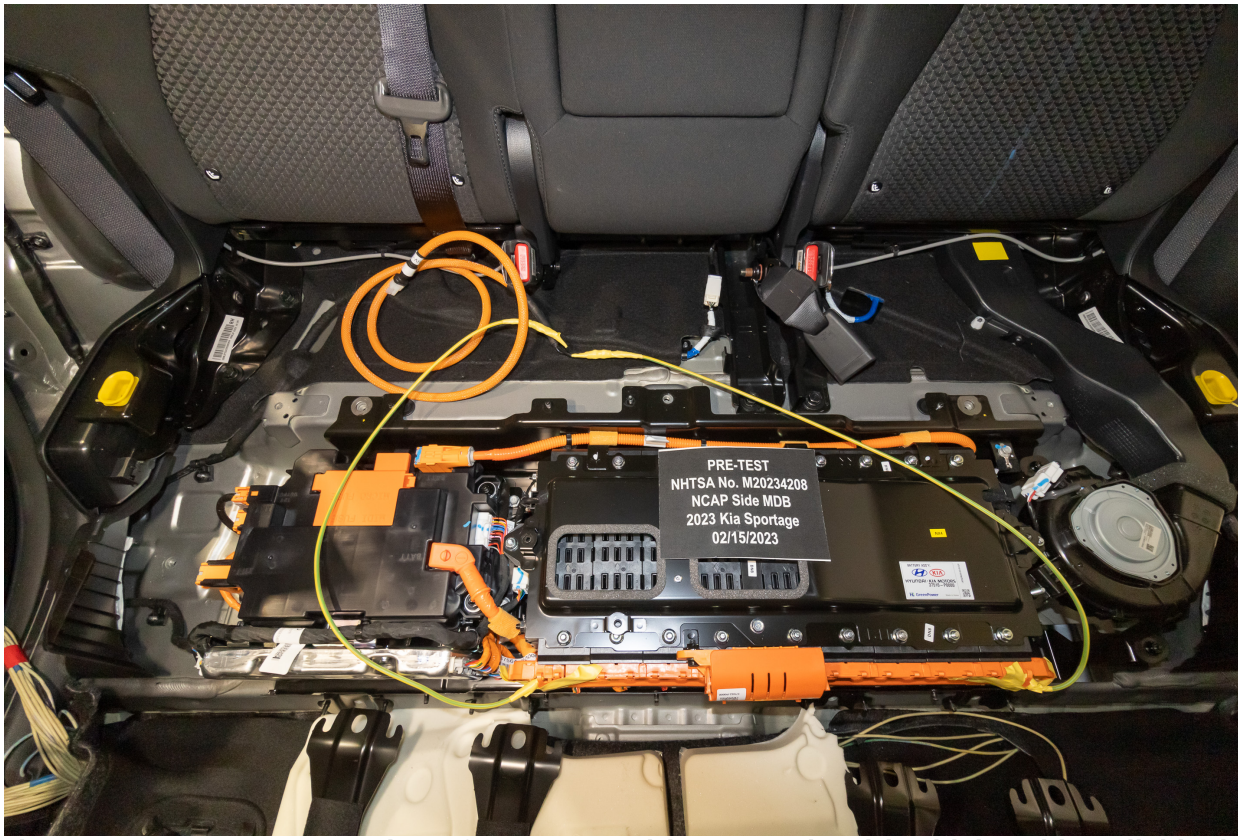


Figure 305-12: Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules



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)

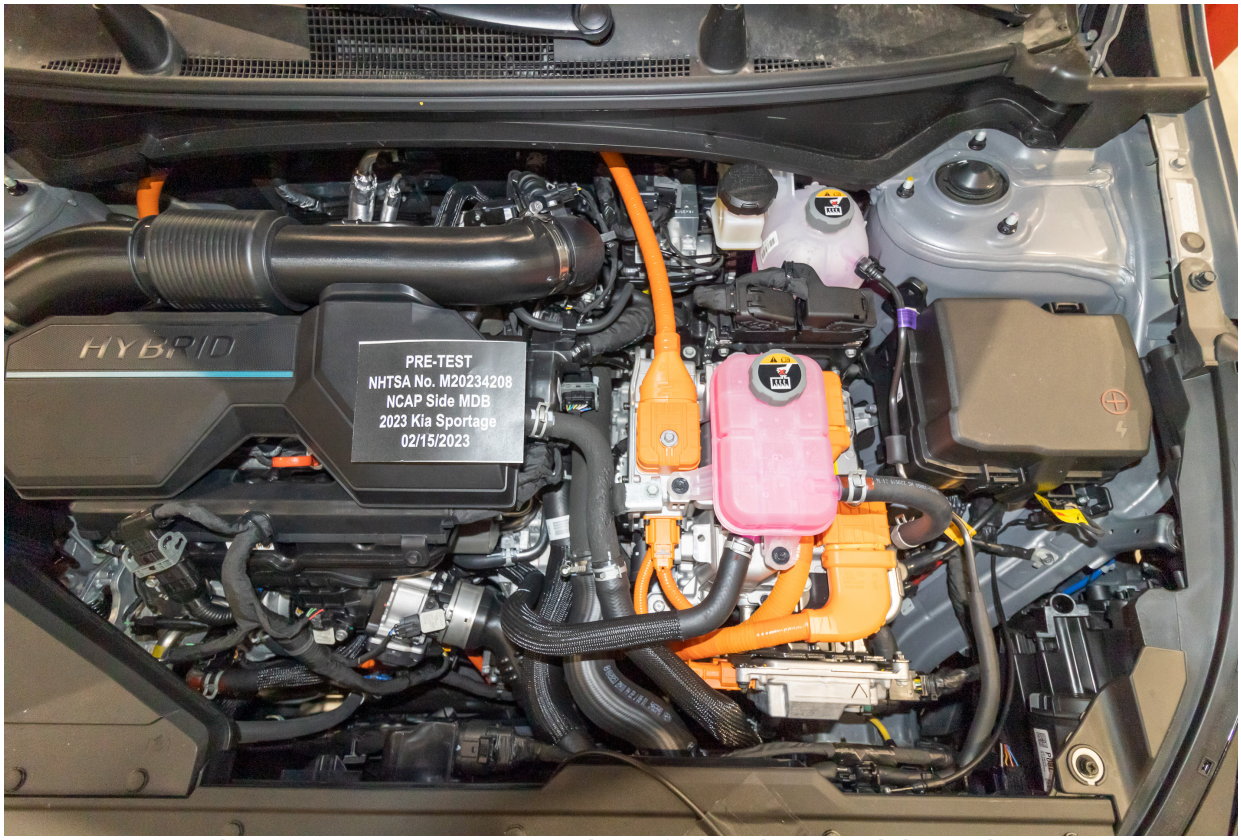


Figure 305-16: Pre-Impact View of Electric Propulsion Drive



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)

Photo Not Applicable

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



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



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



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

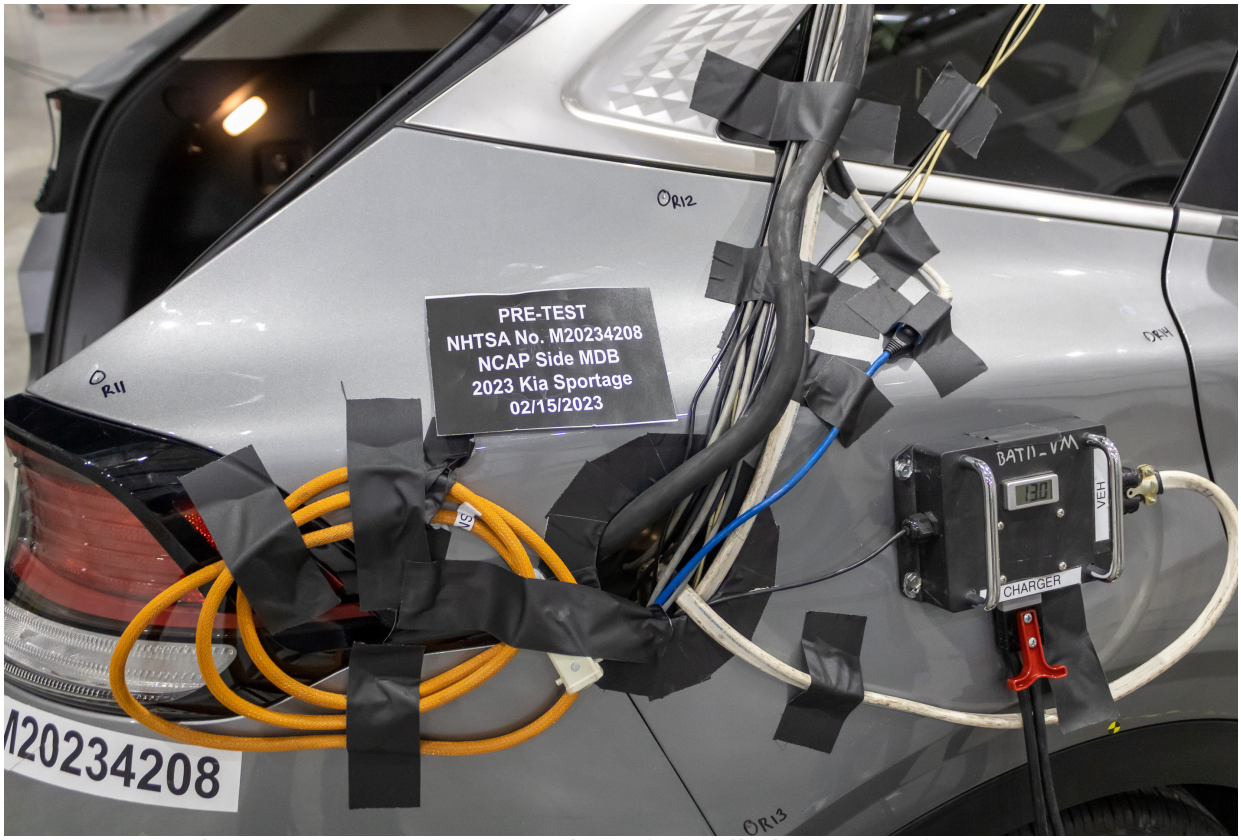


Figure 305-24: Pre-Impact View of Installed Test Interface Port

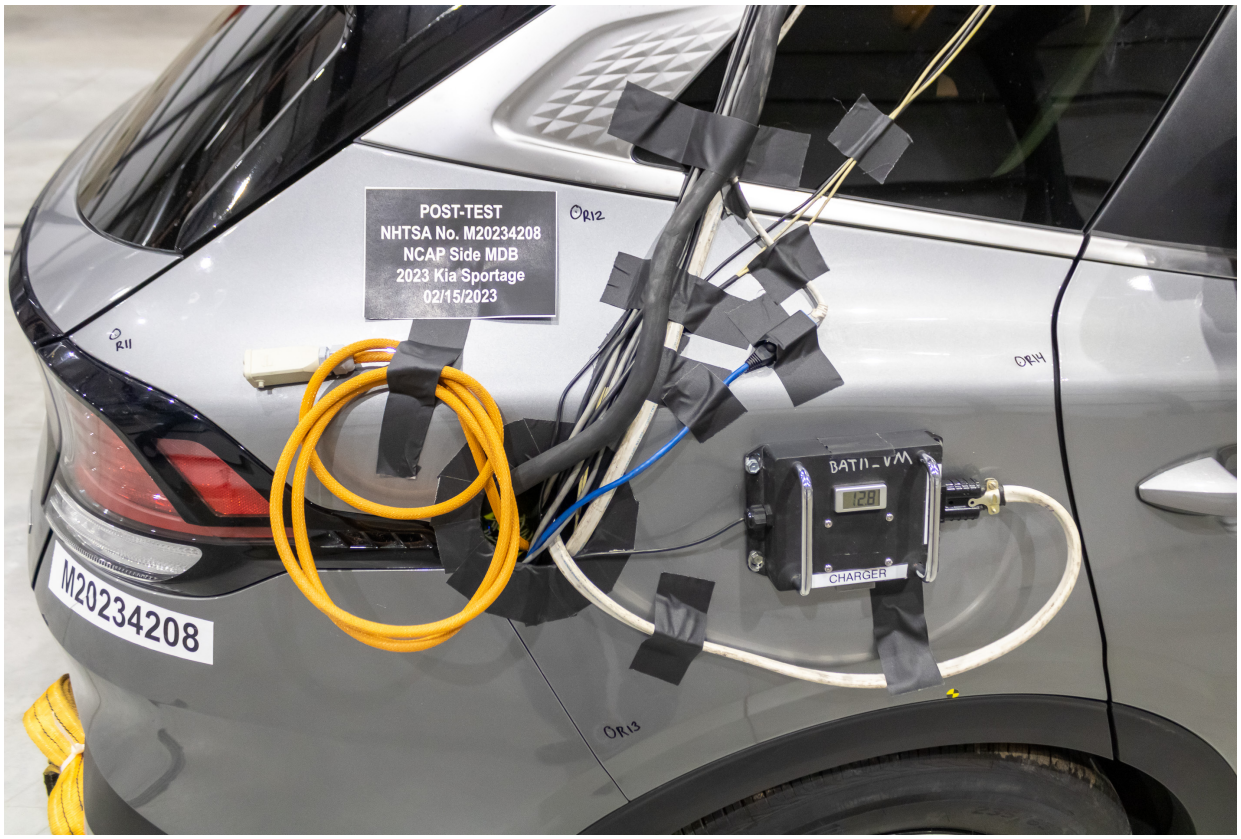


Figure 305-25: Post-Impact View of Installed Test Interface Port

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

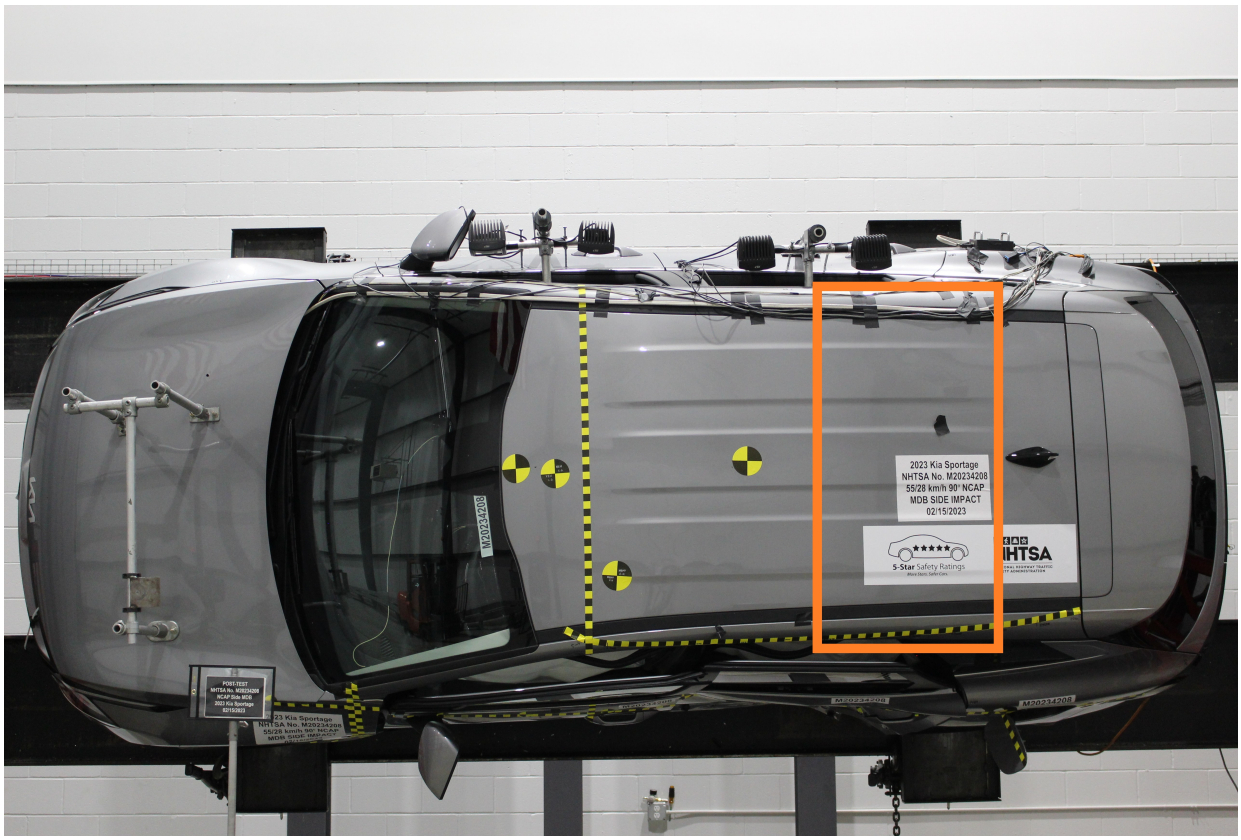


Figure 305-28: FMVSS No. 305 Static Rollover 90 Degrees



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

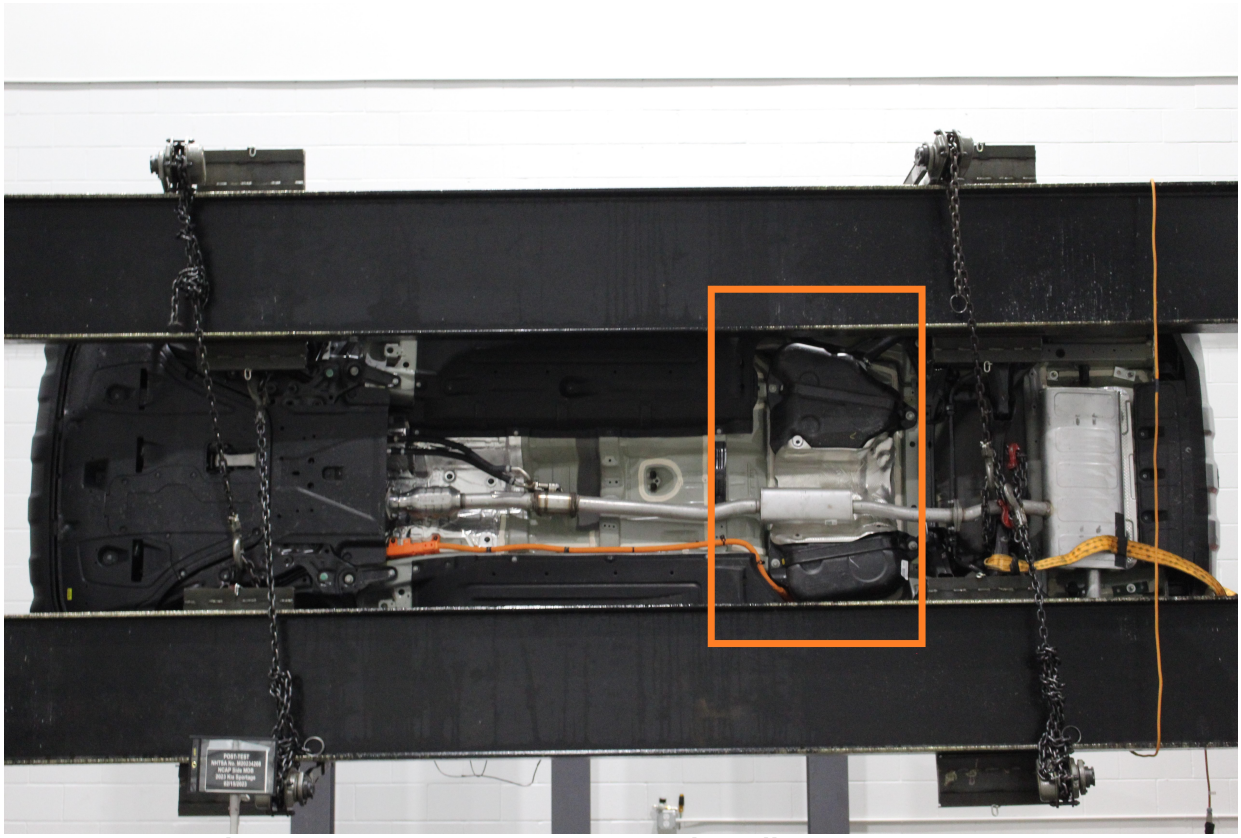


Figure 305-30: FMVSS No. 305 Static Rollover 270 Degrees

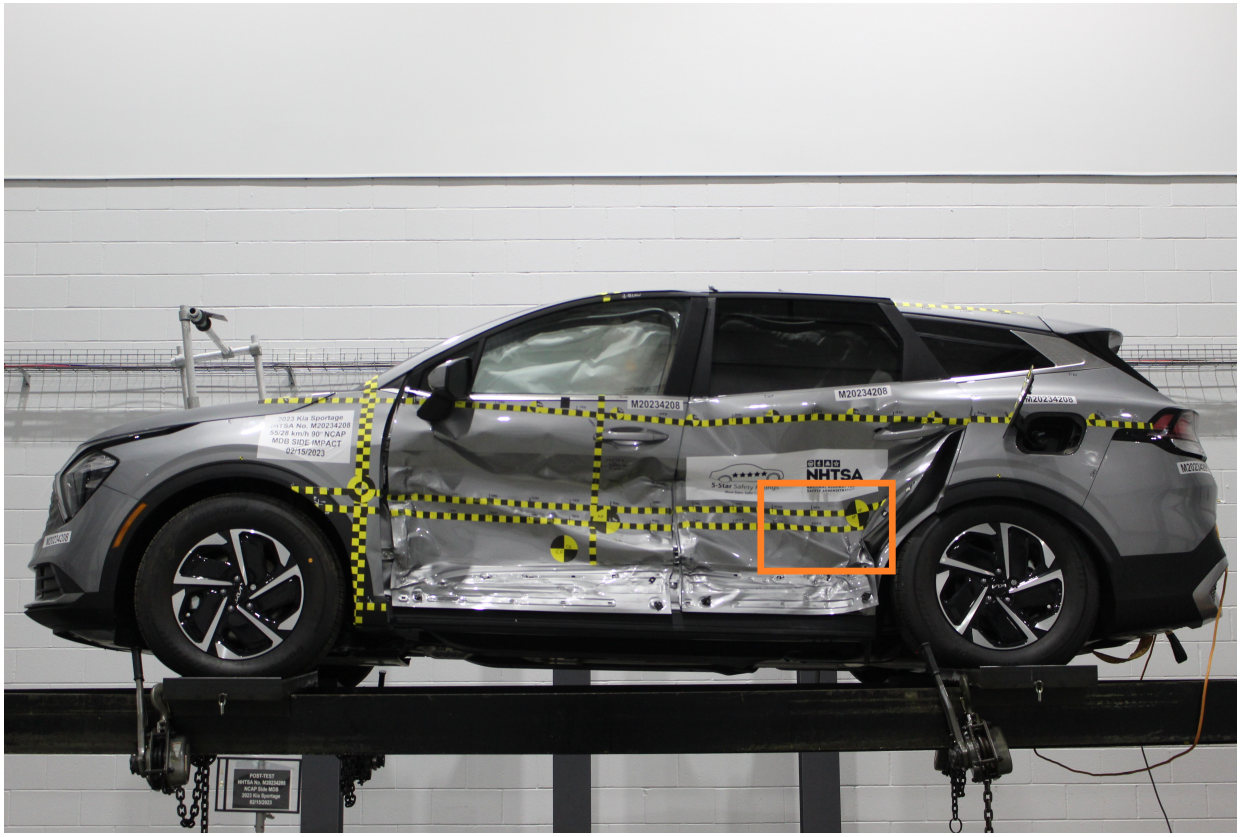


Figure 305-31: FMVSS No. 305 Static Rollover 360 Degrees



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)

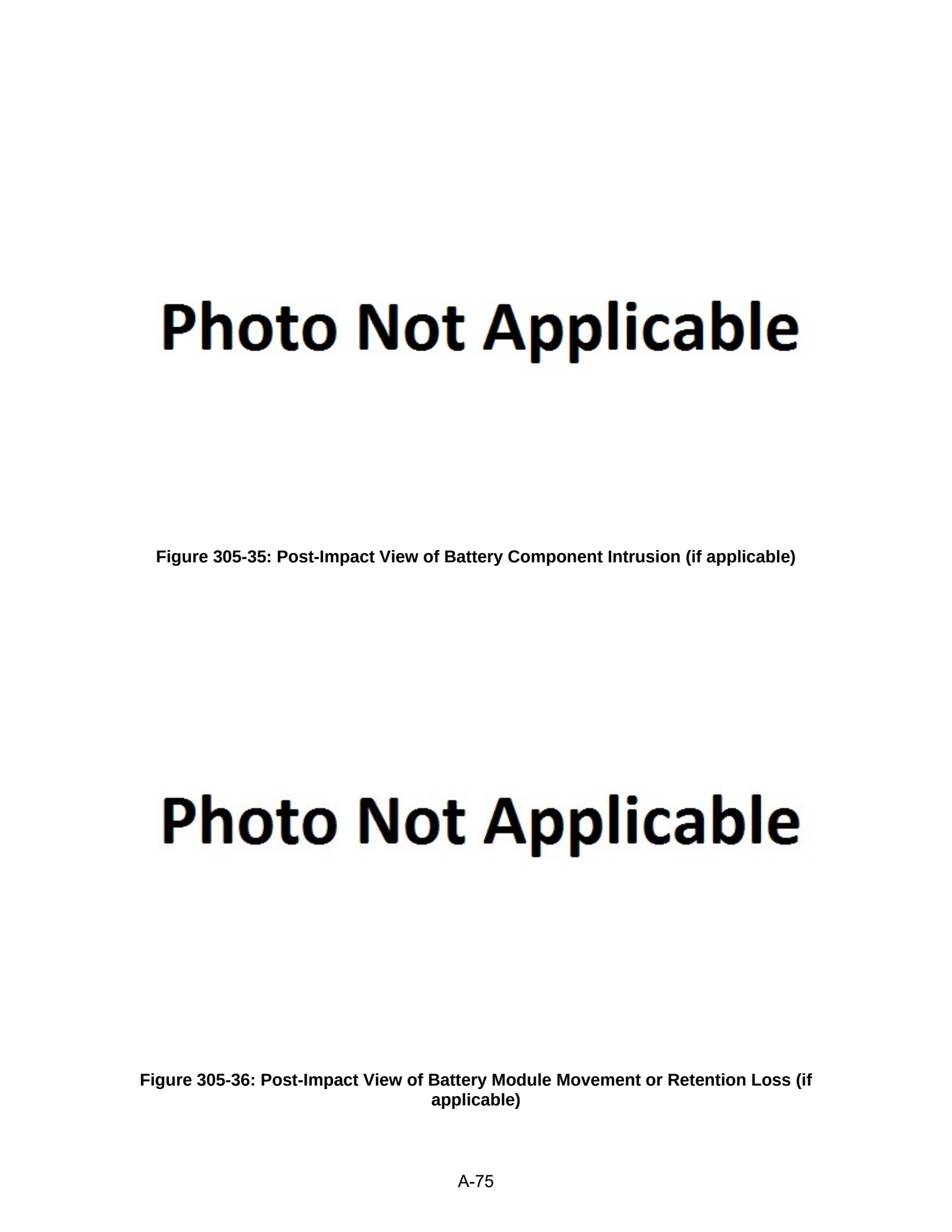


Figure 305-35: Post-Impact View of Battery Component Intrusion (if applicable)

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

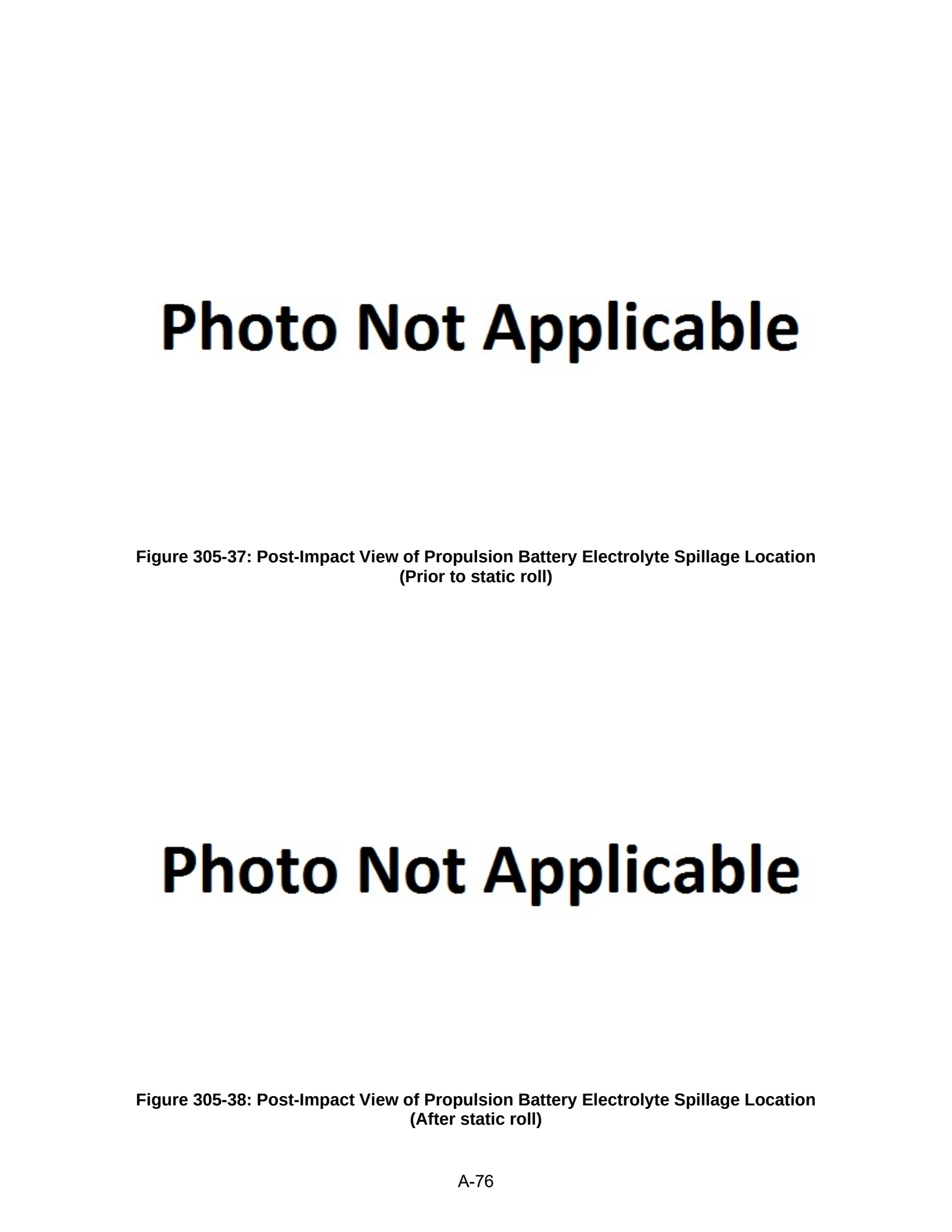


Figure 305-37: Post-Impact View of Propulsion Battery Electrolyte Spillage Location (Prior to static roll)

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

APPENDIX B
VEHICLE & DUMMY RESPONSE DATA TRACES

Table of Data Plots
Driver Dummy Instrumentation Plots

Fig.	Description	Page
Plot 1	Driver Head Acceleration (X) Primary vs. Time	B-5
Plot 2	Driver Head Acceleration (Y) Primary vs. Time	B-5
Plot 3	Driver Head Acceleration (Z) Primary vs. Time	B-5
Plot 4	Driver Head Resultant Acceleration Primary vs. Time	B-5
Plot 5	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-6
Plot 6	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-6
Plot 7	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-6
Plot 8	Driver Thorax Rib Deflection Maximum vs. Time	B-6
Plot 9	Driver Anterior Abdominal Force (Y) vs. Time	B-7
Plot 10	Driver Middle Abdominal Force (Y) vs. Time	B-7
Plot 11	Driver Posterior Abdominal Force (Y) vs. Time	B-7
Plot 12	Driver Total Abdominal Force (Y) vs. Time	B-7
Plot 13	Driver Pubic Symphysis Force (Y) vs. Time	B-8
Plot 14	Passenger Head Acceleration (X) vs. Time Primary	B-8
Plot 15	Passenger Head Acceleration (Y) vs. Time Primary	B-8
Plot 16	Passenger Head Acceleration (Z) vs. Time Primary	B-8
Plot 17	Passenger Head Resultant Acceleration Primary vs. Time	B-9
Plot 18	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-9
Plot 19	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-9
Plot 20	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-9
Plot 21	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-10
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)

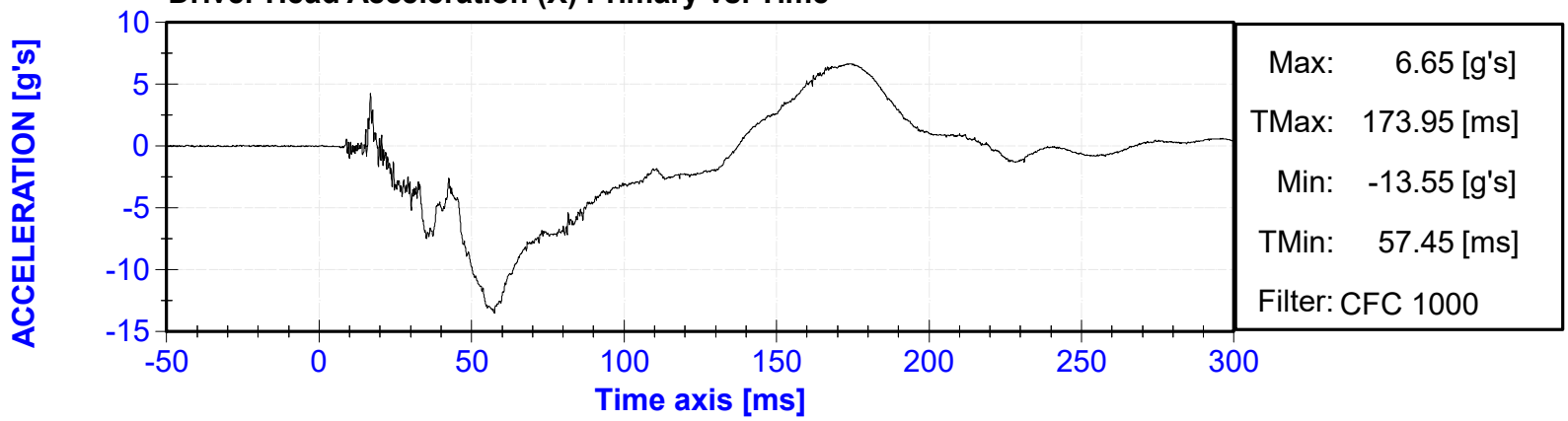
Vehicle Instrumentation Data

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)

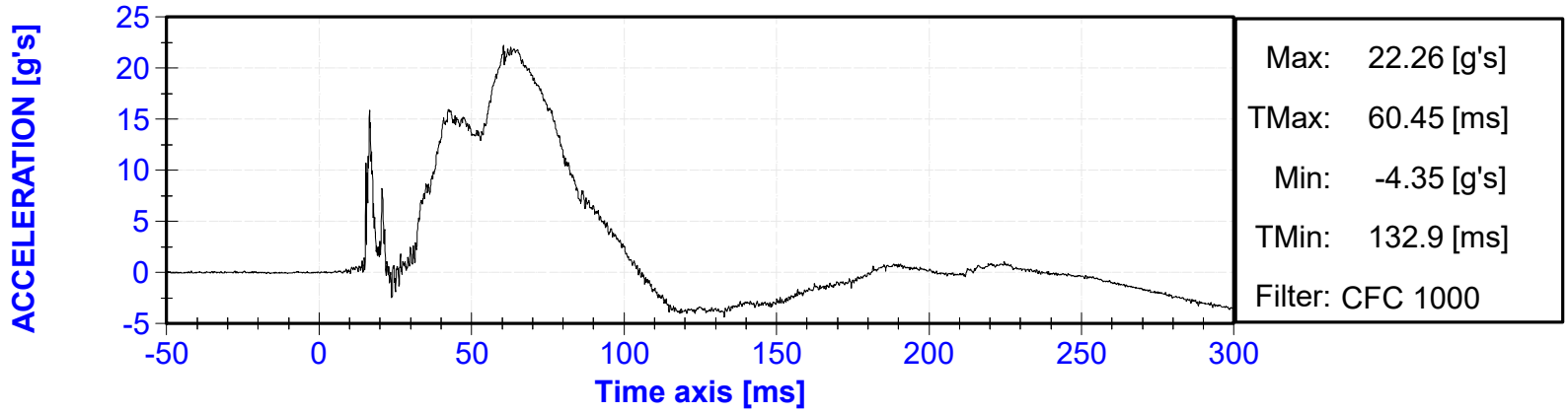
MDB Instrumentation Data

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

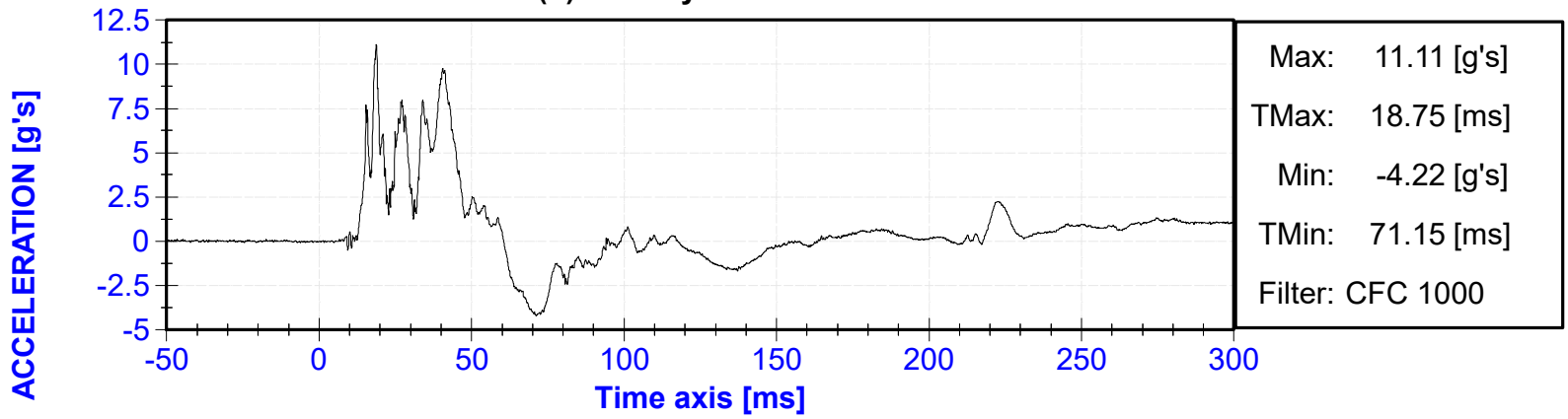
Driver Head Acceleration (X) Primary vs. Time



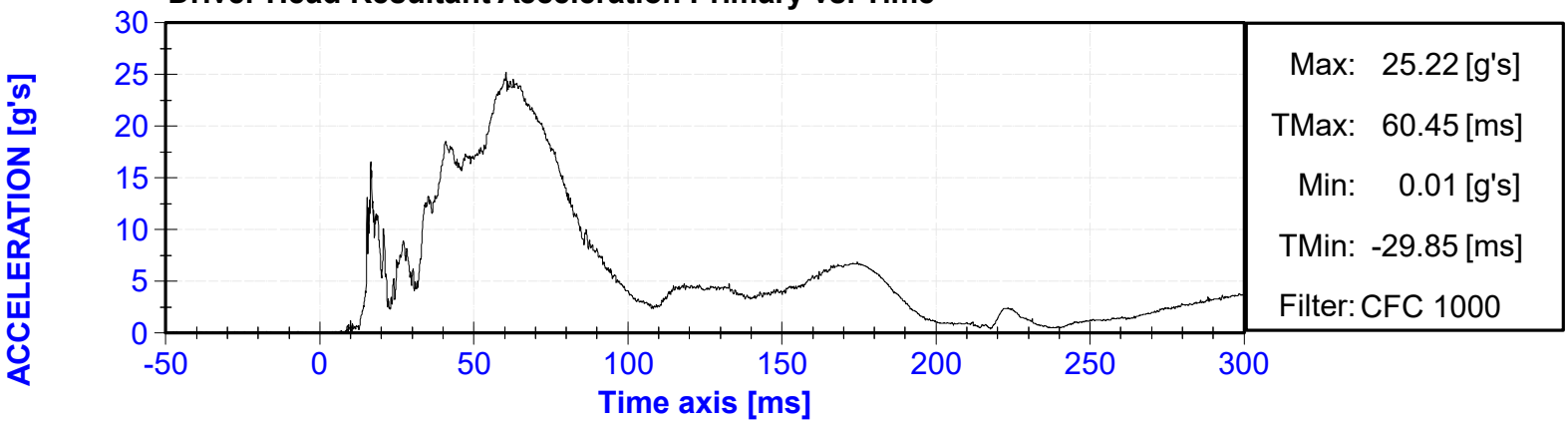
Driver Head Acceleration (Y) Primary vs. Time



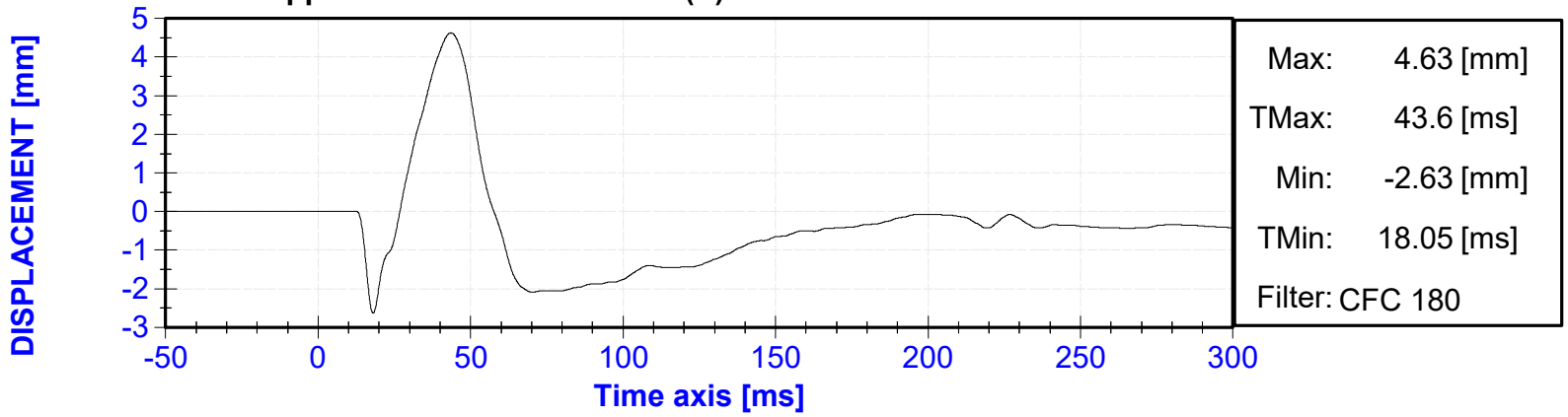
Driver Head Acceleration (Z) Primary vs. Time



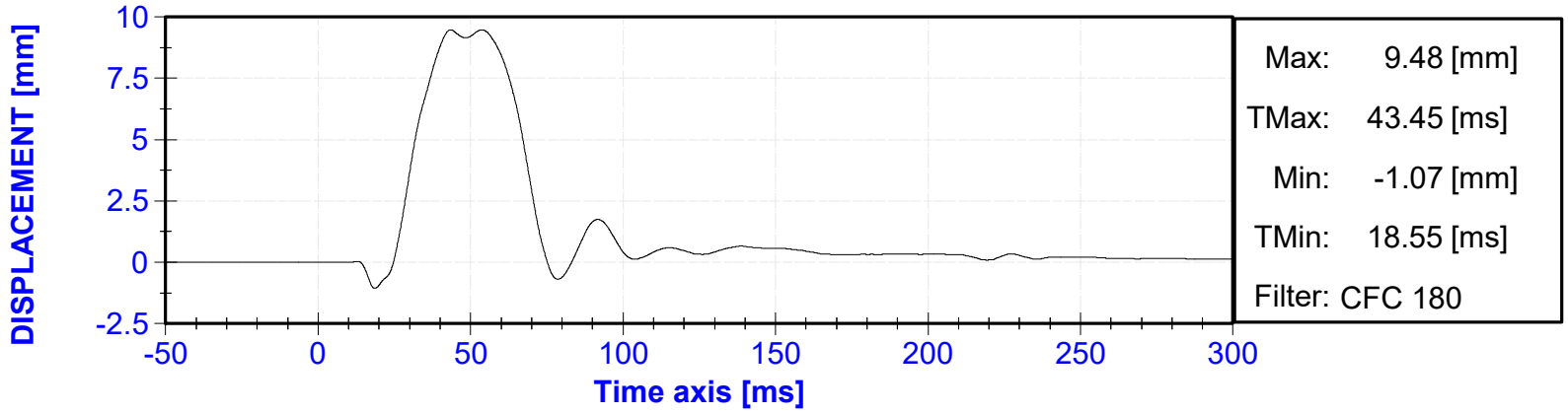
Driver Head Resultant Acceleration Primary vs. Time



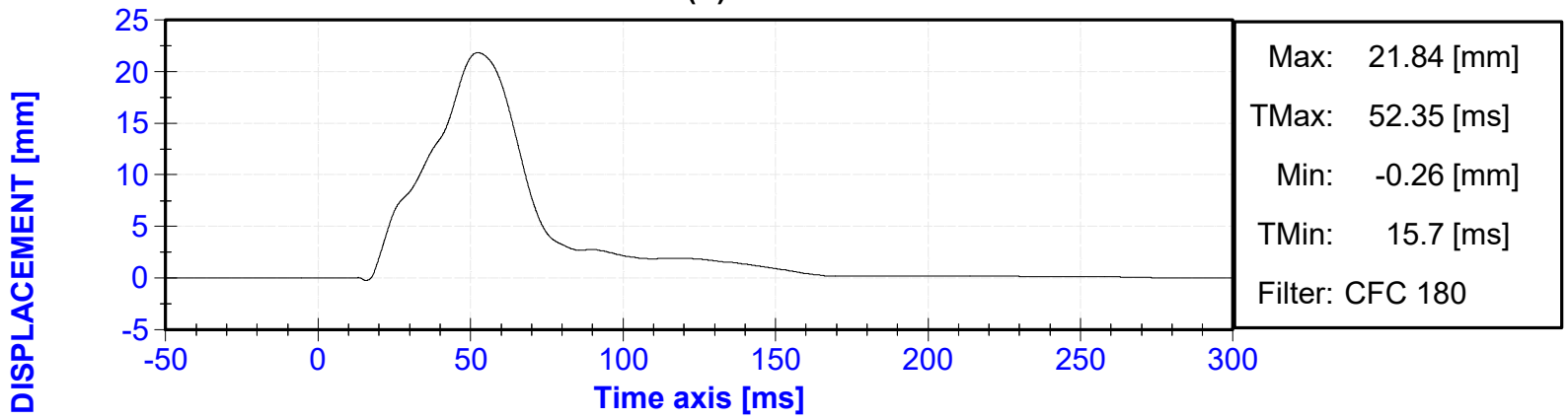
Driver Upper Thorax Rib Deflection (Y) vs. Time



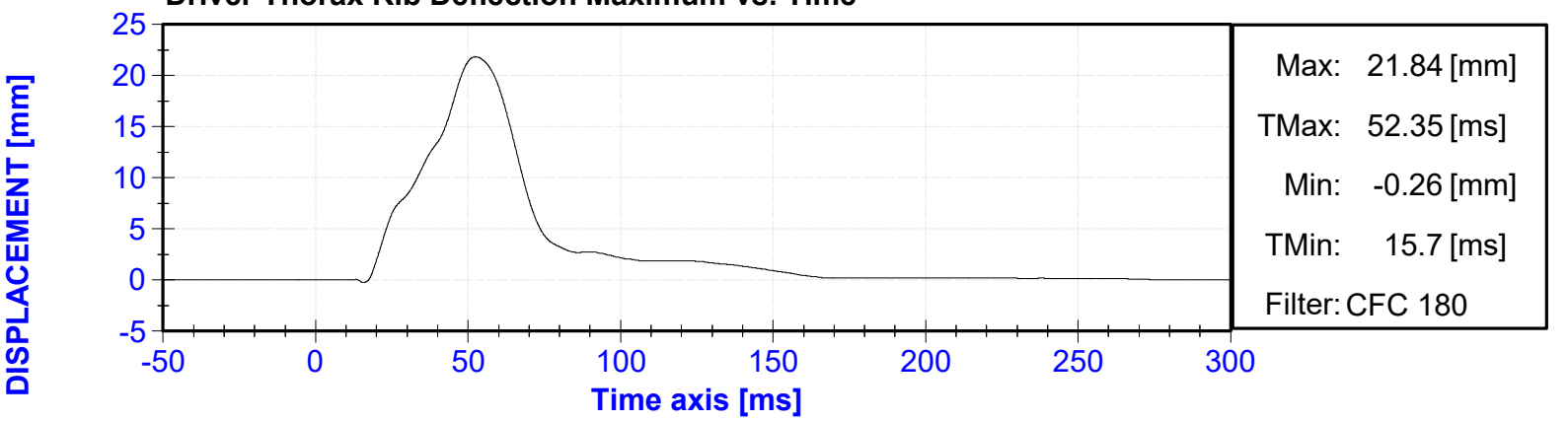
Driver Middle Thorax Rib Deflection (Y) vs. Time



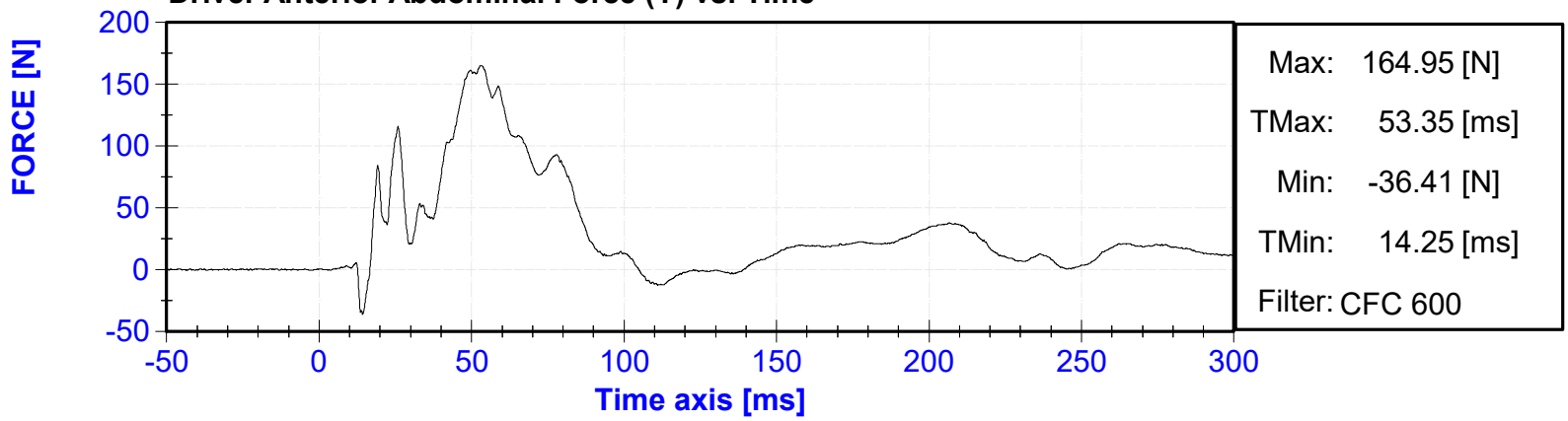
Driver Lower Thorax Rib Deflection (Y) vs. Time



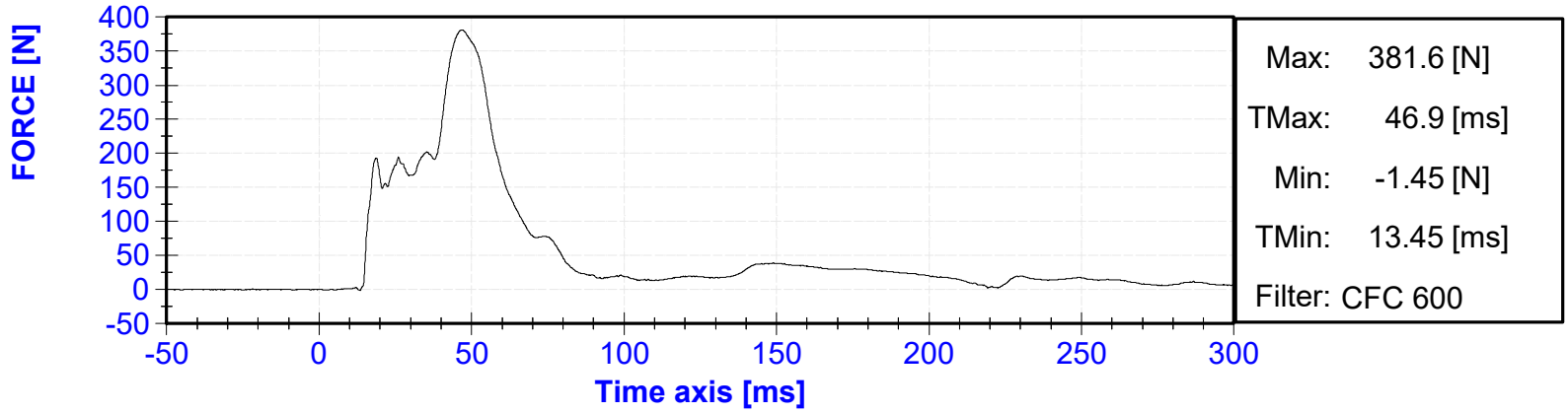
Driver Thorax Rib Deflection Maximum vs. Time



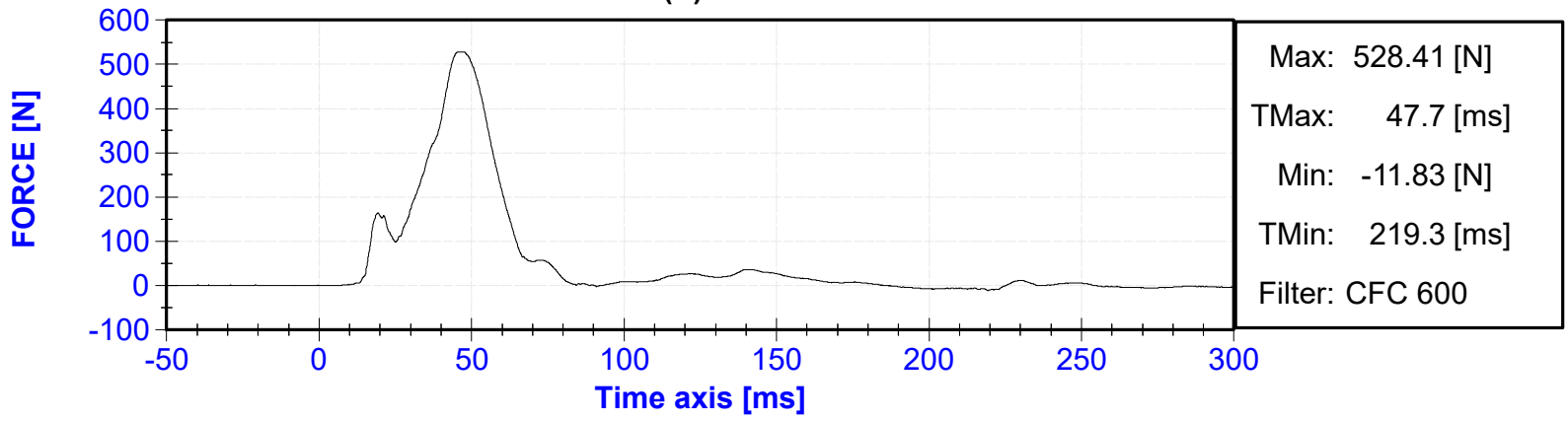
Driver Anterior Abdominal Force (Y) vs. Time



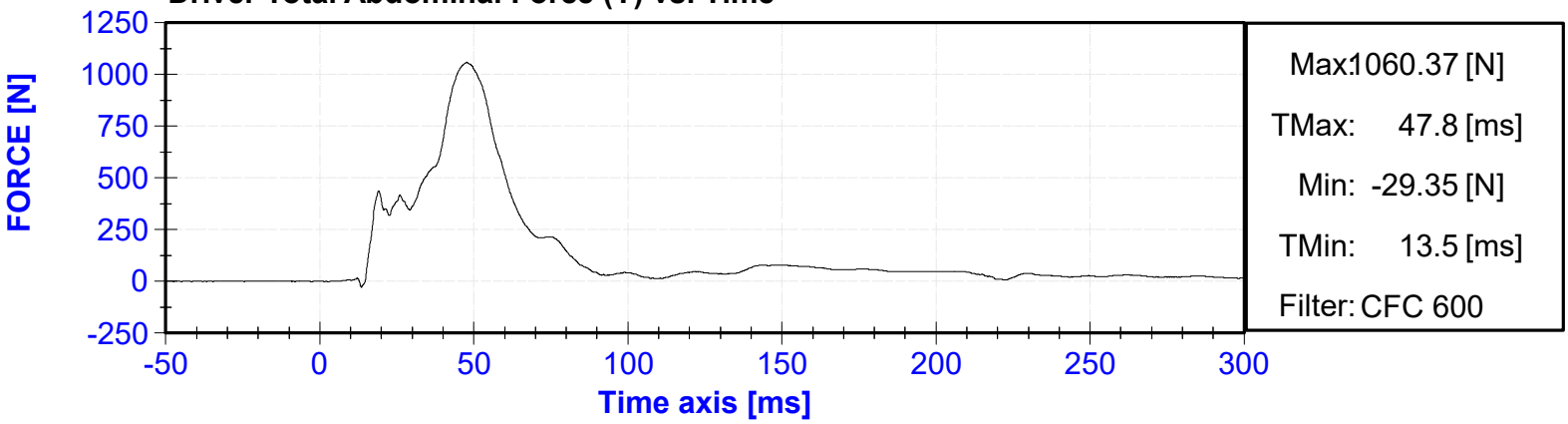
Driver Middle Abdominal Force (Y) vs. Time



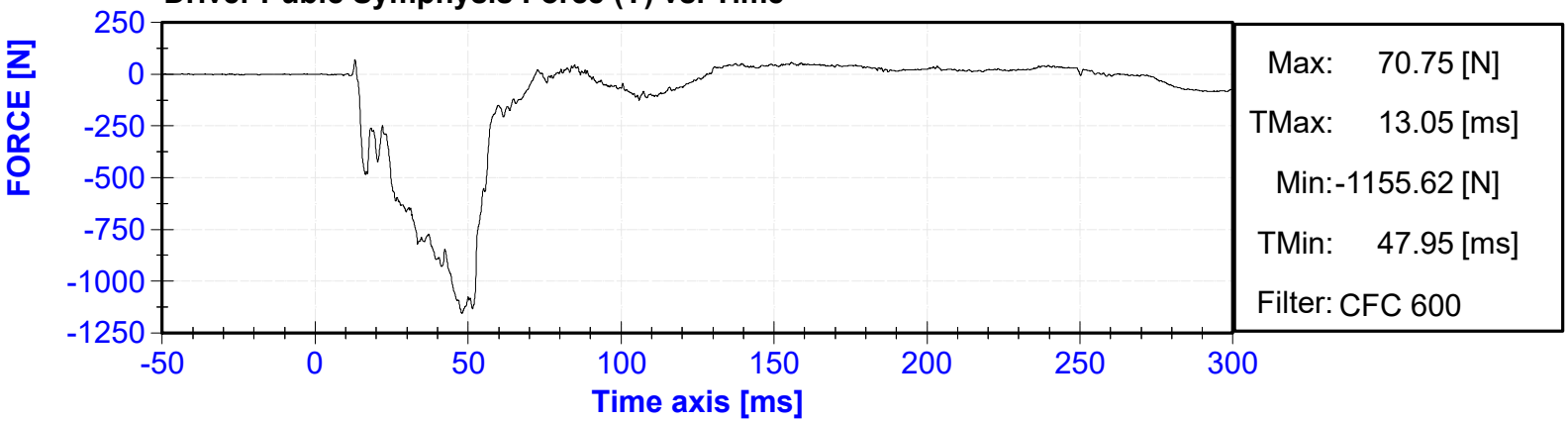
Driver Posterior Abdominal Force (Y) vs. Time



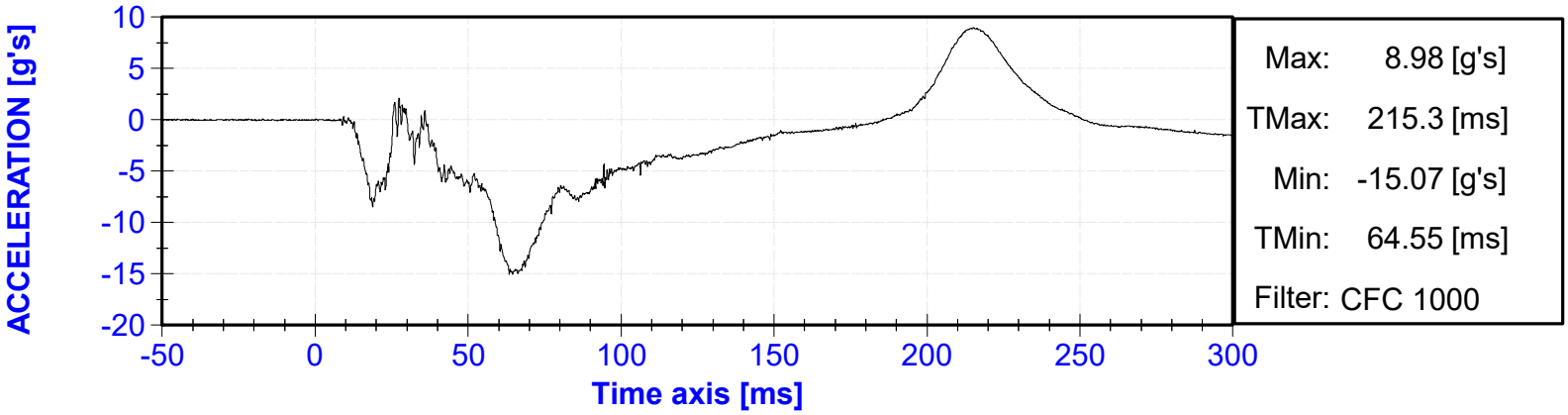
Driver Total Abdominal Force (Y) vs. Time



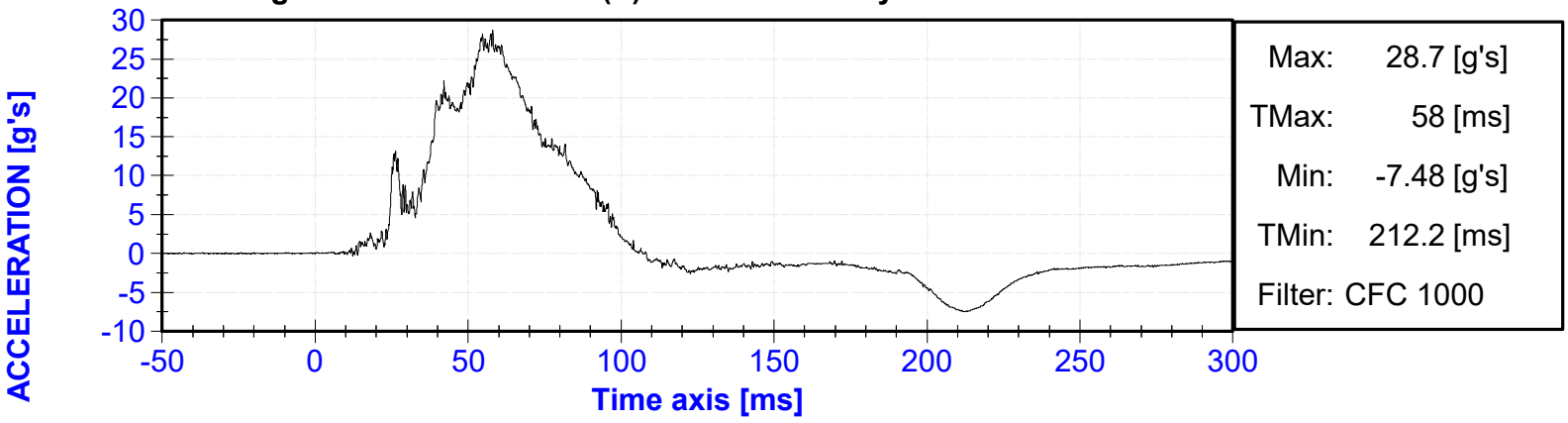
Driver Pubic Symphysis Force (Y) vs. Time



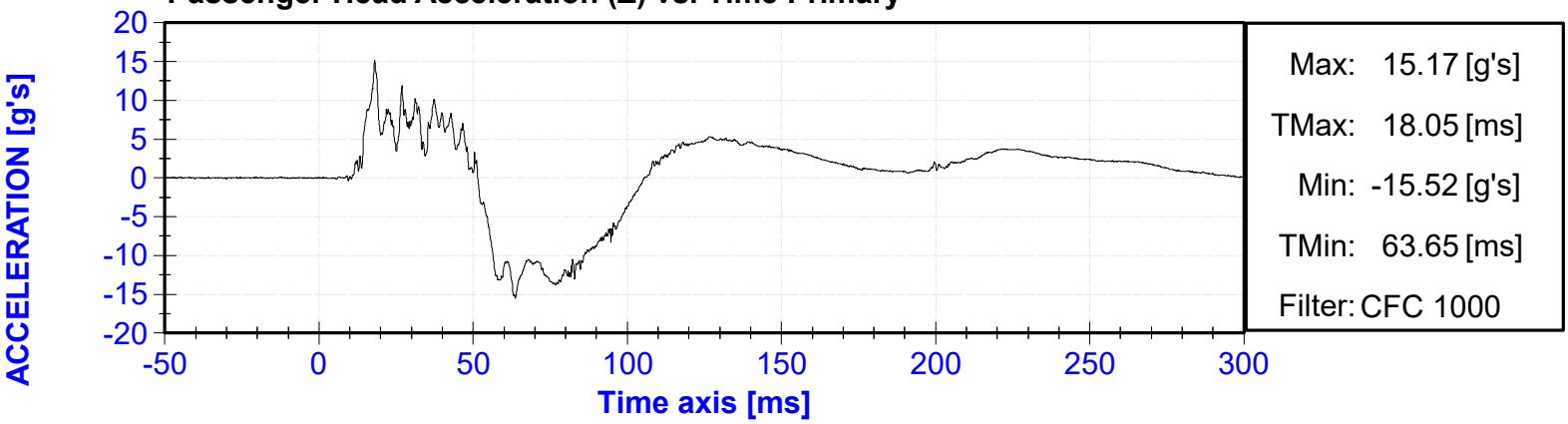
Passenger Head Acceleration (X) vs. Time Primary



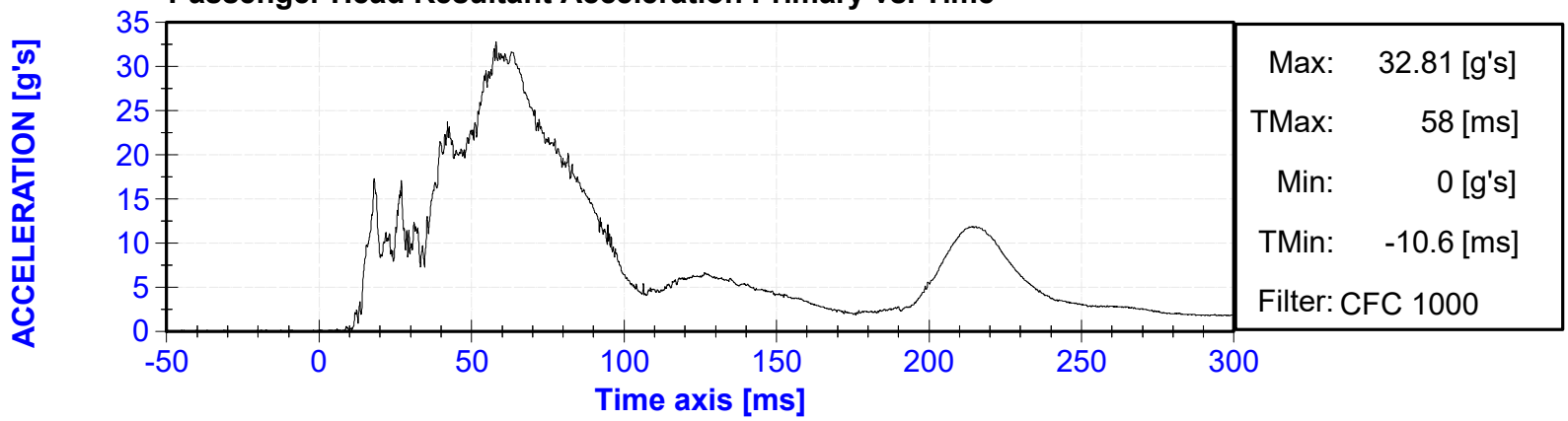
Passenger Head Acceleration (Y) vs. Time Primary



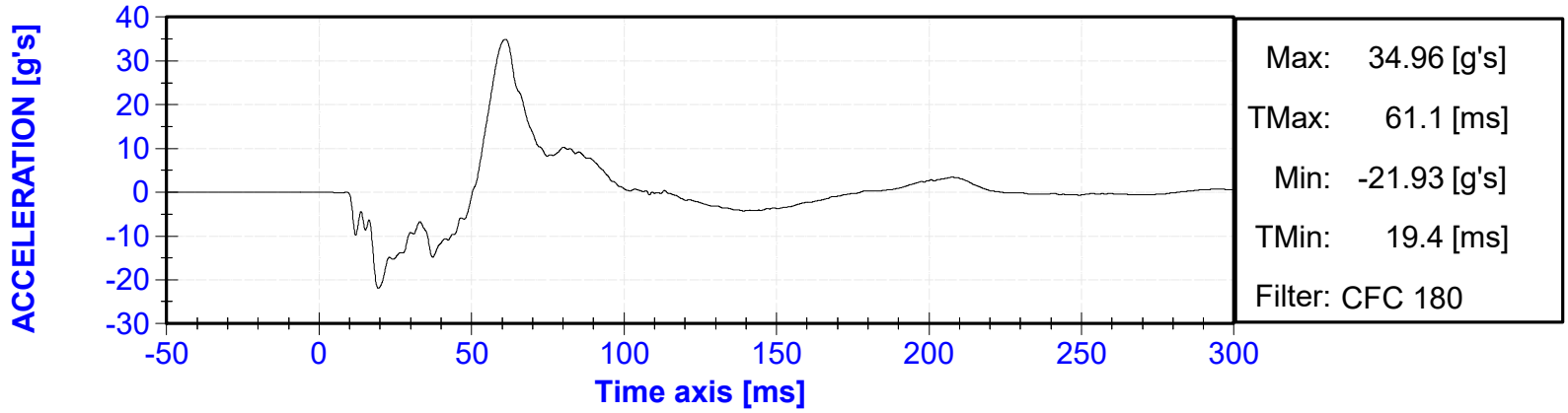
Passenger Head Acceleration (Z) vs. Time Primary



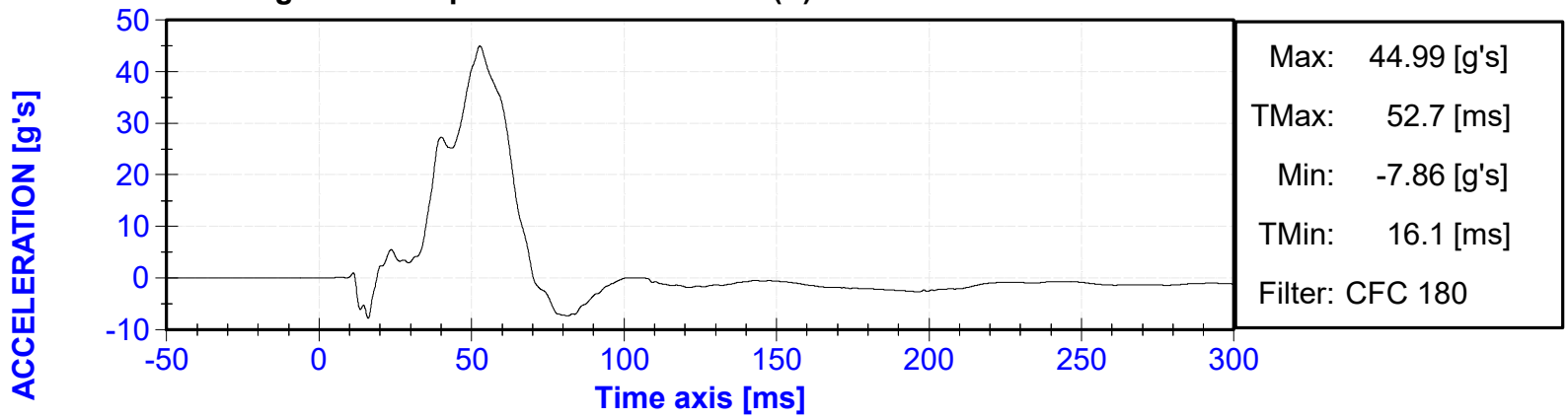
Passenger Head Resultant Acceleration Primary vs. Time



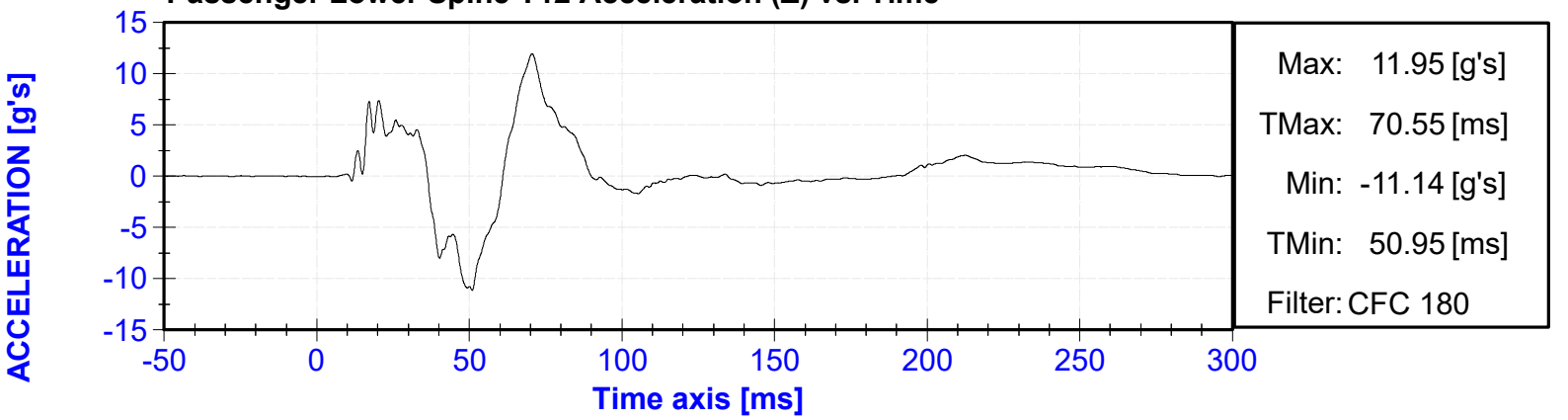
Passenger Lower Spine T12 Acceleration (X) vs. Time



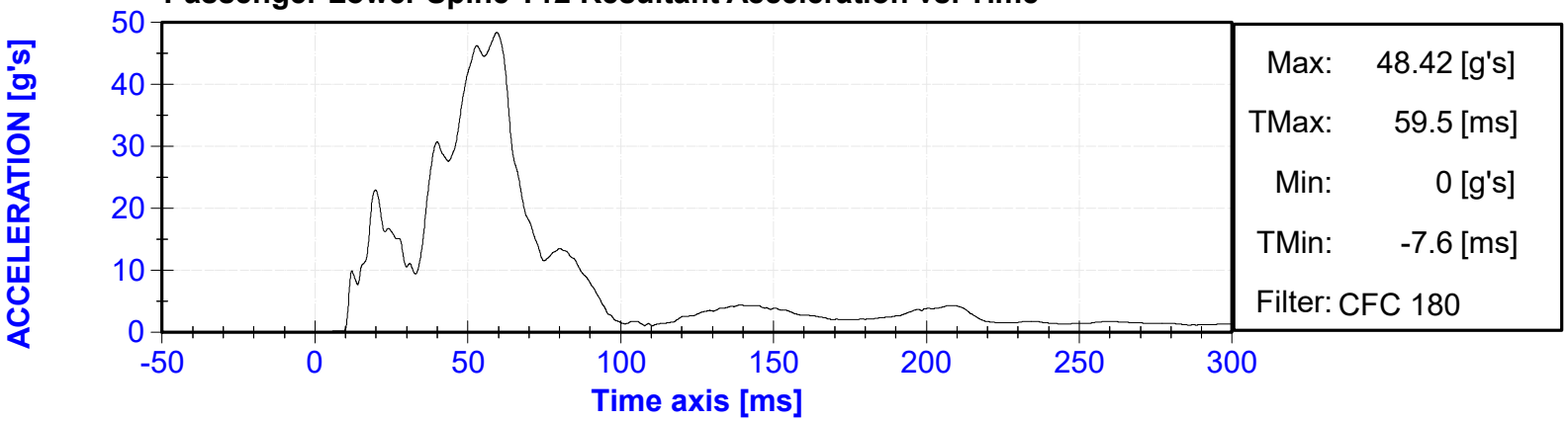
Passenger Lower Spine T12 Acceleration (Y) vs. Time



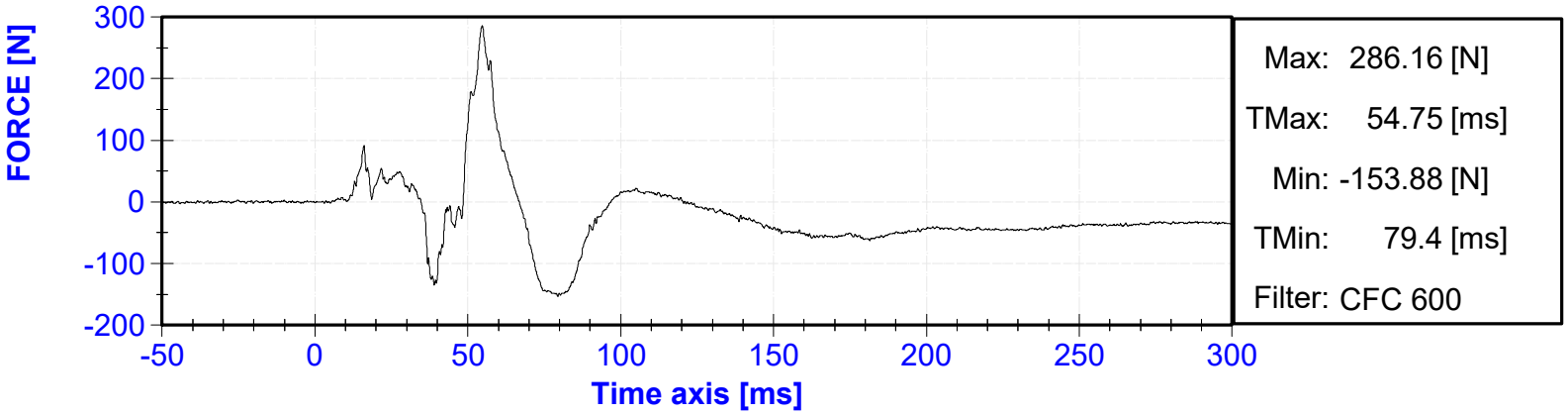
Passenger Lower Spine T12 Acceleration (Z) vs. Time



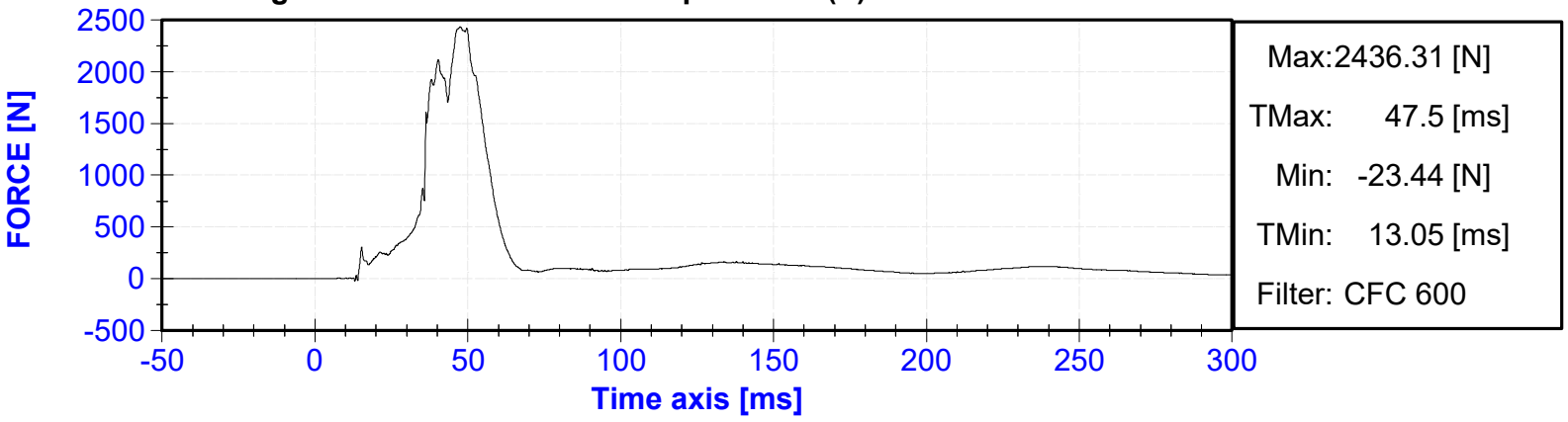
Passenger Lower Spine T12 Resultant Acceleration vs. Time



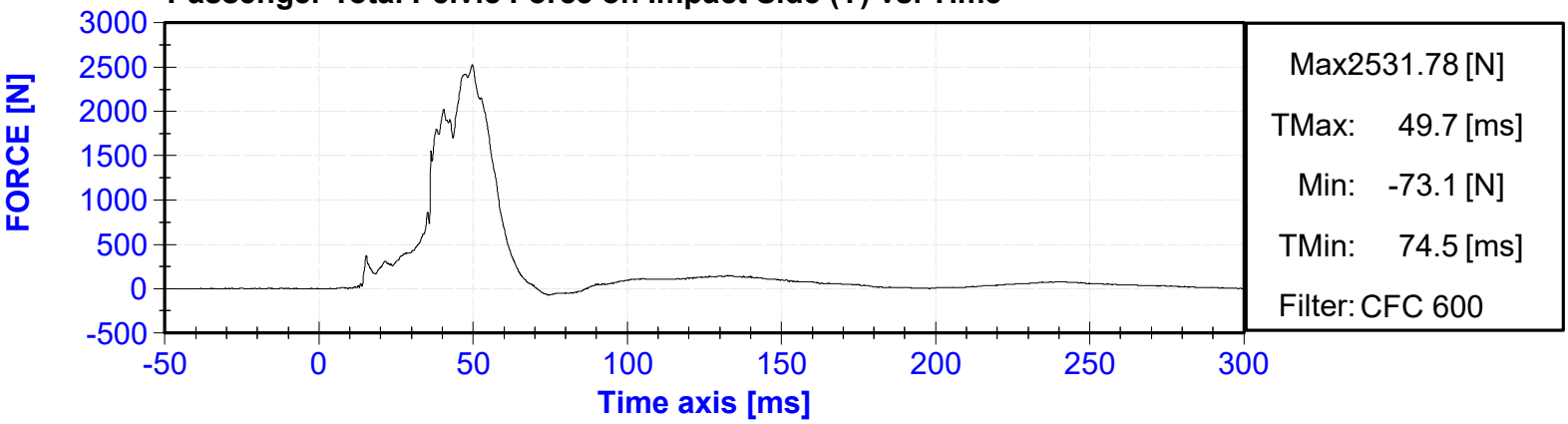
Passenger Iliac Force on Impact Side (Y) vs. Time



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



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



APPENDIX C

DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

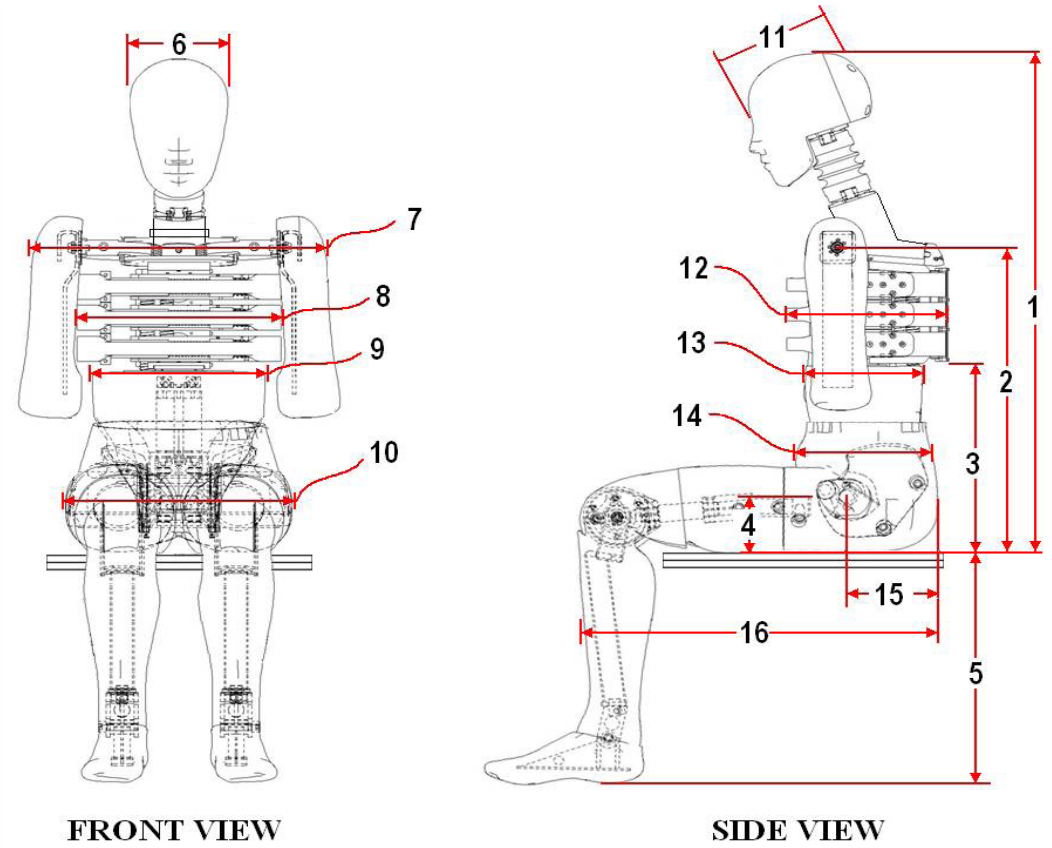
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - EuroSID-2re

Technician: K. Brogan Date: 02/13/2023

Dummy Serial Number: F033



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	911	Pass
2	Seat to Shoulder Joint	558	572	567	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	351	Pass
4	Seat to Hip Joint (center of bolt)	97	103	99	Pass
5	Sole to Seat, Sitting	333	451	420	Pass
6	Head Width	152	158	157	Pass
7	Shoulder/Arm Width	461	479	469	Pass
8	Thorax Width	322	332	328	Pass
9	Abdomen Width	273	287	281	Pass
10	Pelvis Lap Width	359	373	367	Pass
11	Head Depth	196	206	201	Pass
12	Thorax Depth	262	272	268	Pass
13	Abdomen Depth	194	204	202	Pass
14	Pelvis Depth	235	245	238	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	156	Pass
16	Back of Buttocks to Front Knee	597	615	611	Pass

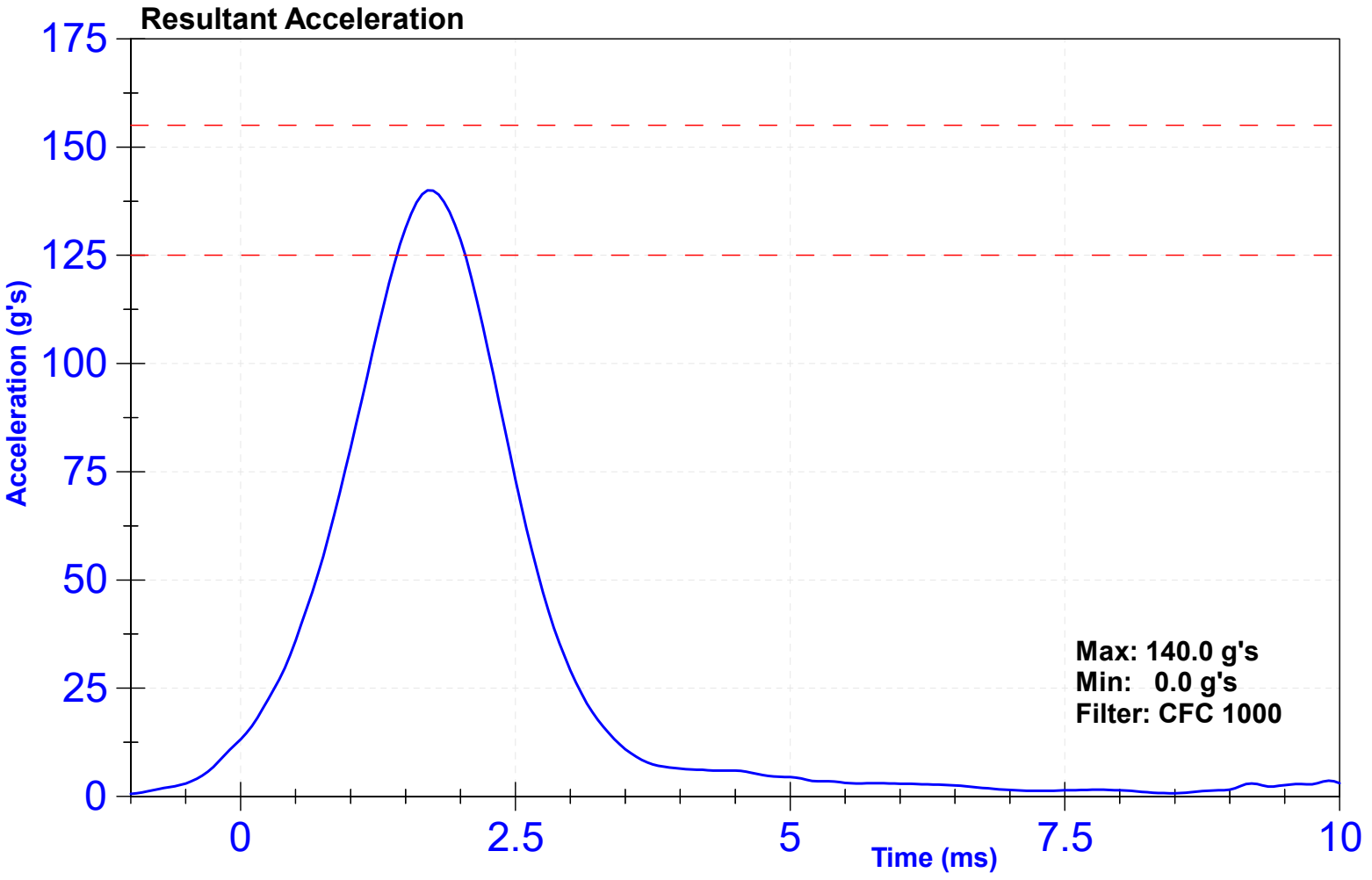
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

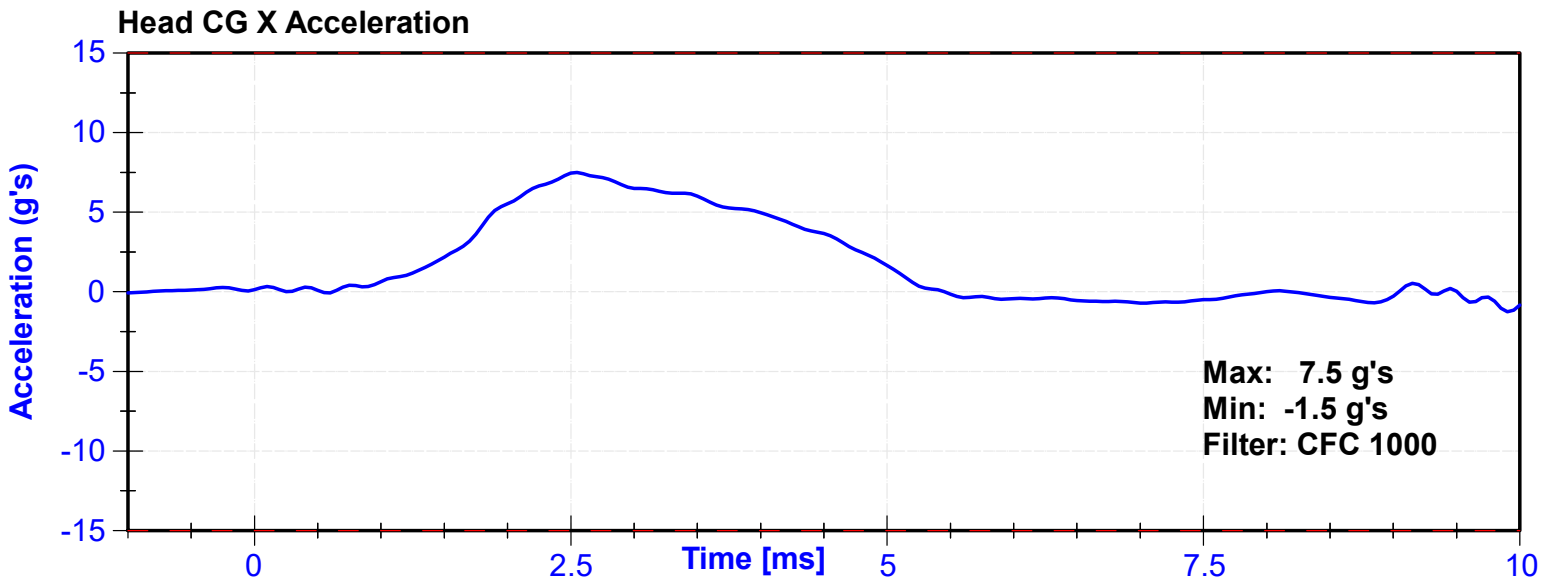
Results

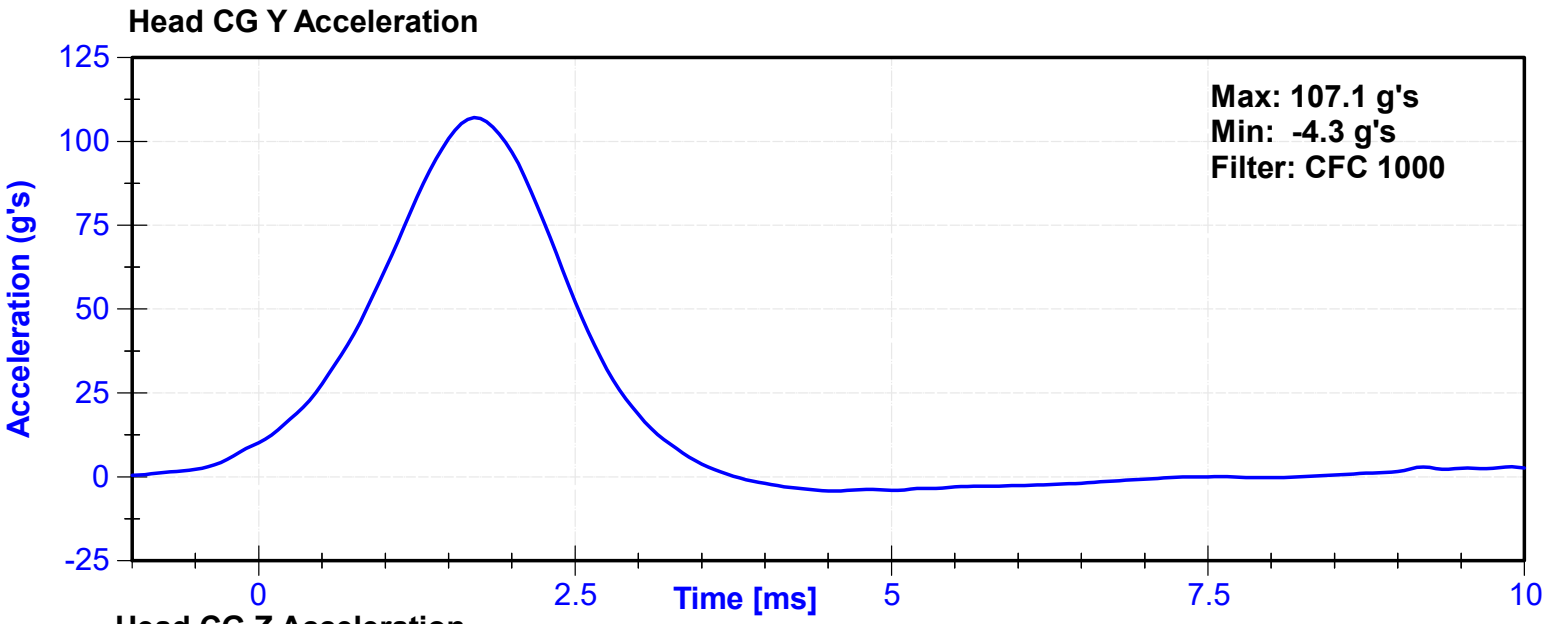
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	30,5	Pass
Resultant Acceleration	125	155	g's	140.0	Pass
Oscillation	0	15	%	4.28	Pass
Fore-Aft Acceleration	-15	15	g's	7.5	Pass

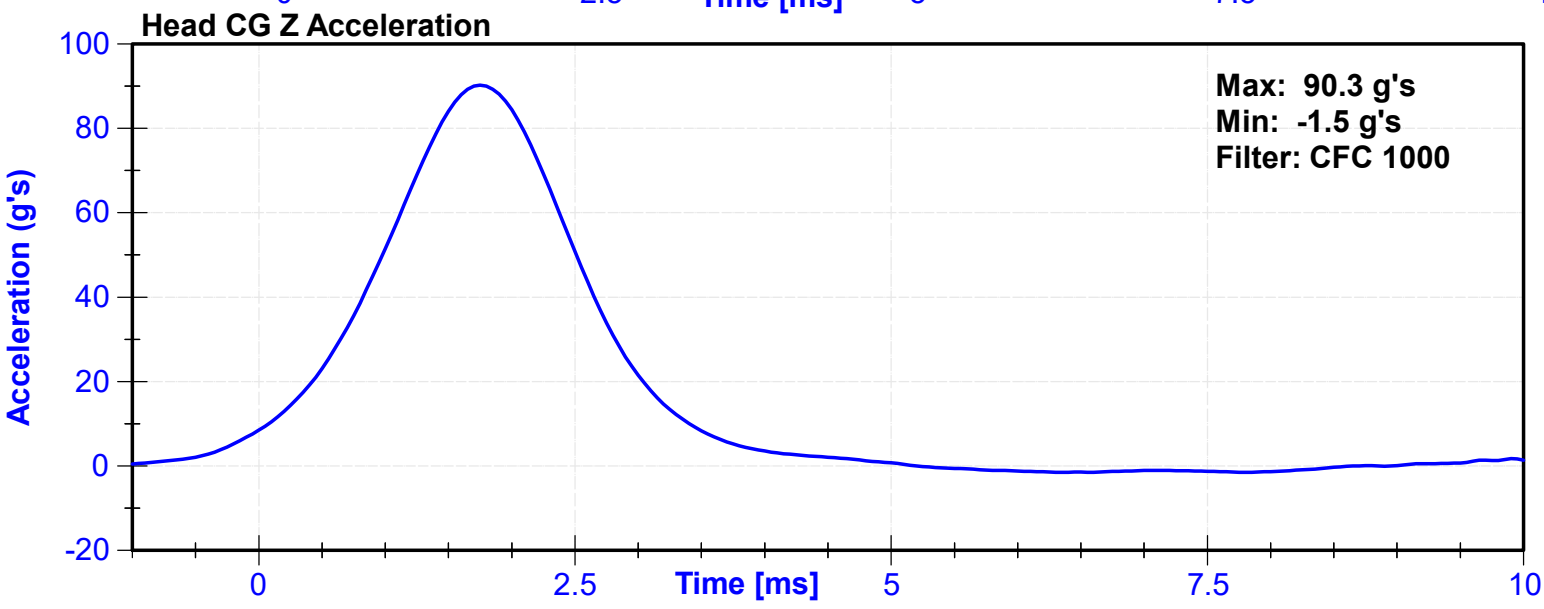
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P63861	1/17/2023	7/16/2023
Y Accelerometer	Endevco	P49216	1/17/2023	7/16/2023
Z Accelerometer	Endevco	P51303	1/17/2023	7/16/2023




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 7.5 g's
Min: -1.5 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 107.1 g's
Min: -4.3 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]
Max: 90.3 g's
Min: -1.5 g's
Filter: CFC 1000

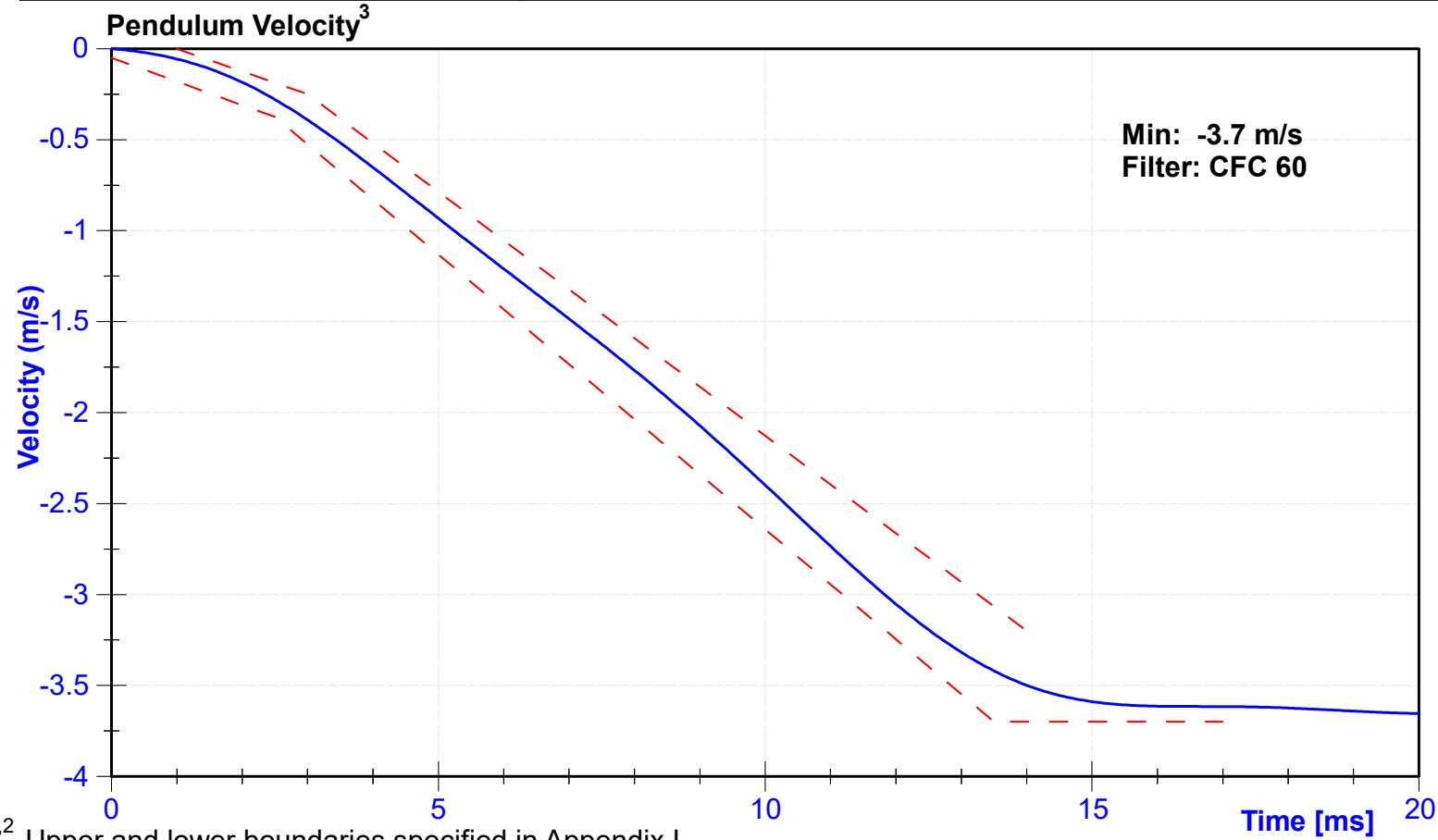
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

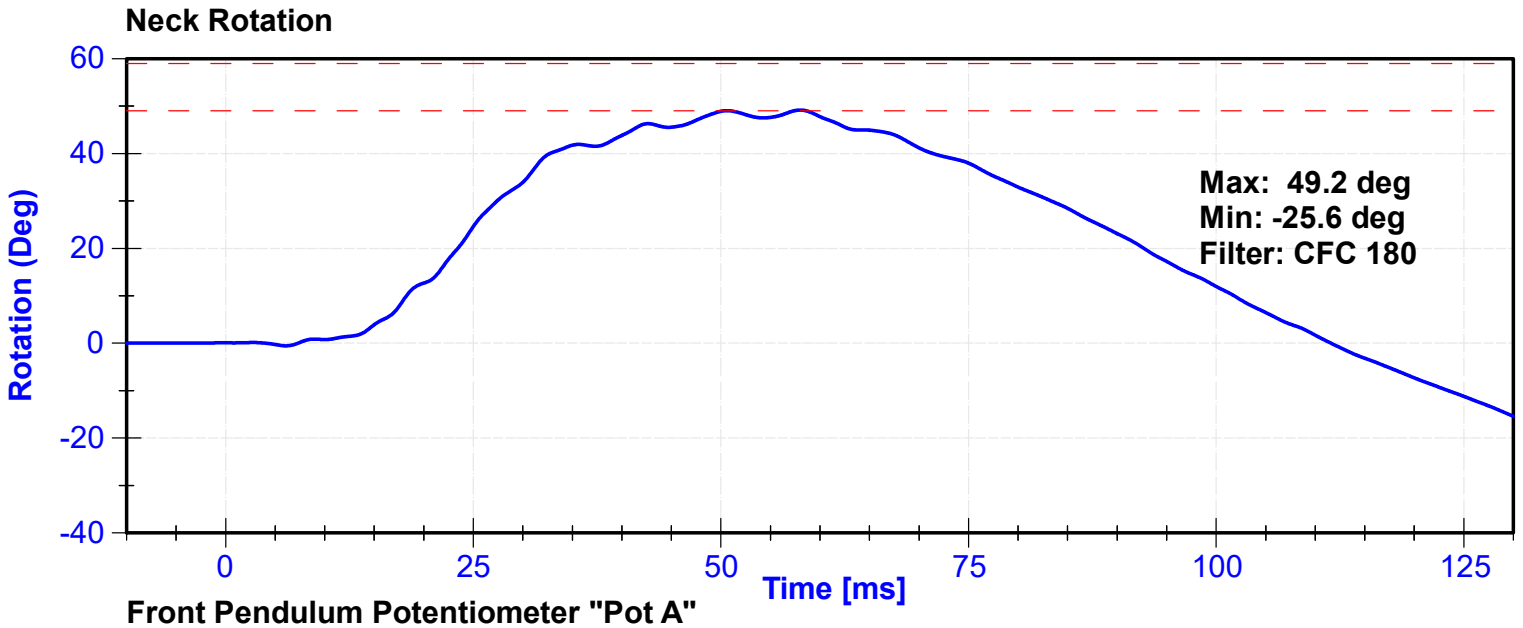
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	27.5	Pass
Velocity	3.3	3.5	m/s	3.40	Pass
Lateral Neck Rotation	49	59	deg	49.2	Pass
Time at Maximum Rotation	54	66	ms	58.0	Pass
Time of Rotation Decay from Maximum	53	88	ms	53.6	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

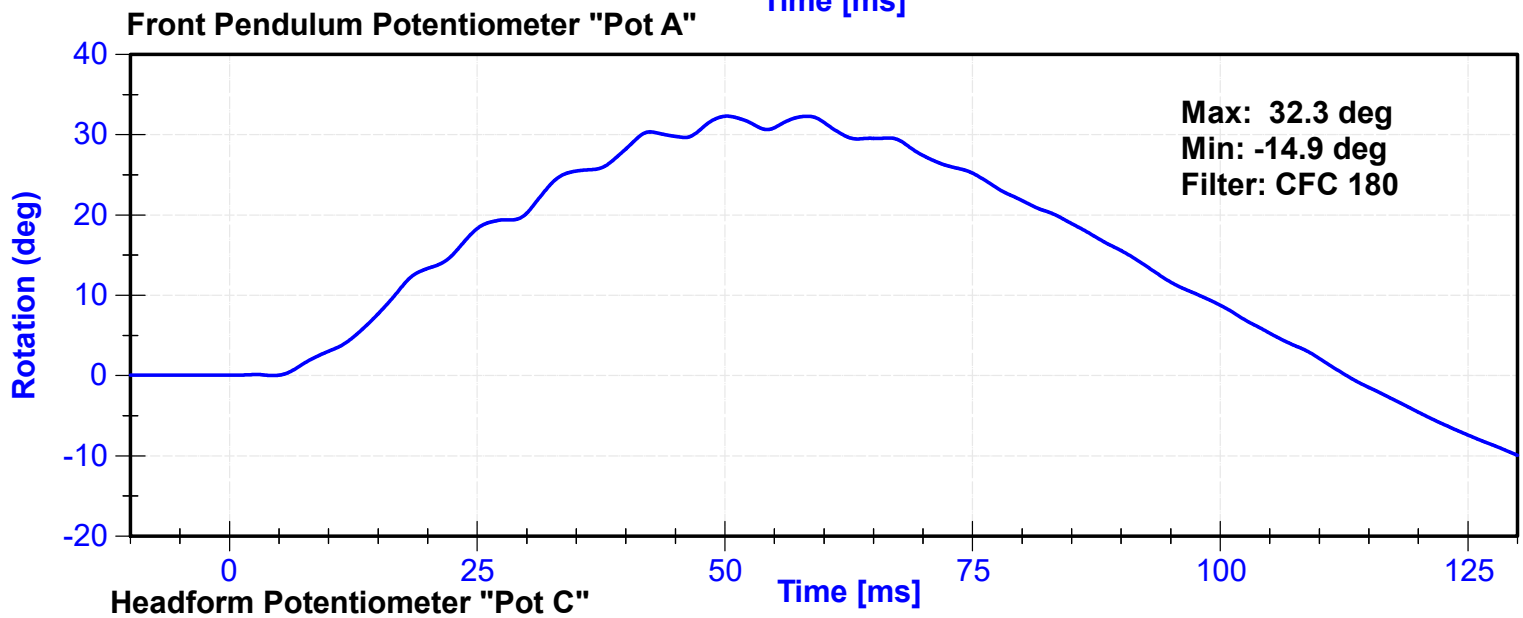
Transducer Calibrations

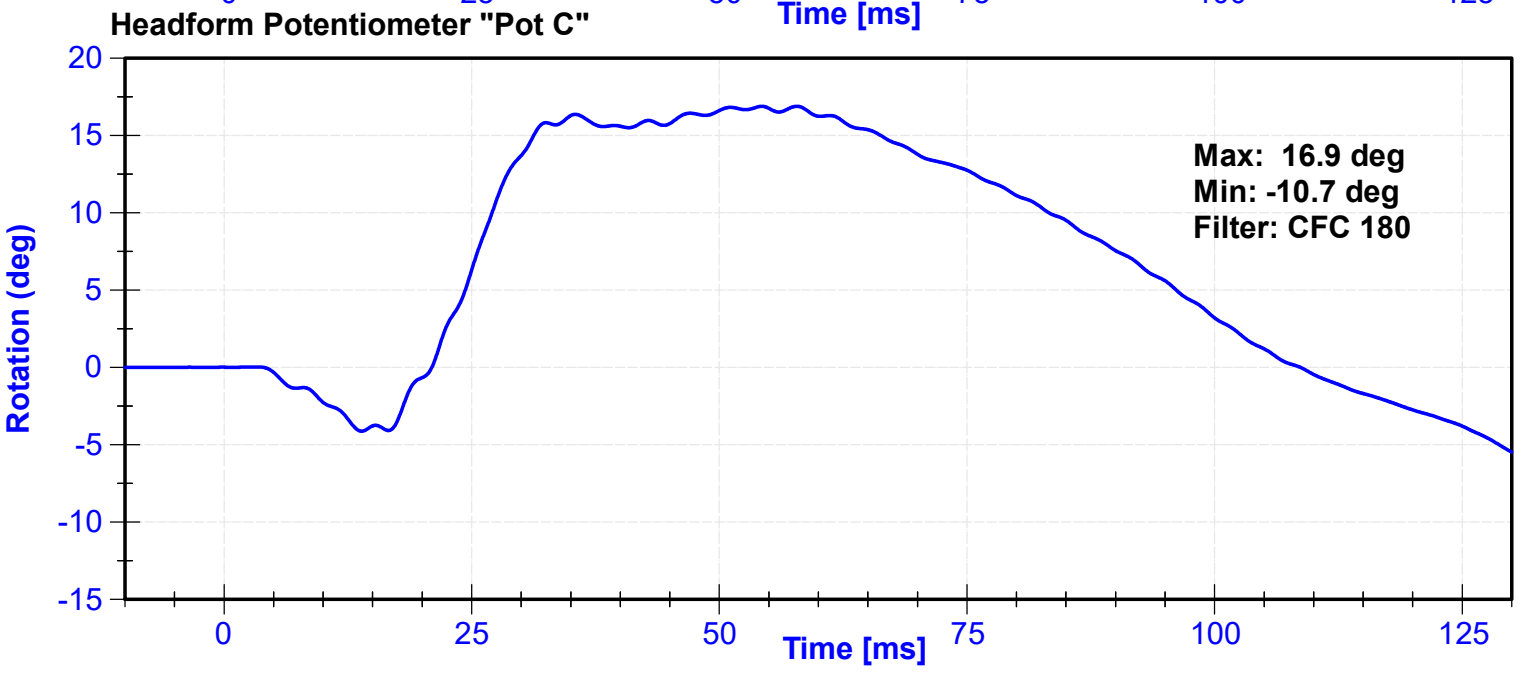
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Front Pendulum Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Headform Potentiometer	Sfernice	095	10/5/2022	10/5/2023



[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: 49.2 deg
Min: -25.6 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: 32.3 deg
Min: -14.9 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: 16.9 deg
Min: -10.7 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

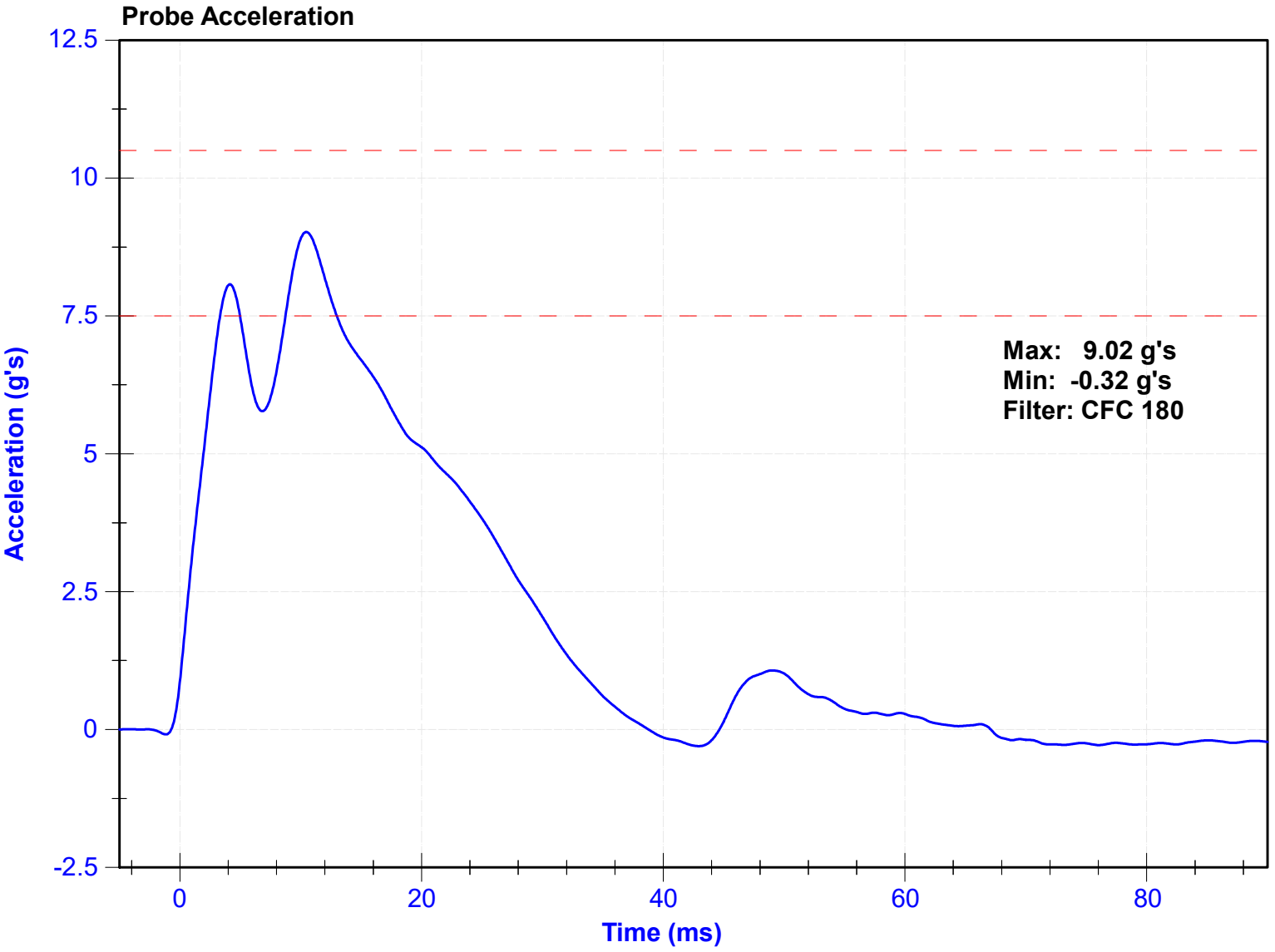
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	19.5	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	7.5	10.5	g's	9.02	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	5/18/2023



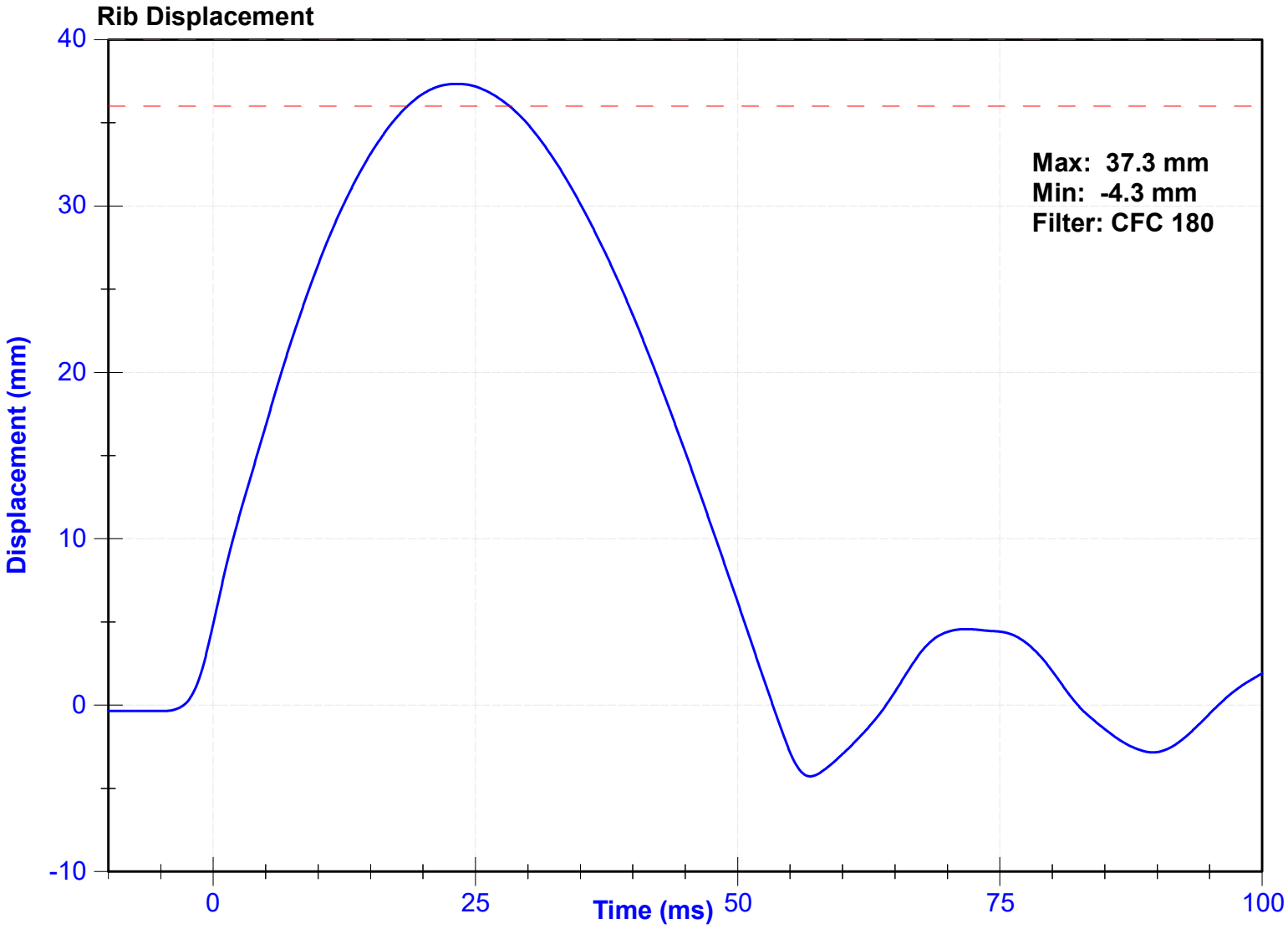
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	37.5	Pass
Rib Displacement	36	40	mm	37.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	1/17/2023	7/18/2023



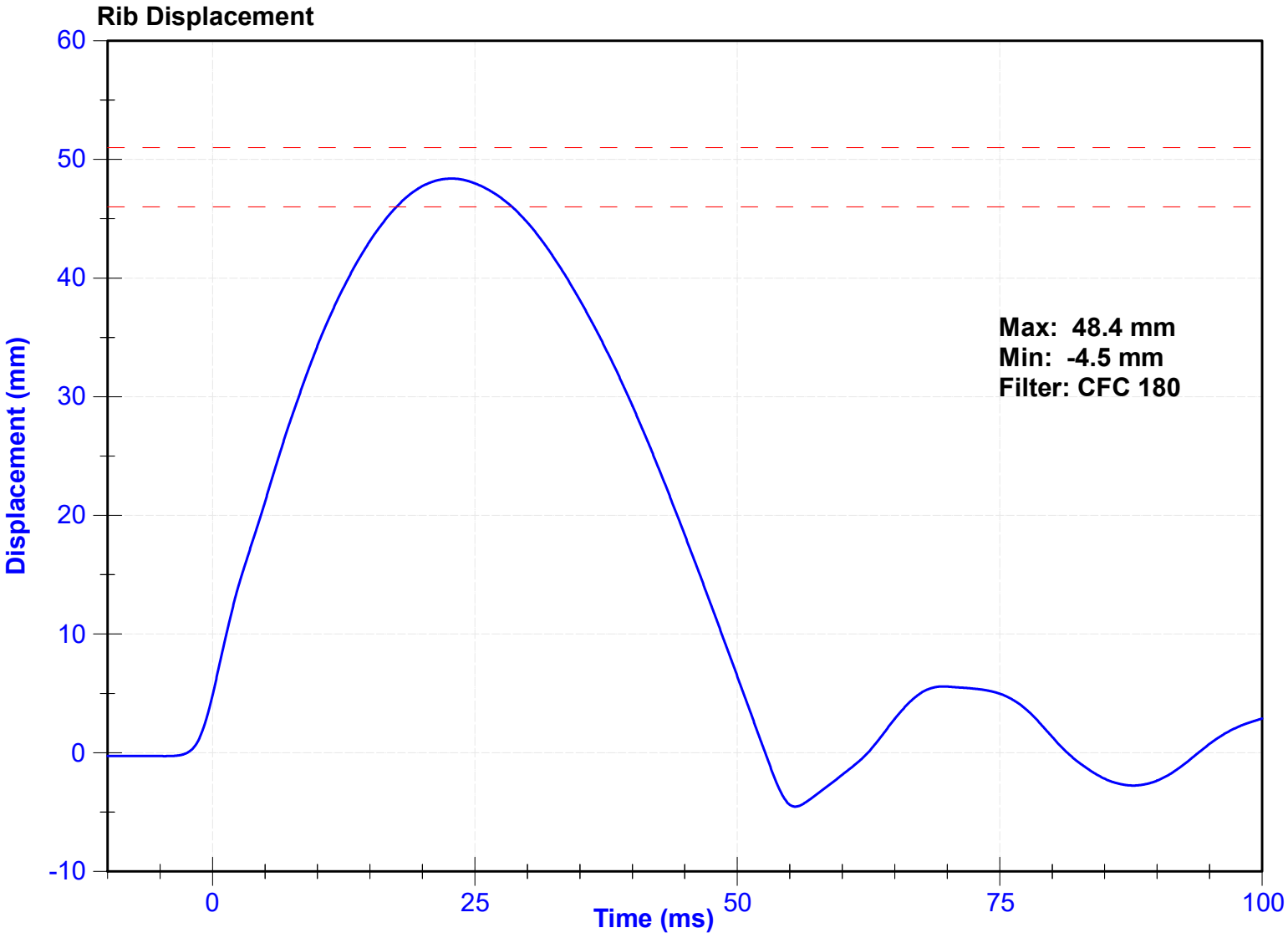
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	37.5	Pass
Rib Displacement	46	51	mm	48.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	1/17/2023	7/18/2023



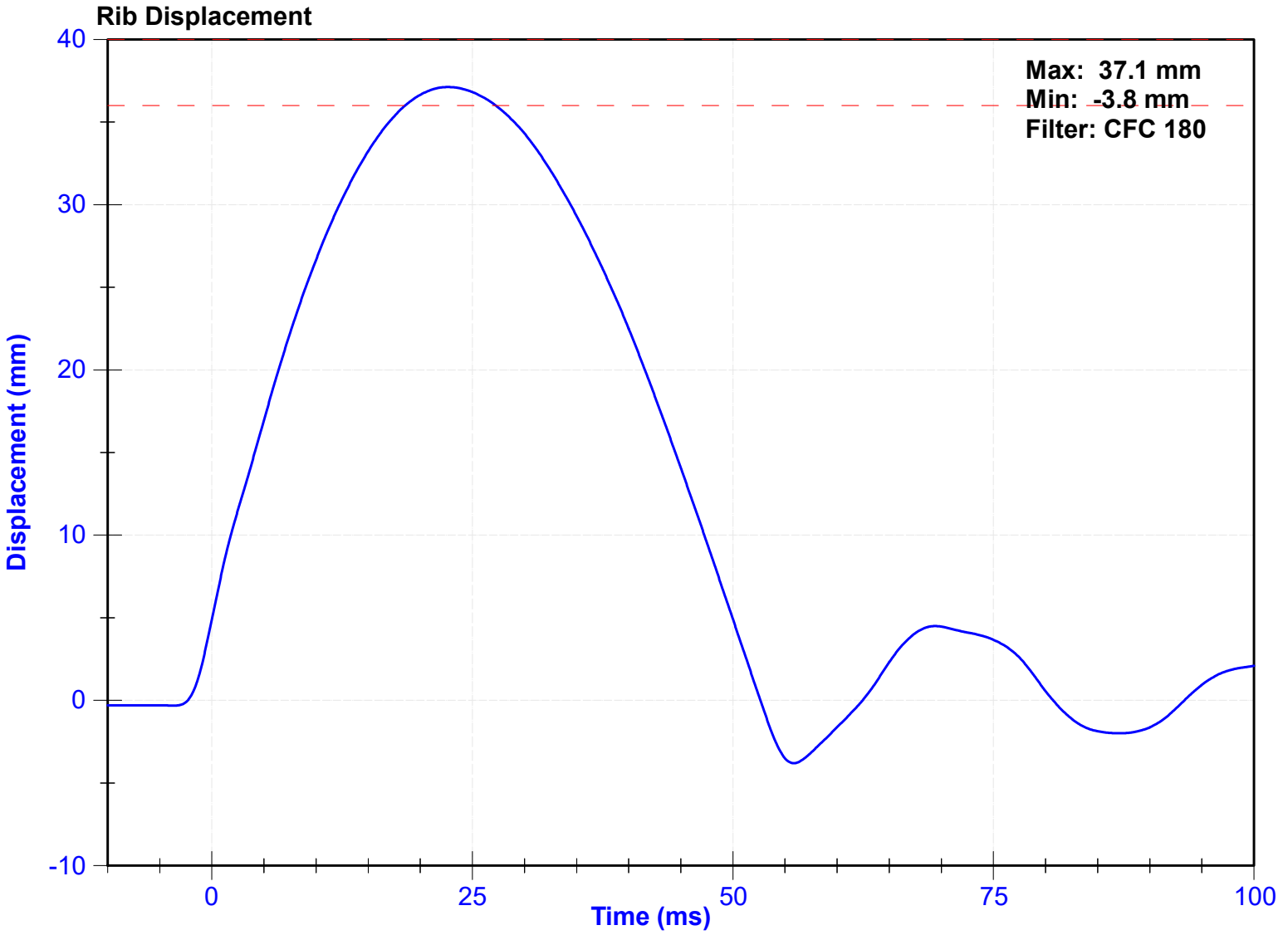
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	37.5	Pass
Rib Displacement	36	40	mm	37.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	1/17/2023	7/18/2023



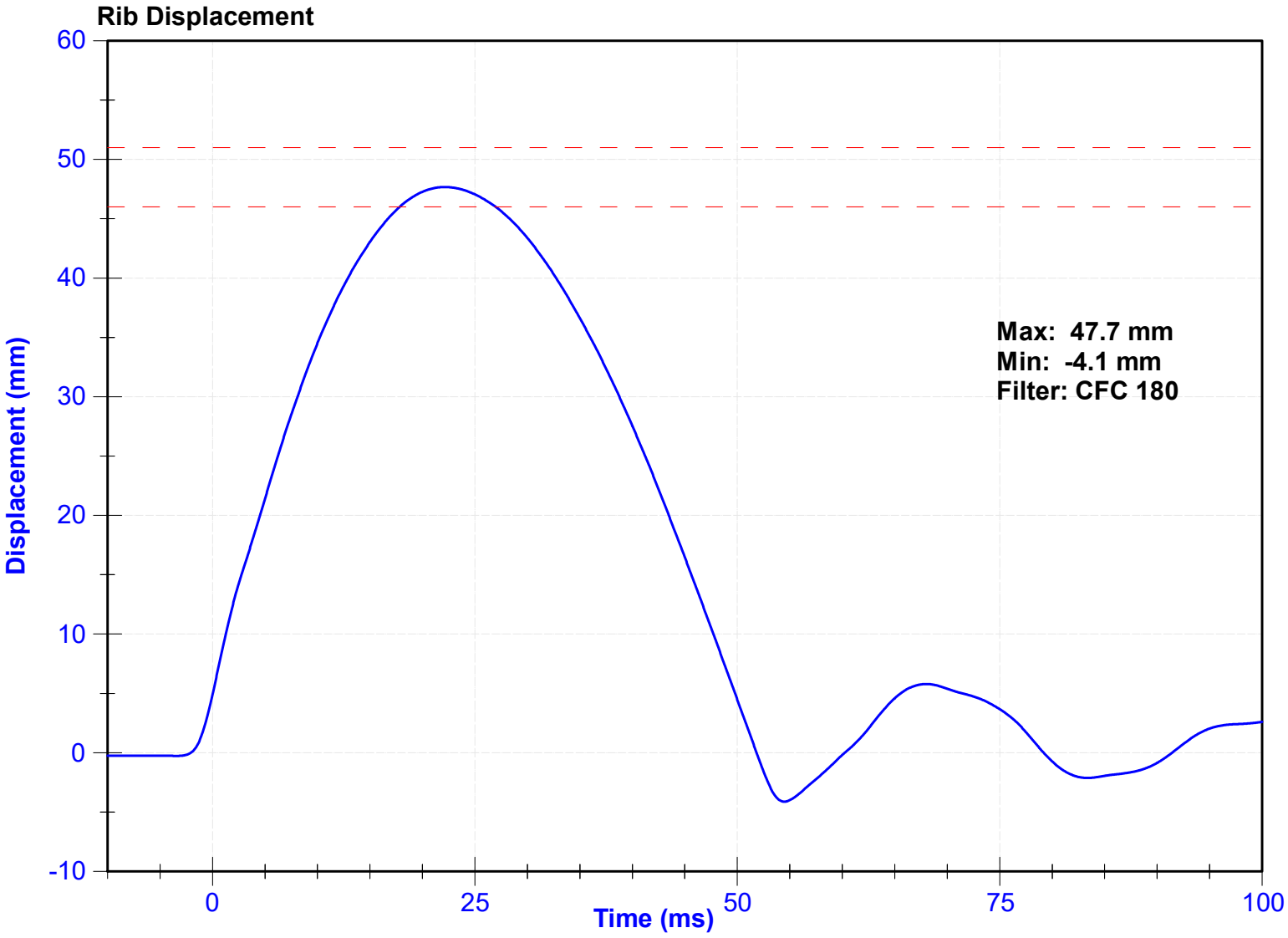
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	37.5	Pass
Rib Displacement	46	51	mm	47.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	1/17/2023	7/18/2023



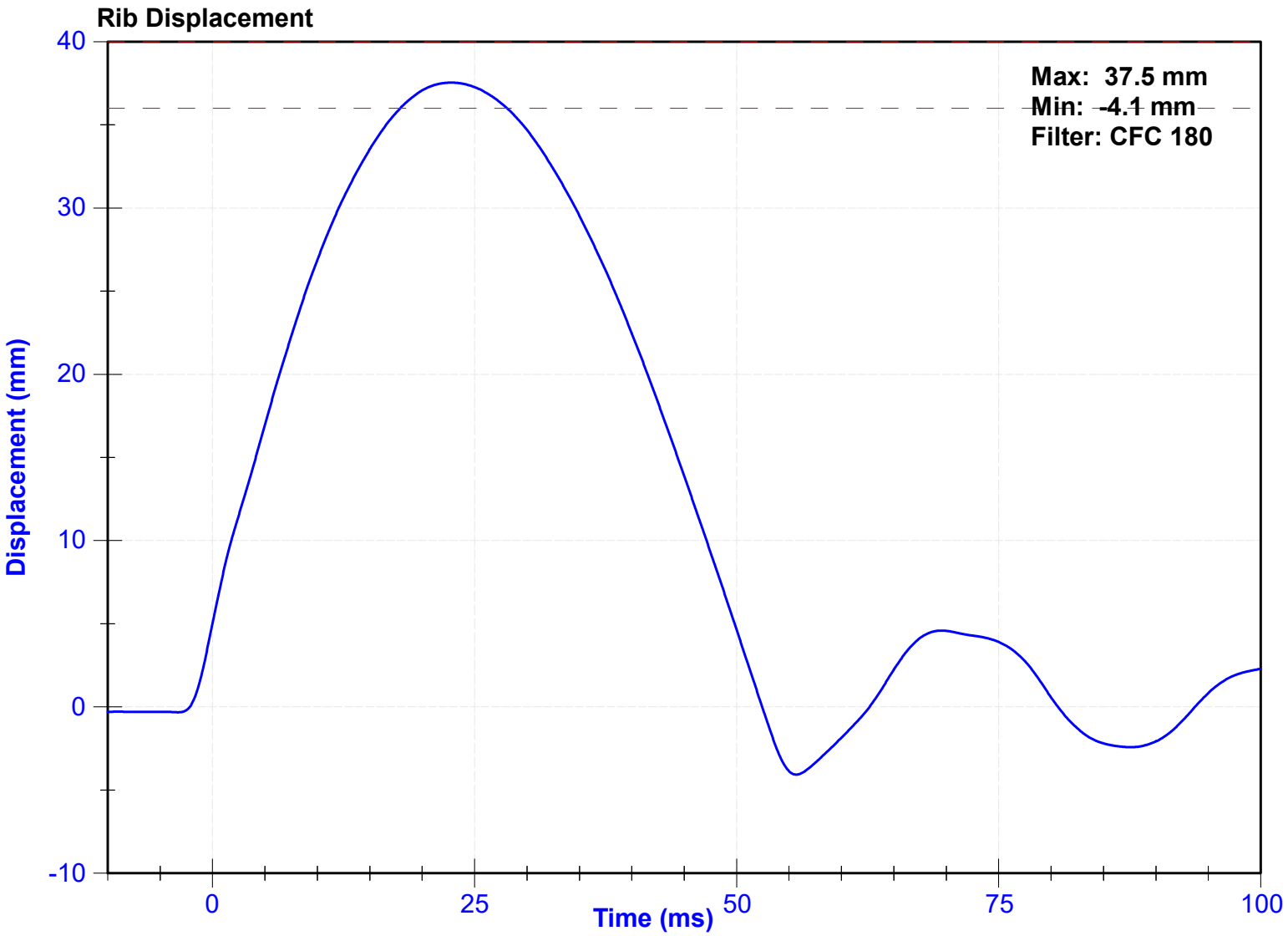
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	37.5	Pass
Rib Displacement	36	40	mm	37.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	1/17/2023	7/18/2023



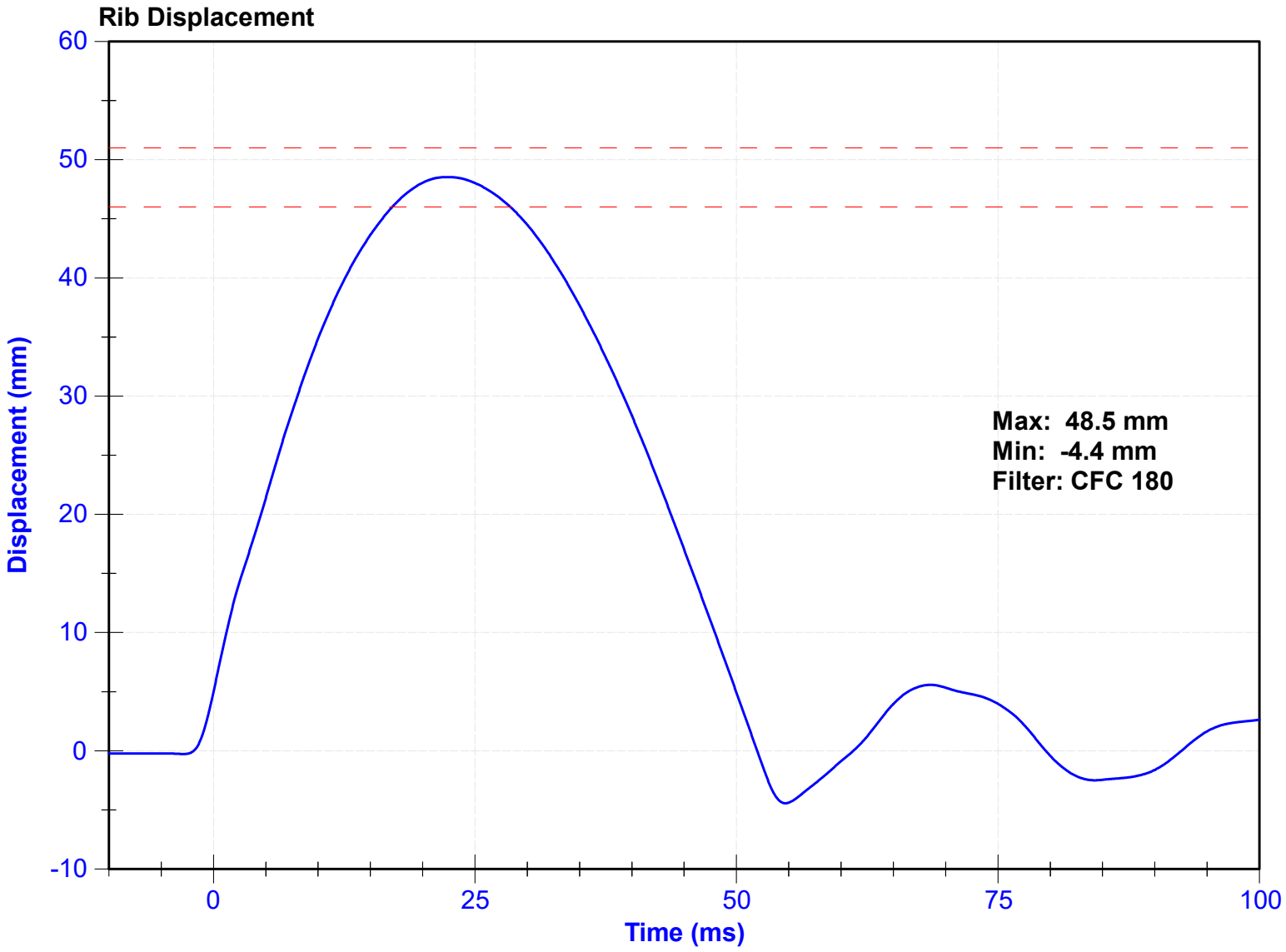
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	37.5	Pass
Rib Displacement	46	51	mm	48.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	1/17/2023	7/18/2023



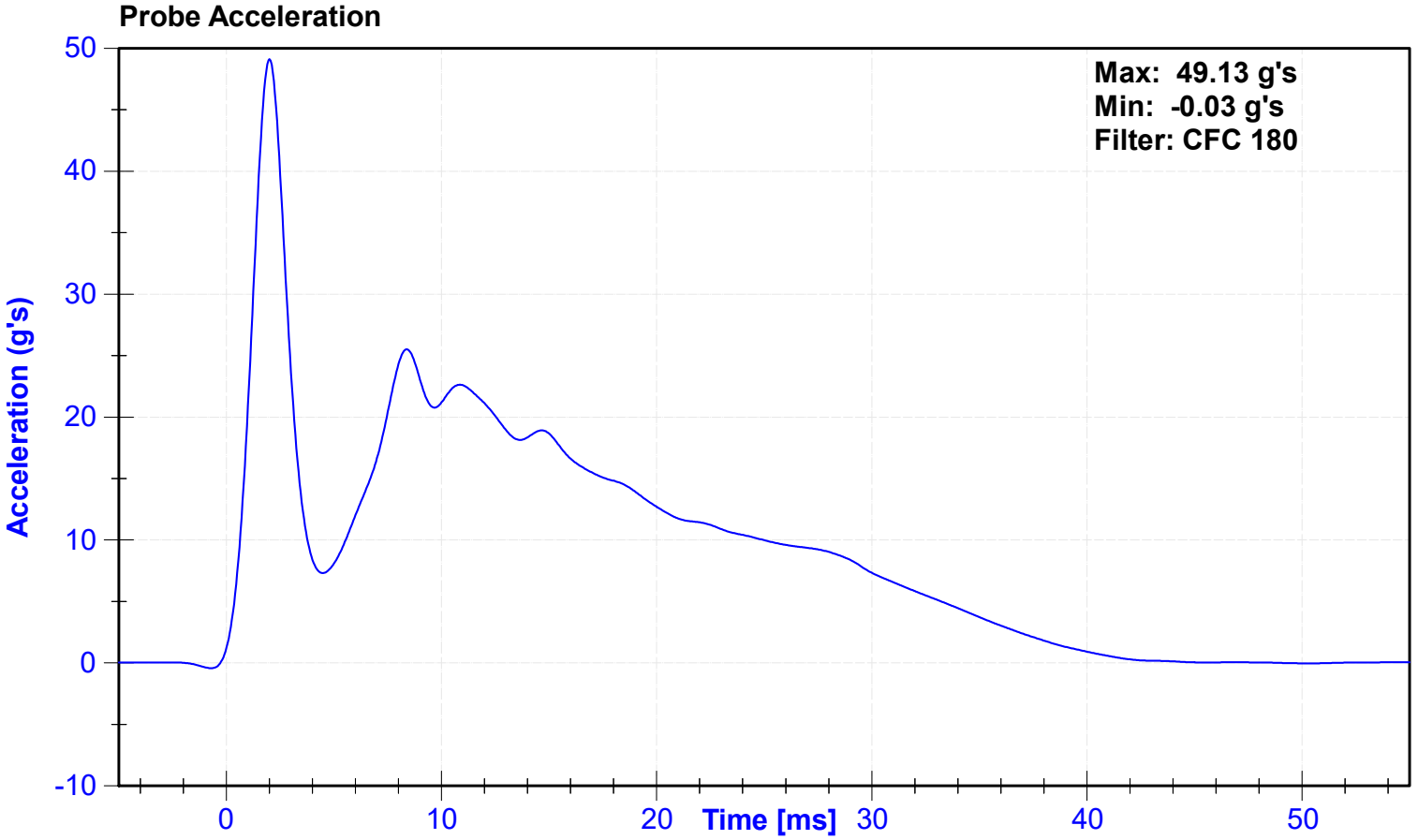
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

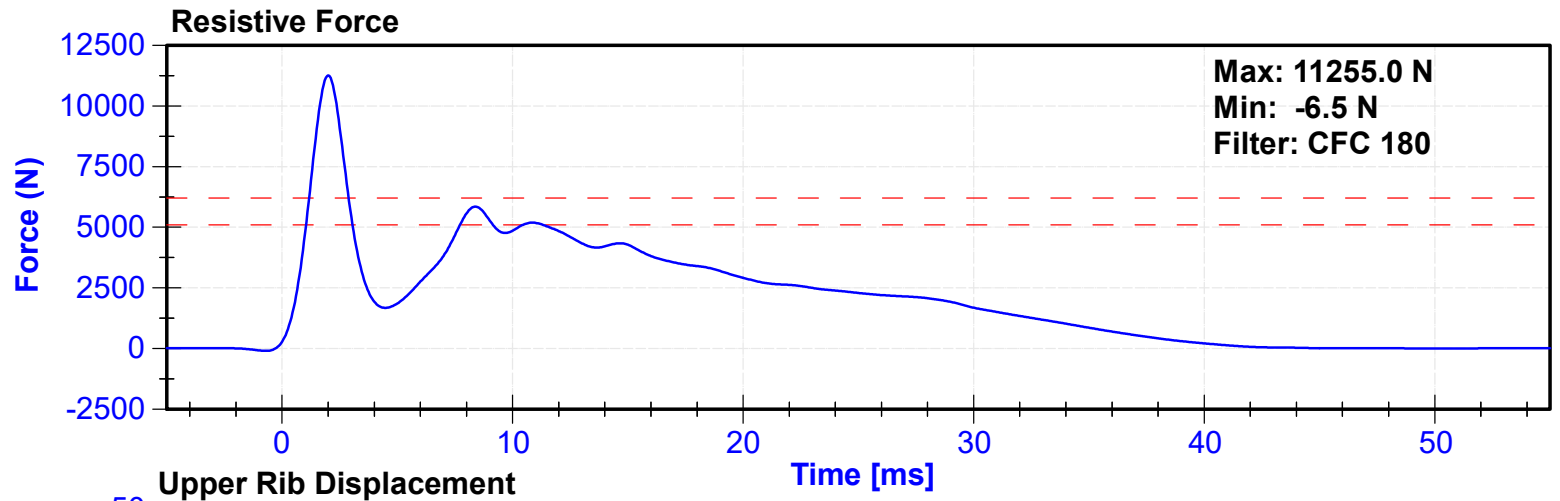
Results

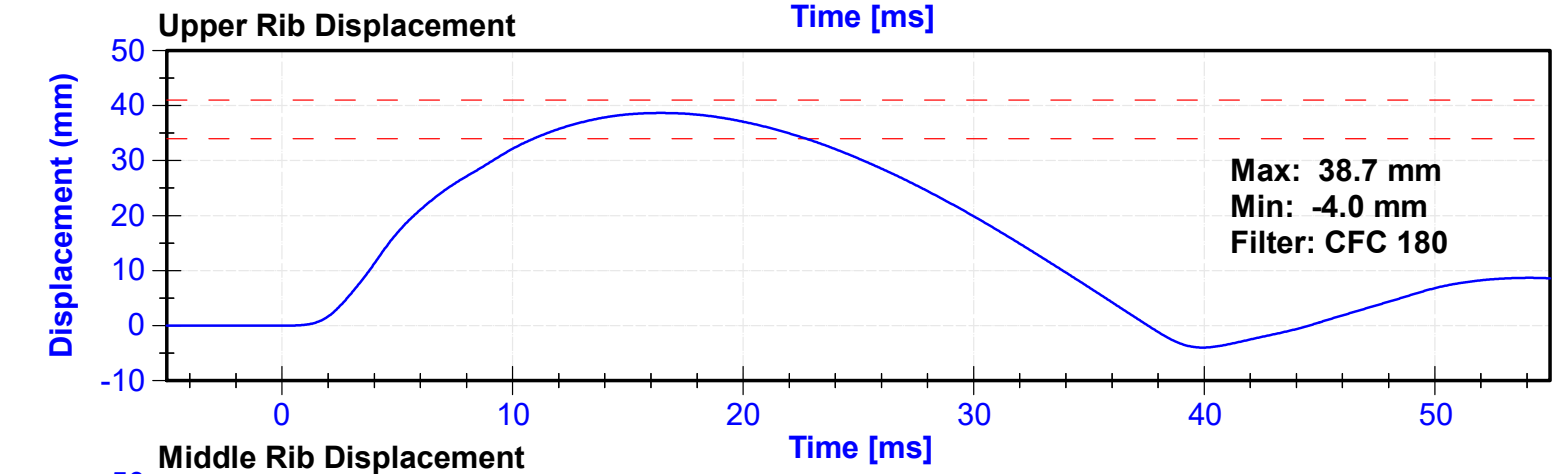
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	19.5	Pass
Velocity	5.4	5.6	m/s	5.52	Pass
Resistive Force after 6ms	5100	6200	N	5846.8	Pass
Upper Thorax Rib Deflection	34	41	mm	38.7	Pass
Mid Thorax Rib Deflection	37	45	mm	41.5	Pass
Lower Thorax Rib Deflection	37	44	mm	40.5	Pass

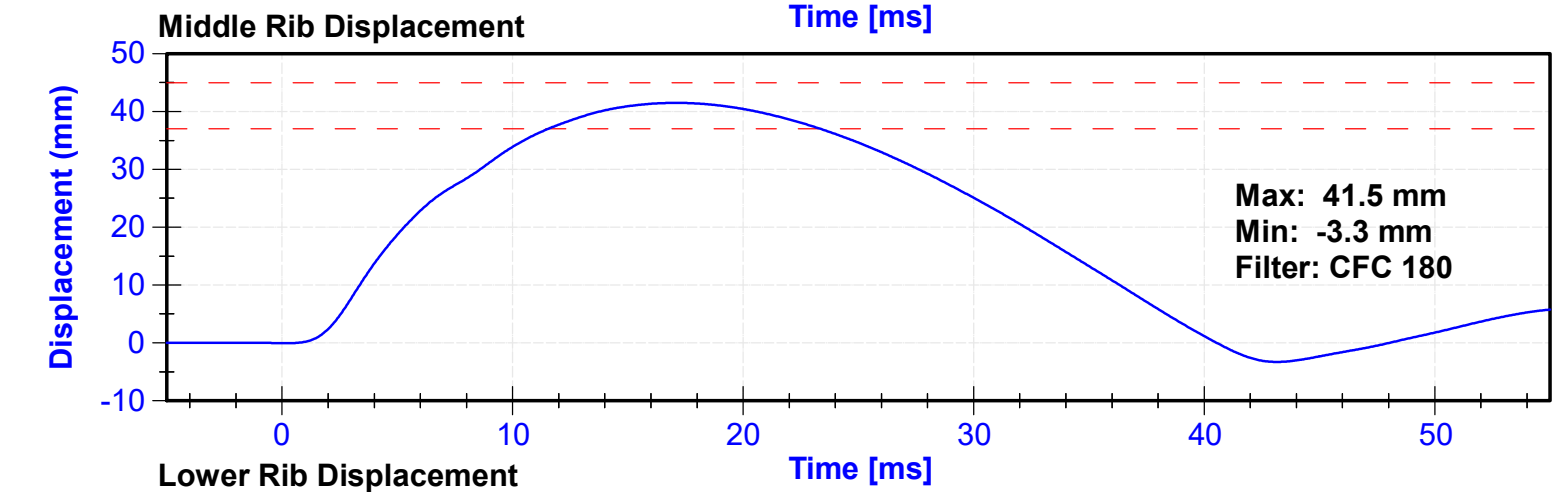
Transducer Calibrations

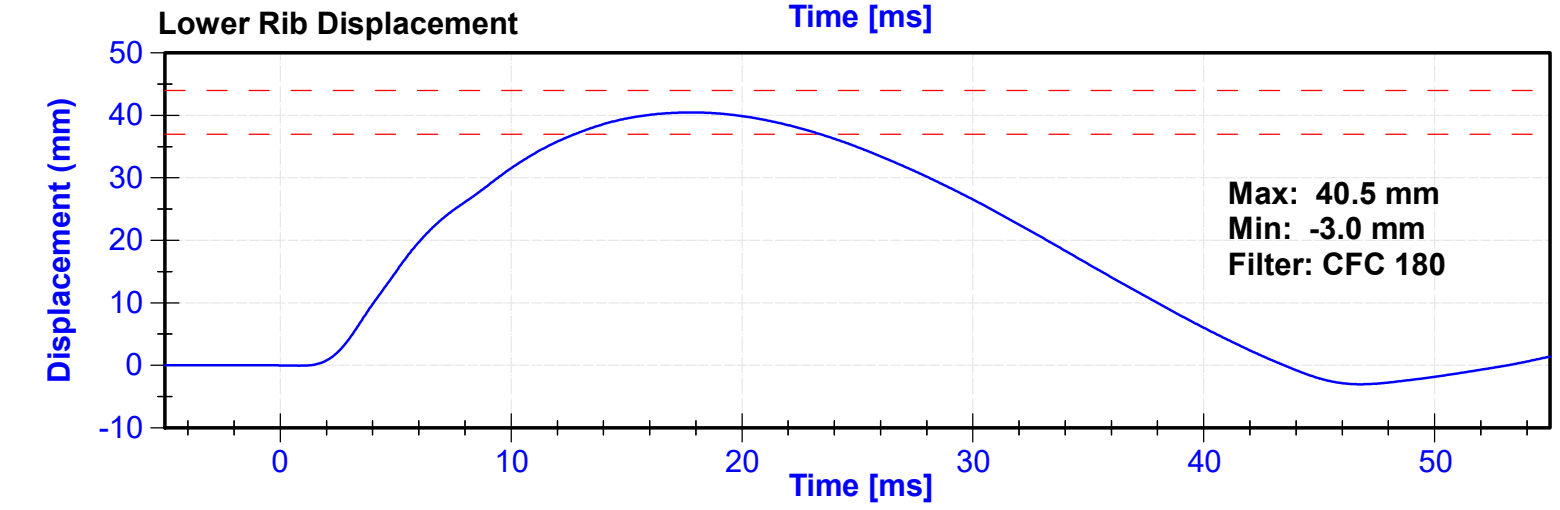
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Upper Thorax Rib Potentiometer	Honeywell	179GFE	1/17/2023	7/18/2023
Middle Thorax Rib Potentiometer	Honeywell	185GFE	1/17/2023	7/18/2023
Lower Thorax Rib Potentiometer	Honeywell	178GFE	1/17/2023	7/18/2023




Resistive Force
Max: 11255.0 N
Min: -6.5 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: 38.7 mm
Min: -4.0 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: 41.5 mm
Min: -3.3 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: 40.5 mm
Min: -3.0 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]

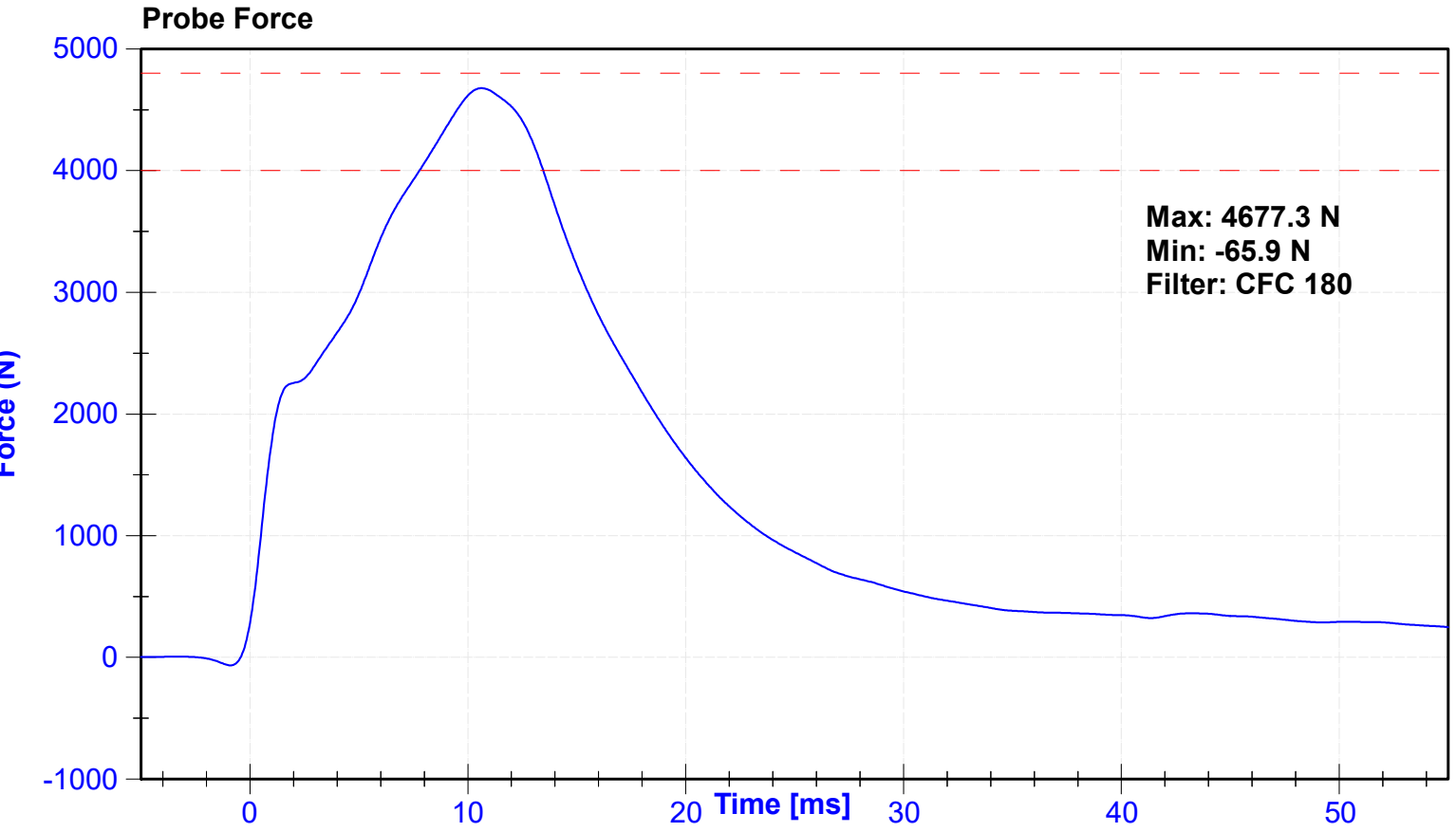
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

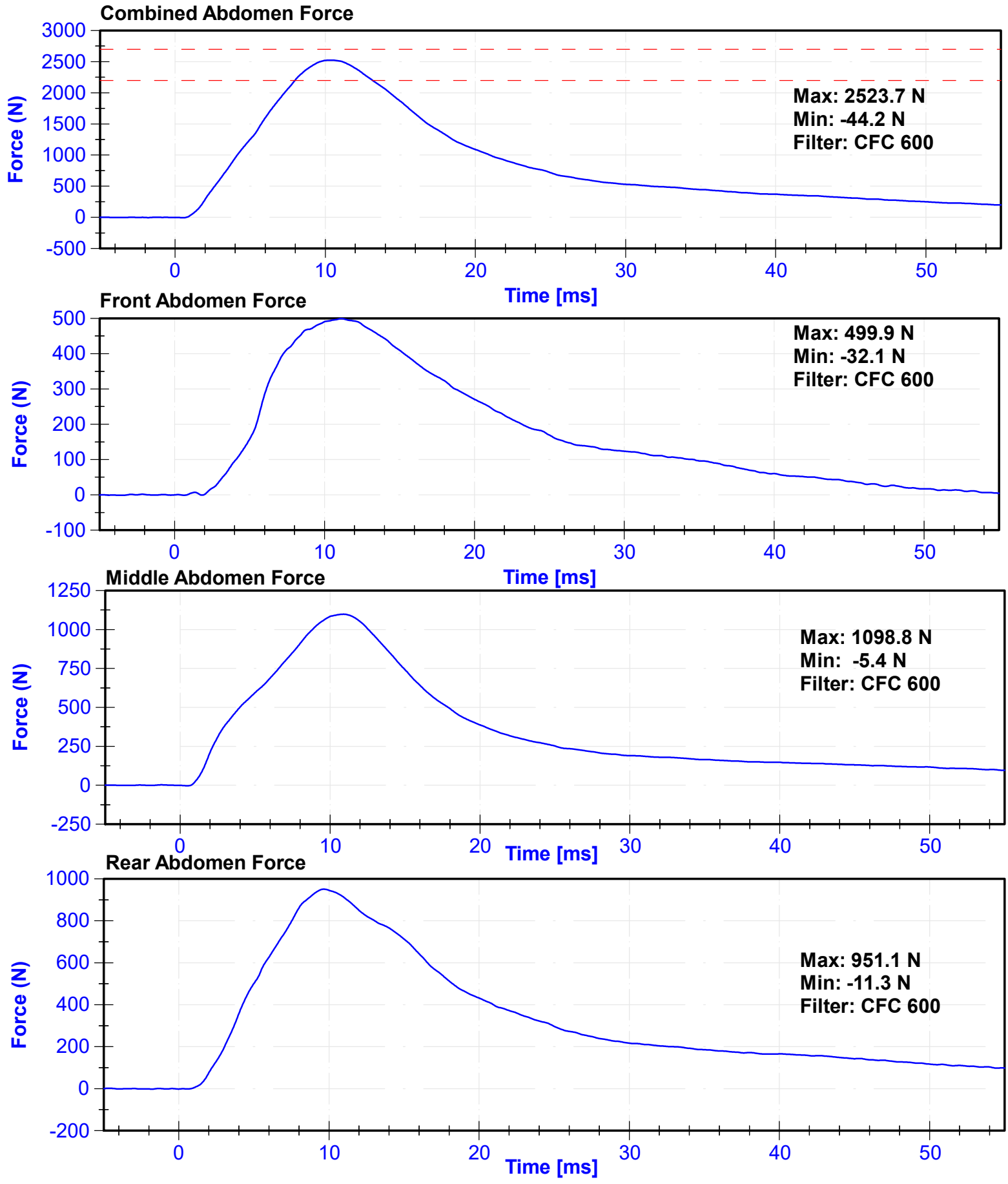
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	19.5	Pass
Velocity	3.9	4.1	m/s	4.02	Pass
Combined Abdomen Force	2200	2700	N	2523.7	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.45	Pass
Resistive Probe Force	4000	4800	N	4677.3	Pass
Time at Peak Resistive Force	10.6	13.0	ms	10.65	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Front Abdomen Load Cell	Denton	1509	8/12/2022	8/12/2023
Middle Abdomen Load Cell	Denton	1508	8/12/2022	8/12/2023
Rear Abdomen Load Cell	Denton	1507	8/12/2022	8/12/2023




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2523.7 N
Min: -44.2 N
Filter: CFC 600
Front Abdomen Force
Force (N)
Time [ms]
Max: 499.9 N
Min: -32.1 N
Filter: CFC 600
Middle Abdomen Force
Force (N)
Time [ms]
Max: 1098.8 N
Min: -5.4 N
Filter: CFC 600
Rear Abdomen Force
Force (N)
Time [ms]
Max: 951.1 N
Min: -11.3 N
Filter: CFC 600

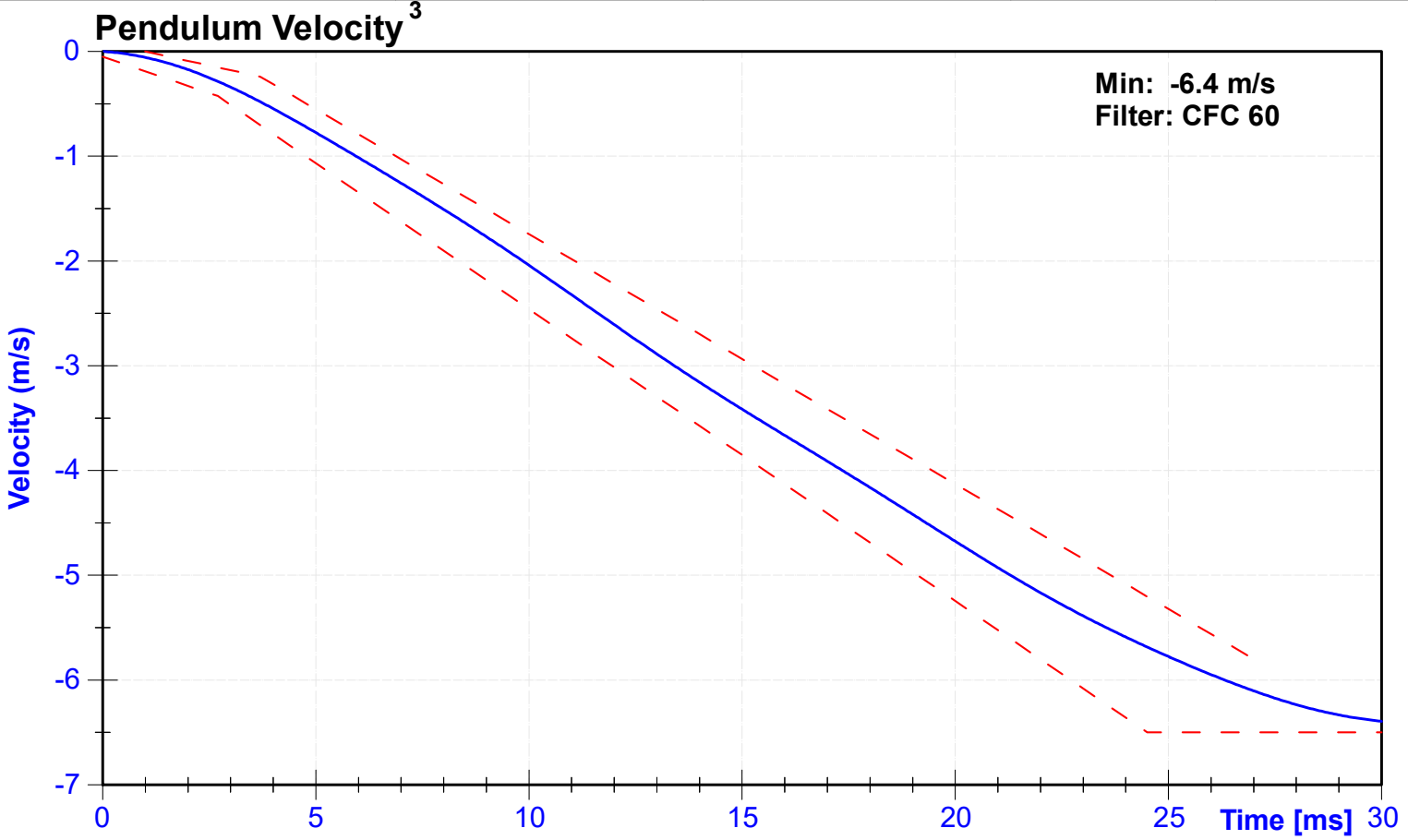
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

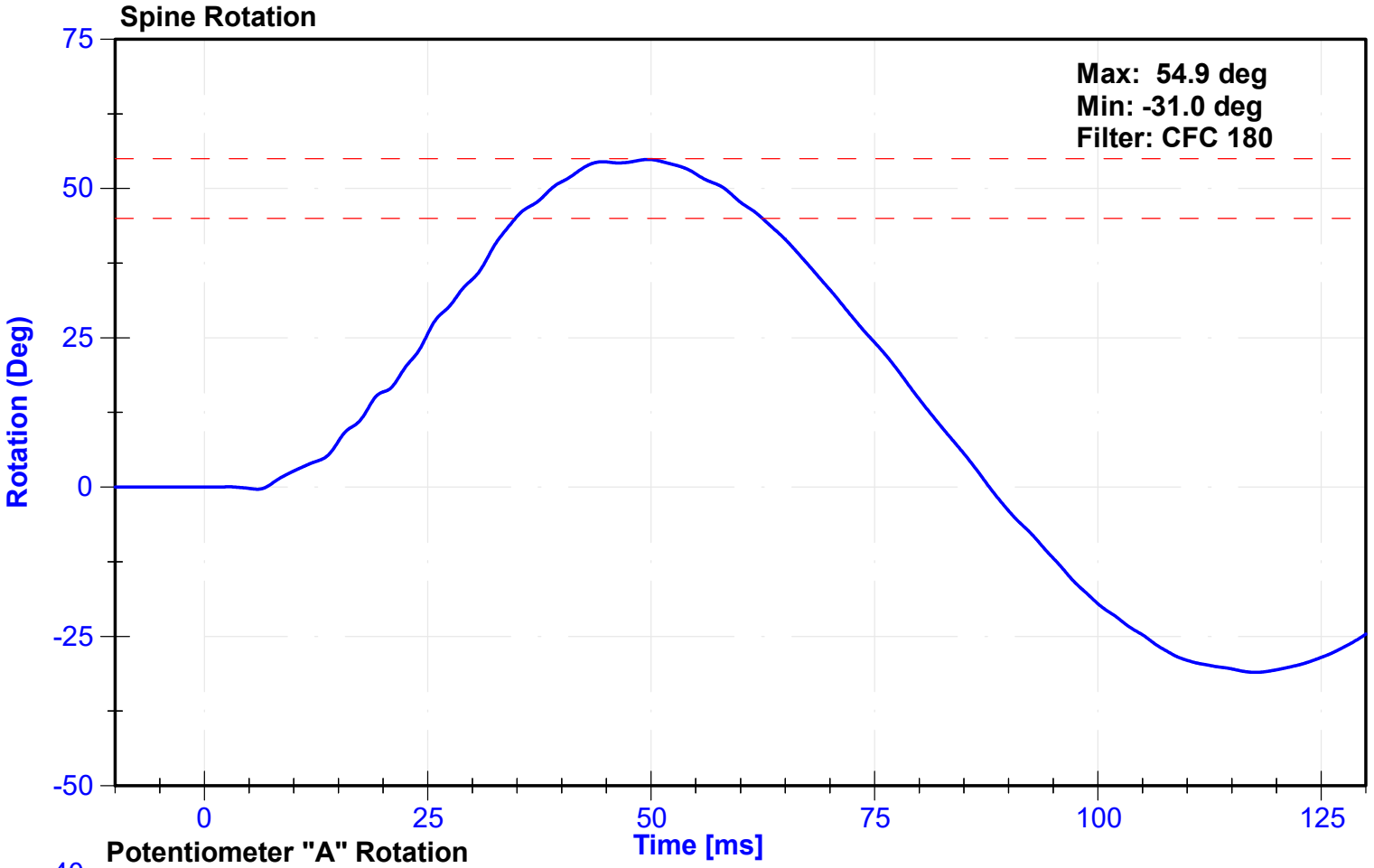
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	27.5	Pass
Velocity	5.95	6.15	m/s	6.042	Pass
Lateral Spine Rotation	45	55	deg	54.9	Pass
Time at Maximum Rotation	39	53	ms	49.7	Pass
Time of Decay to Zero Degrees	37	57	ms	38.2	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

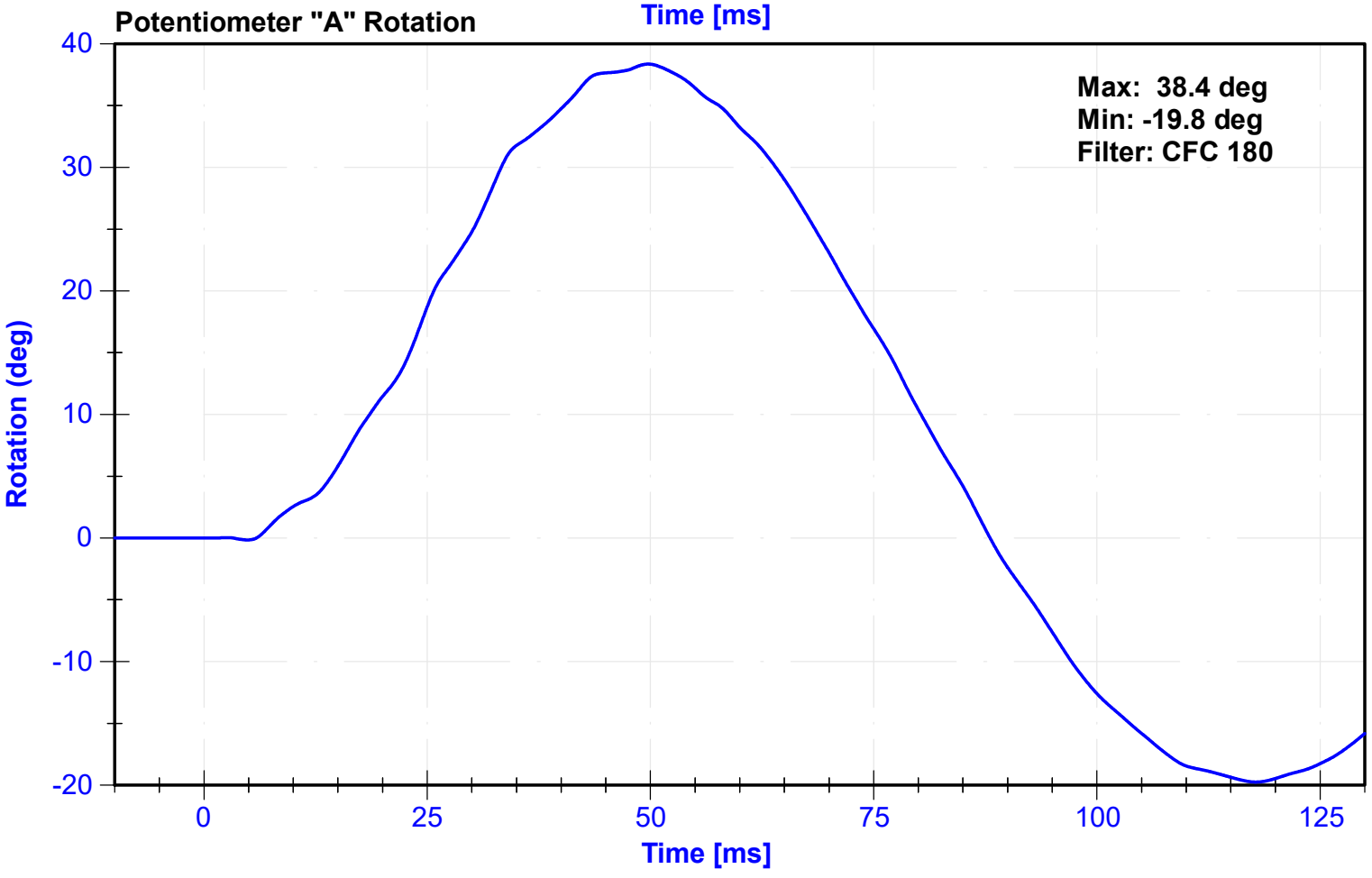
Transducer Calibrations

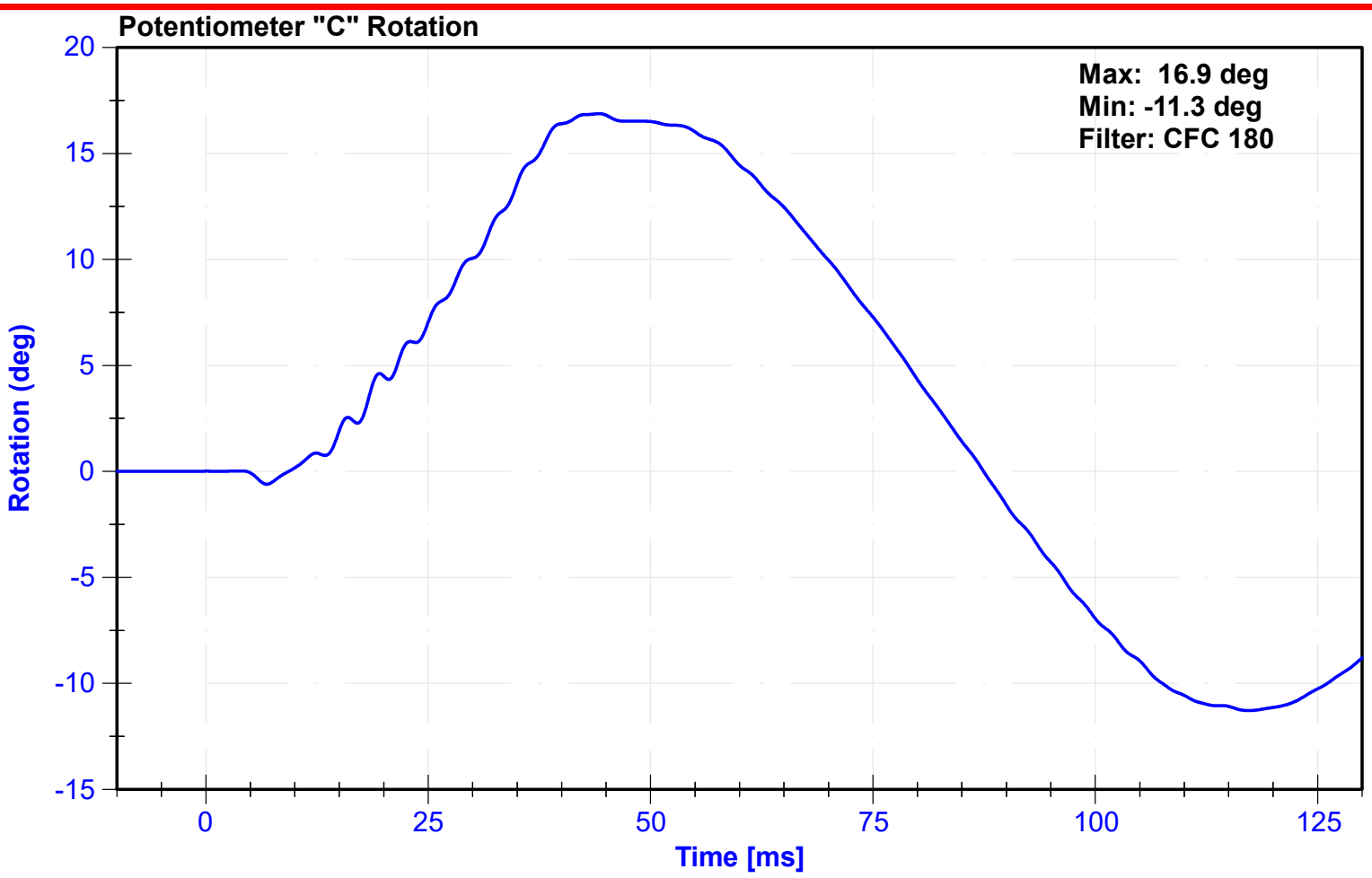
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Pendulum "A" Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Condyle "B" Potentiometer	Sfernice	095	10/5/2022	10/5/2023



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


Spine Rotation
Max: 54.9 deg
Min: -31.0 deg
Filter: CFC 180
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 38.4 deg
Min: -19.8 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

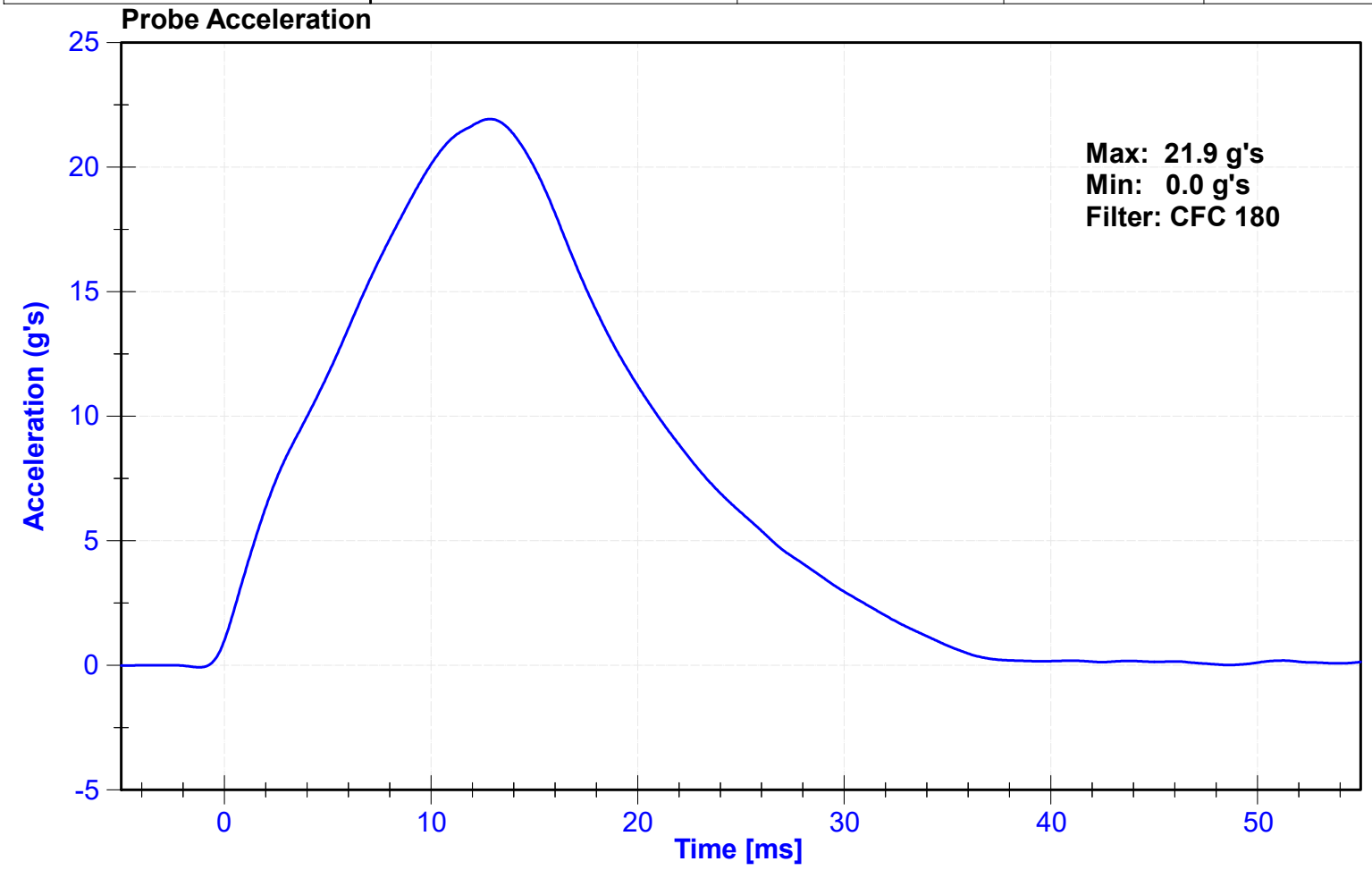
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

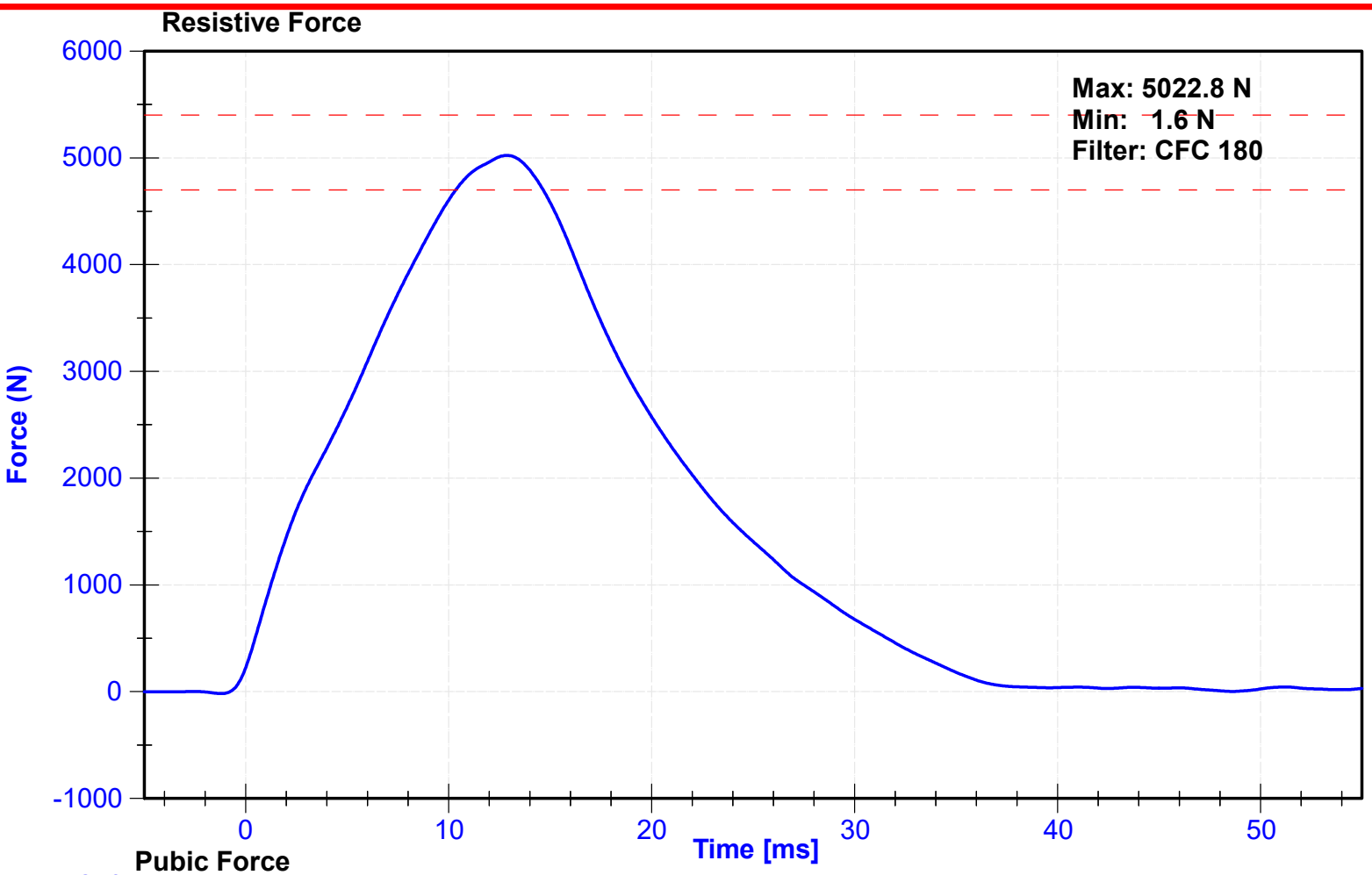
Results

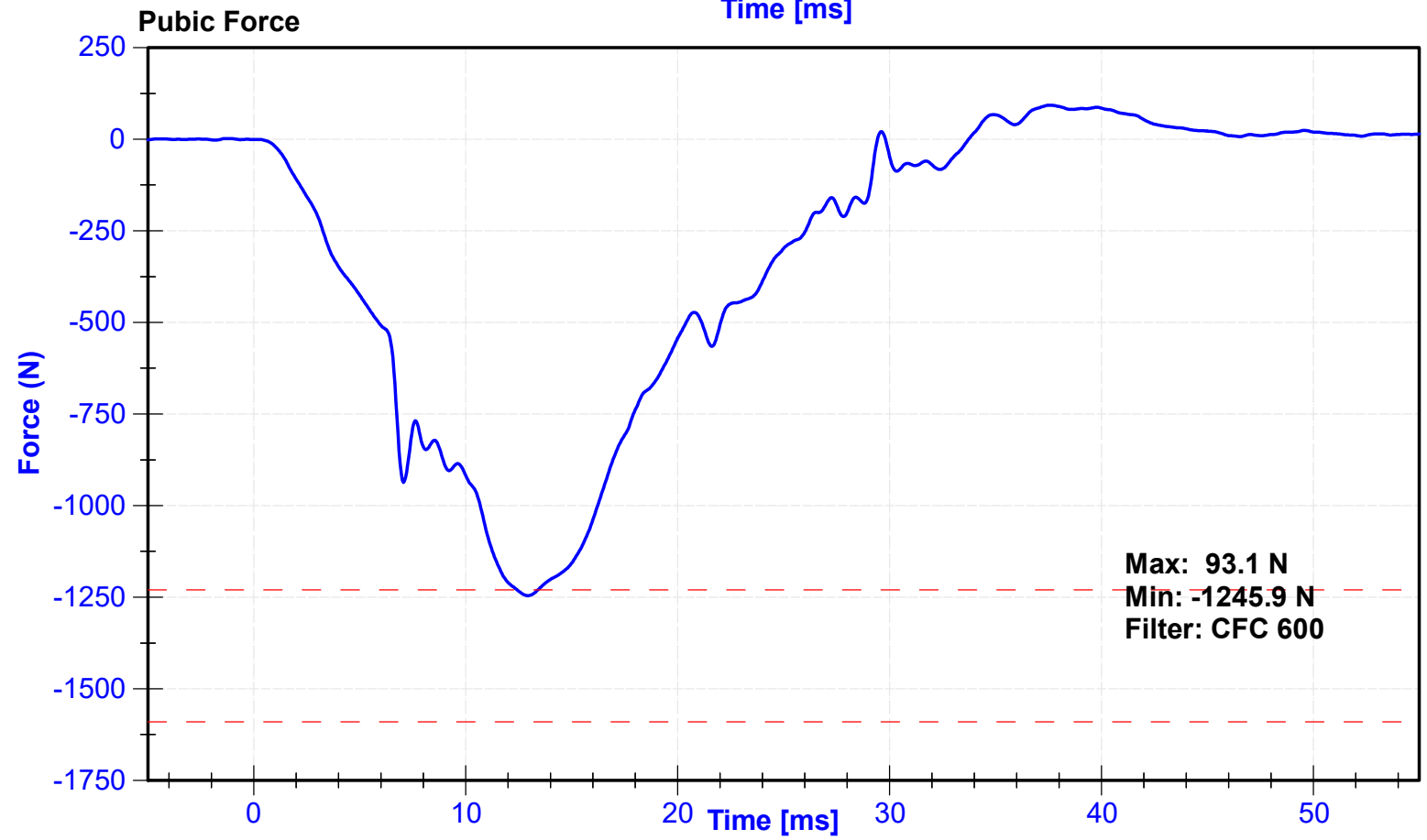
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	19.5	Pass
Velocity	4.2	4.4	m/s	4.32	Pass
Resistive Force	4700	5400	N	5022.8	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.85	Pass
Pubic Force	-1590	-1230	N	-1245.9	Pass
Time at Peak Pubic Force	12.2	17.0	ms	12.95	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Pubic Load Cell	Denton	459-FY	6/14/2022	6/14/2023




Resistive Force
Max: 5022.8 N
Min: 1.6 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: 93.1 N
Min: -1245.9 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

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE – PASSENGER ATD

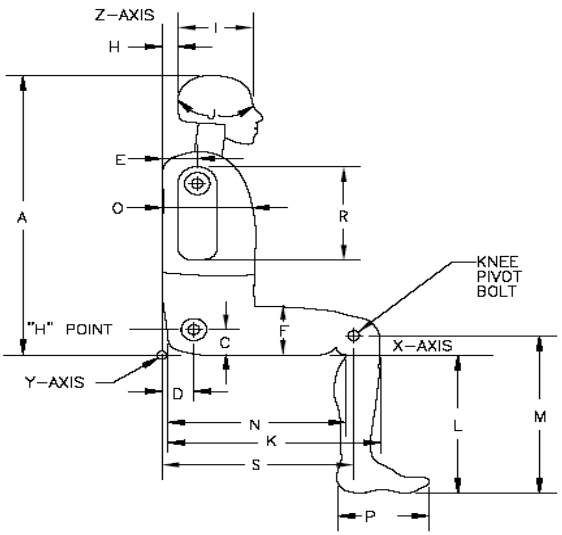
SERIAL NO:DG8012

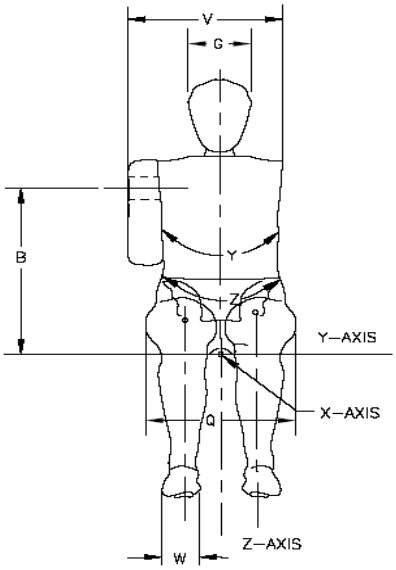
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Brogan Date: 02/13/2023

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	785	Pass
B	Shoulder Pivot Height	437	453	447	Pass
C	H-point Height	79	89	82	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	127	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	545	Pass
K	Buttock to Knee Length	514	540	528	Pass
L	Popliteal Height	343	369	359	Pass
M	Knee Pivot to floor height	392	409	402	Pass
N	Buttock Popliteal Length	416	442	431	Pass
O	Chest Depth w/o jacket	195	211	201	Pass
P	Foot Length	216	232	226	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	320	Pass
R	Arm Length	249	259	251	Pass
S	Knee Joint to seatback	477	493	487	Pass
V	Shoulder Width	341	357	351	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	872	Pass
Z	Waist Circumference	761	791	778	Pass

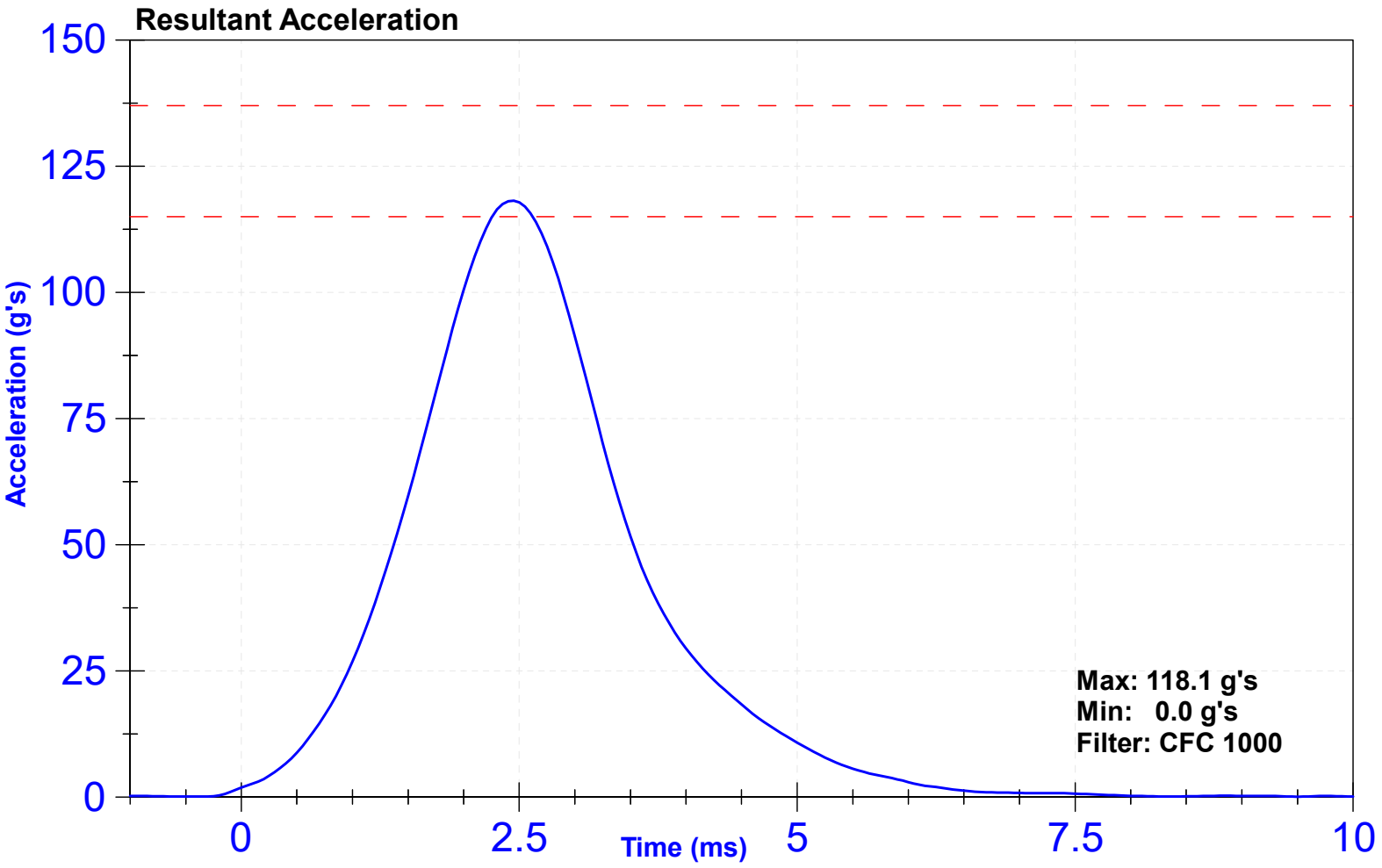
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

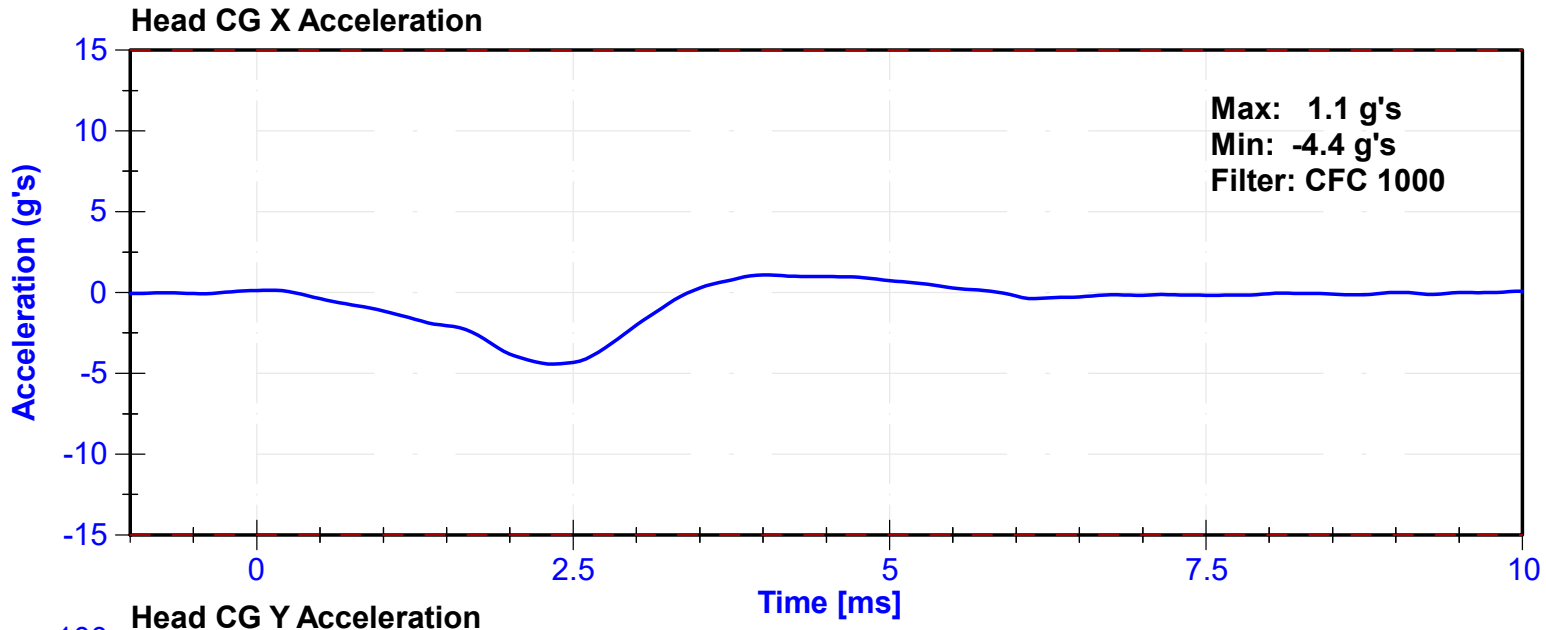
Results

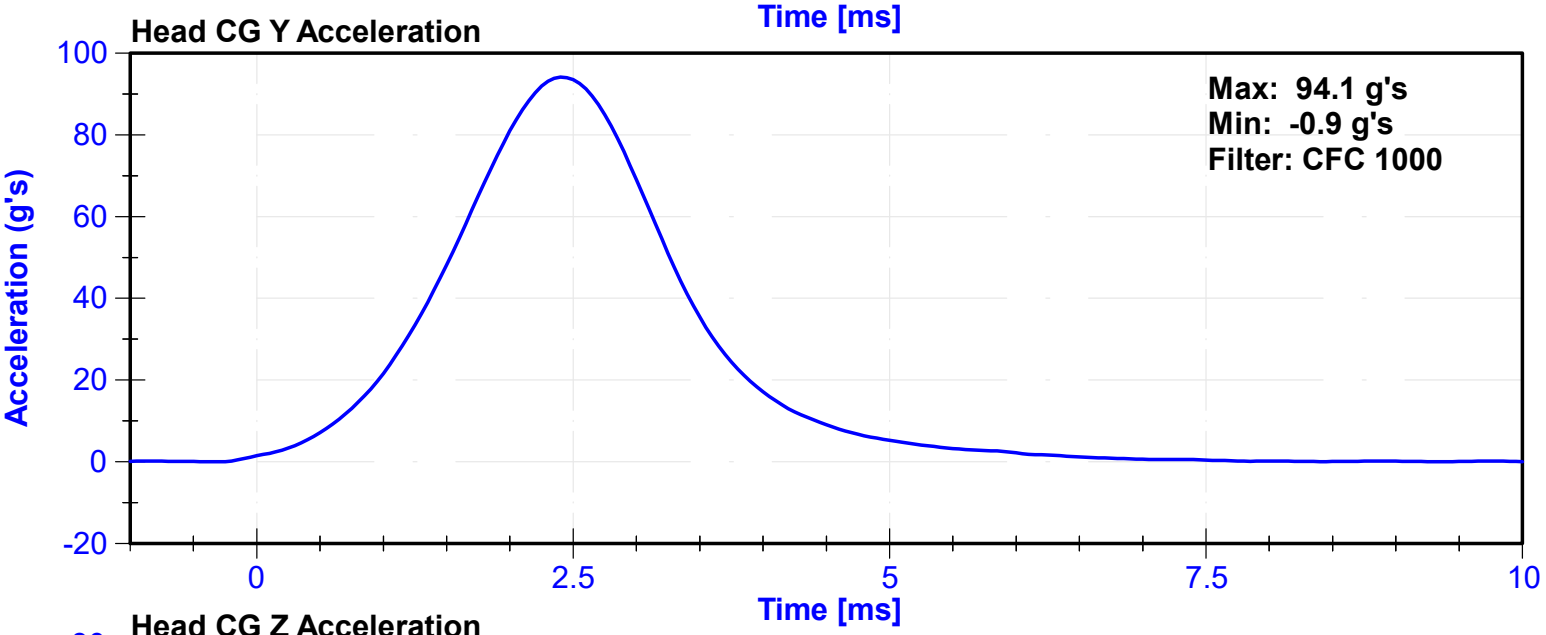
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	29.5	Pass
Resultant Acceleration	115	137	g's	118.1	Pass
Oscillation	0	15	%	0.8	Pass
Fore-Aft Acceleration	-15	15	g's	-4.4	Pass

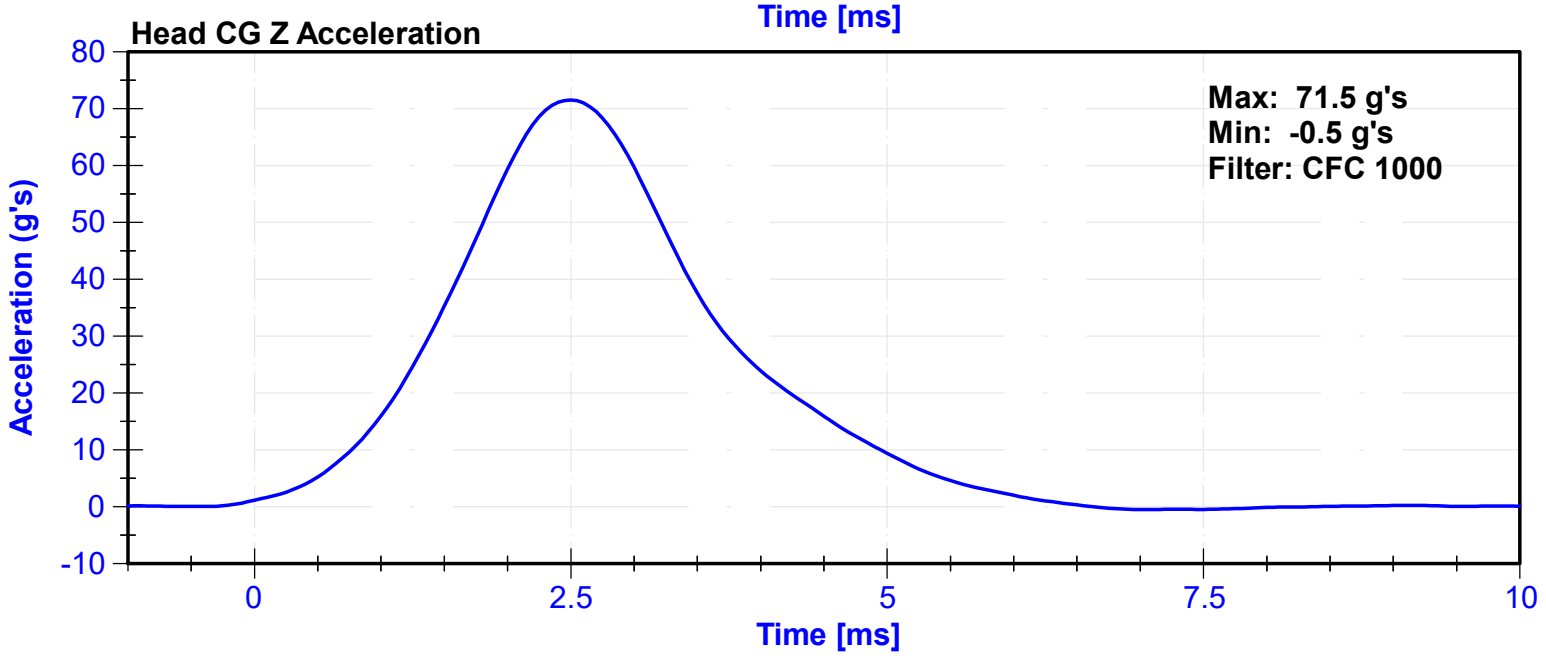
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P74788	12/12/2022	6/10/2023
Y Accelerometer	Endevco	P51668	12/12/2022	6/10/2023
Z Accelerometer	Endevco	P83319	12/12/2022	6/10/2023




Head CG X Acceleration
Max: 1.1 g's
Min: -4.4 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: 94.1 g's
Min: -0.9 g's
Filter: CFC 1000
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
5
7.5
10
Time [ms]


Head CG Z Acceleration
Max: 71.5 g's
Min: -0.5 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	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

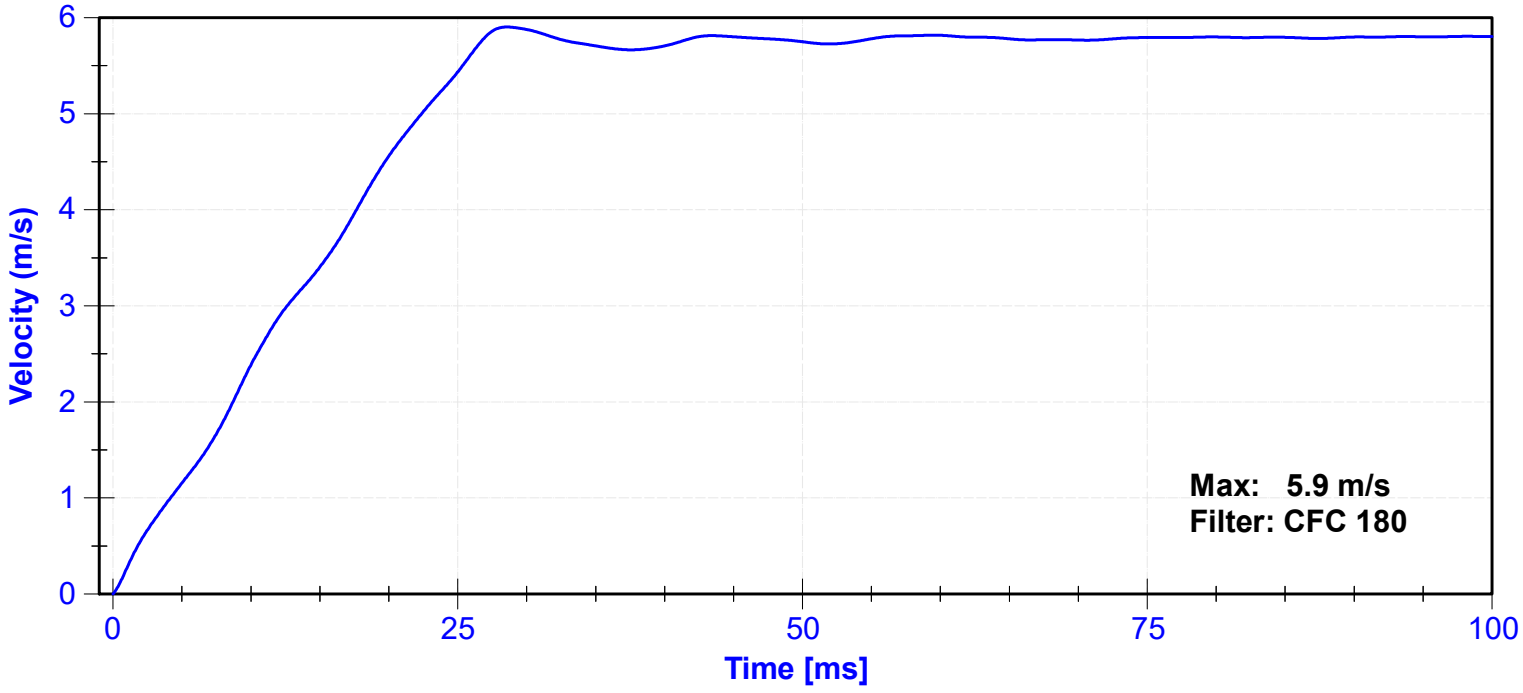
Results

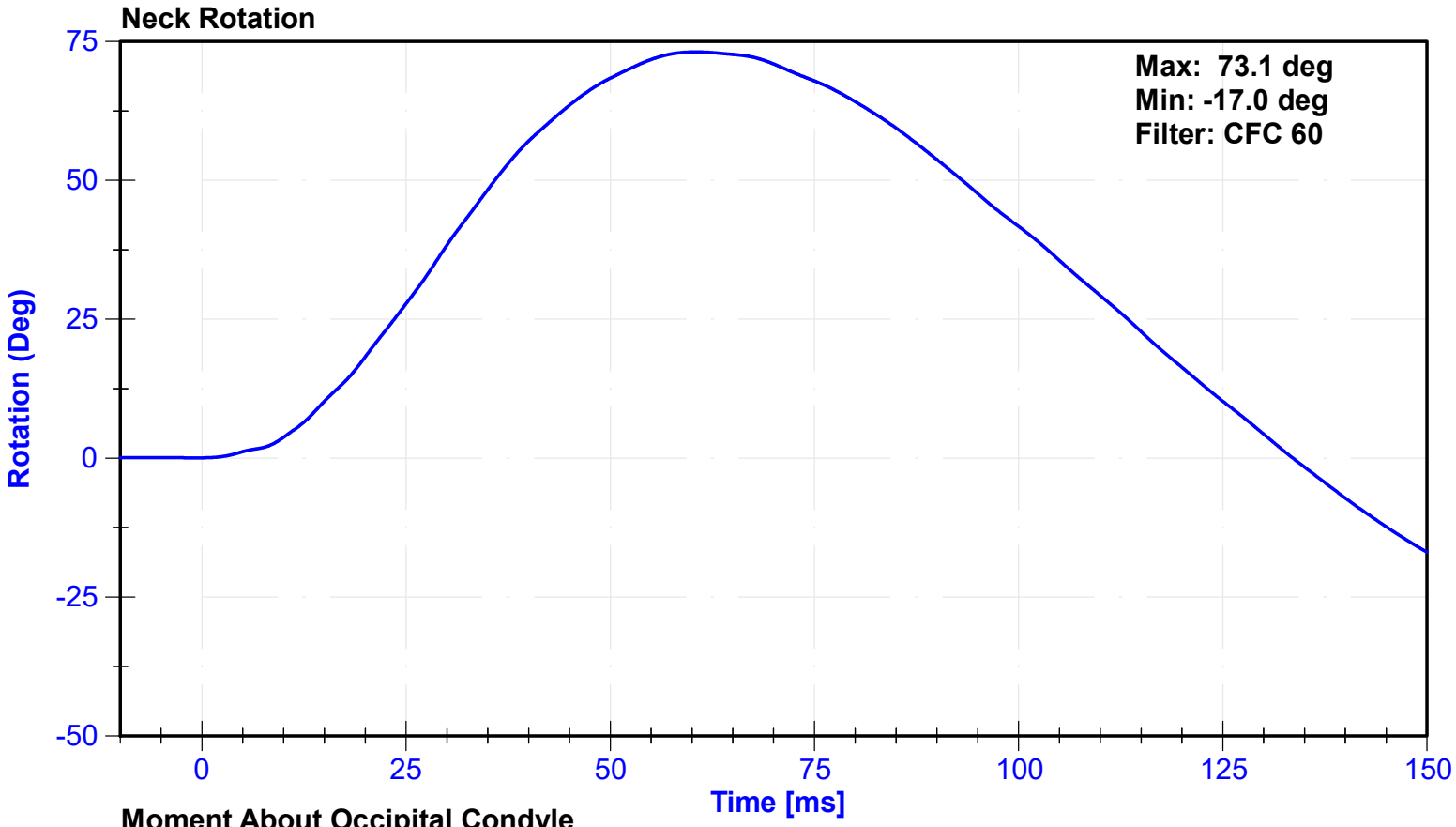
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	19.5	Pass
Velocity	5.51	5.63	m/s	5.532	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.39	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.40	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.56	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.43	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.90	Pass
Neck Rotation	71	81	deg	73.1	Pass
Time at Maximum Rotation	50	70	ms	60.5	Pass
Moment about the OC	36	44	Nm	41.6	Pass
Moment Decay to 0 Nm	102	126	ms	115.3	Pass

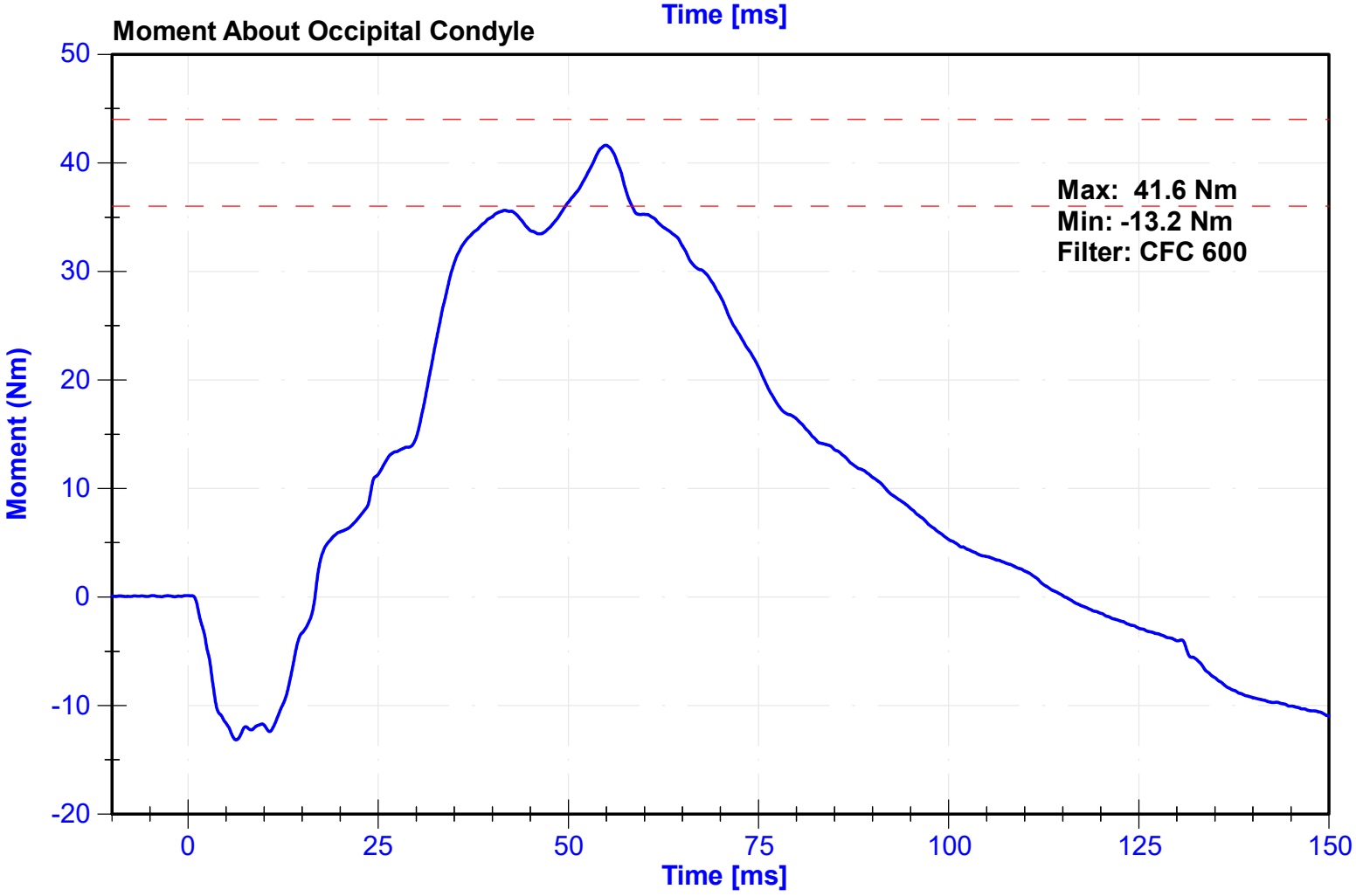
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/26/2022	10/26/2023
Pendulum Potentiometer	Servo	4961	11/11/2022	11/11/2023
Condyle Potentiometer	Servo	DS185	11/11/2022	11/11/2023
Upper Neck Load Cell	Humanetics	1716A_1872-FY	6/13/2022	6/13/2023

Pendulum Impulse




Neck Rotation
Max: 73.1 deg
Min: -17.0 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: 41.6 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]

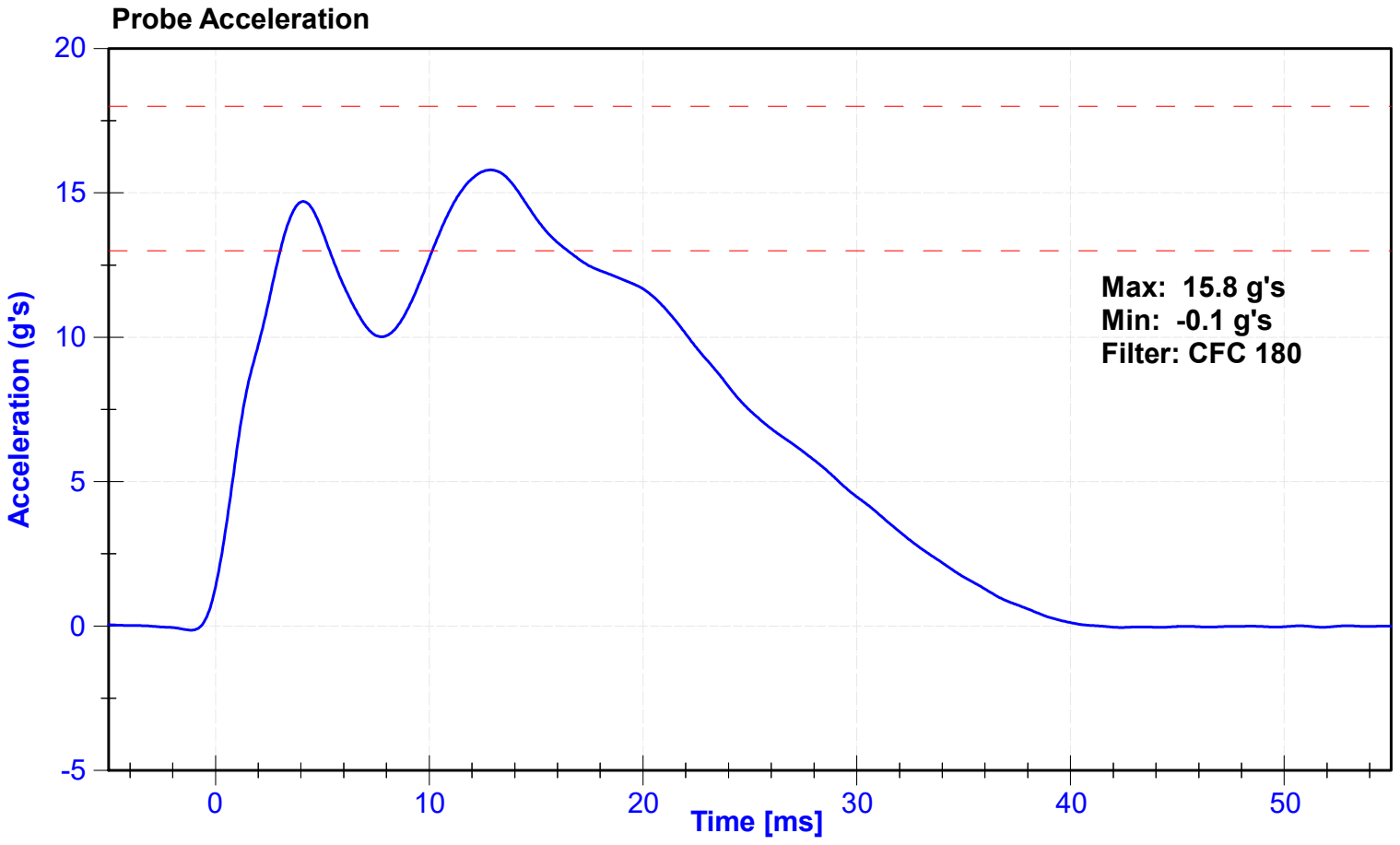
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

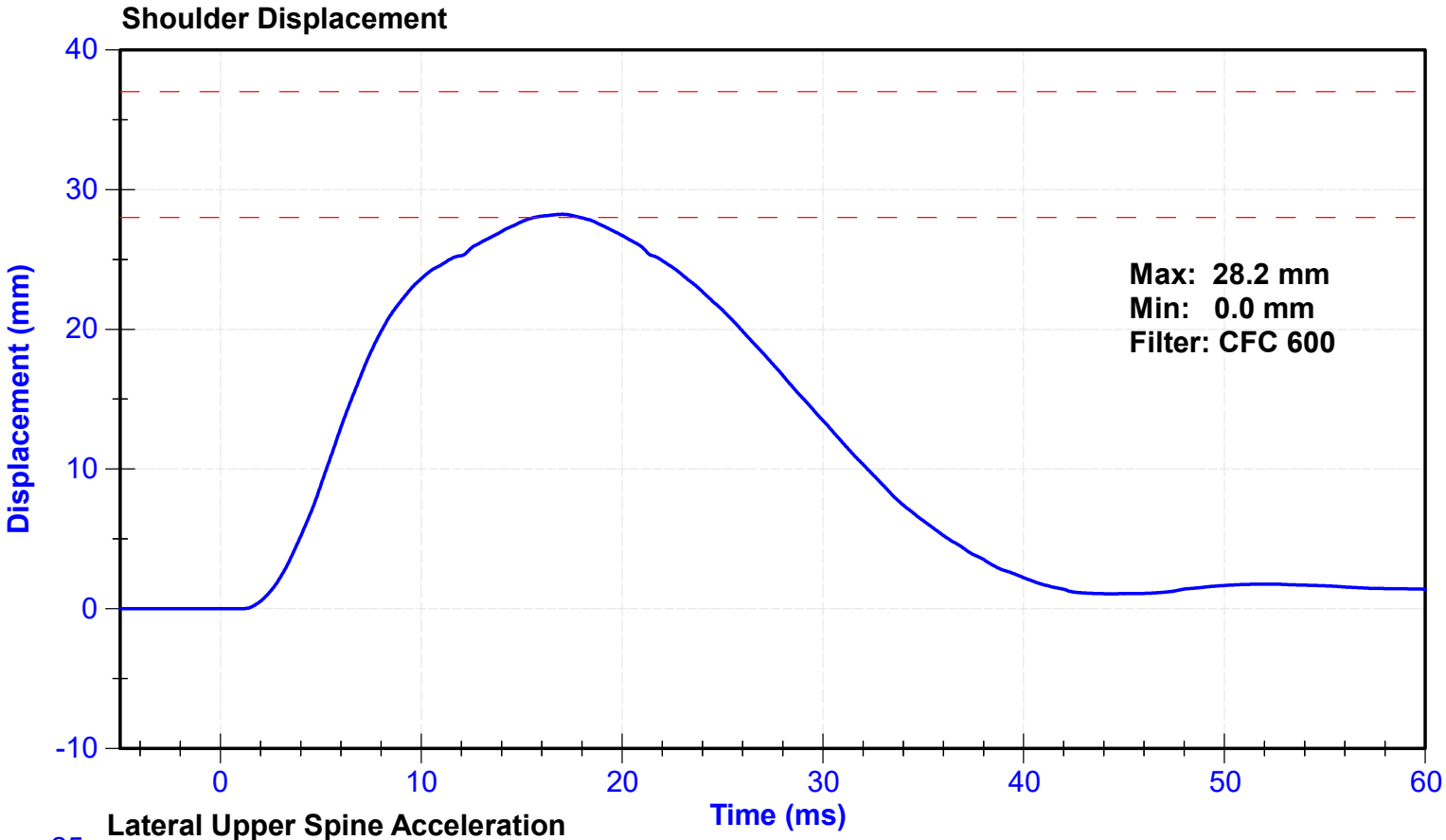
Results

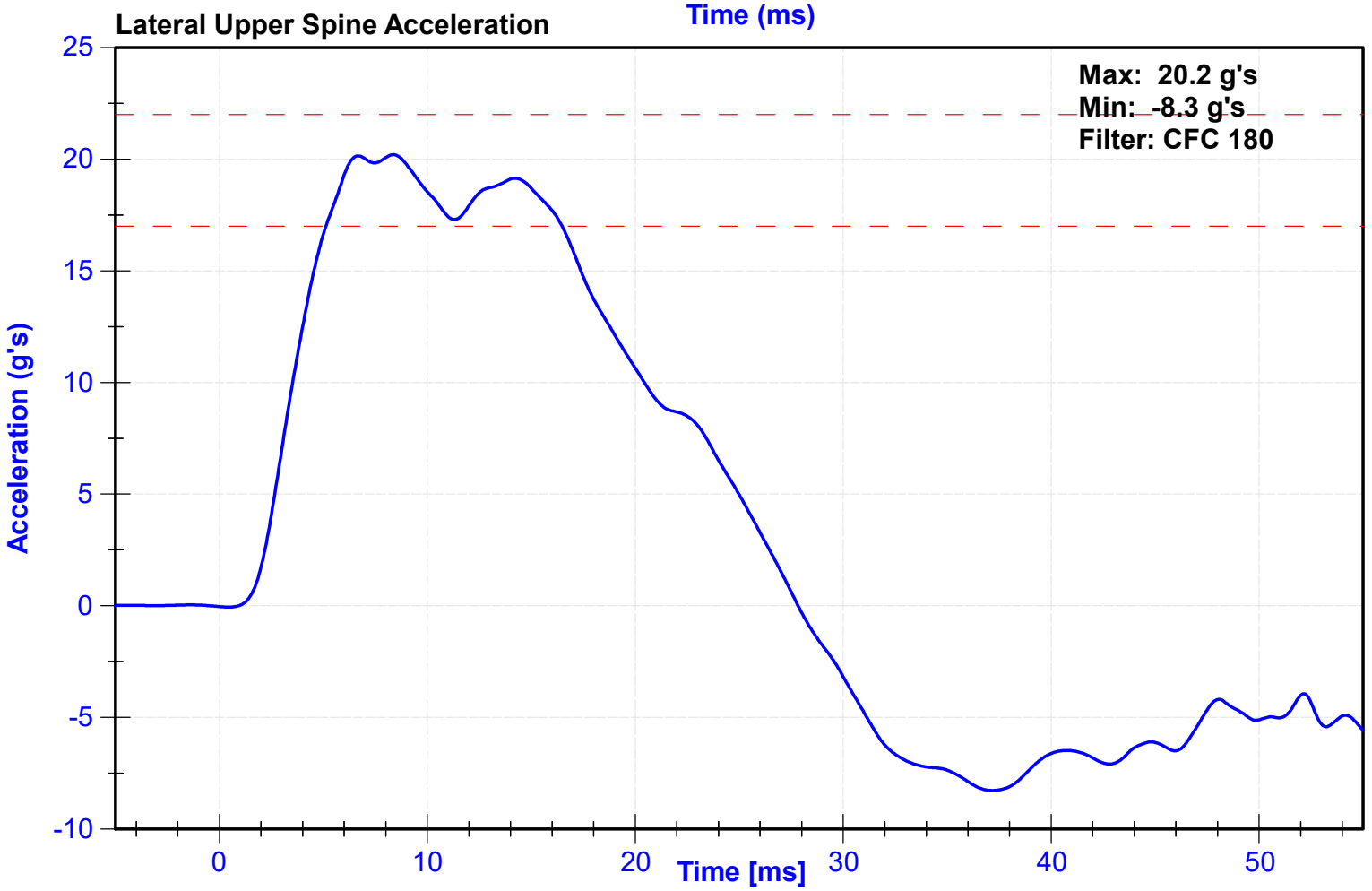
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	19	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	13	18	g's	15.8	Pass
Shoulder Deflection	28	37	mm	28.2	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Shoulder Potentiometer	Servo	1274GFE	12/13/2022	6/13/2023
Upper Spine Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023




Shoulder Displacement
Displacement (mm)
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time (ms)
Max: 28.2 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
Time [ms]
Max: 20.2 g's
Min: -8.3 g's
Filter: CFC 180

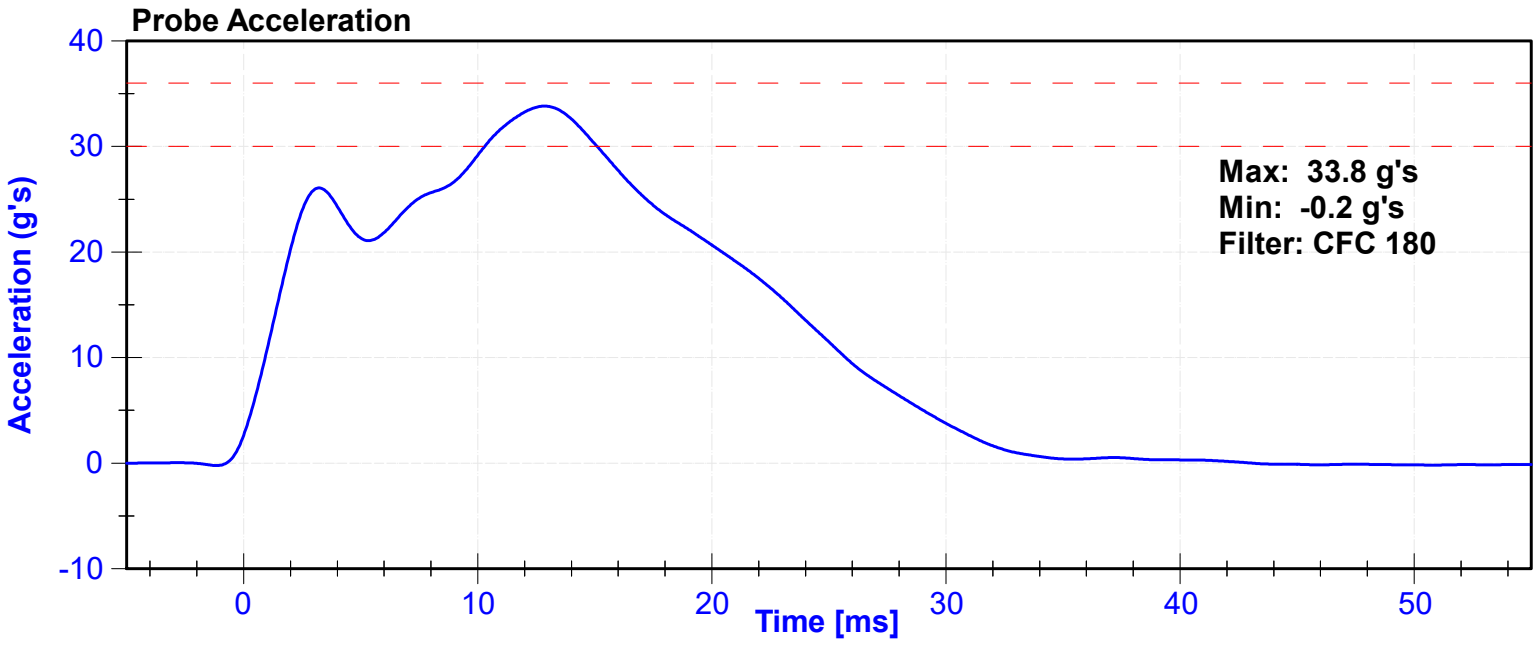
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

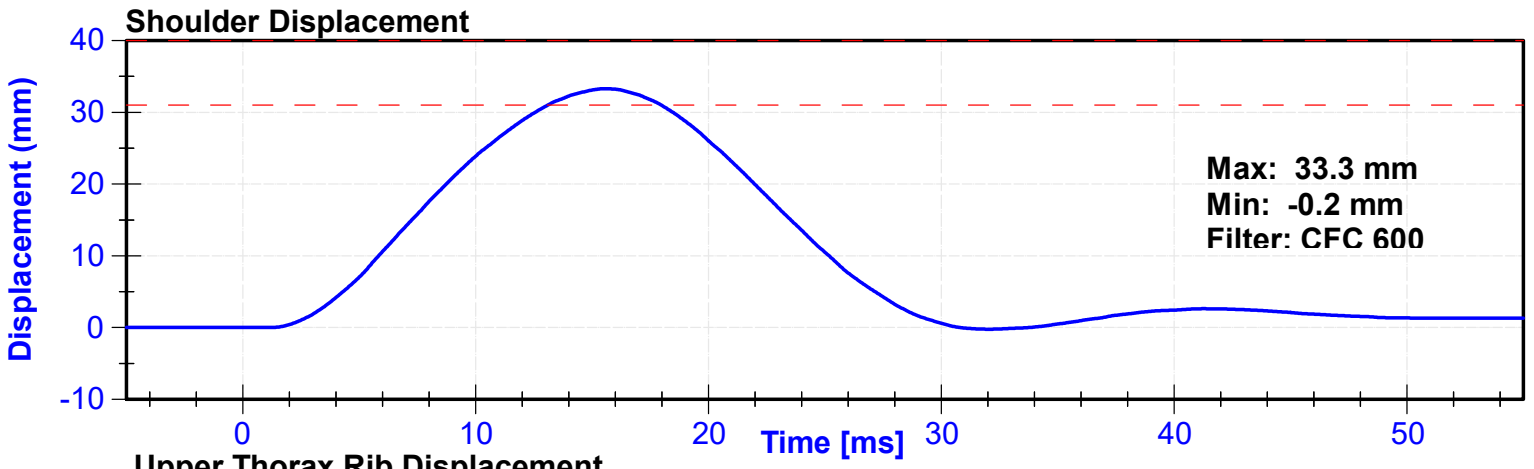
Results

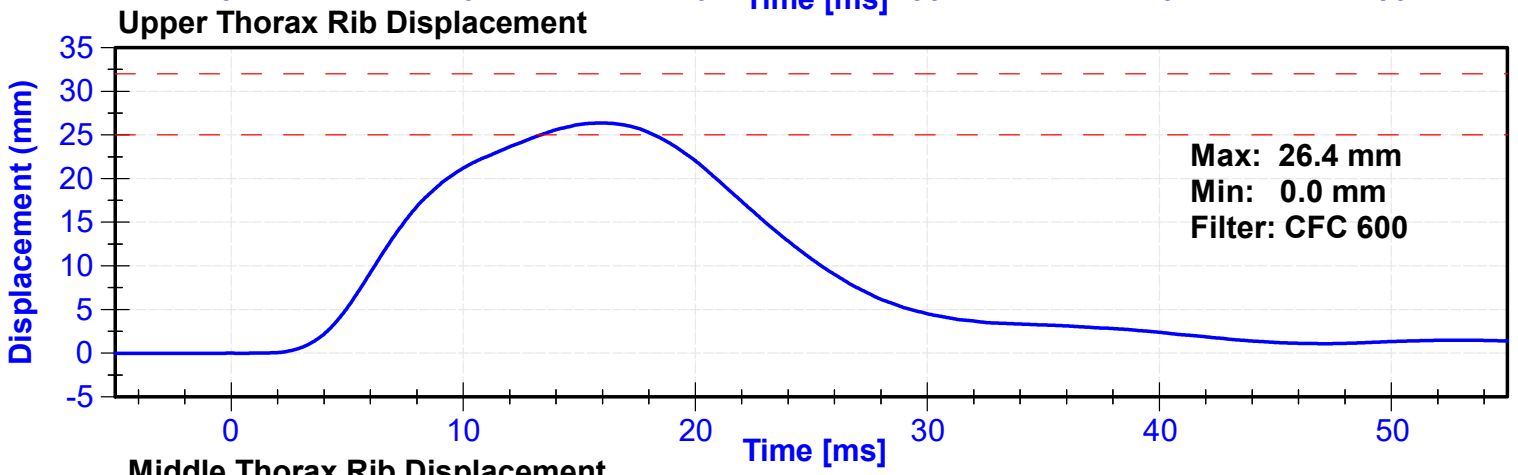
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	19	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration after 5 ms	30	36	g's	33.8	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.3	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.7	Pass
Shoulder Deflection	31	40	mm	33.3	Pass
Upper Thorax Rib Deflection	25	32	mm	26.4	Pass
Mid Thorax Rib Deflection	30	36	mm	30.1	Pass
Lower Thorax Rib Deflection	32	38	mm	32.3	Pass

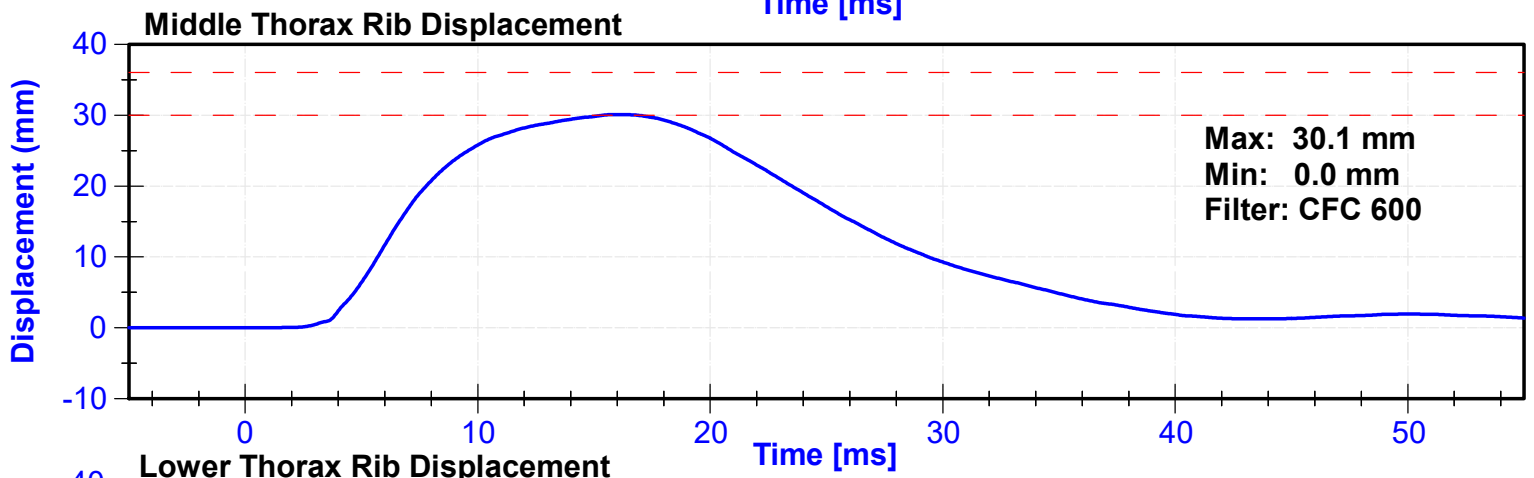
Transducer Calibrations

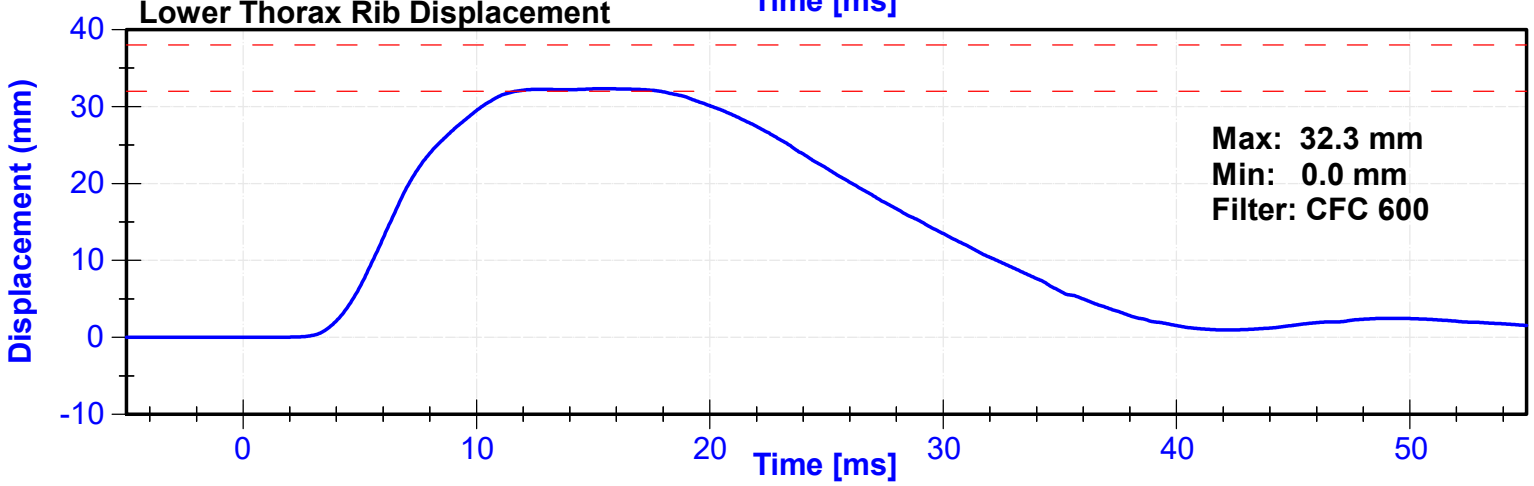
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine T1 Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023
Upper Spine T12 Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Shoulder Potentiometer	Servo	1274GFE	12/13/2022	6/13/2023
Upper Thorax Rib Potentiometer	Servo	1199GFE	12/13/2022	6/13/2023
Middle Thorax Rib Potentiometer	Servo	1246GFE	12/13/2022	6/13/2023
Lower Thorax Rib Potentiometer	Servo	011GFE	12/13/2022	6/13/2023

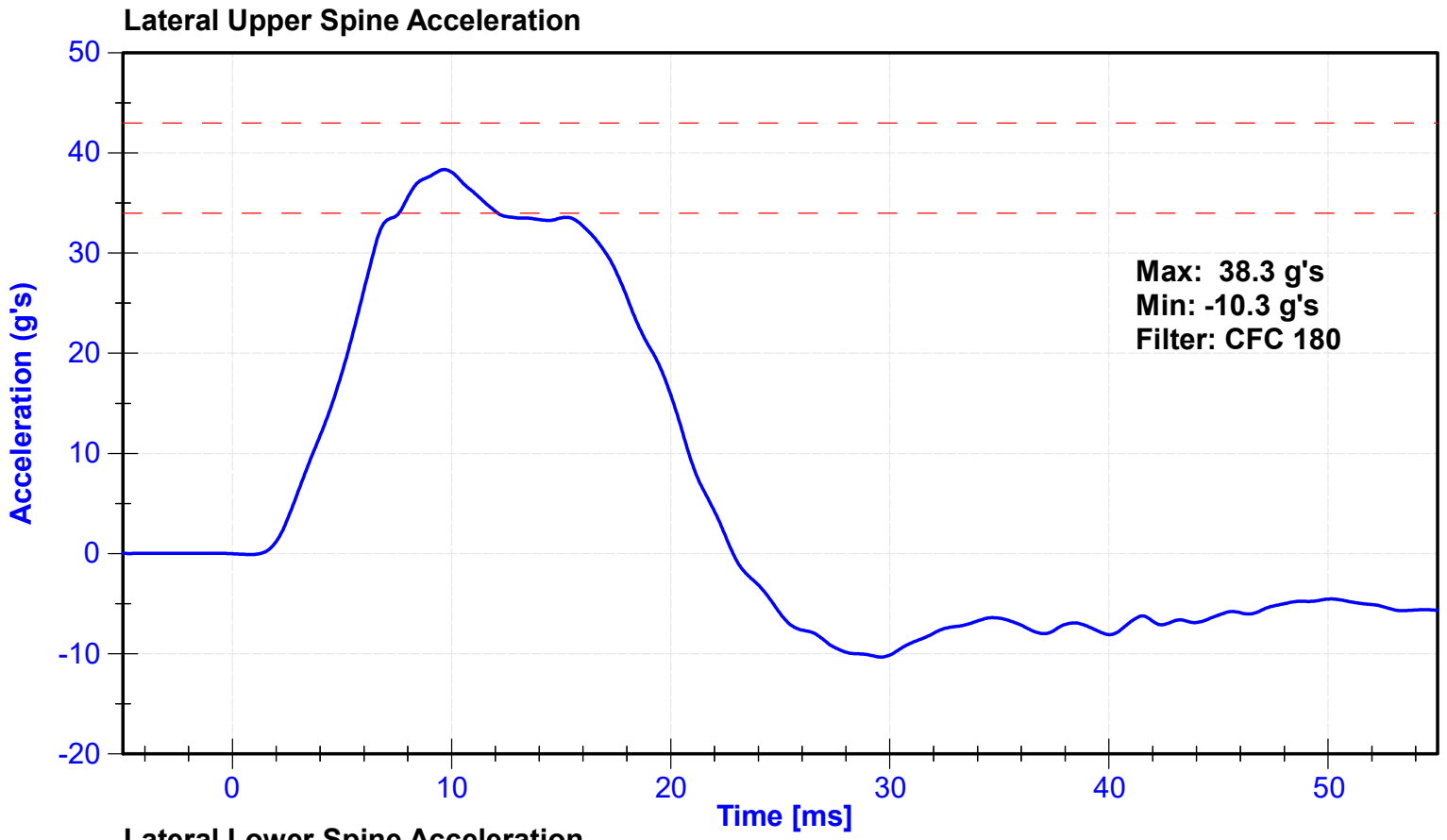


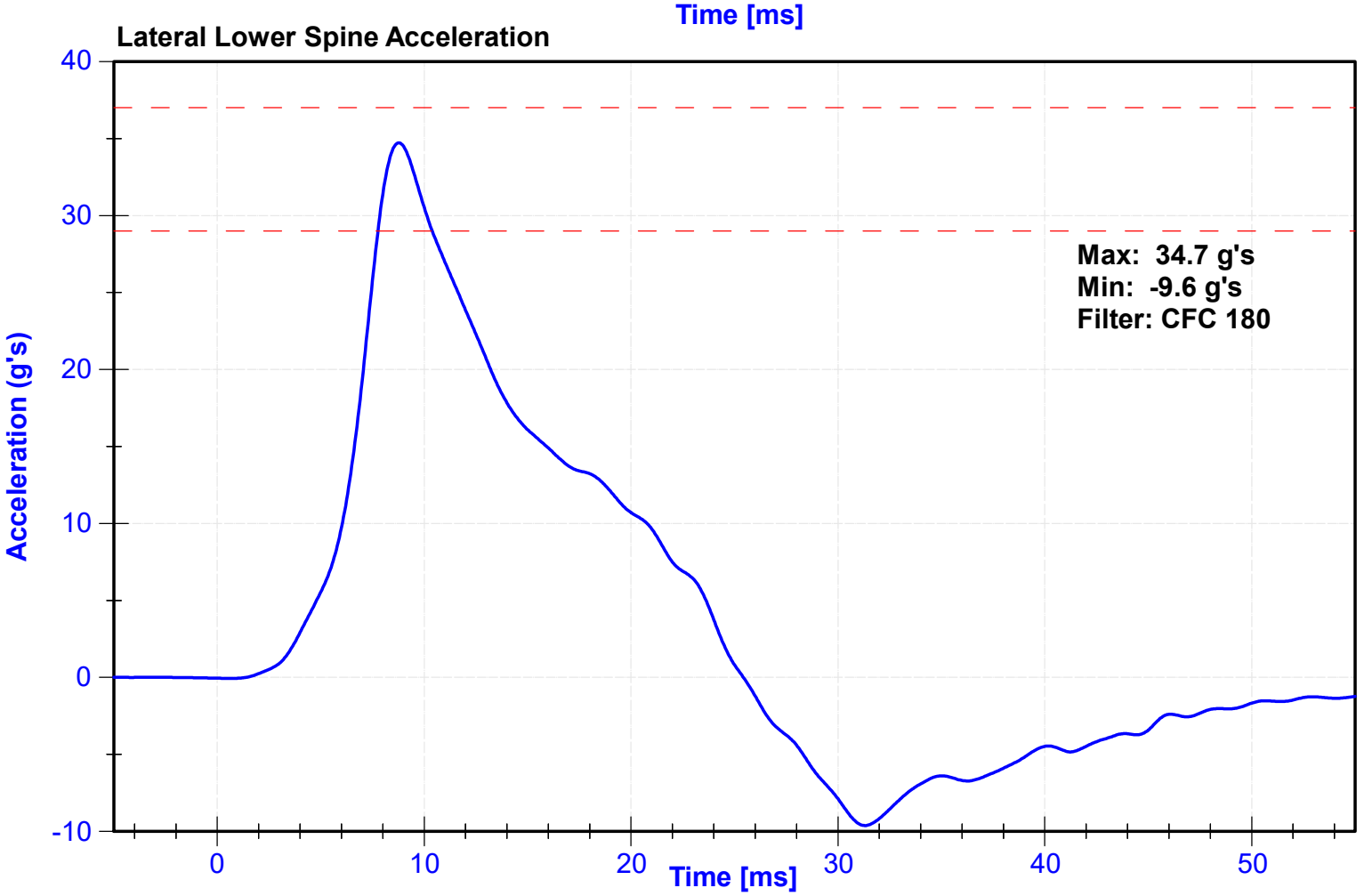

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 33.3 mm
Min: -0.2 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.4 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.1 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.3 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 38.3 g's
Min: -10.3 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 34.7 g's
Min: -9.6 g's
Filter: CFC 180

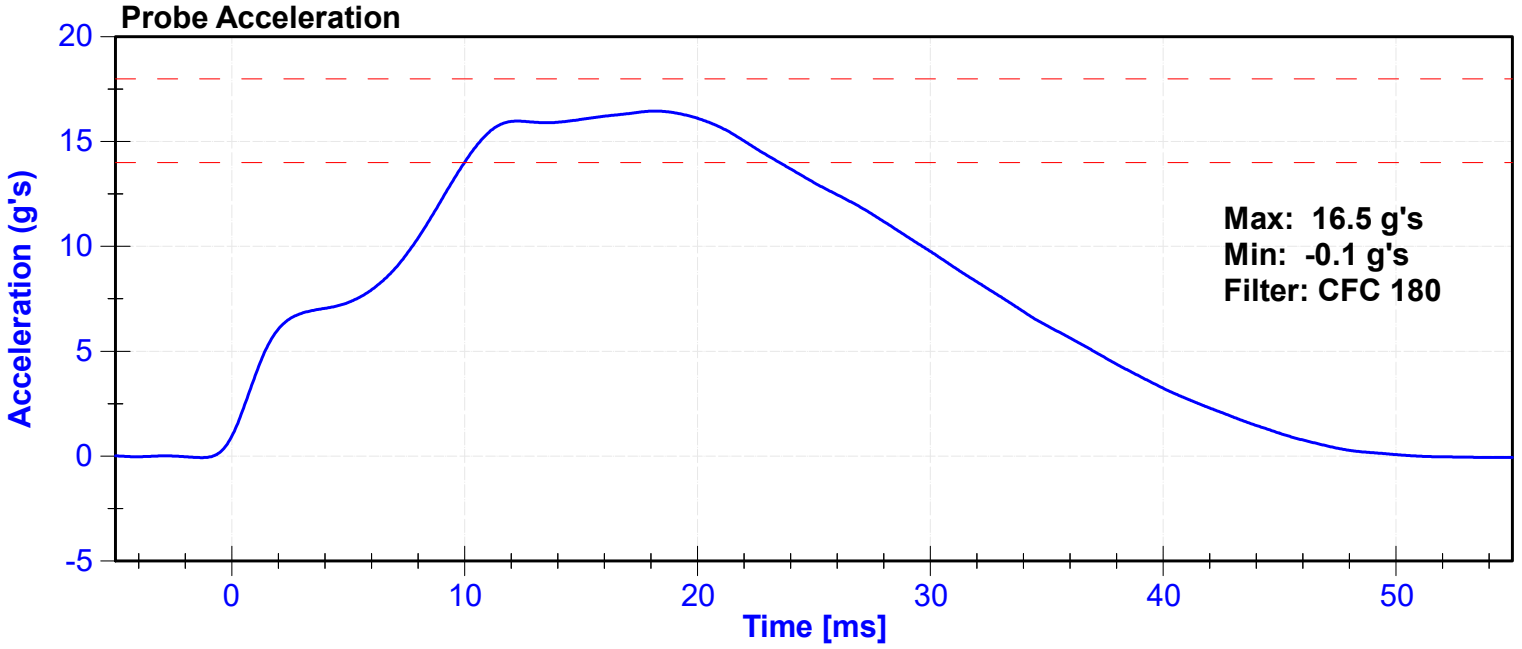
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

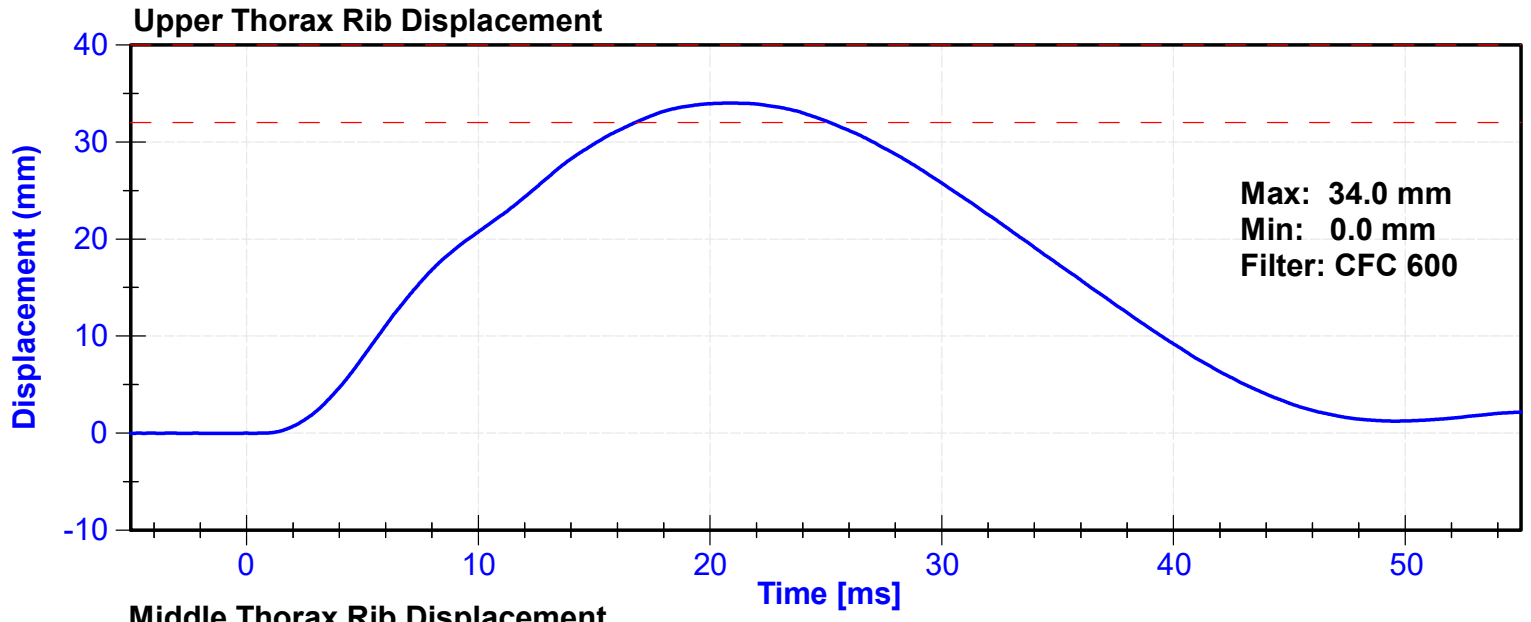
Results

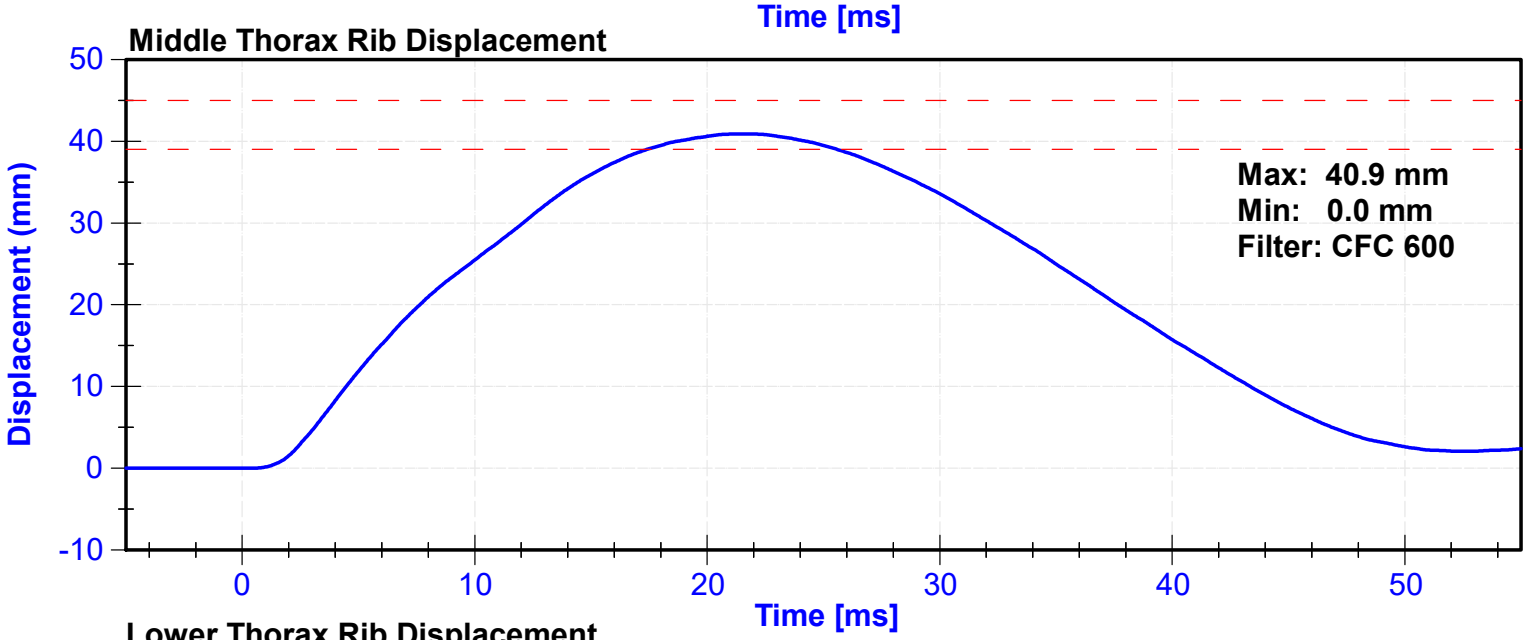
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	19	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	14	18	g's	16.5	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.7	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.9	Pass
Upper Thorax Rib Deflection	32	40	mm	34.0	Pass
Middle Thorax Rib Deflection	39	45	mm	40.9	Pass
Lower Thorax Rib Deflection	35	43	mm	40.3	Pass

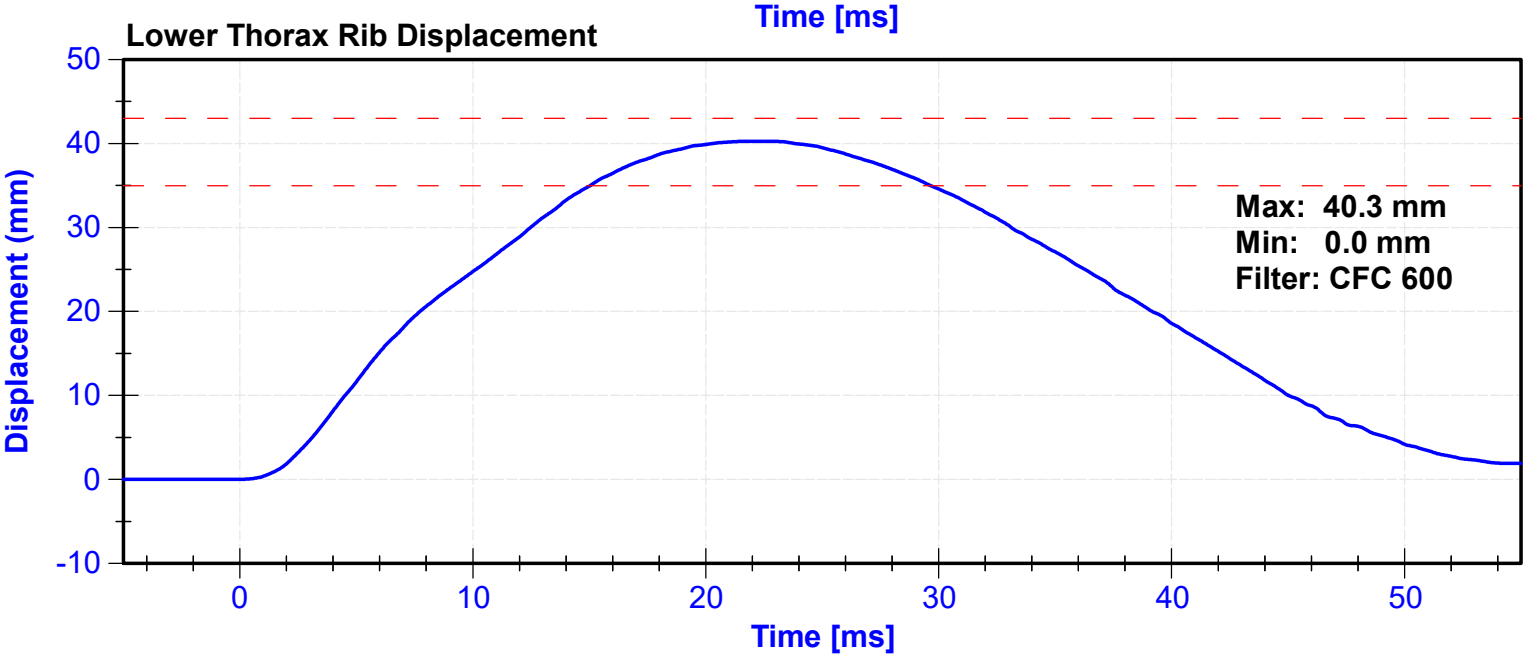
Transducer Calibrations

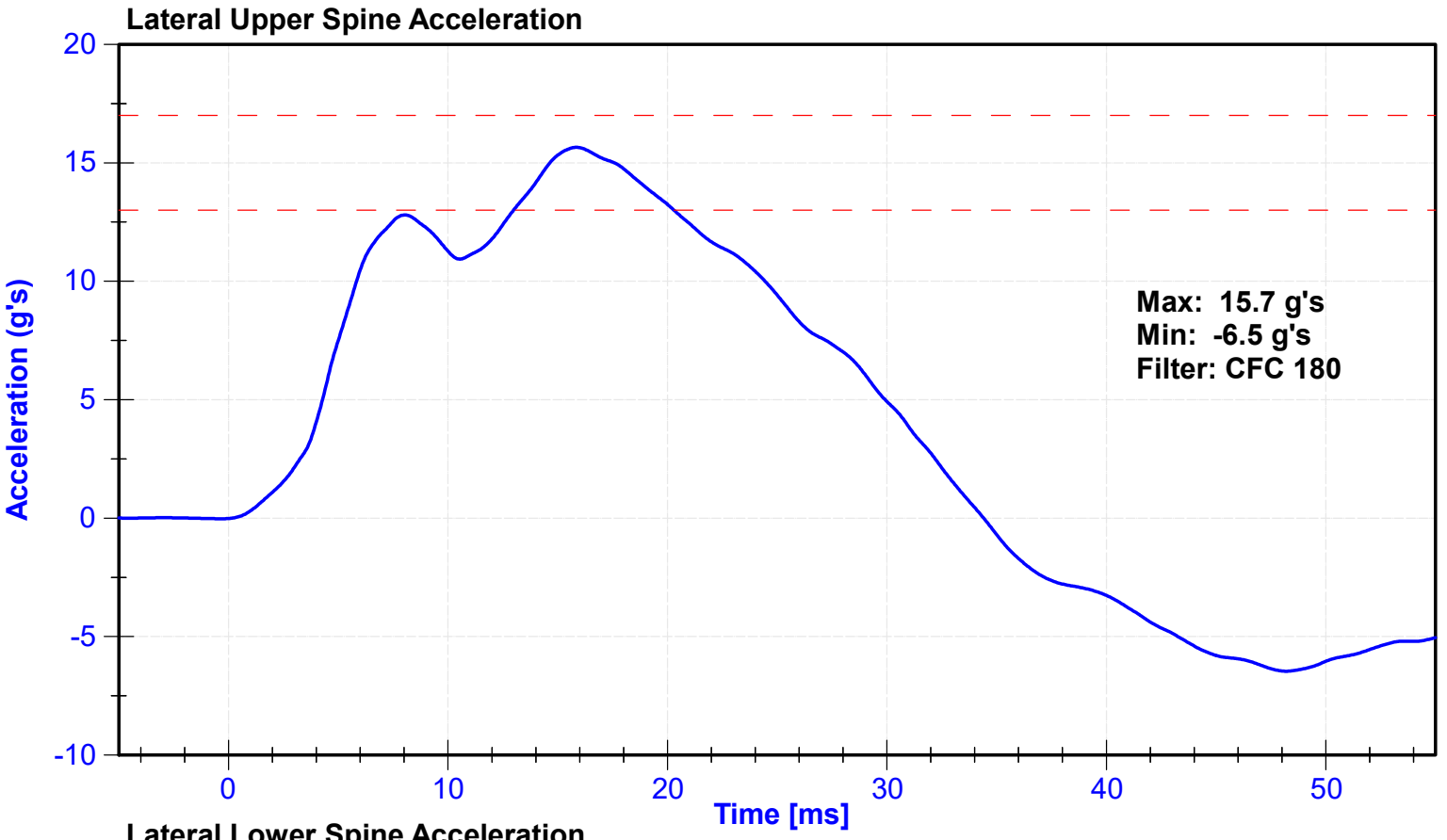
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023
Lower Spine Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Upper Thorax Rib Potentiometer	Servo	1199GFE	12/13/2022	6/13/2023
Middle Thorax Rib Potentiometer	Servo	1246GFE	12/13/2022	6/13/2023
Lower Thorax Rib Potentiometer	Servo	011GFE	12/13/2022	6/13/2023

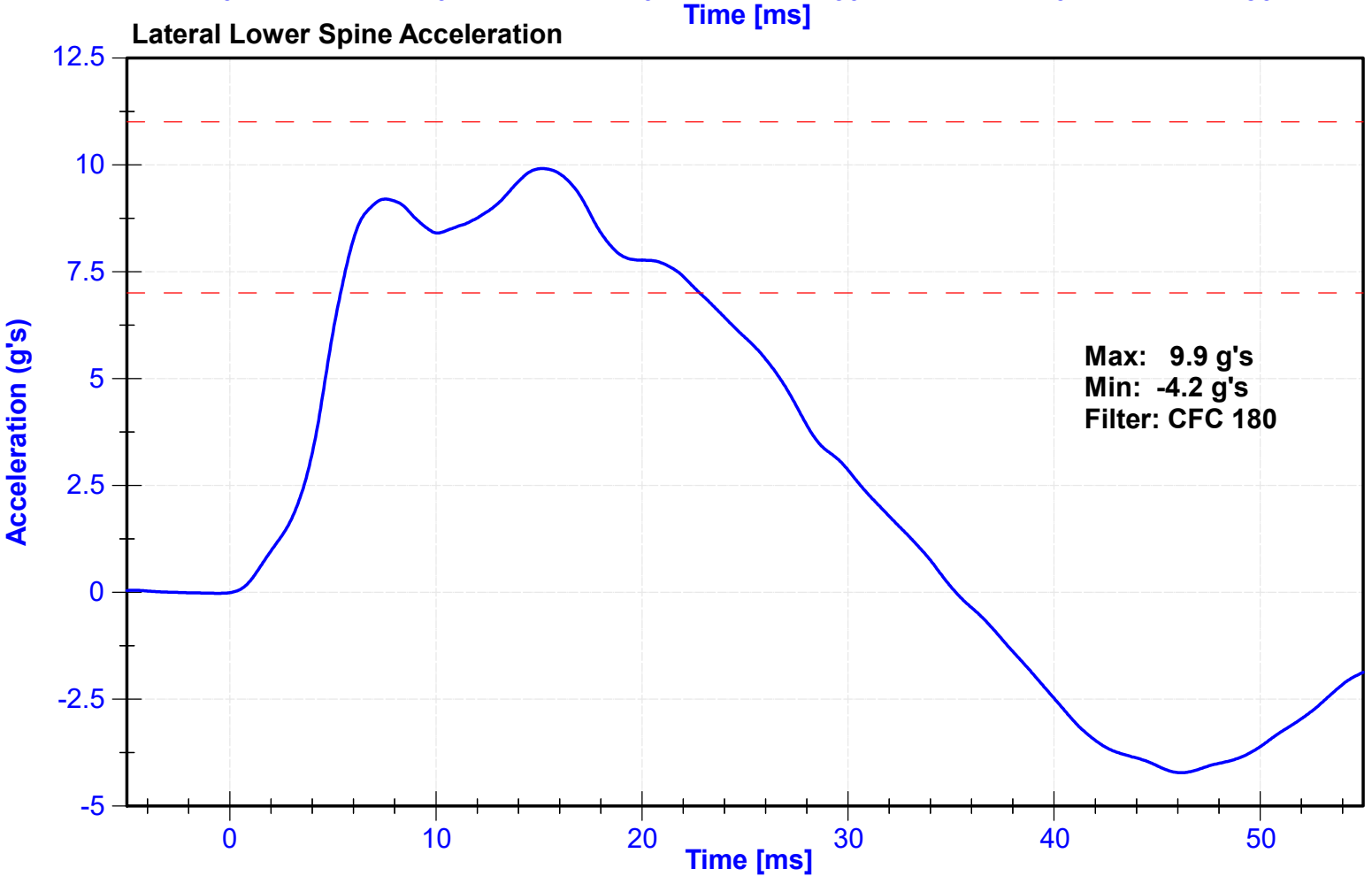



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.0 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.9 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)
20
15
10
5
0
-5
-10
0
10
20
30
40
50
Time [ms]
Max: 15.7 g's
Min: -6.5 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
Time [ms]
Max: 9.9 g's
Min: -4.2 g's
Filter: CFC 180

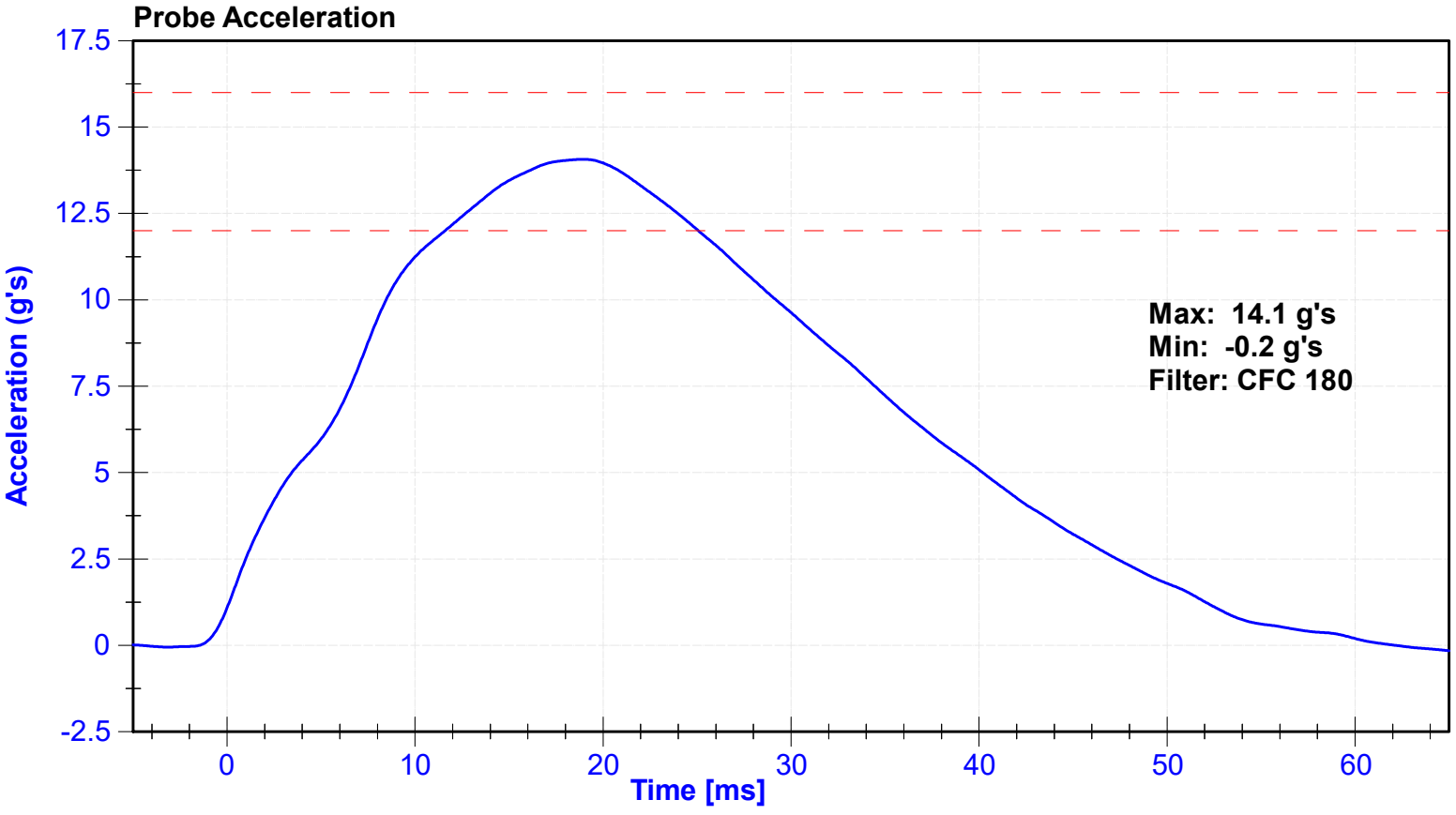
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

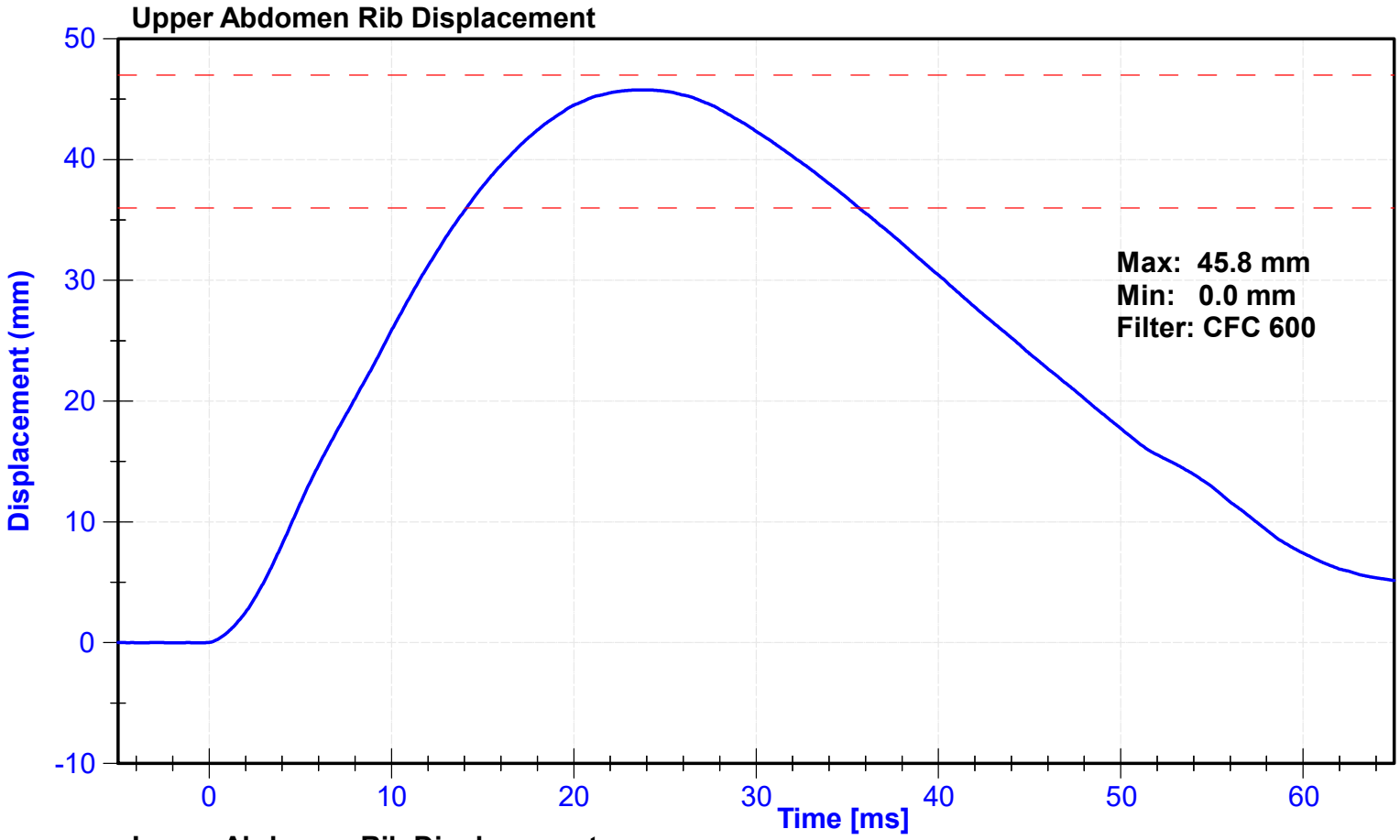
Results

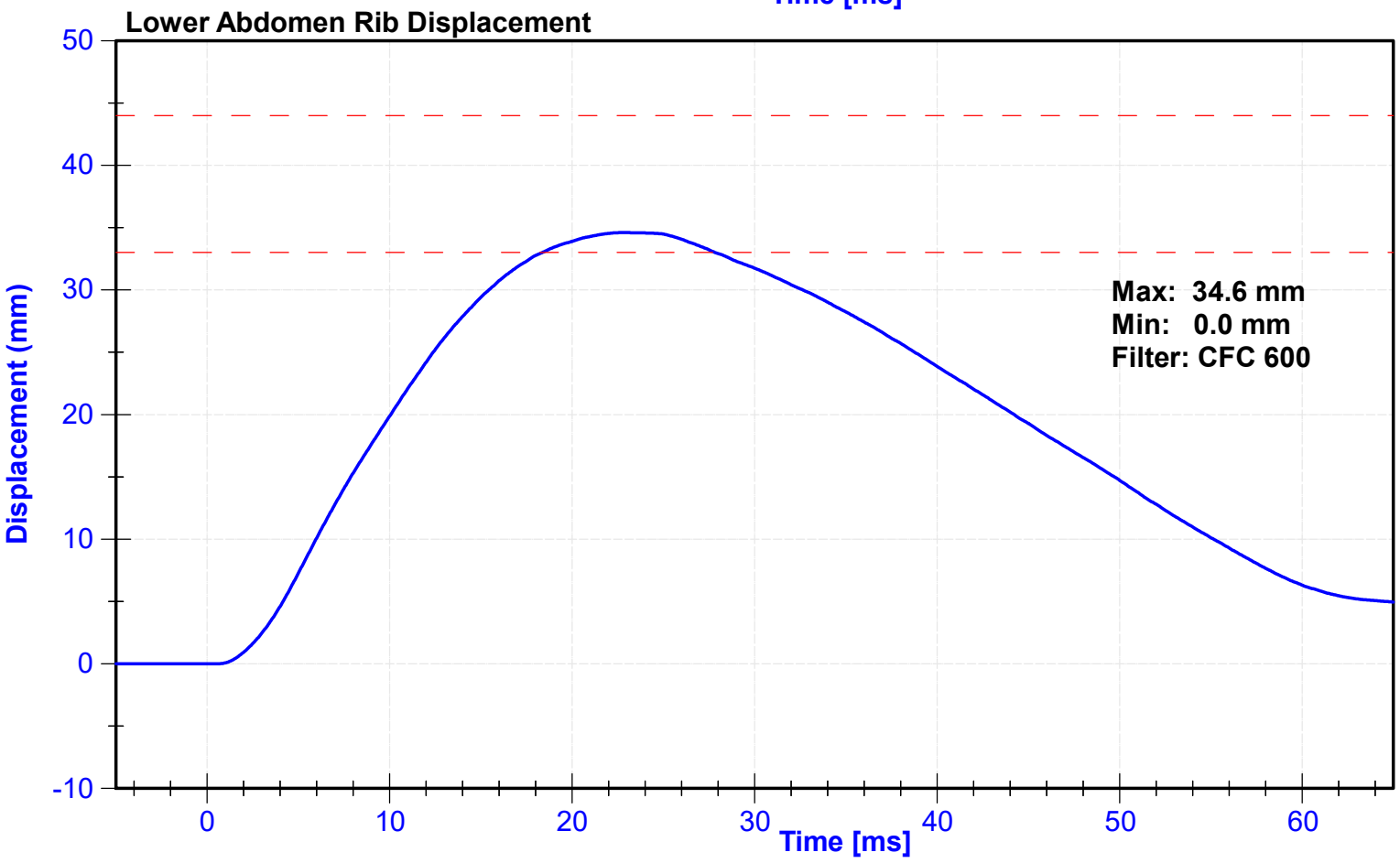
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	19	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	12	16	g's	14.1	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.7	Pass
Upper Abdomen Rib Deflection	36	47	mm	45.8	Pass
Lower Abdomen Rib Deflection	33	44	mm	34.6	Pass

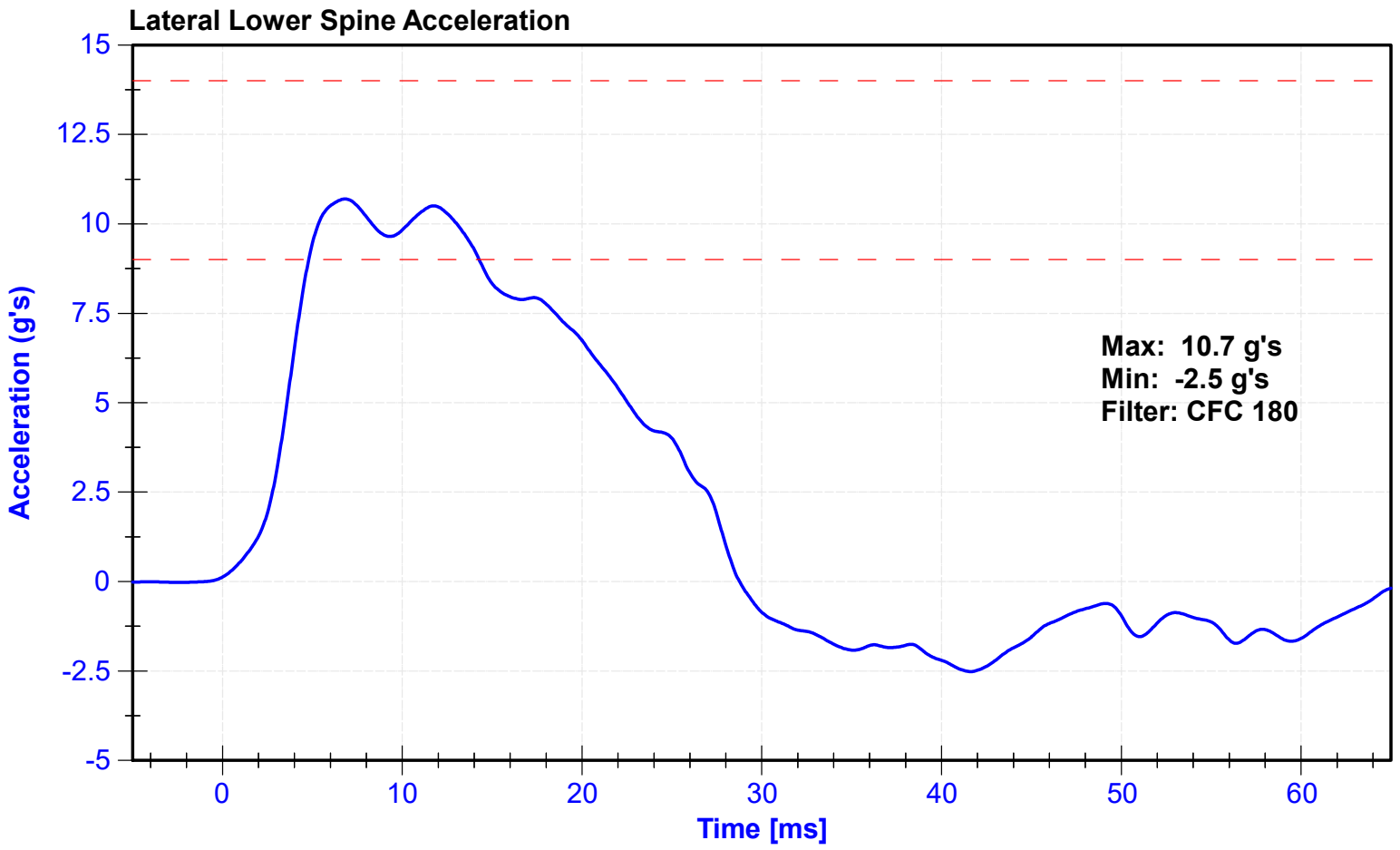
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Lower Spine Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Upper Abdomen Rib Potentiometer	Servo	008GFE	12/13/2022	6/13/2023
Lower Abdomen Rib Potentiometer	Servo	041 GFE	12/13/2022	6/13/2023




Upper Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 45.8 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: 34.6 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: 10.7 g's
Min: -2.5 g's
Filter: CFC 180

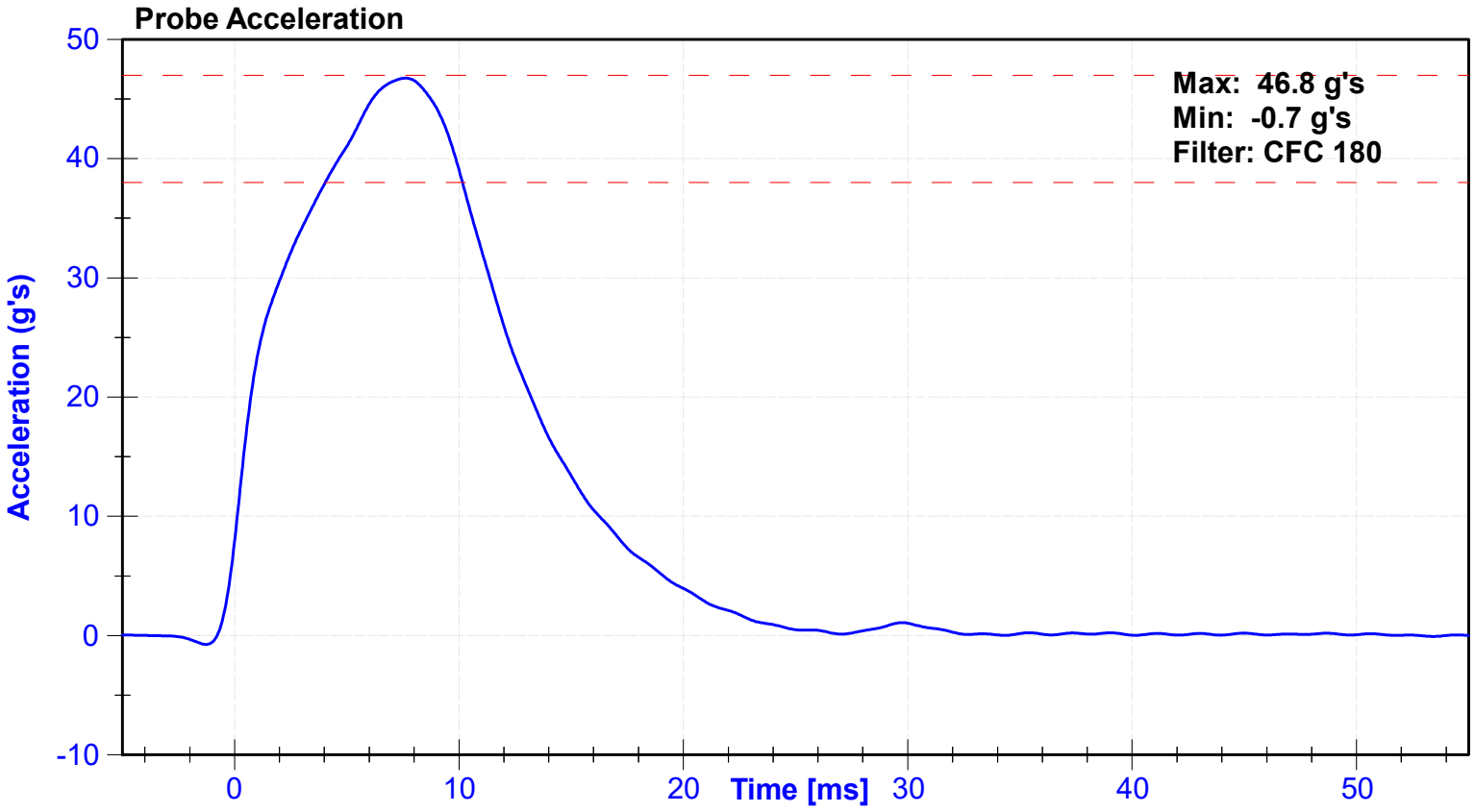
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

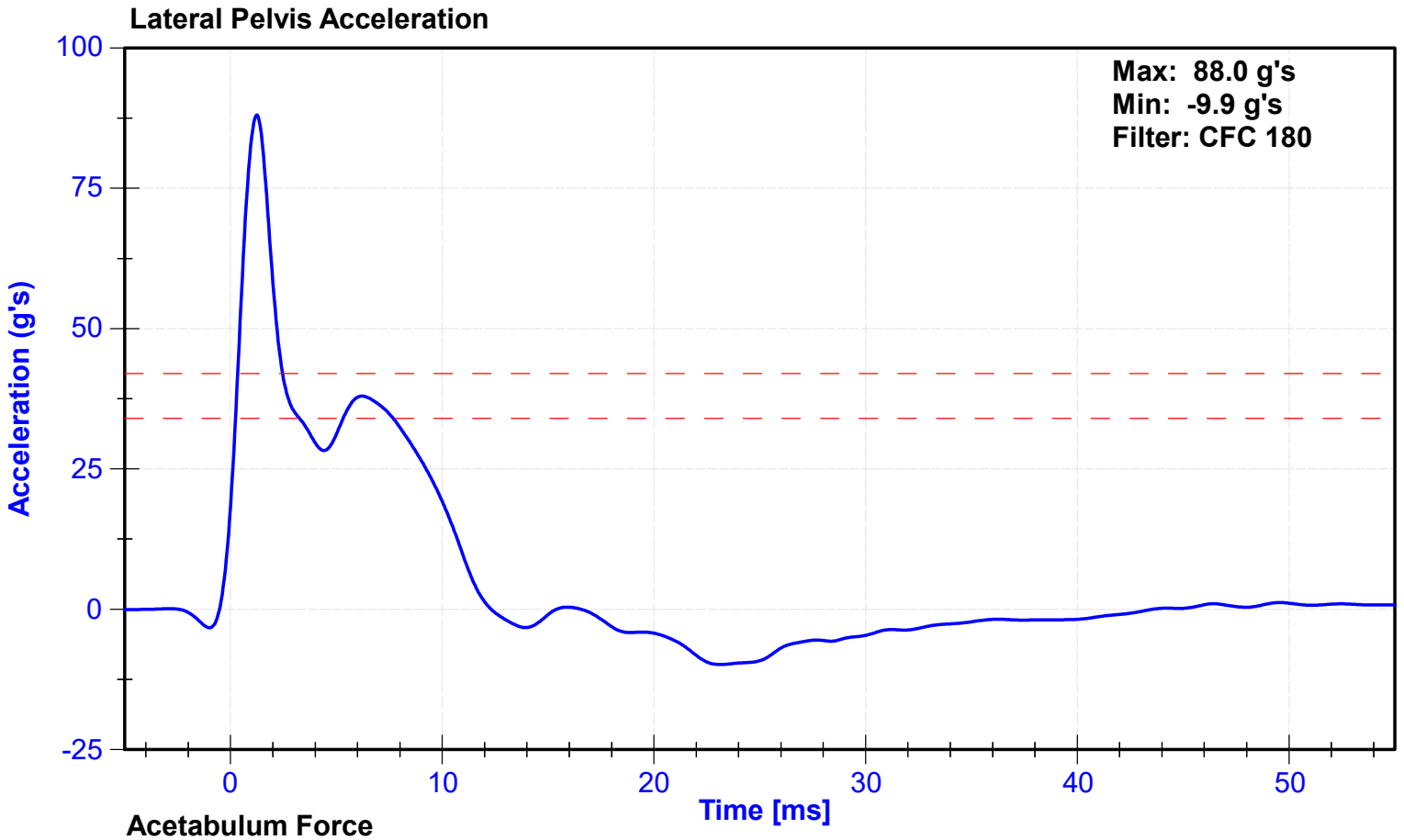
Results

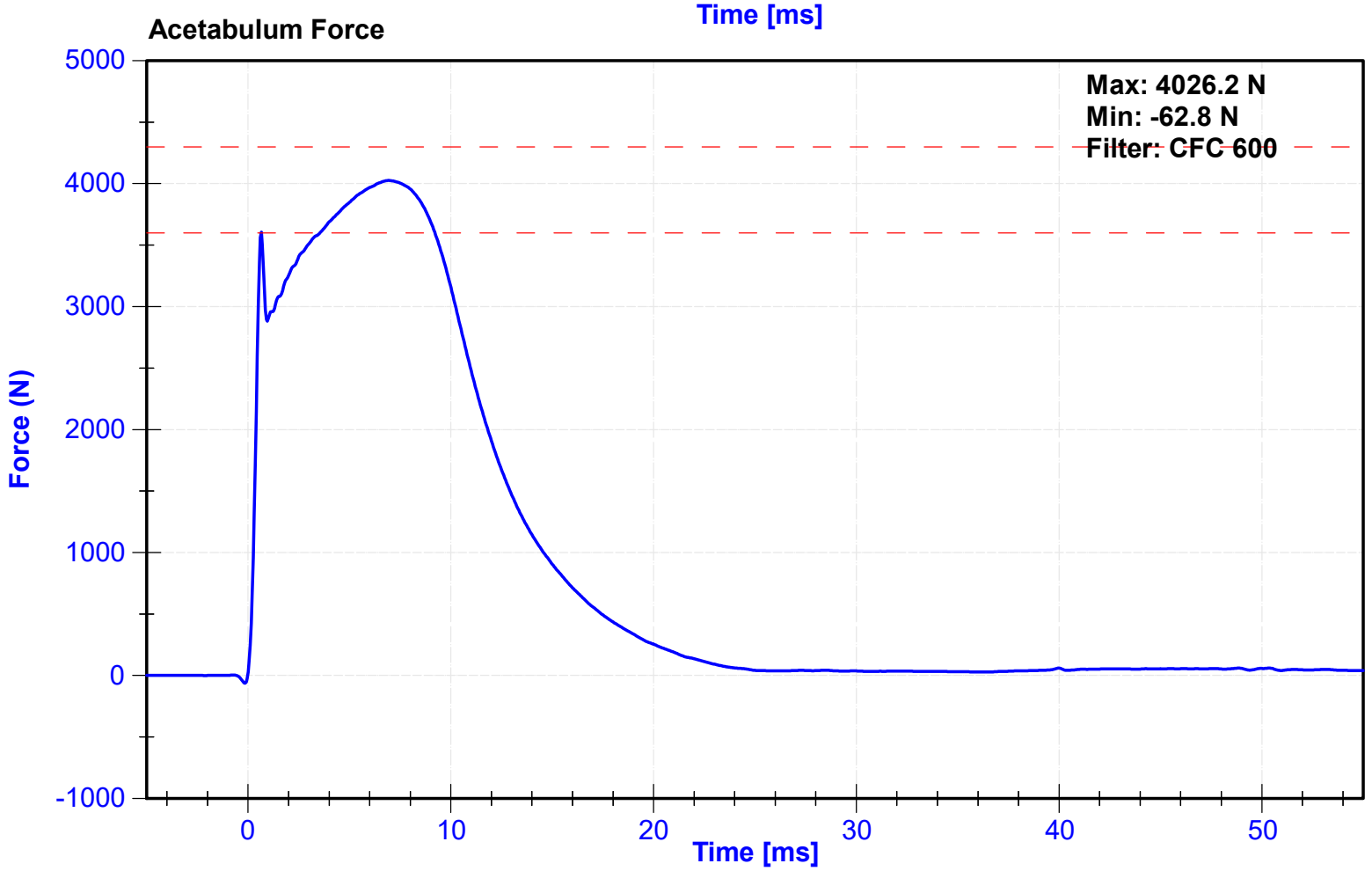
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	19	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration	38	47	g's	46.8	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	38.0	Pass
Acetabulum Force	3600	4300	N	4026.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Pelvis Y Accelerometer	Endevco	P51875	12/12/2022	6/10/2023
Acetabulum Load Cell	Denton	276-FY	8/11/2022	8/11/2023
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 88.0 g's
Min: -9.9 g's
Filter: CFC 180
Acceleration (g's)
100
75
50
25
0
-25
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 4026.2 N
Min: -62.8 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

CERT

SID-IIs Pelvis Plug Certification Test

Plug S/N 15164
Test Number 17880
Report Number 17929
Test Date 3/8/2021 11:51:56 AM

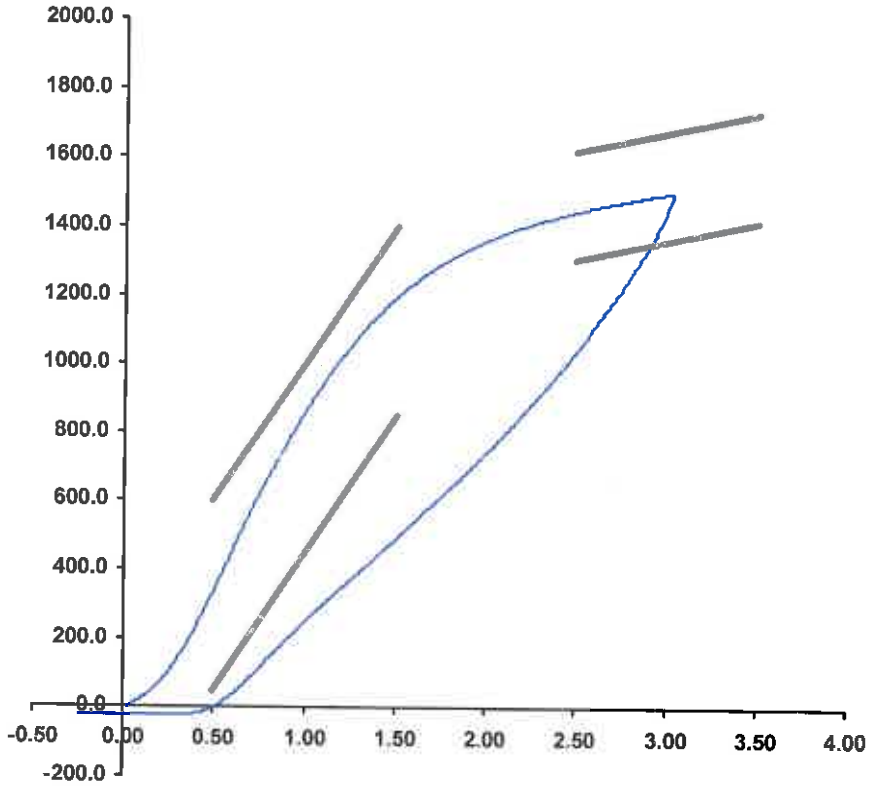
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	351	50	600
Force @ 1.5 mm (N)	1,192	850	1,400
Force @ 2.5 mm (N)	1,446	1,306	1,618
Force @ 3.0 mm (N)	1,497	1,361	1,673

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:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 08-Mar-21
SACO Research

By : _____ Date : 3/8/2021

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

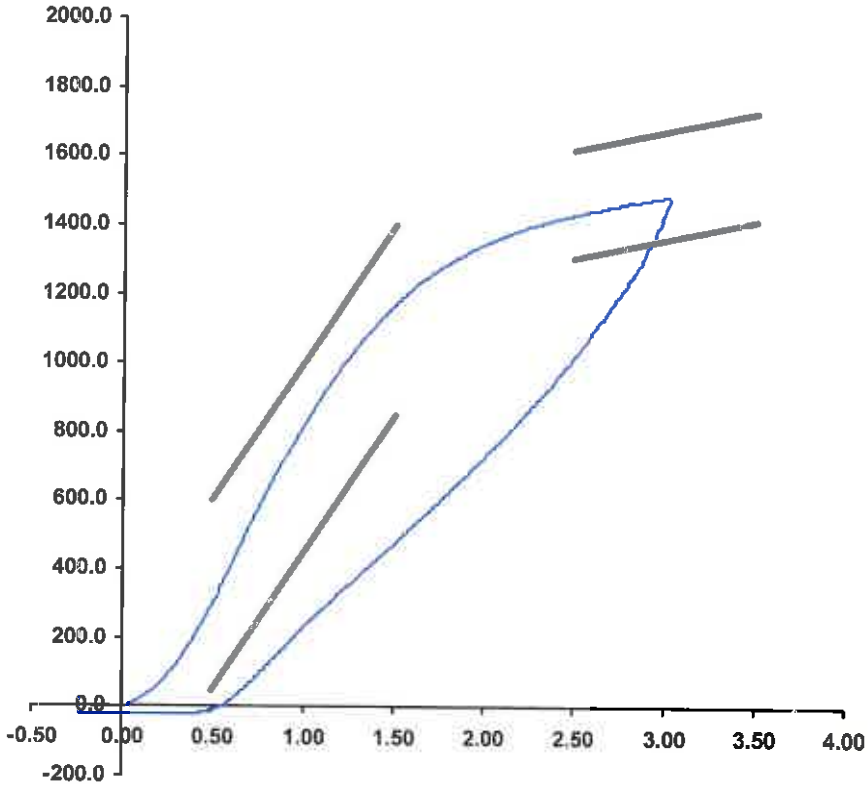
Crash Impact

SID-IIs Pelvis Plug Certification Test

Plug S/N 15155
Test Number 17867
Report Number 17916
Test Date 3/5/2021 11:19:38 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	302	50	600
Force @ 1.5 mm (N)	1,170	850	1,400
Force @ 2.5 mm (N)	1,434	1,306	1,618
Force @ 3.0 mm (N)	1,485	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 05-Mar-21
SACO Research

By : DC Date : 3/5/2021

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

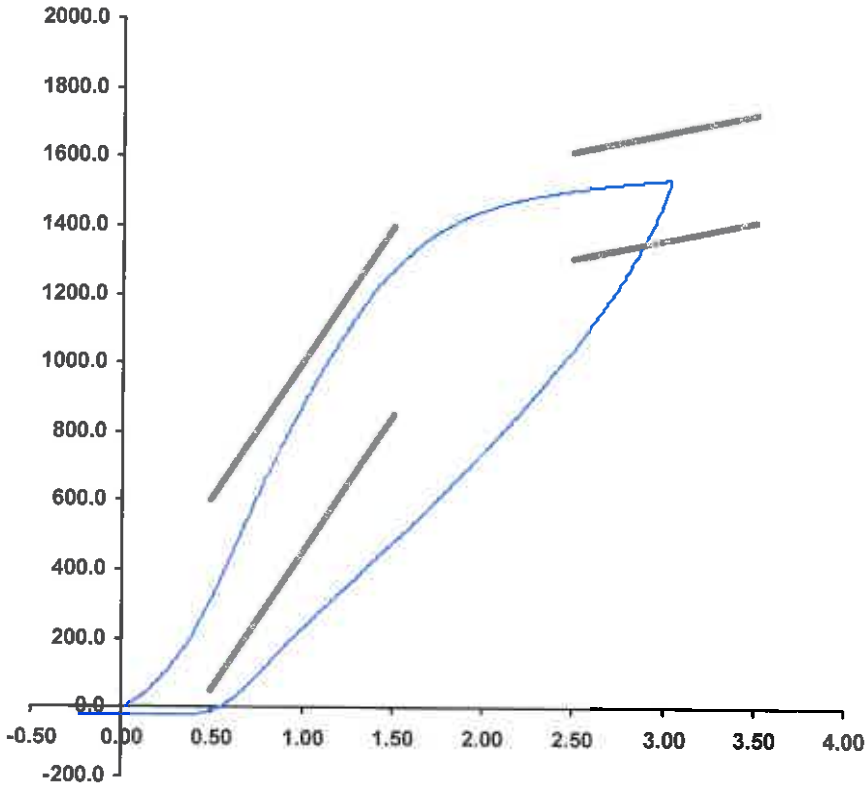
Crash
Non-Impact

SID-IIs Pelvis Plug Certification Test

Plug S/N 15447
Test Number 20108
Report Number 20162
Test Date 9/9/2021 10:45:55 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	327	50	600
Force @ 1.5 mm (N)	1,274	850	1,400
Force @ 2.5 mm (N)	1,508	1,306	1,618
Force @ 3.0 mm (N)	1,535	1,361	1,673

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS) 1000
Preload Value (-N) 22.24
Crosshead Speed (mm / min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:

Operator

Part Number 180-4450

Template No 107 09-Sep-21
SACO Research

By : DC Date : 9/9/2021

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

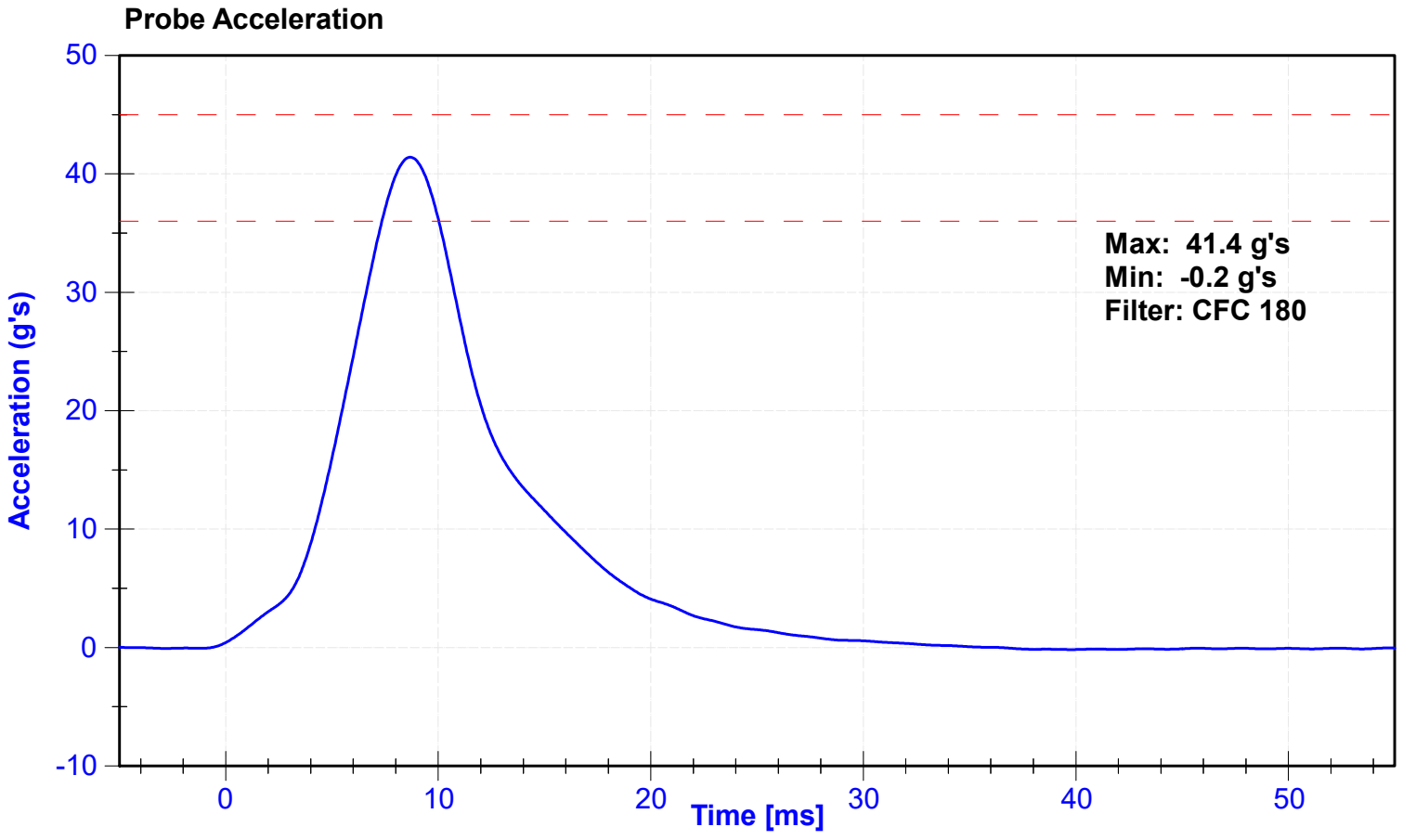
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

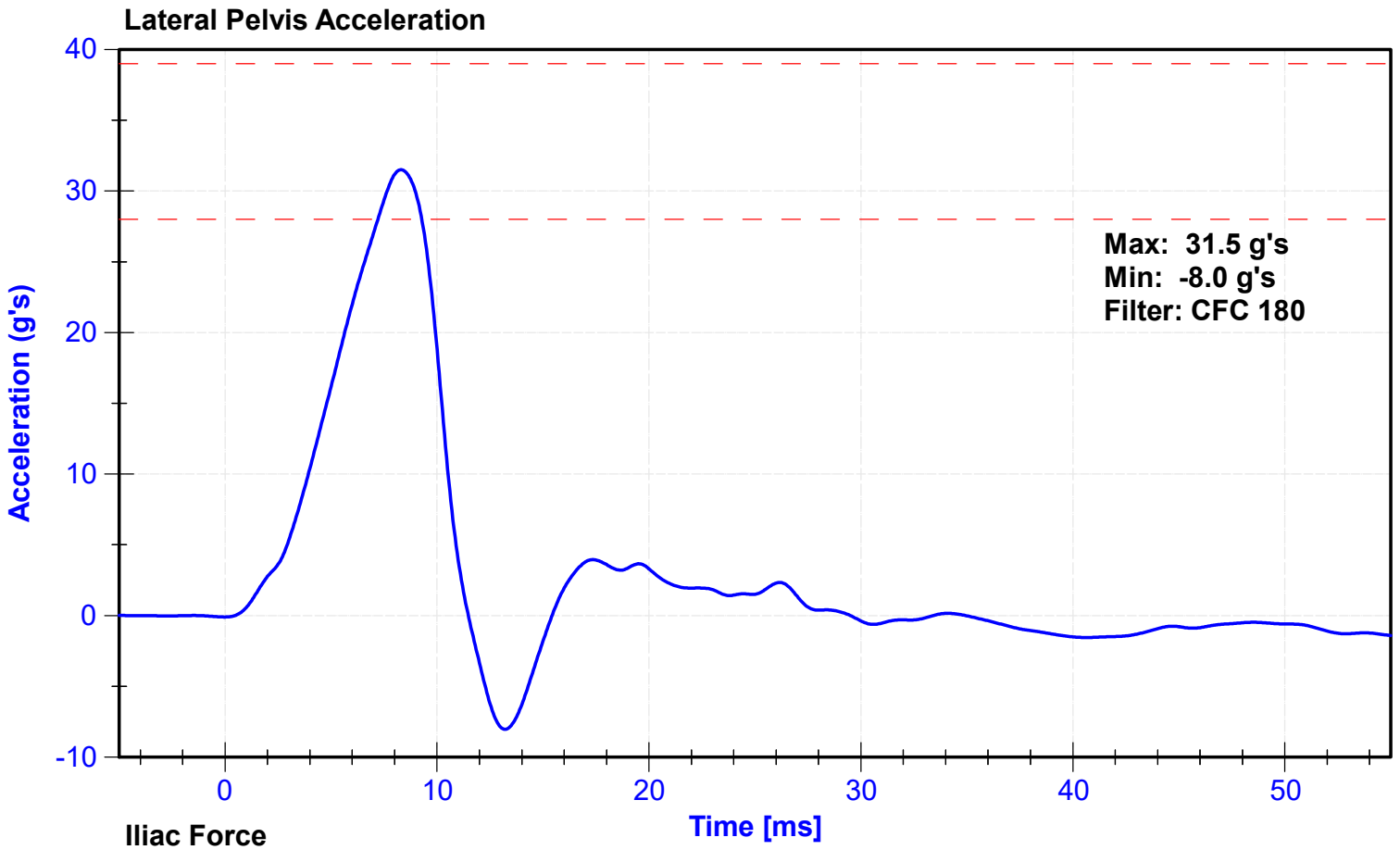
Results

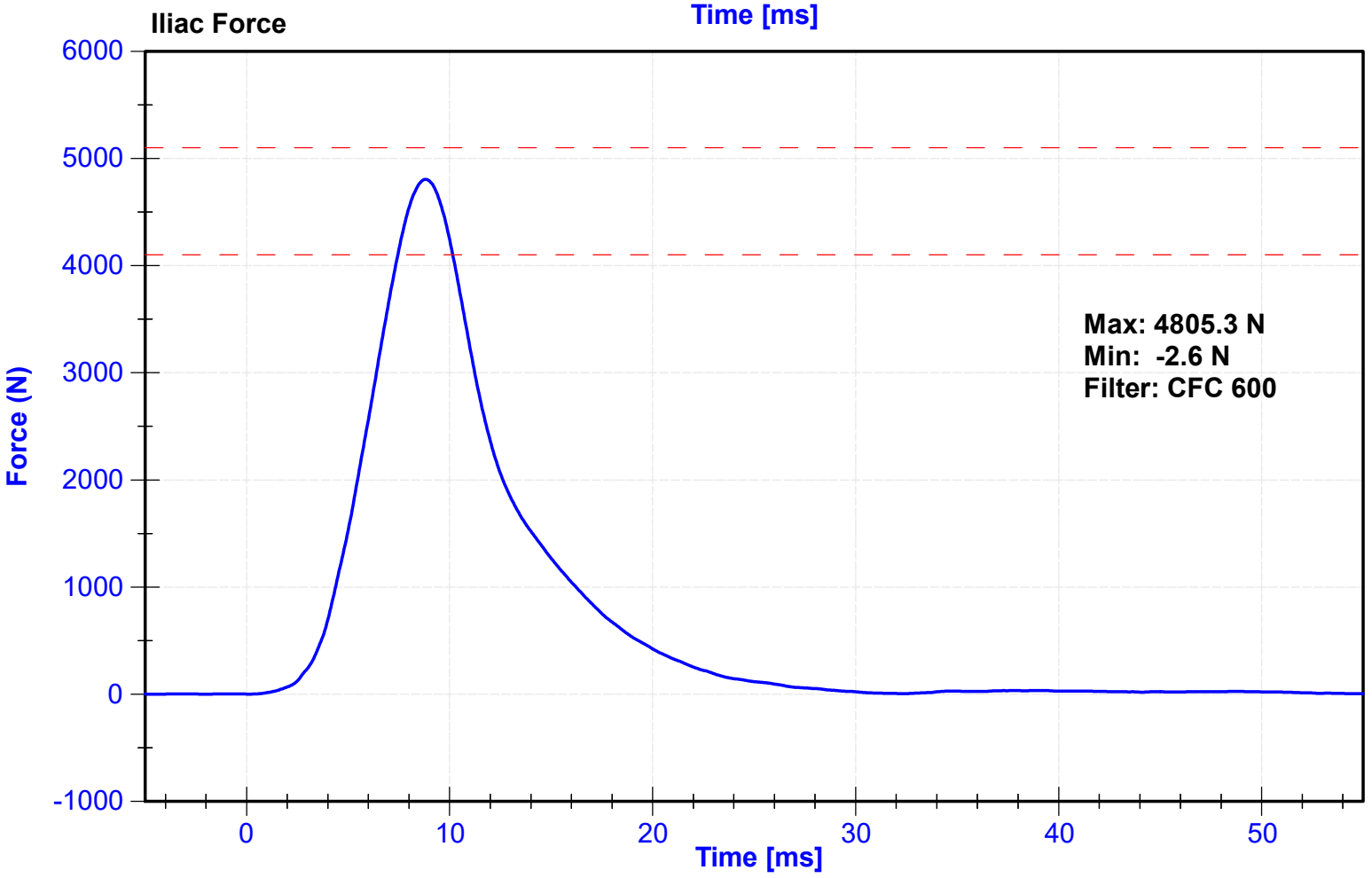
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	19	Pass
Velocity	4.2	4.4	m/s	4.21	Pass
Probe Acceleration	36	45	g's	41.4	Pass
Lateral Pelvis Acceleration	28	39	g's	31.5	Pass
Iliac Force	4100	5100	N	4805.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Pelvis Y Accelerometer	Endevco	P51875	12/12/2022	6/10/2023
Iliac Load Cell	Denton	290-FY	8/11/2022	8/11/2023




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 31.5 g's
Min: -8.0 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: 4805.3 N
Min: -2.6 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

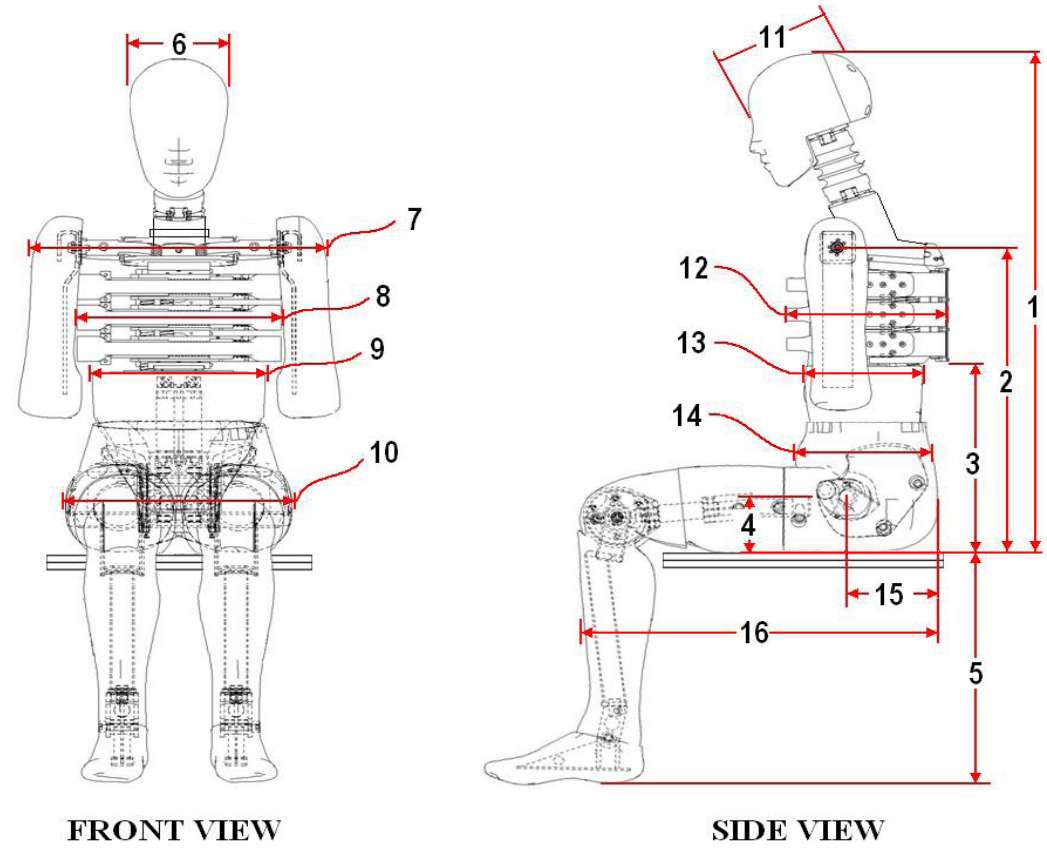
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE It

External Measurements - EuroSID-2re

Technician: K. Brogan Date: 02/17/2023

Dummy Serial Number: F033



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	912	Pass
2	Seat to Shoulder Joint	558	572	567	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	353	Pass
4	Seat to Hip Joint (center of bolt)	97	103	99	Pass
5	Sole to Seat, Sitting	333	451	423	Pass
6	Head Width	152	158	157	Pass
7	Shoulder/Arm Width	461	479	470	Pass
8	Thorax Width	322	332	328	Pass
9	Abdomen Width	273	287	281	Pass
10	Pelvis Lap Width	359	373	368	Pass
11	Head Depth	196	206	201	Pass
12	Thorax Depth	262	272	269	Pass
13	Abdomen Depth	194	204	202	Pass
14	Pelvis Depth	235	245	239	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	156	Pass
16	Back of Buttocks to Front Knee	597	615	612	Pass

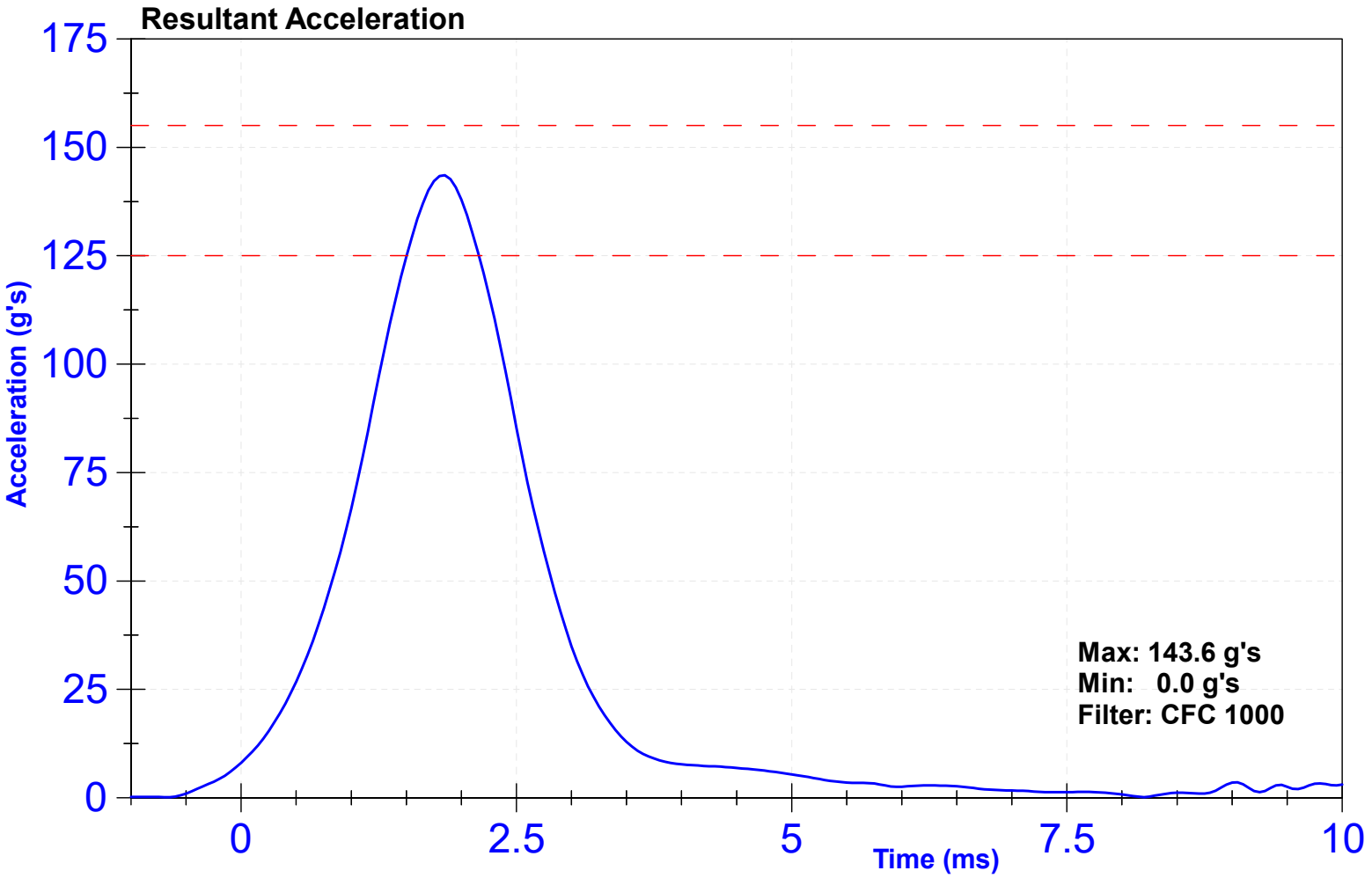
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

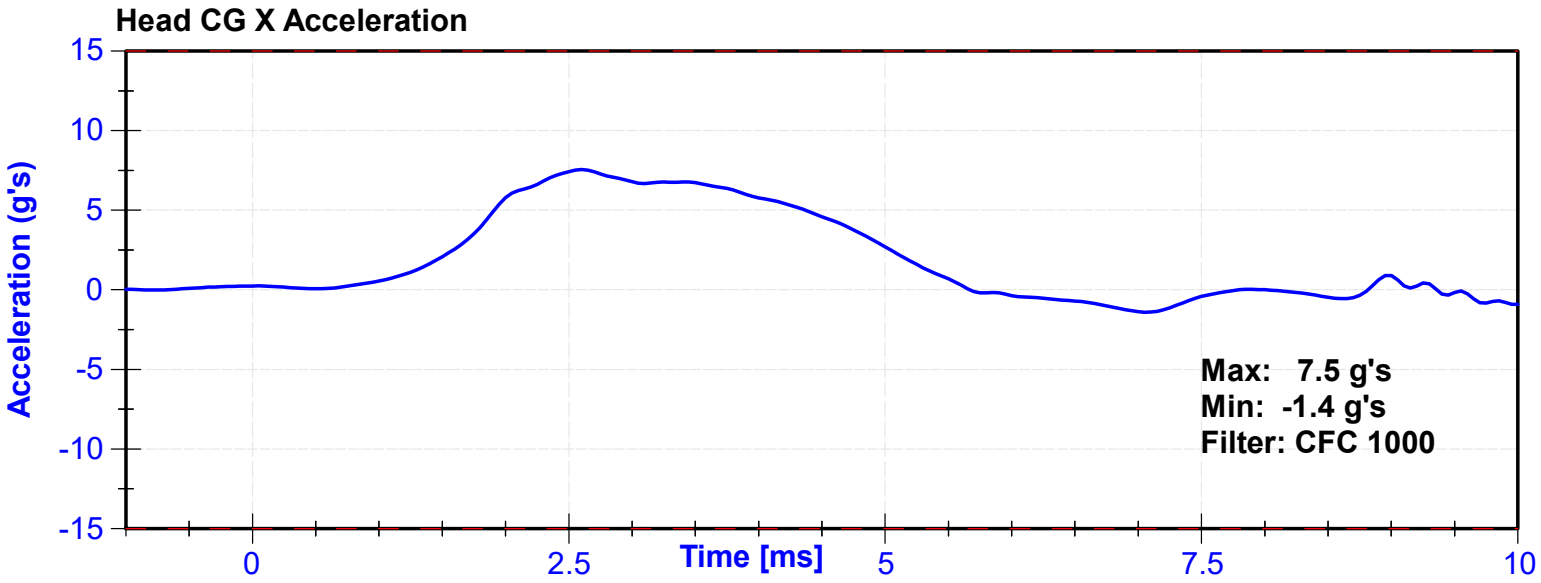
Results

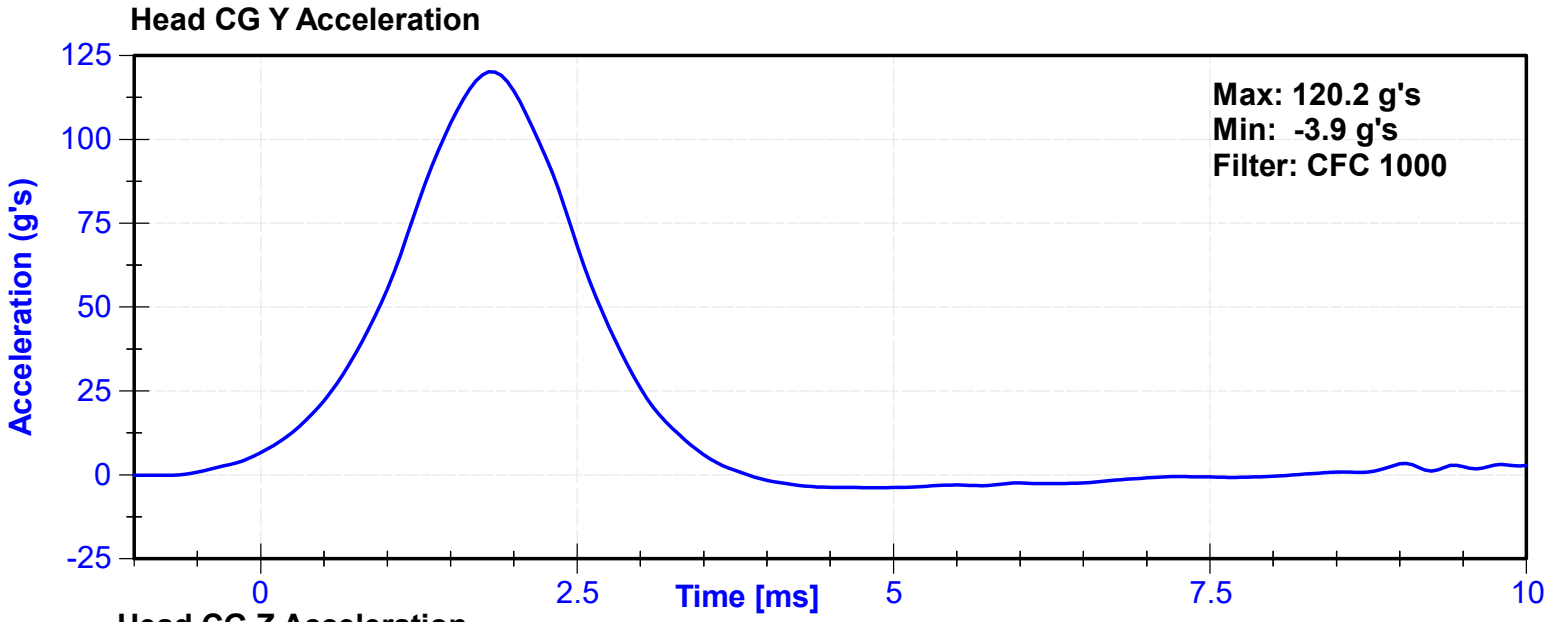
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	30,5	Pass
Resultant Acceleration	125	155	g's	143.6	Pass
Oscillation	0	15	%	2.82	Pass
Fore-Aft Acceleration	-15	15	g's	7.5	Pass

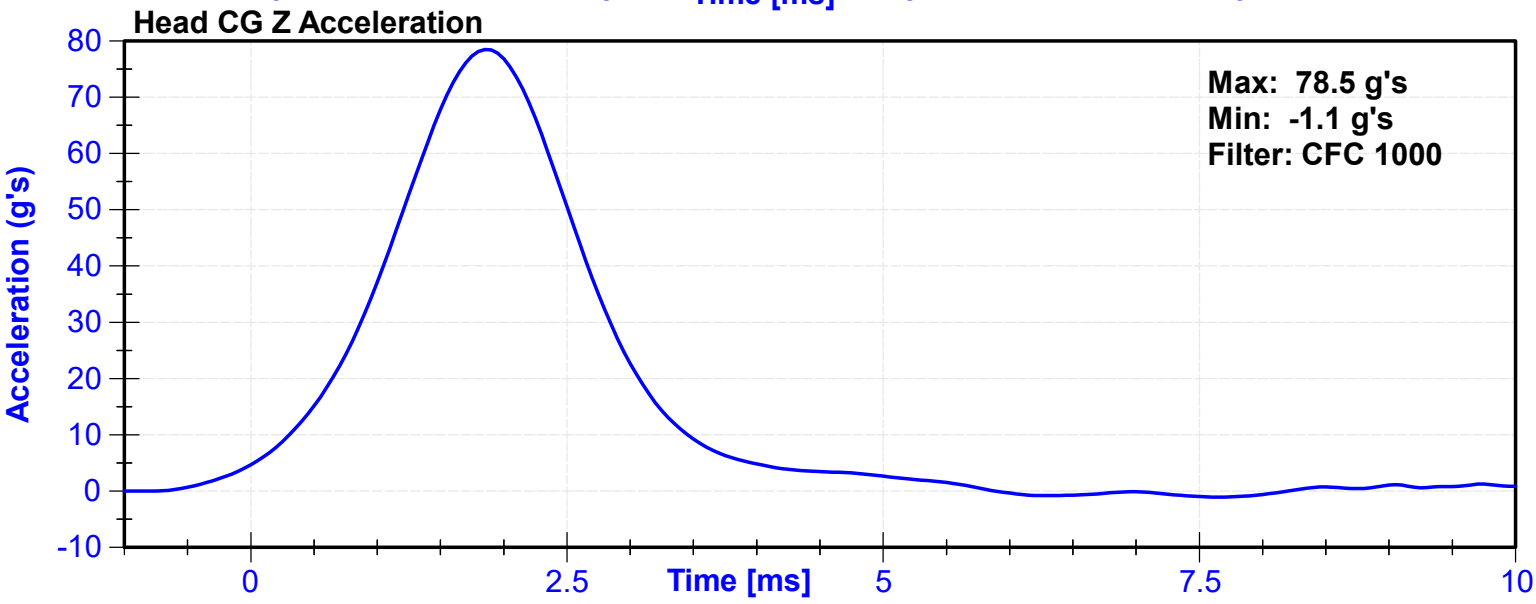
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P63861	1/17/2023	7/16/2023
Y Accelerometer	Endevco	P49216	1/17/2023	7/16/2023
Z Accelerometer	Endevco	P51303	1/17/2023	7/16/2023




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 7.5 g's
Min: -1.4 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 120.2 g's
Min: -3.9 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
80
70
60
50
40
30
20
10
0
-10
0
2.5
5
7.5
10
Time [ms]
Max: 78.5 g's
Min: -1.1 g's
Filter: CFC 1000

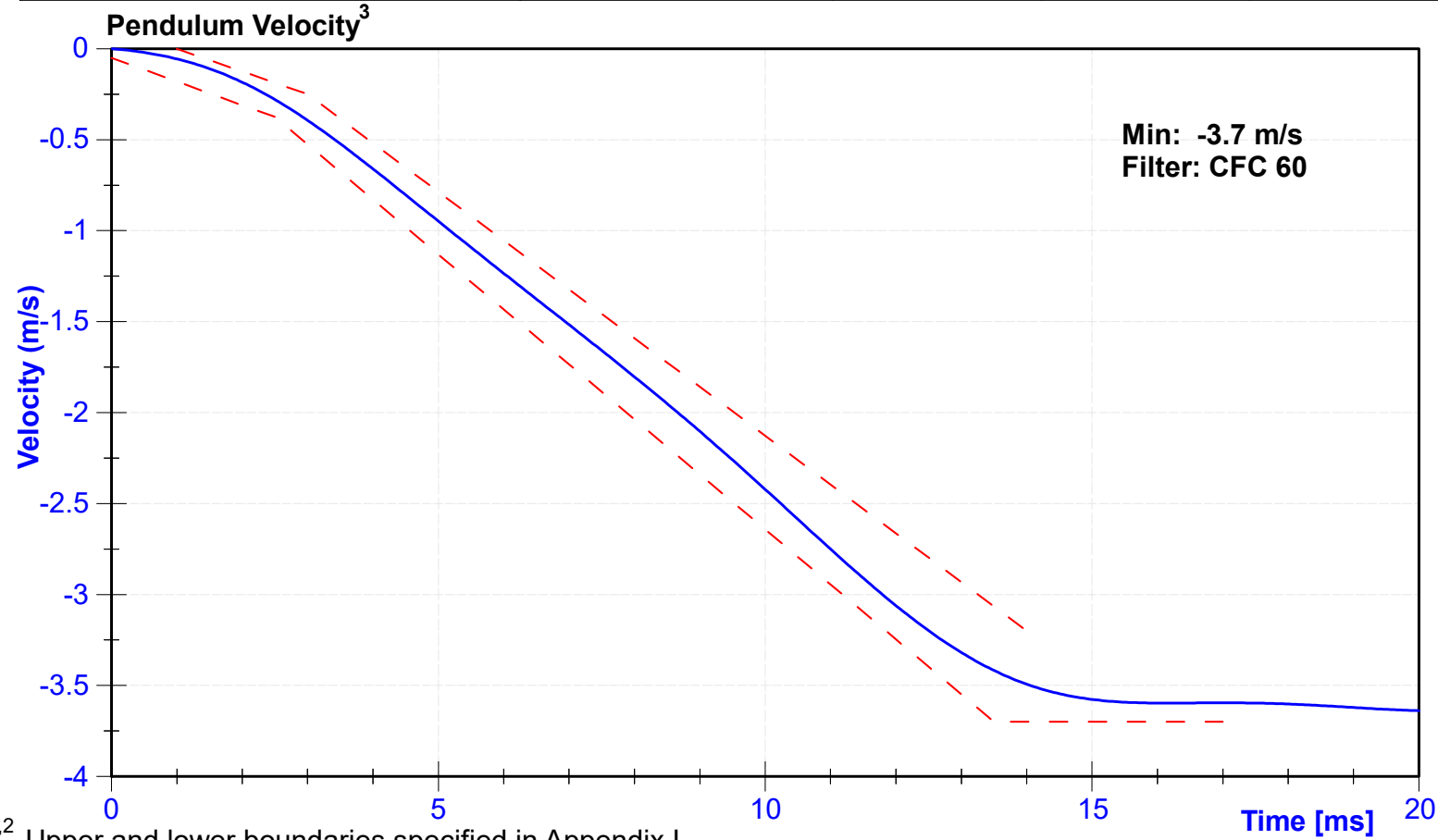
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

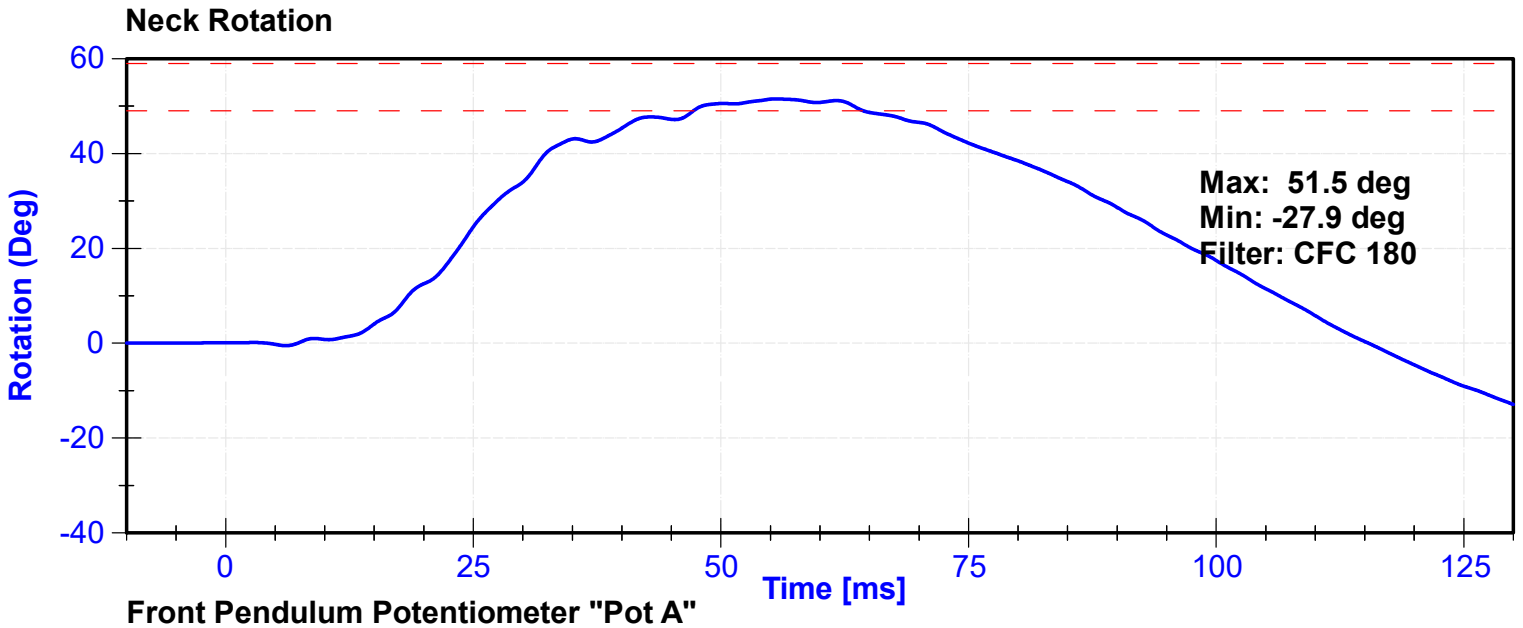
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	27.5	Pass
Velocity	3.3	3.5	m/s	3.38	Pass
Lateral Neck Rotation	49	59	deg	51.5	Pass
Time at Maximum Rotation	54	66	ms	55.5	Pass
Time of Rotation Decay from Maximum	53	88	ms	59.9	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

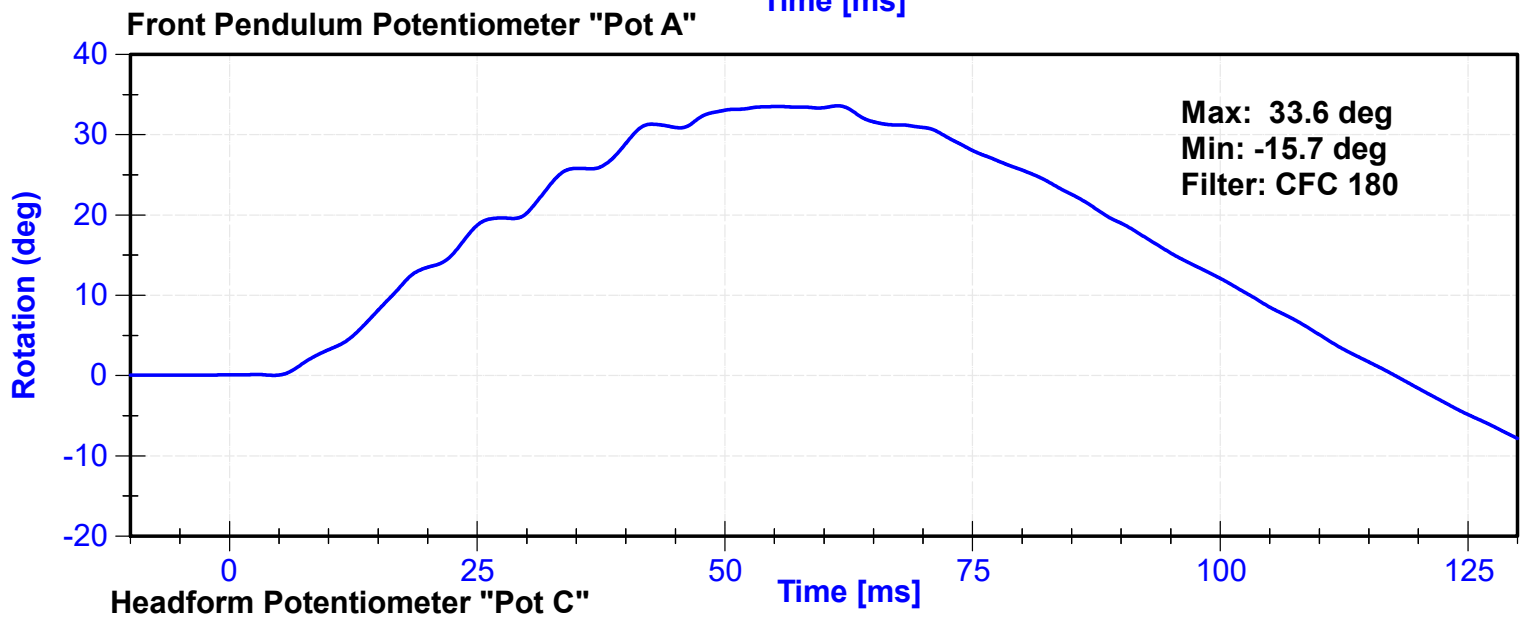
Transducer Calibrations

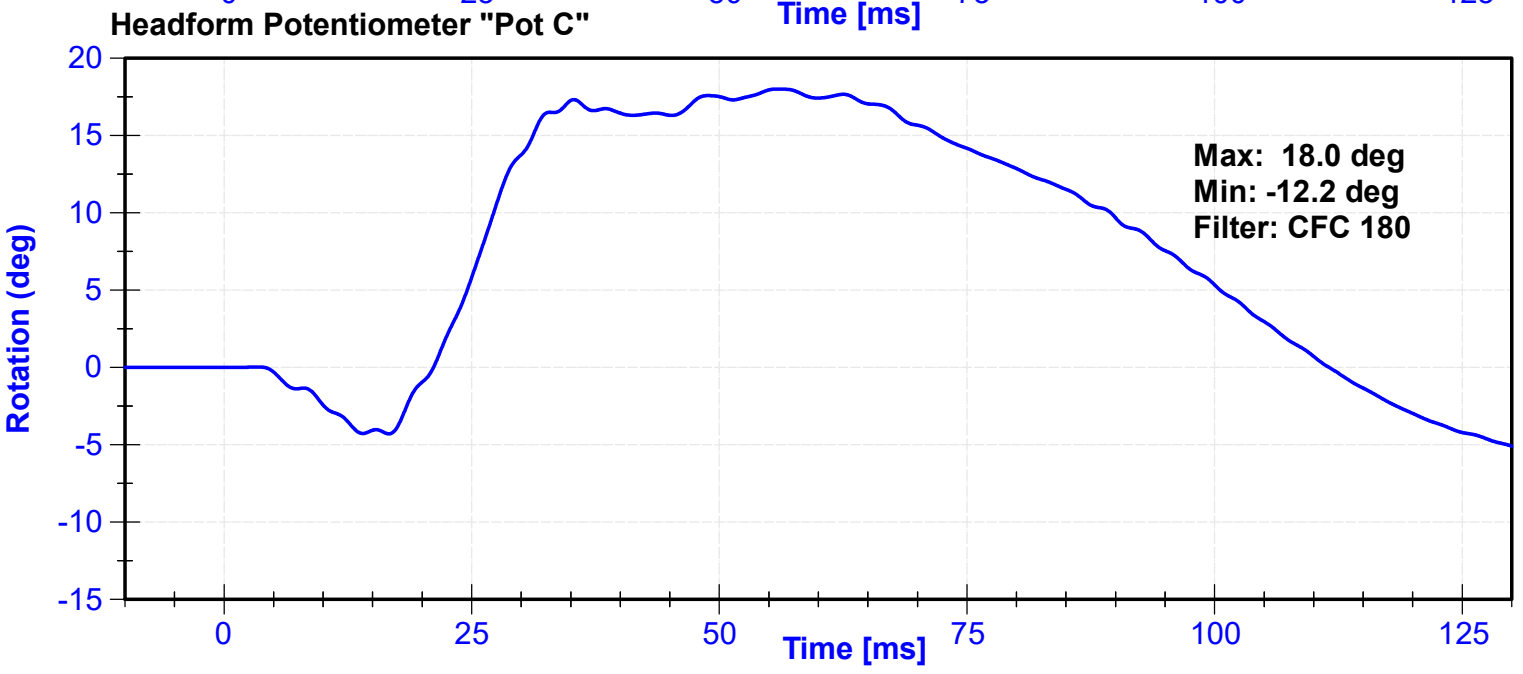
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Front Pendulum Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Headform Potentiometer	Sfernice	095	10/5/2022	10/5/2023



[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: 51.5 deg
Min: -27.9 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: 33.6 deg
Min: -15.7 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: 18.0 deg
Min: -12.2 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

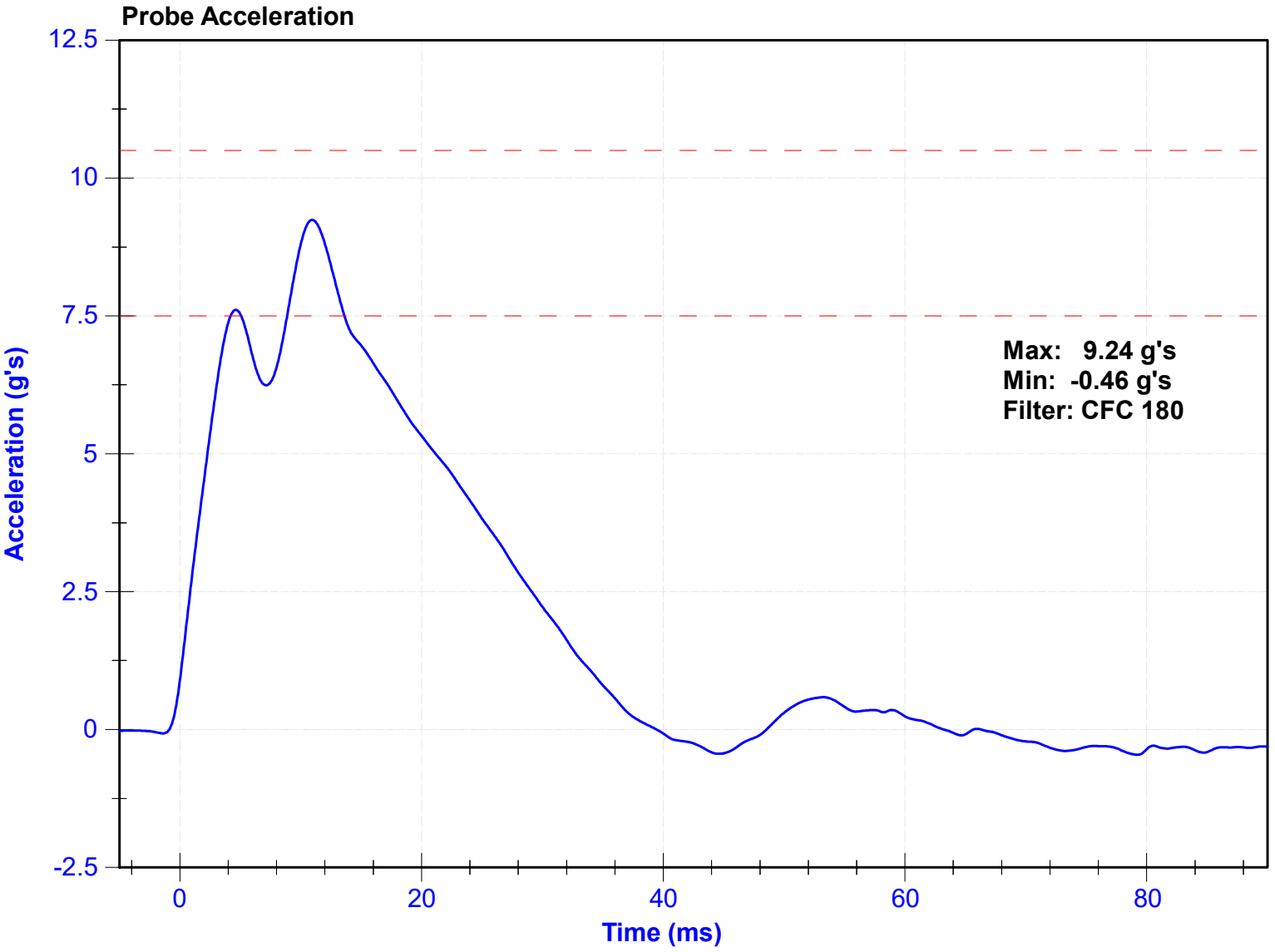
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	27.3	Pass
Velocity	4.2	4.4	m/s	4.31	Pass
Probe Acceleration	7.5	10.5	g's	9.24	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	5/18/2023



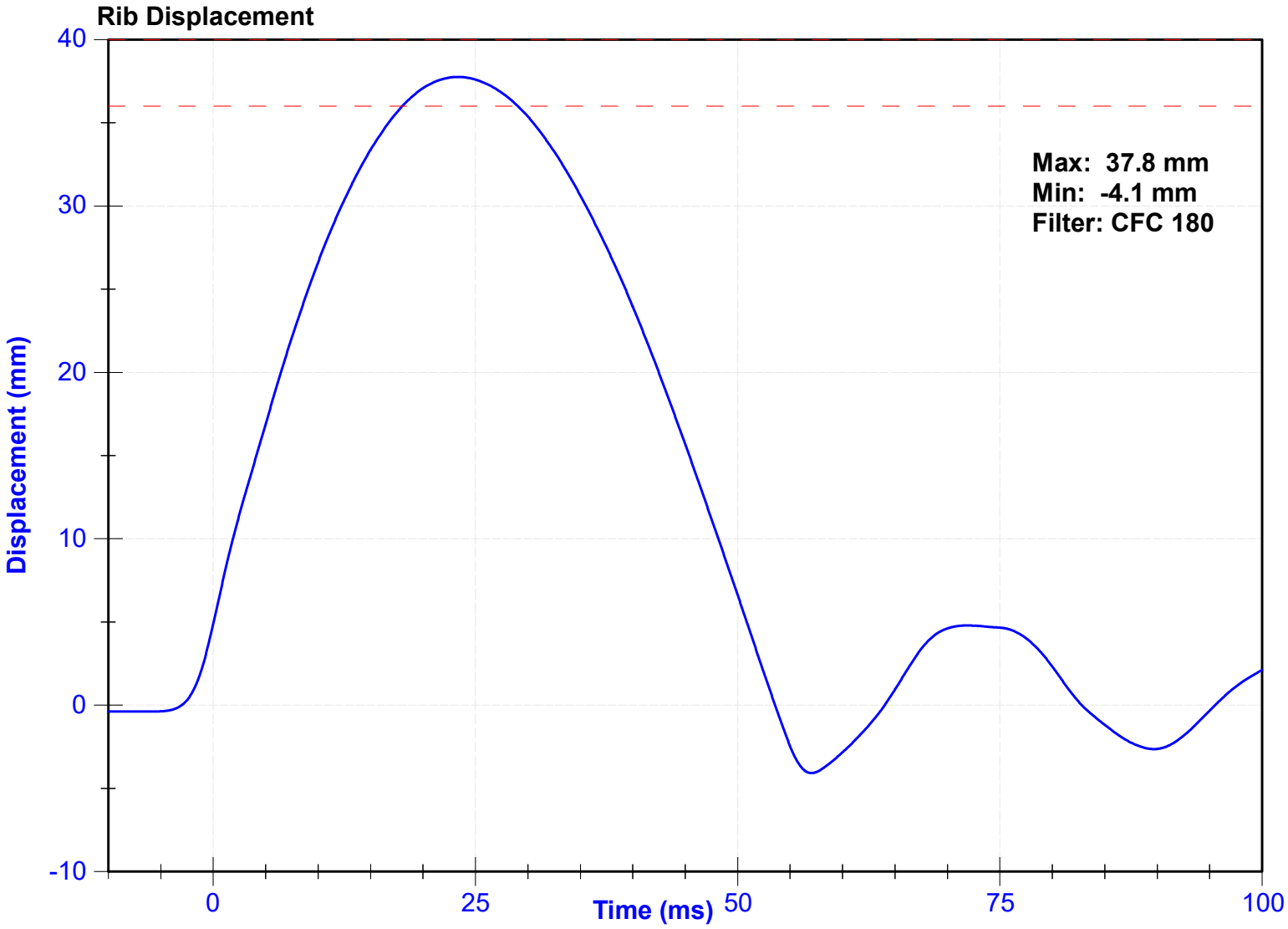
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	20.9	Pass
Rib Displacement	36	40	mm	37.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	1/17/2023	7/18/2023



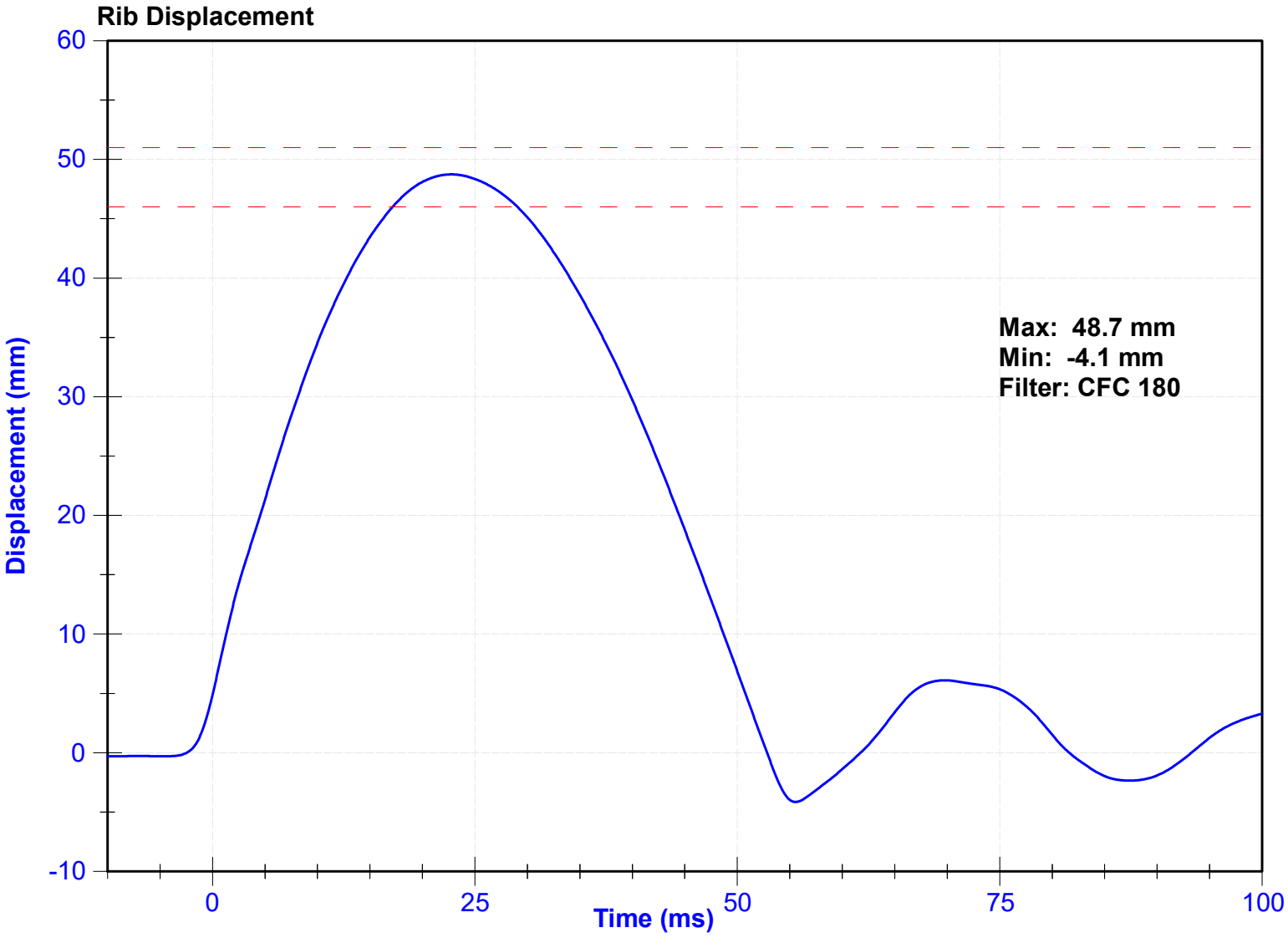
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	20.9	Pass
Rib Displacement	46	51	mm	48.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	1/17/2023	7/18/2023



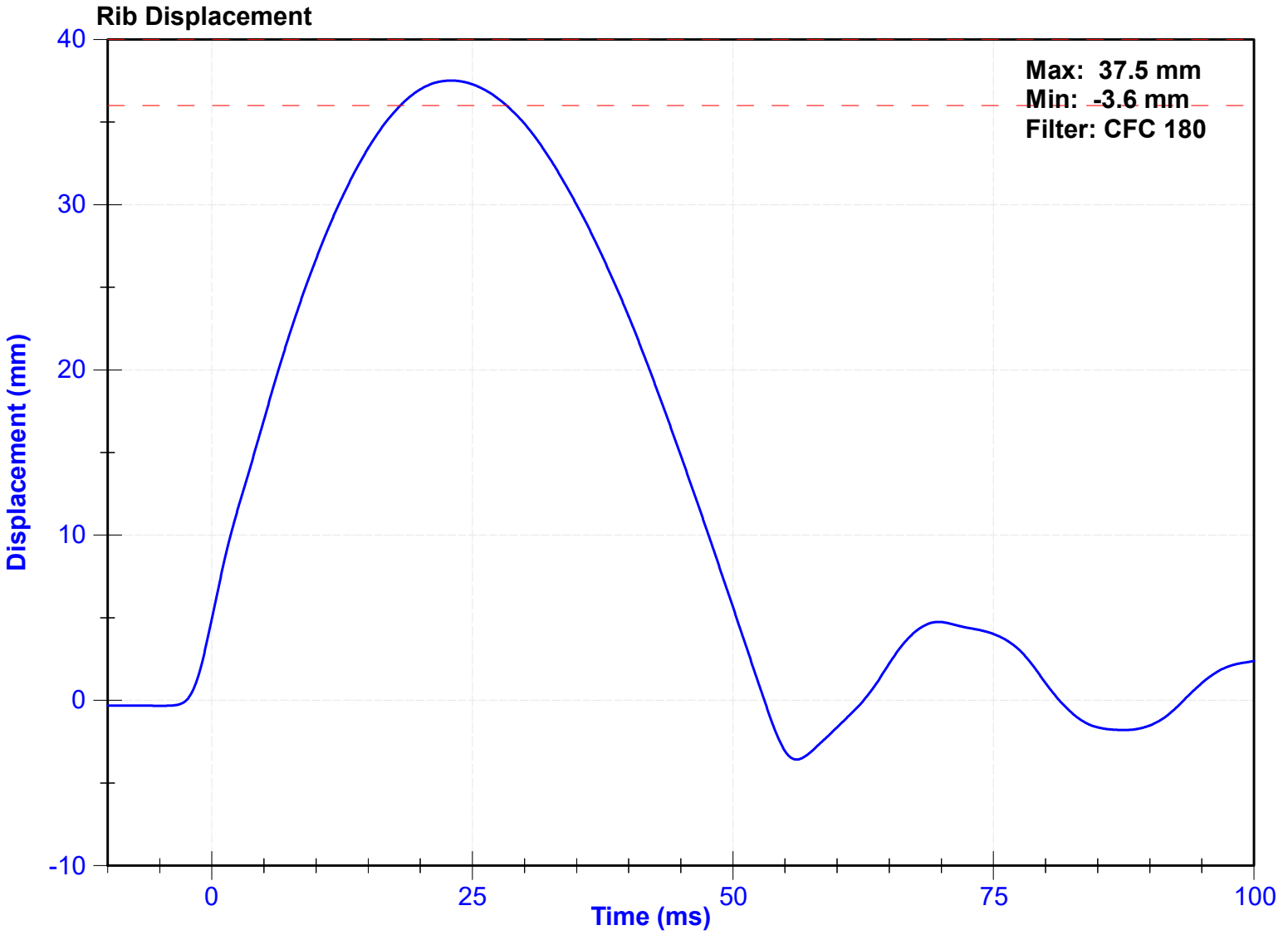
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	20.9	Pass
Rib Displacement	36	40	mm	37.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	1/17/2023	7/18/2023



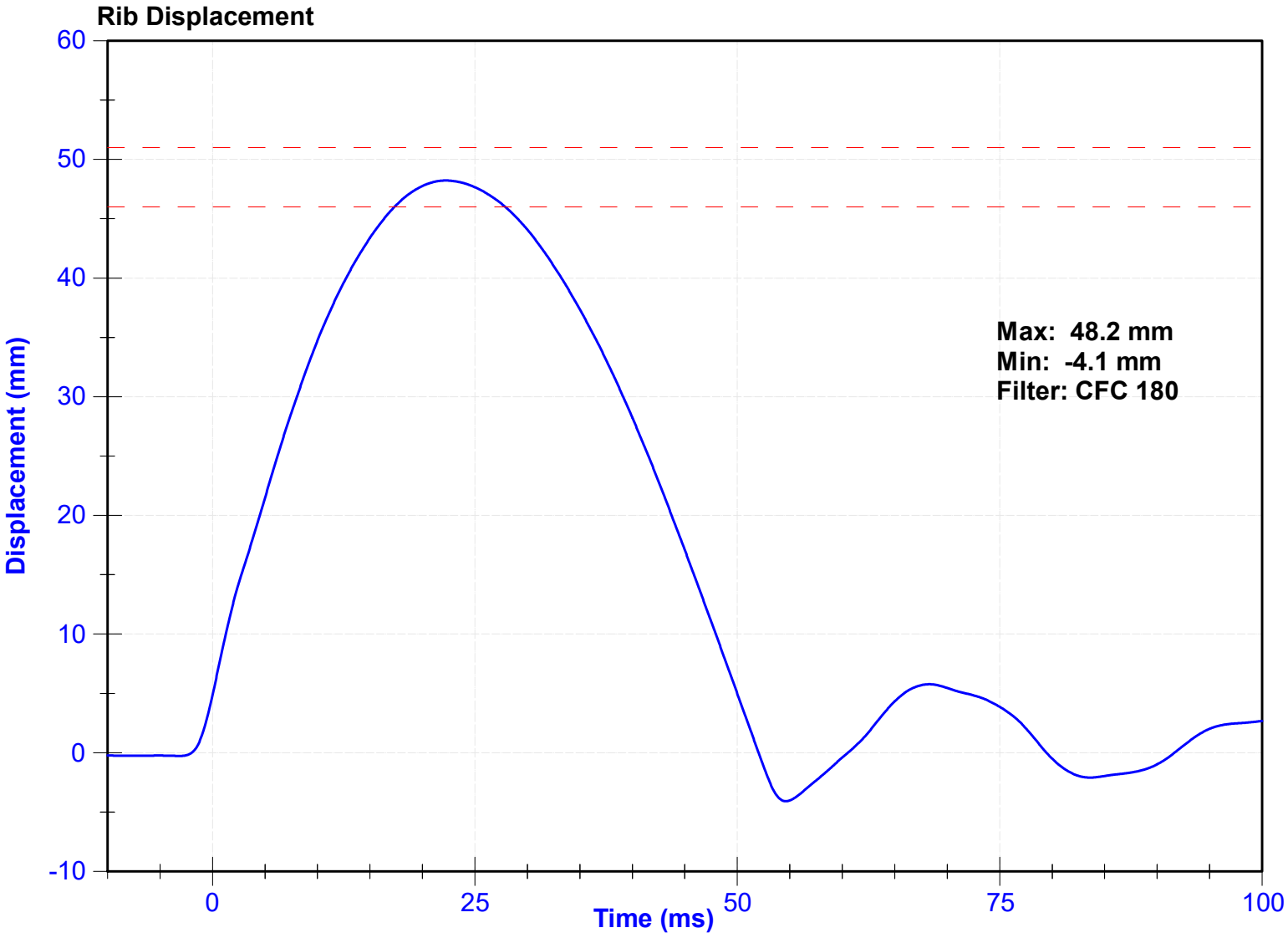
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	20.9	Pass
Rib Displacement	46	51	mm	48.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	1/17/2023	7/18/2023



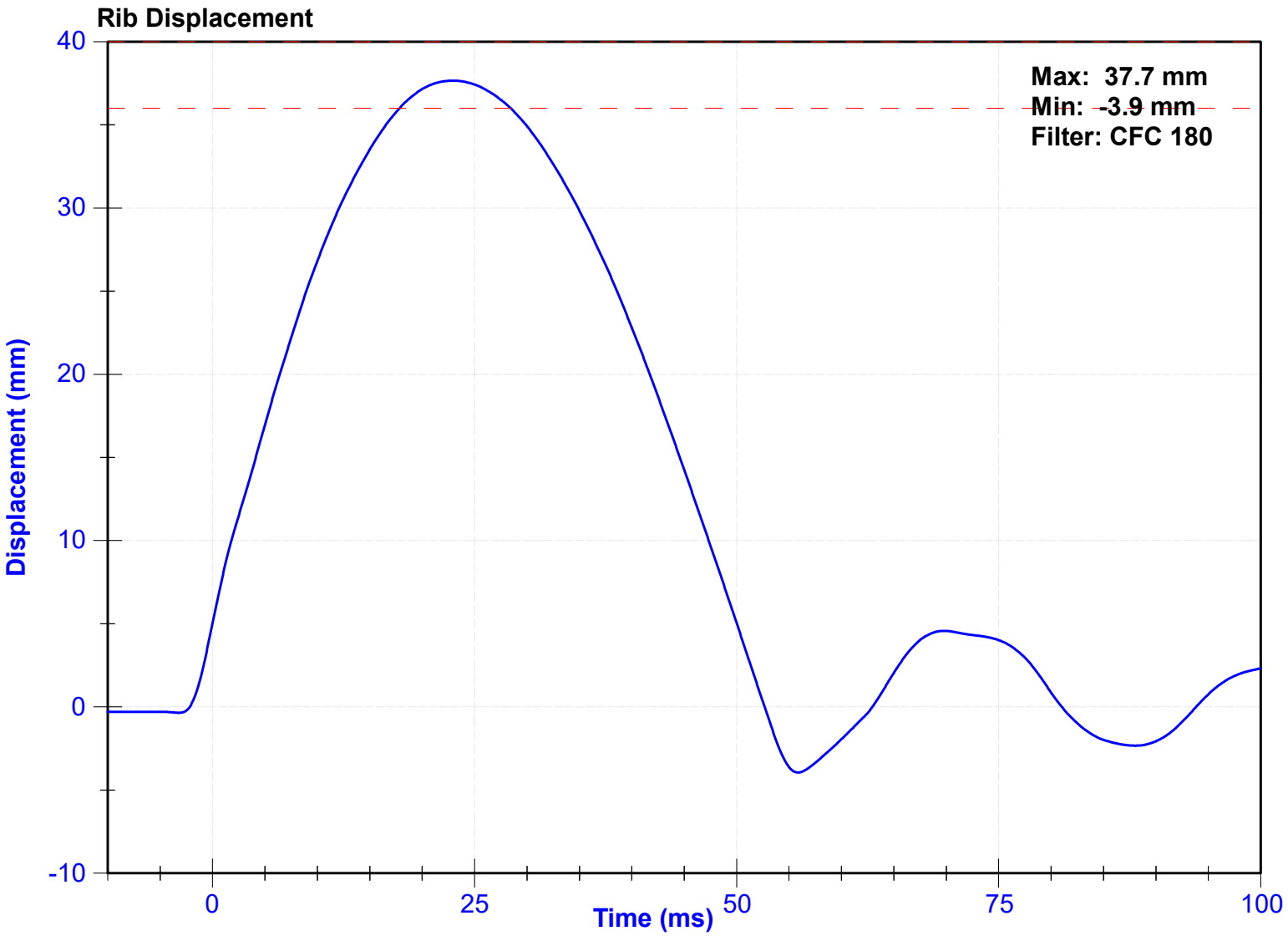
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	20.9	Pass
Rib Displacement	36	40	mm	37.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	1/17/2023	7/18/2023



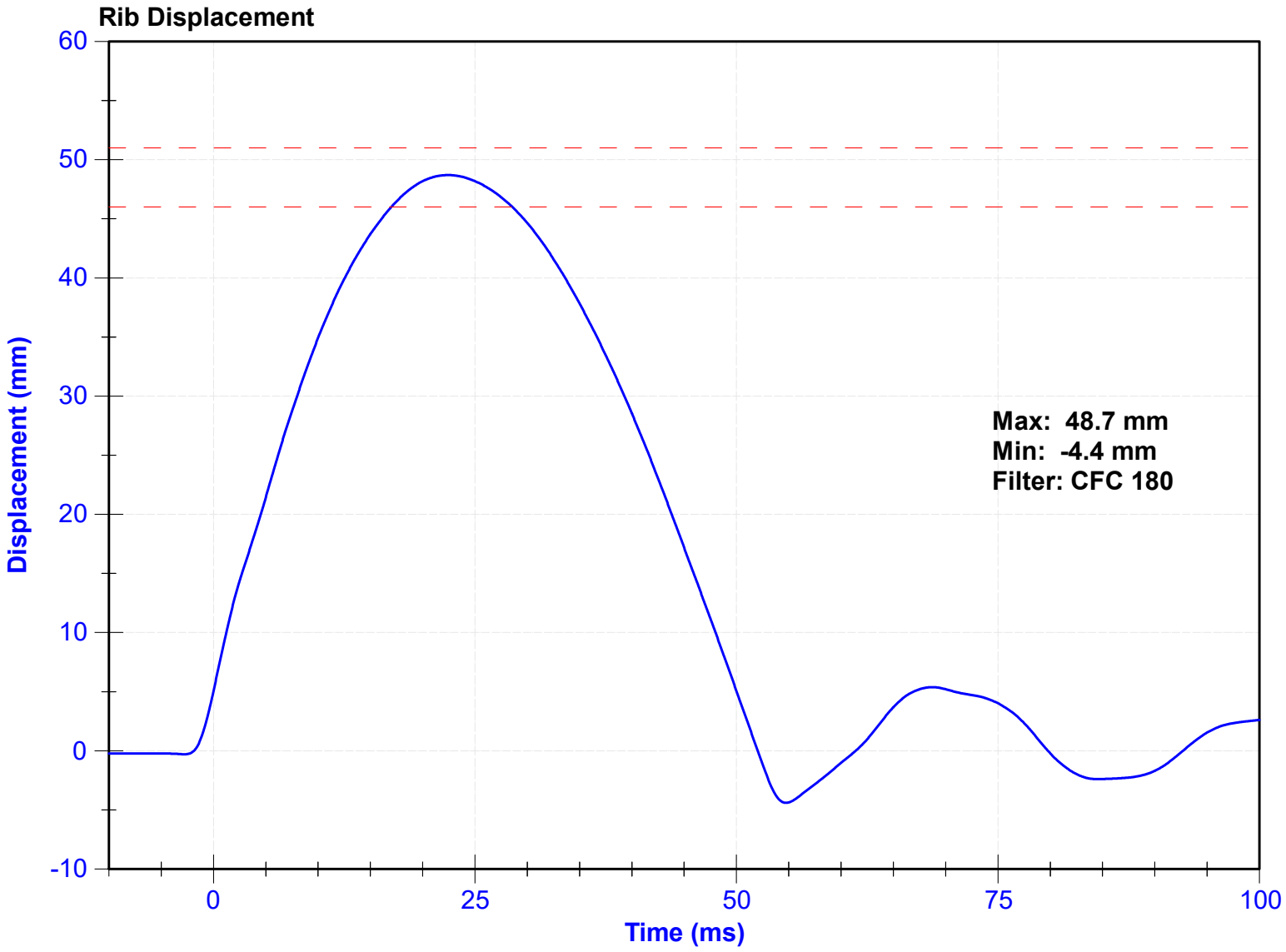
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	K. Brogan

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	20.9	Pass
Rib Displacement	46	51	mm	48.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	178GFE	1/17/2023	7/18/2023



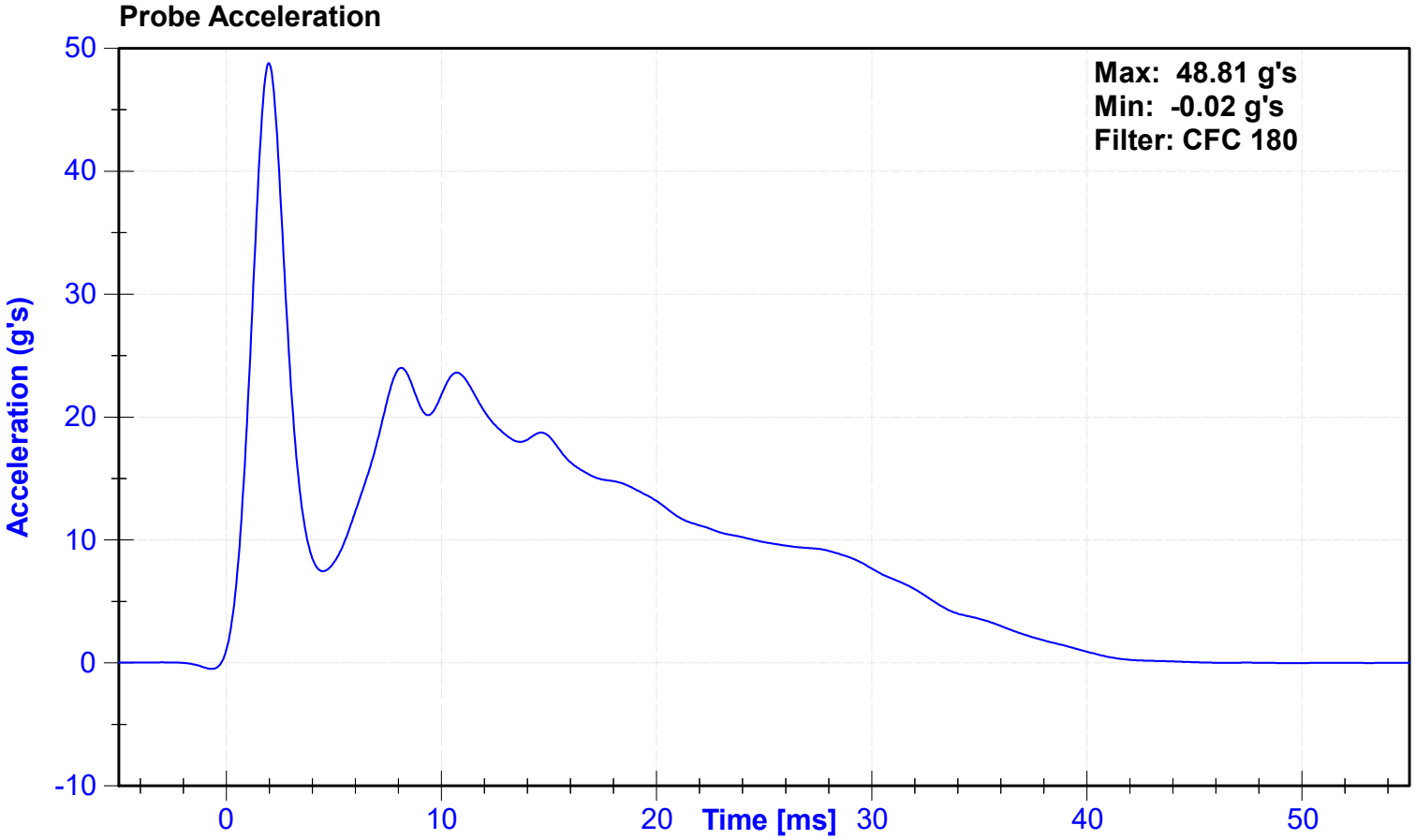
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

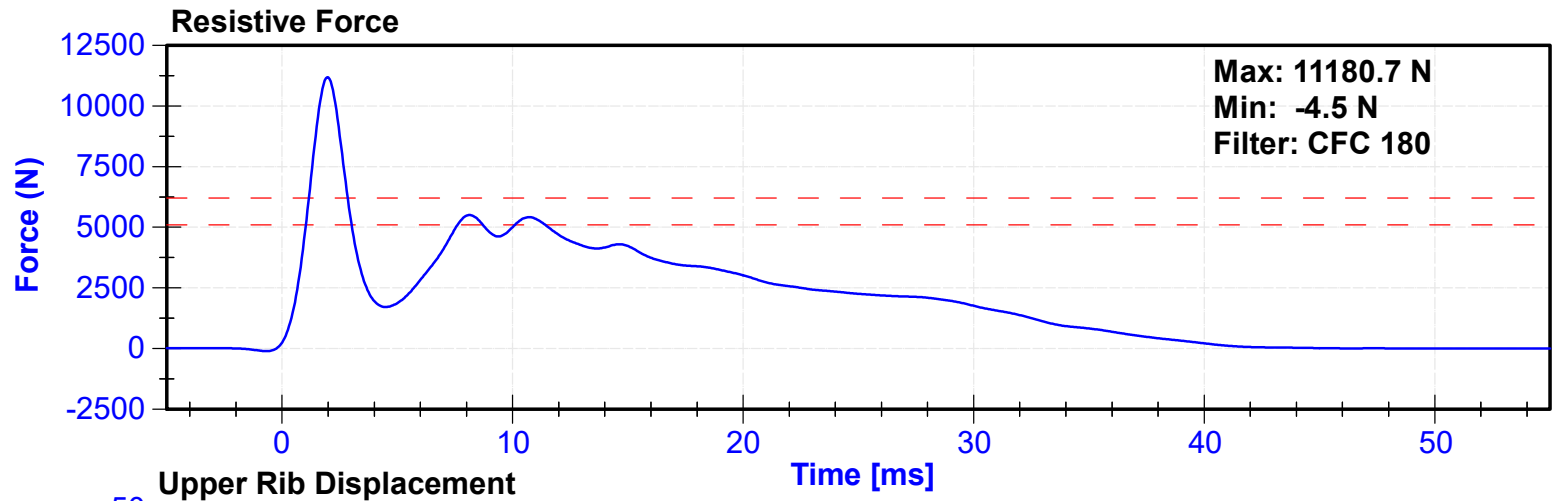
Results

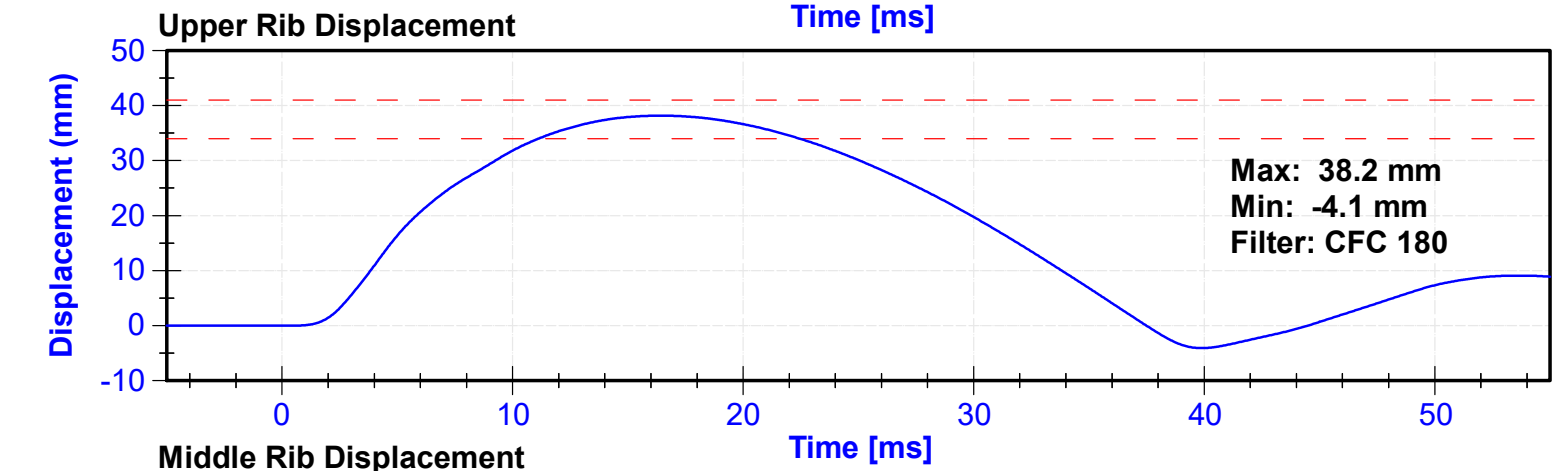
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	27.3	Pass
Velocity	5.4	5.6	m/s	5.52	Pass
Resistive Force after 6ms	5100	6200	N	5500.9	Pass
Upper Thorax Rib Deflection	34	41	mm	38.2	Pass
Mid Thorax Rib Deflection	37	45	mm	42.0	Pass
Lower Thorax Rib Deflection	37	44	mm	40.7	Pass

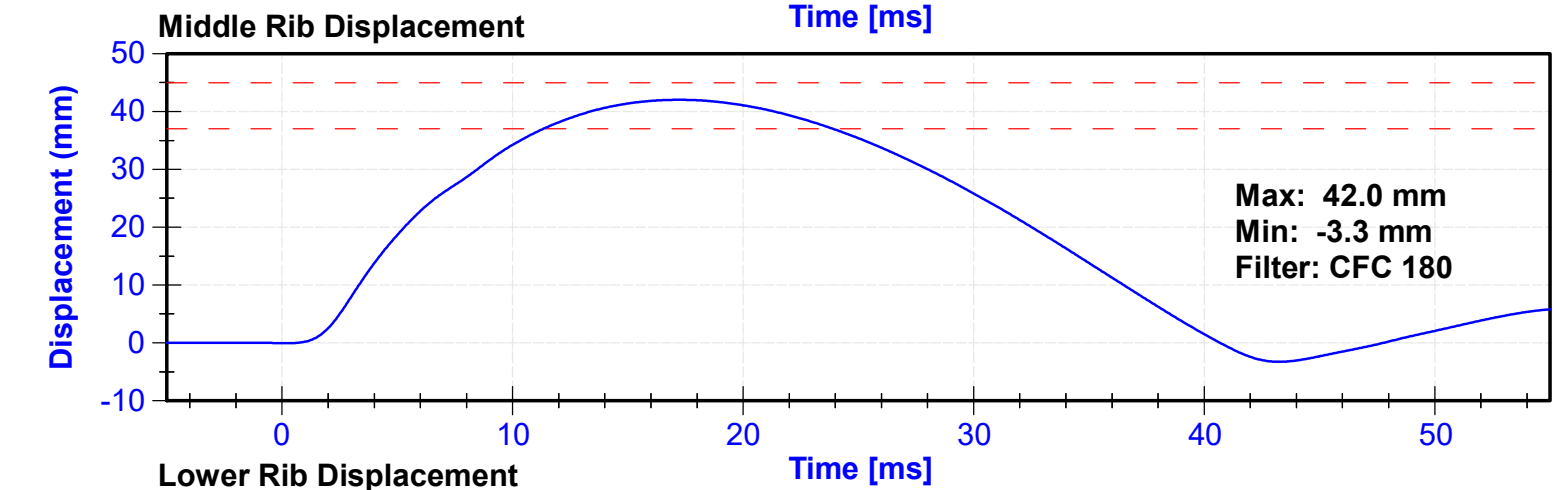
Transducer Calibrations

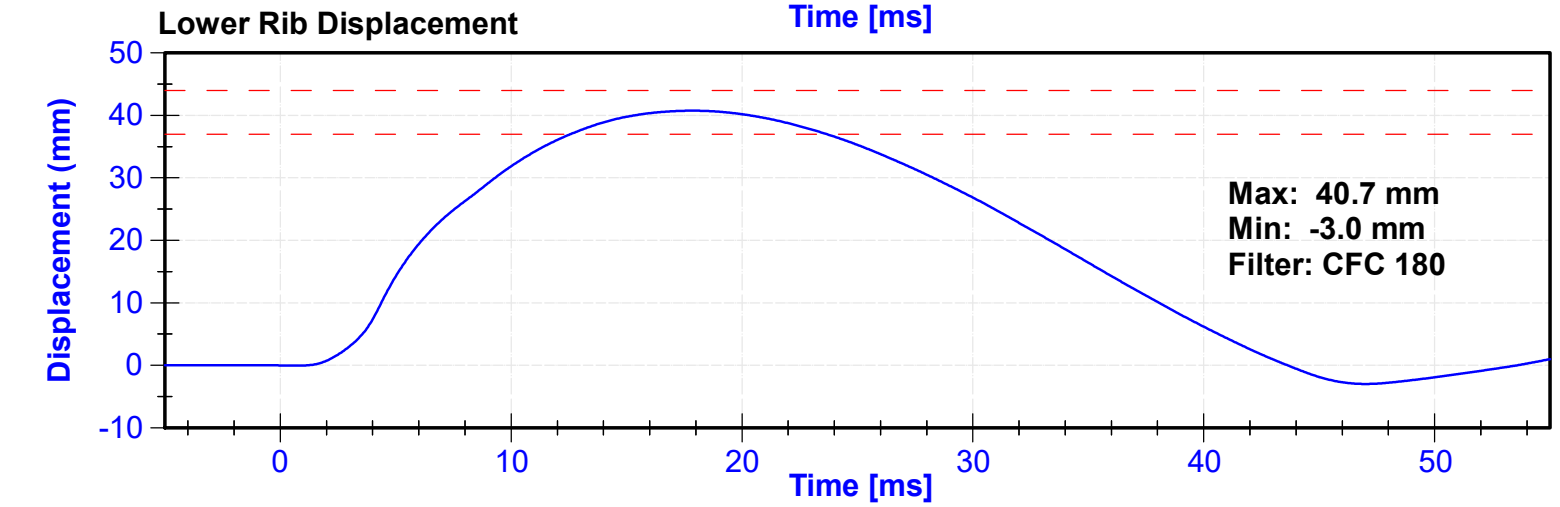
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Upper Thorax Rib Potentiometer	Honeywell	179GFE	1/17/2023	7/18/2023
Middle Thorax Rib Potentiometer	Honeywell	185GFE	1/17/2023	7/18/2023
Lower Thorax Rib Potentiometer	Honeywell	178GFE	1/17/2023	7/18/2023




Resistive Force
Force (N)
12500
10000
7500
5000
2500
0
-2500
0
10
20
30
40
50
Time [ms]
Max: 11180.7 N
Min: -4.5 N
Filter: CFC 180


Upper Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 38.2 mm
Min: -4.1 mm
Filter: CFC 180


Middle Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 42.0 mm
Min: -3.3 mm
Filter: CFC 180


Lower Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 40.7 mm
Min: -3.0 mm
Filter: CFC 180

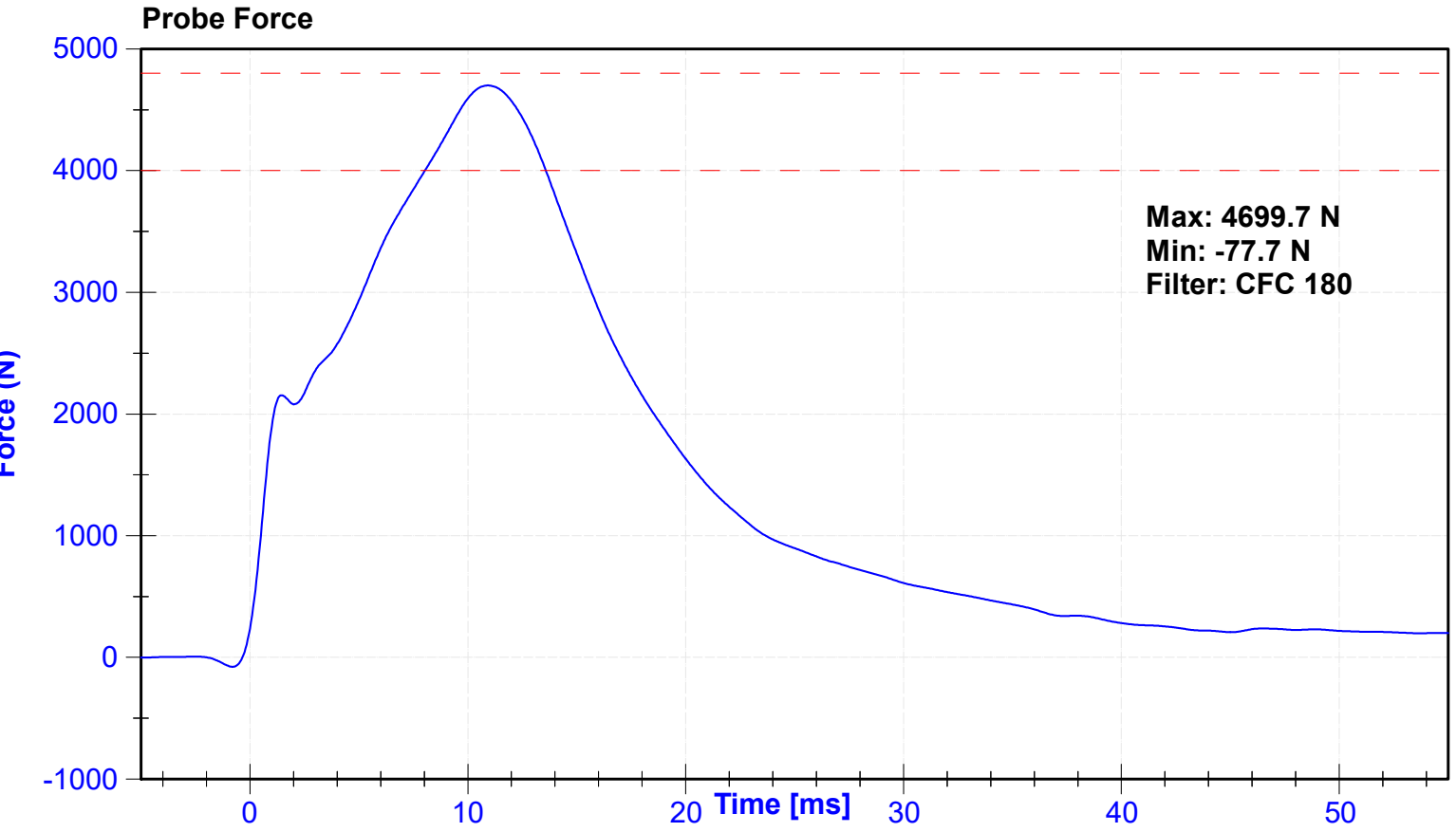
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

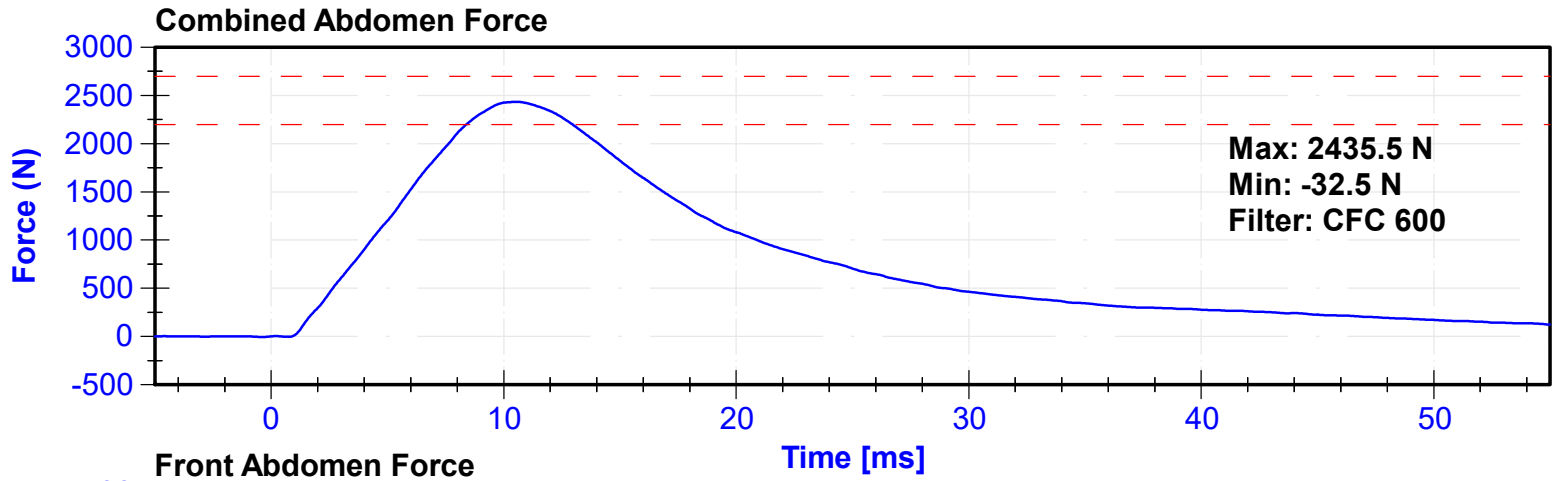
Results

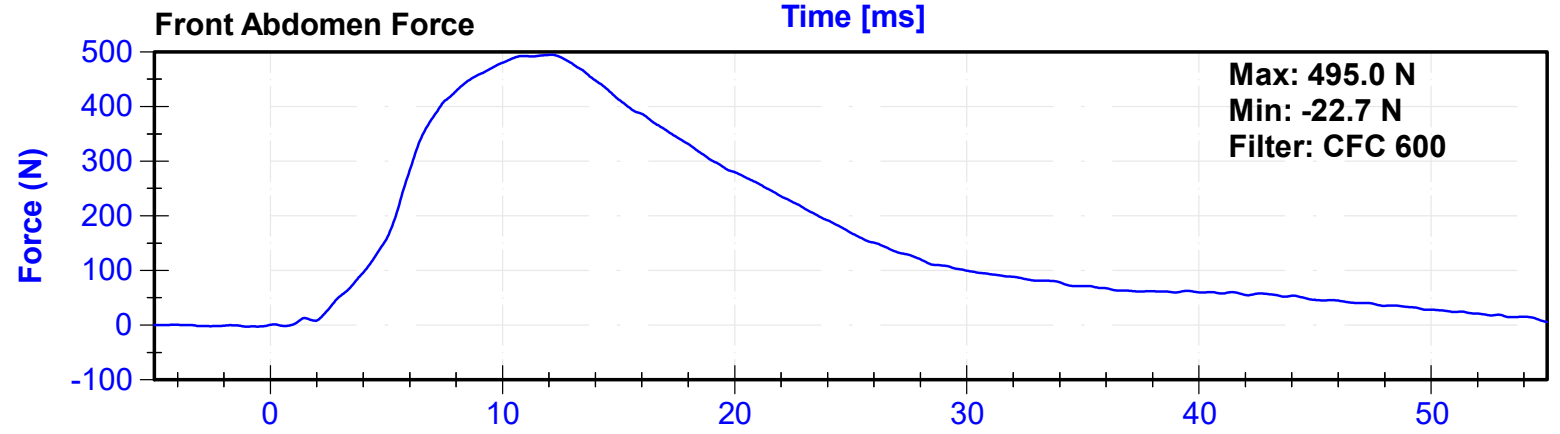
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	27.3	Pass
Velocity	3.9	4.1	m/s	4.01	Pass
Combined Abdomen Force	2200	2700	N	2435.5	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.55	Pass
Resistive Probe Force	4000	4800	N	4699.7	Pass
Time at Peak Resistive Force	10.6	13.0	ms	10.90	Pass

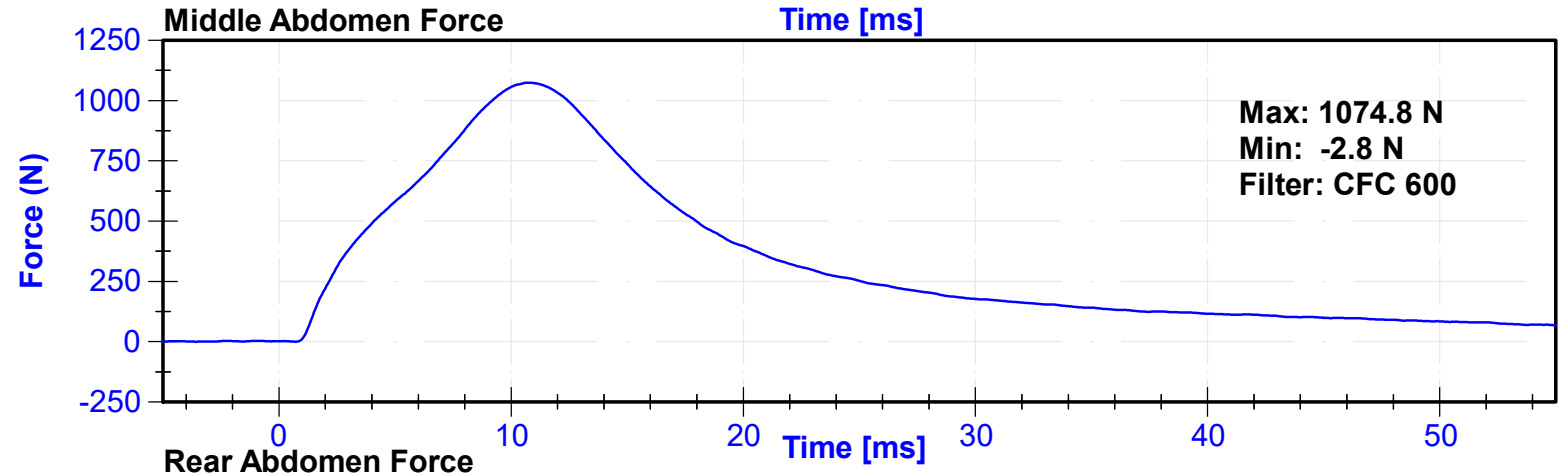
Transducer Calibrations

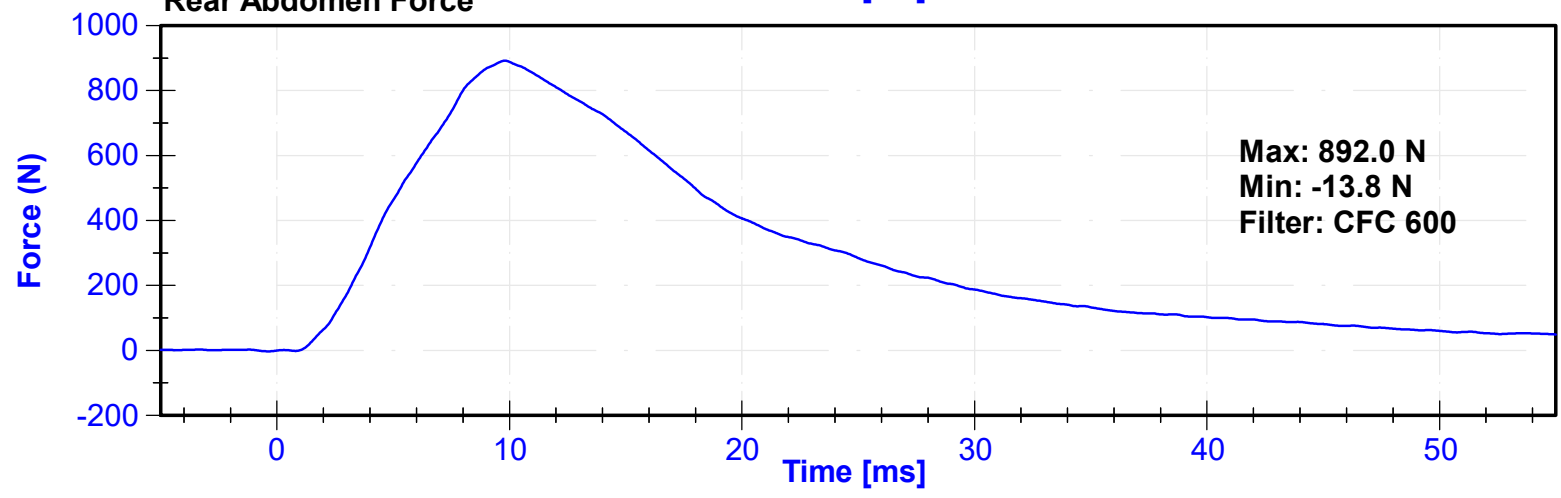
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Front Abdomen Load Cell	Denton	1509	8/12/2022	8/12/2023
Middle Abdomen Load Cell	Denton	1508	8/12/2022	8/12/2023
Rear Abdomen Load Cell	Denton	1507	8/12/2022	8/12/2023




Combined Abdomen Force
Force (N)
3000
2500
2000
1500
1000
500
0
-500
0
10
20
30
40
50
Time [ms]
Max: 2435.5 N
Min: -32.5 N
Filter: CFC 600


Front Abdomen Force
Force (N)
500
400
300
200
100
0
-100
0
10
20
30
40
50
Time [ms]
Max: 495.0 N
Min: -22.7 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
1250
1000
750
500
250
0
-250
0
10
20
30
40
50
Time [ms]
Max: 1074.8 N
Min: -2.8 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
1000
800
600
400
200
0
-200
0
10
20
30
40
50
Time [ms]
Max: 892.0 N
Min: -13.8 N
Filter: CFC 600

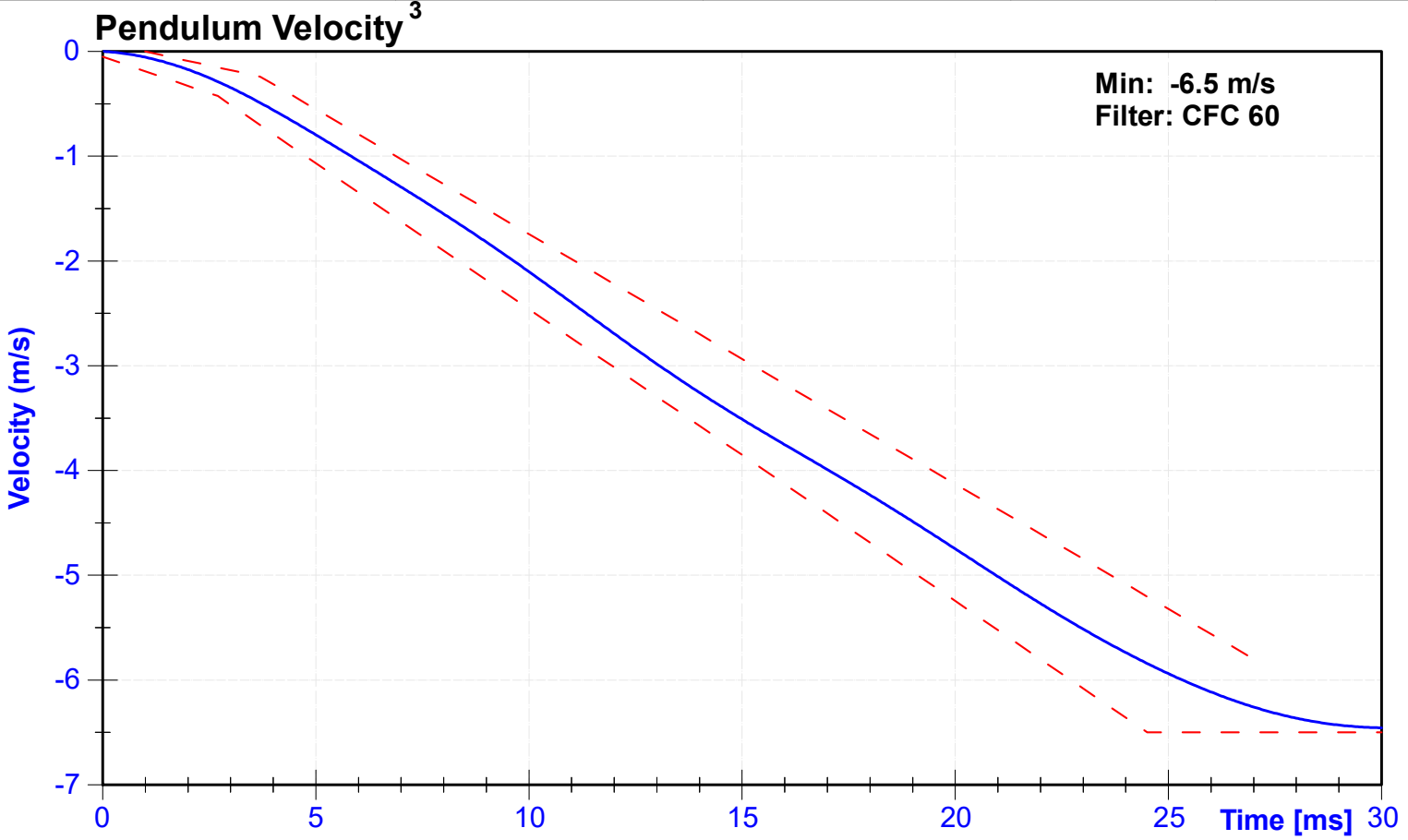
ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

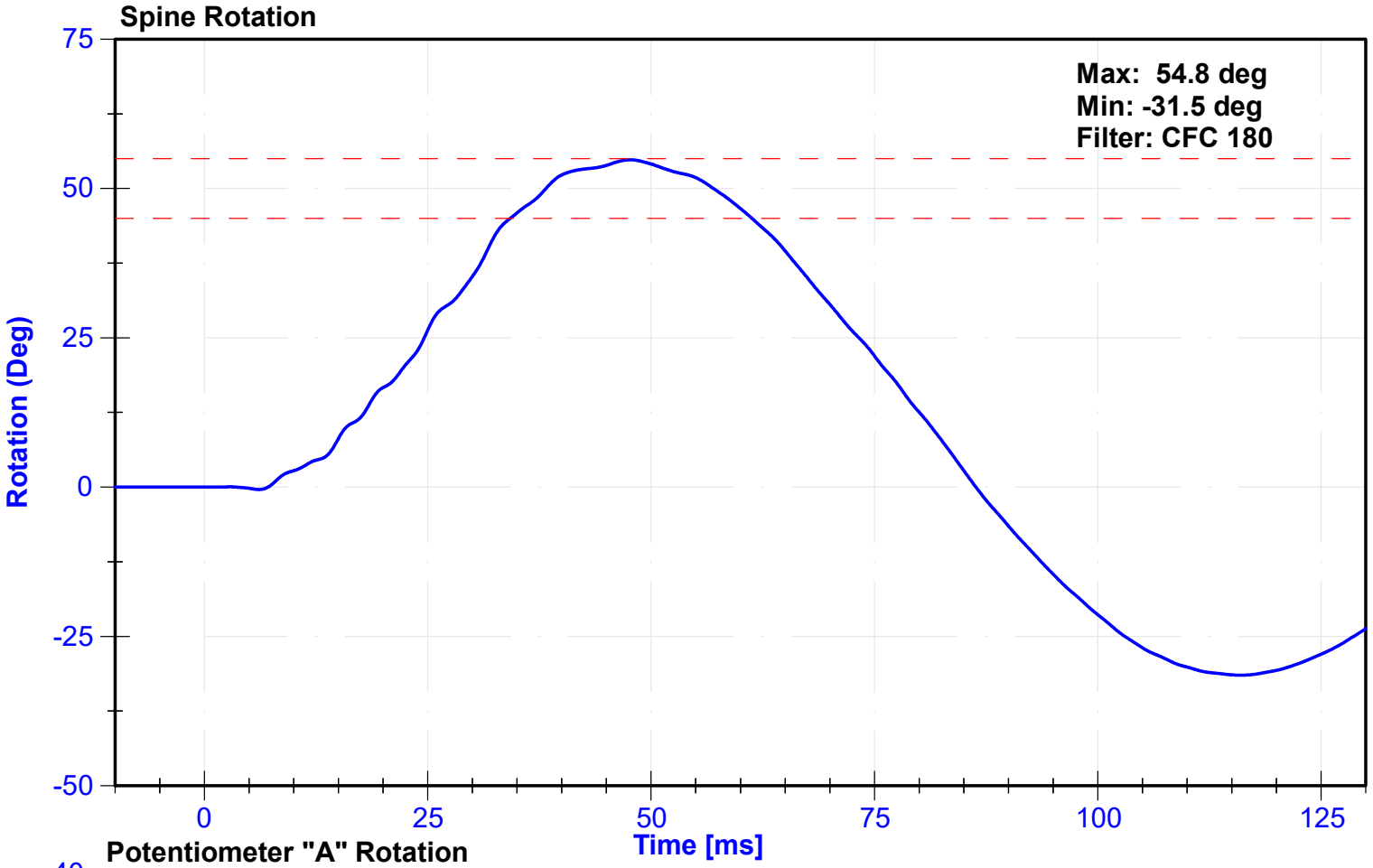
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	27.5	Pass
Velocity	5.95	6.15	m/s	6.044	Pass
Lateral Spine Rotation	45	55	deg	54.8	Pass
Time at Maximum Rotation	39	53	ms	47.7	Pass
Time of Decay to Zero Degrees	37	57	ms	38.7	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

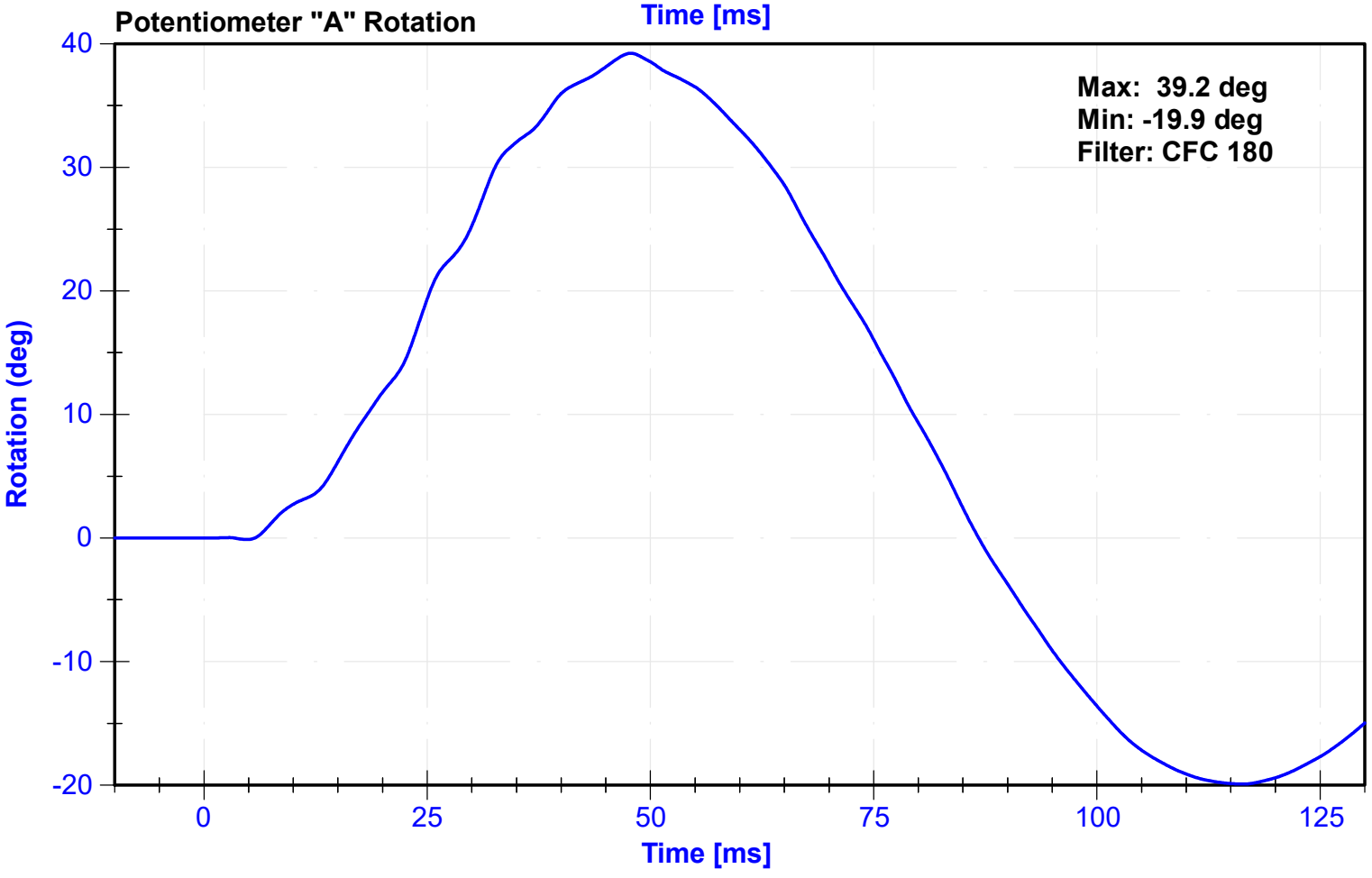
Transducer Calibrations

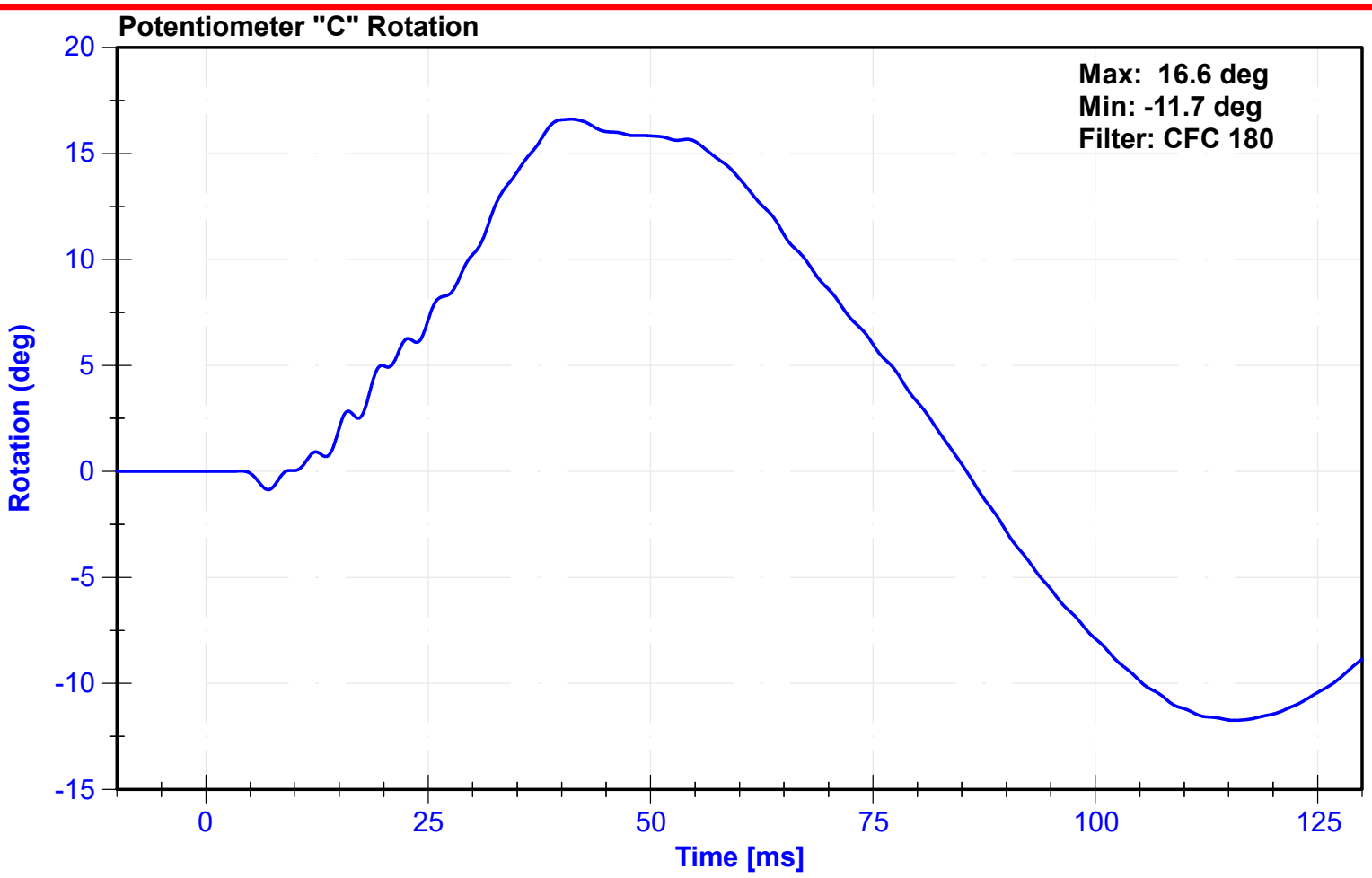
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/26/2022	10/26/2023
Pendulum "A" Potentiometer	Sfernice	094	10/5/2022	10/5/2023
Condyle "B" Potentiometer	Sfernice	095	10/5/2022	10/5/2023



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


Spine Rotation
Max: 54.8 deg
Min: -31.5 deg
Filter: CFC 180
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 39.2 deg
Min: -19.9 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

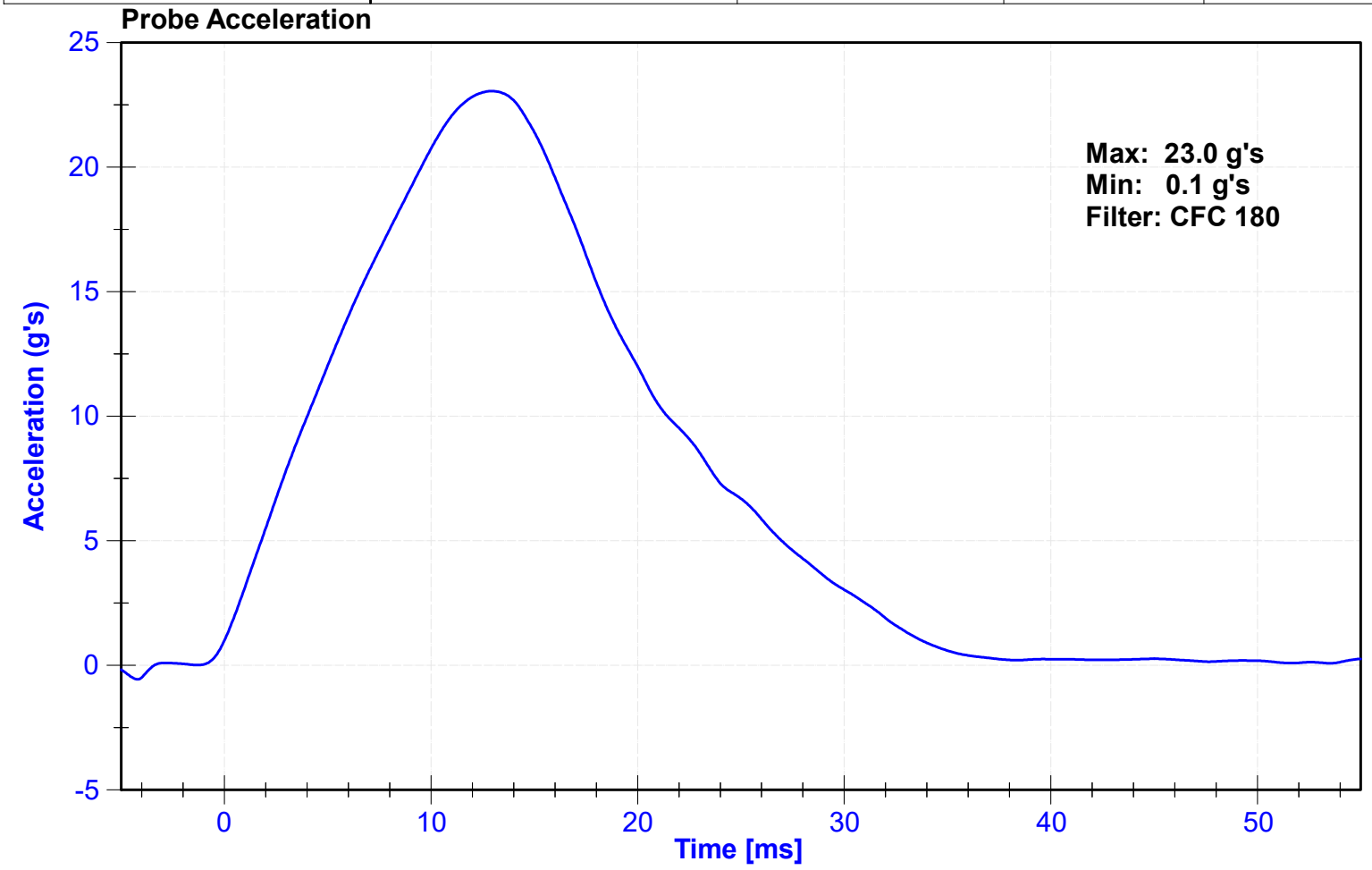
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

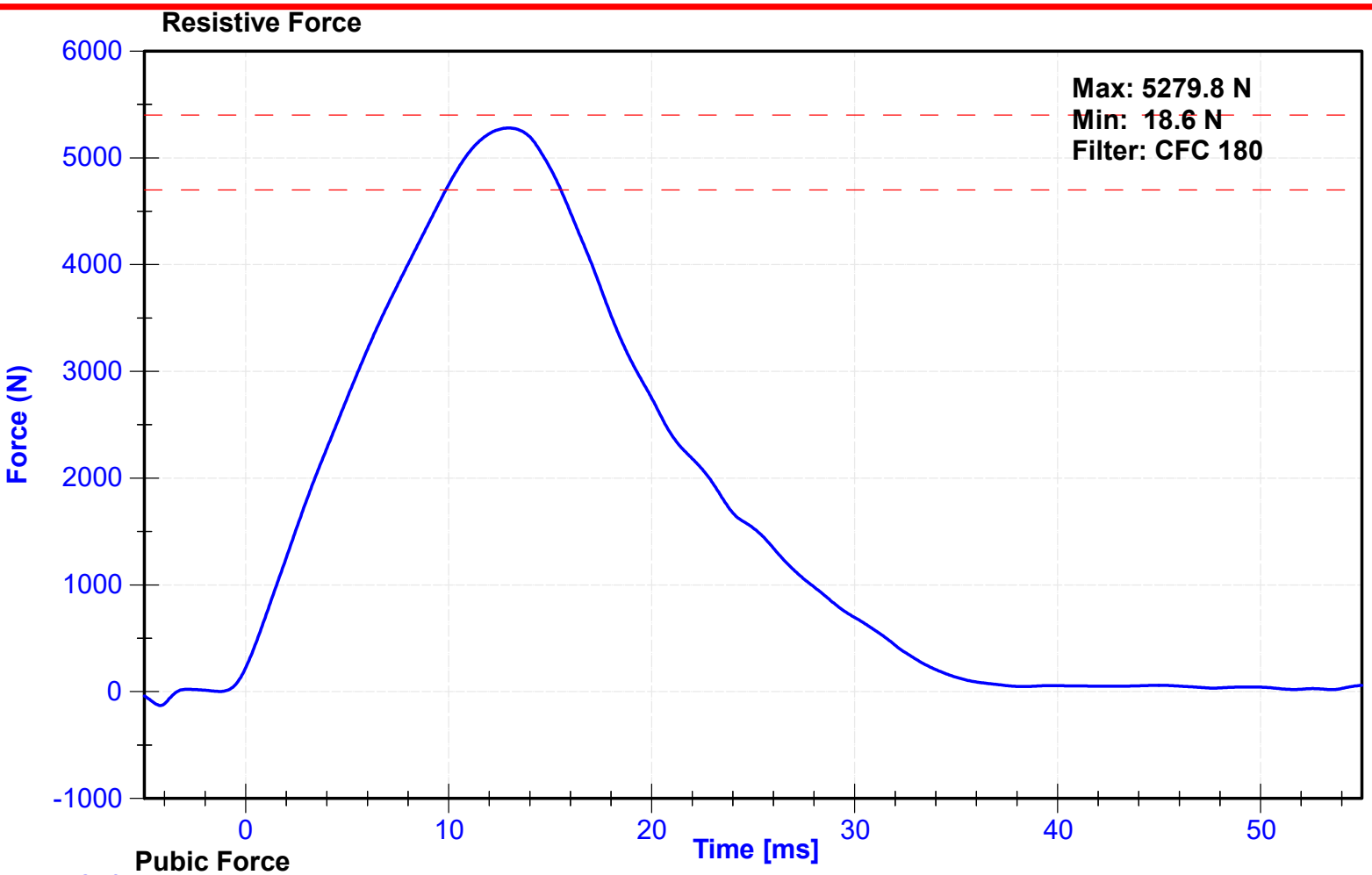
Results

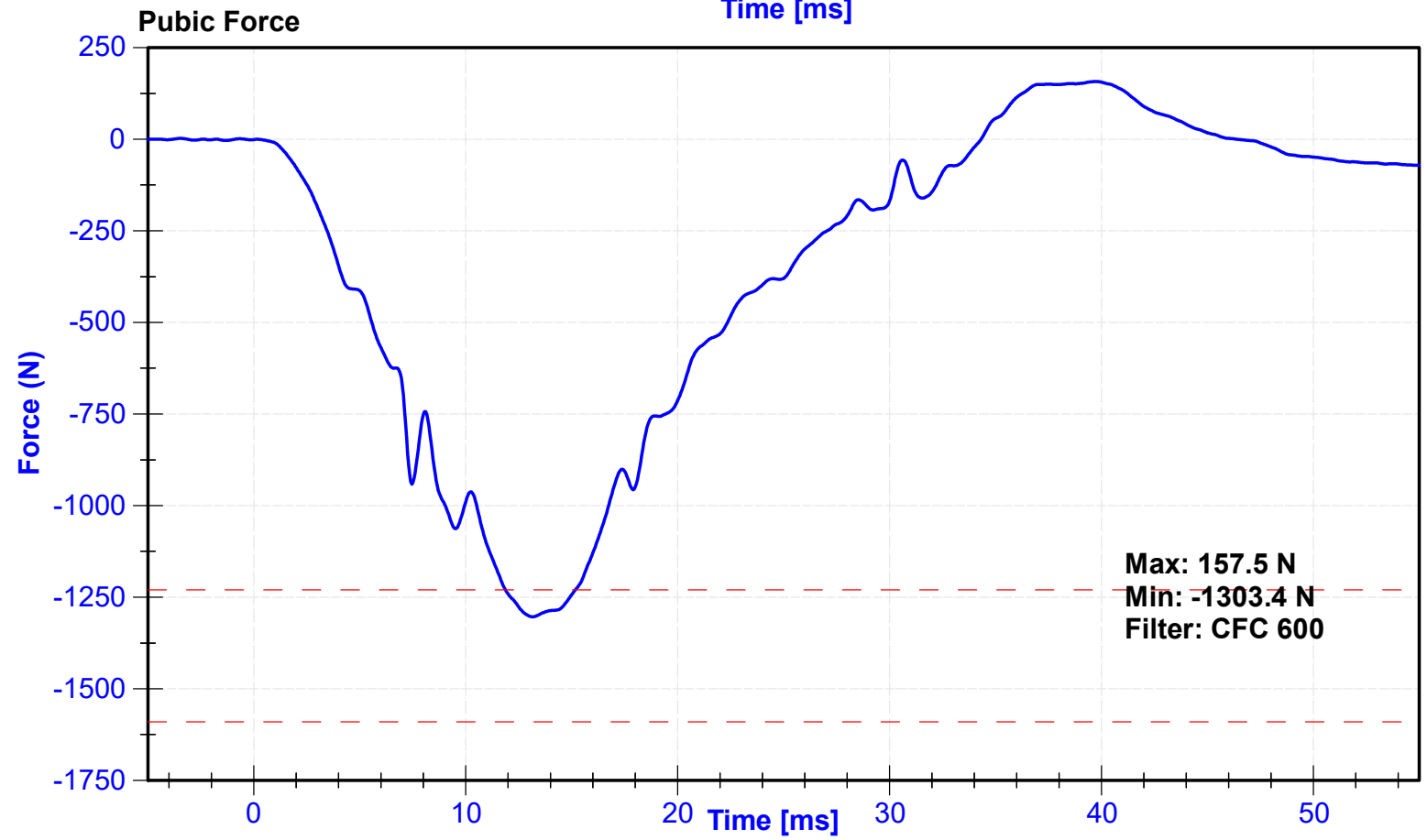
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	27.3	Pass
Velocity	4.2	4.4	m/s	4.35	Pass
Resistive Force	4700	5400	N	5279.8	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.95	Pass
Pubic Force	-1590	-1230	N	-1303.4	Pass
Time at Peak Pubic Force	12.2	17.0	ms	13.15	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18546	11/19/2022	5/18/2023
Pubic Load Cell	Denton	459-FY	6/14/2022	6/14/2023




Resistive Force
Max: 5279.8 N
Min: 18.6 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: 157.5 N
Min: -1303.4 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

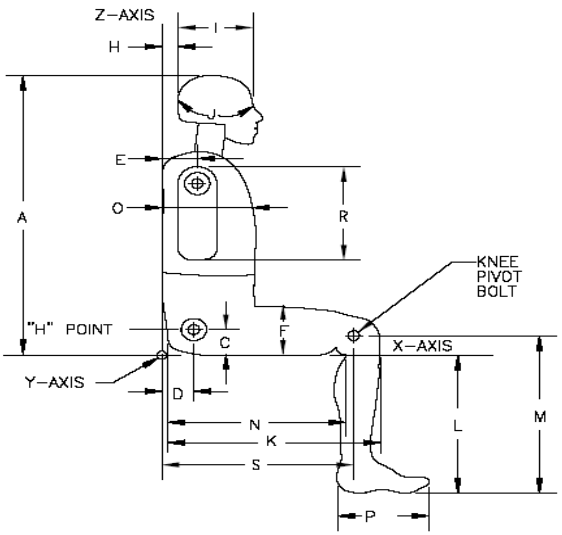
SERIAL NO:DG8012

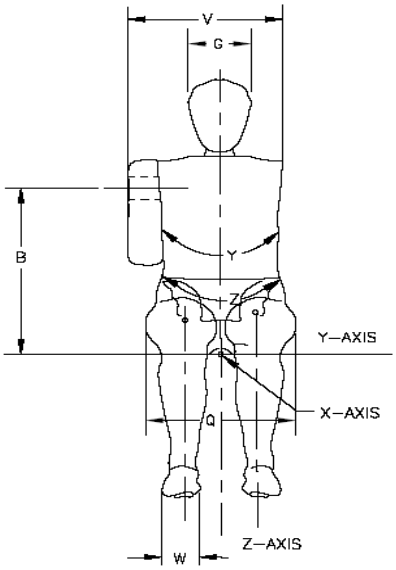
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: K. Brogan Date: 02/16/2023

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	786	Pass
B	Shoulder Pivot Height	437	453	447	Pass
C	H-point Height	79	89	81	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	128	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	546	Pass
K	Buttock to Knee Length	514	540	528	Pass
L	Popliteal Height	343	369	359	Pass
M	Knee Pivot to floor height	392	409	402	Pass
N	Buttock Popliteal Length	416	442	433	Pass
O	Chest Depth w/o jacket	195	211	201	Pass
P	Foot Length	216	232	226	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	319	Pass
R	Arm Length	249	259	251	Pass
S	Knee Joint to seatback	477	493	487	Pass
V	Shoulder Width	341	357	351	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	873	Pass
Z	Waist Circumference	761	791	778	Pass

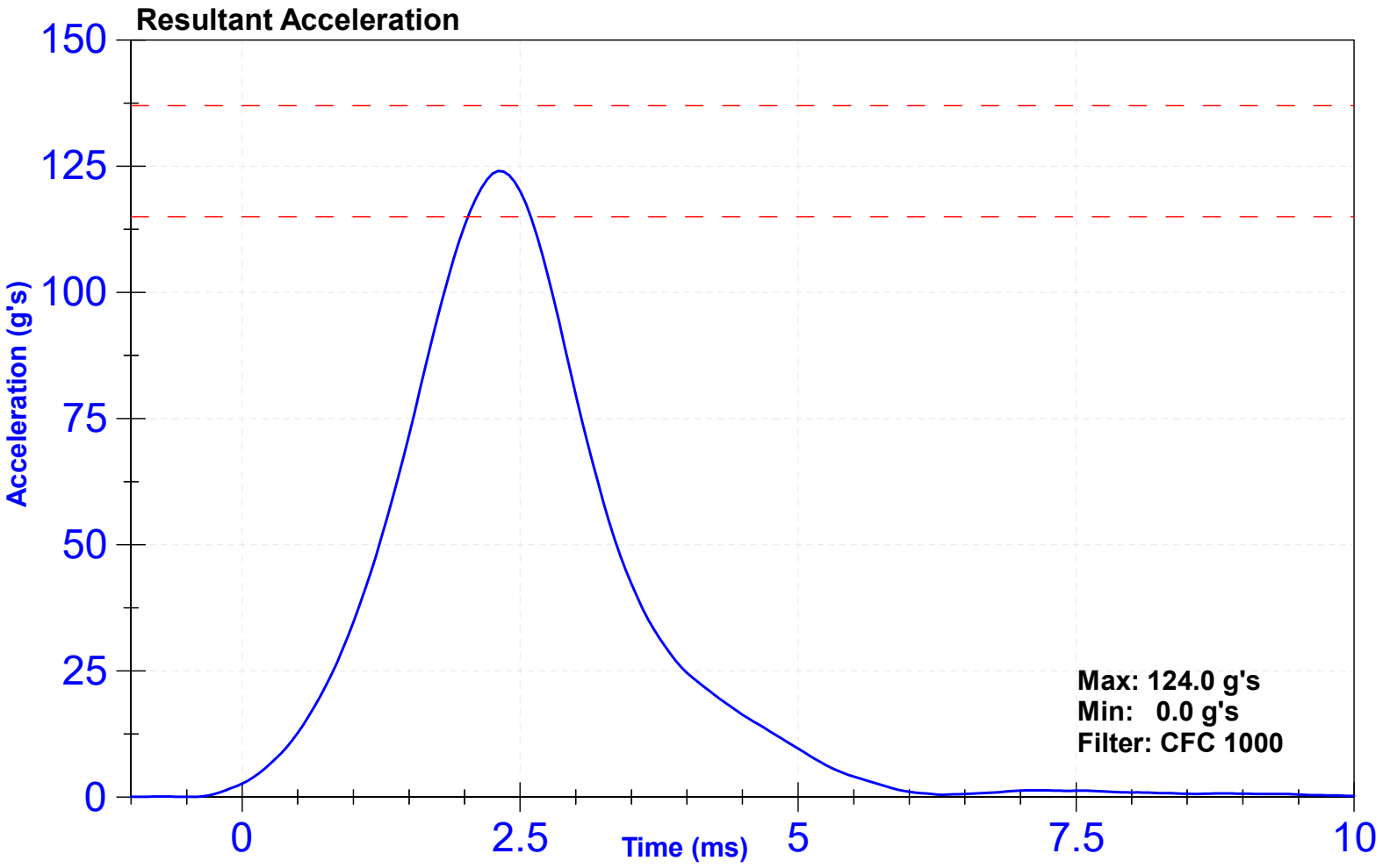
ATD Manufacturer	FTSS	Test Technician	T. Roseman
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

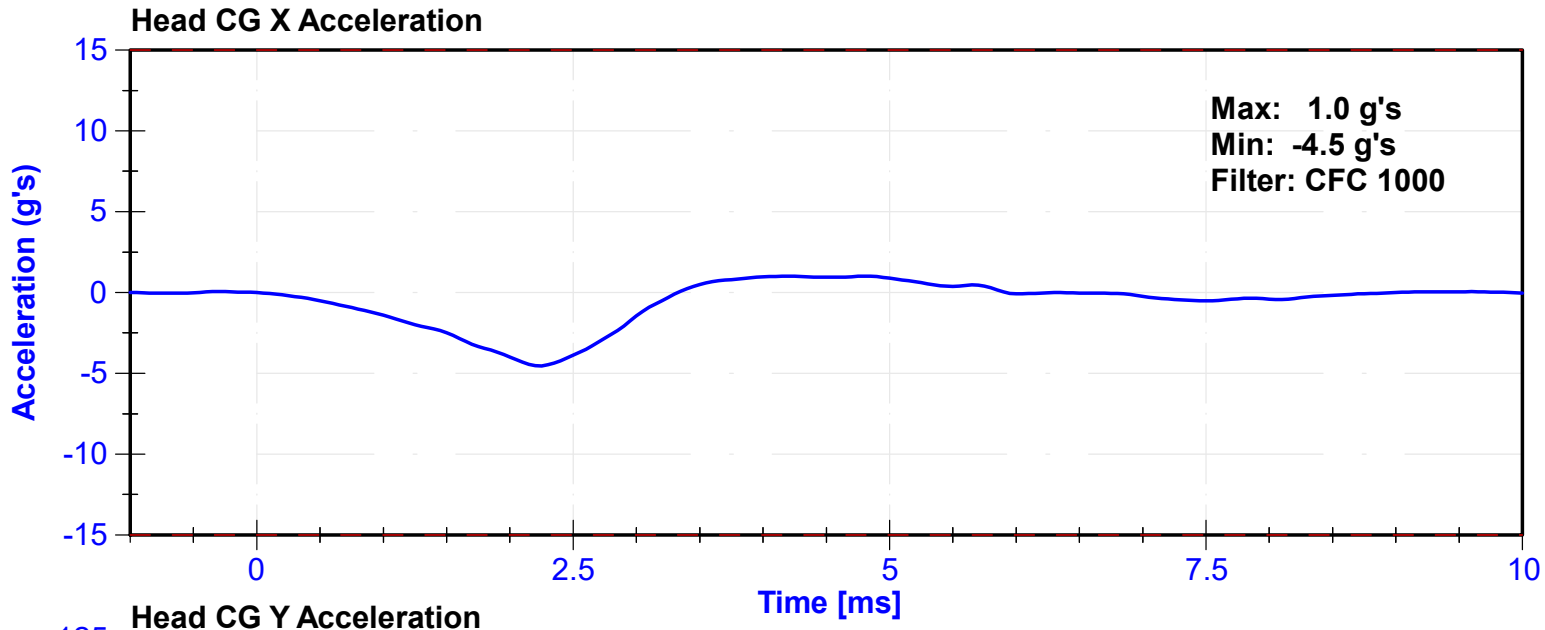
Results

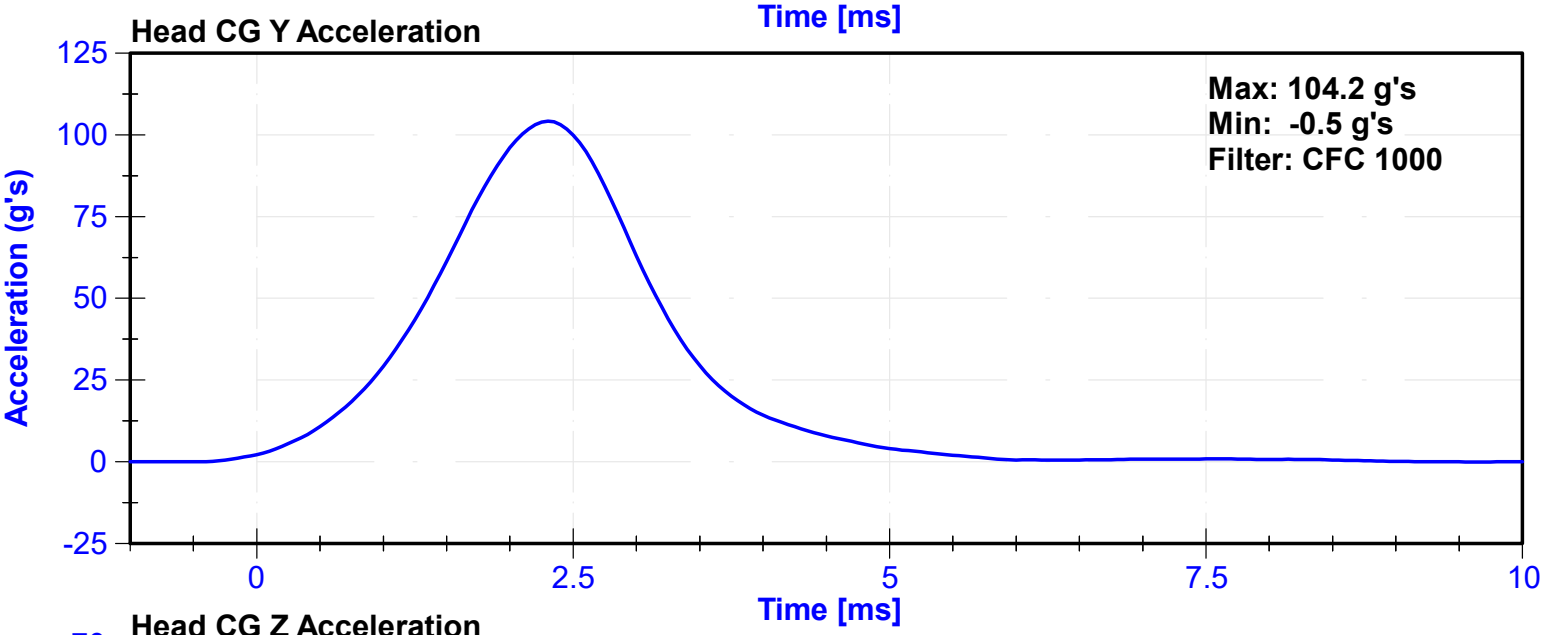
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	22.3	Pass
Resultant Acceleration	115	137	g's	124.0	Pass
Oscillation	0	15	%	1.0	Pass
Fore-Aft Acceleration	-15	15	g's	-4.5	Pass

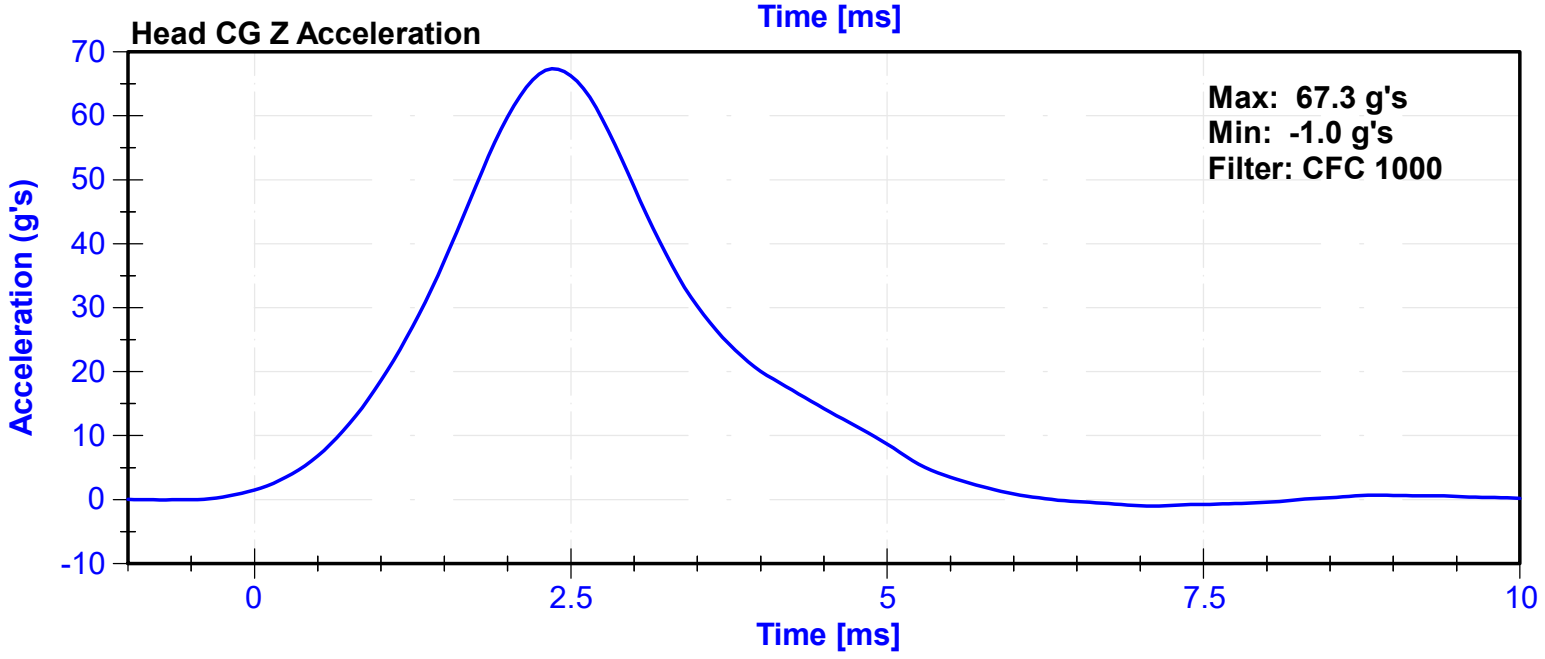
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P74788	12/12/2022	6/10/2023
Y Accelerometer	Endevco	P51668	12/12/2022	6/10/2023
Z Accelerometer	Endevco	P83319	12/12/2022	6/10/2023




Head CG X Acceleration
Max: 1.0 g's
Min: -4.5 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 104.2 g's
Min: -0.5 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 67.3 g's
Min: -1.0 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

ATD Manufacturer	FTSS	Test Technician	D. Kroll
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

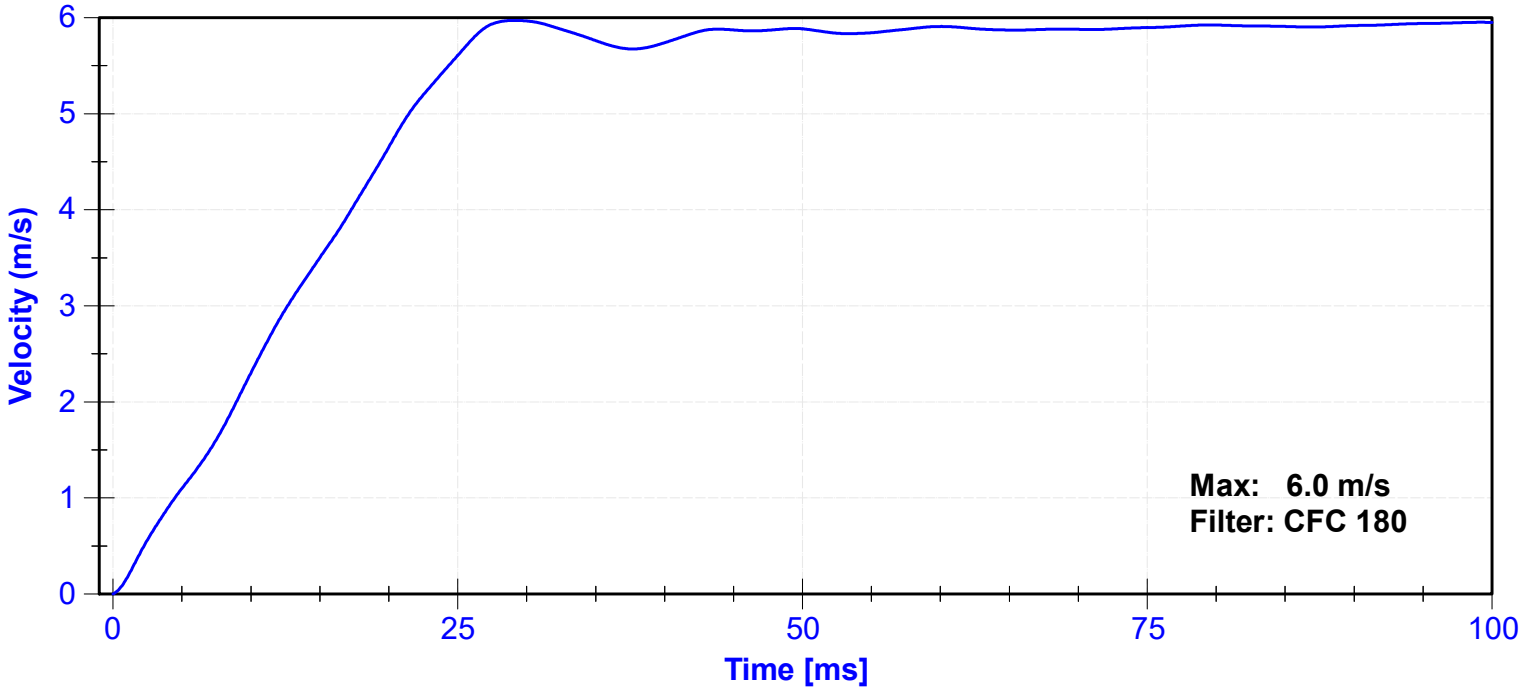
Results

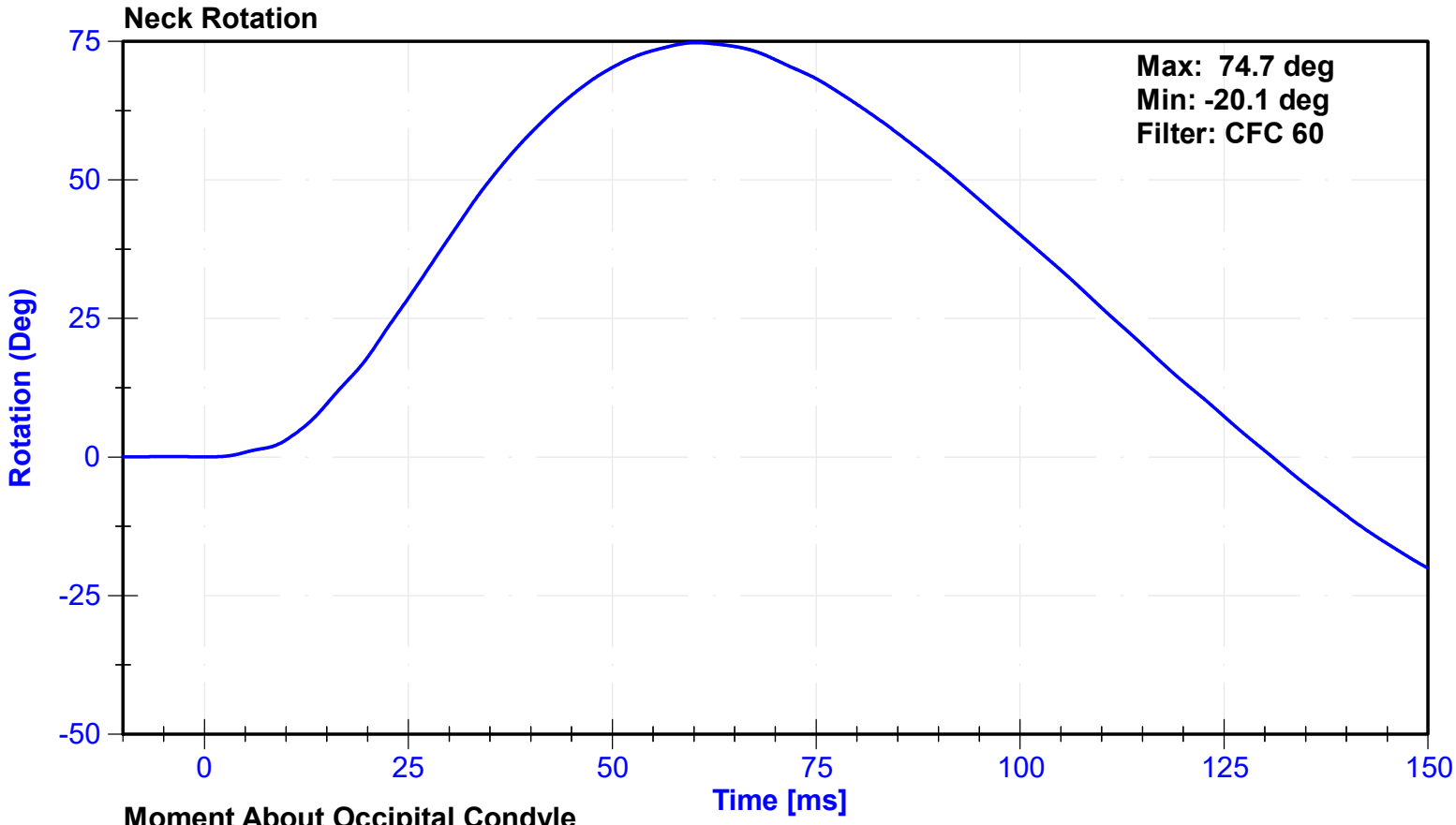
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	22.5	Pass
Velocity	5.51	5.63	m/s	5.530	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.30	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.50	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.65	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.61	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.97	Pass
Neck Rotation	71	81	deg	74.7	Pass
Time at Maximum Rotation	50	70	ms	60.3	Pass
Moment about the OC	36	44	Nm	43.2	Pass
Moment Decay to 0 Nm	102	126	ms	111.9	Pass

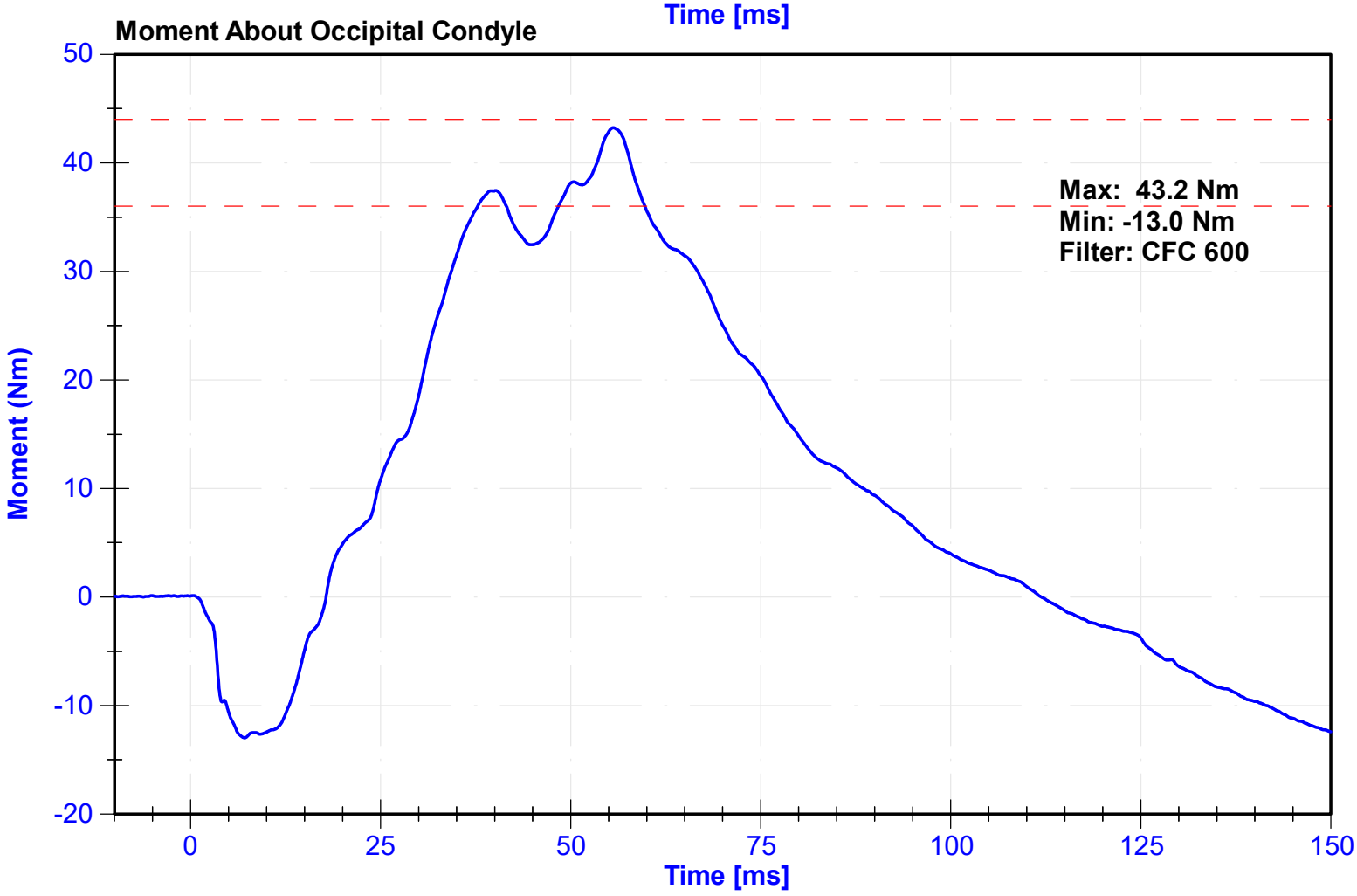
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/26/2022	10/26/2023
Pendulum Potentiometer	Servo	4961	11/11/2022	11/11/2023
Condyle Potentiometer	Servo	DS185	11/11/2022	11/11/2023
Upper Neck Load Cell	Humanetics	1716A_1872-FY	6/13/2022	6/13/2023

Pendulum Impulse




Neck Rotation
Max: 74.7 deg
Min: -20.1 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: 43.2 Nm
Min: -13.0 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

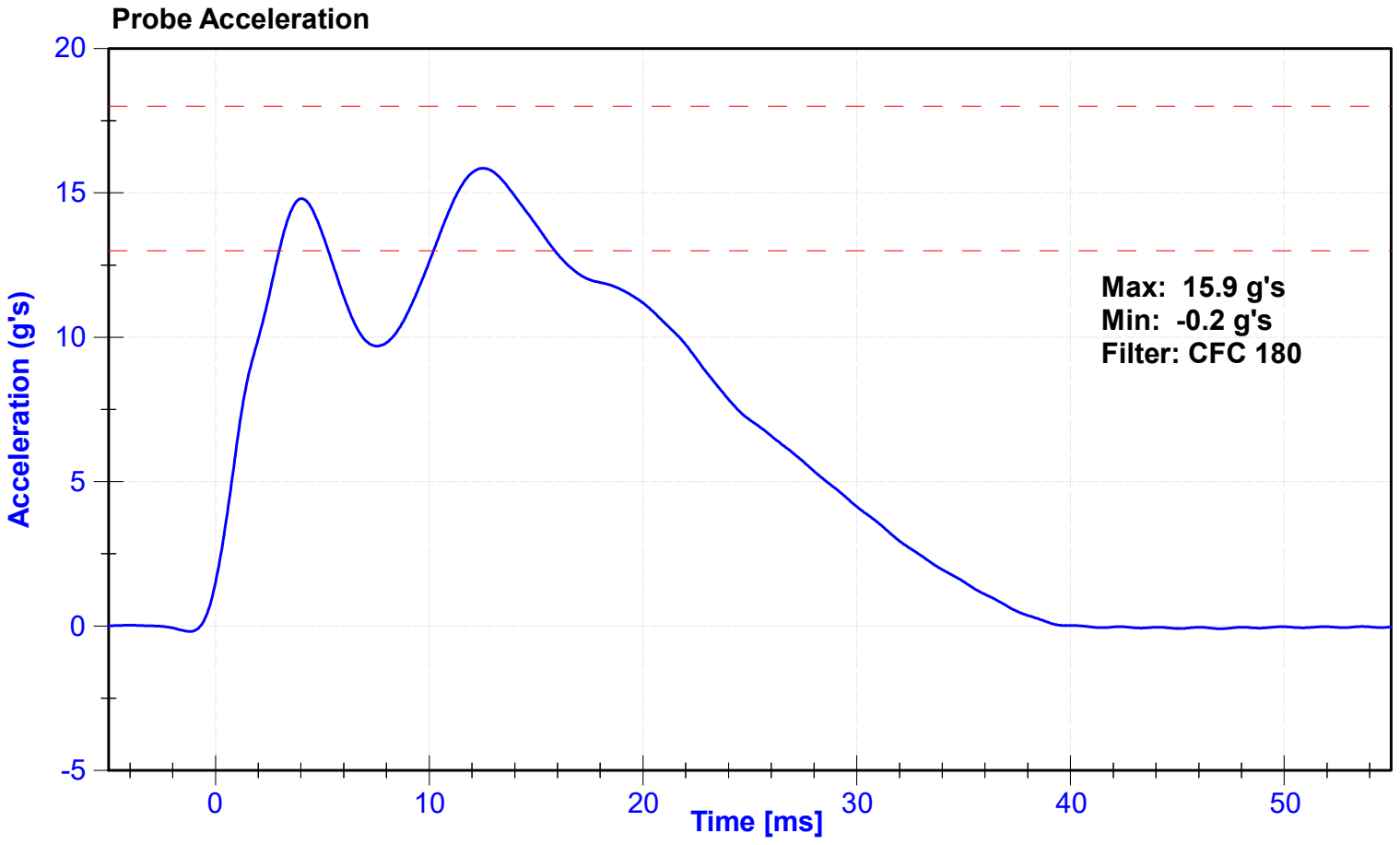
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

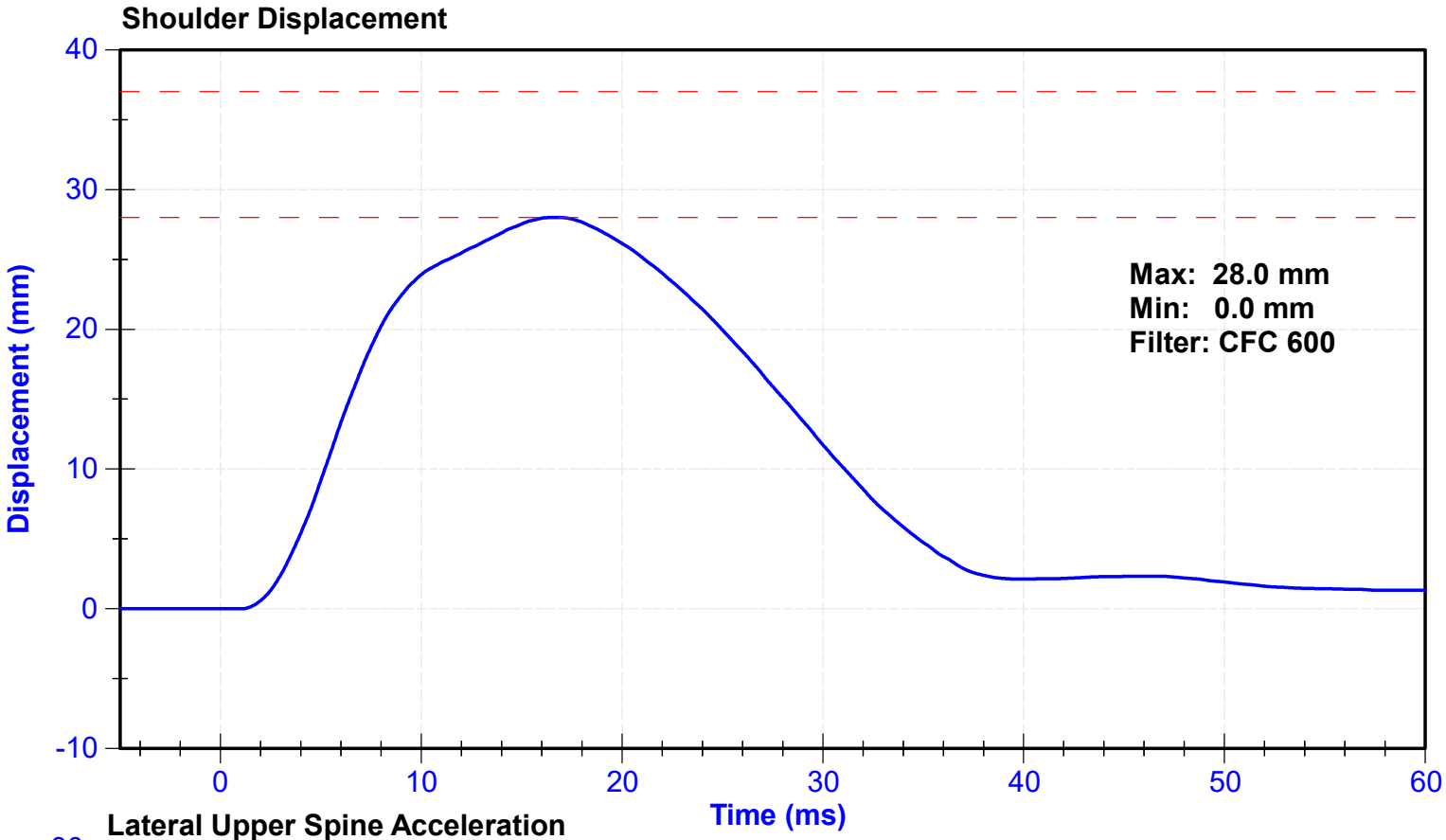
Results

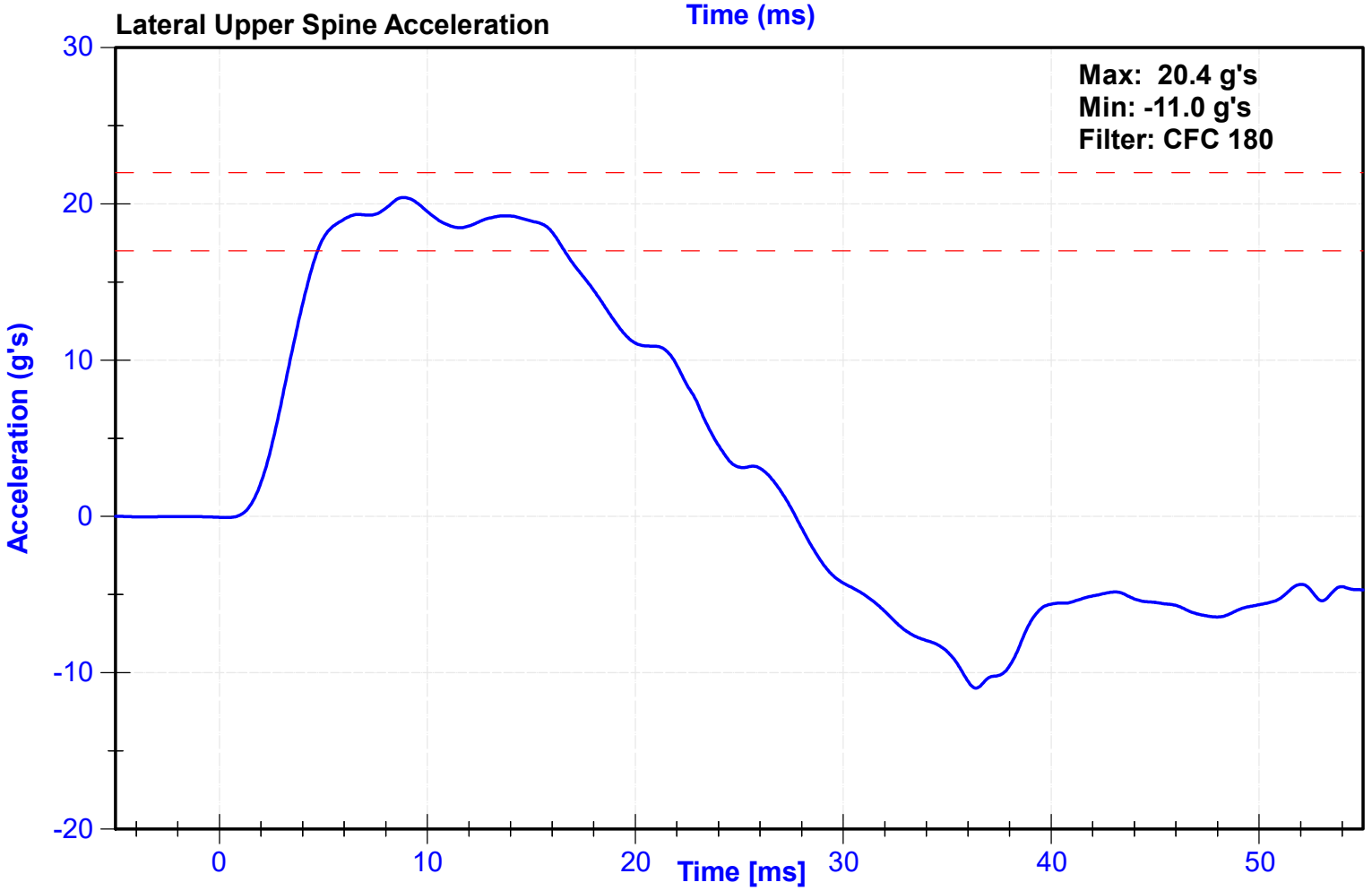
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	26.5	Pass
Velocity	4.2	4.4	m/s	4.34	Pass
Probe Acceleration	13	18	g's	15.9	Pass
Shoulder Deflection	28	37	mm	28.0	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Shoulder Potentiometer	Servo	1274GFE	12/13/2022	6/13/2023
Upper Spine Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 28.0 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 20.4 g's
Min: -11.0 g's
Filter: CFC 180

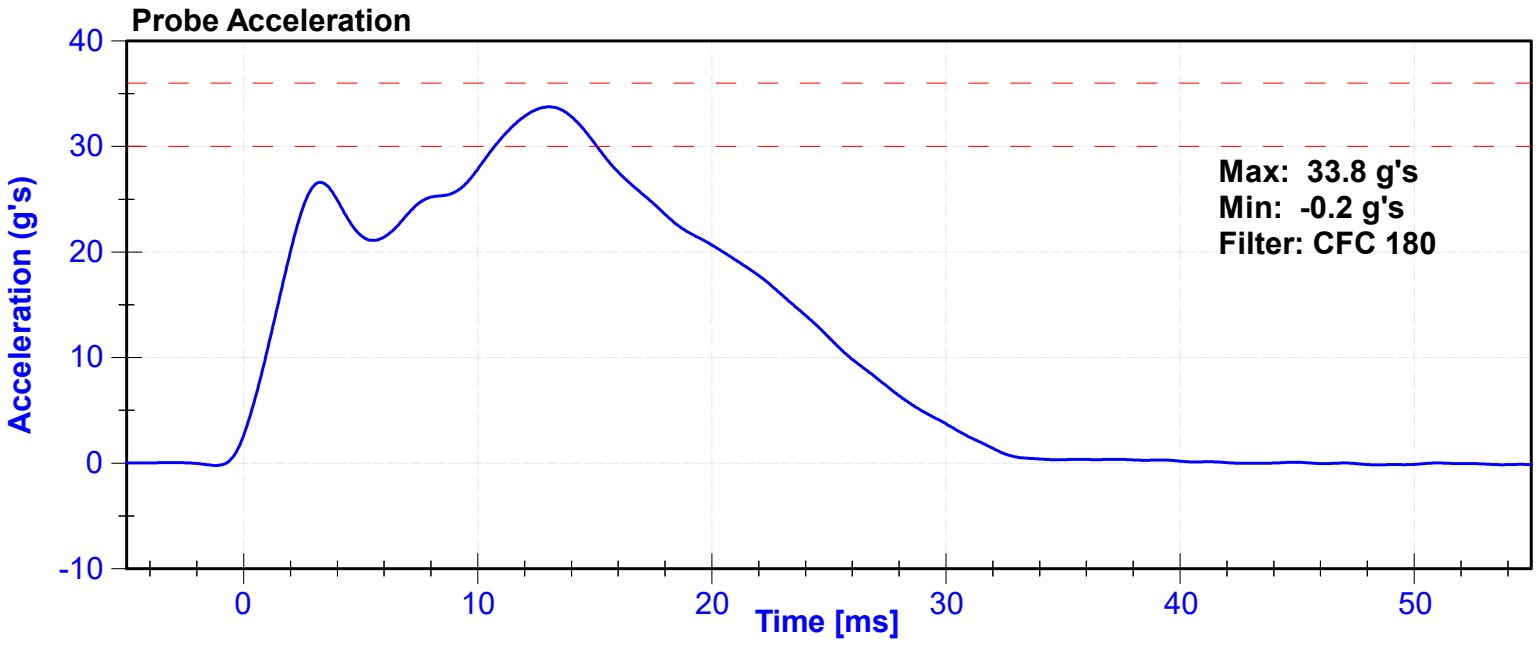
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

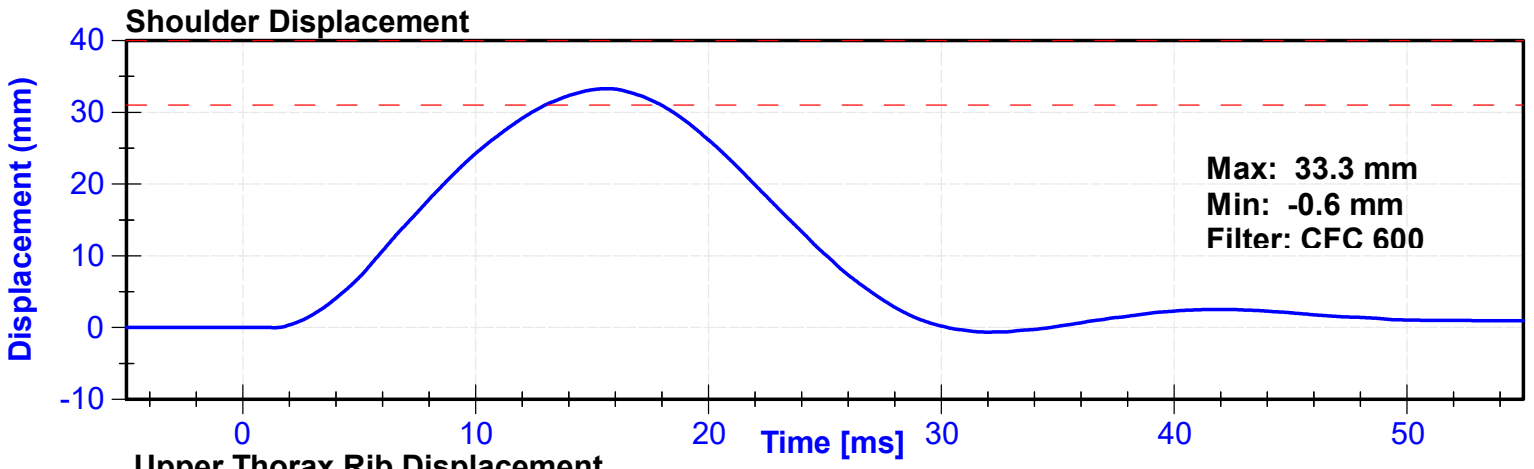
Results

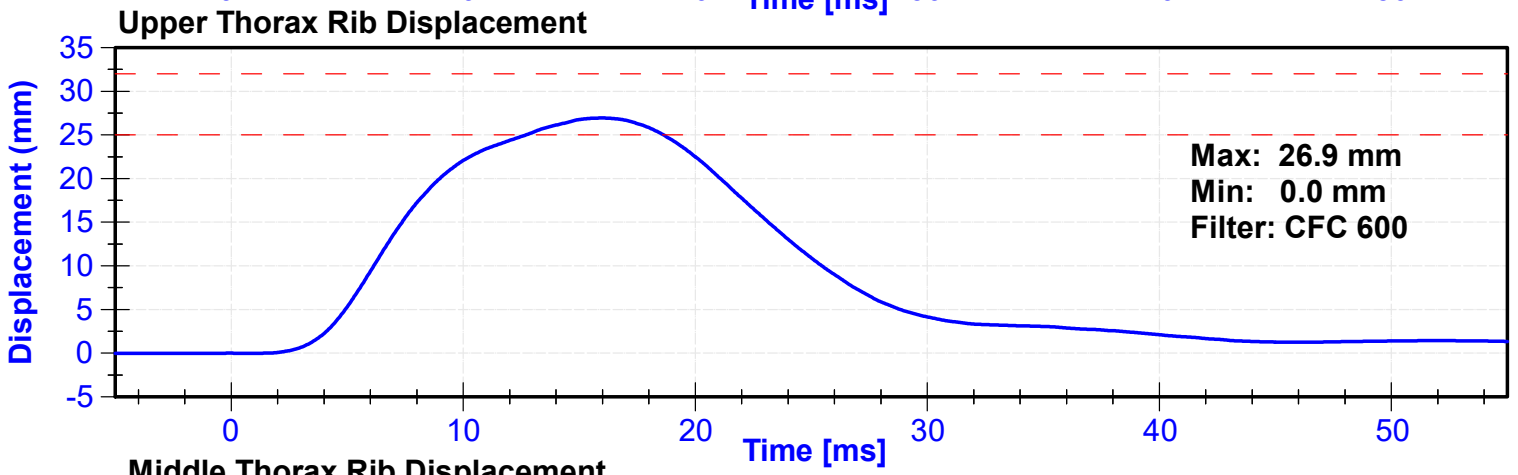
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	26.5	Pass
Velocity	6.6	6.8	m/s	6.70	Pass
Probe Acceleration after 5 ms	30	36	g's	33.8	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.4	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.6	Pass
Shoulder Deflection	31	40	mm	33.3	Pass
Upper Thorax Rib Deflection	25	32	mm	26.9	Pass
Mid Thorax Rib Deflection	30	36	mm	30.4	Pass
Lower Thorax Rib Deflection	32	38	mm	32.4	Pass

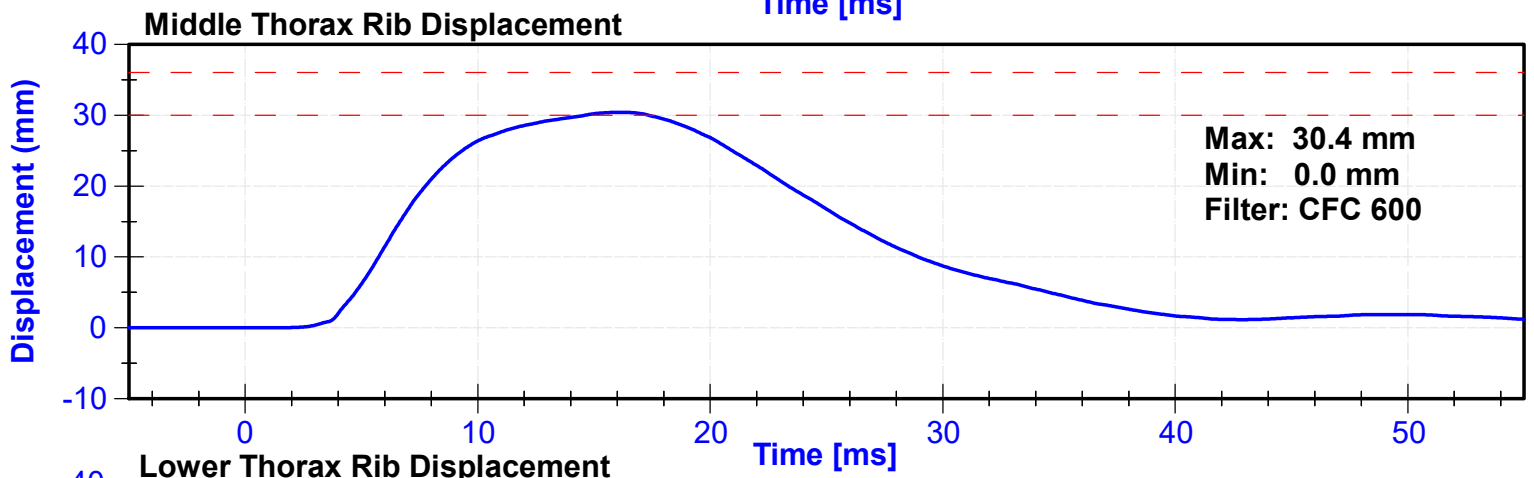
Transducer Calibrations

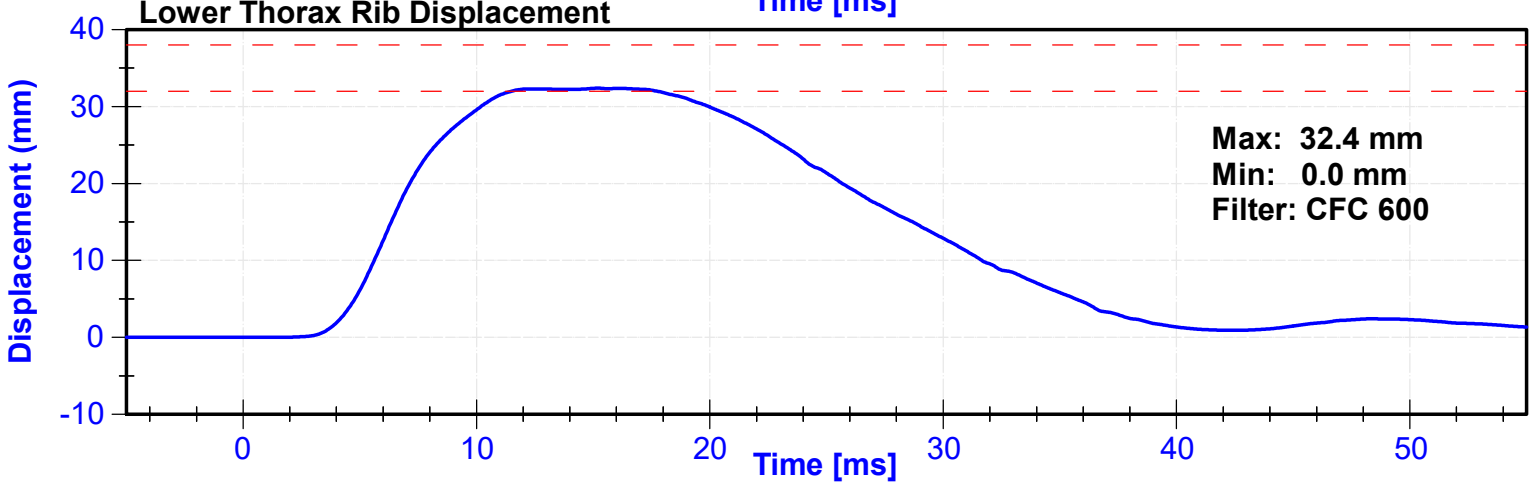
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine T1 Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023
Upper Spine T12 Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Shoulder Potentiometer	Servo	1274GFE	12/13/2022	6/13/2023
Upper Thorax Rib Potentiometer	Servo	1199GFE	12/13/2022	6/13/2023
Middle Thorax Rib Potentiometer	Servo	1246GFE	12/13/2022	6/13/2023
Lower Thorax Rib Potentiometer	Servo	011GFE	12/13/2022	6/13/2023

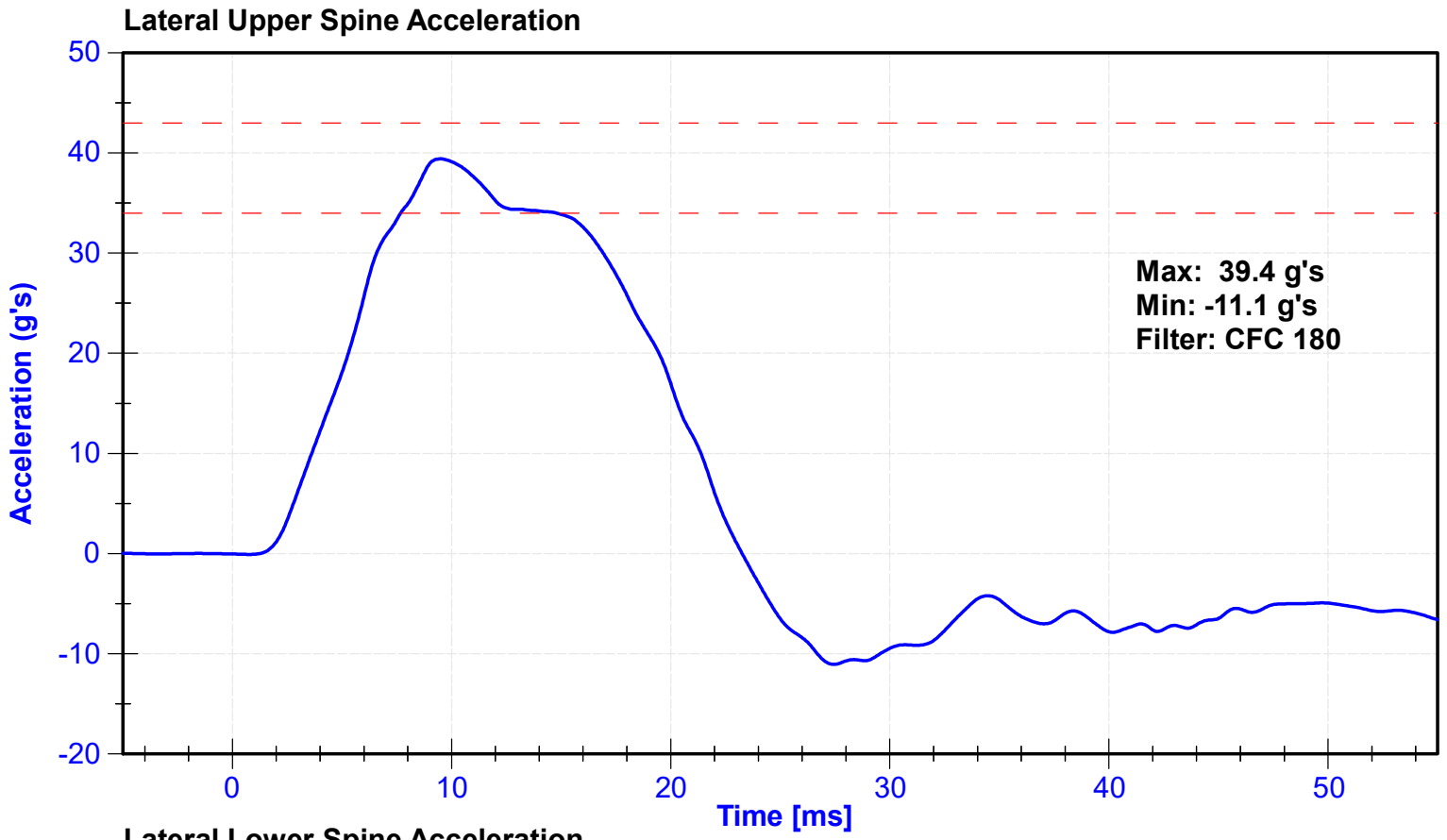


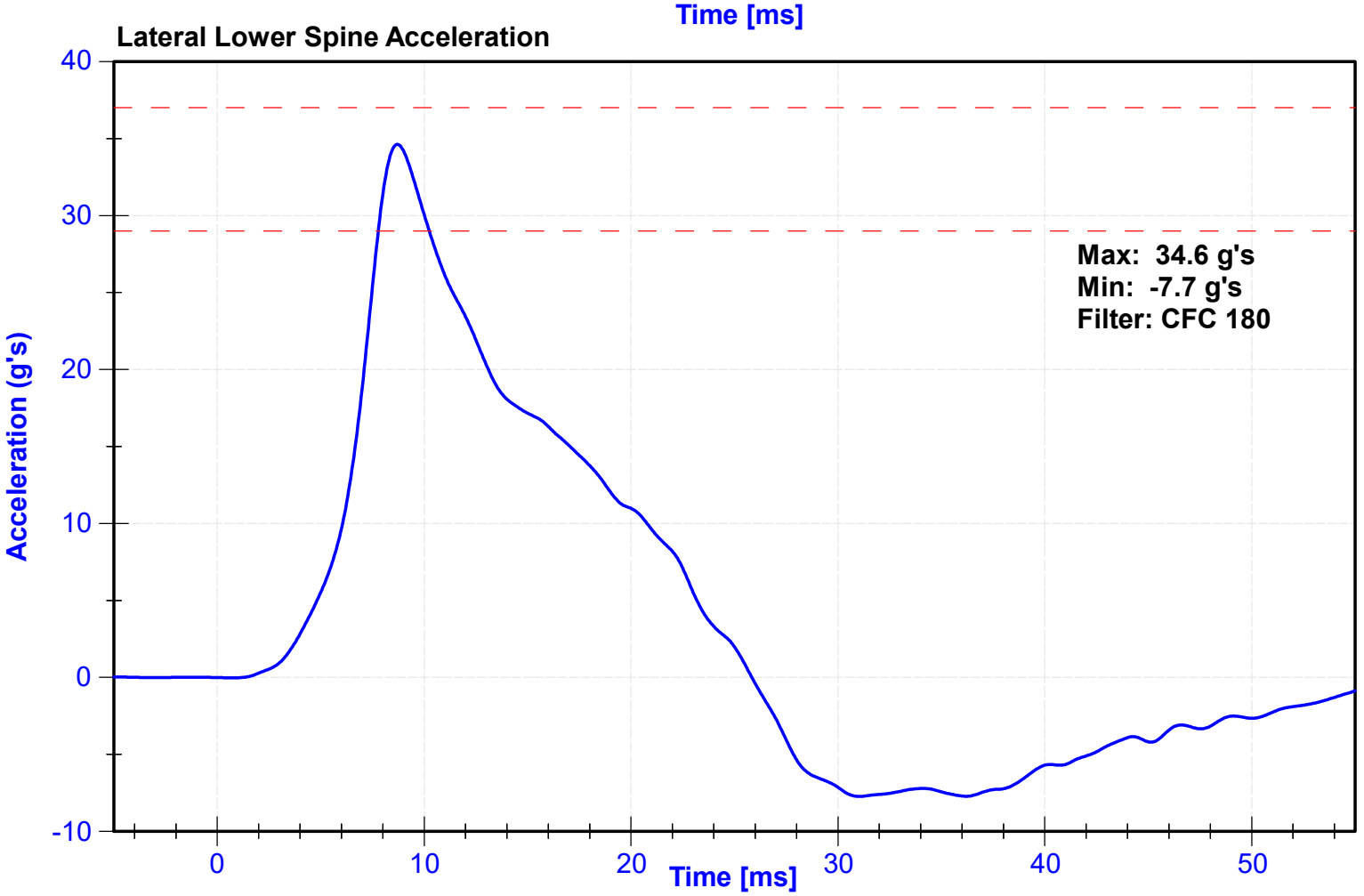

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 33.3 mm
Min: -0.6 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.9 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.4 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.4 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 39.4 g's
Min: -11.1 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 34.6 g's
Min: -7.7 g's
Filter: CFC 180

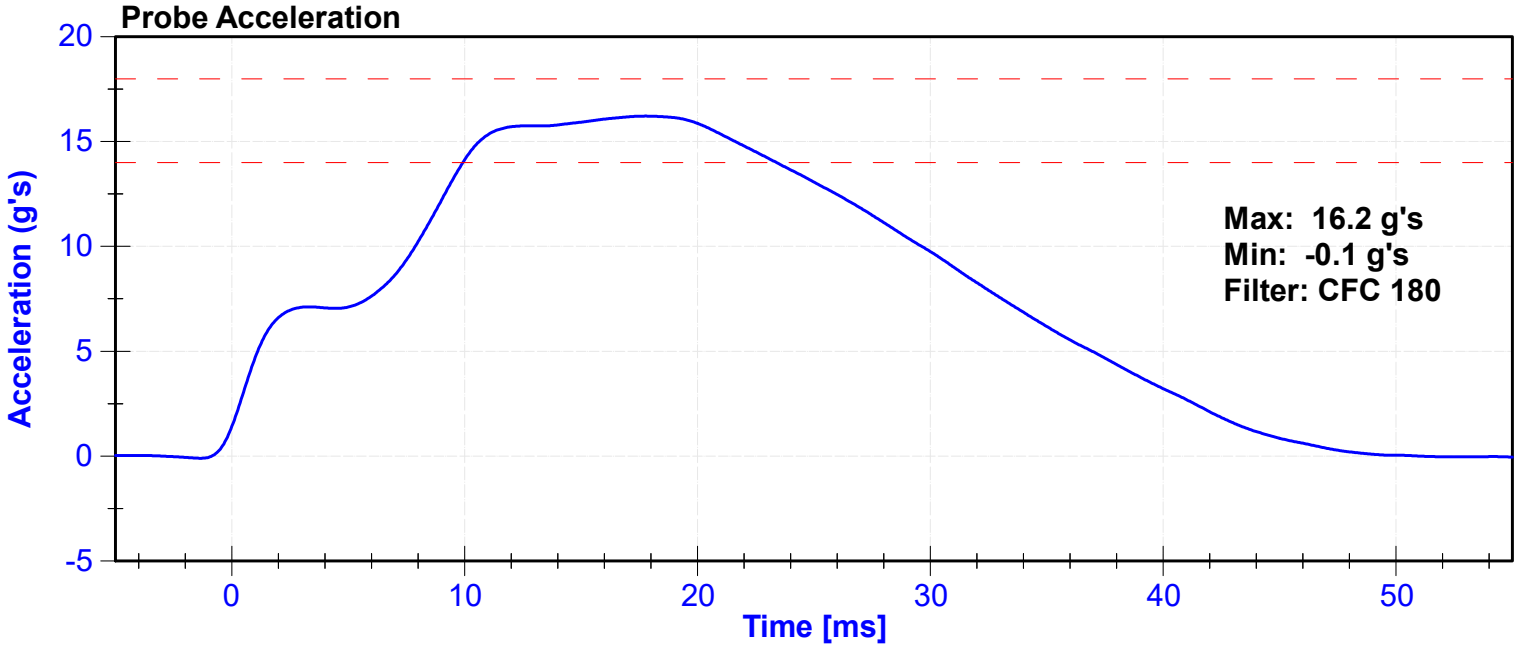
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

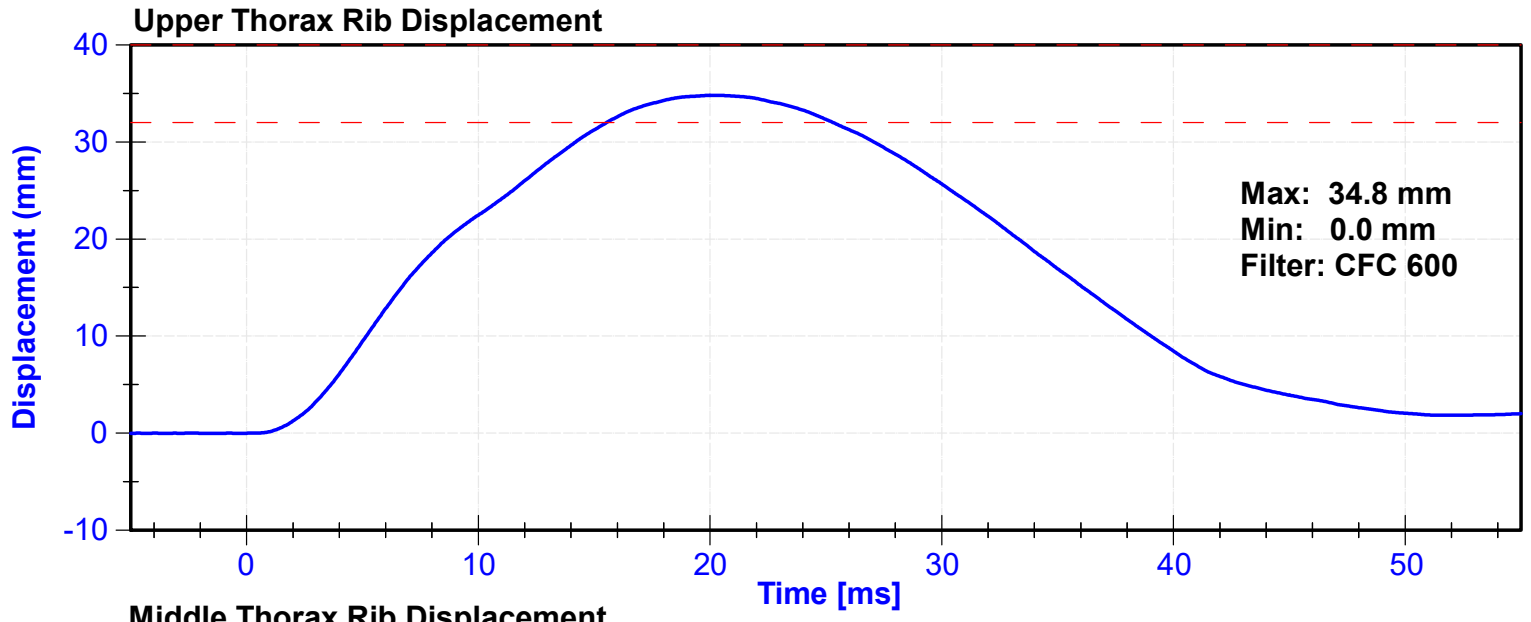
Results

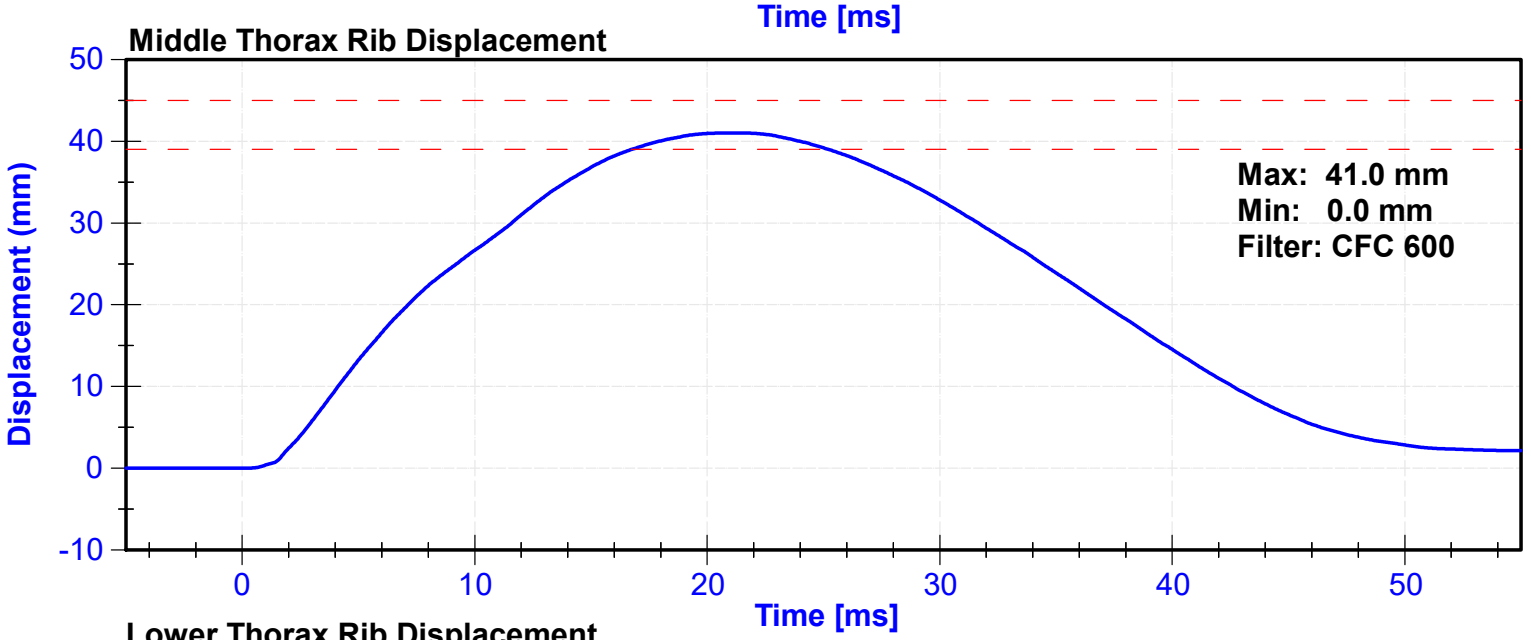
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	26.5	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	14	18	g's	16.2	Pass
Lateral Upper Spine Acceleration	13	17	g's	16.2	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.8	Pass
Upper Thorax Rib Deflection	32	40	mm	34.8	Pass
Middle Thorax Rib Deflection	39	45	mm	41.0	Pass
Lower Thorax Rib Deflection	35	43	mm	39.9	Pass

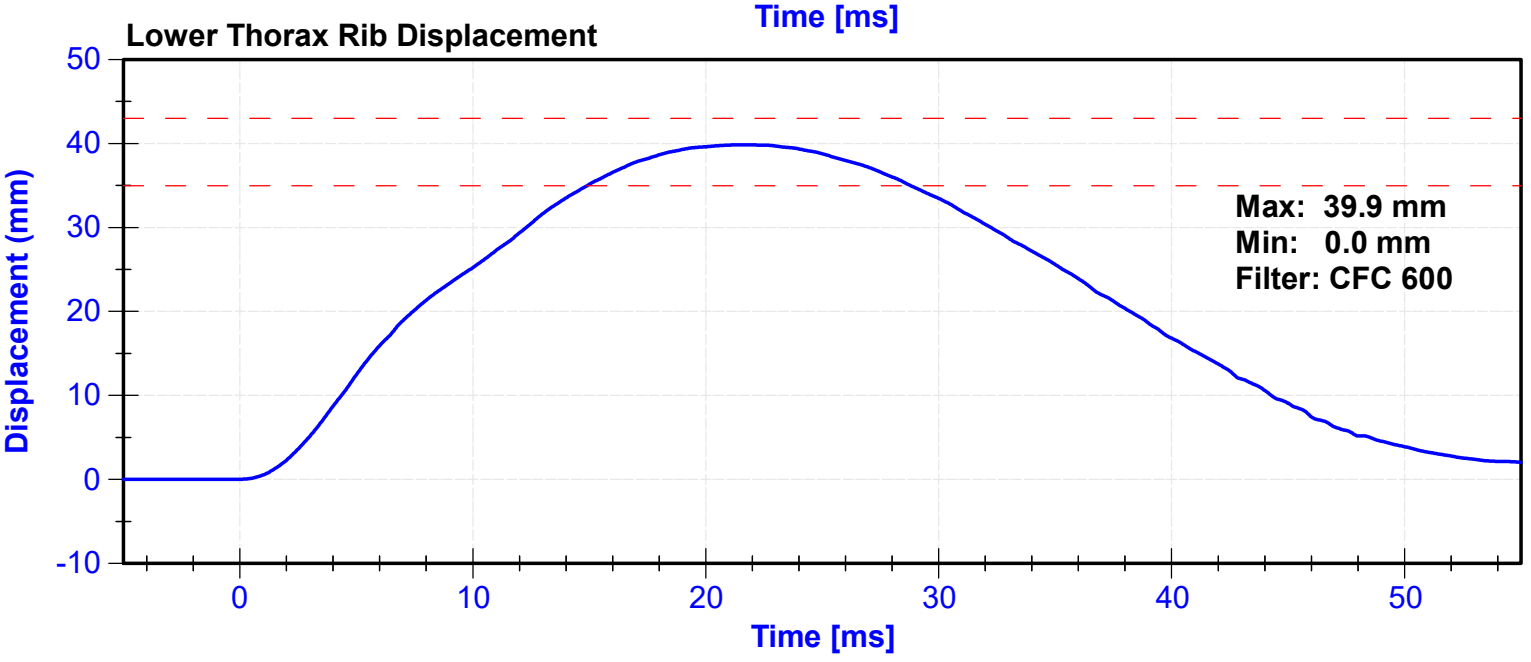
Transducer Calibrations

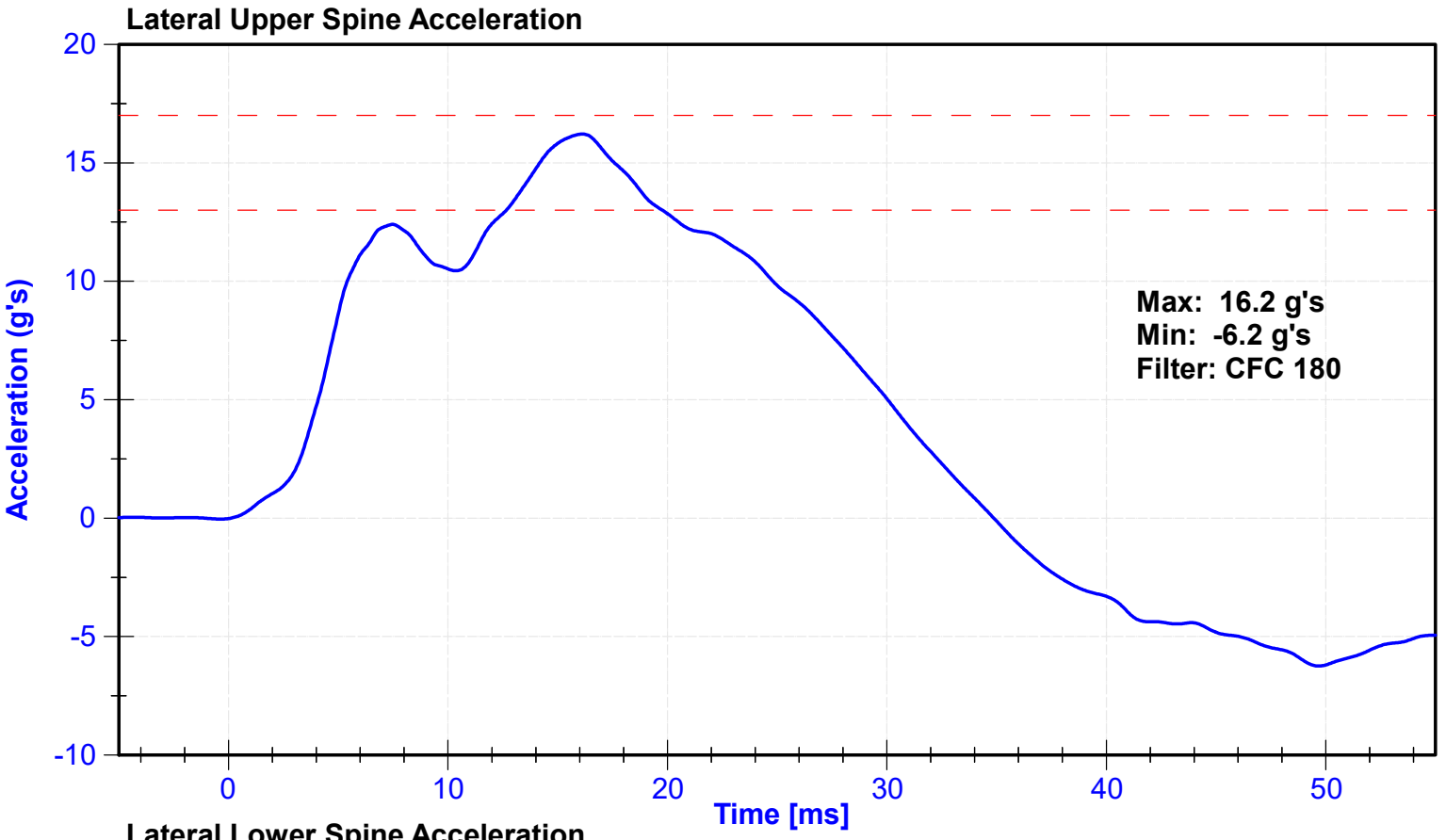
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Upper Spine Y Accelerometer	Endevco	P64148	12/12/2022	6/10/2023
Lower Spine Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Upper Thorax Rib Potentiometer	Servo	1199GFE	12/13/2022	6/13/2023
Middle Thorax Rib Potentiometer	Servo	1246GFE	12/13/2022	6/13/2023
Lower Thorax Rib Potentiometer	Servo	011GFE	12/13/2022	6/13/2023

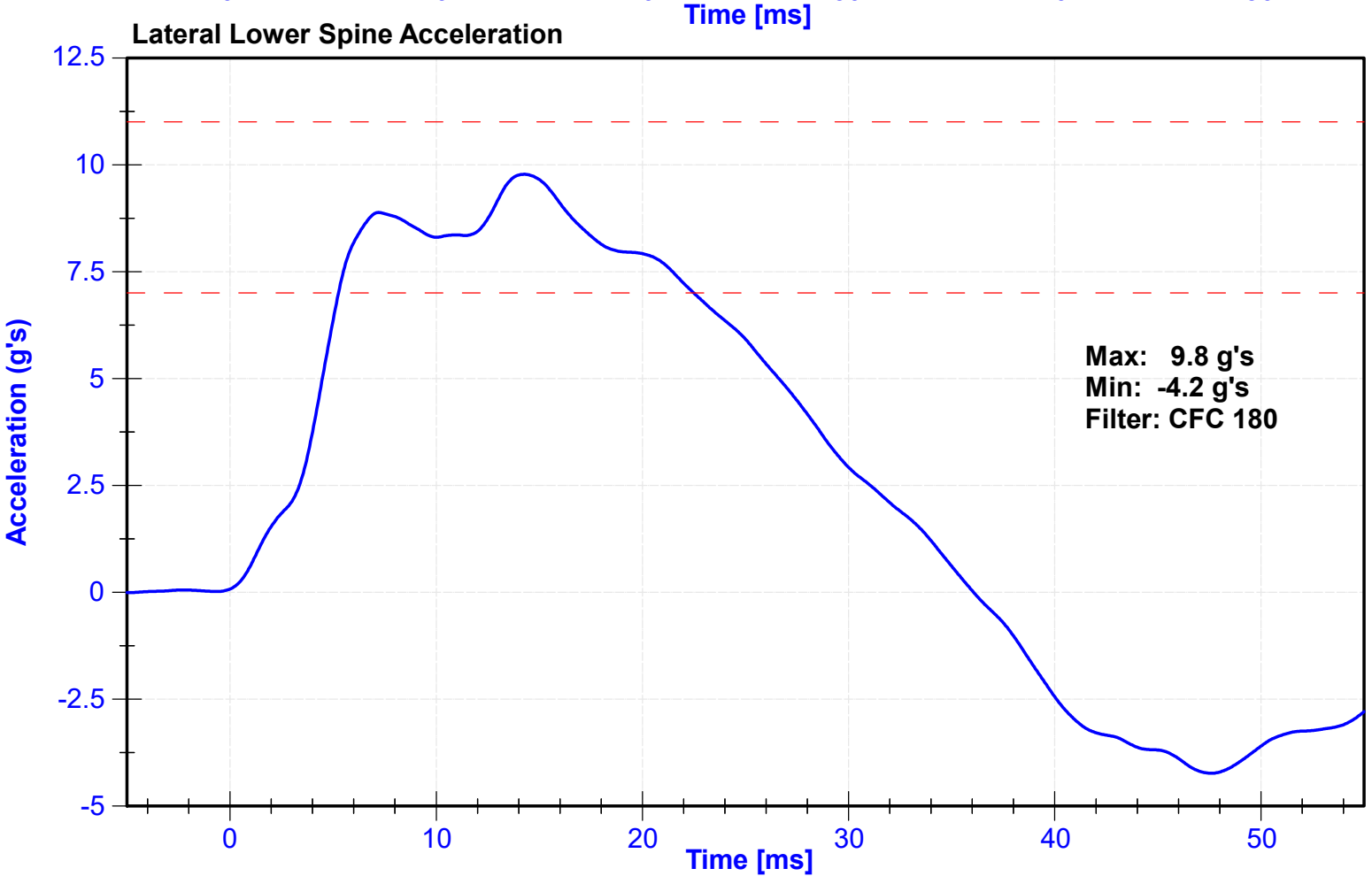



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.8 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.0 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.9 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 16.2 g's
Min: -6.2 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.8 g's
Min: -4.2 g's
Filter: CFC 180

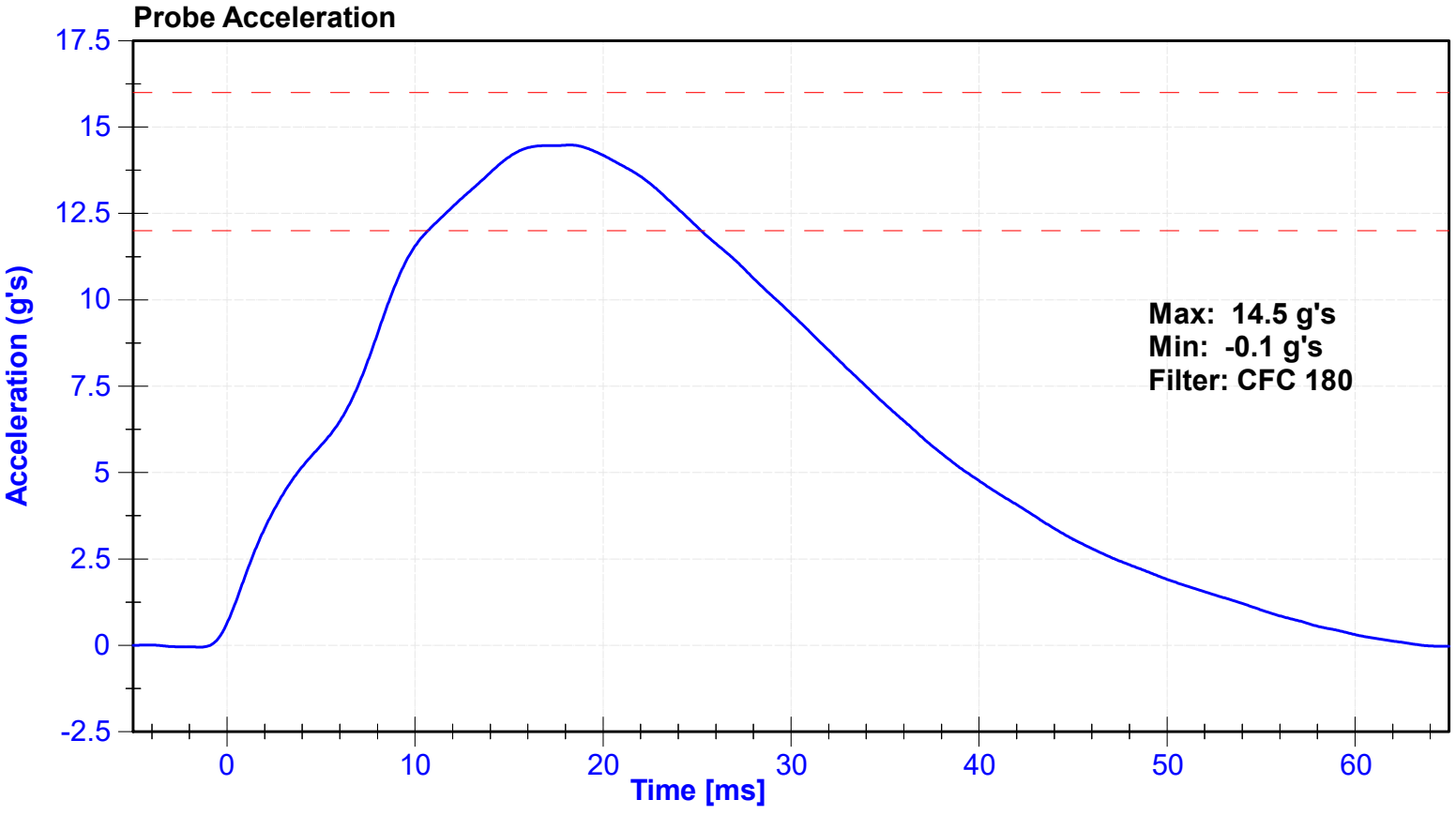
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

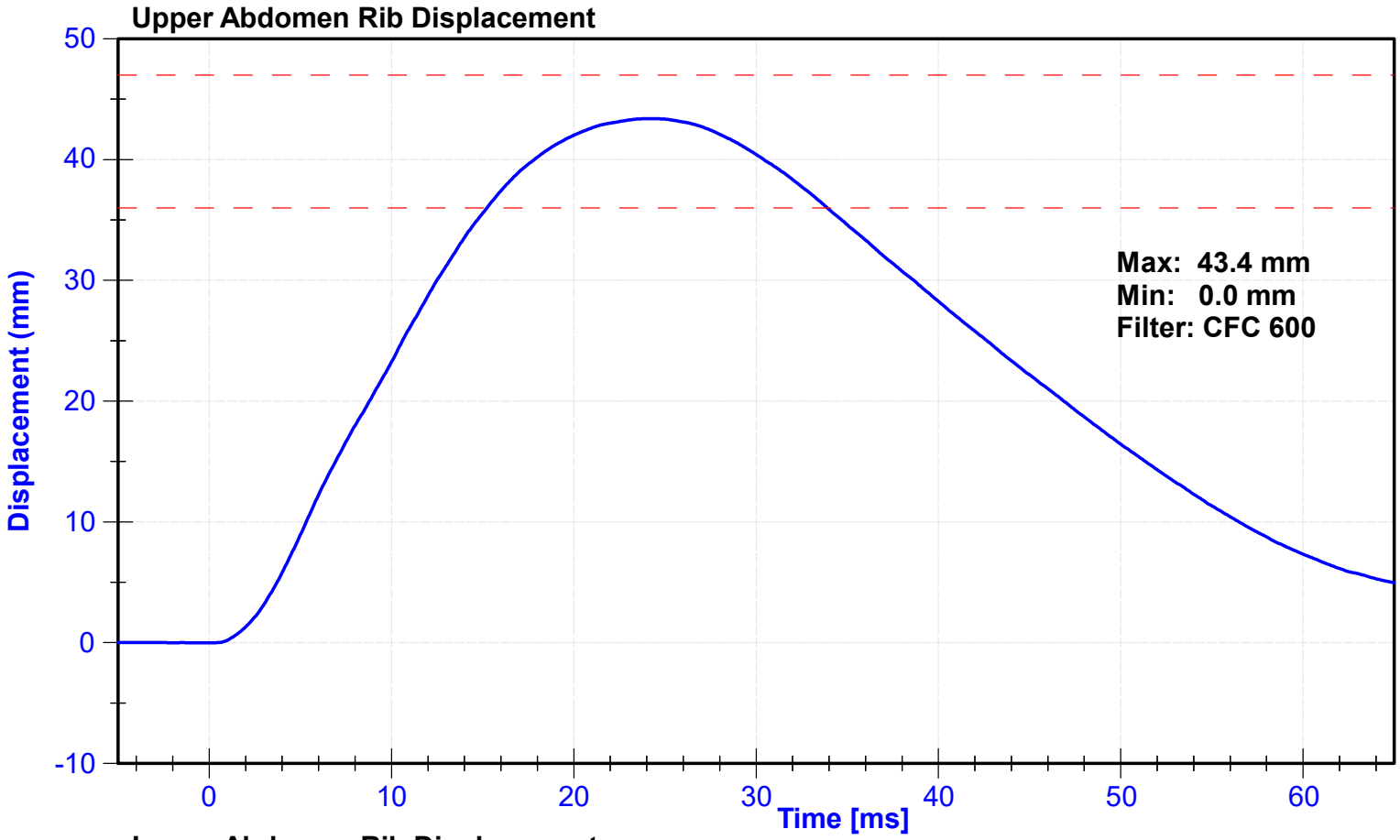
Results

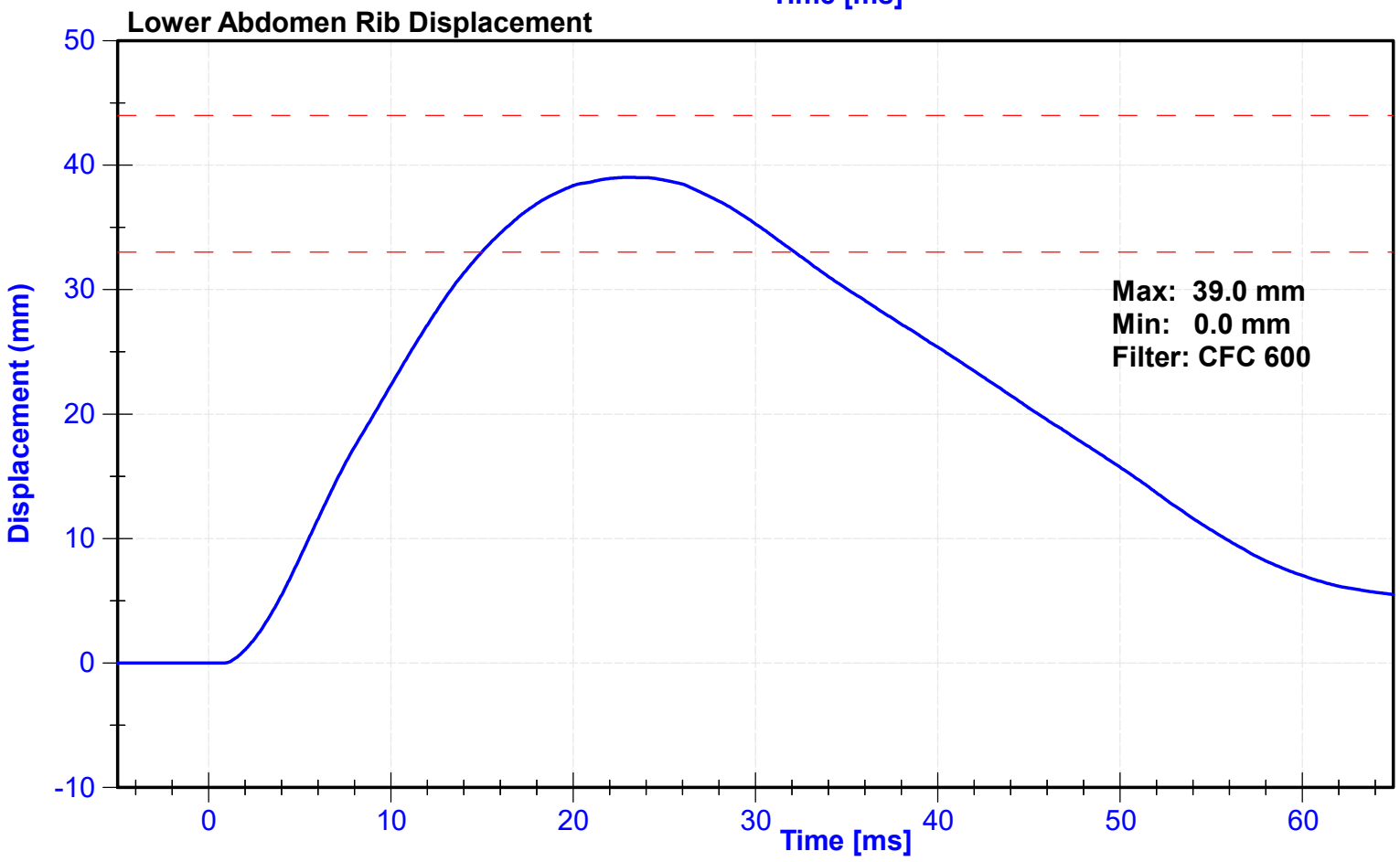
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	26.5	Pass
Velocity	4.2	4.4	m/s	4.33	Pass
Probe Acceleration	12	16	g's	14.5	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.0	Pass
Upper Abdomen Rib Deflection	36	47	mm	43.4	Pass
Lower Abdomen Rib Deflection	33	44	mm	39.0	Pass

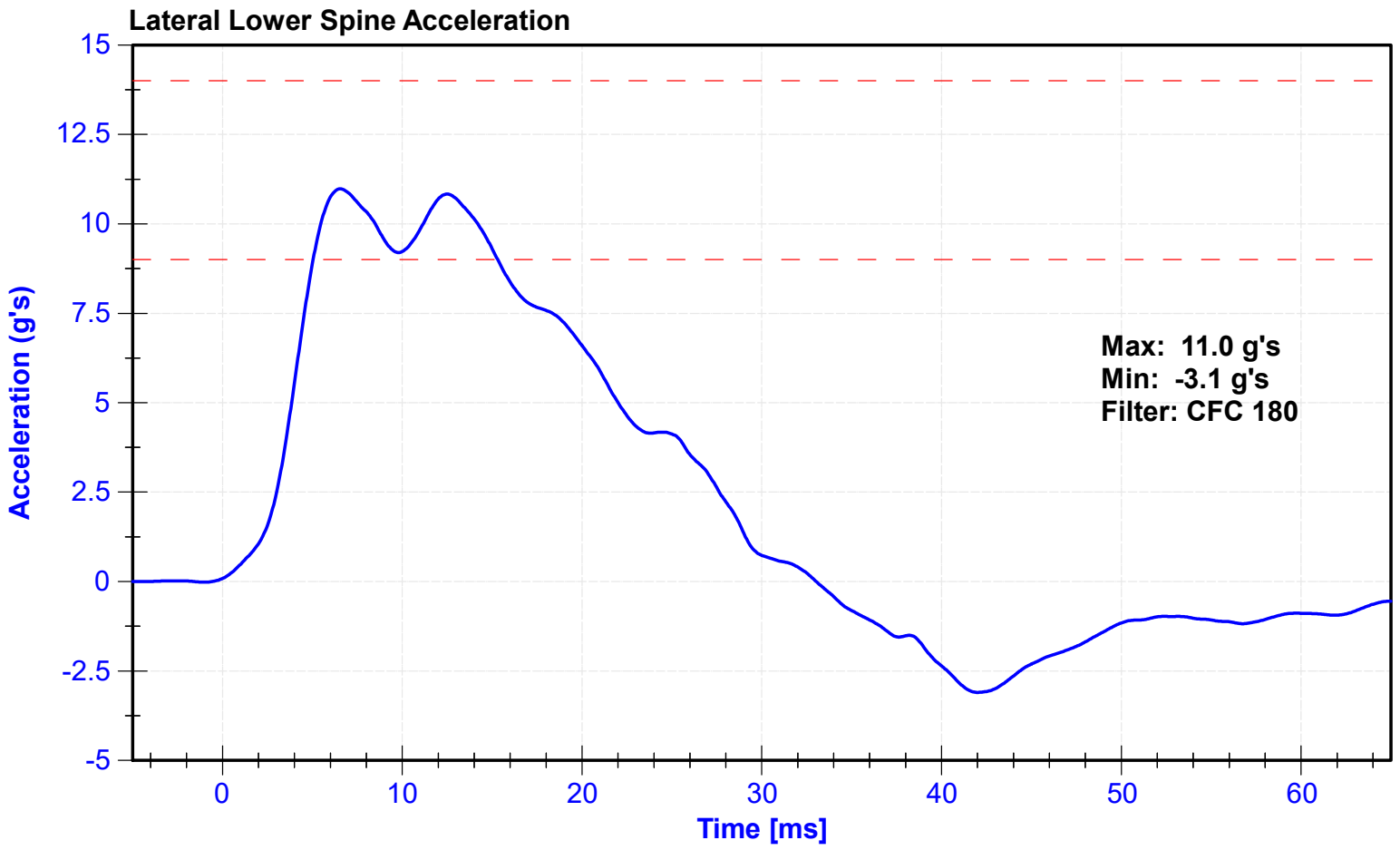
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Lower Spine Y Accelerometer	Endevco	P51327	12/12/2022	6/10/2023
Upper Abdomen Rib Potentiometer	Servo	008GFE	12/13/2022	6/13/2023
Lower Abdomen Rib Potentiometer	Servo	041 GFE	12/13/2022	6/13/2023




Upper Abdomen Rib Displacement
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
60
Time [ms]
Max: 43.4 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: 39.0 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: 11.0 g's
Min: -3.1 g's
Filter: CFC 180

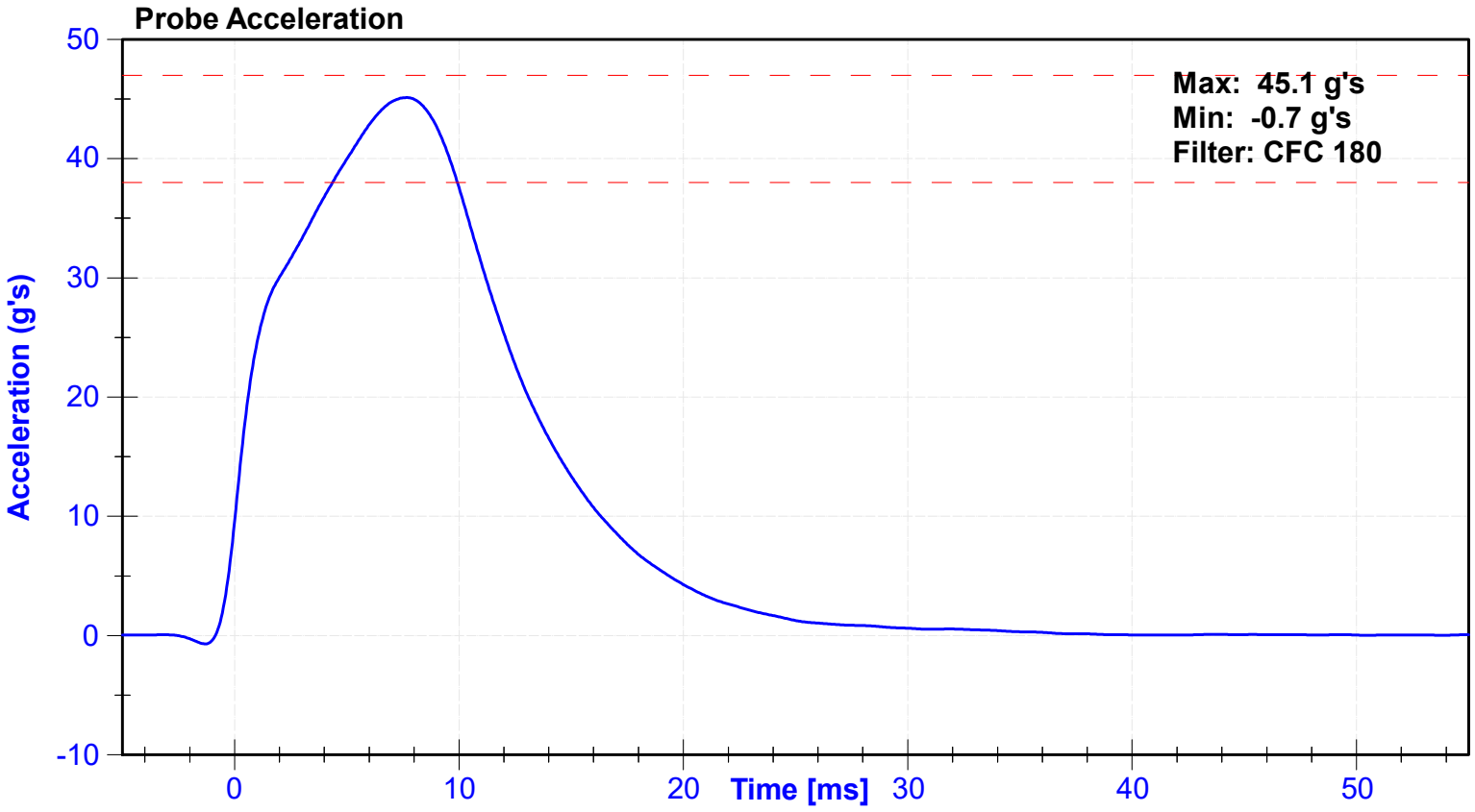
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

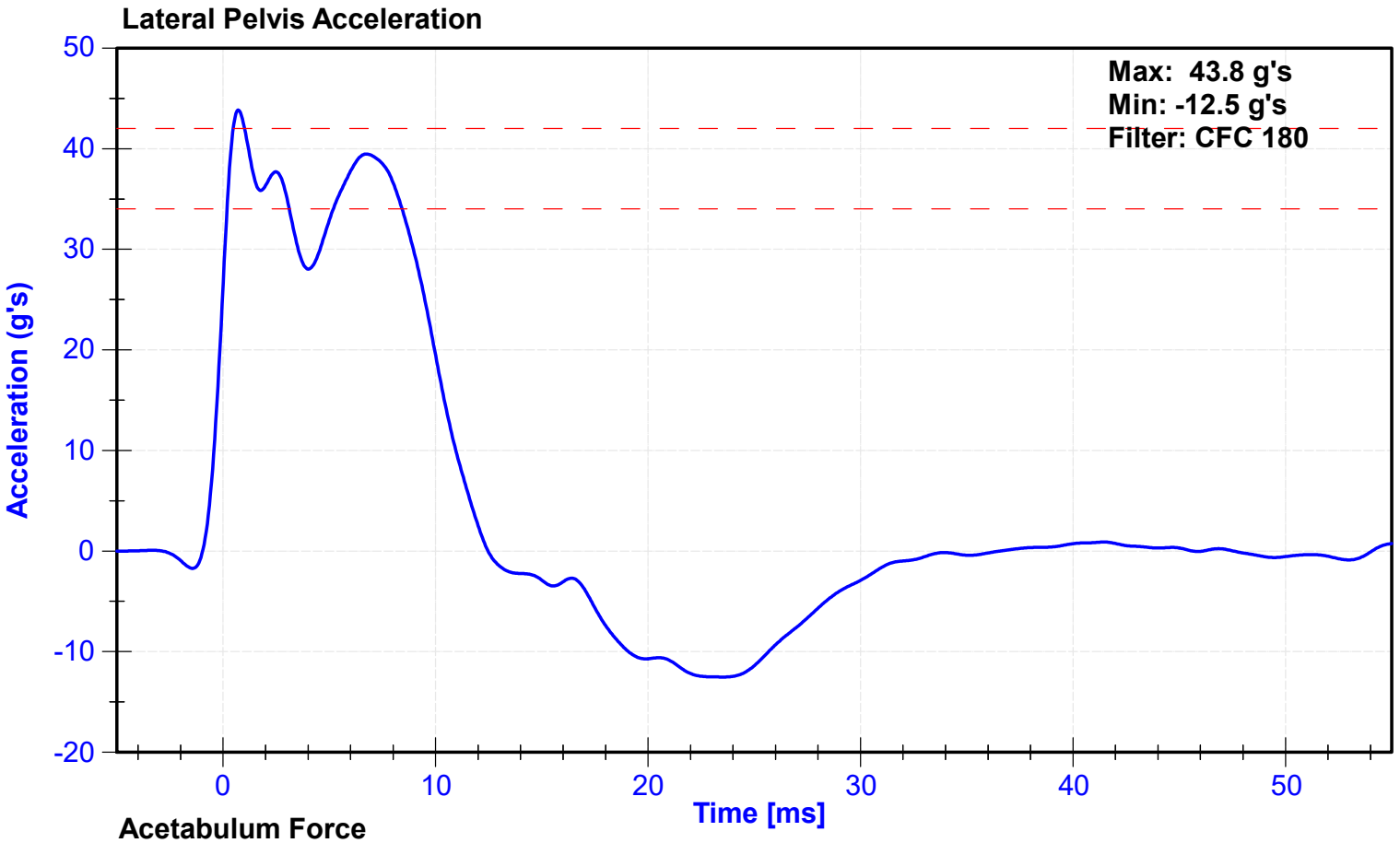
Results

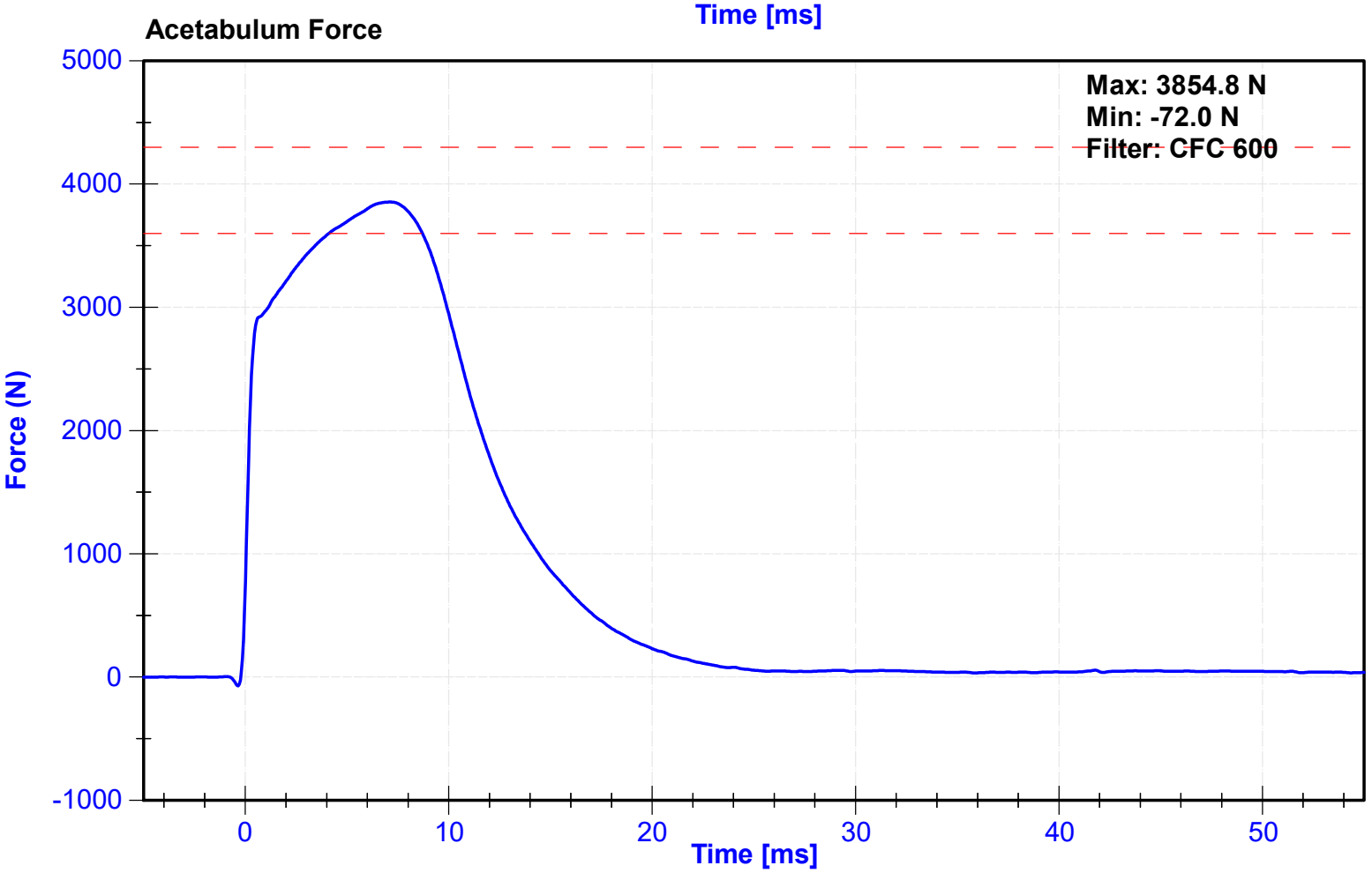
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	26.5	Pass
Velocity	6.6	6.8	m/s	6.63	Pass
Probe Acceleration	38	47	g's	45.1	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	39.5	Pass
Acetabulum Force	3600	4300	N	3854.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Pelvis Y Accelerometer	Endevco	P51875	12/12/2022	6/10/2023
Acetabulum Load Cell	Denton	276-FY	8/11/2022	8/11/2023
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 43.8 g's
Min: -12.5 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: 3854.8 N
Min: -72.0 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

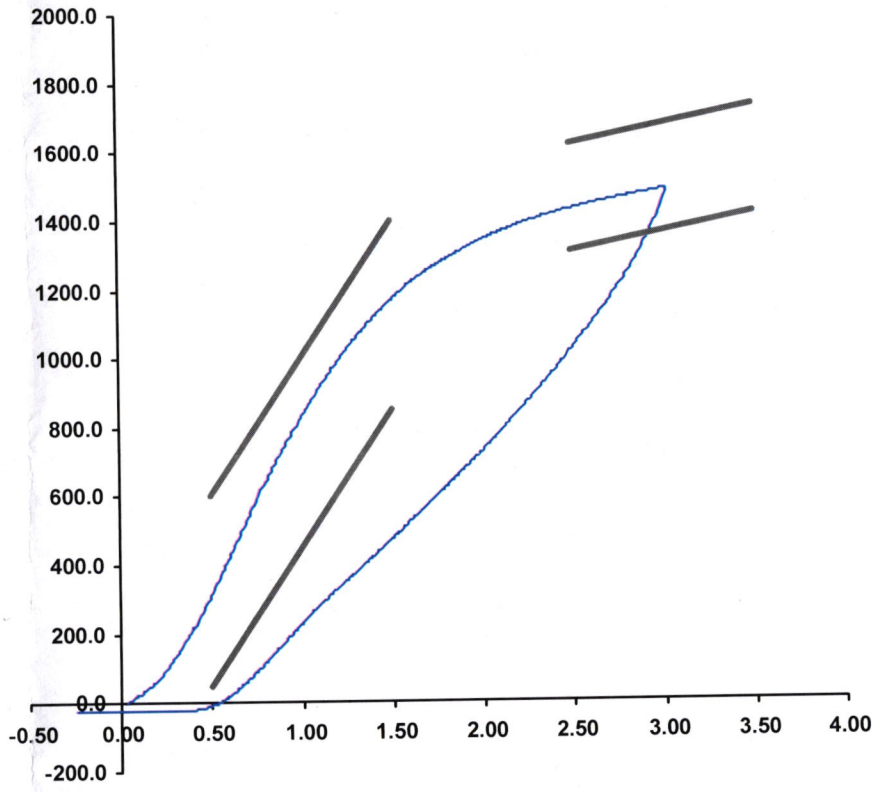
Cert
2/16/23

SID-IIs Pelvis Plug Certification Test

Plug S/N 15237
Test Number 17988
Report Number 18037
Test Date 3/10/2021 1:04:53 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	321	50	600
Force @ 1.5 mm (N)	1,171	850	1,400
Force @ 2.5 mm (N)	1,431	1,306	1,618
Force @ 3.0 mm (N)	1,484	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 10-Mar-21
SACO Research

By : DC Date : 3/10/2021

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

Test prepared 2/16/23

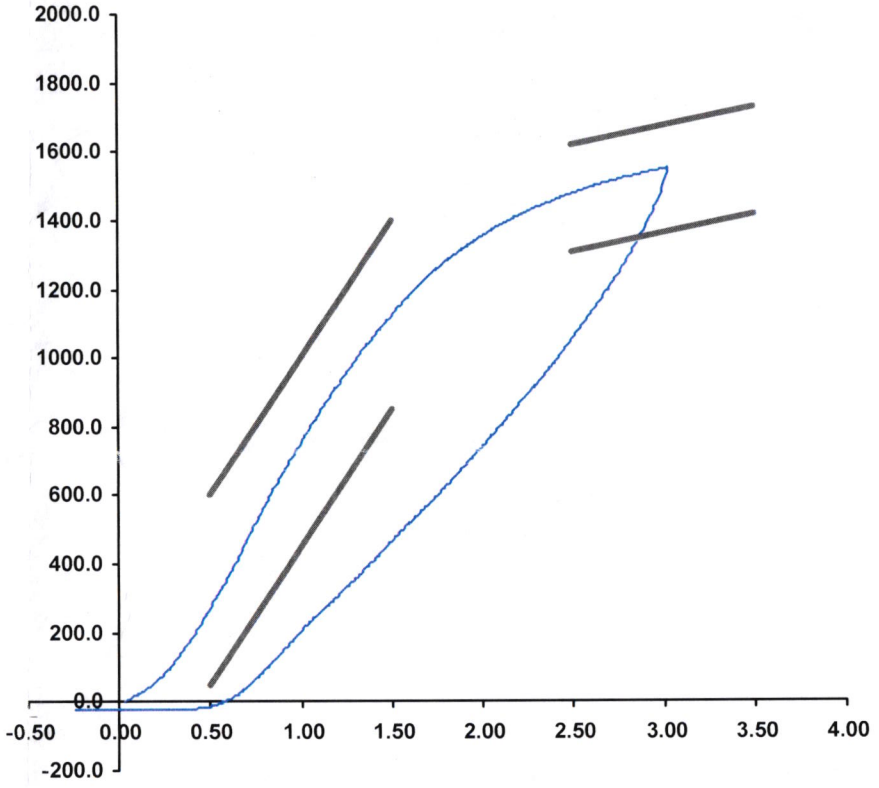
IMPACT

SID-IIs Pelvis Plug Certification Test

Plug S/N 15461
Test Number 20180
Report Number 20234
Test Date 9/22/2021 7:54:43 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	280	50	600
Force @ 1.5 mm (N)	1,129	850	1,400
Force @ 2.5 mm (N)	1,481	1,306	1,618
Force @ 3.0 mm (N)	1,550	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 22-Sep-21
SACO Research

By : DC Date : 9/22/2021

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

C-90

SACO RESEARCH

Test prepared 2/16/23

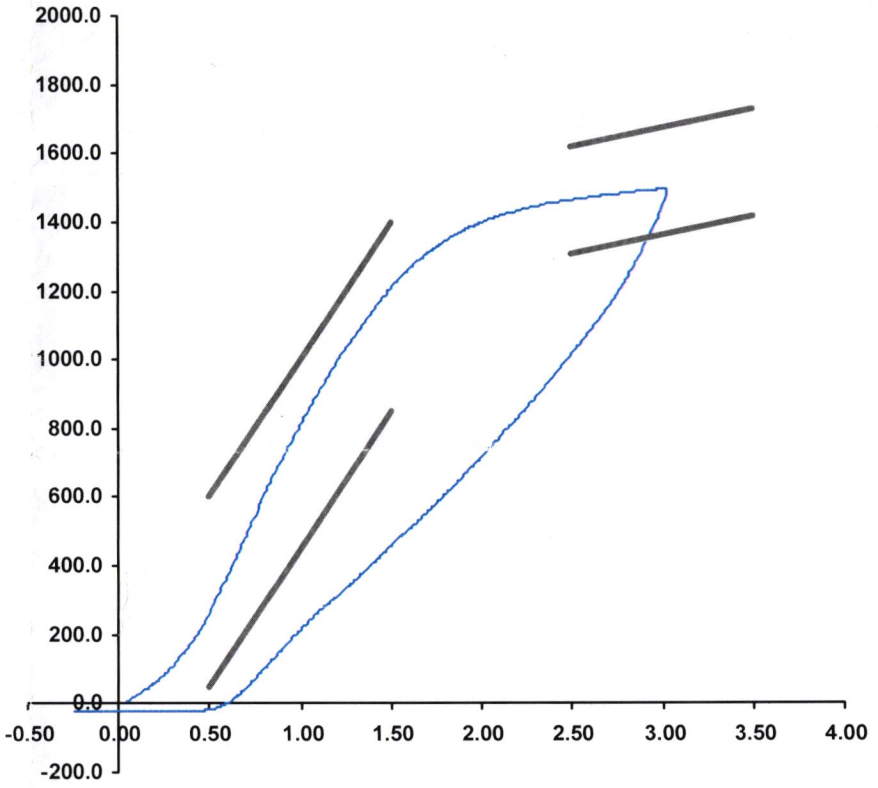
NON-IMPACT

SID-IIs Pelvis Plug Certification Test

Plug S/N 15454
Test Number 20115
Report Number 20169
Test Date 9/9/2021 10:53:34 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	267	50	600
Force @ 1.5 mm (N)	1,215	850	1,400
Force @ 2.5 mm (N)	1,465	1,306	1,618
Force @ 3.0 mm (N)	1,497	1,361	1,673

Force (-N) vs Extension (-mm)



Testing Machine STM-20 5965542
Load Cell S/N (FI360947), Units (LBS) 1000
Preload Value (-N) 22.24
Crosshead Speed (mm / min) or Rate 12.7
Extension or Position Measured by XHD_100 (XHD100)

Notes:

Operator

Part Number 180-4450

Template No 107 09-Sep-21
SACO Research

By : DC Date : 9/9/2021

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

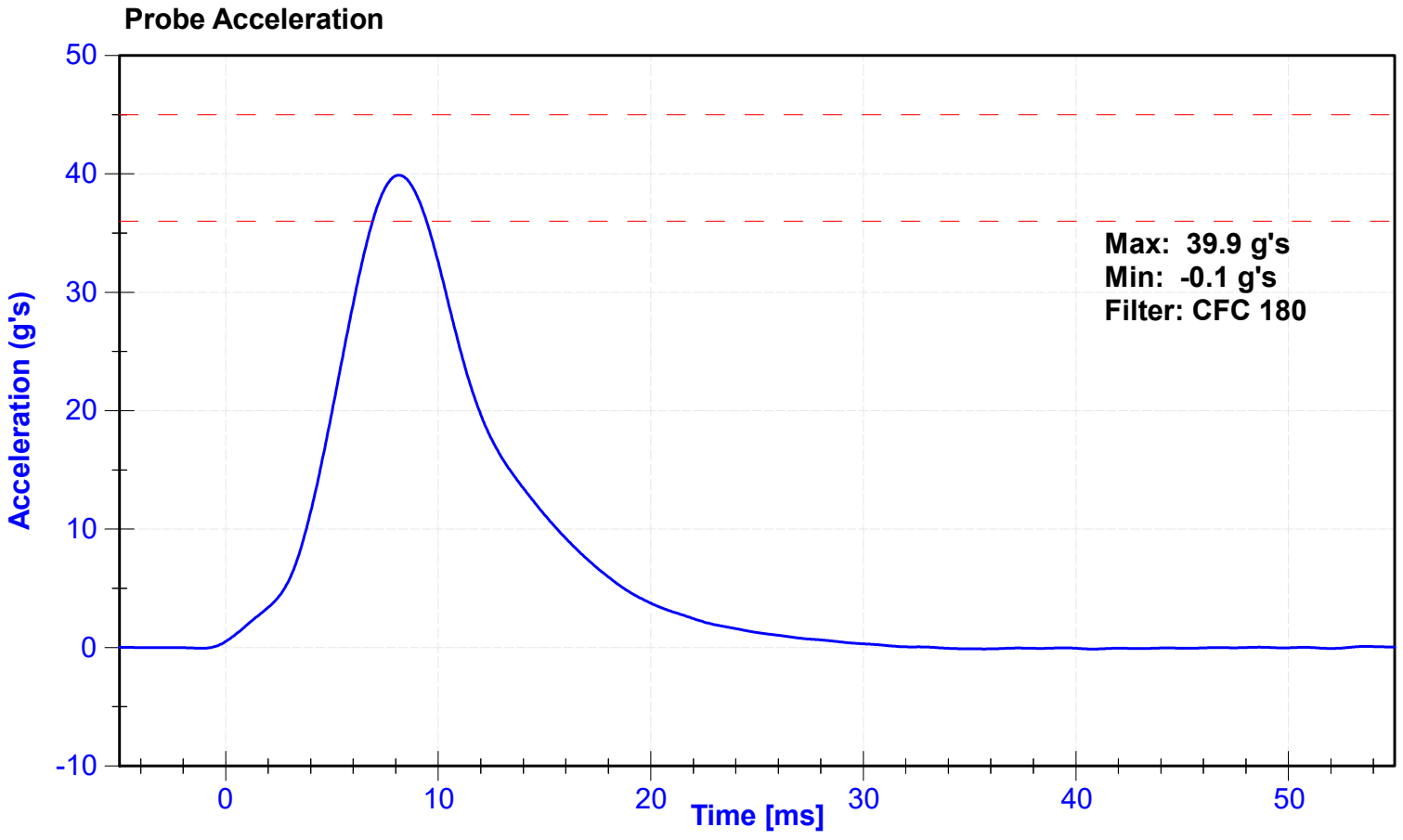
ATD Manufacturer	FTSS	Test Technician	D. Sakona
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

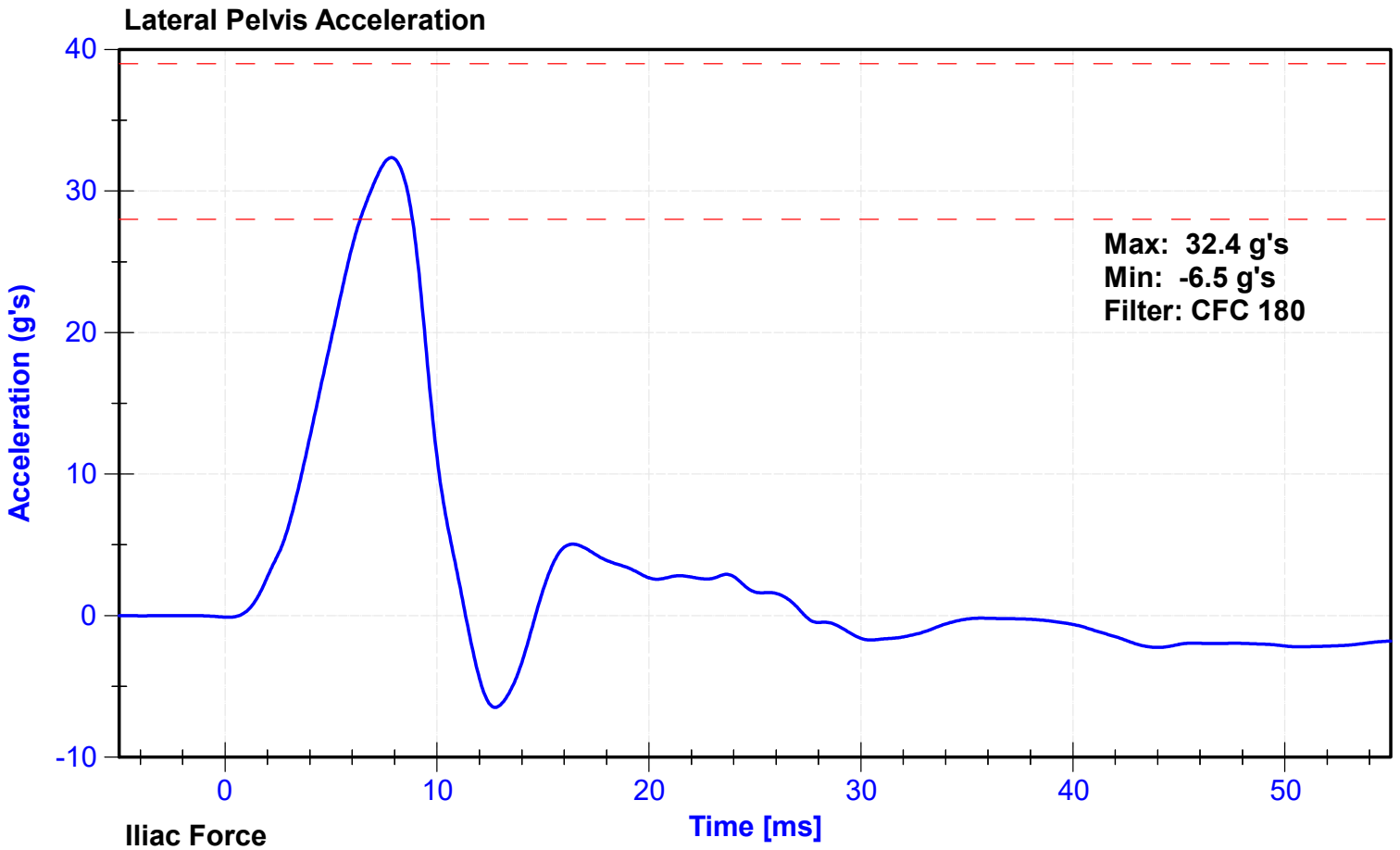
Results

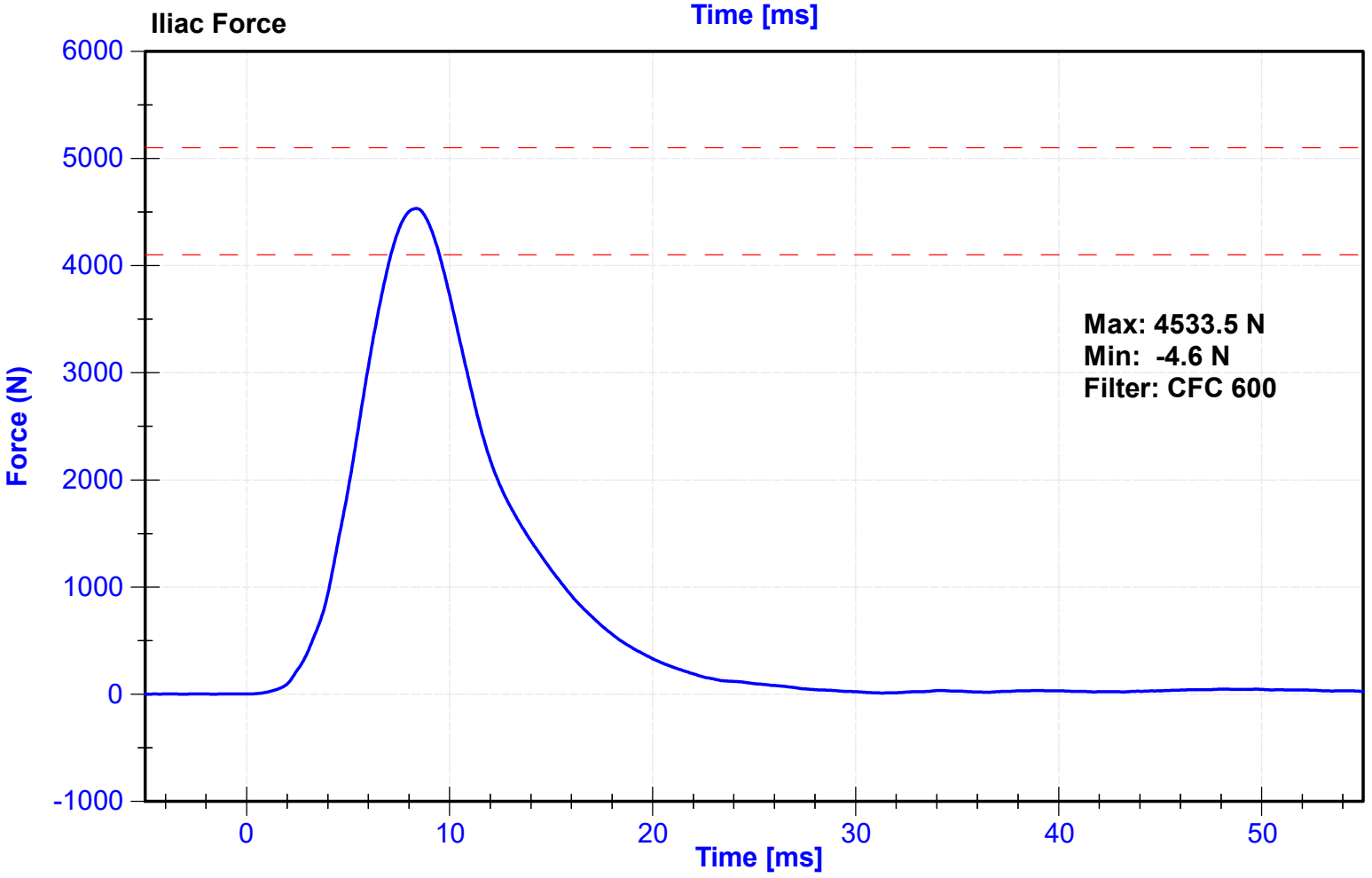
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	26.5	Pass
Velocity	4.2	4.4	m/s	4.20	Pass
Probe Acceleration	36	45	g's	39.9	Pass
Lateral Pelvis Acceleration	28	39	g's	32.4	Pass
Iliac Force	4100	5100	N	4533.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P51736	10/25/2022	10/25/2023
Pelvis Y Accelerometer	Endevco	P51875	12/12/2022	6/10/2023
Iliac Load Cell	Denton	290-FY	8/11/2022	8/11/2023




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 32.4 g's
Min: -6.5 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: 4533.5 N
Min: -4.6 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	1/17/2023
		Y	P49216	Endevco	1/17/2023
		Z	P51303	Endevco	1/17/2023
	Redundant	X	P58868	Endevco	1/17/2023
		Y	P59020	Endevco	1/12/2023
		Z	P52132	Endevco	1/17/2023
Thorax Rib Displacement Potentiometers	Upper	Y	179GFE	Honeywell	1/17/2023
	Middle	Y	185GFE	Honeywell	1/17/2023
	Lower	Y	178GFE	Honeywell	1/17/2023
Abdomen Load Cells	Forward	Y	1509	Denton	8/12/2022
	Middle	Y	1508	Denton	8/12/2022
	Rear	Y	1507	Denton	8/12/2022
Lower Spine Accelerometers (T12)		X	P51740	Endevco	1/17/2023
		Y	T21243	Endevco	1/18/2023
		Z	P52033	Endevco	1/17/2023
Pubic Symphysis Load Cell		Y	459-FY	Denton	6/14/2022

TABLE 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N __DG8012__		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers		Primary	X	P74788	Endevco	12/12/2022
			Y	P51668	Endevco	12/12/2022
			Z	P83319	Endevco	12/12/2022
		Redundant	X	P80334	Endevco	12/12/2022
			Y	P52155	Endevco	12/12/2022
			Z	P83322	Endevco	12/12/2022
Displacement Potentiometers	Thoracic Rib	Upper	Y	1199GFE	Servo	12/13/2022
		Middle	Y	1246GFE	Servo	12/13/2022
		Lower	Y	011GFE	Servo	12/13/2022
	Abdominal Rib	Upper	Y	008GFE	Servo	12/13/2022
		Lower	Y	041 GFE	Servo	12/13/2022
Lower Spine Accelerometers (T12)			X	P71272	Endevco	12/12/2022
			Y	P51327	Endevco	12/12/2022
			Z	P52067	Endevco	12/12/2022
Acetabulum Load Cell			Y	276-FY	Denton	8/11/2022
Iliac Wing Load Cell			Y	290-FY	Denton	8/11/2022
Pelvis Plug (struck side)				15155	SACO	3/5/2021
Pelvis Plug (non-struck side)				15447	SACO	9/9/2021

TABLE 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	A290925	Measurement Specialties	11/3/2022
	Vehicle Center of Gravity	Y	A301867	Measurement Specialties	11/3/2022
	Vehicle Center of Gravity	Z	A335463	Measurement Specialties	11/3/2022
2	Right Sill at Front Seat	X	A370929	Measurement Specialties	12/29/2022
	Right Sill at Front Seat	Y	A370935	Measurement Specialties	12/29/2022
	Right Sill at Front Seat	Z	A370942	Measurement Specialties	12/29/2022
3	Right Sill at Rear Seat	X	A400752	Measurement Specialties	1/16/2023
	Right Sill at Rear Seat	Y	A400761	Measurement Specialties	1/16/2023
	Right Sill at Rear Seat	Z	A400768	Measurement Specialties	1/16/2023
4	Left Sill at Front Door	Y	A398661	Measurement Specialties	12/29/2022
5	Left Sill at Rear Door	Y	A428014	Measurement Specialties	1/3/2023
6	Left A-Post Lower	Y	A396626	Measurement Specialties	9/2/2022
7	Left A-Post Middle	Y	A374224	Measurement Specialties	9/27/2022
8	Left B-Post Lower	Y	A290938	Measurement Specialties	9/20/2022
9	Left B-Post Middle	Y	A282760	Measurement Specialties	11/21/2022
10	Front Seat Track	Y	A373223	Measurement Specialties	1/3/2023
11	Rear Seat Track or Structure	Y	A315724	Measurement Specialties	11/17/2022
12	Right Rear Occ. Compartment	Y	A281024	Measurement Specialties	9/29/2022
13	Engine Block	X	A284346	Measurement Specialties	10/3/2022
	Engine Block	Y	A315936	Measurement Specialties	10/3/2022
14	Rear Floorpan Above Axle	X	A399940	Measurement Specialties	1/4/2023
	Rear Floorpan Above Axle	Y	A399946	Measurement Specialties	1/4/2023
	Rear Floorpan Above Axle	Z	A431363	Measurement Specialties	1/4/2023

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	A398663	Measurement Specialties	11/15/2022
MDB Center of Gravity	Y	A413569	Measurement Specialties	11/15/2022
MDB Center of Gravity	Z	A413574	Measurement Specialties	11/15/2022
Left Frame at Rear Axle Centerline	X	A255878	Measurement Specialties	11/15/2022
Left Frame at Rear Axle Centerline	Y	A350971	Measurement Specialties	11/15/2022