REPORT NUMBER: SINCAP-CAL-25-001

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

KIA Mexico, S.A. DE C.V.
2025 KIA K4
4 Door Sedan

NHTSA No: M20254202

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

February 27, 2025

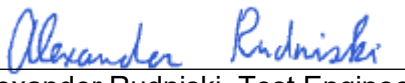
FINAL REPORT

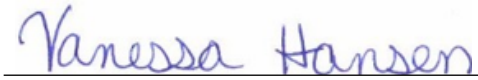
PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
MAIL CODE: NRM-110
1200 NEW JERSEY AVE SE
WASHINGTON, D.C. 20590

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: February 27, 2025
Alexander Rudniski, Test Engineer

Approved by:  Date: February 27, 2025
Vanessa Hansen, Operations Manager

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. *Report No.* SINCAP-CAL-25-001	***2. Government Accession No.***	***3. Recipient's Catalog No.***
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing of a 2025 KIA K4 4 Door Sedan NHTSA No.: M20254202		***5. Report Date*** February 27, 2025 ***6. Performing Organization Code*** CAL
7. Author(s) Alexander Rudniski, Test Engineer Vanessa Hansen, Operations Manager		***8. Performing Organization Report No.*** CAL-DOT-2025-001
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 January 8, 2025 - February 27, 2025 ***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 2025 KIA K4 4 Door Sedan in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP MDB 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 January 8, 2025.

The impact velocity of the Moving Deformable Barrier (MDB) was 62.08 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 160 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	222.045
Maximum Thorax Rib Deflection	mm	44	24.658
Total Abdominal Force	N	2500	870.155
Pubic Symphysis Force	N	6000	1605.452
Lower Spine (T12) Resultant Acceleration	G	82*	36.025
Measurement Description	**Passenger ATD (SID-IIs)**		
	Units	**IARV**	**Result**
Head Injury Criteria (HIC36)		1000	319.761
Maximum Thorax Rib Deflection	mm	38*	25.403
Lower Spine (T12) Resultant Acceleration	G	82	65.525
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3016.970
Maximum Abdominal Rib Deflection	mm	45*	21.331

**Proposed IARV*

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

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

19. Security Class. (of this report)	***20. Security Class. (of this page)***	***21. No. of Pages***	***22. Price***
UNCLASSIFIED	UNCLASSIFIED	196	

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 of 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

Appendix		Page
A	Photographs	A-1
B	Vehicle and Dummy Response Data Traces	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 2025 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 2025 KIA K4 4 Door Sedan. 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 2025 KIA K4 4 Door Sedan was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.08 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 January 8, 2025. Pre-test and post-test photographs of the test vehicle, the MDB and the dummies (ES-2re and SID-IIs) are included in this report.

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

The Dummies were instrumented in the following manner:

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

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

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

DUMMY INJURY VALUES

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	222.045
Maximum Thorax Rib Deflection	mm	44	24.658
Total Abdominal Force	N	2500	870.155
Pubic Symphysis Force	N	6000	1605.452
Lower Spine (T12) Resultant Acceleration	G	82*	36.025

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	319.761
Maximum Thorax Rib Deflection	mm	38*	25.403
Lower Spine (T12) Resultant Acceleration	G	82	65.525
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3016.970
Maximum Abdominal Rib Deflection	mm	45*	21.331

**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
Side Airbag 3 - Torso Airbag	No	N/A	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other				

GENERAL COMMENTS:

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

Data Anomalies:

The following channel was questionable for:

- Left B-Pillar Lower Y Acceleration, Exceeded calibration range at 8.9 ms
- Left B-Pillar Middle Y Acceleration, Exceeded calibration range and saturated at 9.6 ms
- Left B-Pillar Lower Y Acceleration, Exceeded calibration range at 8.9 ms
- Left B-Pillar Middle Y Acceleration, Exceeded calibration range and saturated at 9.6 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. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2025 KIA K4 4 Door Sedan NHTSA No.: M20254202
Test Program: NCAP Side MDB Impact Test Test Date: 01/08/2025

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20254202
Model Year	2025
Make	KIA
Model	K4
Body Style	Four Door Sedan
VIN	3KPFT4DE6SE014400
Body Color	Snow White Pearl
Odometer Reading (km/mi)	21 miles
Engine Displacement (L)	2.0
Type / No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	CVT
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	Yes
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 Mexico, S.A. DE C.V.
Date of Manufacture	08/24
Vehicle Type	Passenger Car

GVWR (KG)	1780
GAWR Front (KG)	1071
GAWR Rear (KG)	898

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)				385	(A)
DSC x 68.0 kg				340	(B)
Cargo Weight (RCLW) (kg)				45	(A-B)

VEHICLE SEAT TYPE

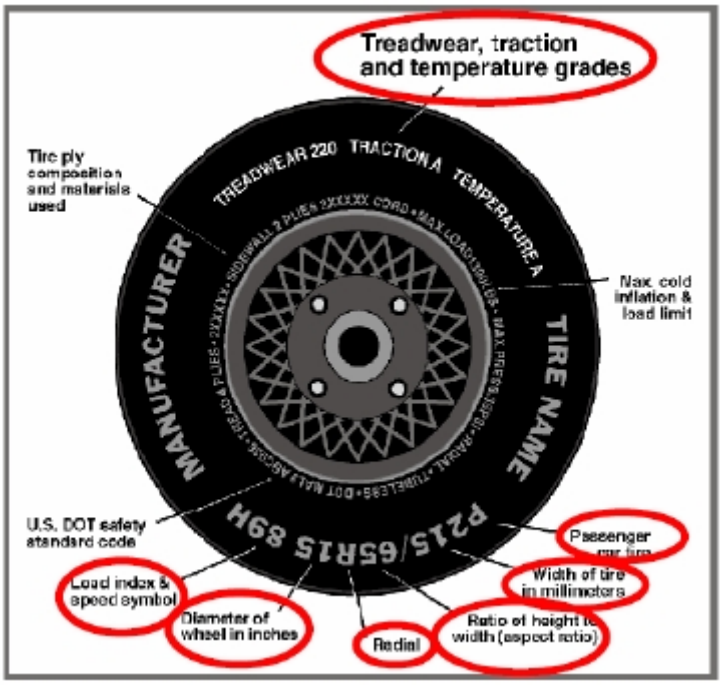
Seating Location	Type Of Seat Pan				Type Of Seat Back		
	Bucket	Bench	Split Bench	Contour	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front	X					X	
Rear or Second Row Seat			X		X		
Third Row Seat	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025

VEHICLE TIRE INFORMATION

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



TIRE SIDEWALL INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	250	230
Recommended Tire Size	205/55R16	205/55R16
Tire Size on Vehicle	205/55R16	205/55R16
Tire Manufacturer	Kumho	Kumho
Tire Model	Solus TA31	Solus TA31
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	2 Steel, 1 Polyester, 1 Nylon	2 Steel, 1 Polyester, 1 Nylon
Load Index / Speed Symbol	91H	91H
Tire Material	Rubber	Rubber
DOT Safety Code Left	000LMYAY1	000LMYAY1
DOT Safety Code Right	000LMYAY1	000LMYAY1

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

Test Vehicle: 2025 KIA K4 4 Door Sedan | NHTSA No.: M20254202
Test Program: NCAP Side MDB Impact Test | Test Date: 01/08/2025

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	254	255	240	238
Tire Placard	kPa	250	250	230	230
Owner's Manual	kPa	250	250	230	230
As Tested	kPa	250	250	230	230

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	409	269		443	339		451	345	
Right	kg	411	255		427	302		420	305	
Ratio	%	61.0	39.0		57.6	42.4		57.3	42.7	
Totals	kg	820	524	1344	870	641	1511	871	650	1521

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1344	(A)
Actual Weight of 2 P572V (ES-2re and SID-IIs) ATDs Used	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	45	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1516	(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	As Tested	Fully Loaded	Meets Rqmt***
LF	mm	707	709	Yes
RF	mm	715	725	Yes
RR	mm	724	732	Yes
LR	mm	720	729	Yes
Vehicle CG (Aft of Front Axle)	mm	1154	1163	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	28	37	

****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:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Truck carpeting	4
Spare Tire	10
Jack	3
Rear Passenger Window	3
Mirror	2
Rear Tail Light	1
Ballast / Equipment Added	0

TEST SURFACE MARKINGS

	Distance from 63° Impact Location Line (mm)
Fore 25 mm target	921
Aft 25 mm target	920
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:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025

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	15.7	12.5	14.1
Front Passenger Seat	16.2	13.0	14.6
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	14.1	20	Max	-	-	-
			Mid	-	-	-
			Min	10	20	30
Front Passenger Seat	14.6	22	Max	-	-	-
			Mid	-	-	-
			Min	12	22	33
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:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025

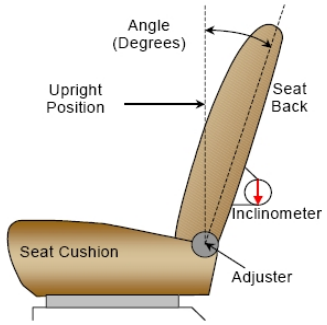
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	260	41 (0-40)	130	20
Front Passenger Seat	260	41 (0-40)	130	20
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	60.0	30 (0-29)	2.5	8
Front Passenger Seat	59.8	30 (0-29)	2.1	8
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*

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

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025

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	3 (0-2)	0
Rear Seat	3 (0-2)	0

HEAD RESTRAINT ADJUSTMENT

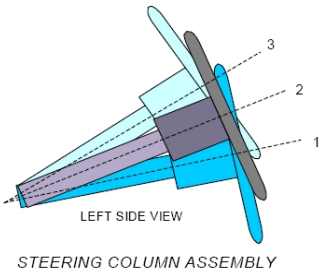
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

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

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	19.4	
Geometric center - Position No. 2	21.9	
Uppermost - Position No. 3	24.4	
Telescoping Steering Wheel Travel		52
Test Position	21.9	26

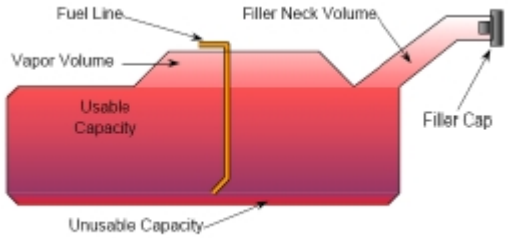


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

The vehicle is equipped with an electric fuel pump. The fuel filler neck 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:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025

FUEL TANK CAPACITY

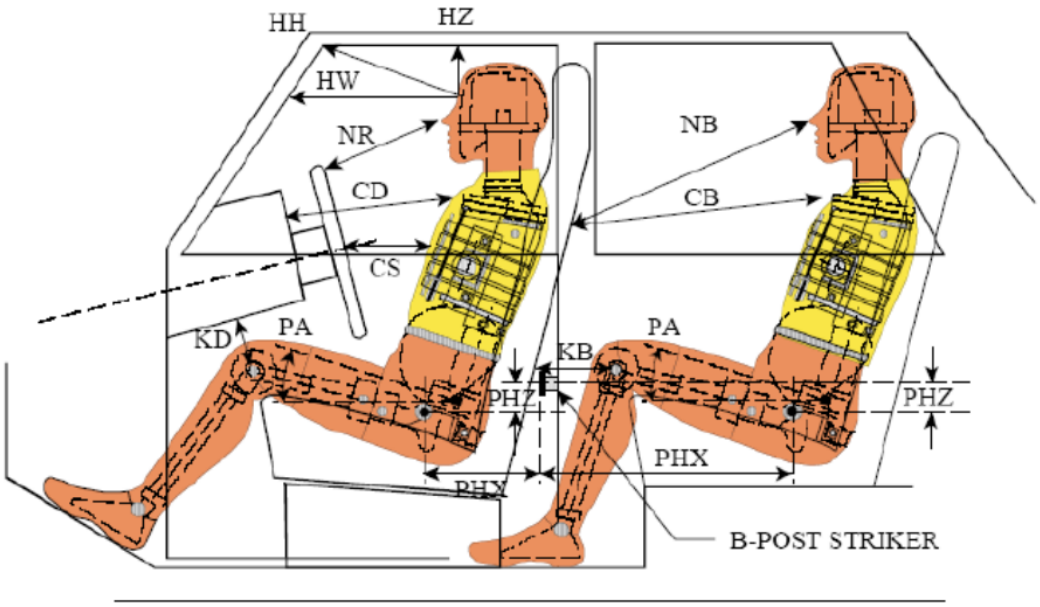
Description	Liters
Usable Capacity of “Standard Tank” (see Form No. 1)	47
Usable Capacity of “Optional Tank” (see Form No. 1)	N/A
Usable Capacity of “Standard Tank” (see Owner’s Manual)	47
Usable Capacity of “Optional Tank” (see Owner’s Manual)	N/A
93% of Usable Capacity	43.7
Actual Amount of Solvent Used in Test	43.7
1/3 of Usable Capacity	15.7

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**

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION



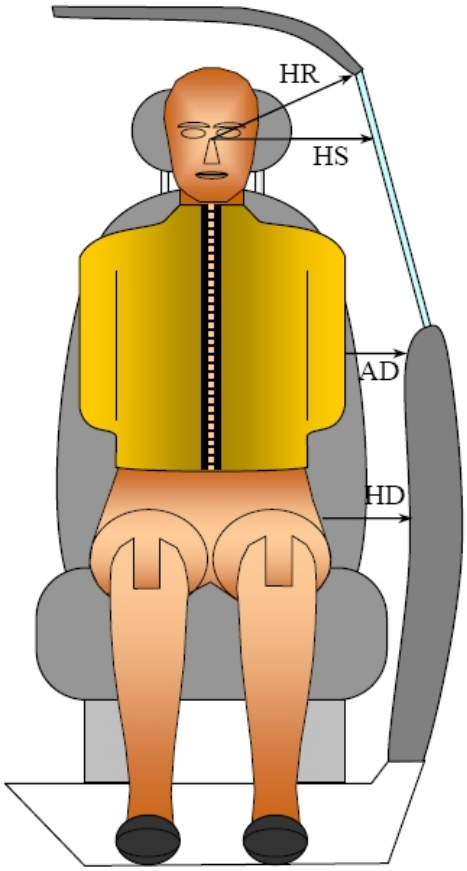
LEFT SIDE VIEW

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. 300)	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Header to Header	411			
HW		Header to Windshield	595			
HZ	HZ	Head to Roof Liner	156		256	
NR	NB	Nose to Rim/Seat Back	475		530	
CD	CB	Chest to Dash/Seat Back	657		567	
CS		Chest to Steering Wheel	423			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	228	40.0	296	4.2
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	208	36.1	299	5.4
PAX°	PAX°	Pelvic Tilt Angle X		23.3		24.1
	PAY°	Pelvic Tilt Angle Y				0.4
PHX	PHX	Hip Point to Striker (X-Axis)	167		218	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	238		274	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025



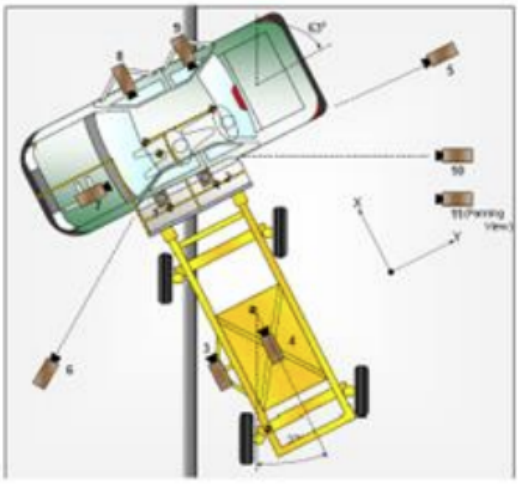
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F033)	Left Rear Passenger (Serial No. 300)
HR	Head to Side Header	mm	209	253
HS	Head to Side Window	mm	339	308
AD	Arm to Door	mm	117	176
HD	Hip Point to Door	mm	147	170

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2025 KIA K4 4 Door Sedan NHTSA No.: M20254202
Test Program: NCAP Side MDB Impact Test Test Date: 01/08/2025



CAMERA LOCATIONS AND DATA

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Overhead Overall	0	0	-8128	12.5	1000
2	Overhead Close-up	0	0	-8128	28	1000
3	Left Impact Point (MDB)	-1470	0	-847	25	1000
4	Side Overall (MDB)	-1140	878	-1587	8	1000
5	Rear	0	8052	-1452	28	1000
6	Left Front	-2650	-5974	-1561	24	1000
7	Driver Front (OB)				25	1000
8	Driver Side (OB)				12.5	1000
9	Passenger Side (OB)				12.5	1000
10	Real-time Left Rear				Zoom	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.*

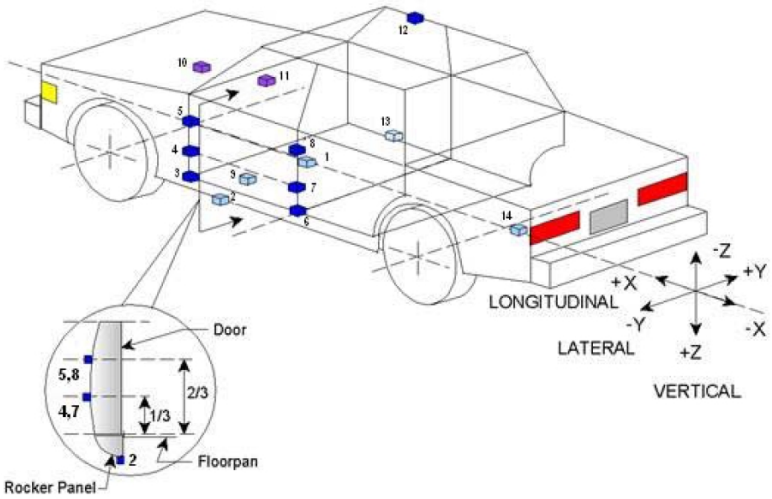
If applicable, explain why camera(s) did not operate as intended: All cameras operated as intended.

INSTRUMENTATION

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:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025



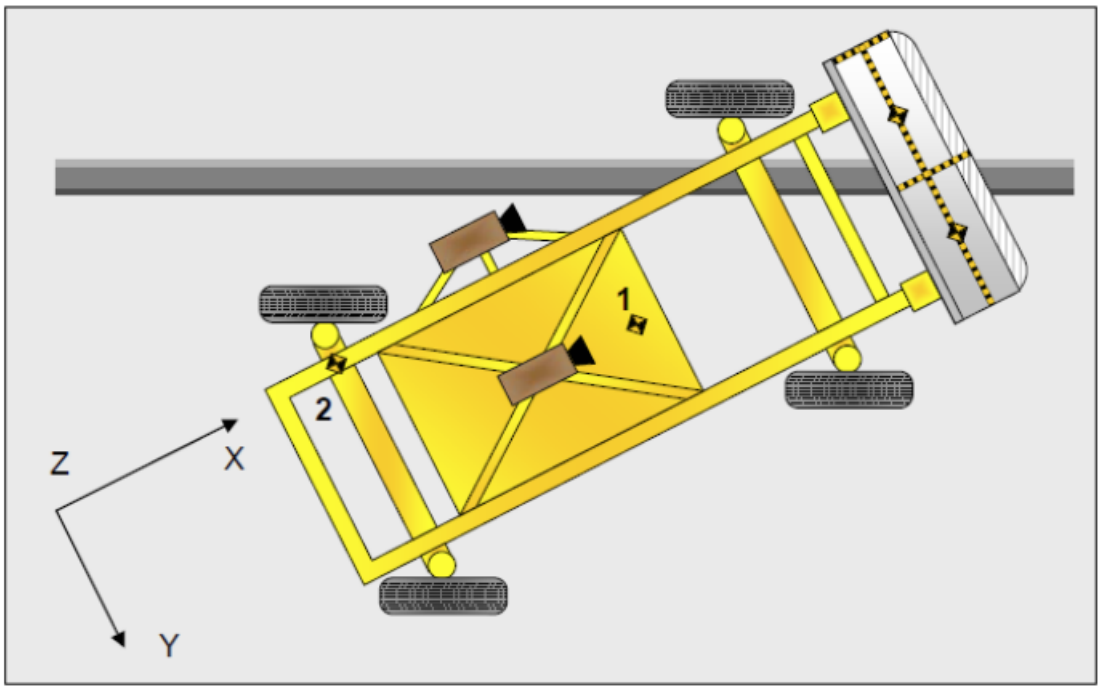
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2752	-6	28
2	Right Sill at Front Seat	2899	669	295
3	Right Sill at Rear Seat	2015	669	291
4	Left Sill at Front Door	2879	-665	305
5	Left Sill at Rear Door	2013	-667	300
6	A-Post Lower	3368	-631	130
7	A-Post Middle	3198	-666	-357
8	B-Post Lower	2255	-673	-48
9	B-Post Middle	2209	-660	-348
10	Front Seat Track	2588	-555	335
11	Rear Seat Structure	1936	-336	300
12	Rt. Rear Occ. Compartment	2153	387	397
13	Engine Block	3985	182	-208
14	Rear Above Axle	1142	-3	101

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:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025



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): 1470

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2025 KIA K4 4 Door Sedan | NHTSA No.: M20254202
Test Program: NCAP Side MDB Impact Test | Test Date: 01/08/2025

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	Curtain Airbag & Side Headliner	Curtain Airbag & Middle Headrest
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag, Side Headliner & Headrest	Curtain Airbag, Middle Headrest & Seatback
Left Shoulder	Torso/Pelvis Airbag	Seatback
Upper Torso	Seatback & Torso/Pelvis Airbag	Seatback
Lower Torso	Seatback	Seatback
Left Hip	Seatback, Seatpan & Torso/Pelvis Airbag	Seatback, Seatpan, Torso Airbag & Door Panel
Left Knee	Door Panel	Door Panel

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

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

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

Test Vehicle: 2025 KIA K4 4 Door Sedan NHTSA No.: M20254202
Test Program: NCAP Side MDB Impact Test Test Date: 01/08/2025

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
Side Airbag 3 - Torso Airbag	No	N/A	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other				

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		2721
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		420
Actual Impact Point (Aft of Frontal Axle)	mm		418
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	+2
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	-2

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2025 KIA K4 4 Door Sedan NHTSA No.: M20254202
Test Program: NCAP Side MDB Impact Test Test Date: 01/08/2025

MDB SPECIFICATIONS

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

MDB WEIGHTS

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

SPEED AND ANGLE AT IMPACT DATA

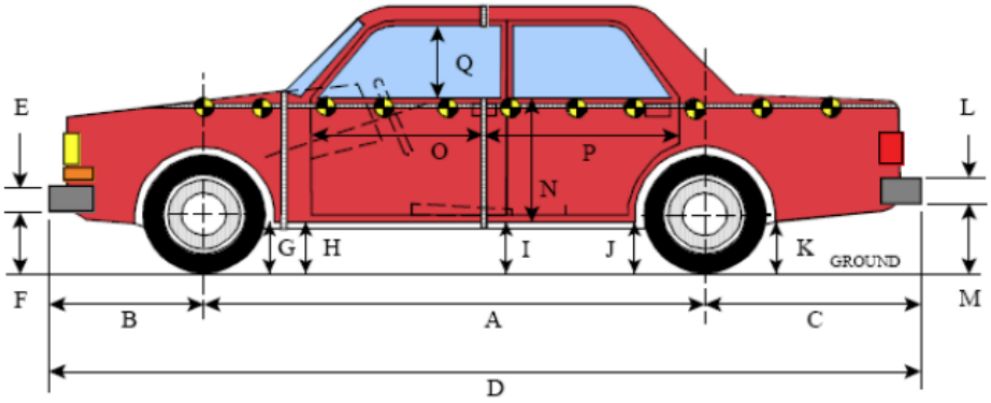
Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.10 to 62.70	62.08
Trap No. 2 Velocity (Redundant)	km/h	61.10 to 62.70	62.19
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed angle 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	300	Right	236
B	Top of Bumper	533	300	Right	169
C	Mid-Level	686	200	Right	157
D	Top of Stack	813	200	Right	149

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025



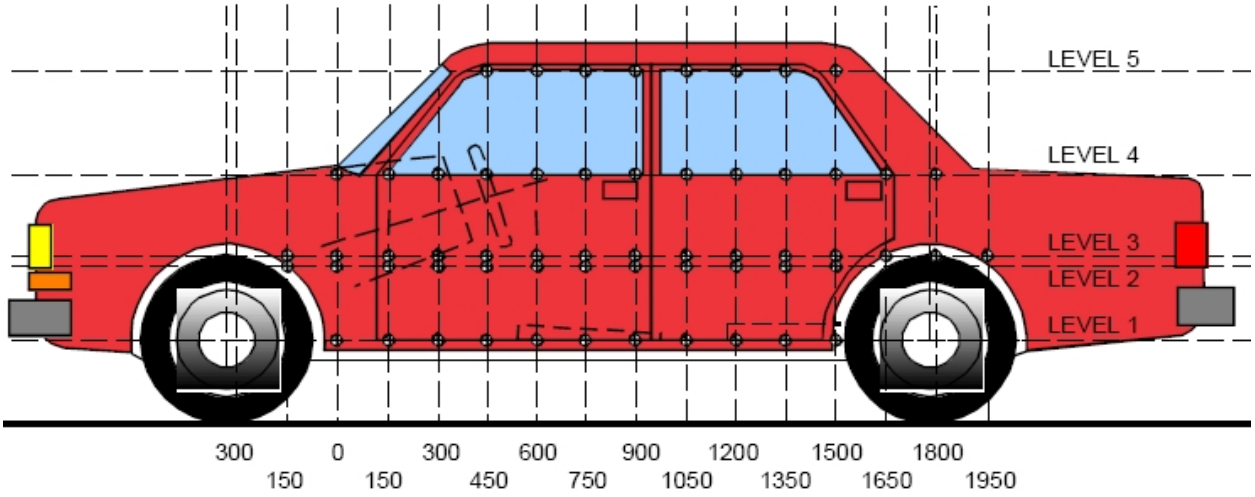
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code.	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	2721	2725	4
B	Front Axle to FSOV	898	896	-2
C	Rear Axle to RSOV	1093	1092	-1
D	Total Length at Centerline	4713	4713	0
E	Front Bumper Thickness	100	100	0
F	Front Bumper Bottom to Ground	458	470	12
G	Sill Height at Front Wheel Well	155	161	6
H	Sill Height at Front Door Leading Edge	155	162	7
I	Sill Height at B Pillar	166	161	-5
J1	Sill Height at Rear Wheel Well	168	164	-4
J2	Pinch Weld Height at Rear Wheel Well	153	143	-10
K	Sill Height Aft of Rear Wheel Well	193	198	5
L	Rear Bumper Thickness	210	210	0
M	Rear Bumper Bottom to Ground	369	383	14
N	Sill Height to Bottom of Front Window Sill	780	787	7
O	Front Door Leading Edge to Impact CL	764	749	-15
P	Rear Door Trailing Edge to Impact CL	1434	1379	-55
Q	Front Window Opening	353	358	5
R	Right Side Length	4646	4646	0
S	Left Side Length	4646	4644	-2
T	Maximum Vehicle Width	1813	1754	-59
U	Front Wheel Track Width	1584	1596	12
V	Rear Wheel Track Width	1595	1593	-2

DATA SHEET NO.11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025



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	316	65	1650
2	Driver H-Point	mm	491	137	1650
3	Mid-Door	mm	611	160	750
4	Window Sill	mm	898	129	1800
5	Window Top	mm	1344	15	1650

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: 2025 KIA K4 4 Door Sedan NHTSA No.: M20254202
Test Program: NCAP Side MDB Impact Test Test Date: 01/08/2025

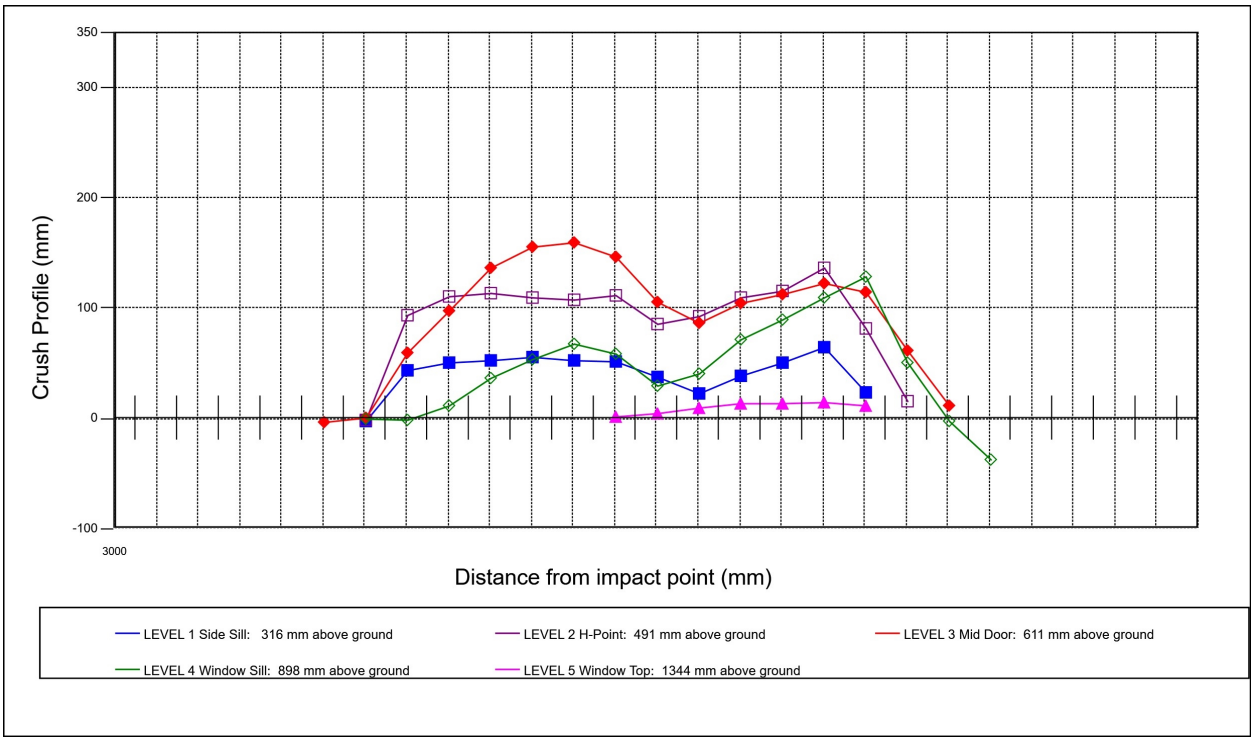
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	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															
-150			903					906					-3		
0	889	905	905	816		891	906	909	816		-2	-1	-4	0	
150	882	899	905	828		838	805	845	829		44	94	60	-1	
300	868	894	905	837		817	783	807	825		51	111	98	12	
450	870	894	907	843		817	780	770	806		53	114	137	37	
600	873	895	908	849		817	785	752	795		56	110	156	54	
750	876	895	908	853		823	787	748	785		53	108	160	68	
900	877	895	908	856	621	825	783	761	797	619	52	112	147	59	2
1050	877	894	907	858	631	839	808	801	828	626	38	86	106	30	5
1200	875	890	903	857	630	852	797	816	816	620	23	93	87	41	10
1350	873	886	898	856	627	834	776	793	784	613	39	110	105	72	14
1500	871	881	893	852	622	820	765	780	762	608	51	116	113	90	14
1650	871	882	891	849	611	806	745	768	739	596	65	137	123	110	15
1800	879	894	898	854	587	855	812	783	725	575	24	82	115	129	12
1950		910	910	864			894	848	813			16	62	51	
2100			910	872				898	874				12	-2	
2250				875					912					-37	
2400															
2550															
2700															
2850															
3000															

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

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

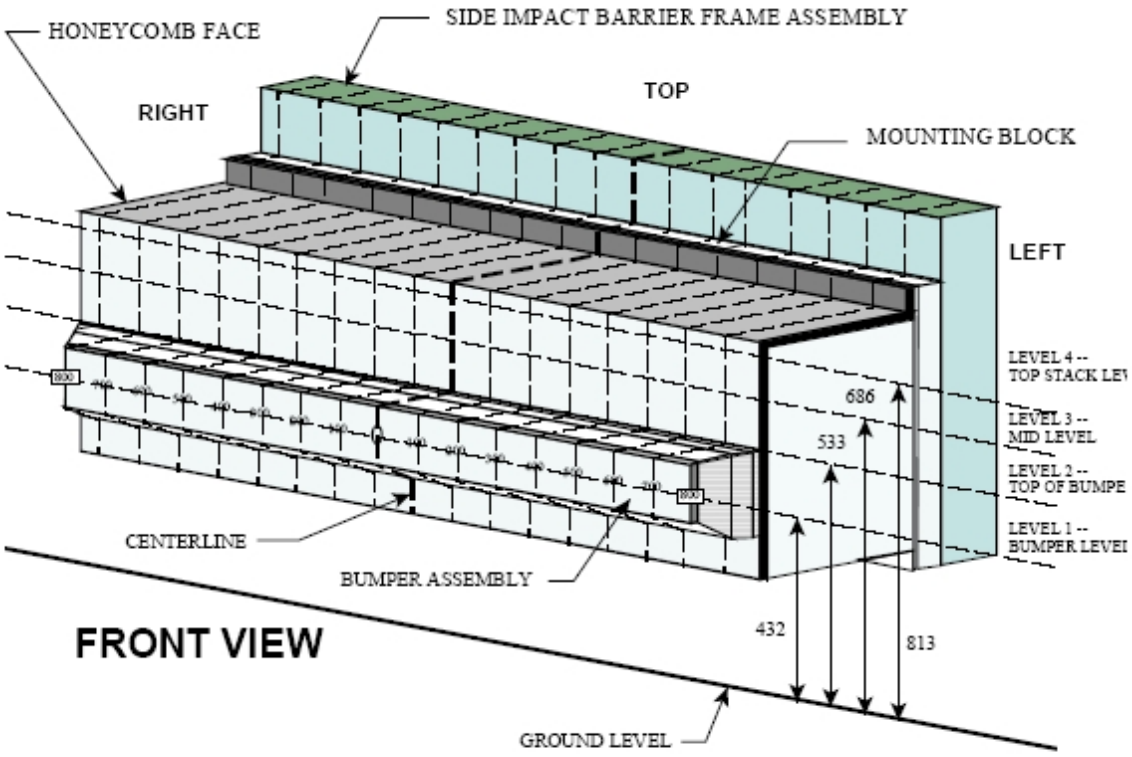
Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO.12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025



NOTE: Dimensions are shown in millimeters, mm

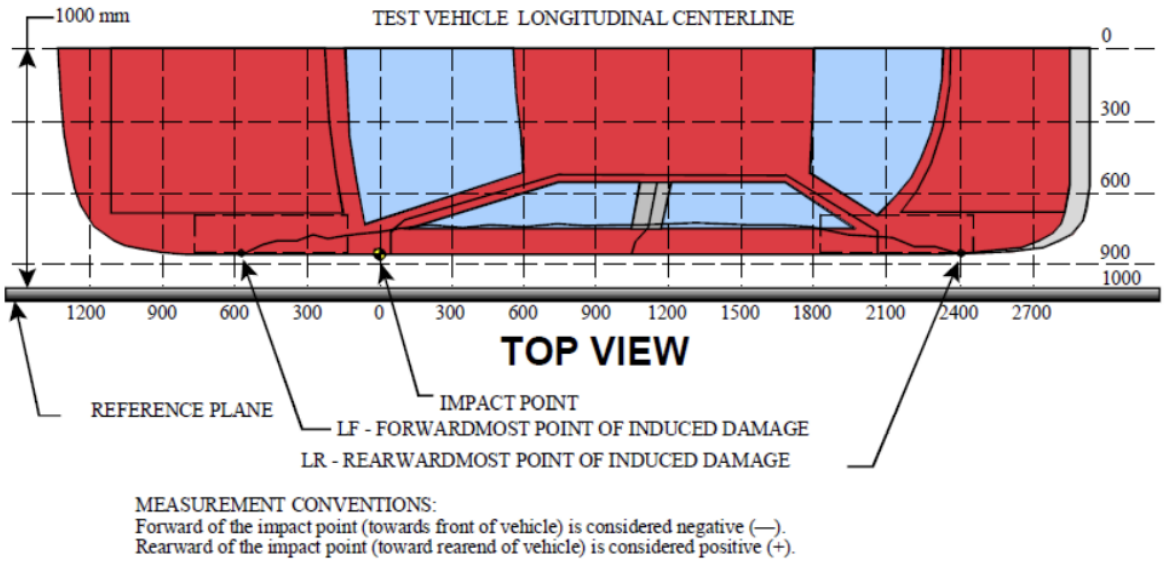
DEFORMABLE BARRIER STATIC CRUSH

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	164	169	180	191	203	236	226	231	213	195	179	175	177	180	186	200	226
2	131	125	136	146	159	169	157	127	84	54	49	43	53	62	79	101	131
3	41	37	45	59	85	148	157	114	71	42	30	26	28	35	49	76	118
4	16	17	25	39	67	130	149	123	70	49	47	47	41	52	73	92	102

DATA SHEET NO.13
VEHICLE AND MDB DAMAGE PROFILE DISTANCE

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025

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	94	97	-3
2	300	3	193	95	98
3	750	3	252	92	160
4	1200	3	184	97	87
5	1650	3	232	109	123
6	2100	3	102	90	12

MDB DAMAGE PROFILE DISTANCES

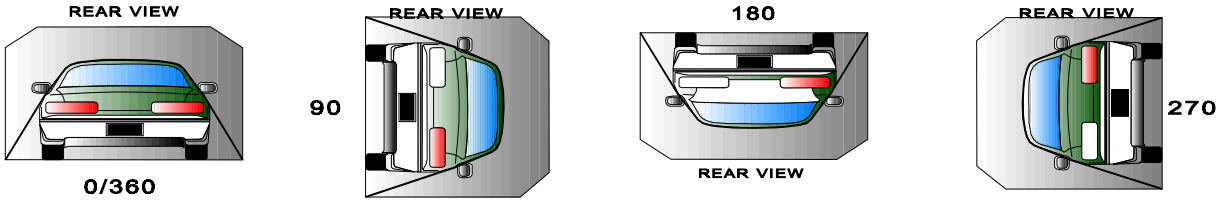
DPD	Distance From Center of MDB	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	800 mm left of center	1	279	505	-226
2	480 mm left of center	1	335	514	-179
3	160 mm left of center	1	329	514	-185
4	160 mm right of center	1	285	513	-228
5	480 mm right of center	1	320	513	-193
6	800 mm right of center	1	337	501	-164

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

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025
Test Time:	10:24 AM	Temperature:	21 °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



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	69	300	369
90° to 180°	62	300	362
180° to 270°	63	300	363
270° to 360°	70	300	370

FMVSS 301 SPILLAGE TABLE

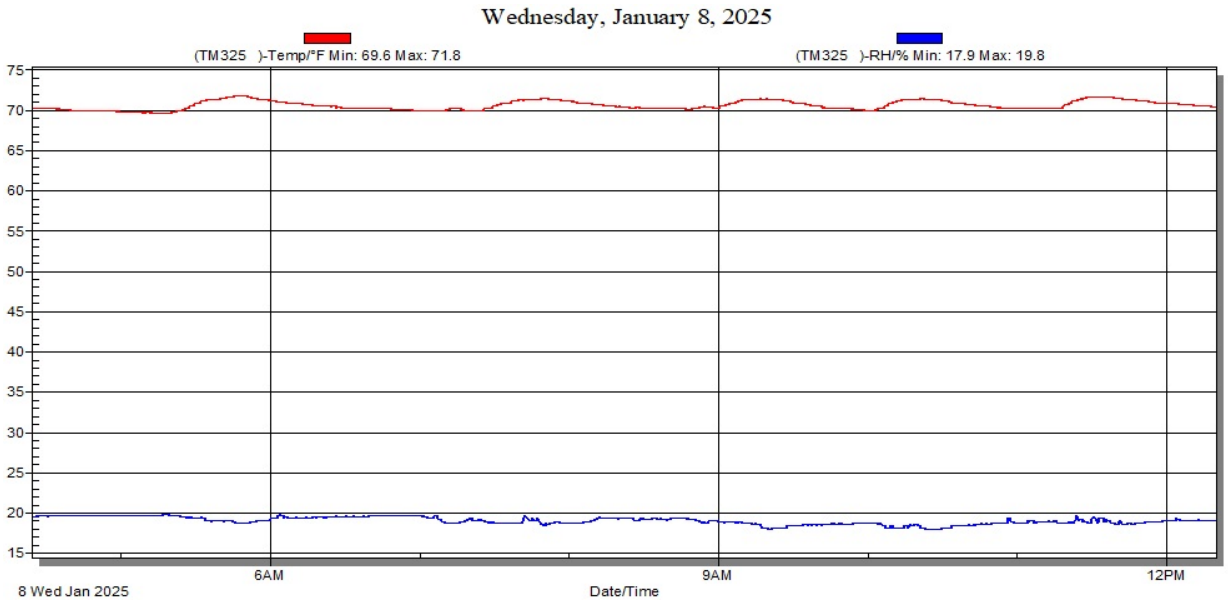
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

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:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254202
Test Program:	NCAP Side MDB Impact Test	Test Date:	01/08/2025



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

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

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

Fig.	Description	Page
35	Pre-Test View of Belt Anchorage for Driver Dummy	A-22
36	Pre-Test Left Side View of Steering Wheel	A-22
37	View of Disengaged Parking Brake	A-23
38	Pre-Test View of Parking Brake	A-23
39	Pre-Test Close-Up Left Side View of Driver Seat Track	A-24
40	Pre-Test Close-Up Left Side View of Driver Seat Back	A-24
41	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-25
42	Pre-Test Driver Dummy and Door Clearance View	A-25
43	Post-Test Driver Dummy and Door Clearance View	A-26
44	Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment	A-26
45	Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment	A-27
46	Pre-Test Driver Inner Door Panel View	A-27
47	Post-Test Driver Inner Door Panel View	A-28
48	Post-Test Driver Dummy Close-Up Head Contact with Vehicle View	A-28
49	Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View	A-29
50	Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View	A-29
51	Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View	A-30
52	Post-Test Driver Dummy Close-Up Pelvis Contact View	A-30
53	Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View	A-31
54	Post-Test Driver Dummy Close-Up Knee Contact View	A-31
55	Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking	A-32
56	Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-32
57	Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-33
58	Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning	A-33
59	Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint	A-34
60	Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning	A-34
61	Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan	A-35
62	Pre-Test View of Rear Passenger Dummy’s Neck Showing Position of Adjustable Neck Bracket	A-35
63	Pre-Test View of Rear Passenger Dummy’s Head Showing Dummy’s Head is Level	A-36
64	Pre-Test Placement of Rear Passenger Dummy’s Feet	A-36
65	Pre-Test View of Belt Anchorage for Rear Passenger Dummy	A-37
66	Pre-Test Close-Up Left Side View of Rear Passenger Seat Track	A-37
67	Pre-Test Close-Up Left Side View of Rear Passenger Seat Back	A-38
68	Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint	A-38

Fig.	Description	Page
69	Pre-Test Rear Passenger Dummy and Door Clearance View	A-39
70	Post-Test Rear Passenger Dummy and Door Clearance View	A-39
71	Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-40
72	Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-40
73	Pre-Test Rear Passenger Inner Door Panel View	A-41
74	Post-Test Rear Passenger Inner Door Panel View Showing Rear Passenger Dummy Contact Locations	A-41
75	Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle View	A-42
76	Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Airbag View	A-42
77	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View	A-43
78	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Airbag View	A-43
79	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact View	A-44
80	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Airbag View	A-44
81	Post-Test Rear Passenger Dummy Close-Up Knee Contact View	A-45
82	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-45
83	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-46
84	Pre-Test Front View of MDB Impactor Face	A-46
85	Post-Test Front View of MDB Impactor Face	A-47
86	Pre-Test Top View of MDB Impactor Face	A-47
87	Post-Test Top View of MDB Impactor Face	A-48
88	Pre-Test Left Side View of MDB Impactor Face	A-48
89	Post-Test Left Side View of MDB Impactor Face	A-49
90	Pre-Test Right Side View of MDB Impactor Face	A-49
91	Post-Test Right Side View of MDB Impactor Face	A-50
92	Close-Up View of Vehicle’s Certification Label	A-50
93	Close-Up View of Vehicle’s Tire Information Placard or Label	A-51
94	Pre-Test Ballast View	A-51
95	Post-Test Primary and Redundant Speed Trap Read-Out	A-52
96	FMVSS No. 301 Static Rollover 0 Degrees	A-52
97	FMVSS No. 301 Static Rollover 90 Degrees	A-53
98	FMVSS No. 301 Static Rollover 180 Degrees	A-53
99	FMVSS No. 301 Static Rollover 270 Degrees	A-54
100	FMVSS No. 301 Static Rollover 360 Degrees	A-54
101	Impact Event	A-55
102	Monroney Label	A-55
103	Driver Head Restraint Use and Adjustment Information from Vehicle Owner’s Manual	A-56
104	Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner’s Manual	A-56



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 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

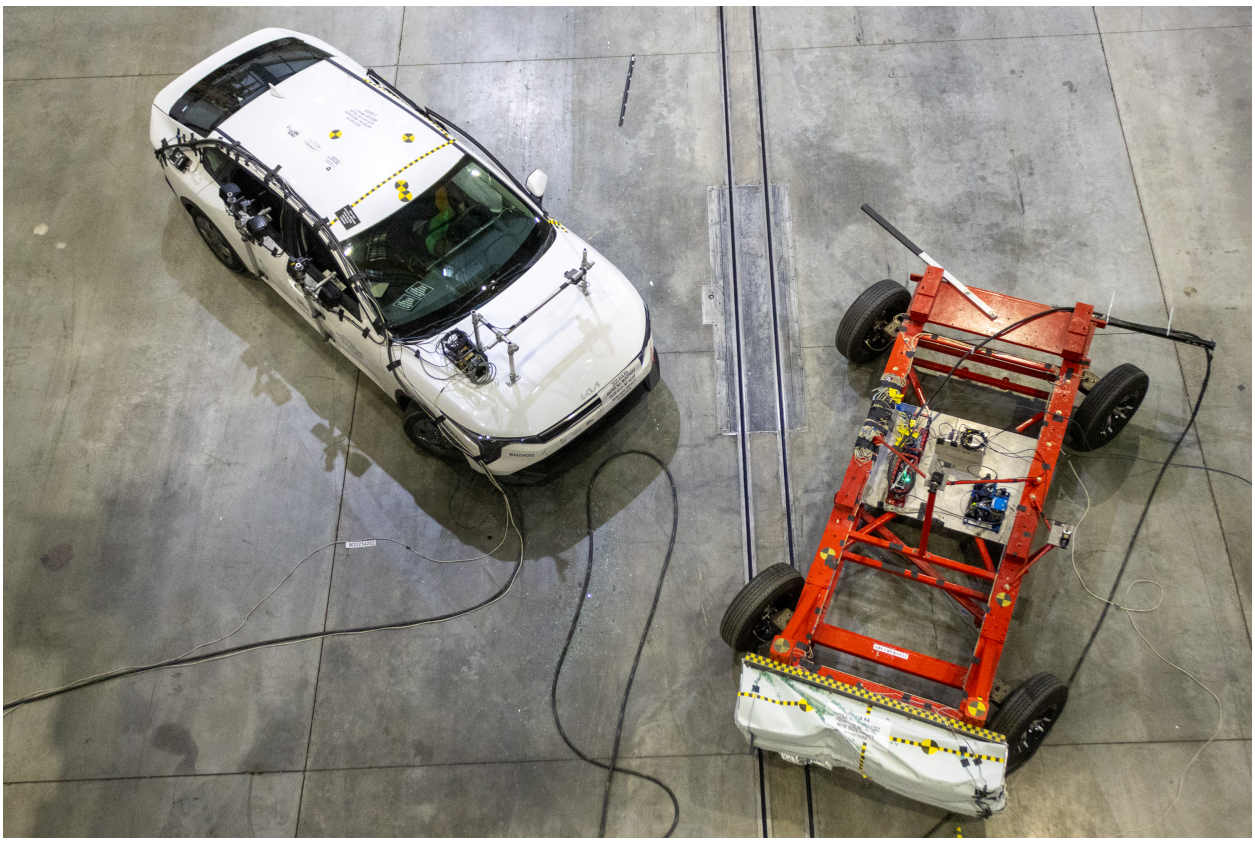


Figure A-16: Post-Test Overhead View of Test Area



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

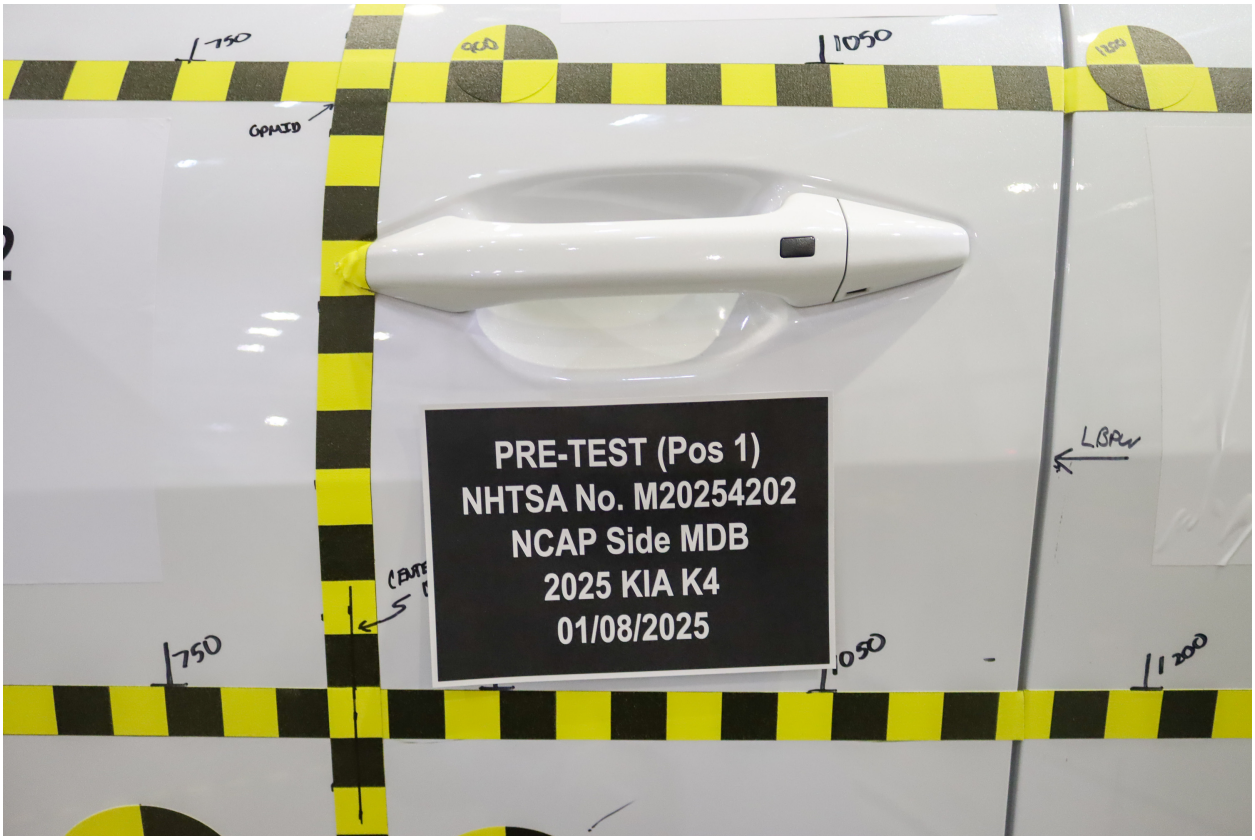


Figure A-21: Pre-Test Left Front Door Latch Close-Up



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

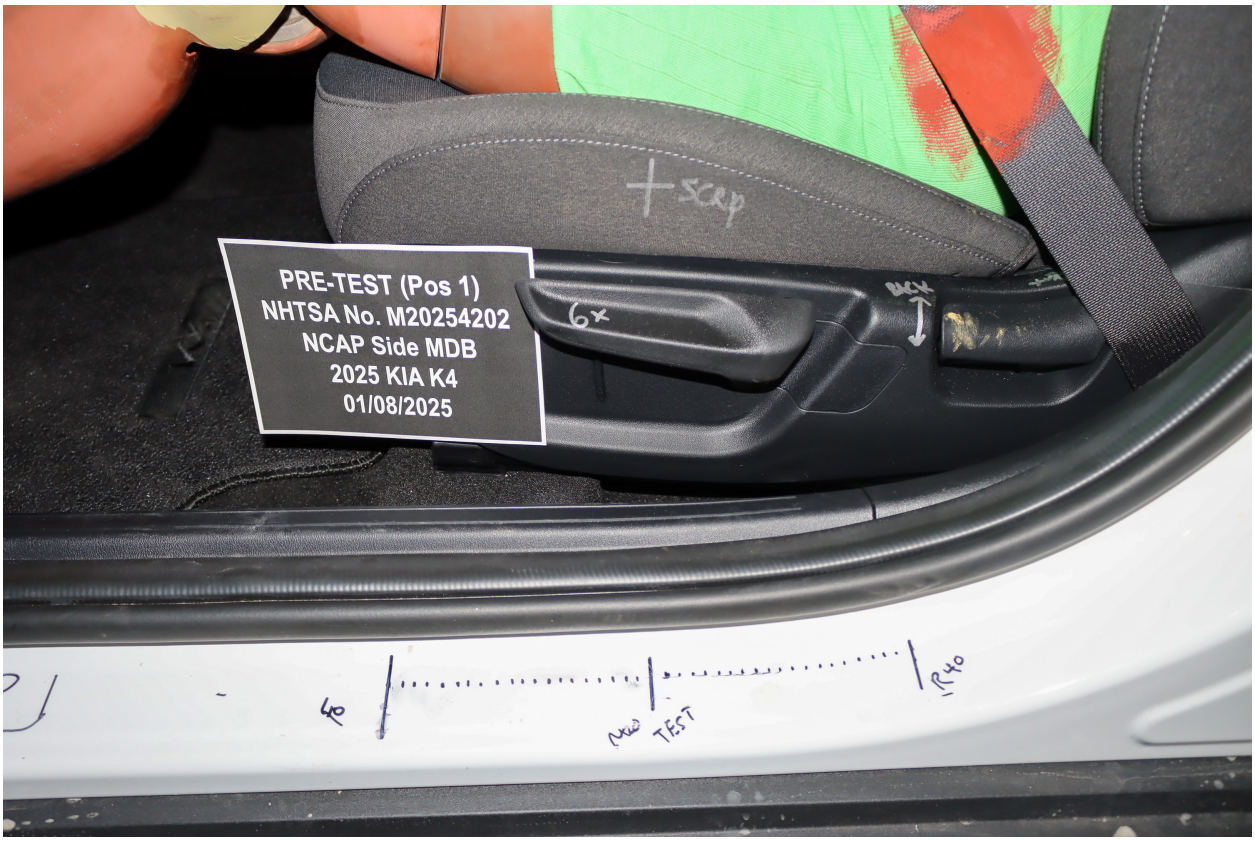


Figure A-39: Pre-Test Close-Up Left Side View of Driver Seat Track



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 Airbag 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 Airbag View



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



Figure A-53: Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag 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

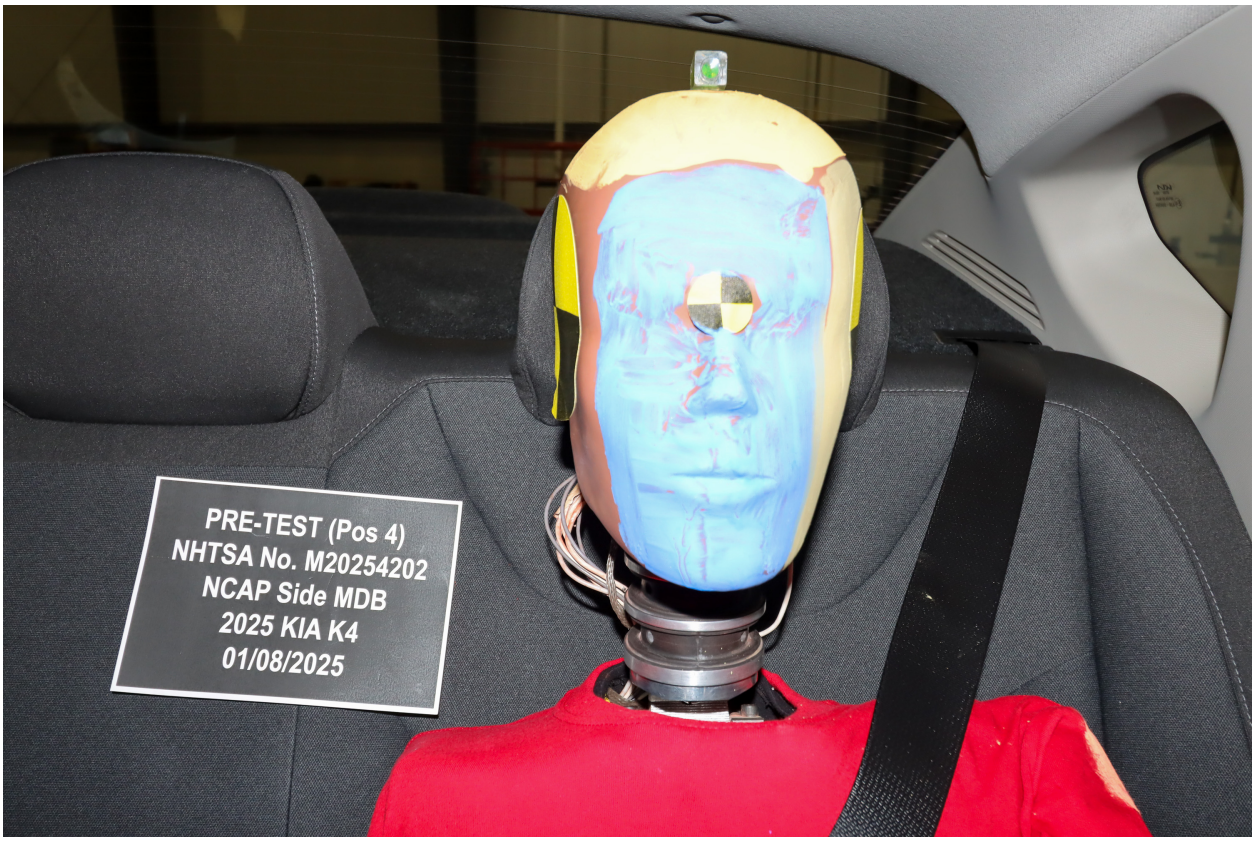


Figure A-59: Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint



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 Airbag 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 Airbag View



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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

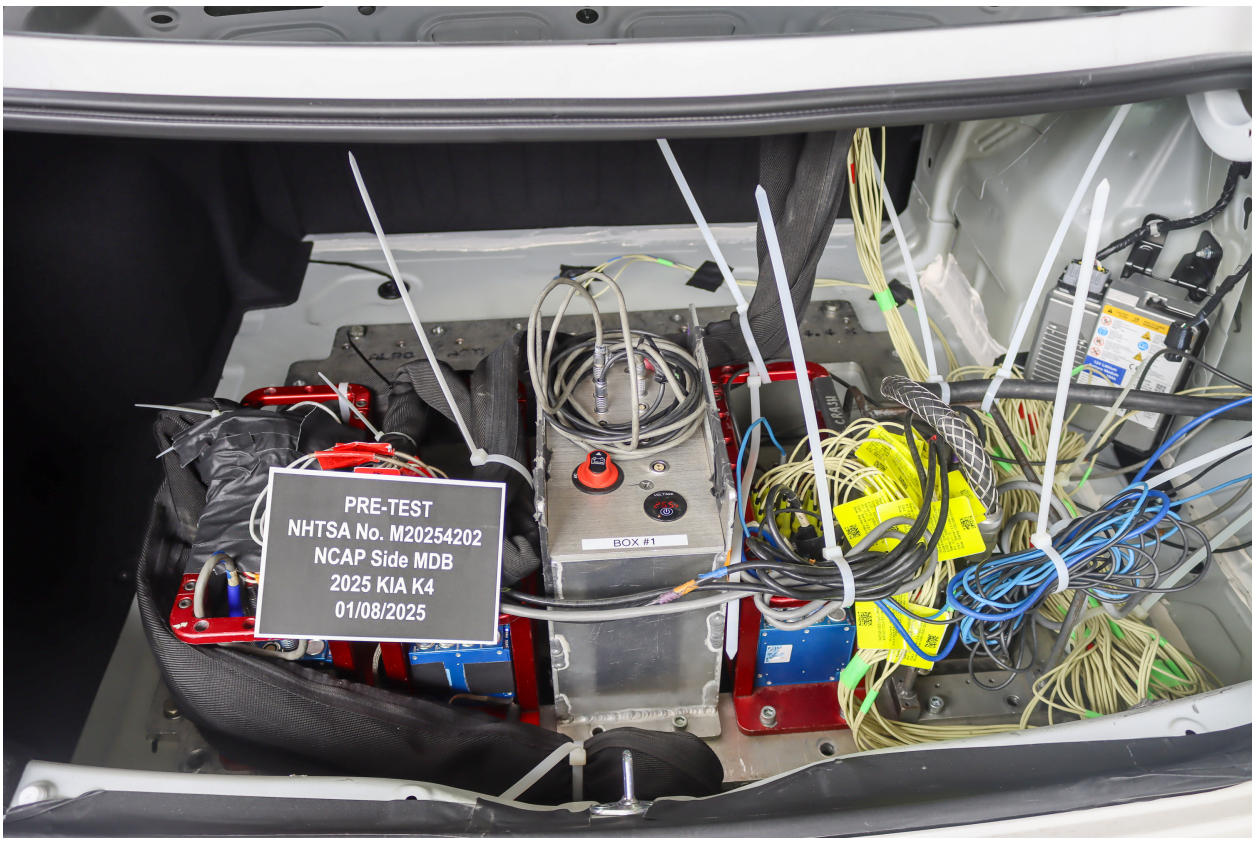


Figure A-94: Pre-Test Ballast View



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

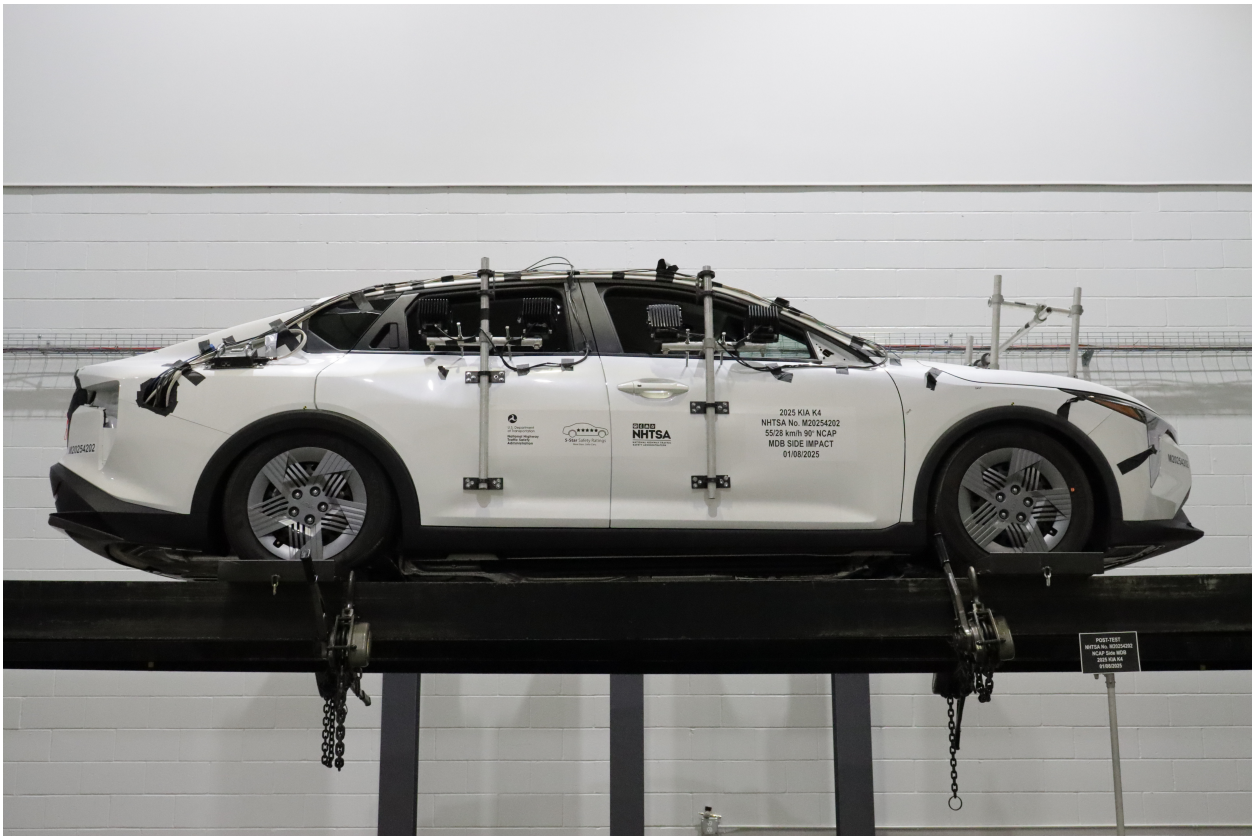


Figure A-96: FMVSS No. 301 Static Rollover 0 Degrees

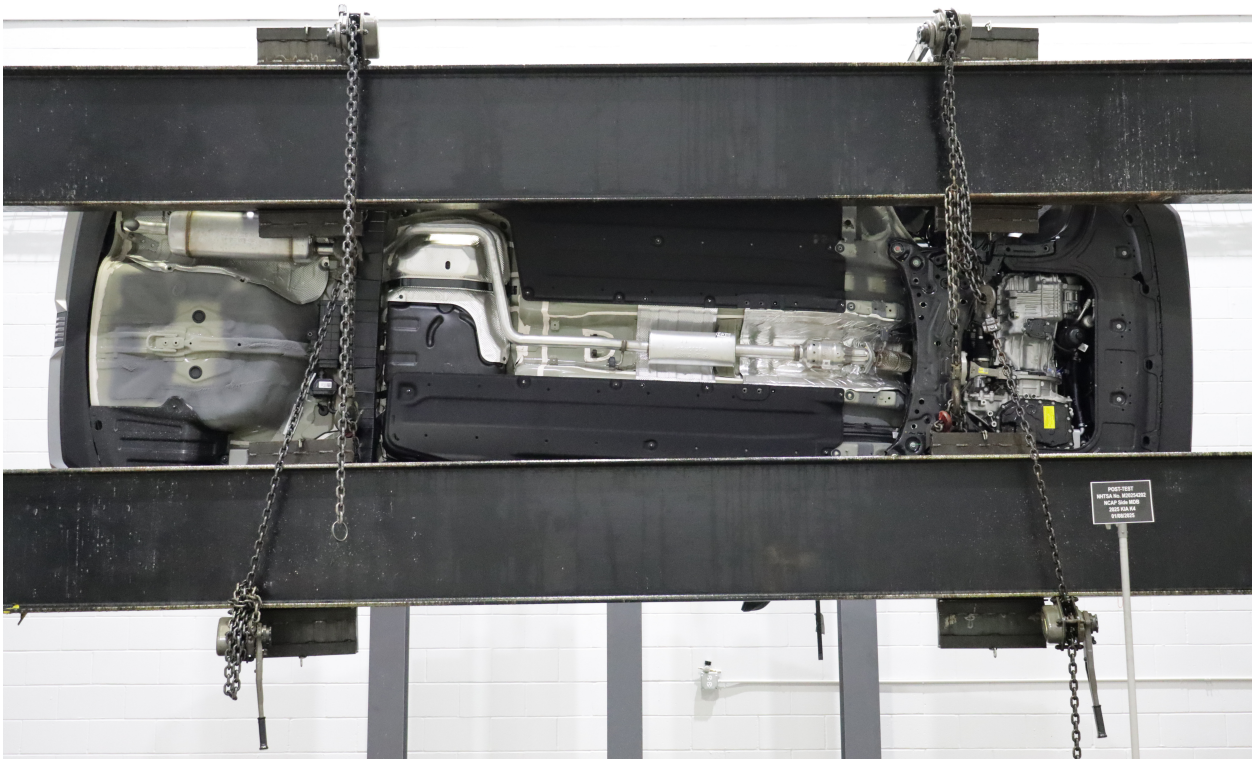


Figure A-97: FMVSS No. 301 Static Rollover 90 Degrees

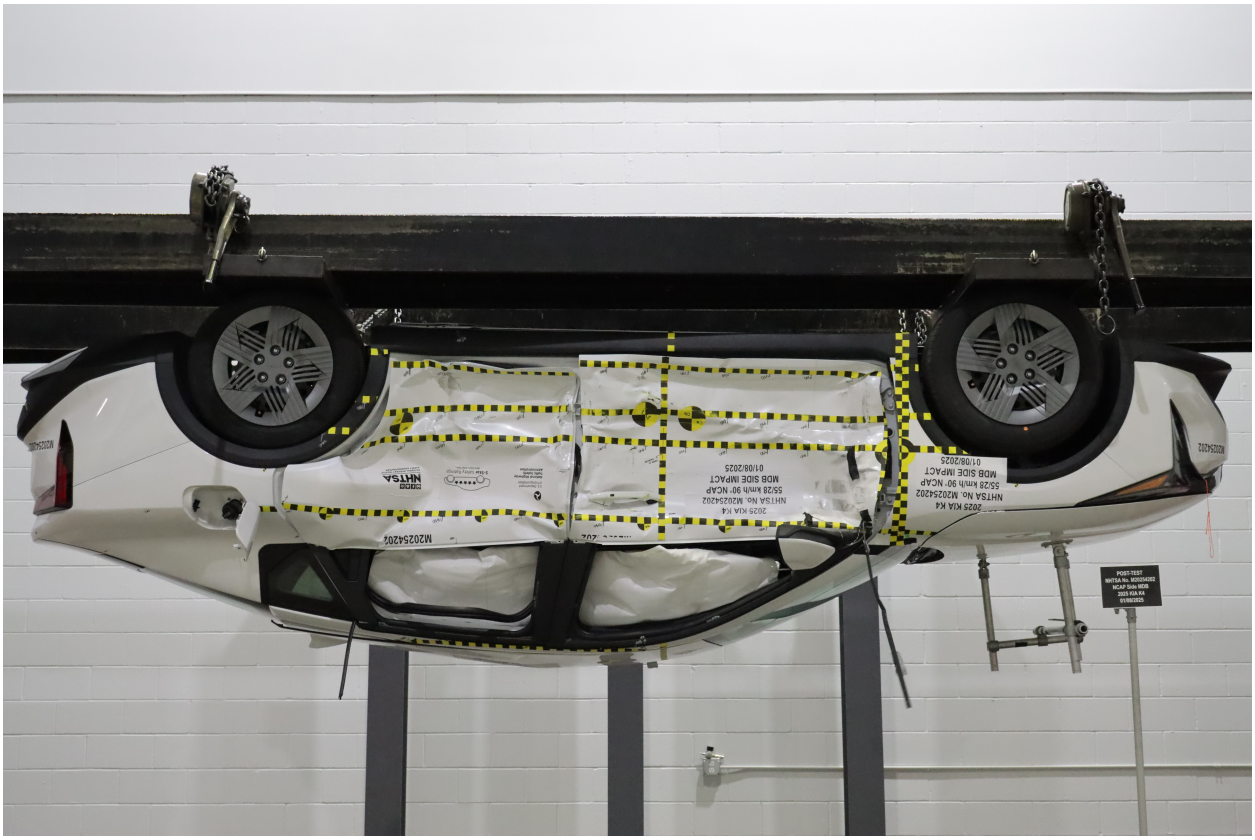


Figure A-98: FMVSS No. 301 Static Rollover 180 Degrees



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



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



Figure A-101: Impact Event

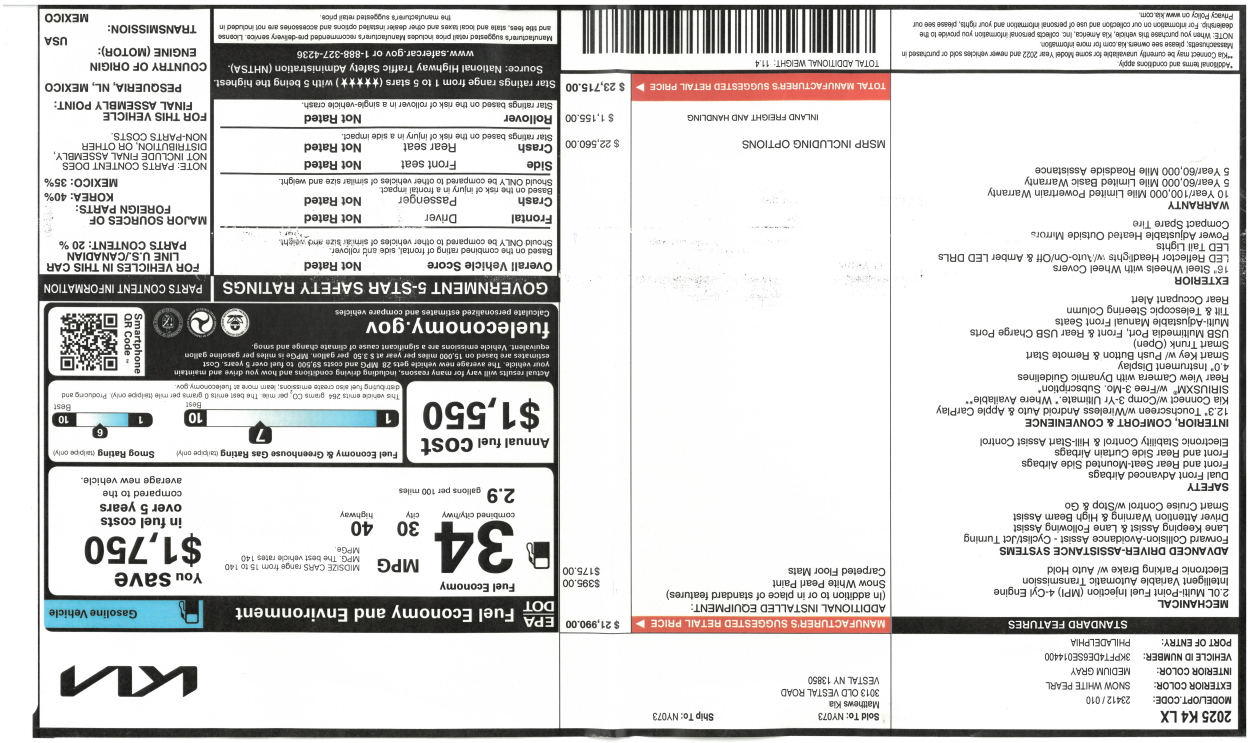
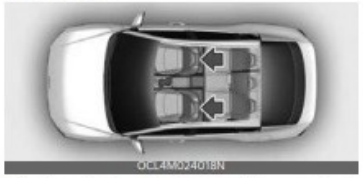


Figure A-102: Monroney Label

Headrest for front seat

The driver's and front passenger's seats are equipped with a headrest for 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 the top of their eyes.

Adjust the headrest as close to your head as possible. 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.

Forward and rearward adjustment (if equipped)



The headrest may be adjusted forward to 3 different positions by pulling the headrest forward to the desired detent. To adjust the headrest to it's furthest rearwards position, pull it fully forward to the farthest position and release it.

Adjusting the height up and down



To raise the headrest:

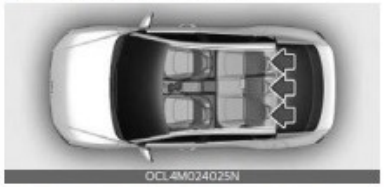
1. Pull it up to the desired position (1).
2. To lower the headrest, push and hold the release button (2) on the headrest support.
3. Lower the headrest to the desired position (3).

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

Rear seat adjustment

Headrest for rear seat

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

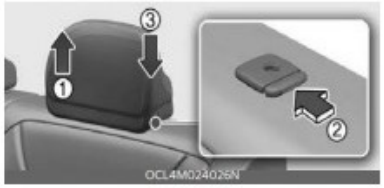


The headrest not only provides comfort, but also helps protect the head and neck in the event of a collision.

To maximize 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 heads is the height at the top of their eyes.

Adjust the headrest as close to your head as possible. The use of a cushion that holds the body away from the seatback is not recommended.

Adjusting the height up and down (if equipped)



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

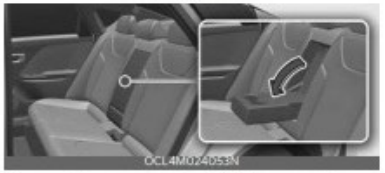
Removal and reinstallation (if equipped)



- To remove the headrest, raise it to the maximum height and then press the release button (1) while pulling the headrest upward (2).
- To reinstall the headrest, put the headrest poles (3) into the holes while pressing the release button (1).

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

Armrest (if equipped)



To use the armrest, pull it forward from the seatback.

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

APPENDIX B
VEHICLE AND 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)

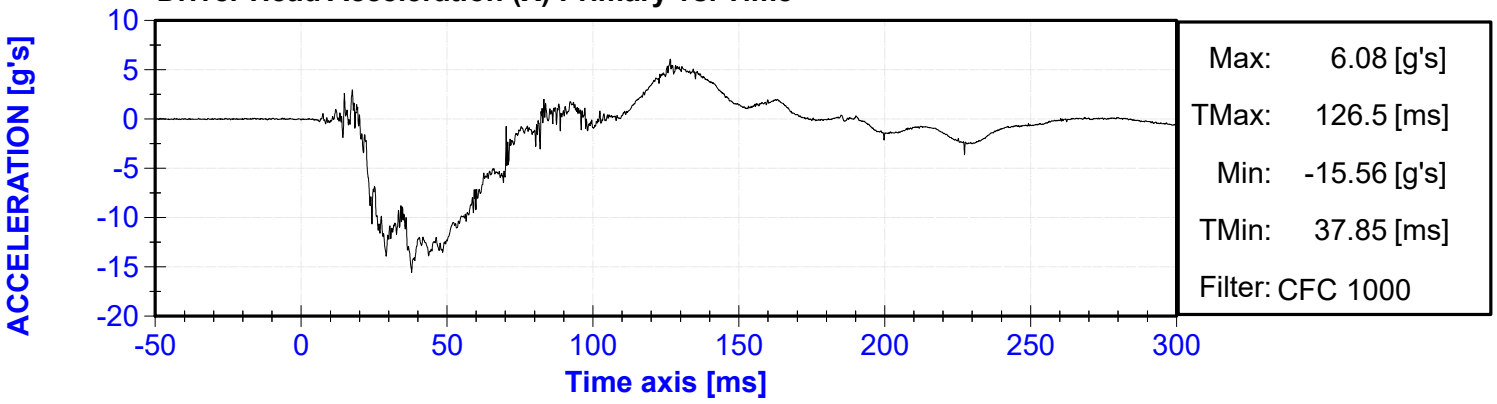
Vehicle Instrumentation Data

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)

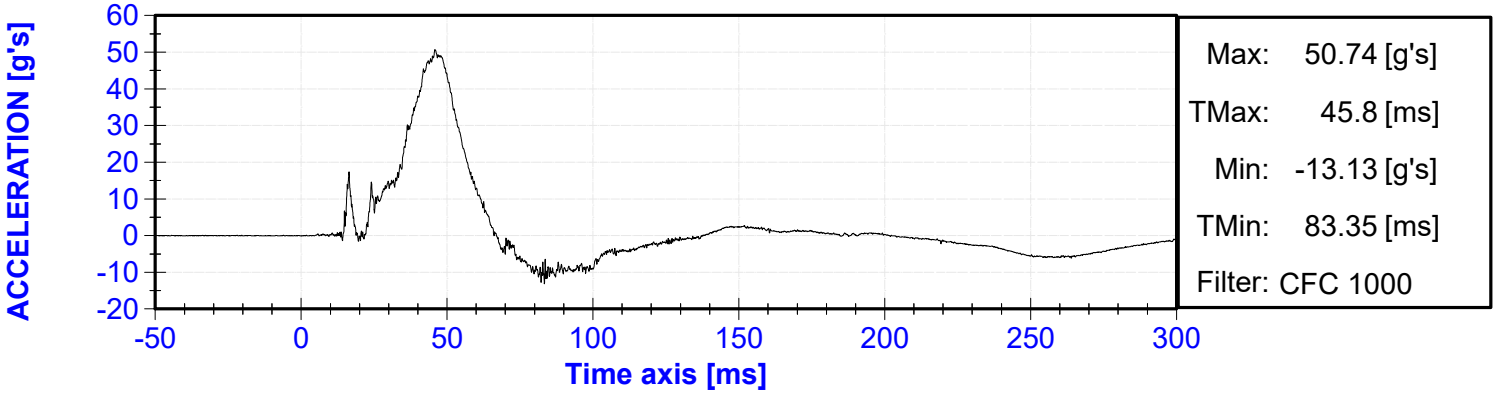
MDB Instrumentation Data

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

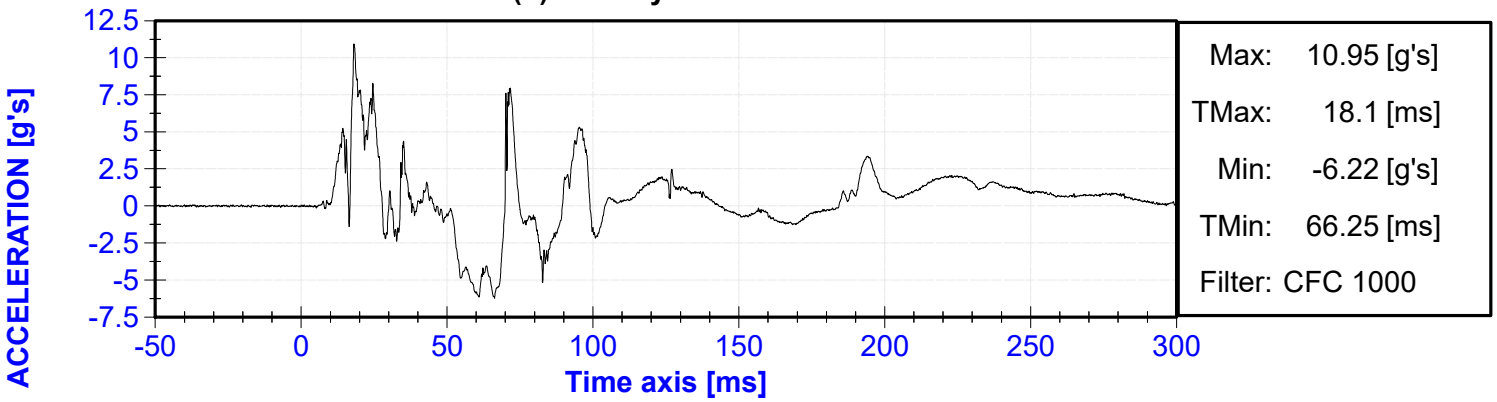
Driver Head Acceleration (X) Primary vs. Time



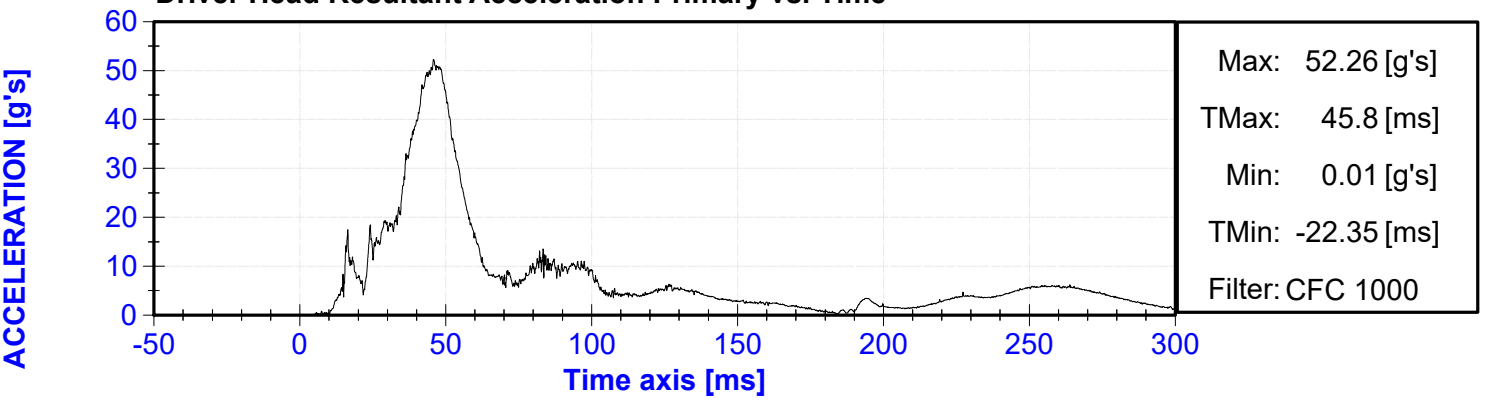
Driver Head Acceleration (Y) Primary vs. Time



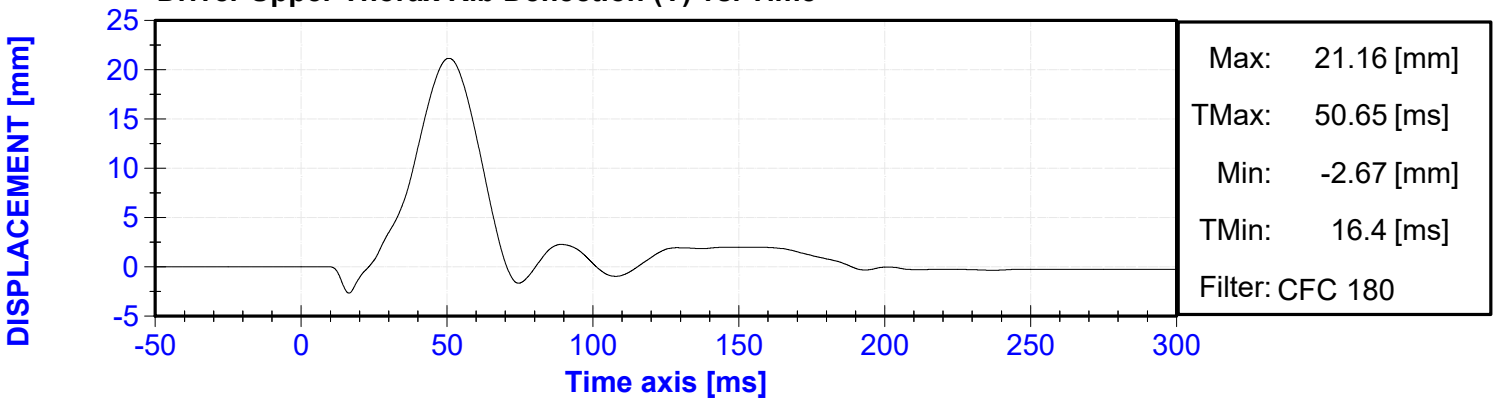
Driver Head Acceleration (Z) Primary vs. Time



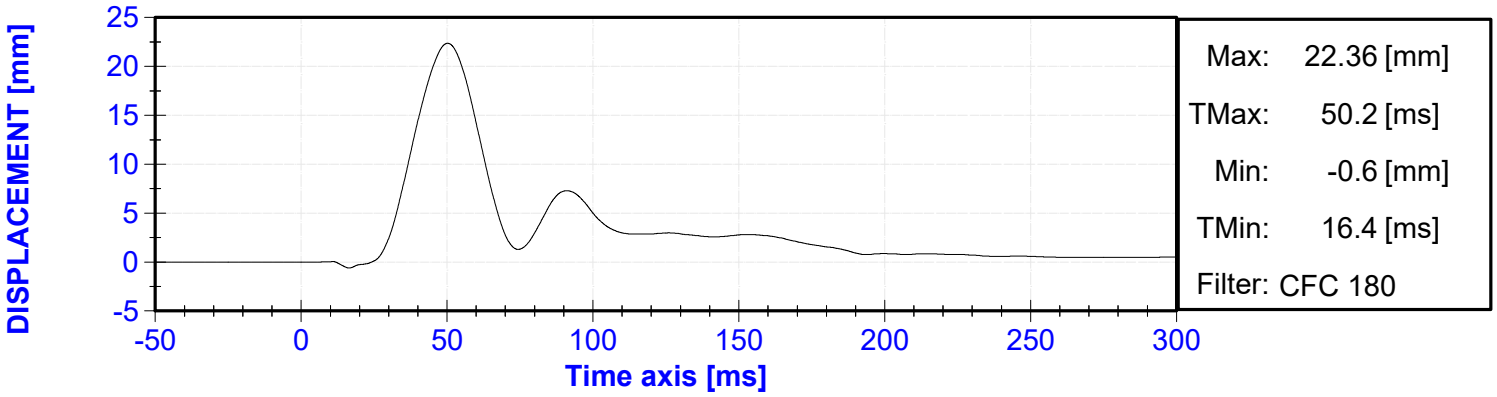
Driver Head Resultant Acceleration Primary vs. Time



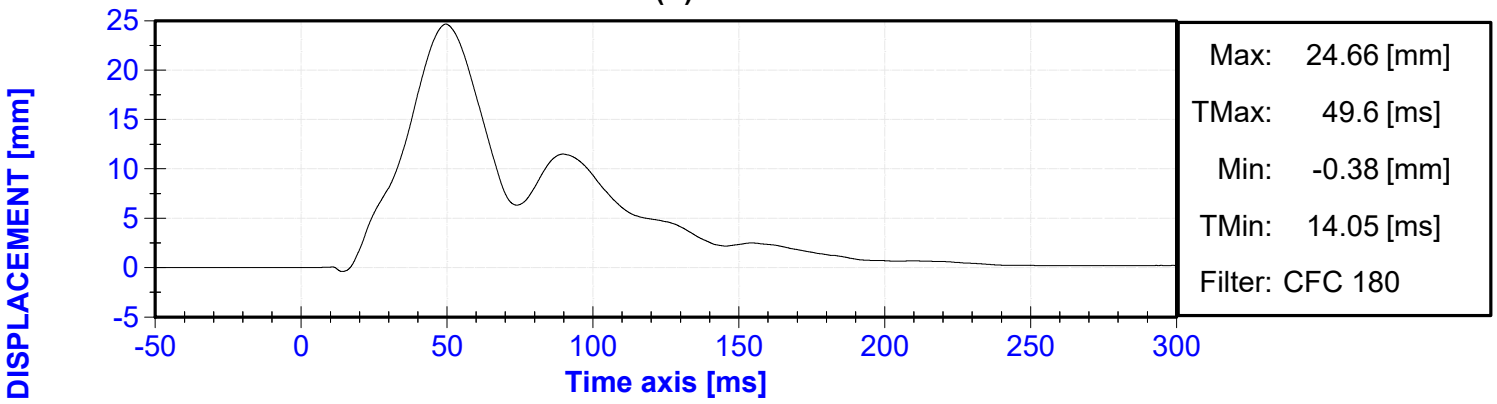
Driver Upper Thorax Rib Deflection (Y) vs. Time



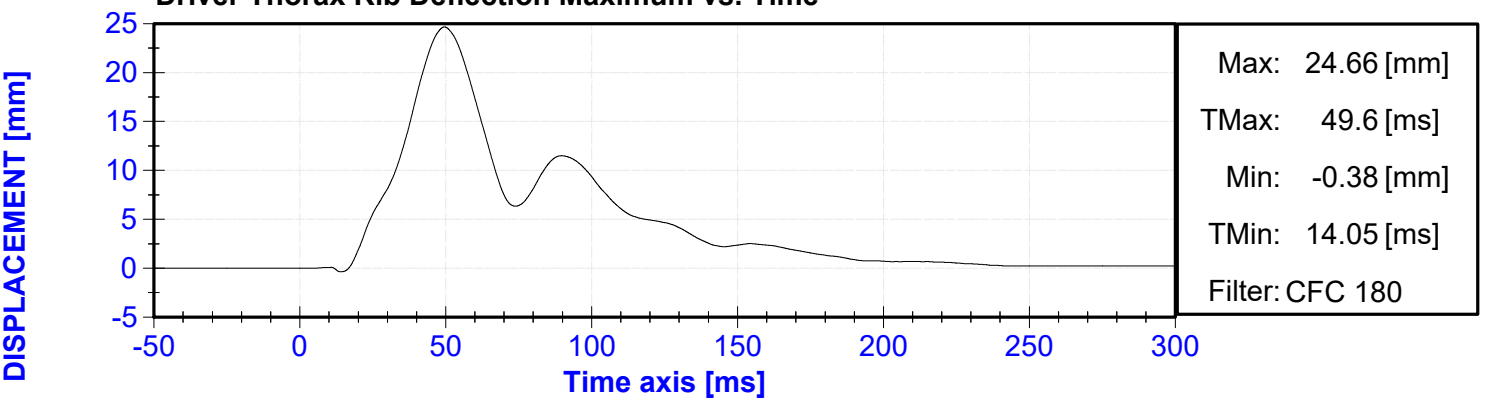
Driver Middle Thorax Rib Deflection (Y) vs. Time



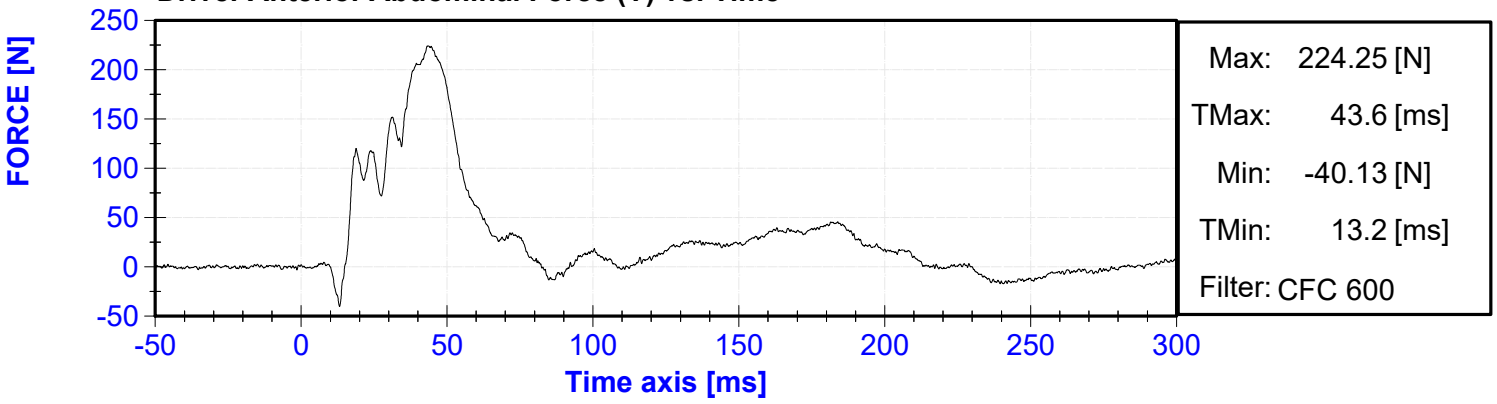
Driver Lower Thorax Rib Deflection (Y) vs. Time



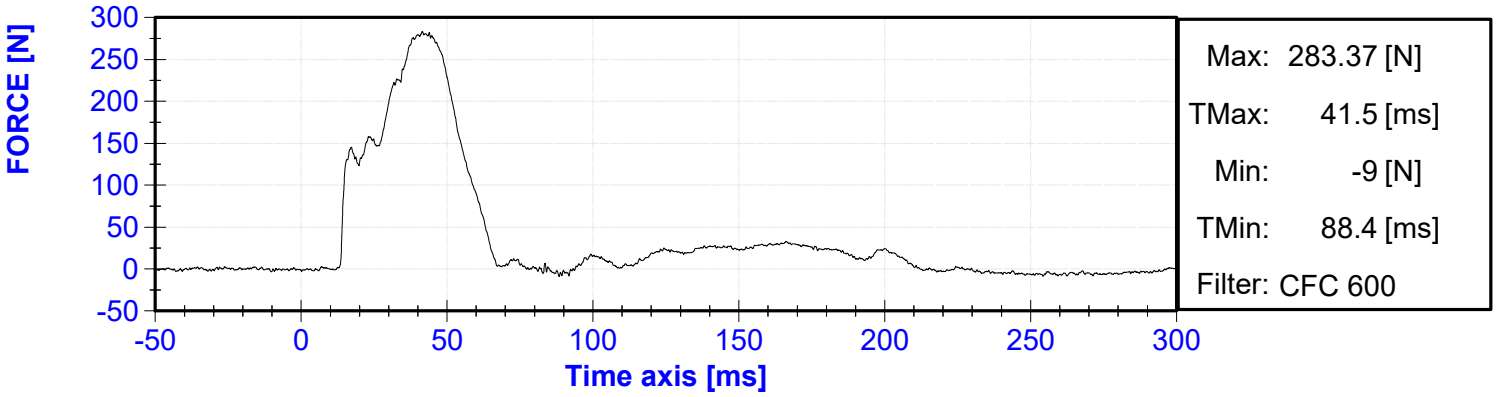
Driver Thorax Rib Deflection Maximum vs. Time



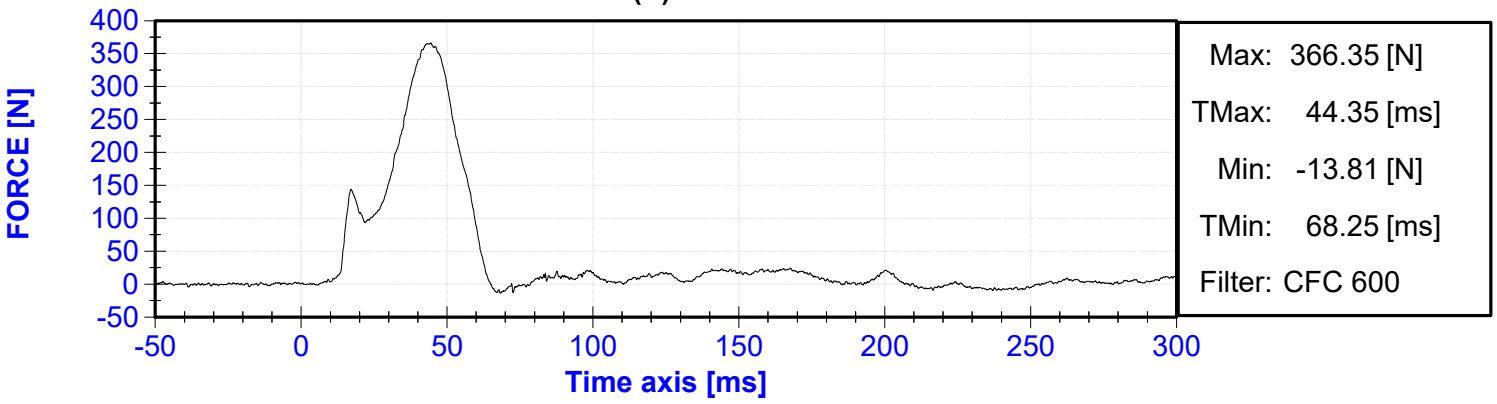
Driver Anterior Abdominal Force (Y) vs. Time



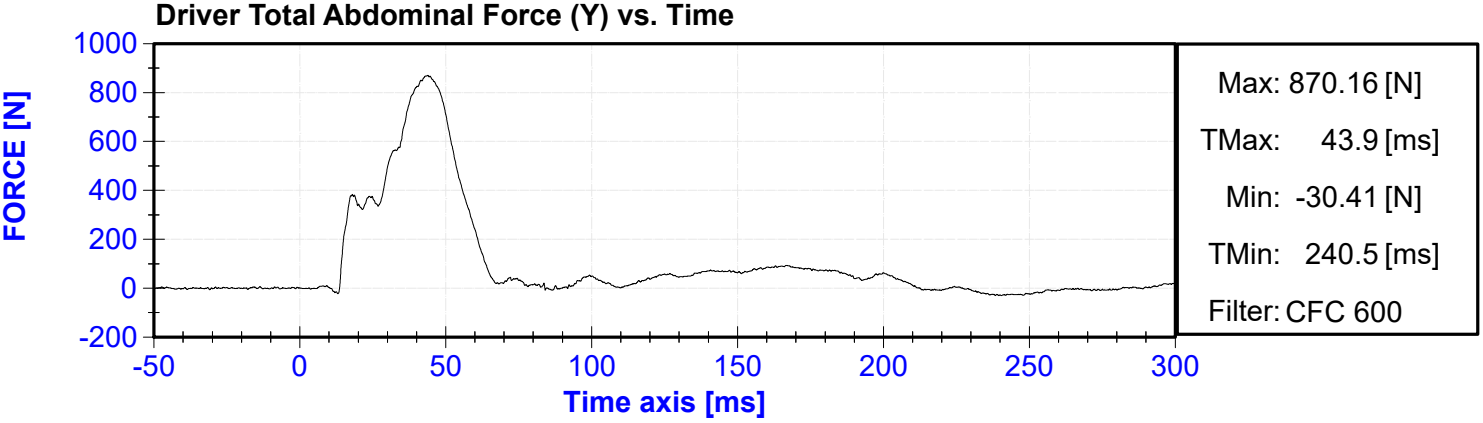
Driver Middle Abdominal Force (Y) vs. Time



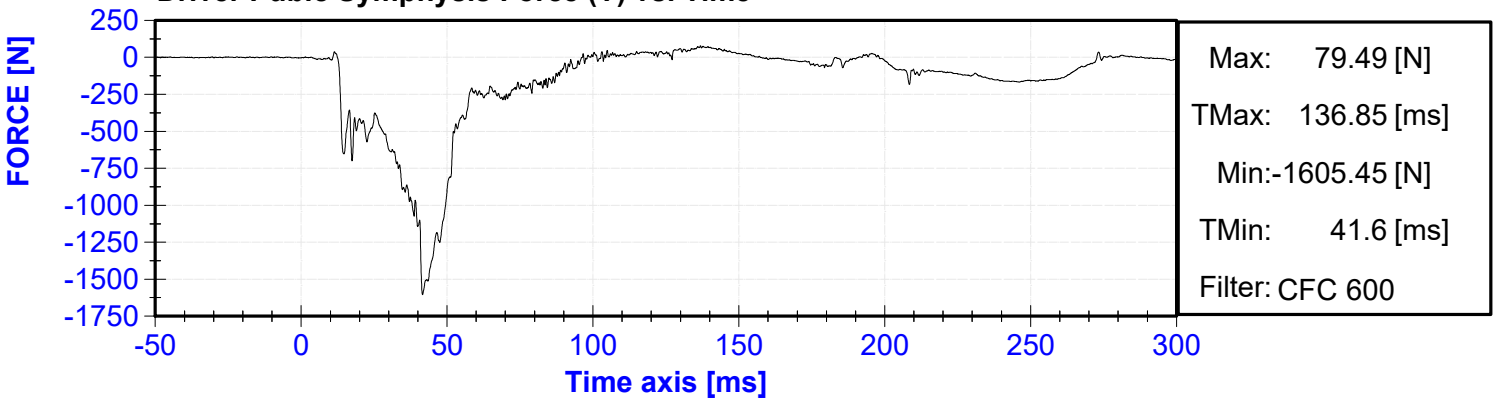
Driver Posterior Abdominal Force (Y) vs. Time



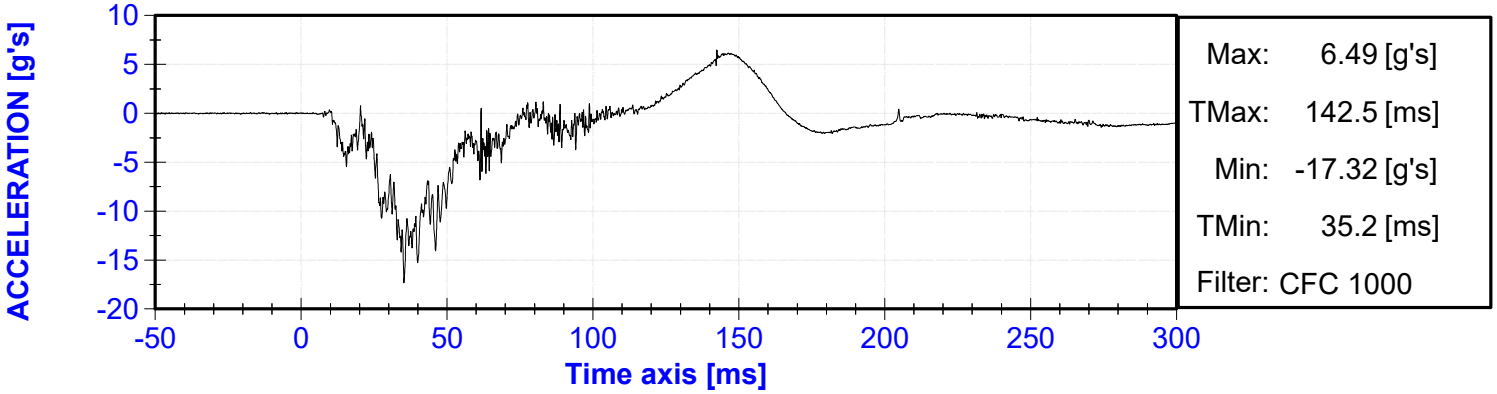
Driver Total Abdominal Force (Y) vs. Time



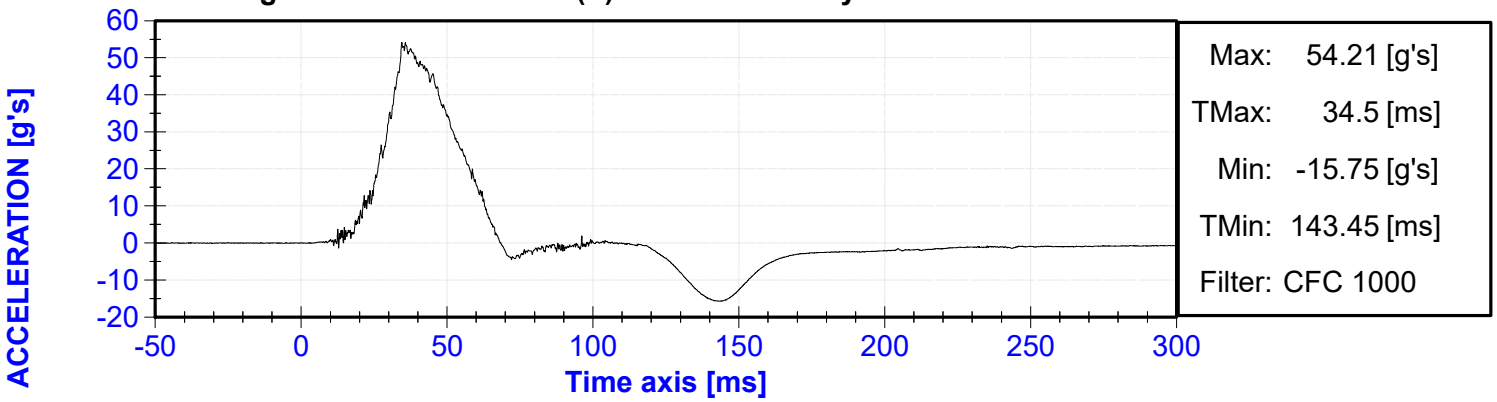
Driver Pubic Symphysis Force (Y) vs. Time



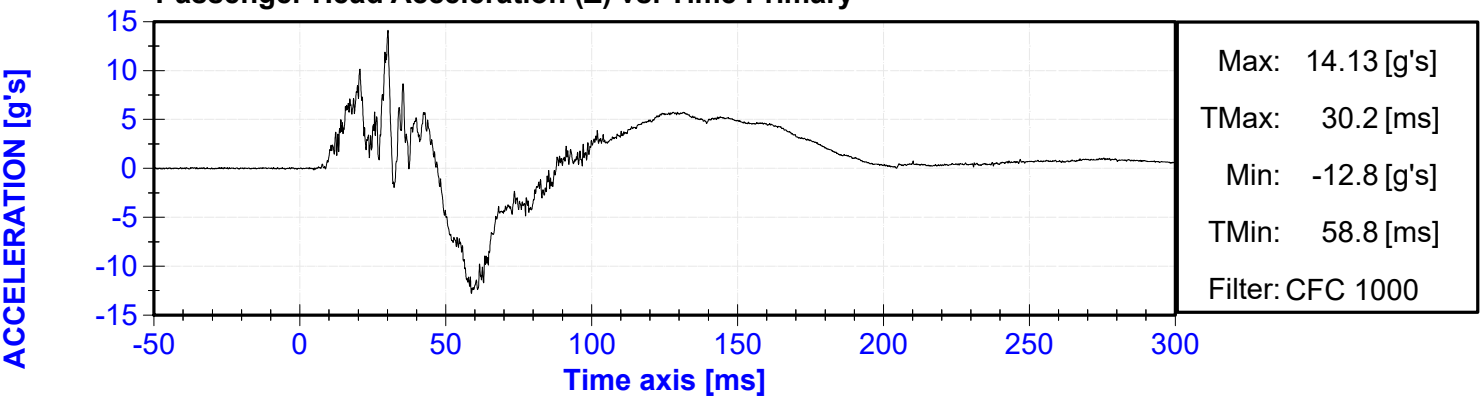
Passenger Head Acceleration (X) vs. Time Primary



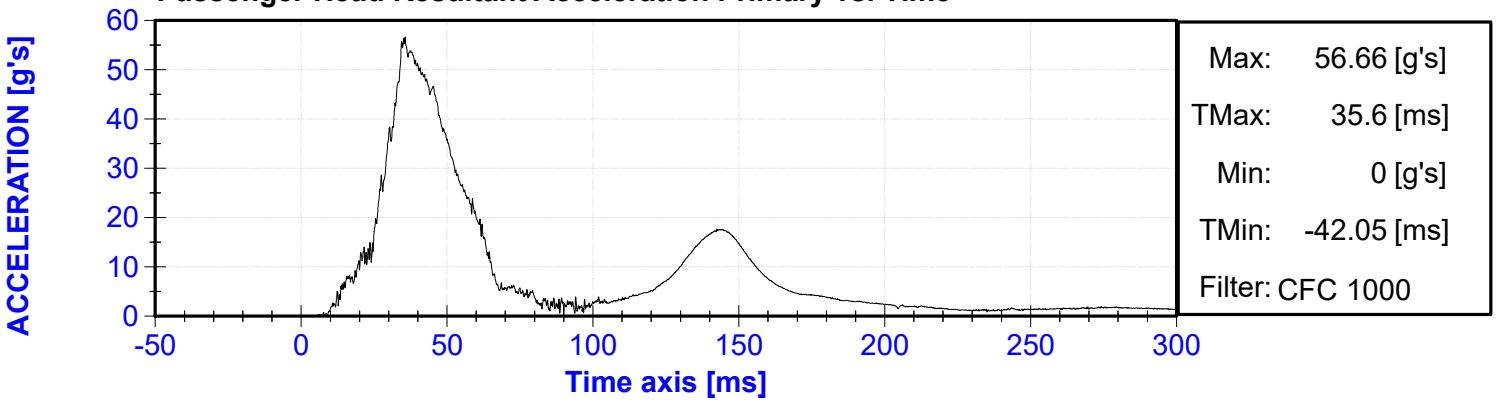
Passenger Head Acceleration (Y) vs. Time Primary



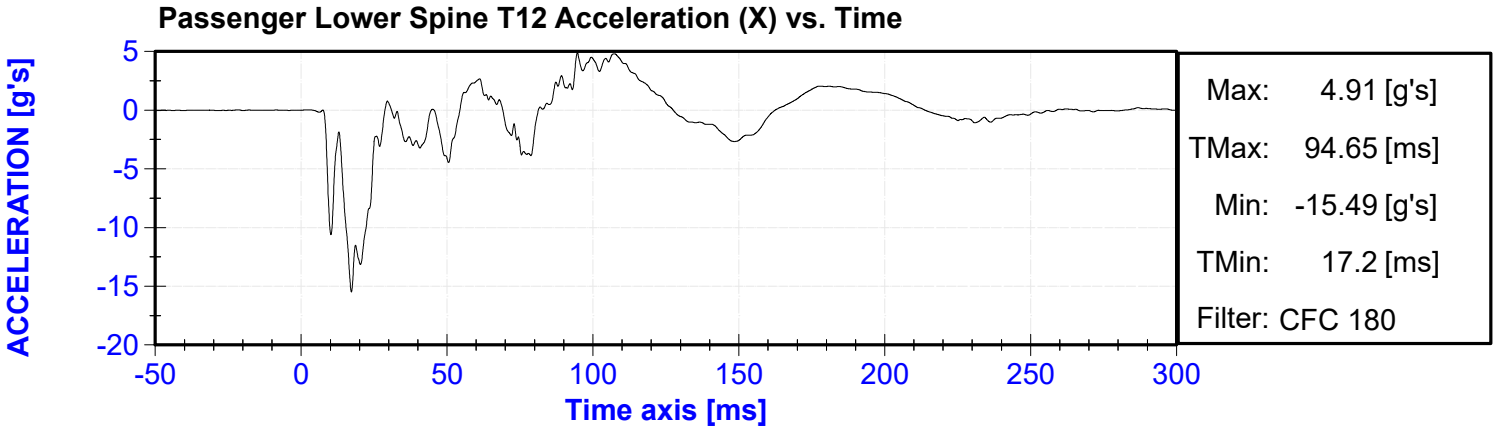
Passenger Head Acceleration (Z) vs. Time Primary



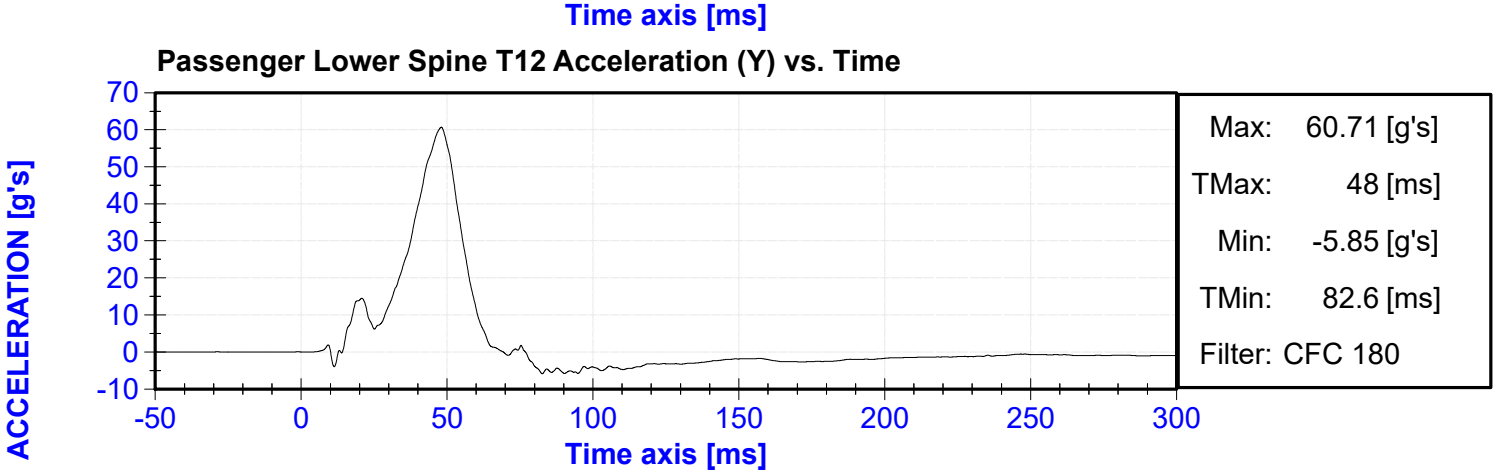
Passenger Head Resultant Acceleration Primary vs. Time



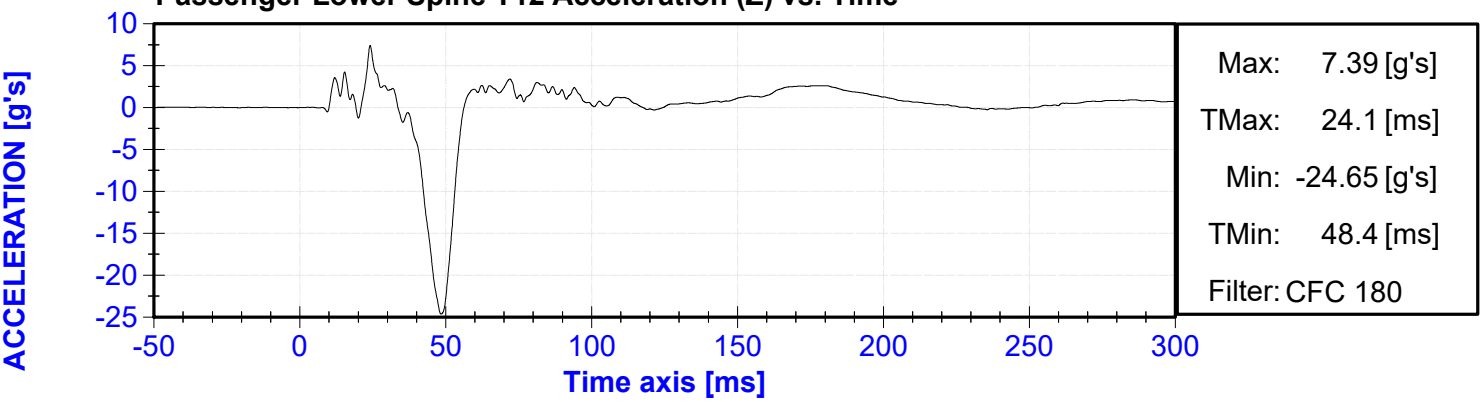
Passenger Lower Spine T12 Acceleration (X) vs. Time



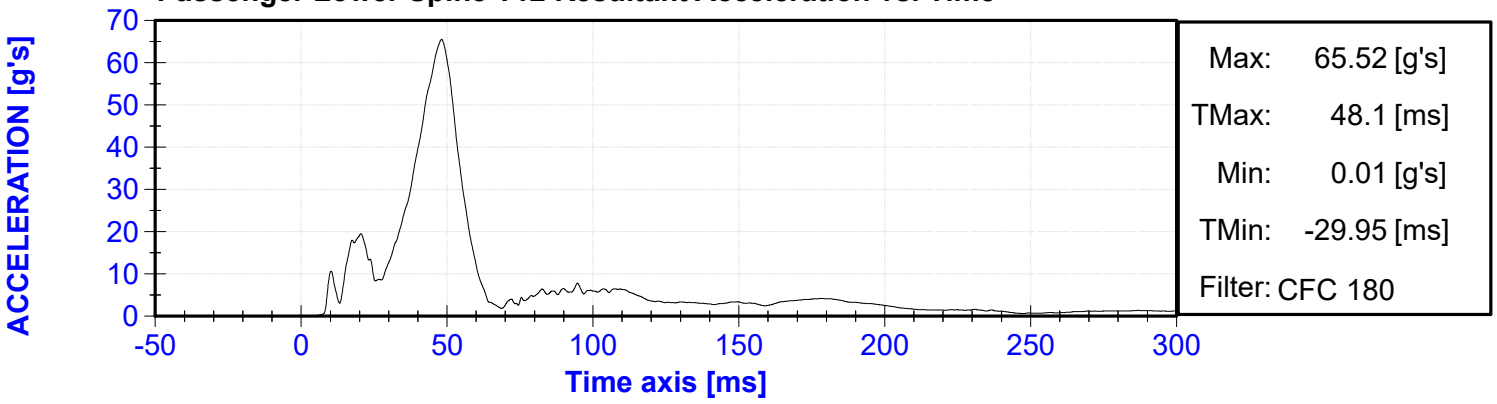
Passenger Lower Spine T12 Acceleration (Y) vs. Time



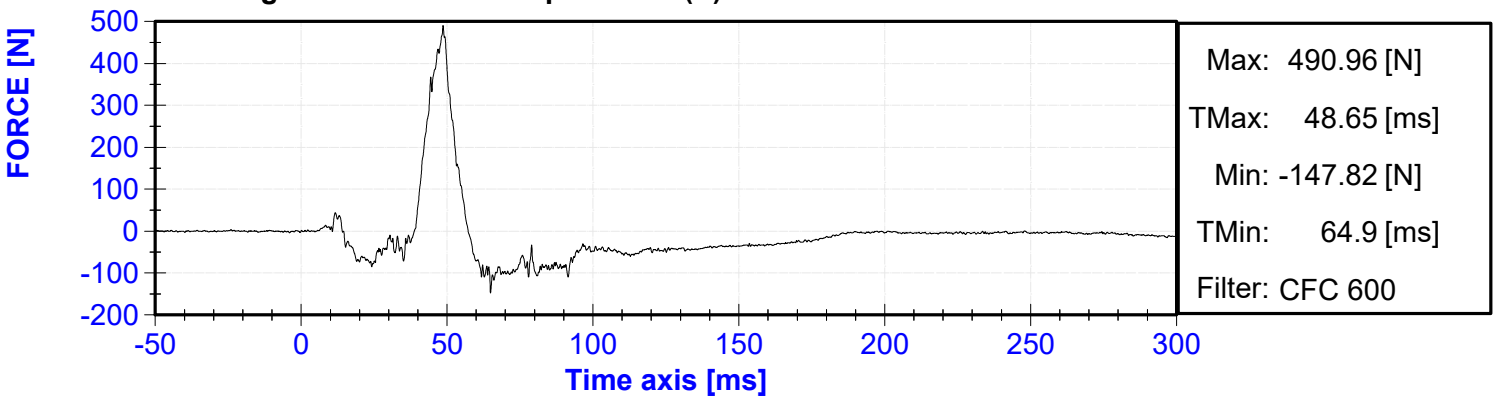
Passenger Lower Spine T12 Acceleration (Z) vs. Time



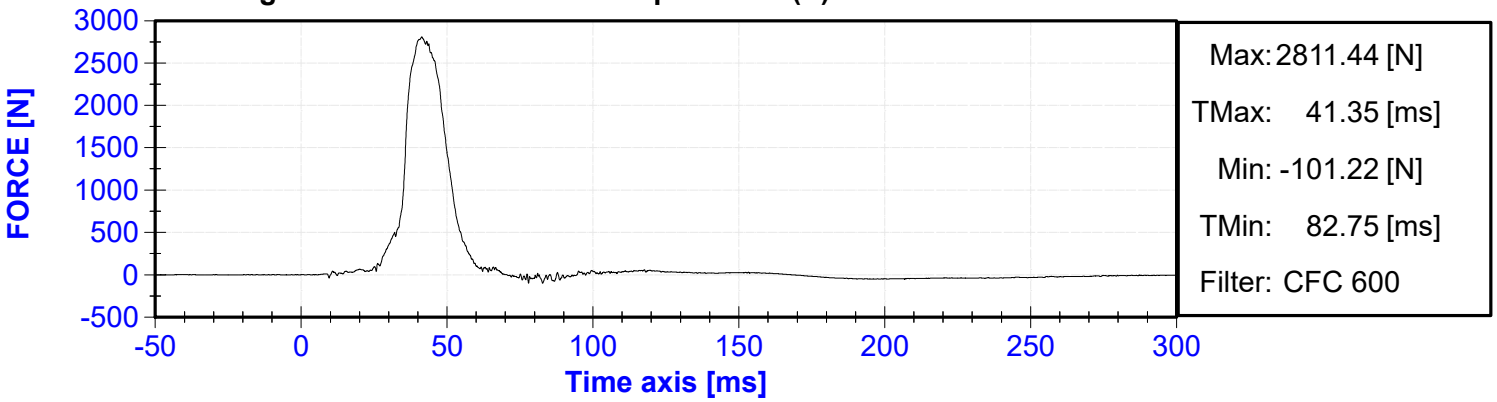
Passenger Lower Spine T12 Resultant Acceleration vs. Time



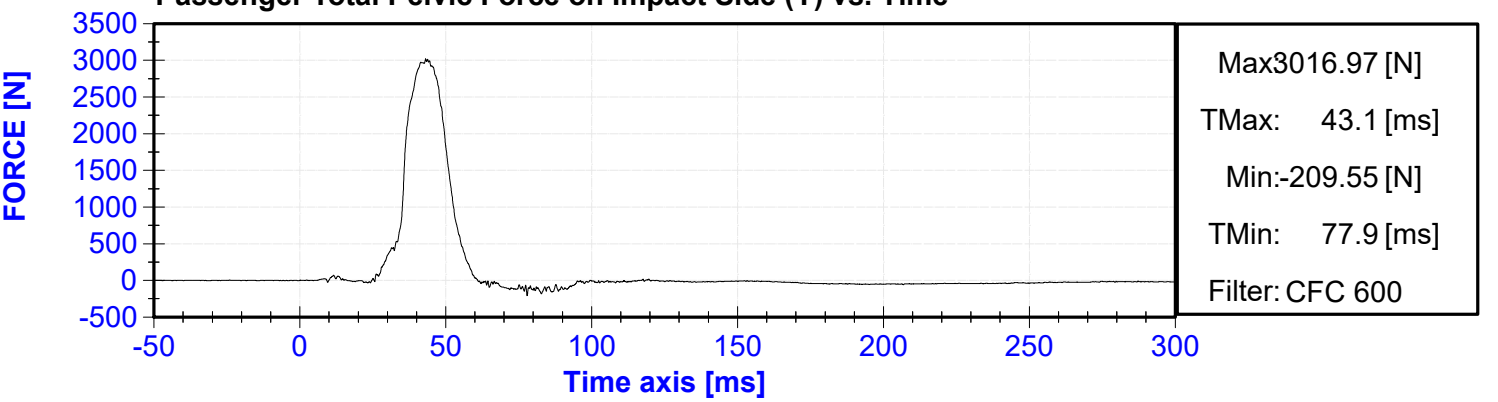
Passenger Iliac Force on Impact Side (Y) vs. Time



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 VERFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

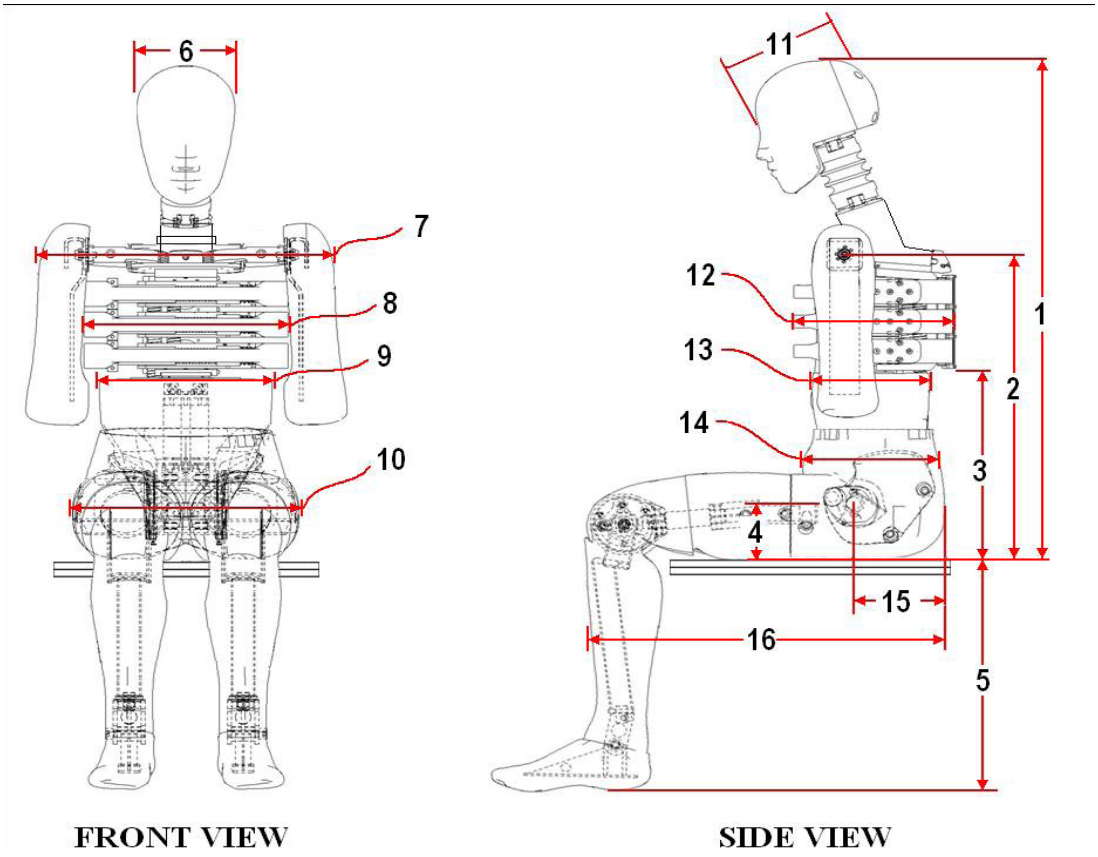
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - EuroSID-2re

Technician: J. Rios Date: 11/23/2024

Dummy Serial Number: F033



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	906	Pass
2	Seat to Shoulder Joint	558	572	559	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	351	Pass
4	Seat to Hip Joint (center of bolt)	97	103	101	Pass
5	Sole to Seat, Sitting	333	451	402	Pass
6	Head Width	152	158	153	Pass
7	Shoulder/Arm Width	461	479	468	Pass
8	Thorax Width	322	332	325	Pass
9	Abdomen Width	273	287	283	Pass
10	Pelvis Lap Width	359	373	363	Pass
11	Head Depth	196	206	201	Pass
12	Thorax Depth	262	272	269	Pass
13	Abdomen Depth	194	204	197	Pass
14	Pelvis Depth	235	245	242	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	154	Pass
16	Back of Buttocks to Front Knee	597	615	607	Pass

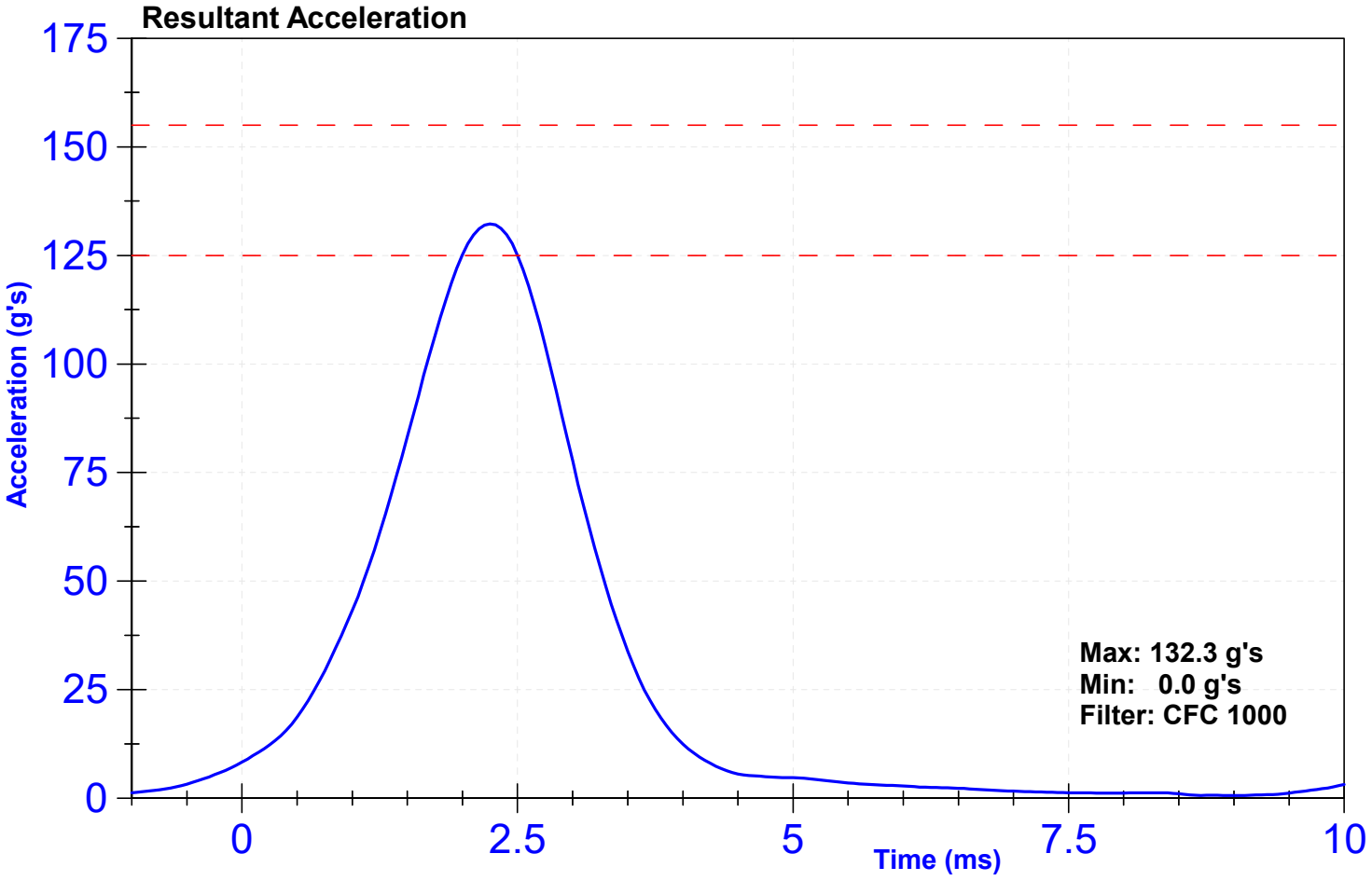
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

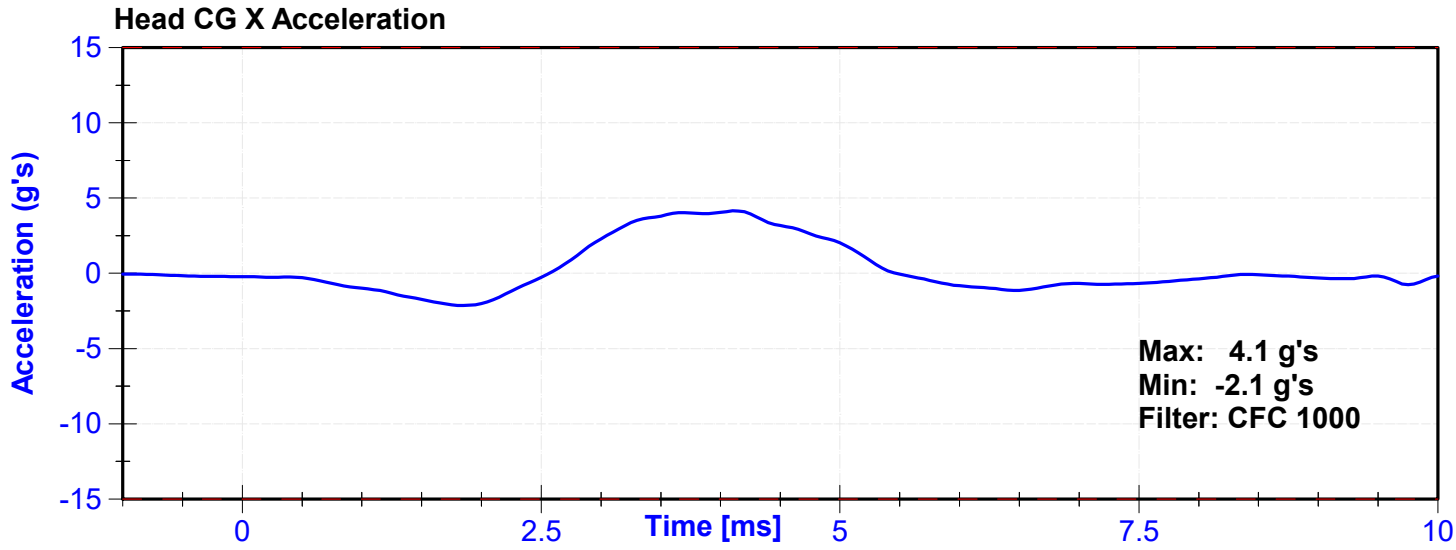
Results

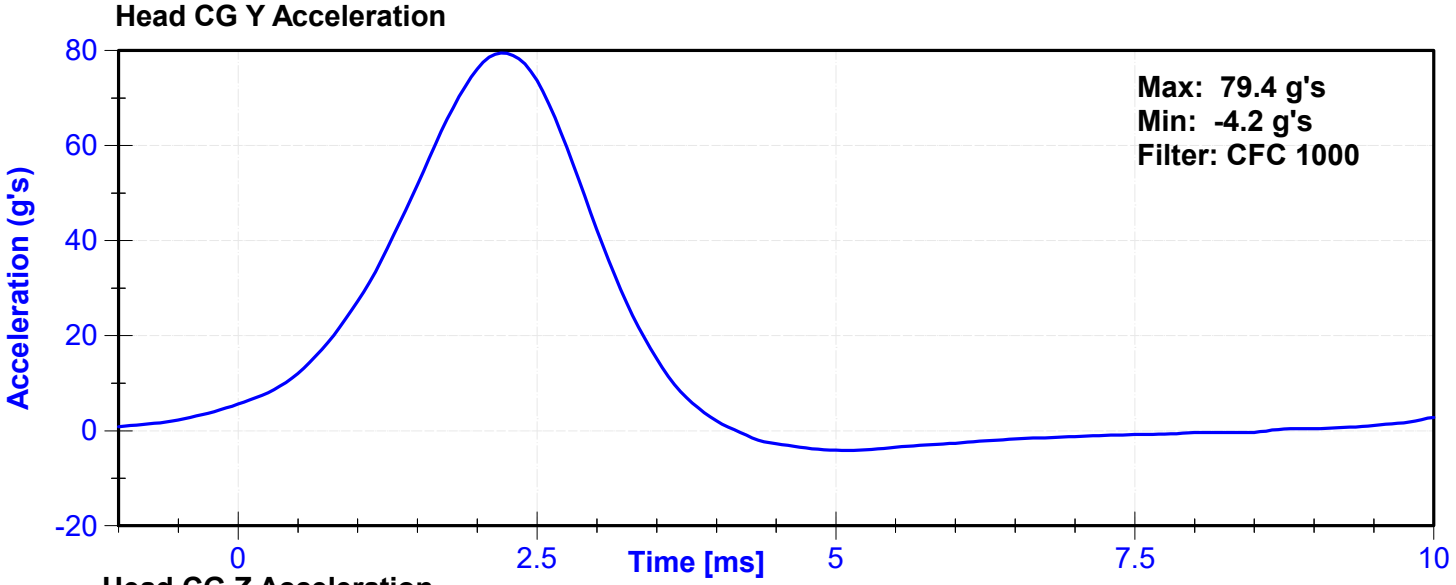
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	39	Pass
Resultant Acceleration	125	155	g's	132.3	Pass
Oscillation	0	15	%	2.85	Pass
Fore-Aft Acceleration	-15	15	g's	4.1	Pass

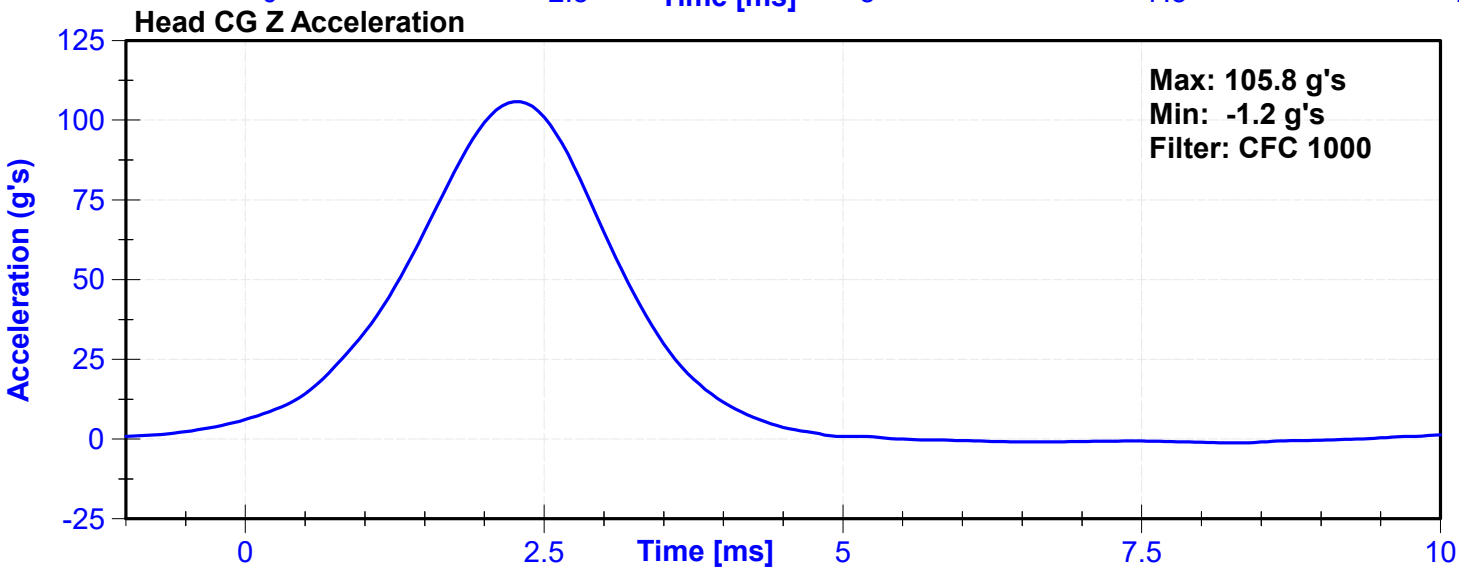
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P63861	10/17/2024	4/15/2025
Y Accelerometer	Endevco	P49216	10/17/2024	4/15/2025
Z Accelerometer	Endevco	P51303	10/17/2024	4/15/2025




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
Time [ms]
5
7.5
10
Max: 4.1 g's
Min: -2.1 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
80
60
40
20
0
-20
0
2.5
Time [ms]
5
7.5
10
Max: 79.4 g's
Min: -4.2 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
Time [ms]
5
7.5
10
Max: 105.8 g's
Min: -1.2 g's
Filter: CFC 1000

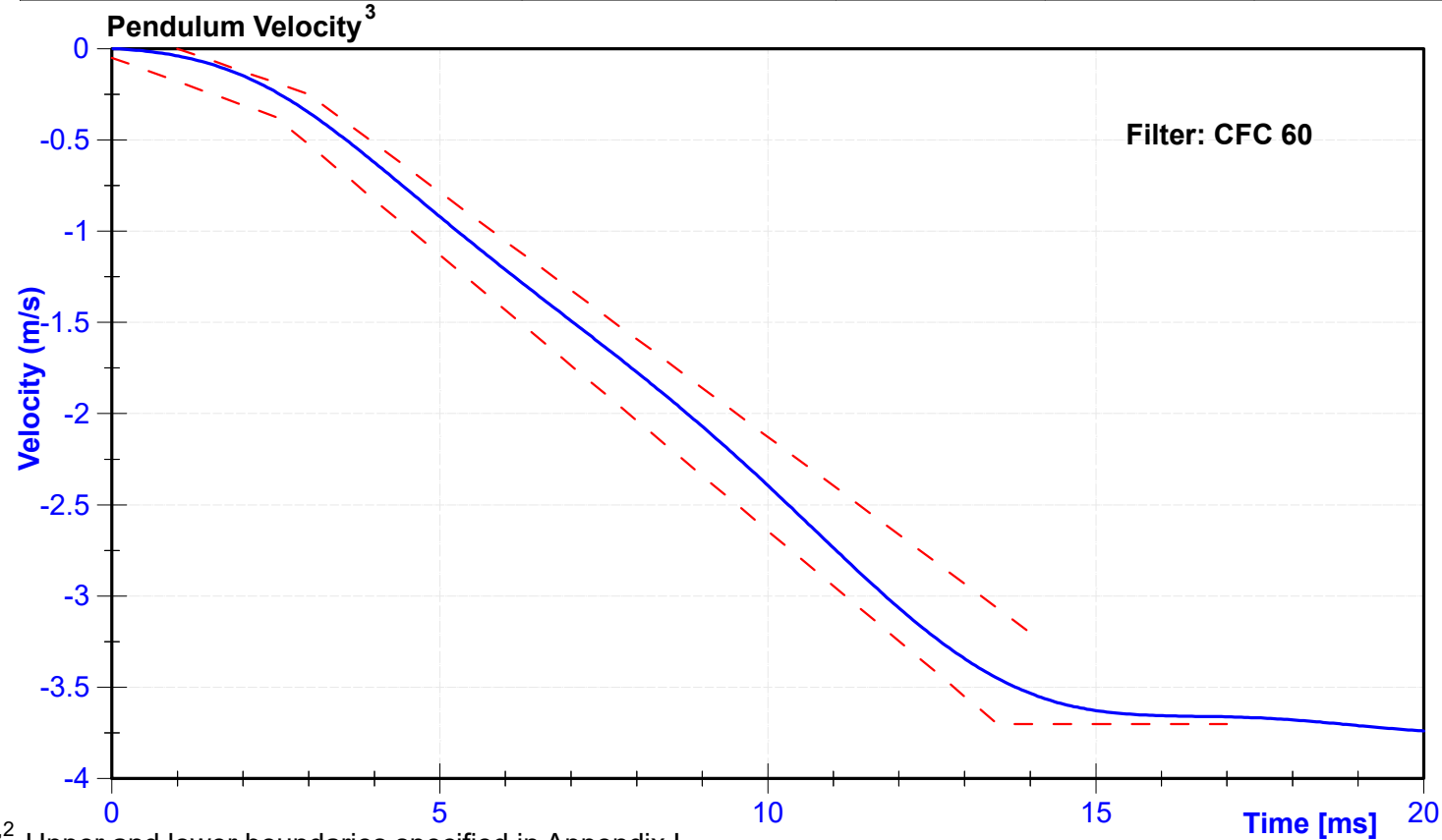
ATD Manufacturer	Humanetics	Test Technician	E.Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J.Kinderman

Results

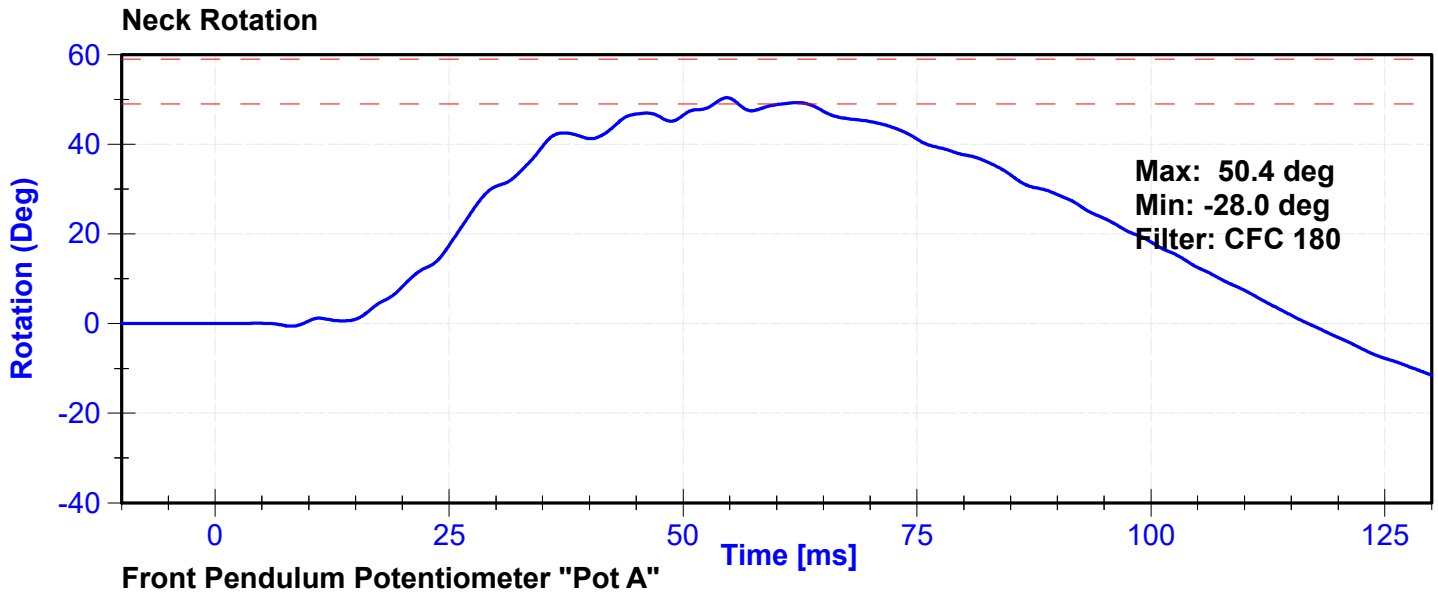
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	35	Pass
Velocity	3.3	3.5	m/s	3.45	Pass
Lateral Neck Rotation	49	59	deg	50.4	Pass
Time at Maximum Rotation	54	66	ms	54.7	Pass
Time of Rotation Decay from Maximum	53	88	ms	62.1	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

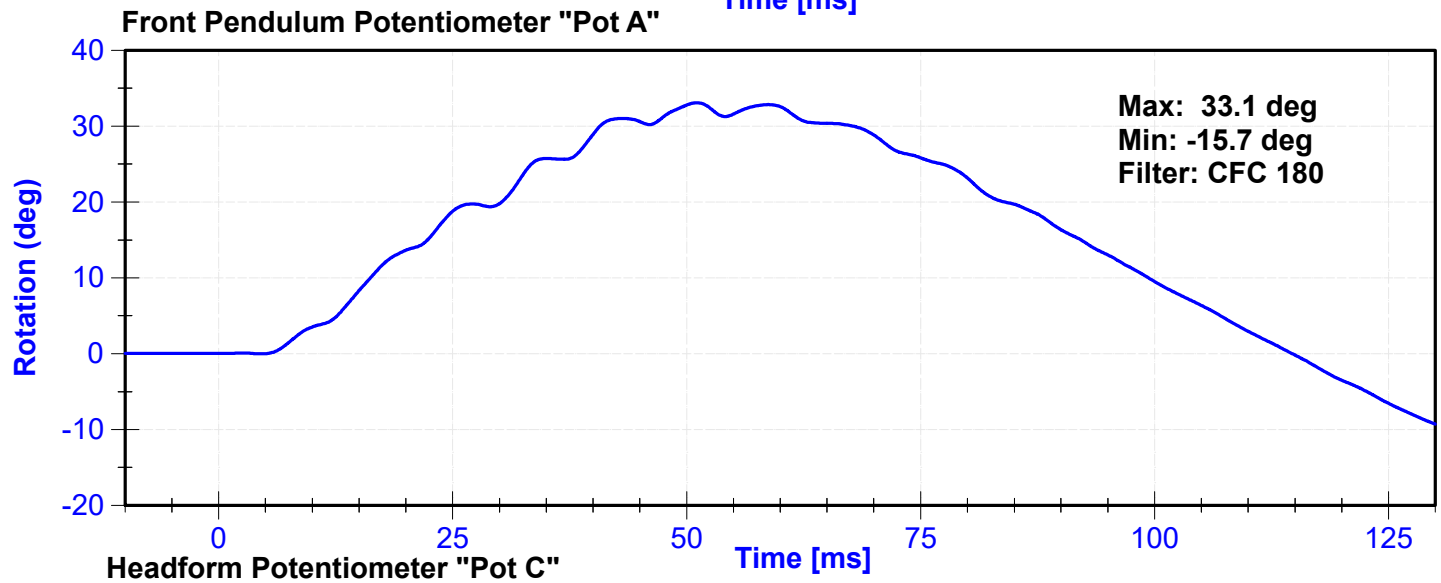
Transducer Calibrations

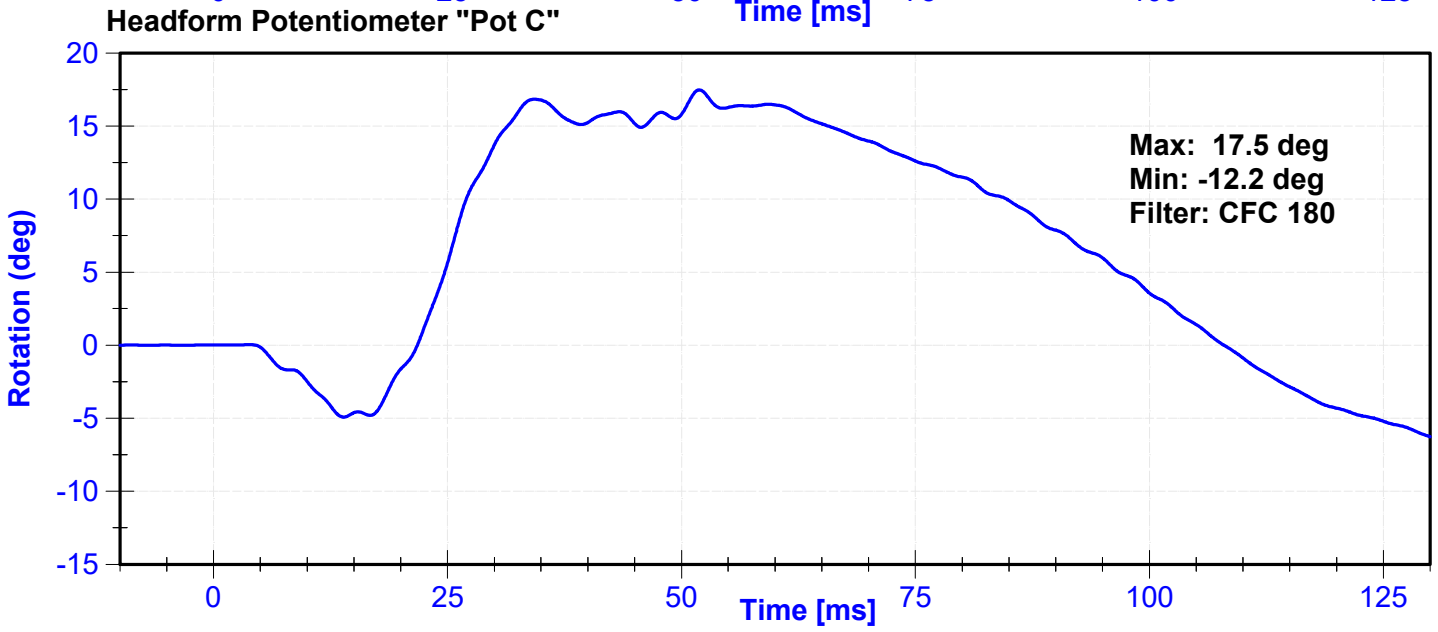
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Front Pendulum Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Headform Potentiometer	Sfernice	095	9/13/2024	9/13/2025



[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: 50.4 deg
Min: -28.0 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: 33.1 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: 17.5 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

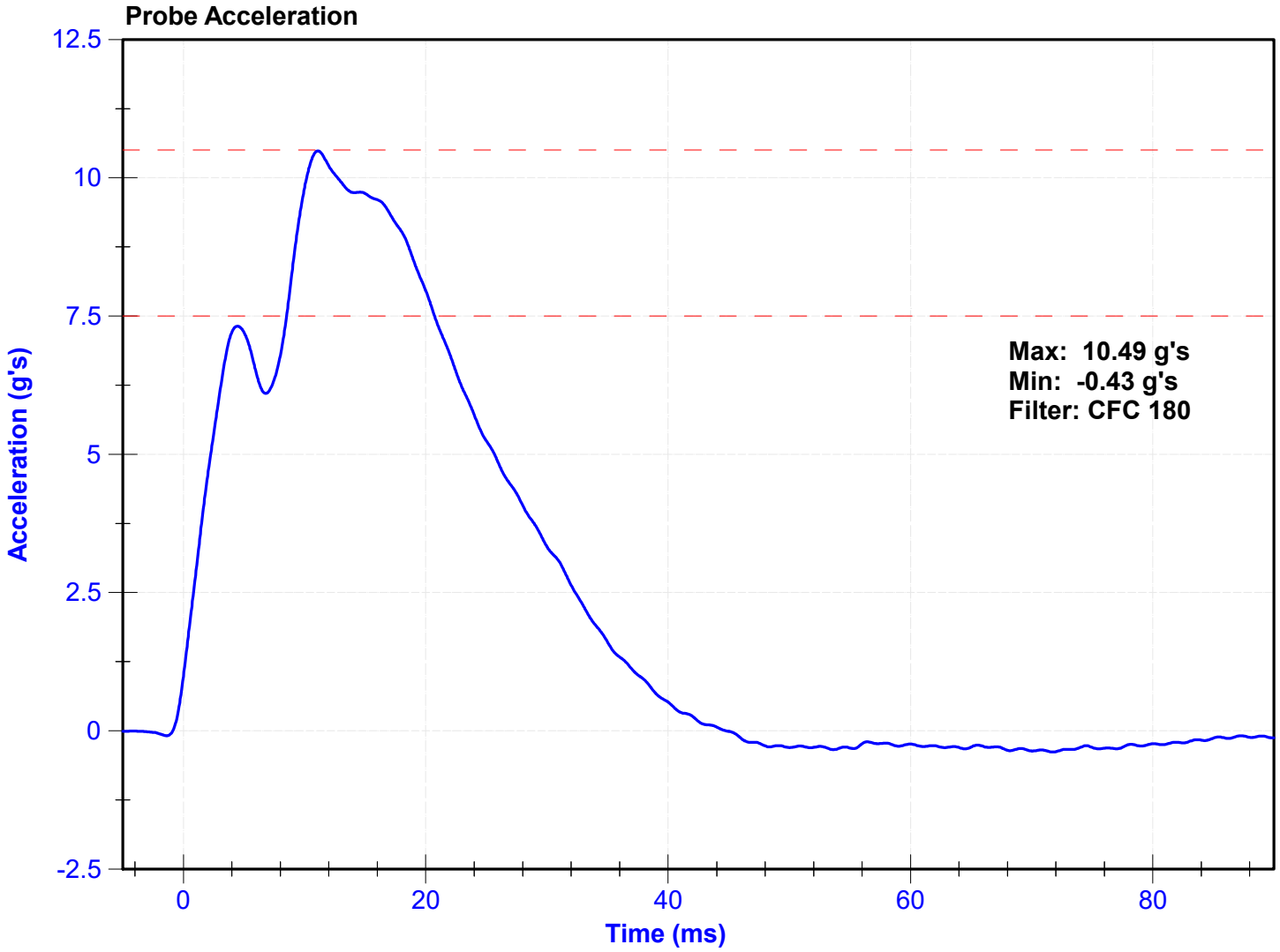
ATD Manufacturer	FTSS	Test Technician	E.Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J.Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	28	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	7.5	10.5	g's	10.49	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18599	9/13/2024	3/12/2025



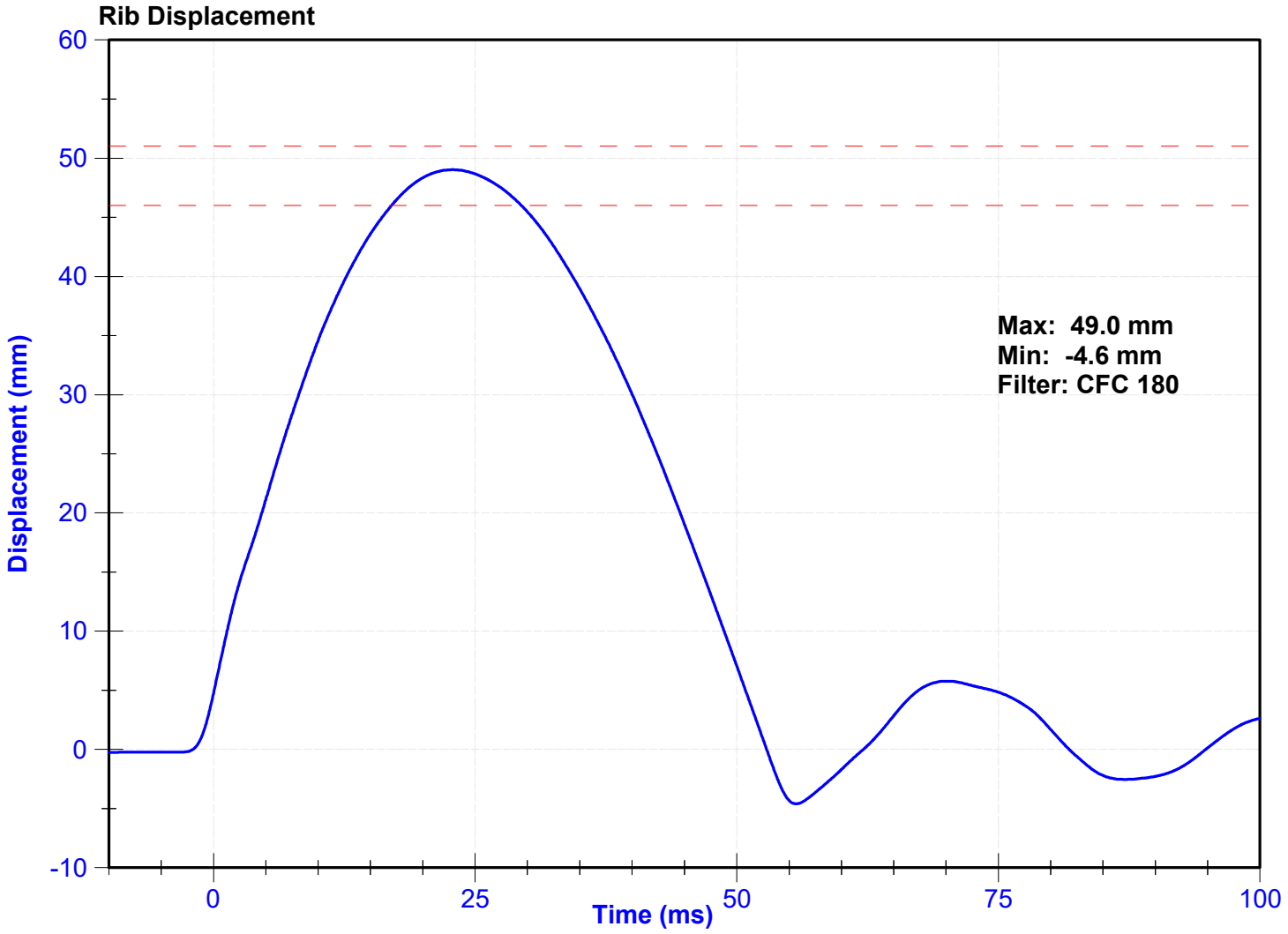
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	39	Pass
Rib Displacement	46	51	mm	49.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	10/16/2024	4/16/2025



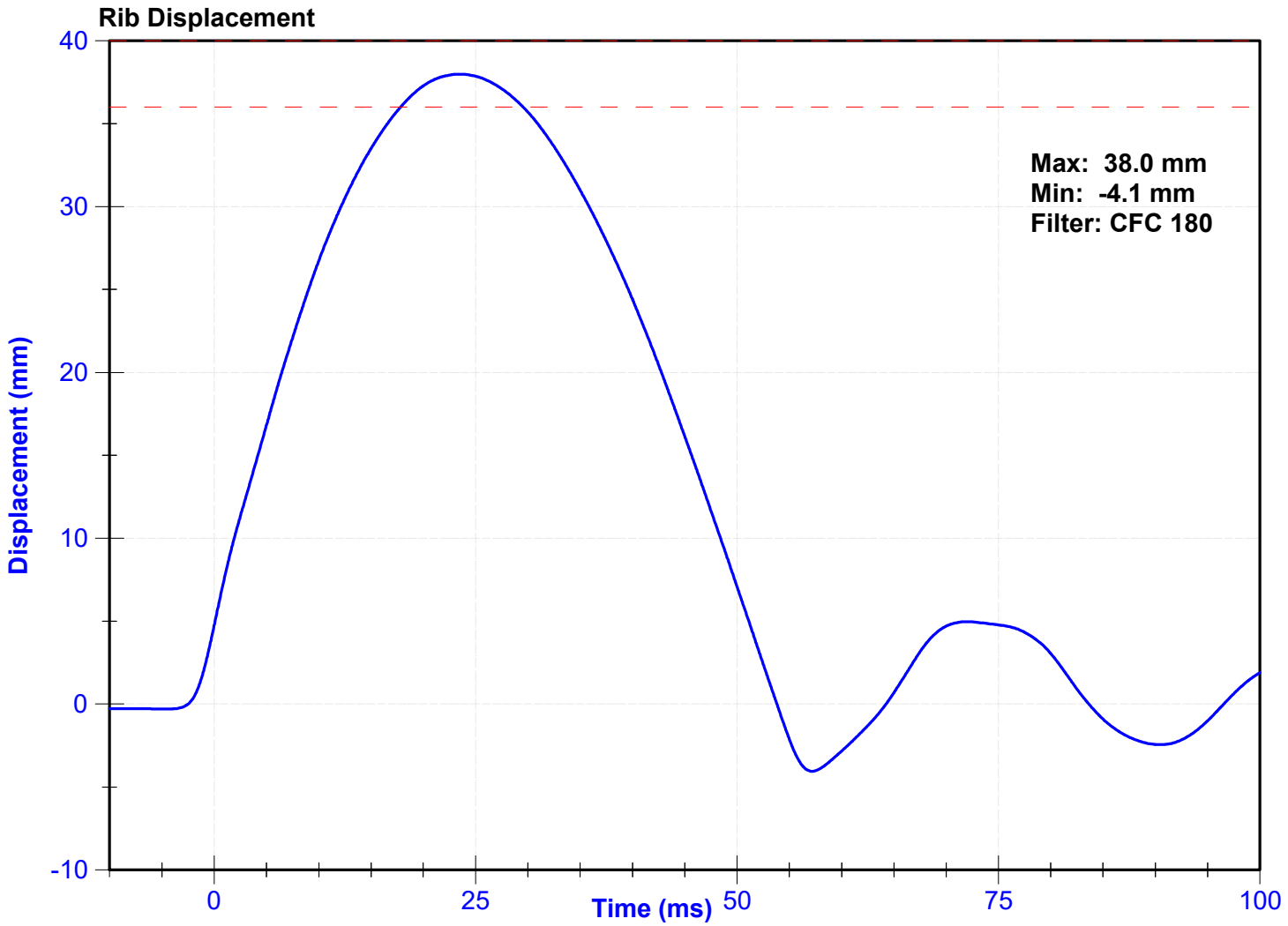
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	39	Pass
Rib Displacement	36	40	mm	38.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	10/16/2024	4/16/2025



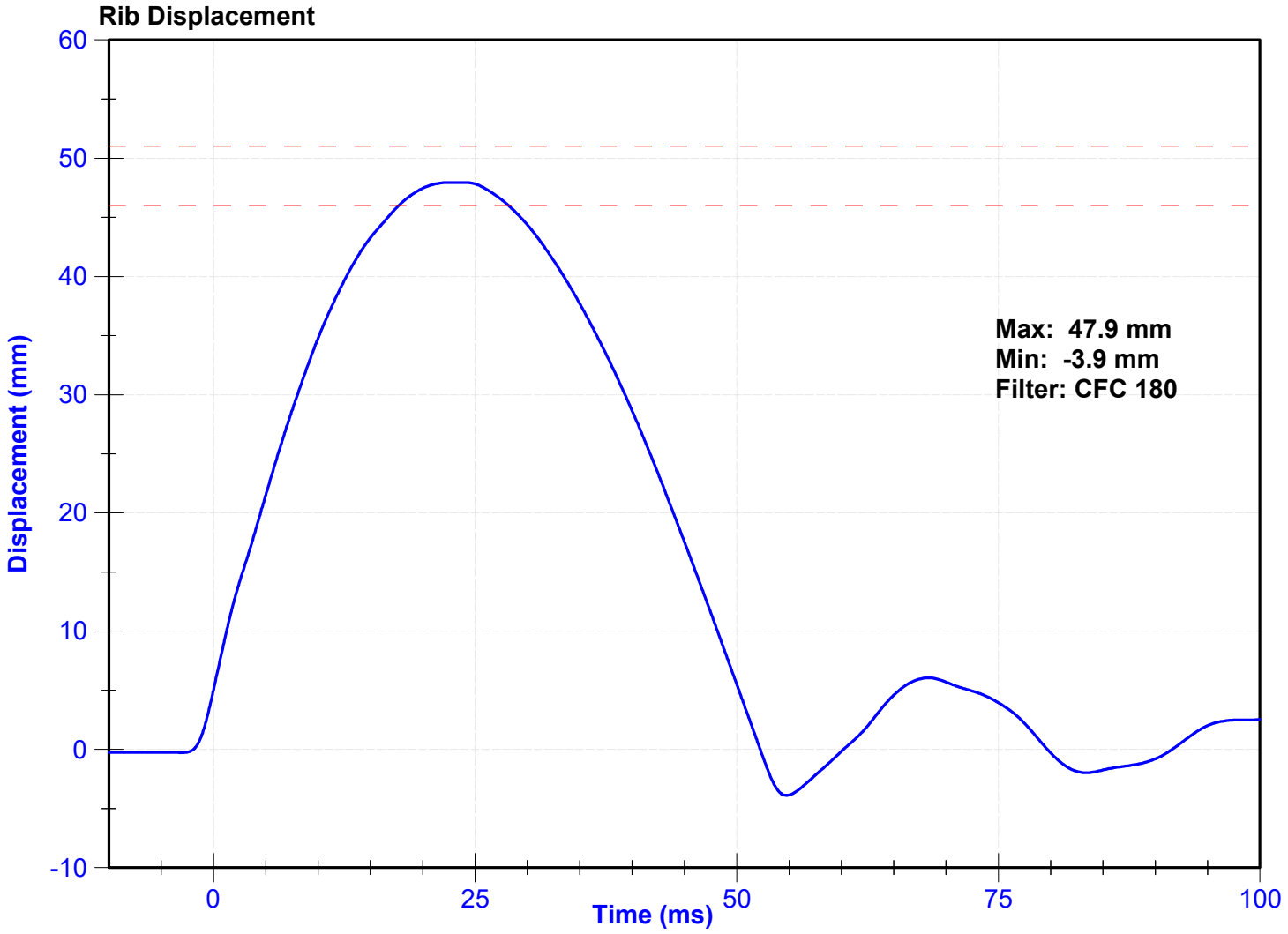
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	39	Pass
Rib Displacement	46	51	mm	47.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	10/16/2024	4/16/2025



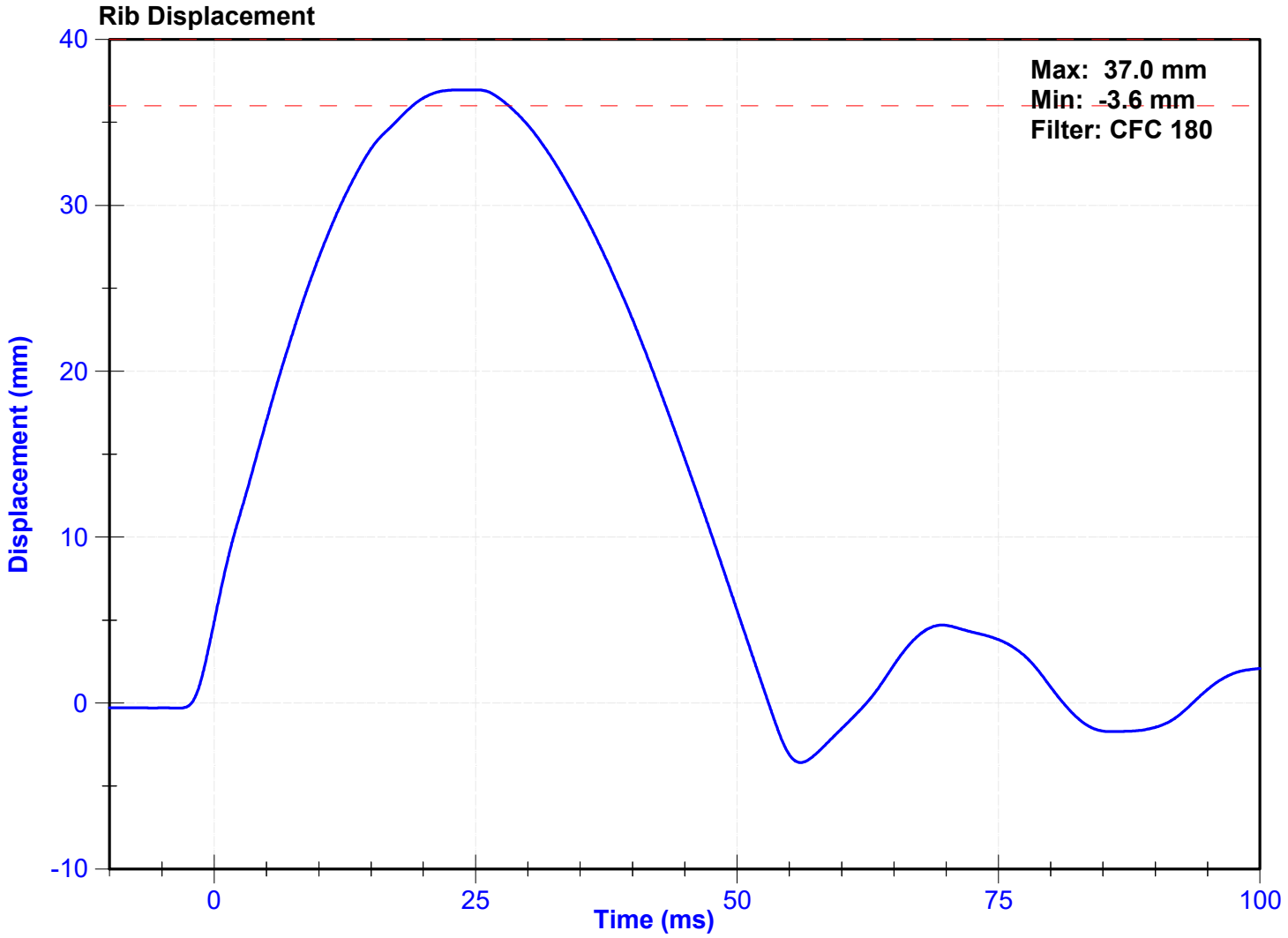
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	39	Pass
Rib Displacement	36	40	mm	37.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	10/16/2024	4/16/2025



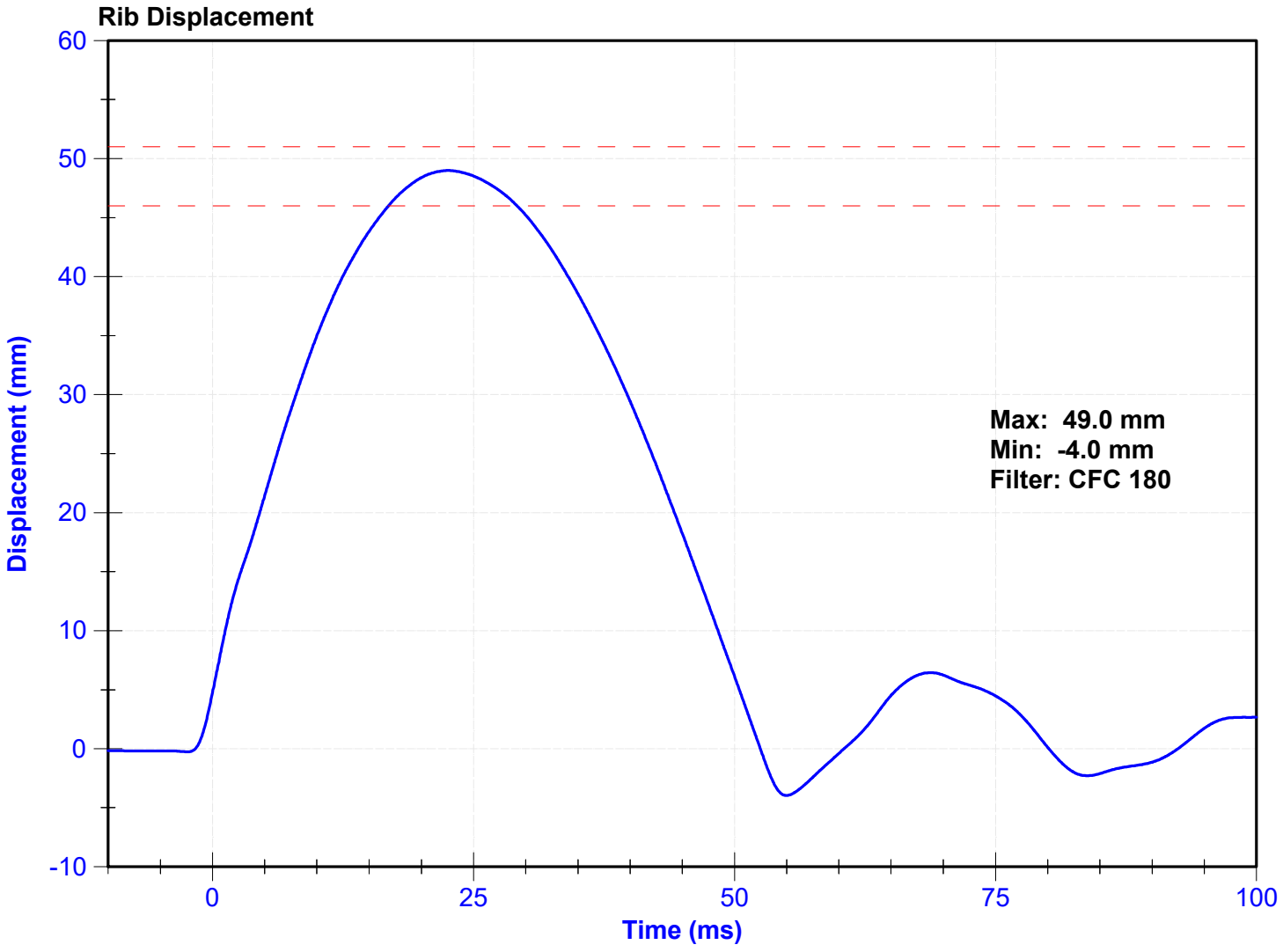
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	39	Pass
Rib Displacement	46	51	mm	49.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	184GFE	11/19/2024	5/20/2025



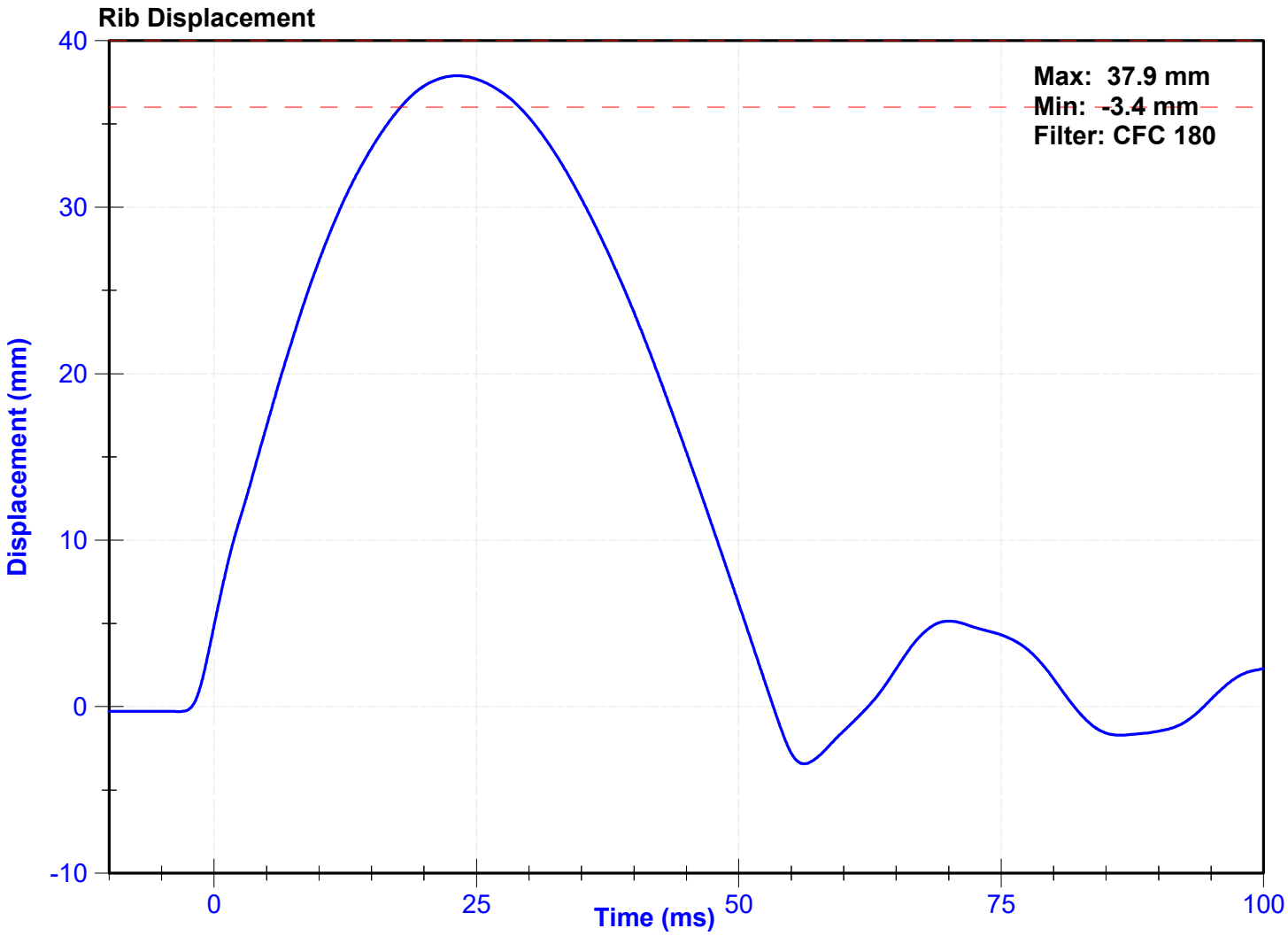
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	39	Pass
Rib Displacement	36	40	mm	37.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	184GFE	11/19/2024	5/20/2025



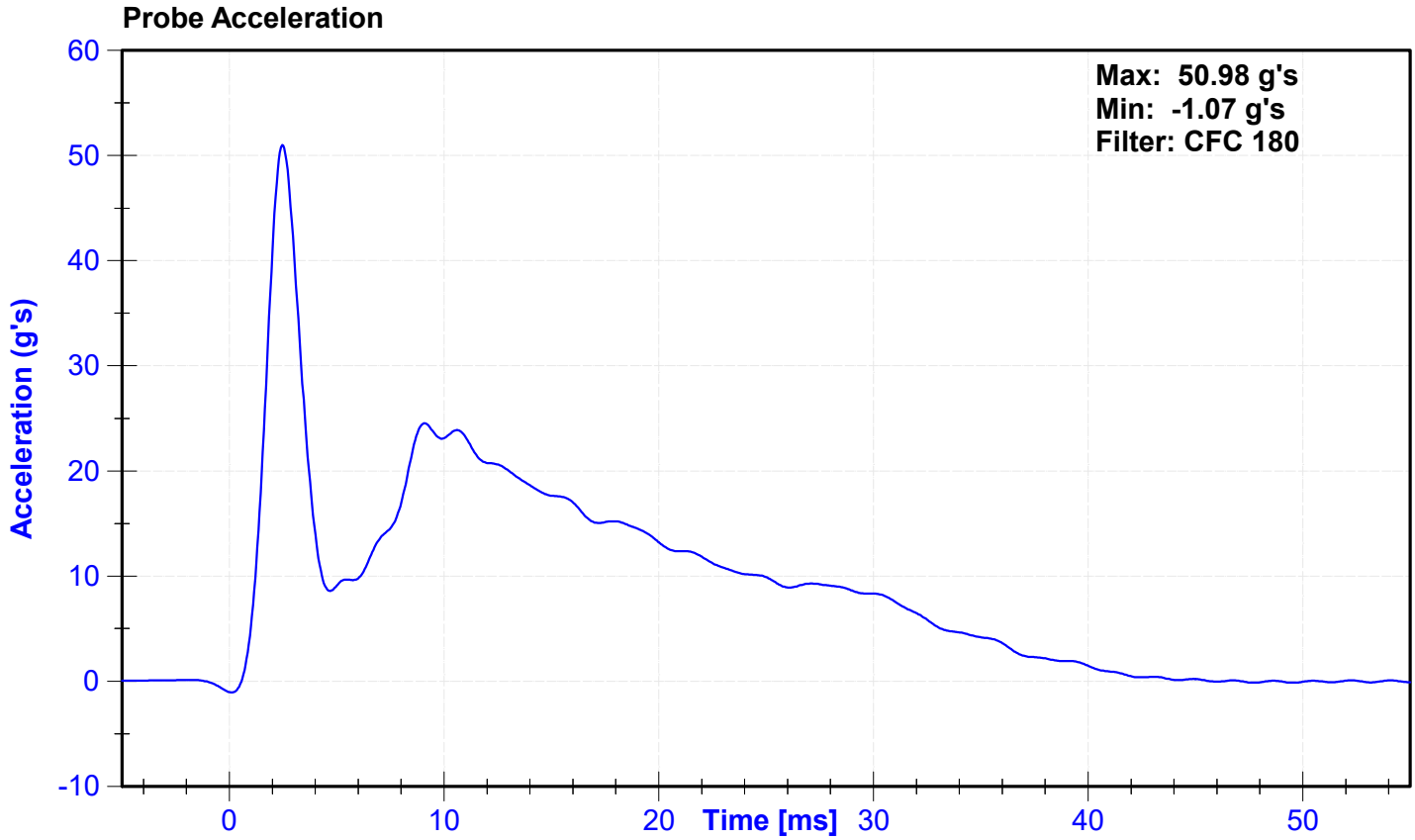
ATD Manufacturer	FTSS	Test Technician	E.Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J.Kinderman

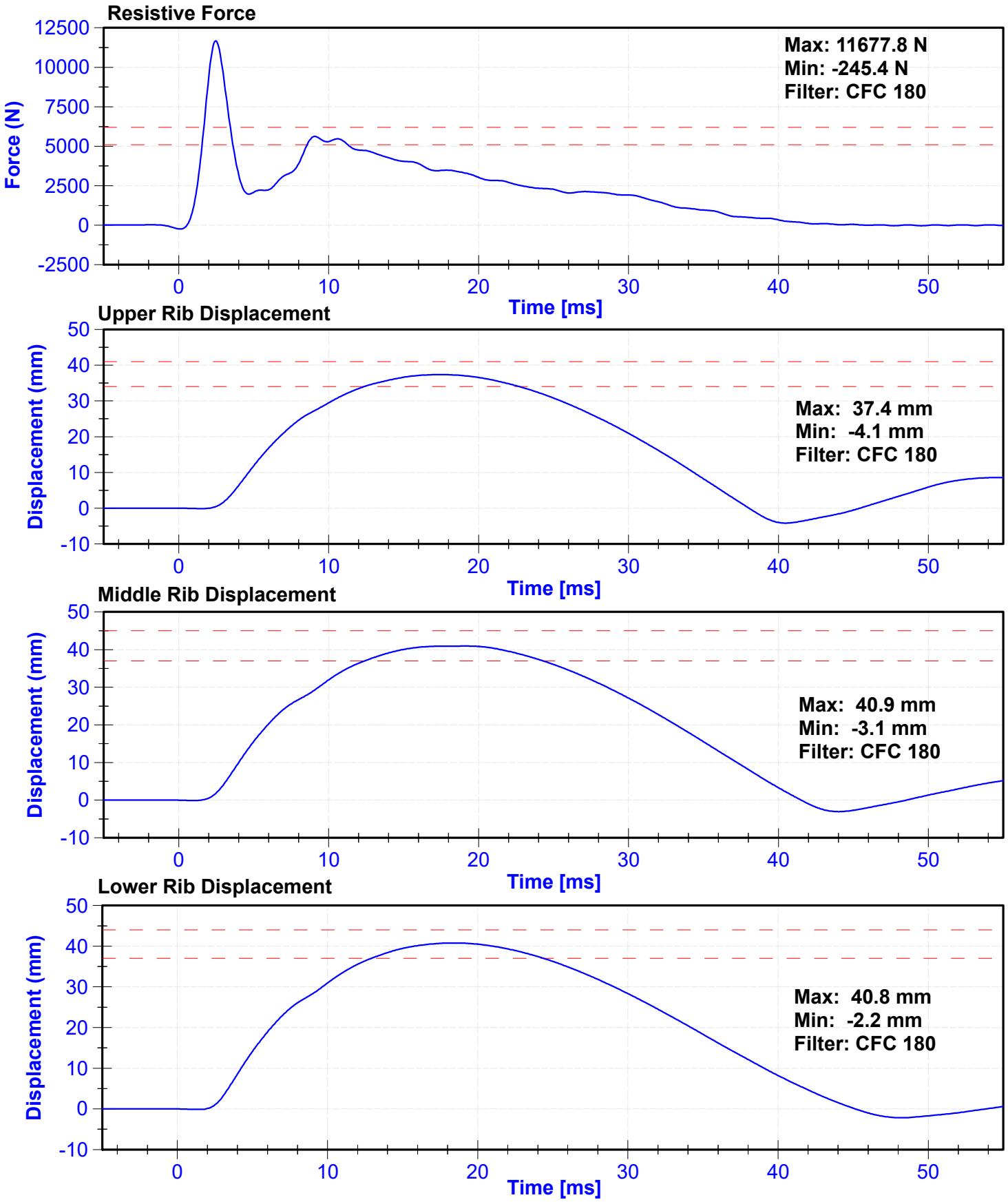
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	28	Pass
Velocity	5.4	5.6	m/s	5.55	Pass
Resistive Force after 6ms	5100	6200	N	5619.4	Pass
Upper Thorax Rib Deflection	34	41	mm	37.4	Pass
Mid Thorax Rib Deflection	37	45	mm	40.9	Pass
Lower Thorax Rib Deflection	37	44	mm	40.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Upper Thorax Rib Potentiometer	Honeywell	179GFE	10/16/2024	4/16/2025
Middle Thorax Rib Potentiometer	Honeywell	185GFE	10/16/2024	4/16/2025
Lower Thorax Rib Potentiometer	Honeywell	184GFE	11/19/2024	5/20/2025




Resistive Force
Force (N)
Max: 11677.8 N
Min: -245.4 N
Filter: CFC 180
Time [ms]
Upper Rib Displacement
Displacement (mm)
Max: 37.4 mm
Min: -4.1 mm
Filter: CFC 180
Time [ms]
Middle Rib Displacement
Displacement (mm)
Max: 40.9 mm
Min: -3.1 mm
Filter: CFC 180
Time [ms]
Lower Rib Displacement
Displacement (mm)
Max: 40.8 mm
Min: -2.2 mm
Filter: CFC 180
Time [ms]

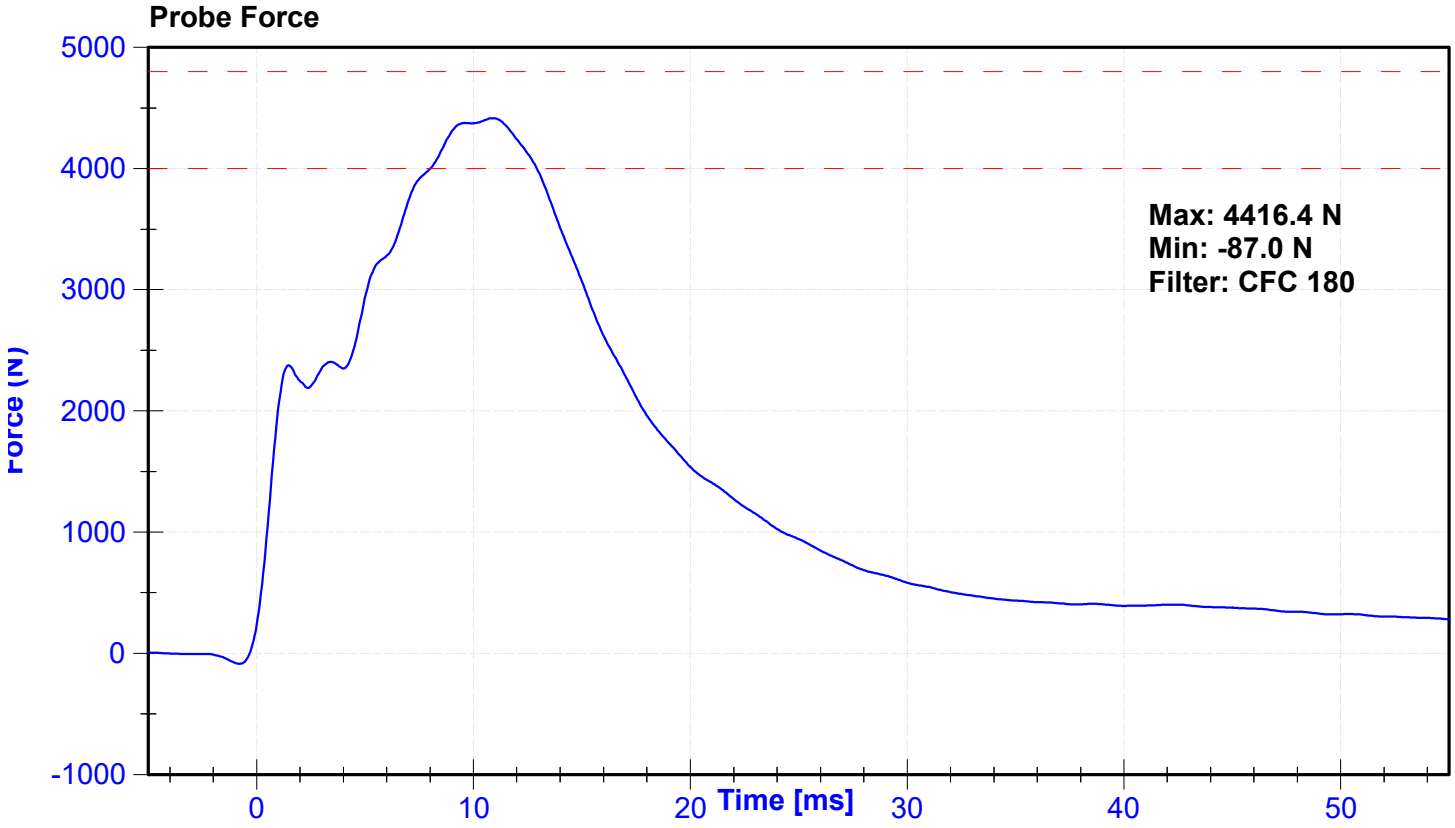
ATD Manufacturer	FTSS	Test Technician	E.Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J.Kinderman

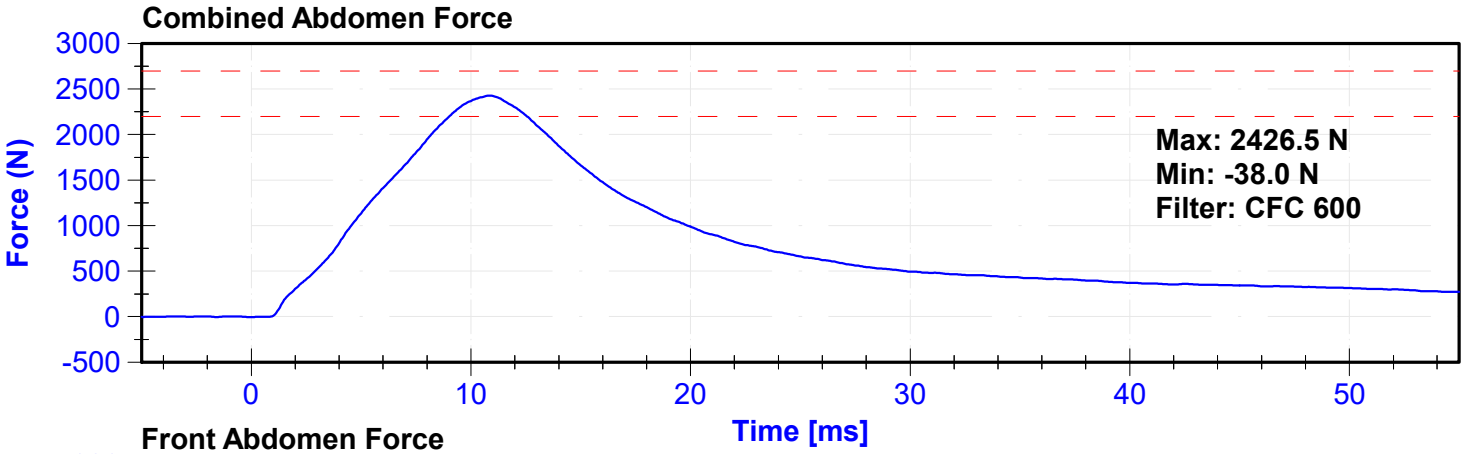
Results

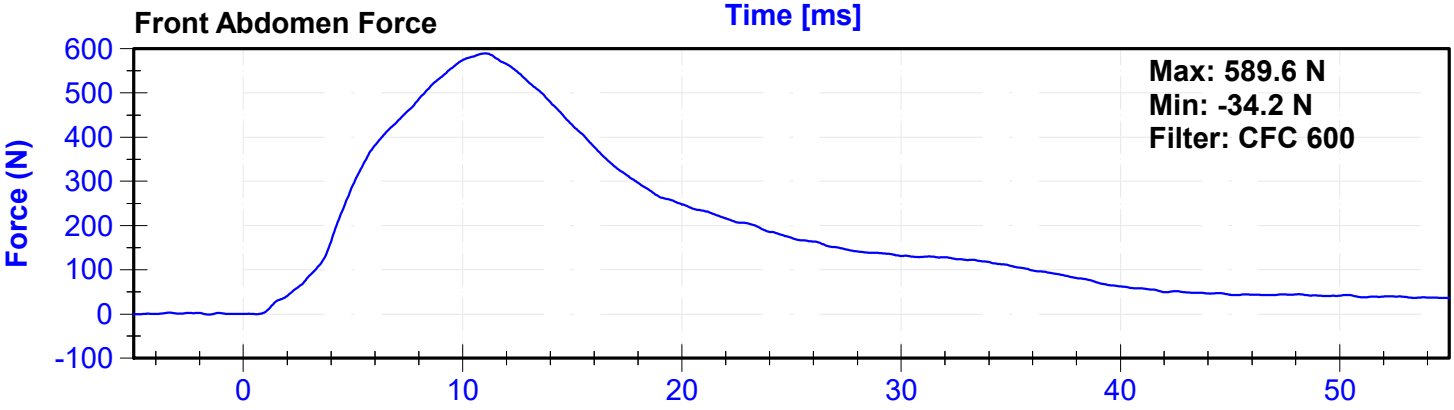
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	28	Pass
Velocity	3.9	4.1	m/s	4.03	Pass
Combined Abdomen Force	2200	2700	N	2426.5	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.85	Pass
Resistive Probe Force	4000	4800	N	4416.4	Pass
Time at Peak Resistive Force	10.6	13.0	ms	10.90	Pass

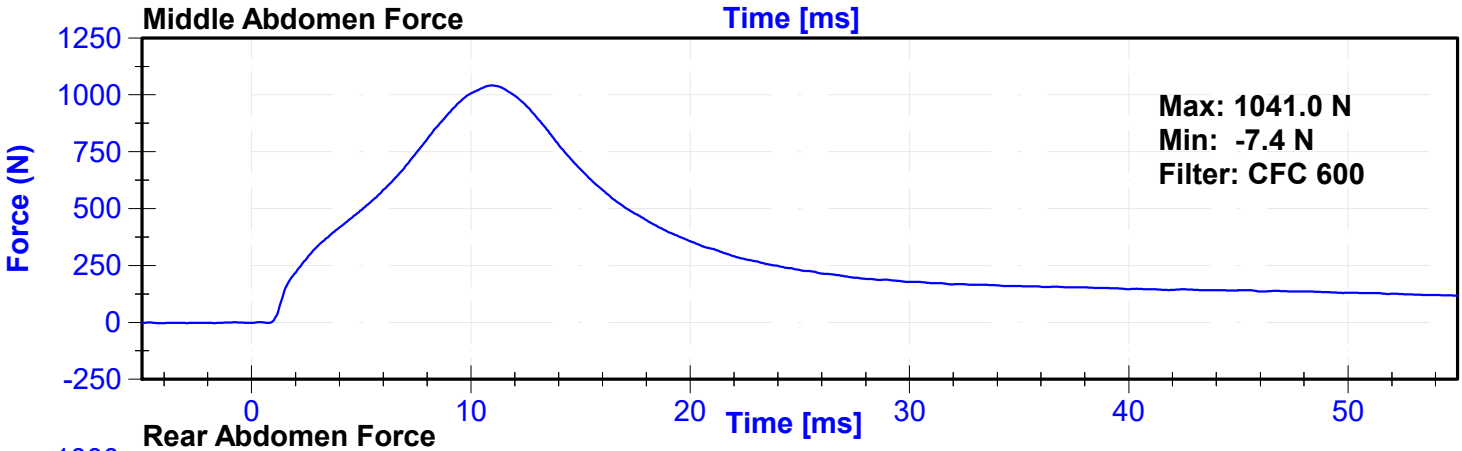
Transducer Calibrations

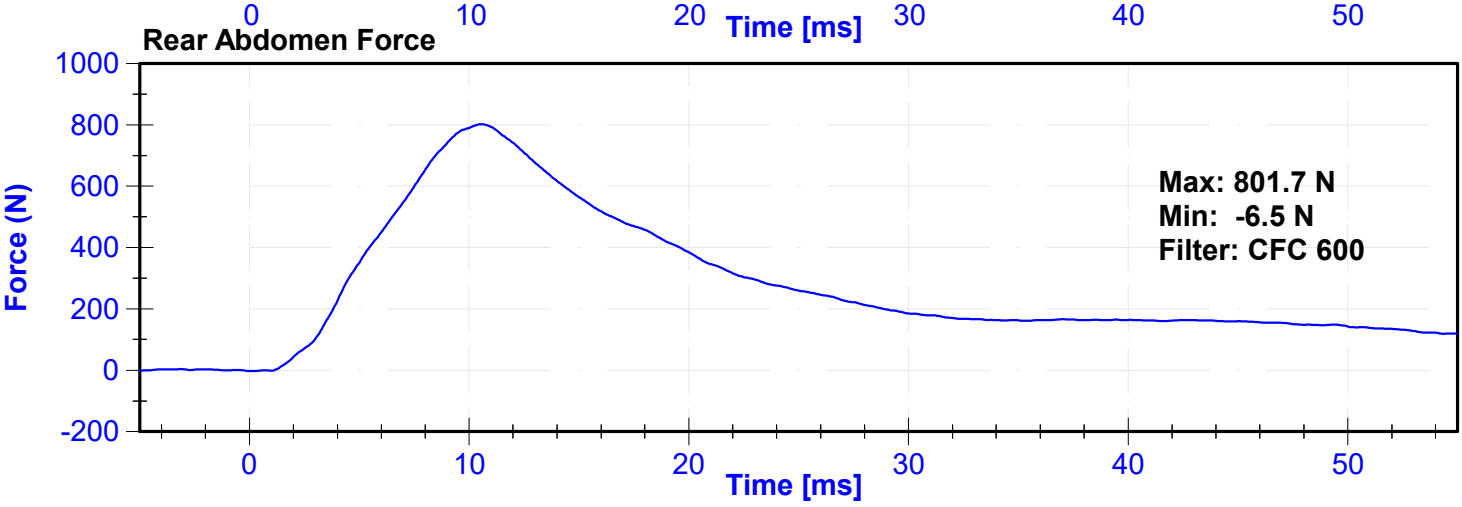
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Front Abdomen Load Cell	Denton	1523	10/28/2024	10/28/2025
Middle Abdomen Load Cell	Denton	1524	10/28/2024	10/28/2025
Rear Abdomen Load Cell	Denton	1530	10/28/2024	10/28/2025




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2426.5 N
Min: -38.0 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 589.6 N
Min: -34.2 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1041.0 N
Min: -7.4 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 801.7 N
Min: -6.5 N
Filter: CFC 600

ATD Manufacturer	Humanetics	Test Technician	E.Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J.Kinderman

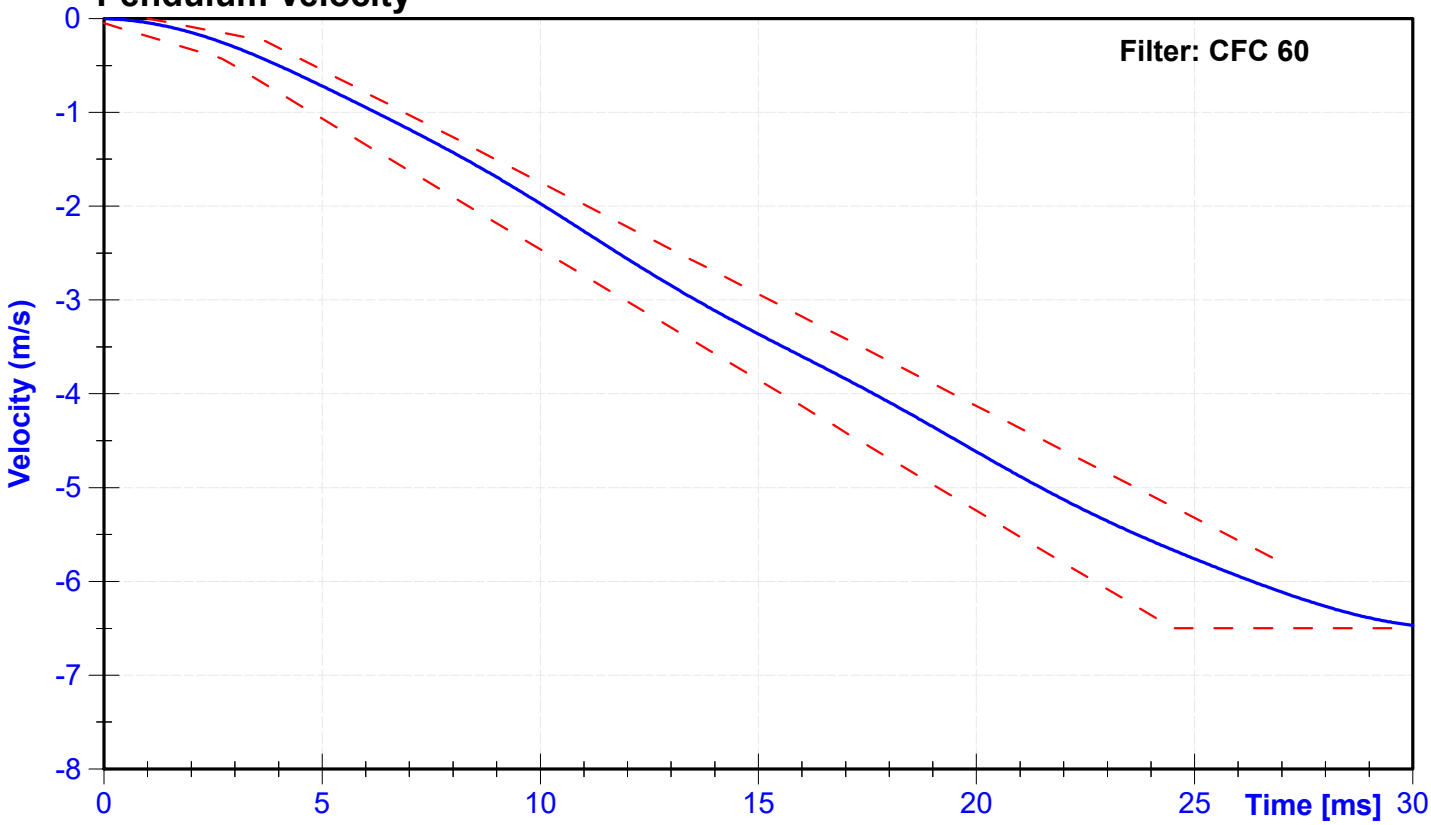
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	35	Pass
Velocity	5.95	6.15	m/s	6.150	Pass
Lateral Spine Rotation	45	55	deg	46.3	Pass
Time at Maximum Rotation	39	53	ms	42.7	Pass
Time of Decay to Zero Degrees	37	57	ms	37.7	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

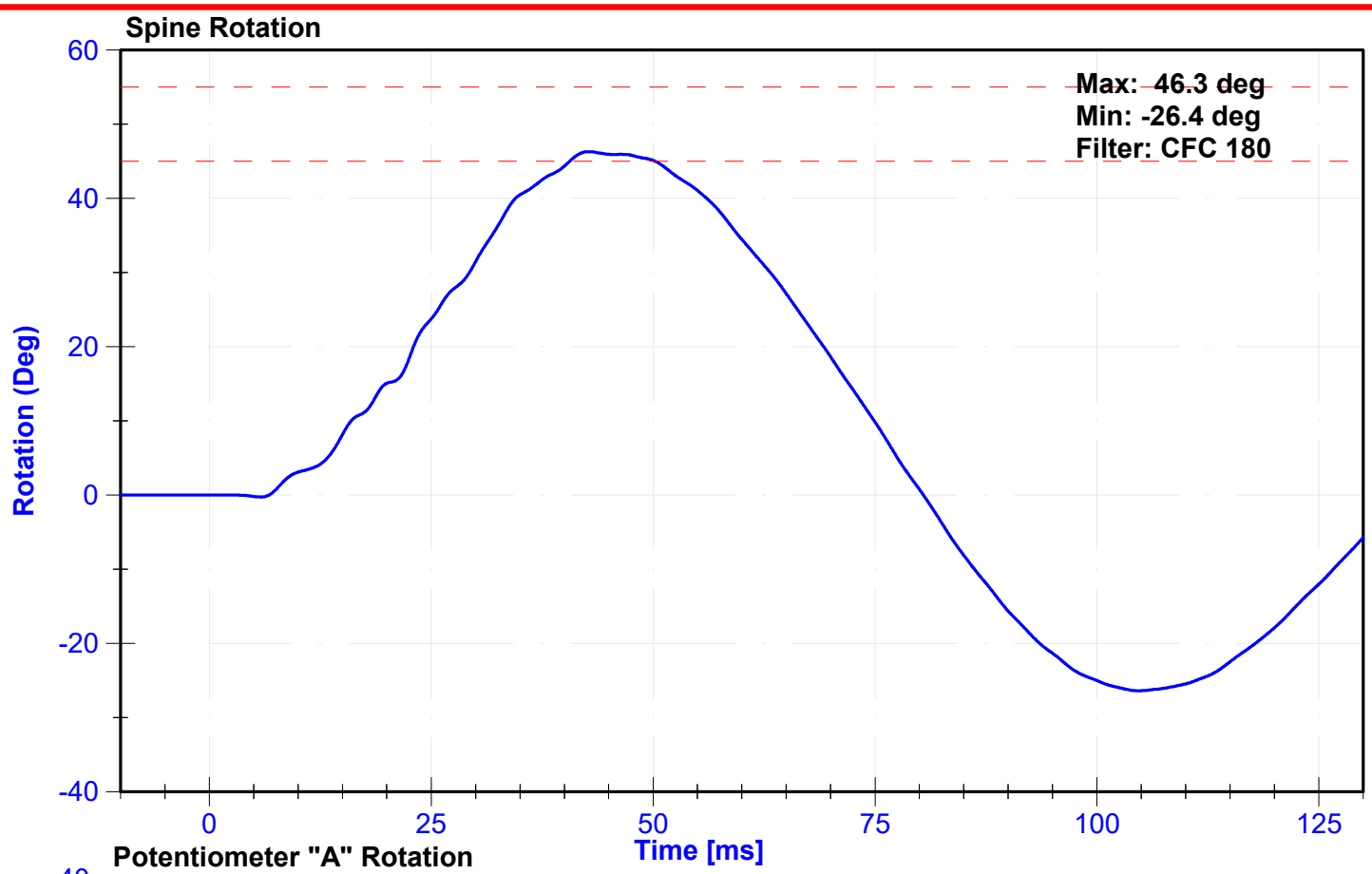
Transducer Calibrations

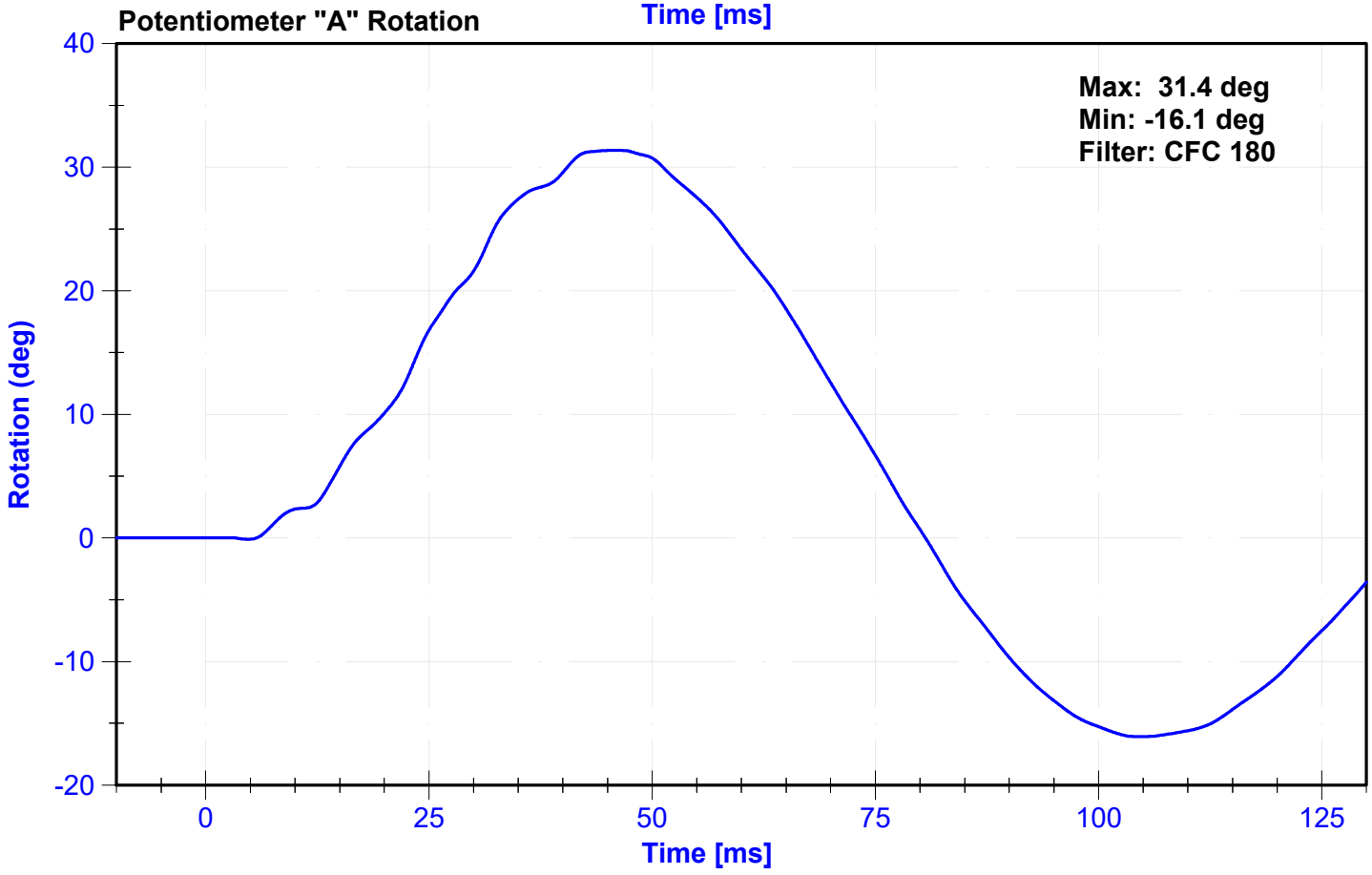
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Pendulum "A" Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Condyle "B" Potentiometer	Sfernice	095	9/13/2024	9/13/2025

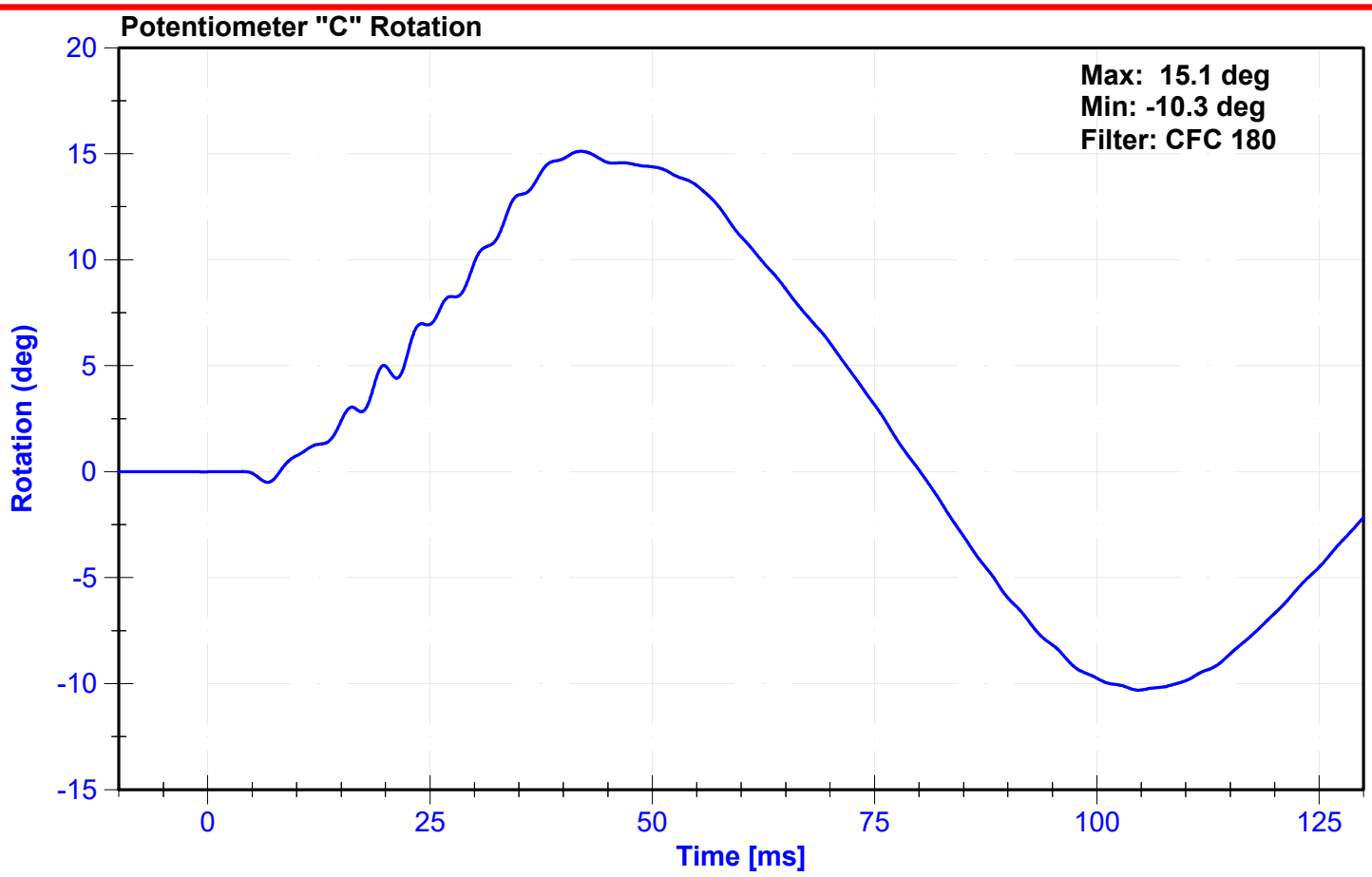
Pendulum Velocity[3]



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


Spine Rotation
Max: 46.3 deg
Min: -26.4 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 31.4 deg
Min: -16.1 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]



Appendix I

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

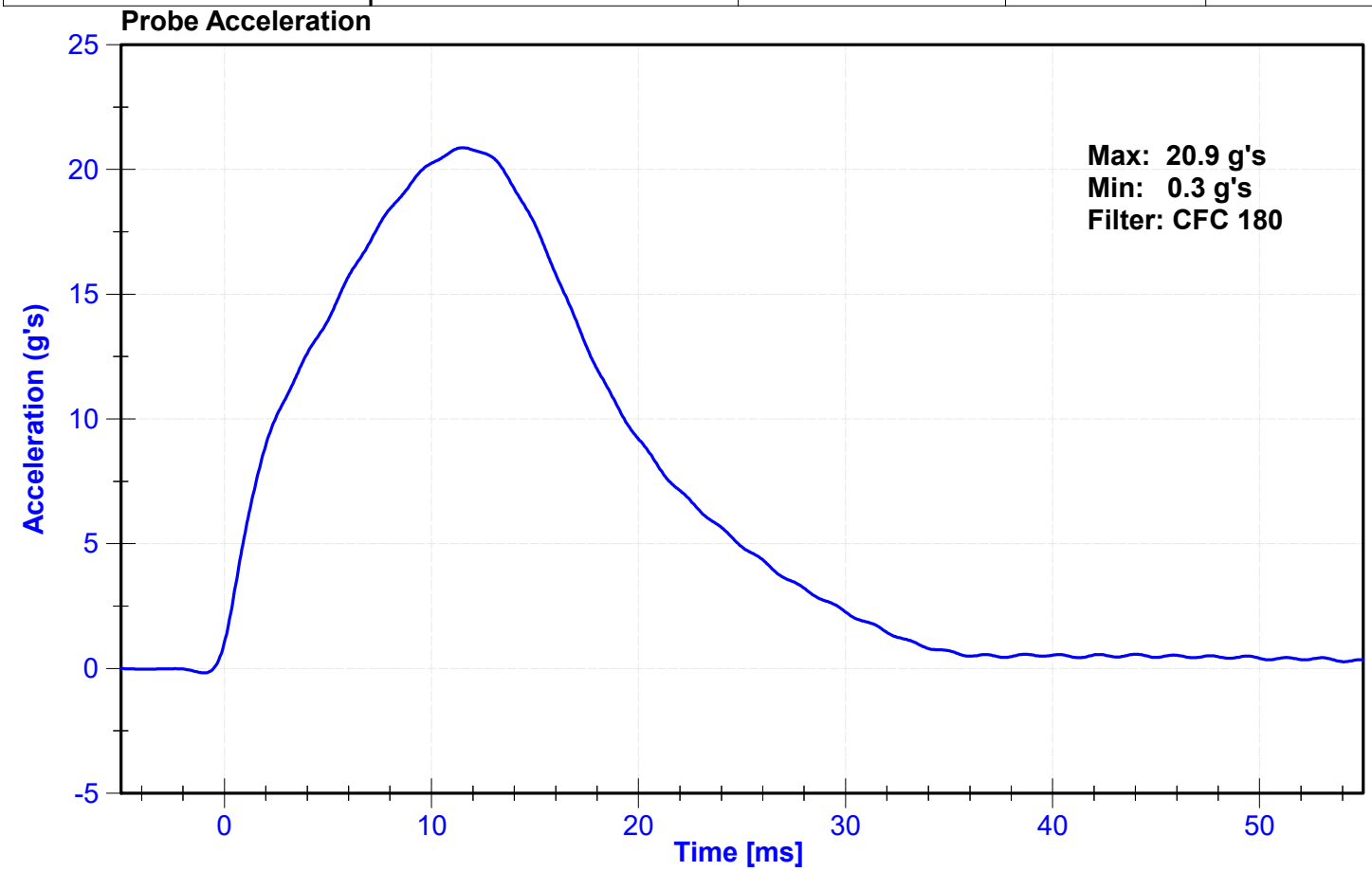
ATD Manufacturer	FTSS	Test Technician	E.Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J.Kinderman

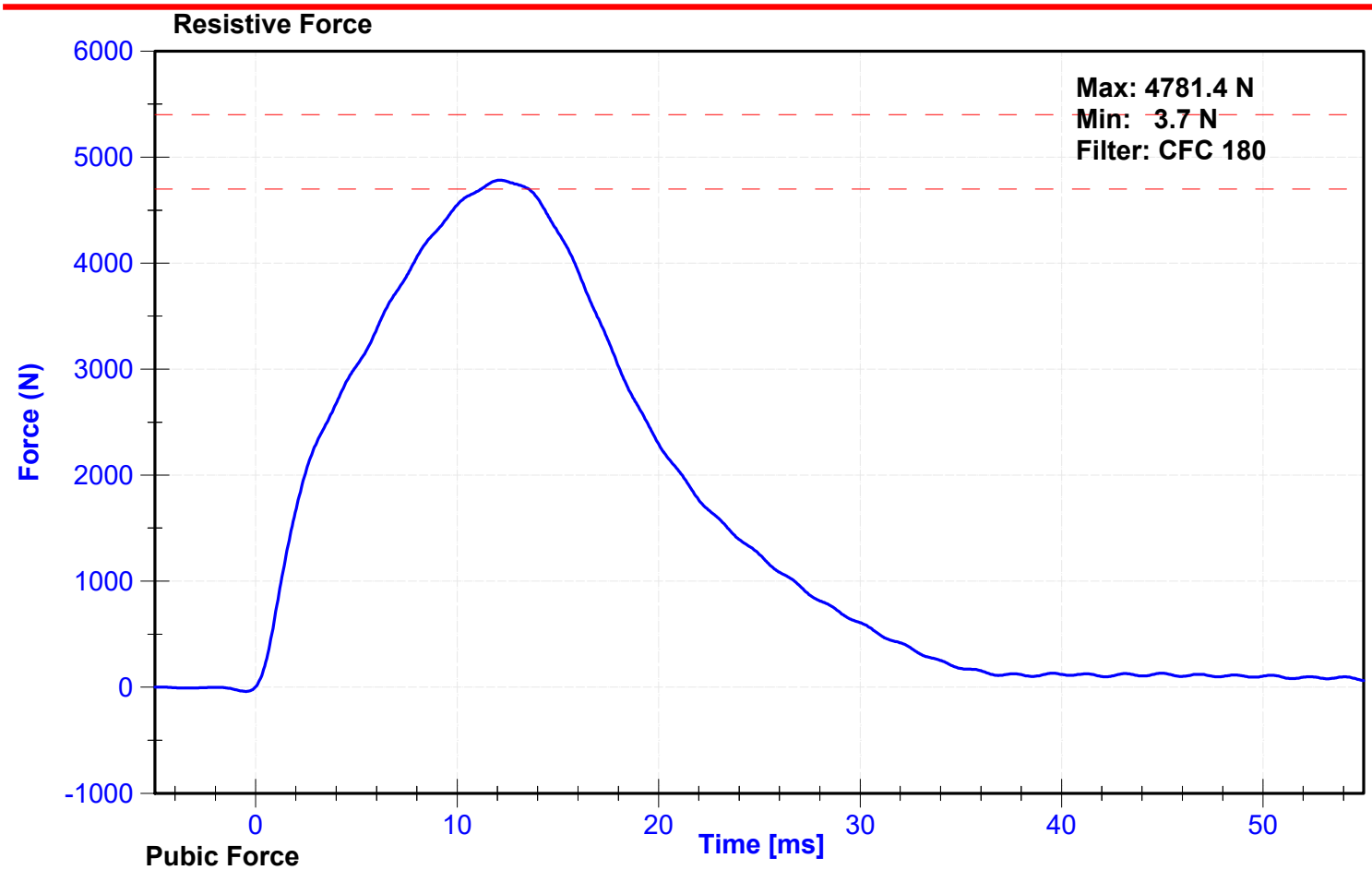
Results

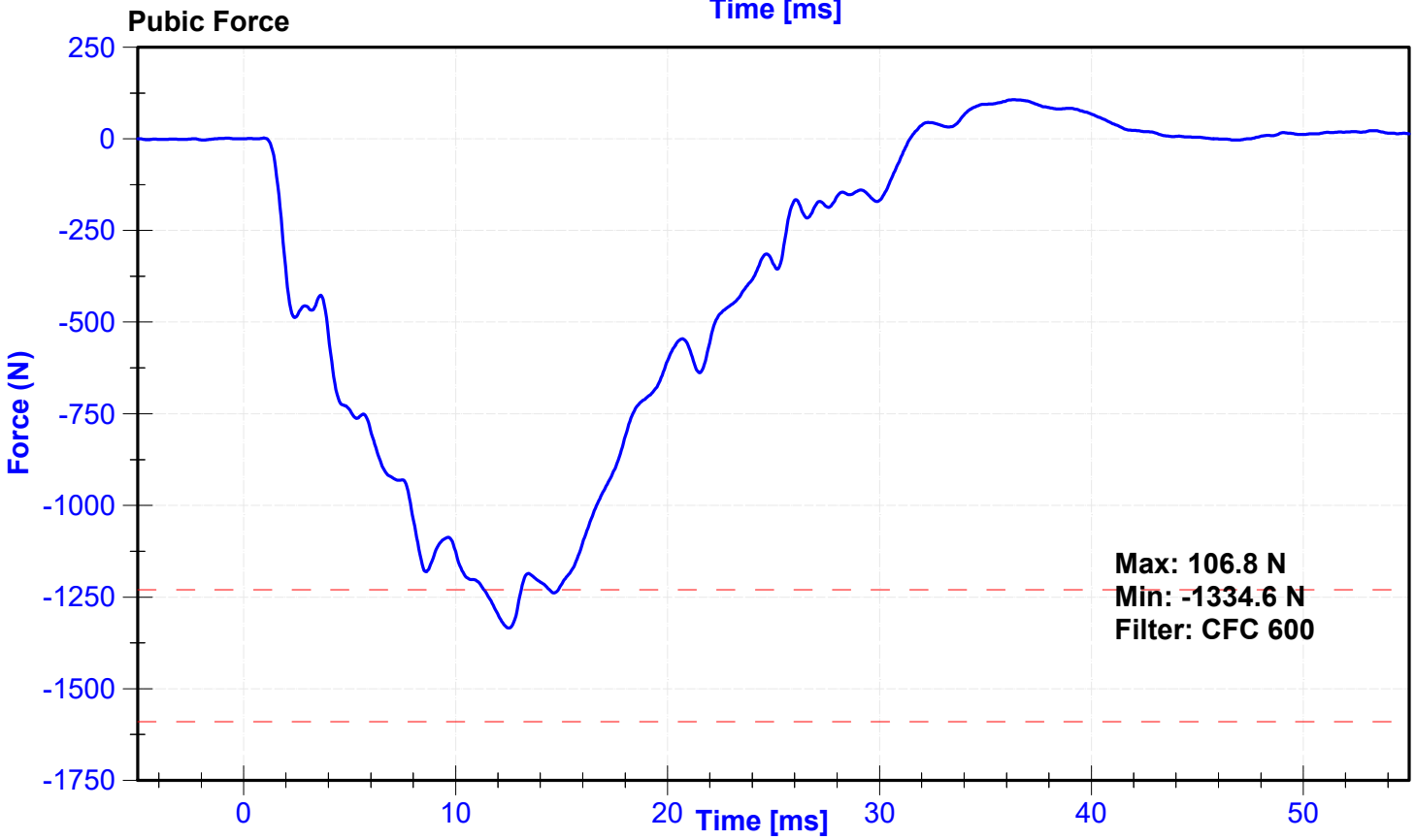
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	28	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Resistive Force	4700	5400	N	4781.4	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.12	Pass
Pubic Force	-1590	-1230	N	-1334.6	Pass
Time at Peak Pubic Force	12.2	17.0	ms	12.53	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Pubic Load Cell	Denton	458-FY	10/28/2024	10/28/2025




Resistive Force
Max: 4781.4 N
Min: 3.7 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: 106.8 N
Min: -1334.6 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

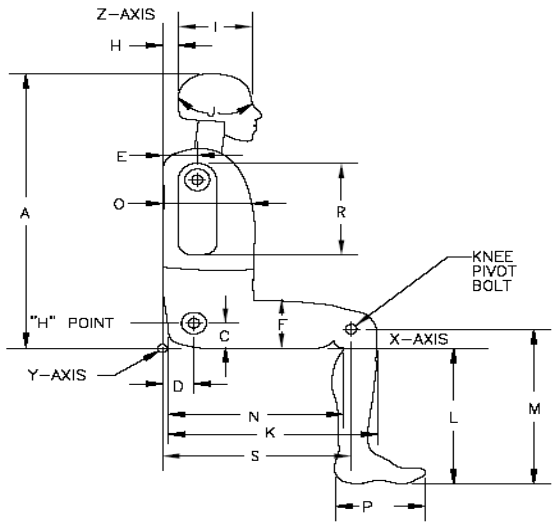
SERIAL NO:300

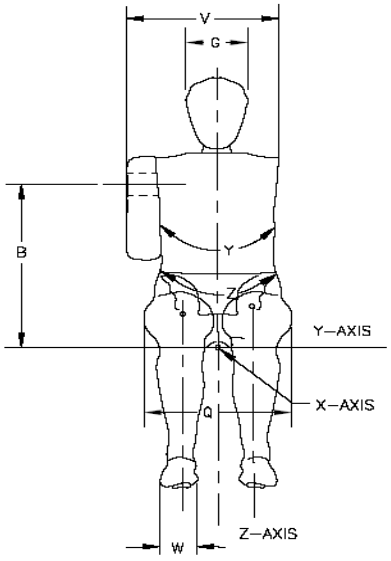
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: J. Rios Date: 11/23/2024

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	786	Pass
B	Shoulder Pivot Height	437	453	438	Pass
C	H-point Height	79	89	81	Pass
D	H-point from seatback	141	151	144	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	126	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	184	Pass
J	Head Circumference	541	551	548	Pass
K	Buttock to Knee Length	514	540	531	Pass
L	Popliteal Height	343	369	359	Pass
M	Knee Pivot to floor height	392	409	405	Pass
N	Buttock Popliteal Length	416	442	434	Pass
O	Chest Depth w/o jacket	195	211	202	Pass
P	Foot Length	216	232	223	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	320	Pass
R	Arm Length	249	259	252	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	80	Pass
Y	Chest Circumference w/jacket	851	881	872	Pass
Z	Waist Circumference	761	791	773	Pass

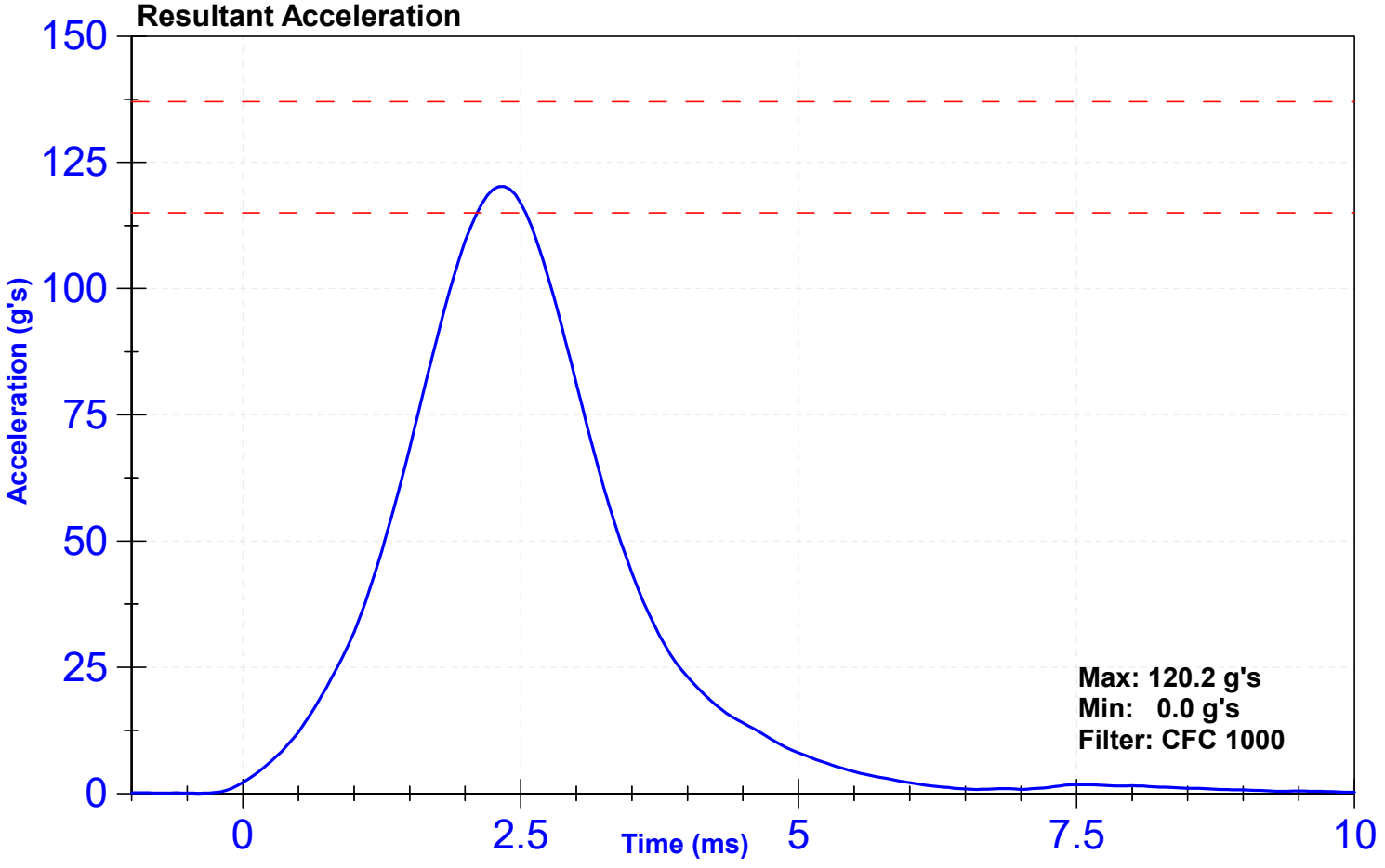
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	C. Mantell

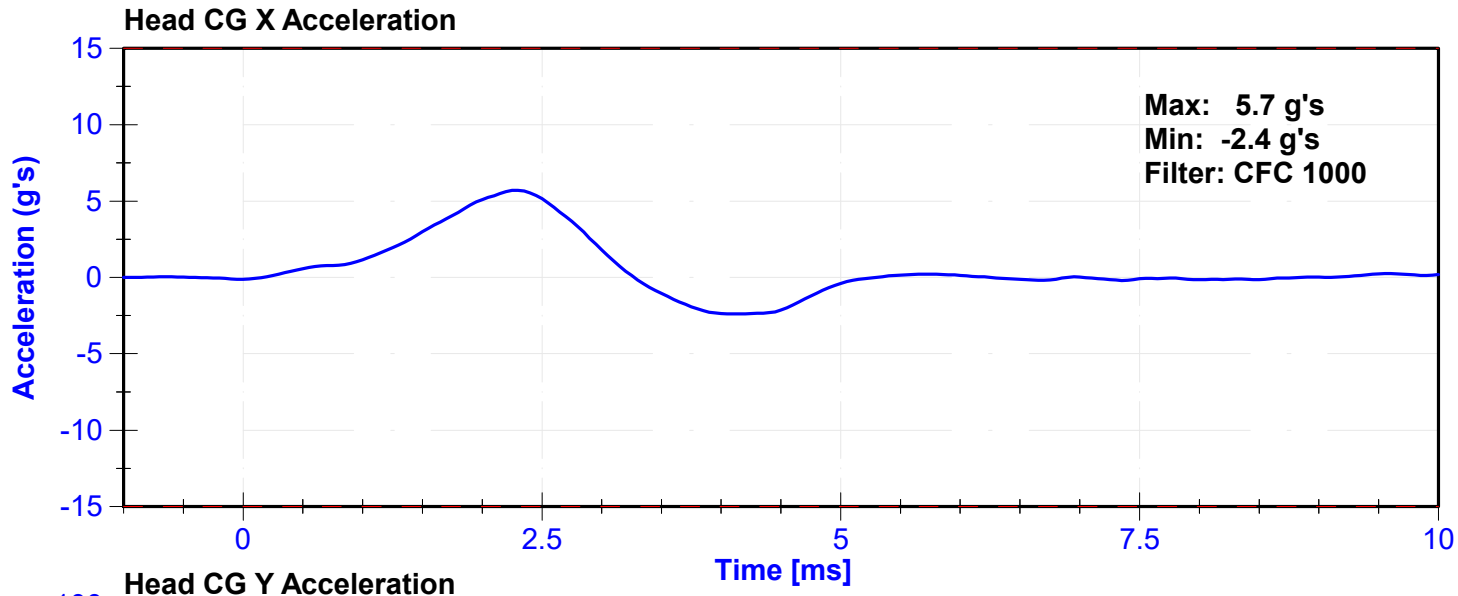
Results

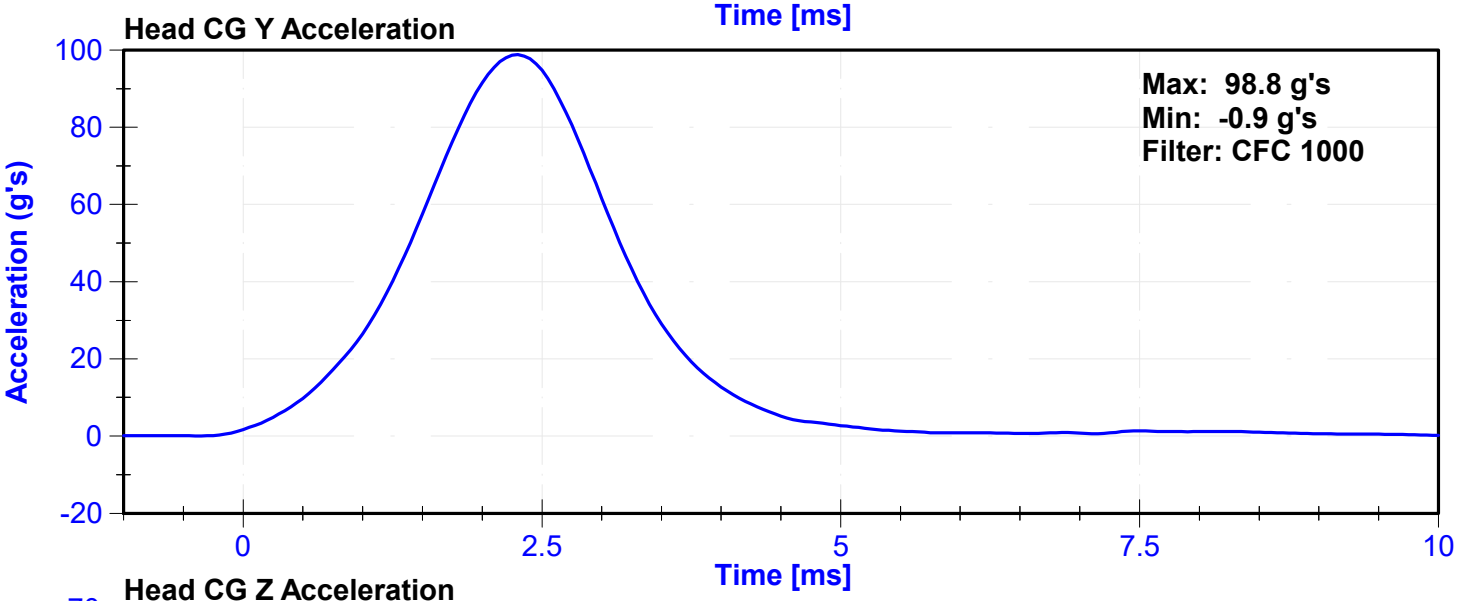
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	29	Pass
Resultant Acceleration	115	137	g's	120.2	Pass
Oscillation	0	15	%	1.4	Pass
Fore-Aft Acceleration	-15	15	g's	5.7	Pass

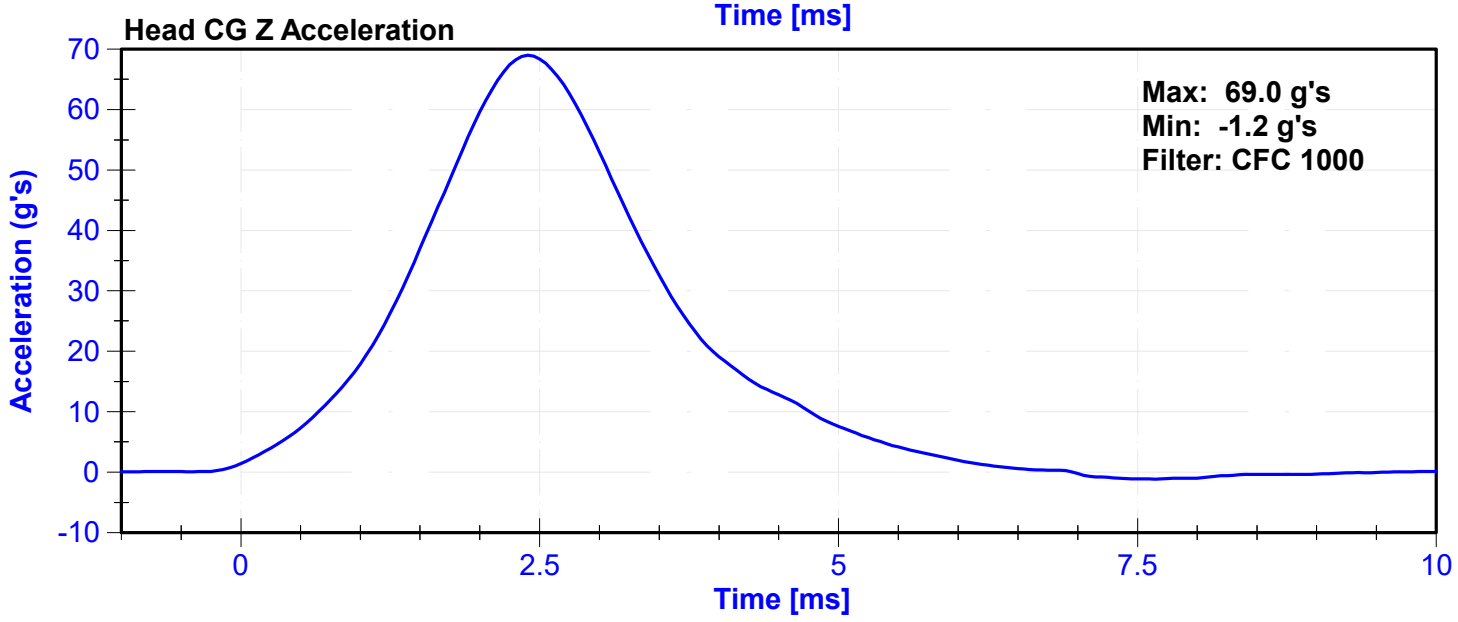
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P59018	10/17/2024	4/15/2025
Y Accelerometer	Endevco	P79189	10/17/2024	4/15/2025
Z Accelerometer	Endevco	P79587	10/17/2024	4/15/2025




Head CG X Acceleration
Max: 5.7 g's
Min: -2.4 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 98.8 g's
Min: -0.9 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 69.0 g's
Min: -1.2 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

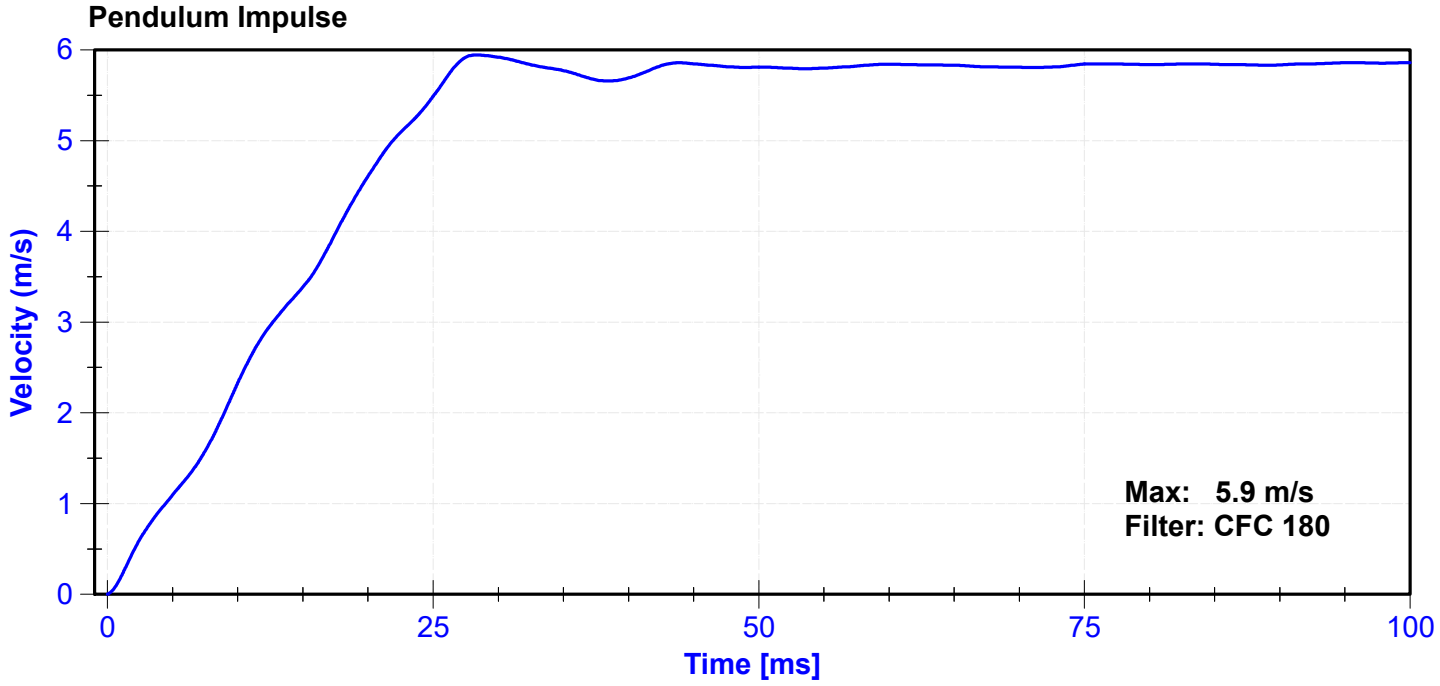
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

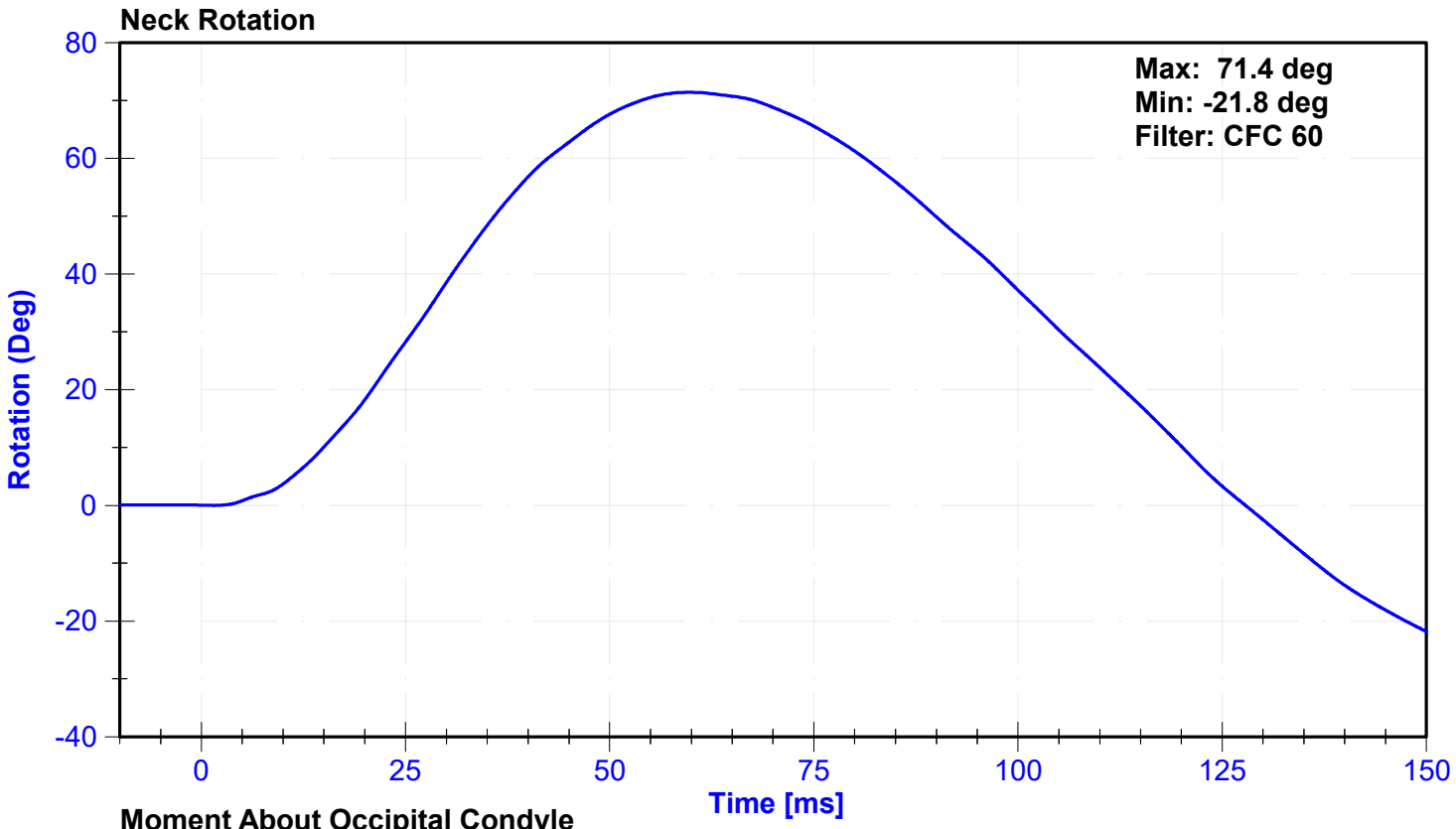
Results

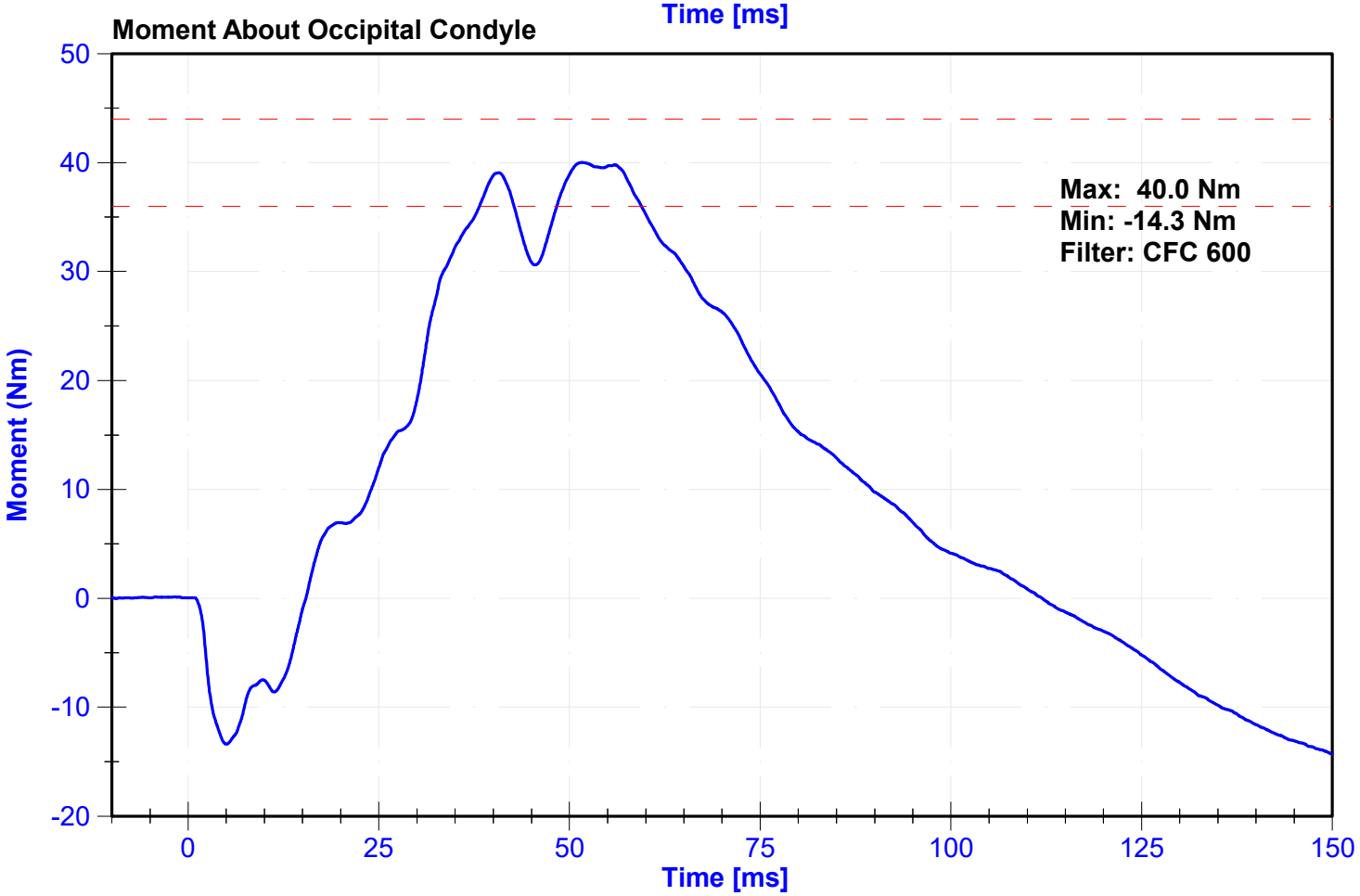
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	35	Pass
Velocity	5.51	5.63	m/s	5.579	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.33	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.39	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.61	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.49	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.94	Pass
Neck Rotation	71	81	deg	71.4	Pass
Time at Maximum Rotation	50	70	ms	59.7	Pass
Moment about the OC	36	44	Nm	40.0	Pass
Moment Decay to 0 Nm	102	126	ms	112.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	11/1/2024	11/1/2025
Pendulum Potentiometer	Servo	4961	9/23/2024	9/23/2025
Condyle Potentiometer	Servo	DS185	9/23/2024	9/23/2025
Upper Neck Load Cell	Denton	1716A_2187-FY	12/5/2023	12/4/2024




Neck Rotation
Max: 71.4 deg
Min: -21.8 deg
Filter: CFC 60
Rotation (Deg)
80
60
40
20
0
-20
-40
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 40.0 Nm
Min: -14.3 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

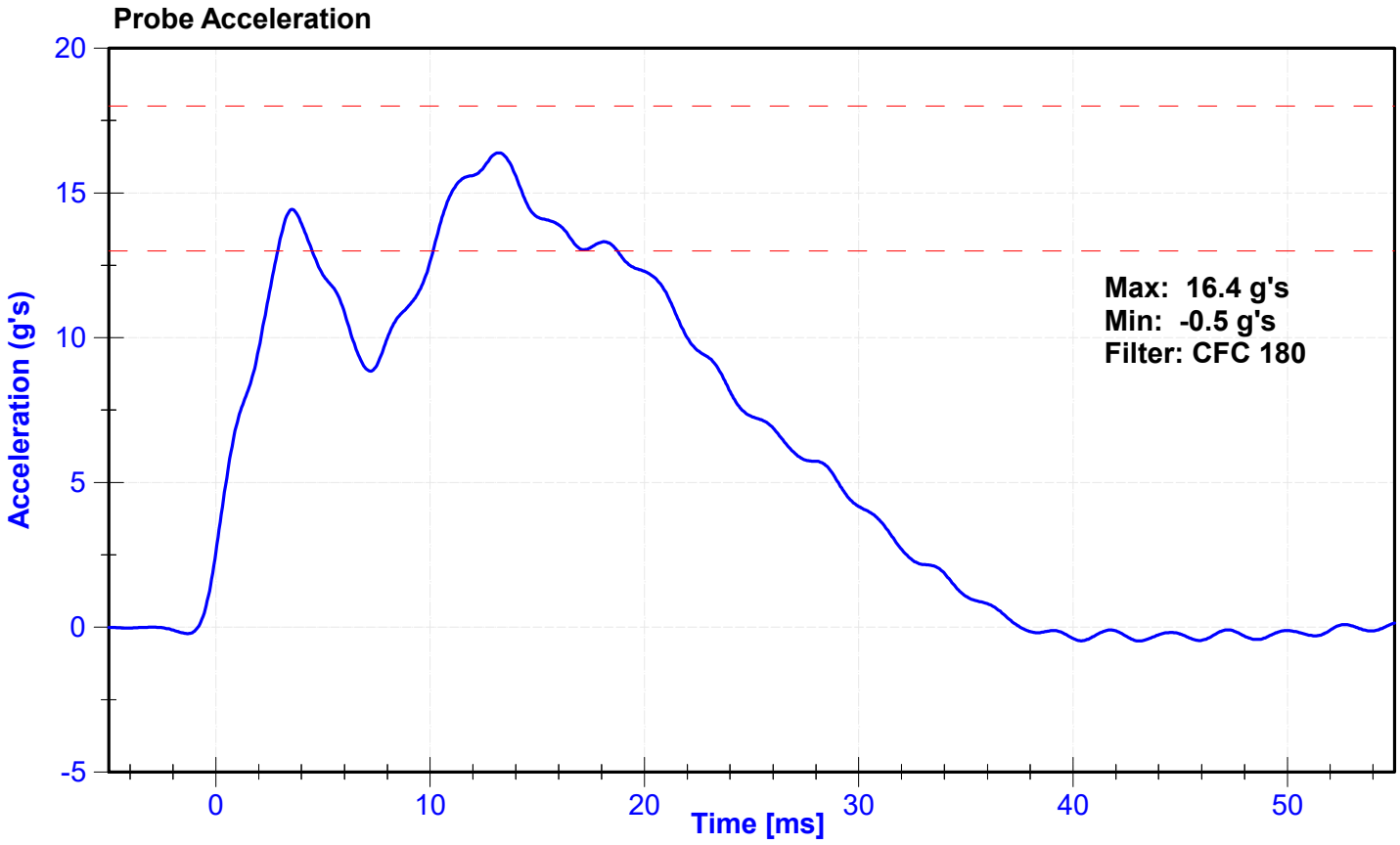
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

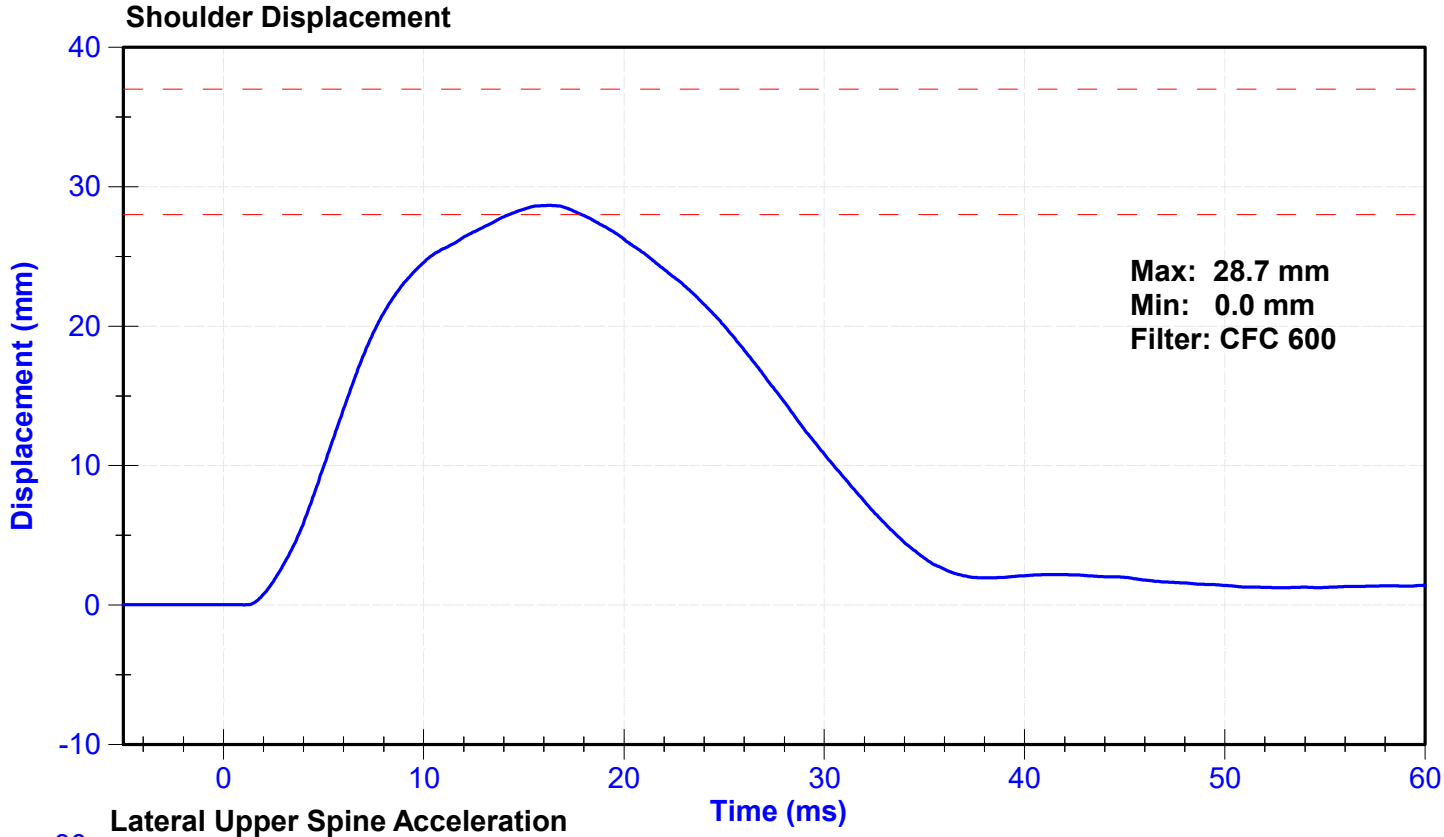
Results

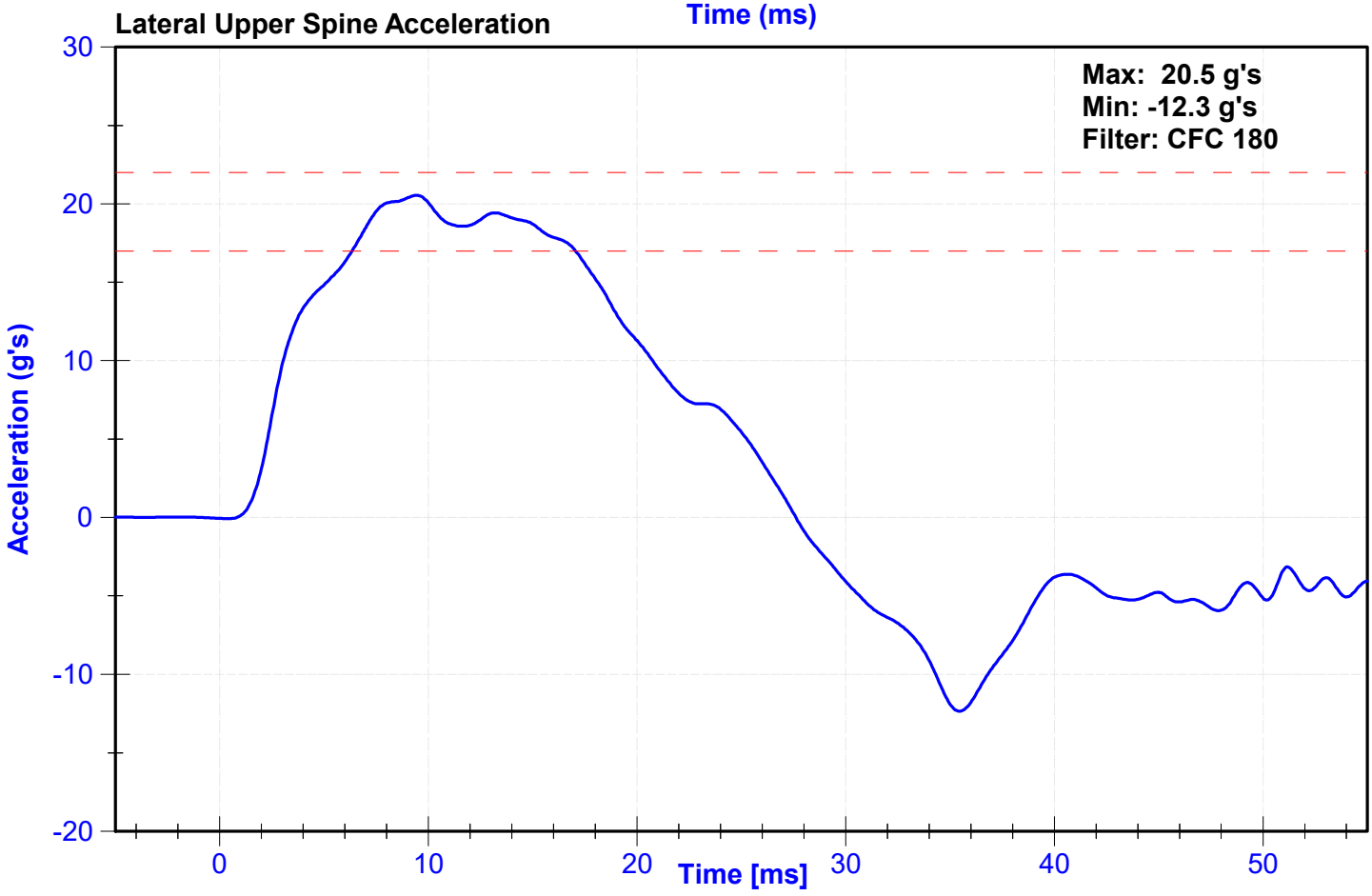
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	31	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	13	18	g's	16.4	Pass
Shoulder Deflection	28	37	mm	28.7	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Shoulder Potentiometer	Servo	053GFE	10/16/2024	4/16/2025
Upper Spine Y Accelerometer	Endevco	T20880	10/17/2024	4/15/2025




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 28.7 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 20.5 g's
Min: -12.3 g's
Filter: CFC 180

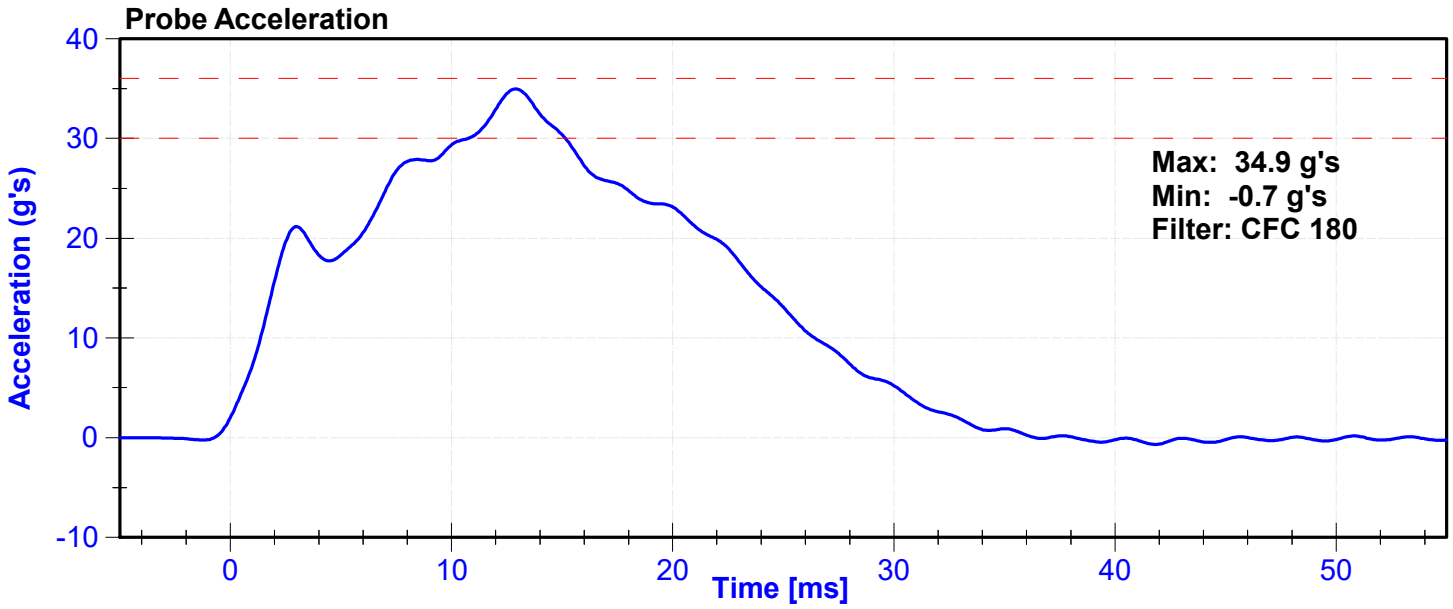
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

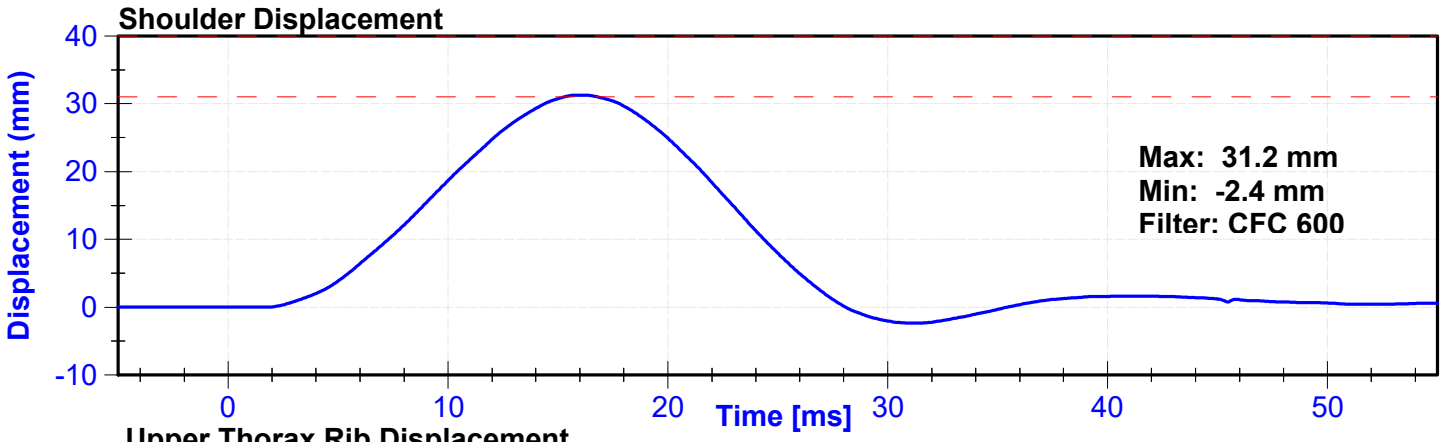
Results

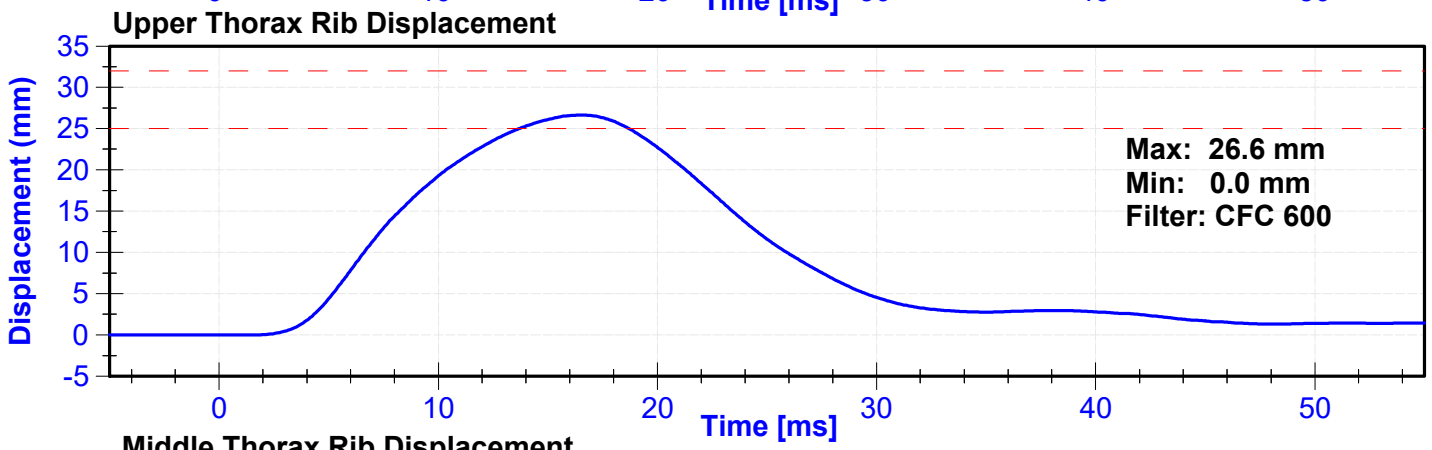
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	31	Pass
Velocity	6.6	6.8	m/s	6.66	Pass
Probe Acceleration after 5 ms	30	36	g's	34.9	Pass
Lateral Upper Spine Acceleration	34	43	g's	35.4	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.3	Pass
Shoulder Deflection	31	40	mm	31.2	Pass
Upper Thorax Rib Deflection	25	32	mm	26.6	Pass
Mid Thorax Rib Deflection	30	36	mm	31.1	Pass
Lower Thorax Rib Deflection	32	38	mm	33.2	Pass

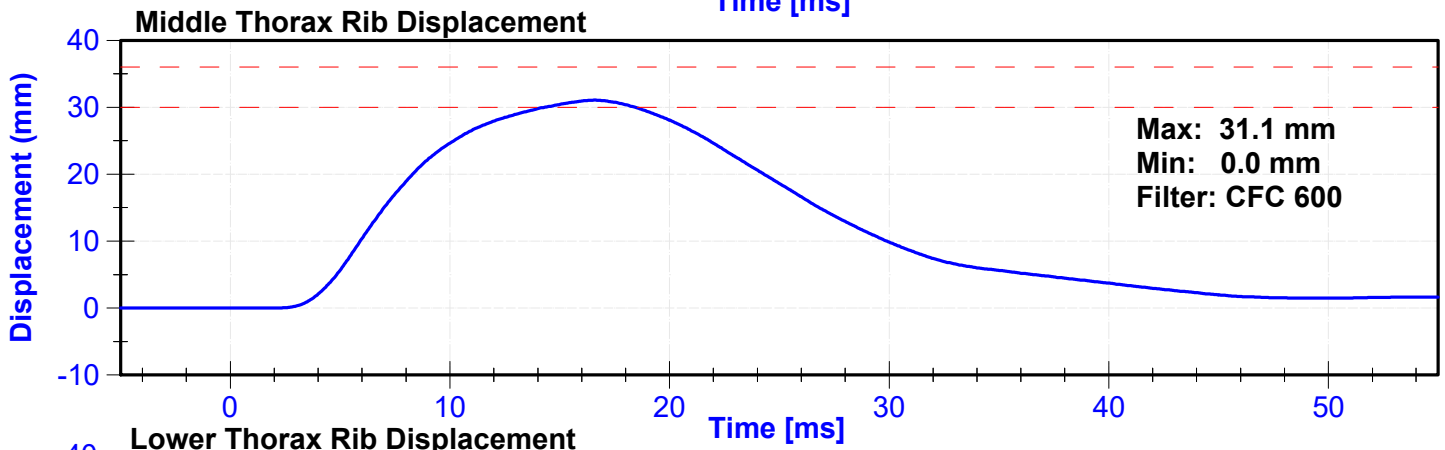
Transducer Calibrations

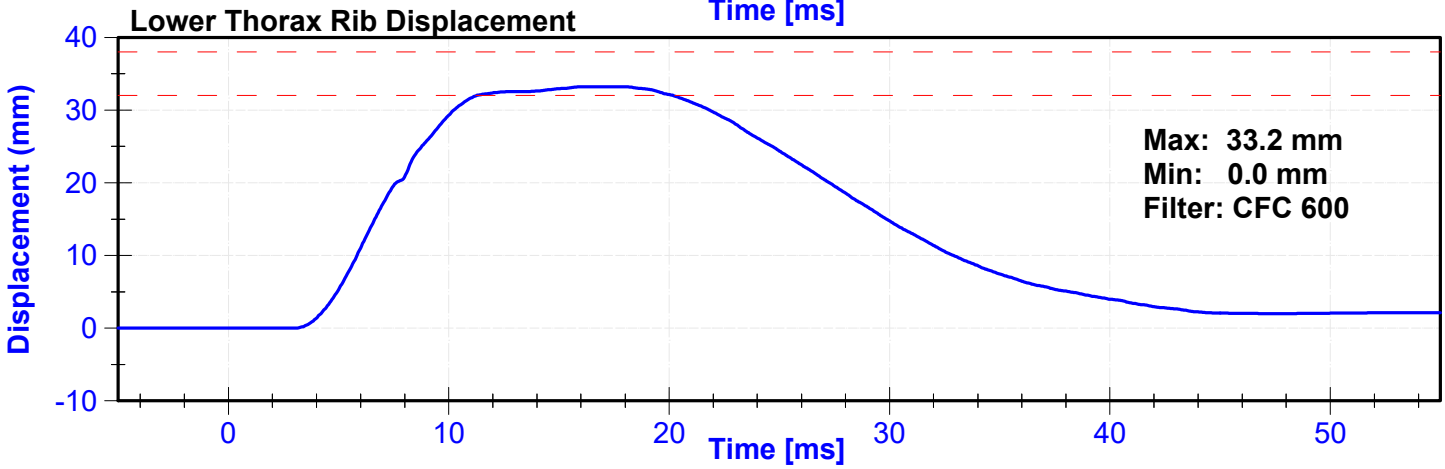
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Upper Spine T1 Y Accelerometer	Endevco	T20880	10/17/2024	4/15/2025
Upper Spine T12 Y Accelerometer	Endevco	P52071	10/17/2024	4/15/2025
Shoulder Potentiometer	Servo	053GFE	10/16/2024	4/16/2025
Upper Thorax Rib Potentiometer	Servo	2316GFE	10/16/2024	4/16/2025
Middle Thorax Rib Potentiometer	Servo	085GFE	10/16/2024	4/16/2025
Lower Thorax Rib Potentiometer	Servo	1156GFE	10/16/2024	4/16/2025

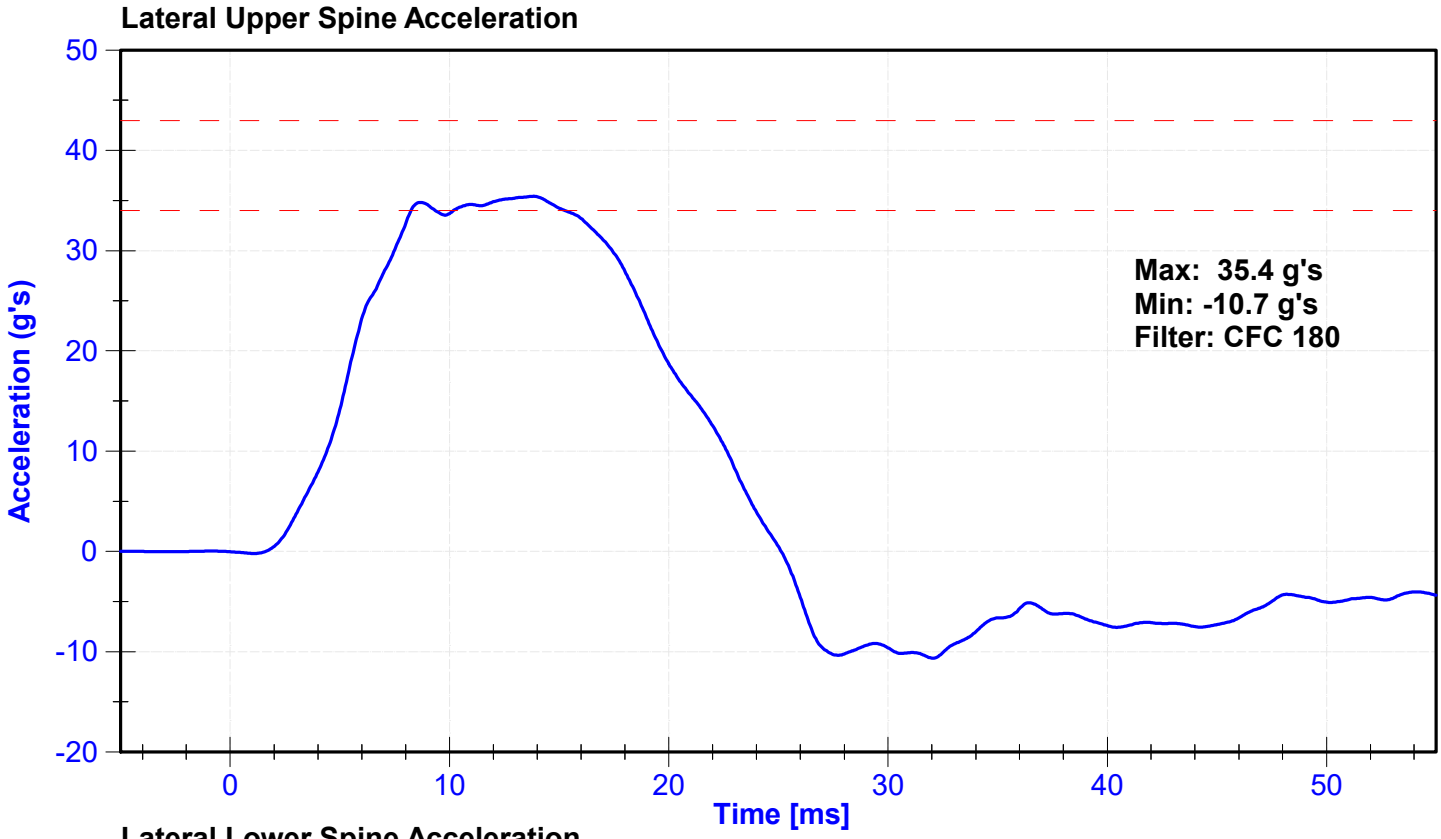


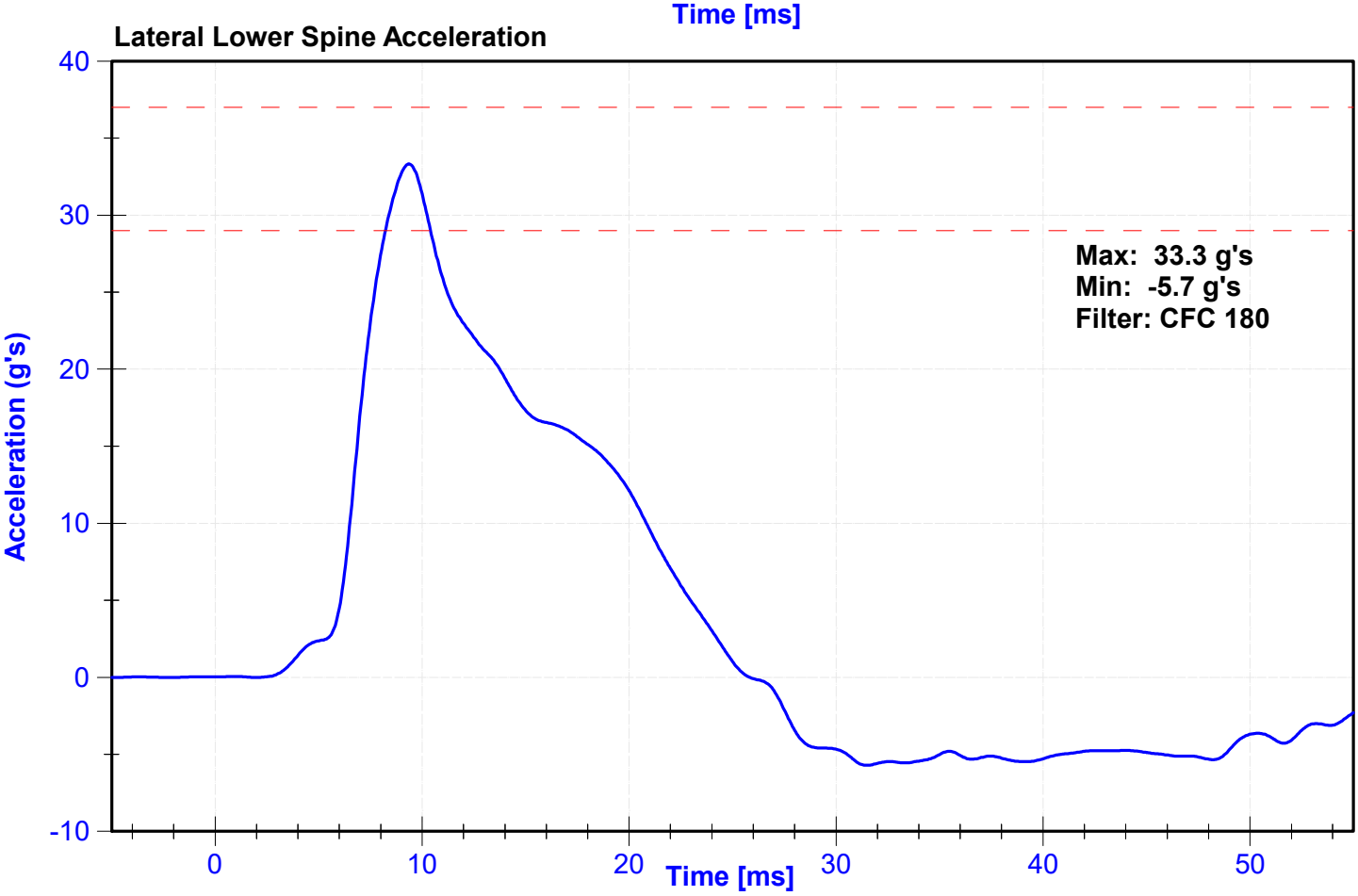

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 31.2 mm
Min: -2.4 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.6 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 31.1 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.2 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 35.4 g's
Min: -10.7 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 33.3 g's
Min: -5.7 g's
Filter: CFC 180

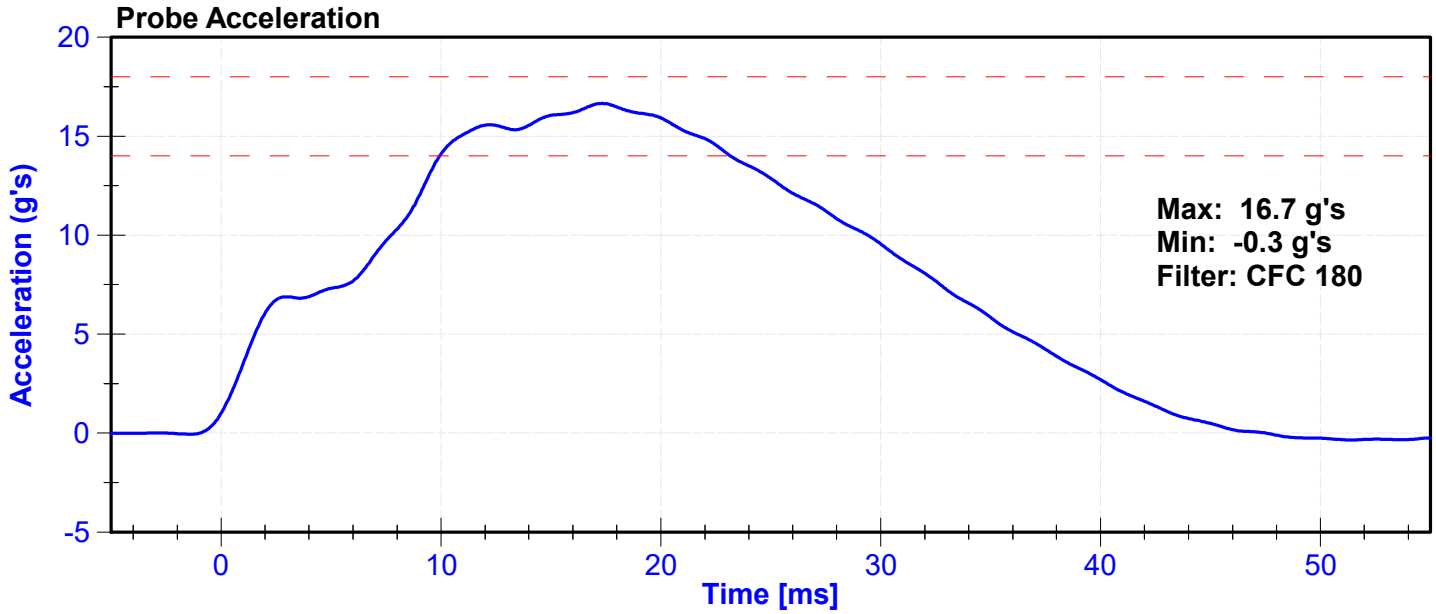
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

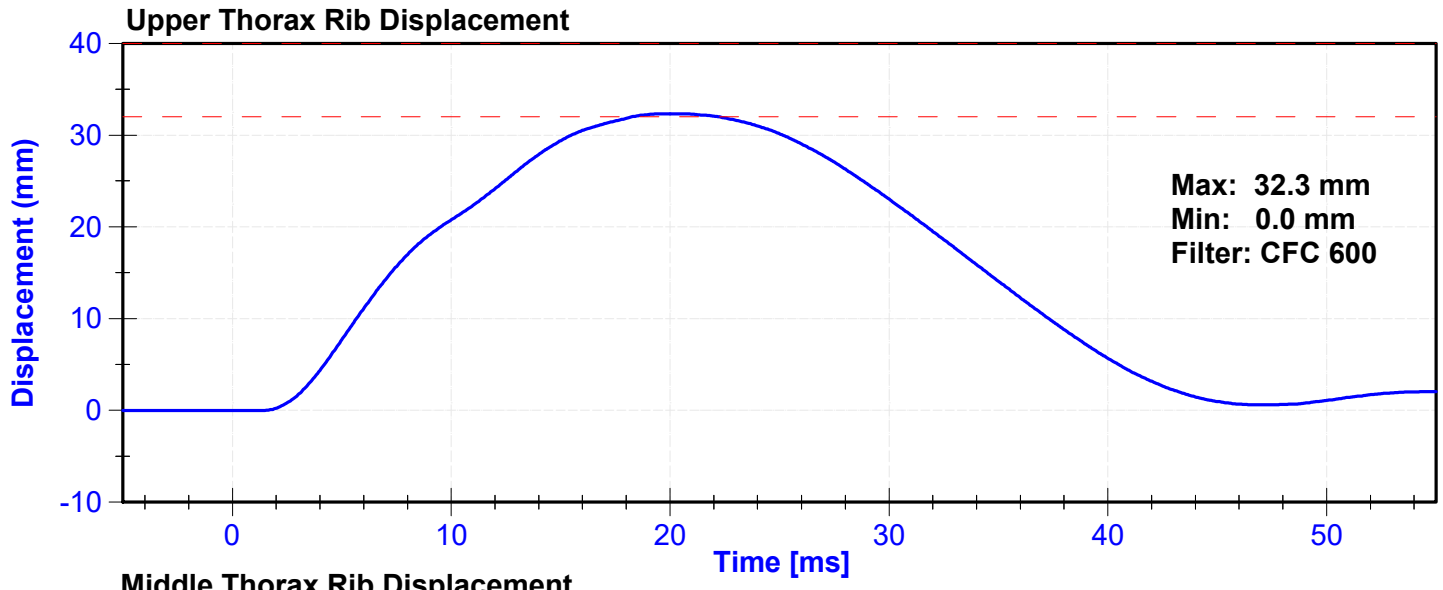
Results

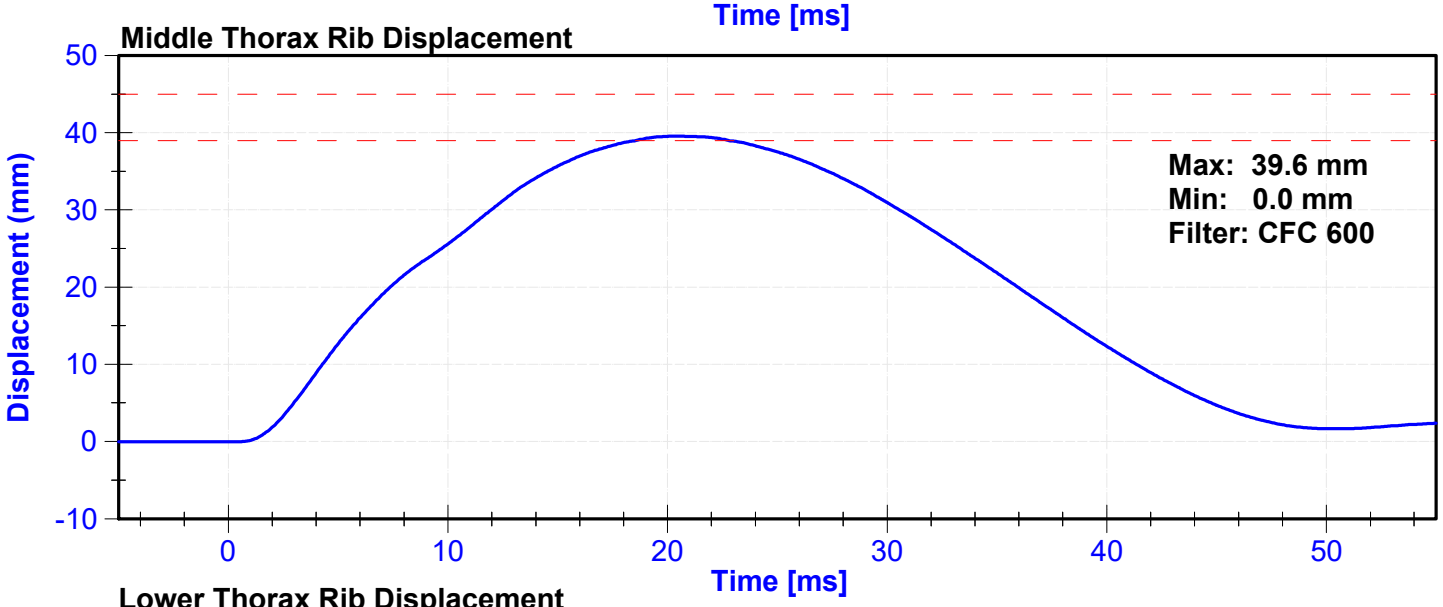
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	31	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	14	18	g's	16.7	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.7	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.3	Pass
Upper Thorax Rib Deflection	32	40	mm	32.3	Pass
Middle Thorax Rib Deflection	39	45	mm	39.6	Pass
Lower Thorax Rib Deflection	35	43	mm	37.7	Pass

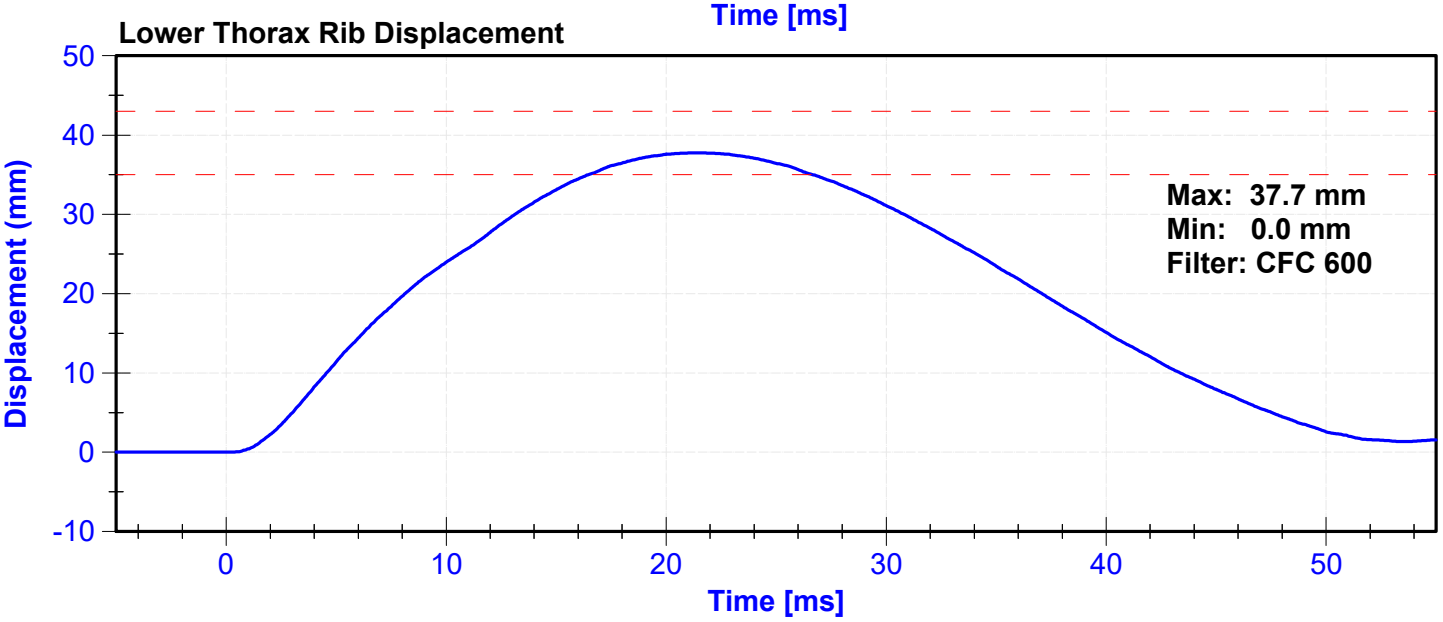
Transducer Calibrations

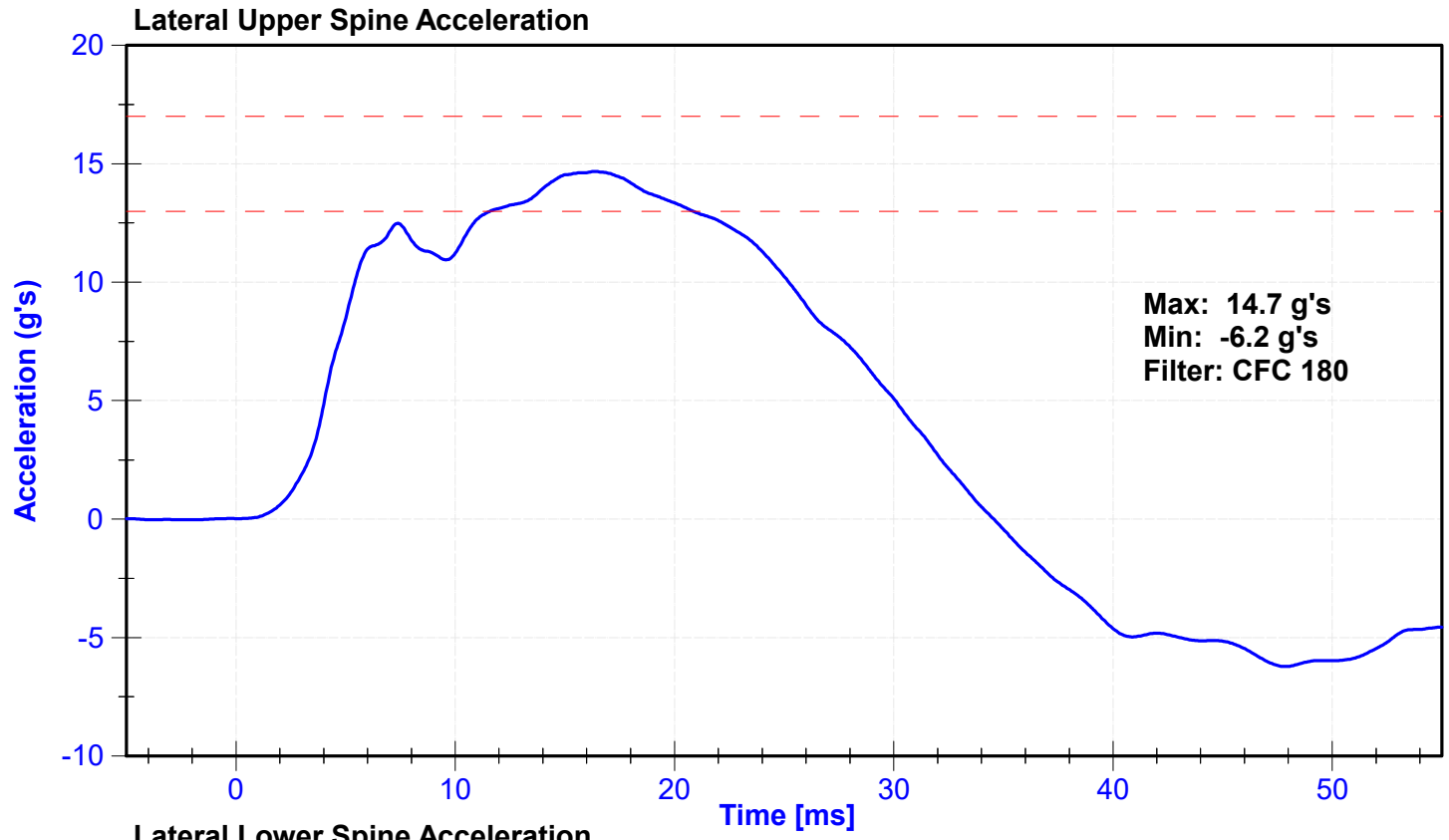
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Upper Spine Y Accelerometer	Endevco	T20880	10/17/2024	4/15/2025
Lower Spine Y Accelerometer	Endevco	P52071	10/17/2024	4/15/2025
Upper Thorax Rib Potentiometer	Servo	2316GFE	10/16/2024	4/16/2025
Middle Thorax Rib Potentiometer	Servo	085GFE	10/16/2024	4/16/2025
Lower Thorax Rib Potentiometer	Servo	1156GFE	10/16/2024	4/16/2025

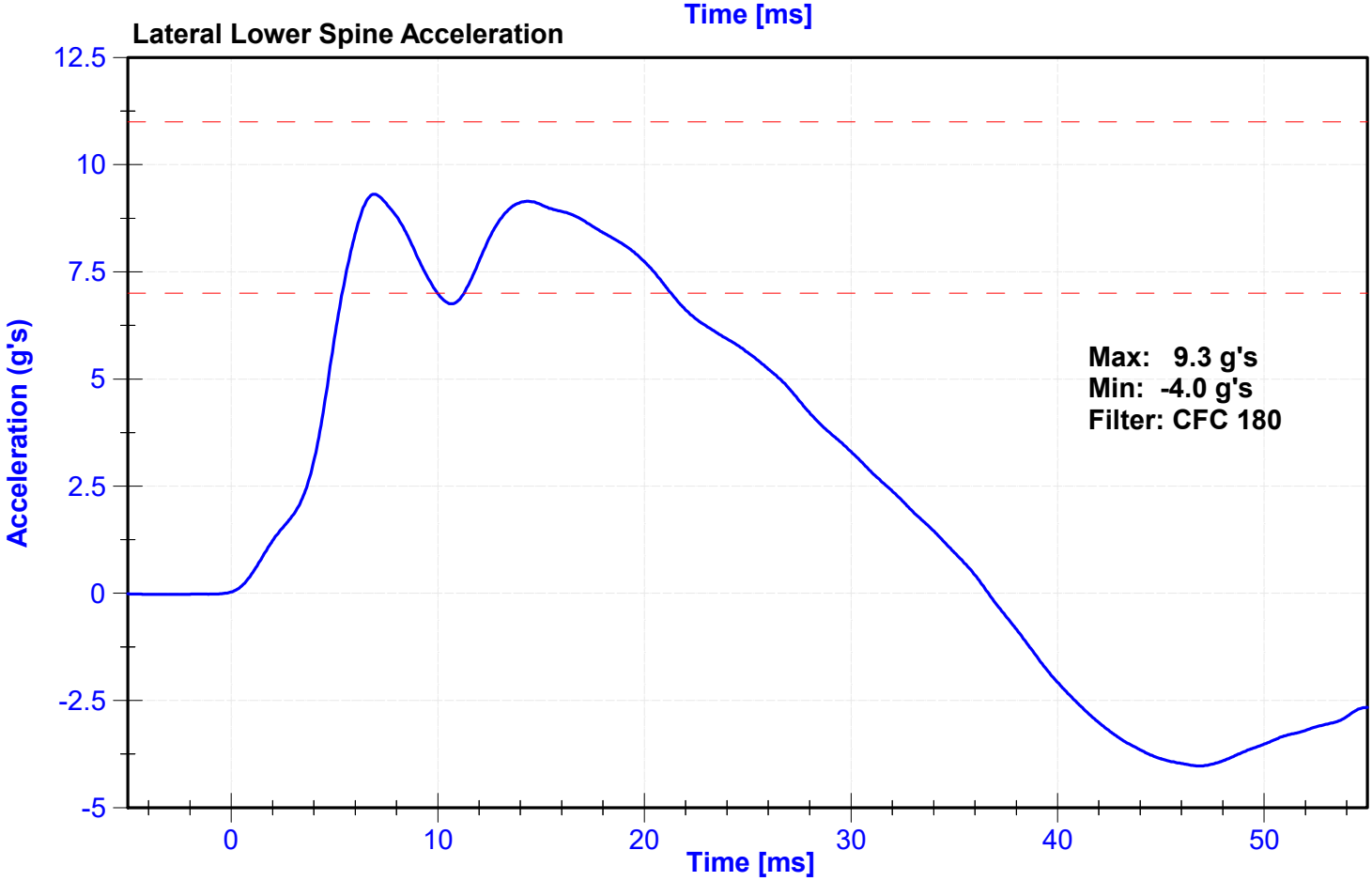



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.3 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.6 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.7 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 14.7 g's
Min: -6.2 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.3 g's
Min: -4.0 g's
Filter: CFC 180

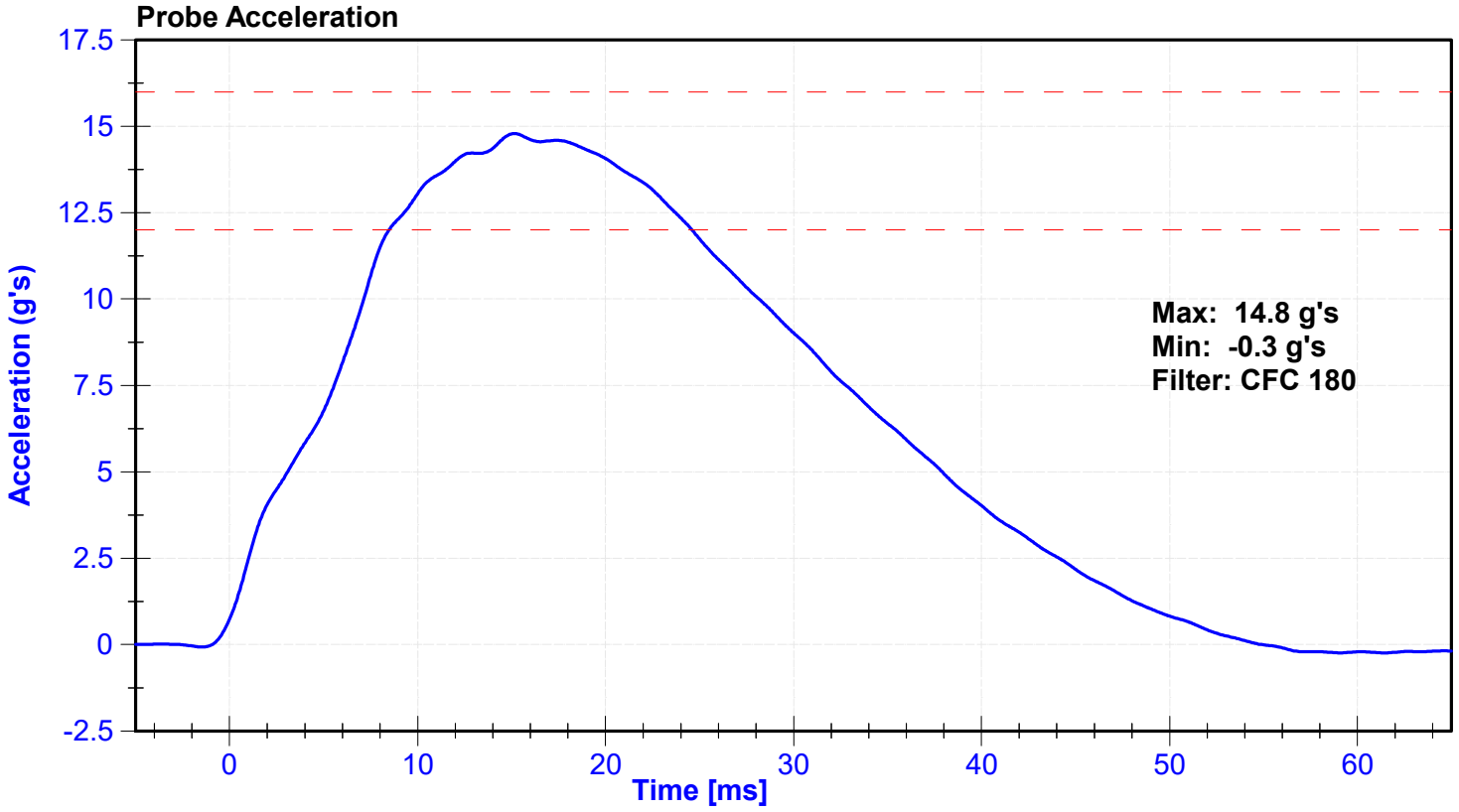
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

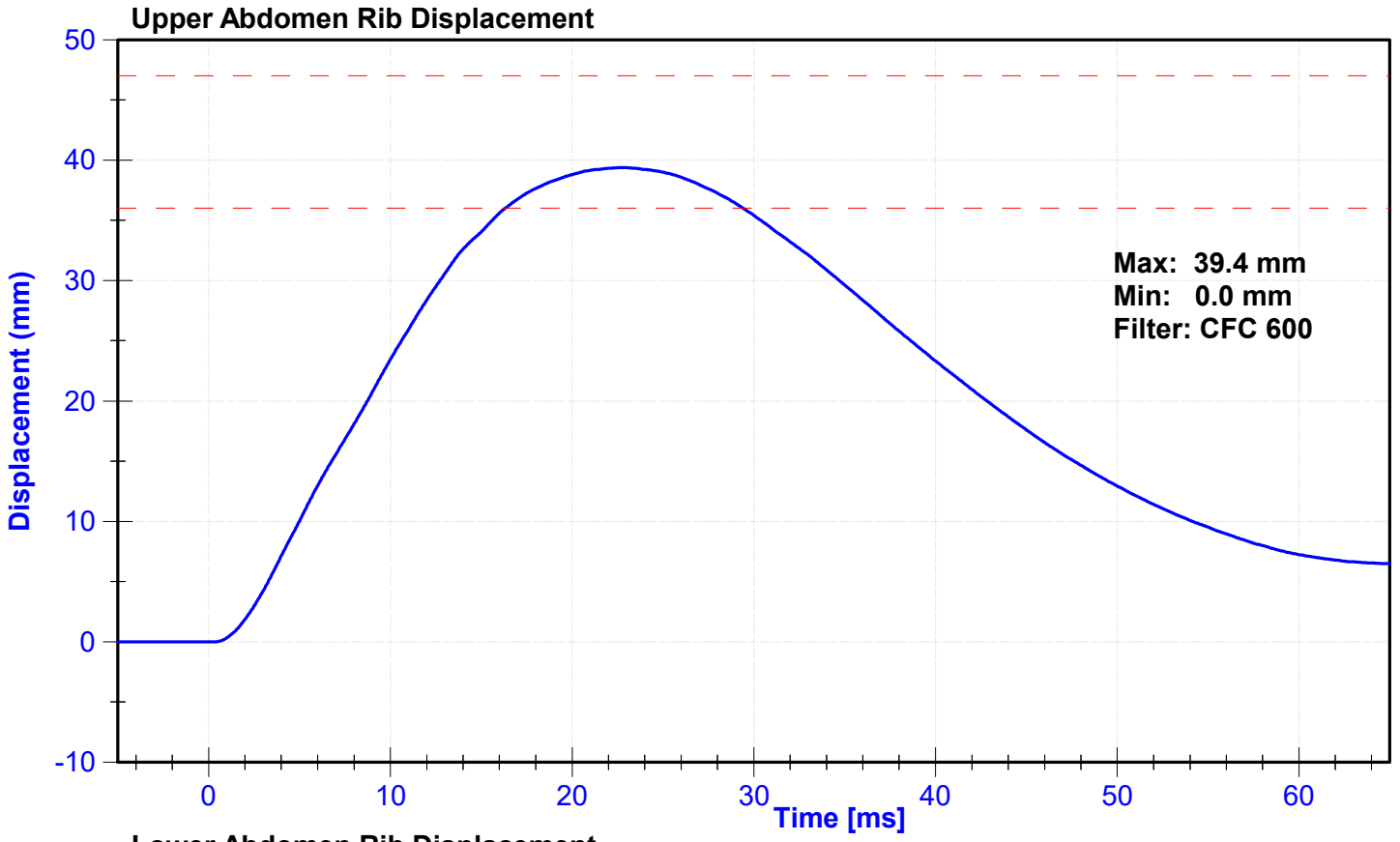
Results

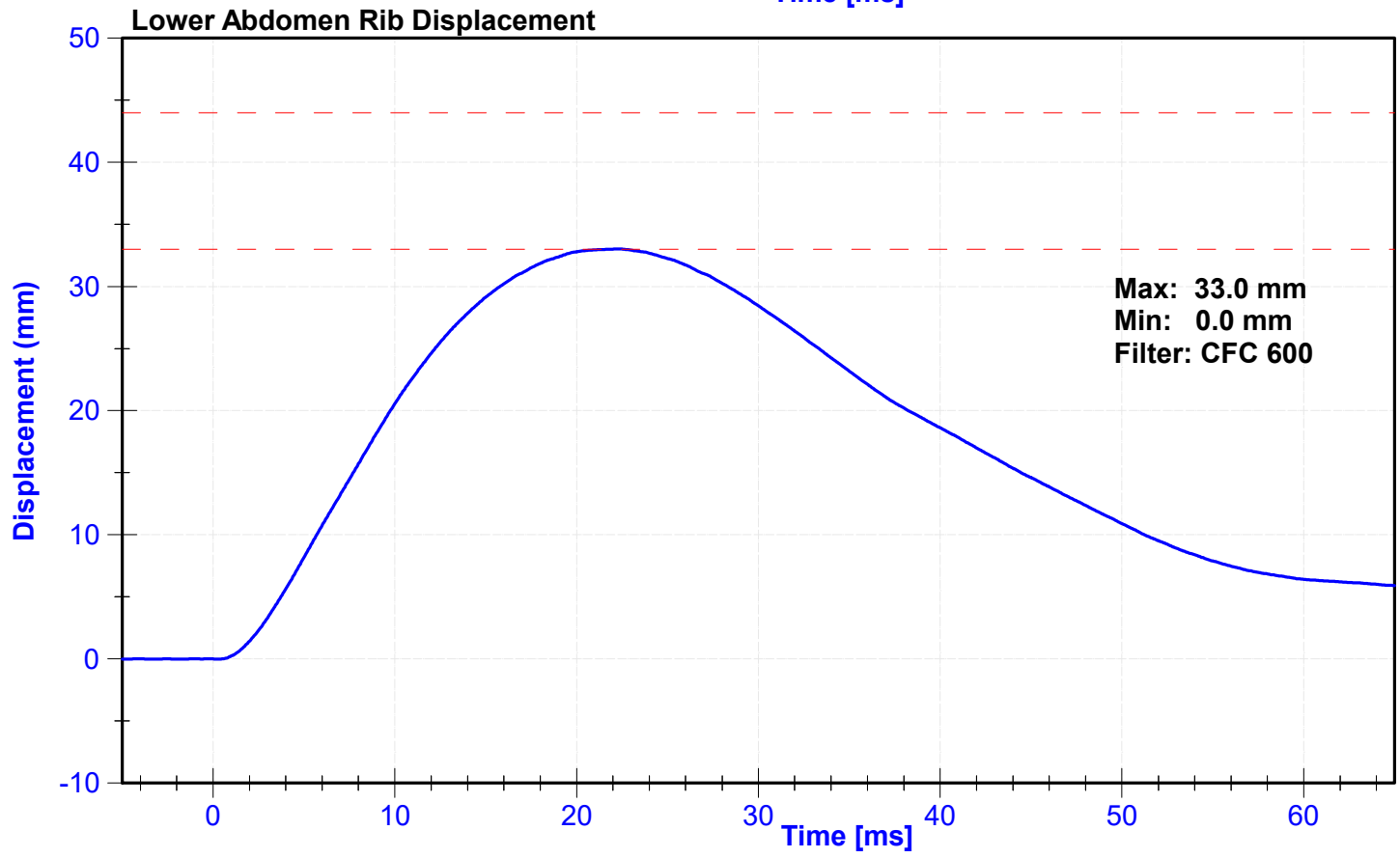
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	31	Pass
Velocity	4.2	4.4	m/s	4.26	Pass
Probe Acceleration	12	16	g's	14.8	Pass
Lateral Lower Spine Acceleration	9	14	g's	12.3	Pass
Upper Abdomen Rib Deflection	36	47	mm	39.4	Pass
Lower Abdomen Rib Deflection	33	44	mm	33.0	Pass

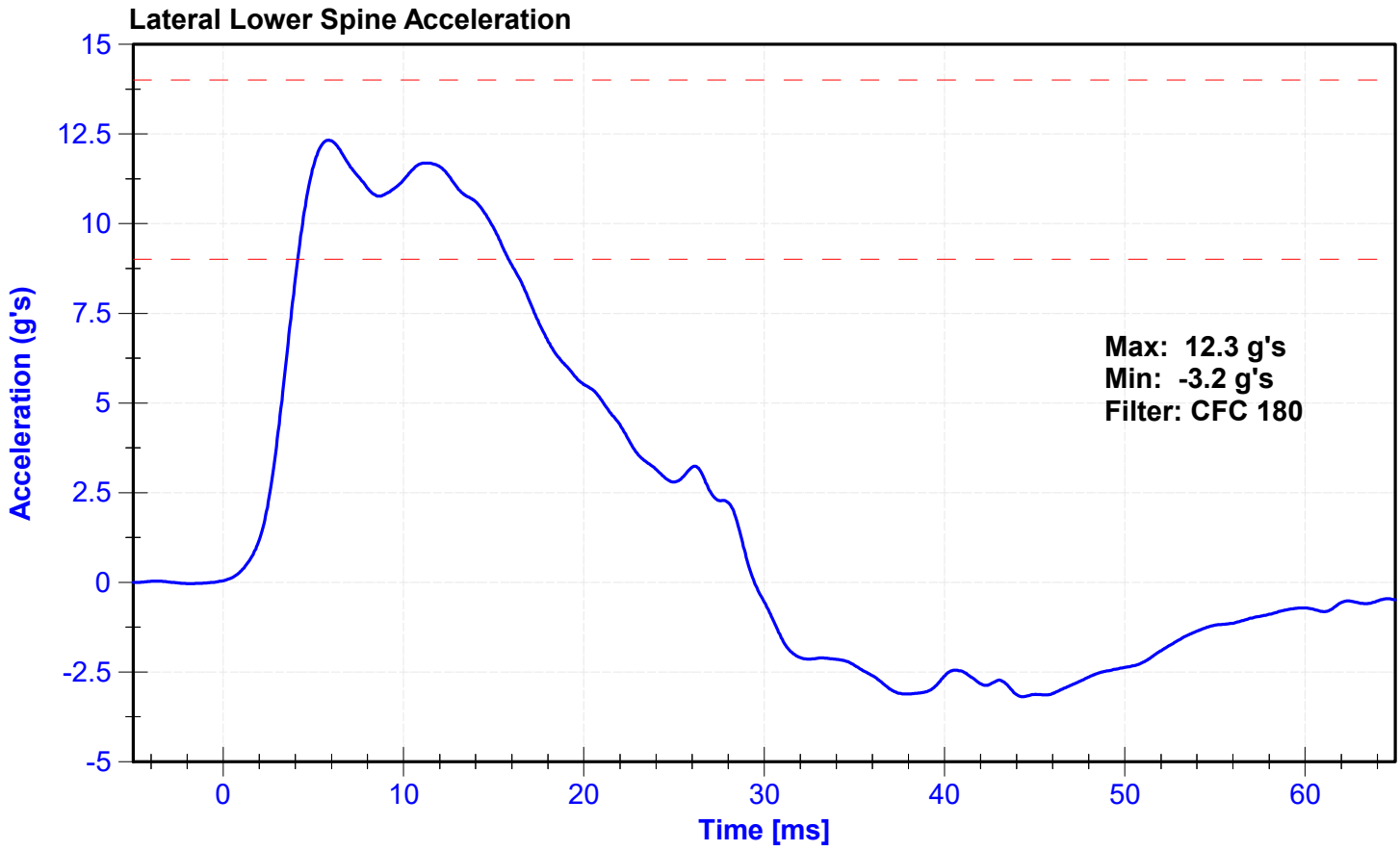
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Lower Spine Y Accelerometer	Endevco	P52071	10/17/2024	4/15/2025
Upper Abdomen Rib Potentiometer	Servo	074GFE	10/16/2024	4/16/2025
Lower Abdomen Rib Potentiometer	Servo	075GFE	10/16/2024	4/16/2025




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


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.0 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: 12.3 g's
Min: -3.2 g's
Filter: CFC 180

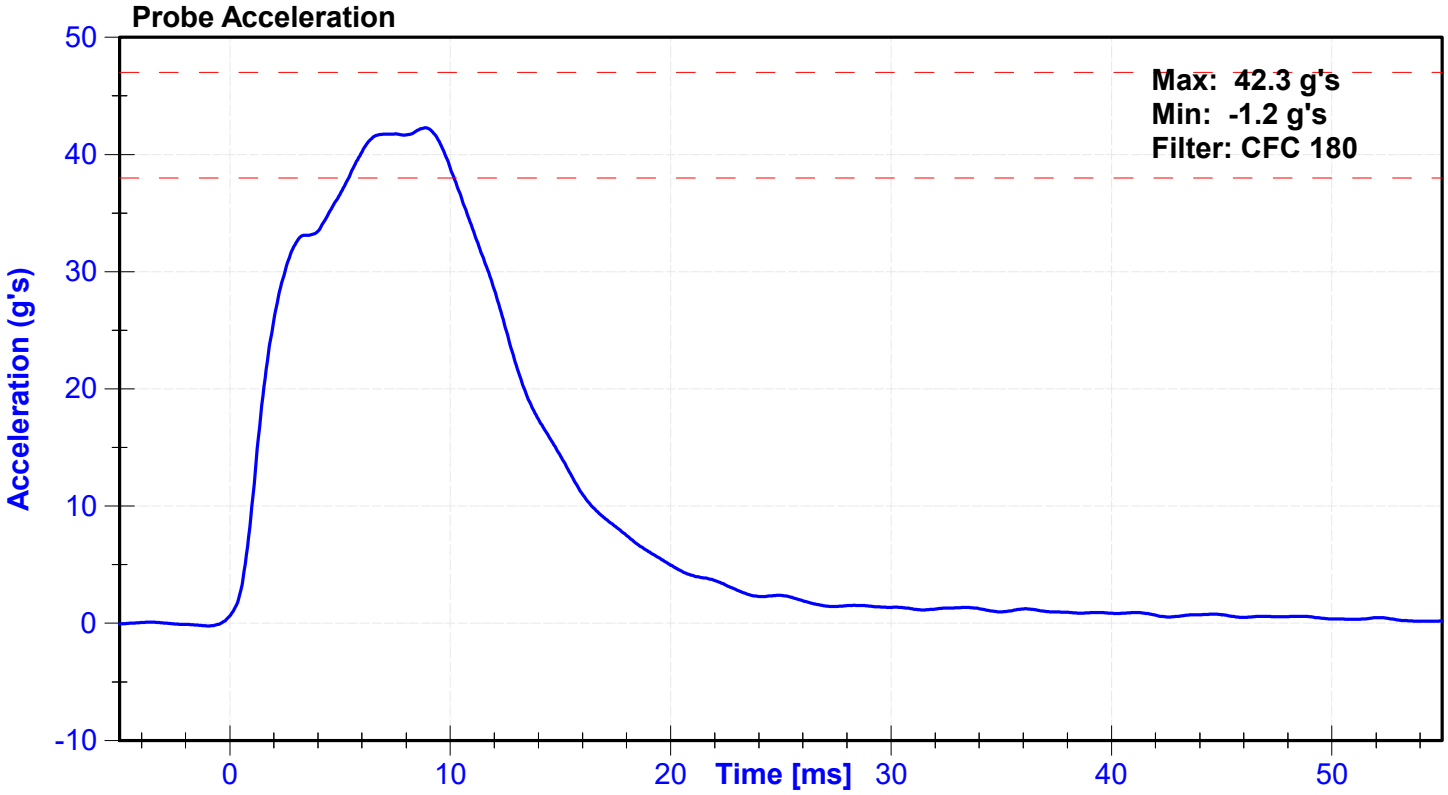
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

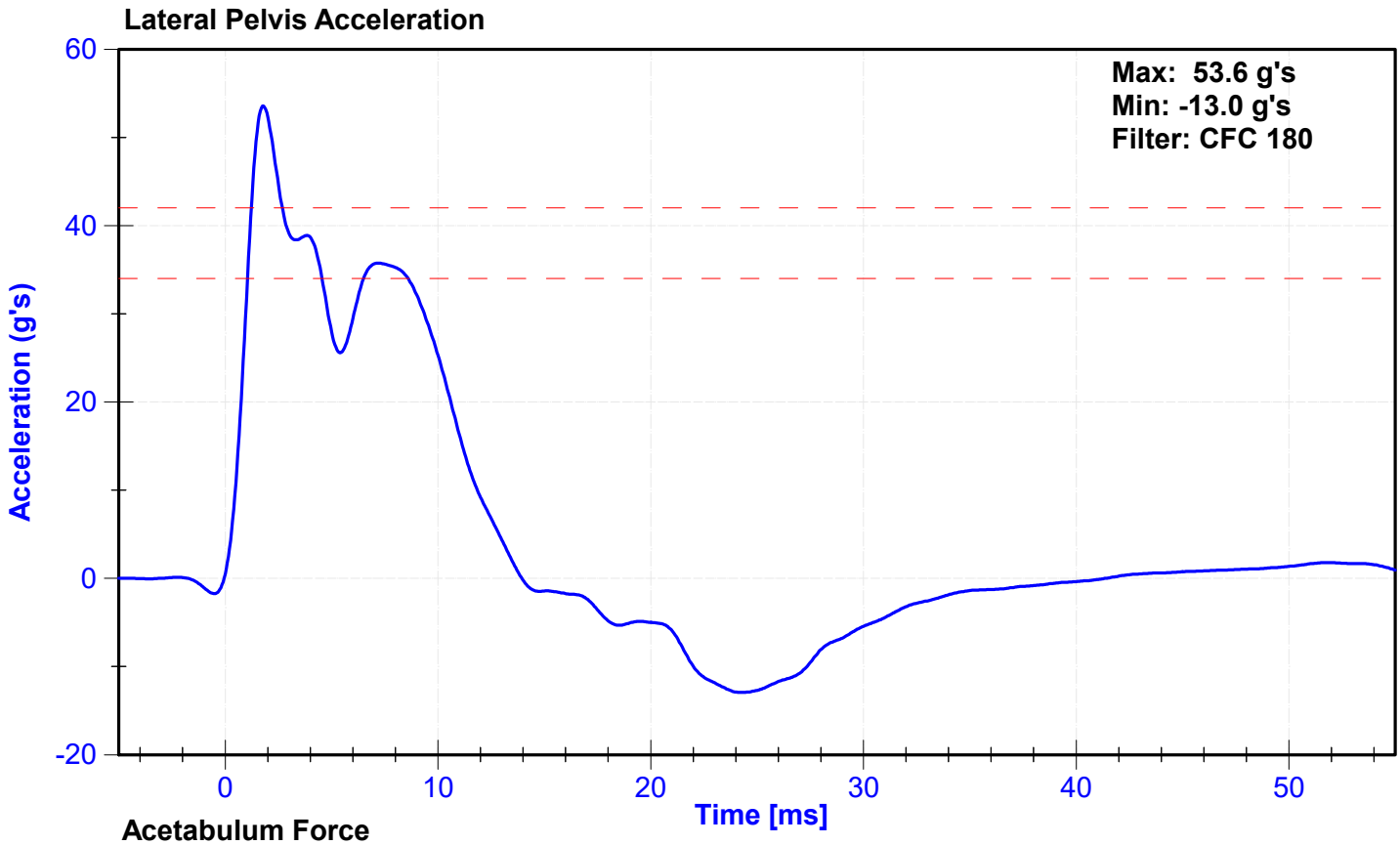
Results

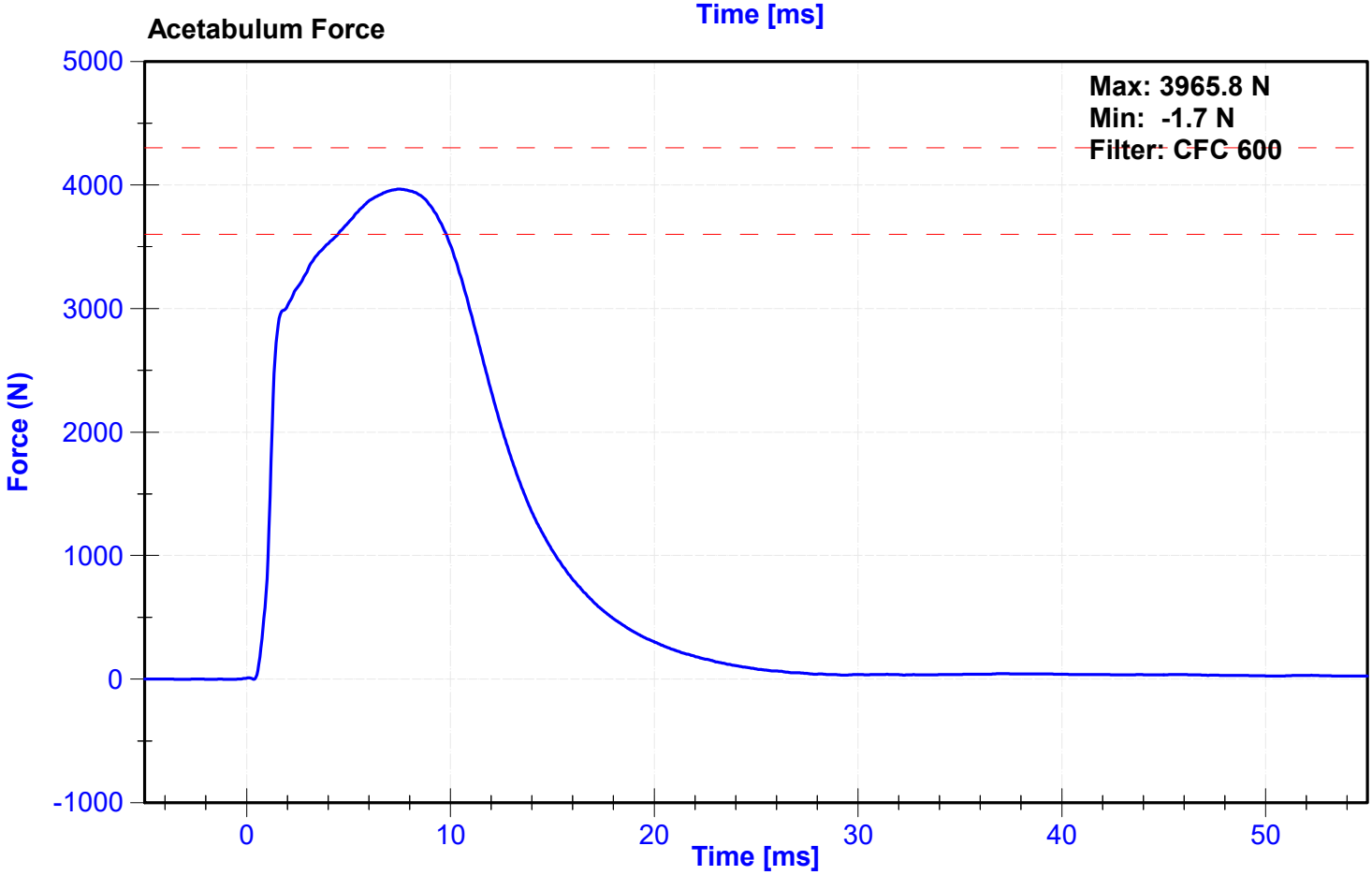
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	31	Pass
Velocity	6.6	6.8	m/s	6.65	Pass
Probe Acceleration	38	47	g's	42.3	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	35.7	Pass
Acetabulum Force	3600	4300	N	3965.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Pelvis Y Accelerometer	Endevco	P51731	10/17/2024	4/15/2025
Acetabulum Load Cell	Denton	275-FY	10/28/2024	10/28/2025
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 53.6 g's
Min: -13.0 g's
Filter: CFC 180
Acceleration (g's)
60
40
20
0
-20
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 3965.8 N
Min: -1.7 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16662
Test Number 23438
Report Number 23495
Test Date 7/21/2022 11:50:13 AM

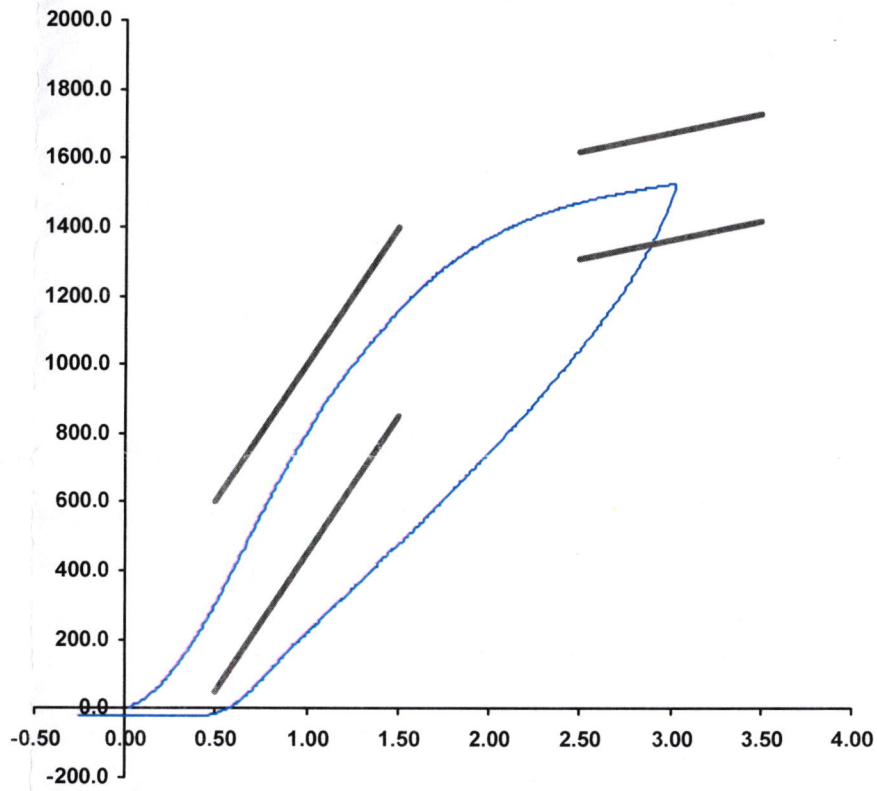
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	310	50	600
Force @ 1.5 mm (N)	1,155	850	1,400
Force @ 2.5 mm (N)	1,473	1,306	1,618
Force @ 3.0 mm (N)	1,526	1,361	1,673

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:
IMPACT 300 11-22-24

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 21-Jul-22
SACO Research

By : DC Date : 7/21/22

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

C-44

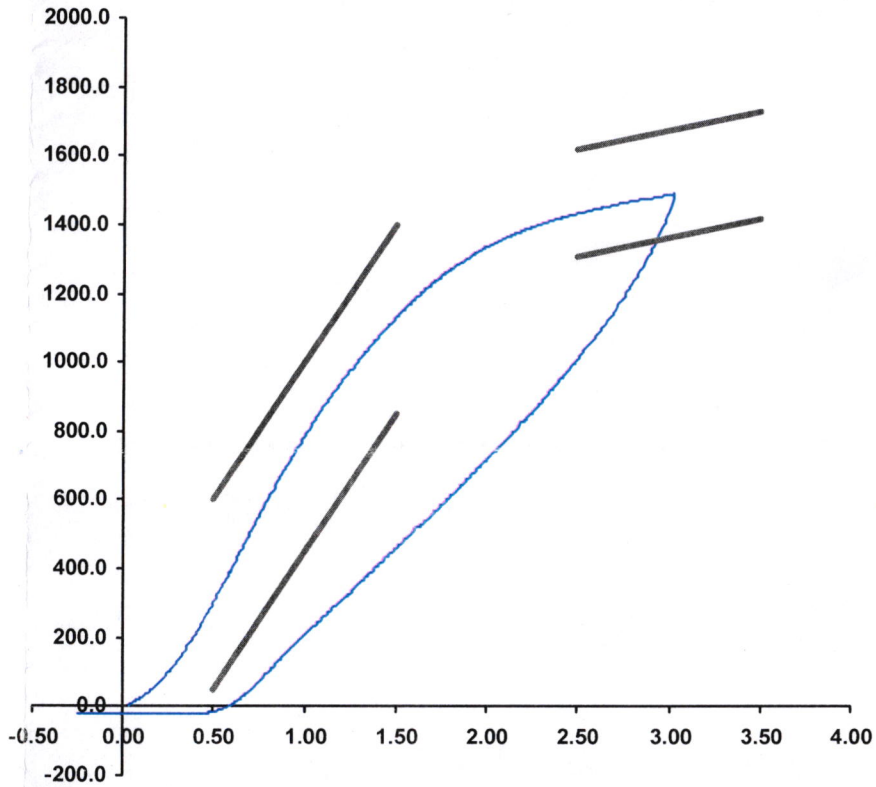
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16664
Test Number 23440
Report Number 23497
Test Date 7/21/2022 11:53:46 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	308	50	600
Force @ 1.5 mm (N)	1,132	850	1,400
Force @ 2.5 mm (N)	1,433	1,306	1,618
Force @ 3.0 mm (N)	1,487	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:
NON IMPACT 300 11-22-24

Operator

Part Number 180-4450

Template No 107 21-Jul-22
SACO Research

By : DC Date : 7/21/22

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

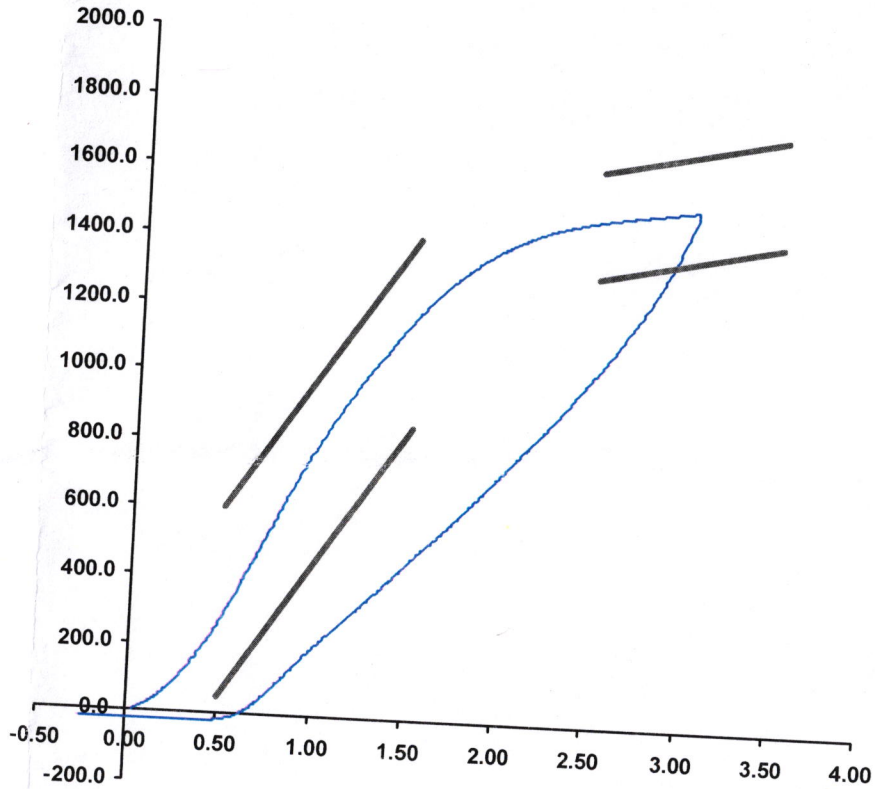
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16700
Test Number 23500
Report Number 23557
Test Date 7/22/2022 11:16:01 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	282	50	600
Force @ 1.5 mm (N)	1,168	850	1,400
Force @ 2.5 mm (N)	1,474	1,306	1,618
Force @ 3.0 mm (N)	1,512	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:
Cert Plug 300 11-22-24

Operator

Part Number 180-4450

Template No 107 22-Jul-22
SACO Research

By : DC Date : 7/22/22

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

C-46

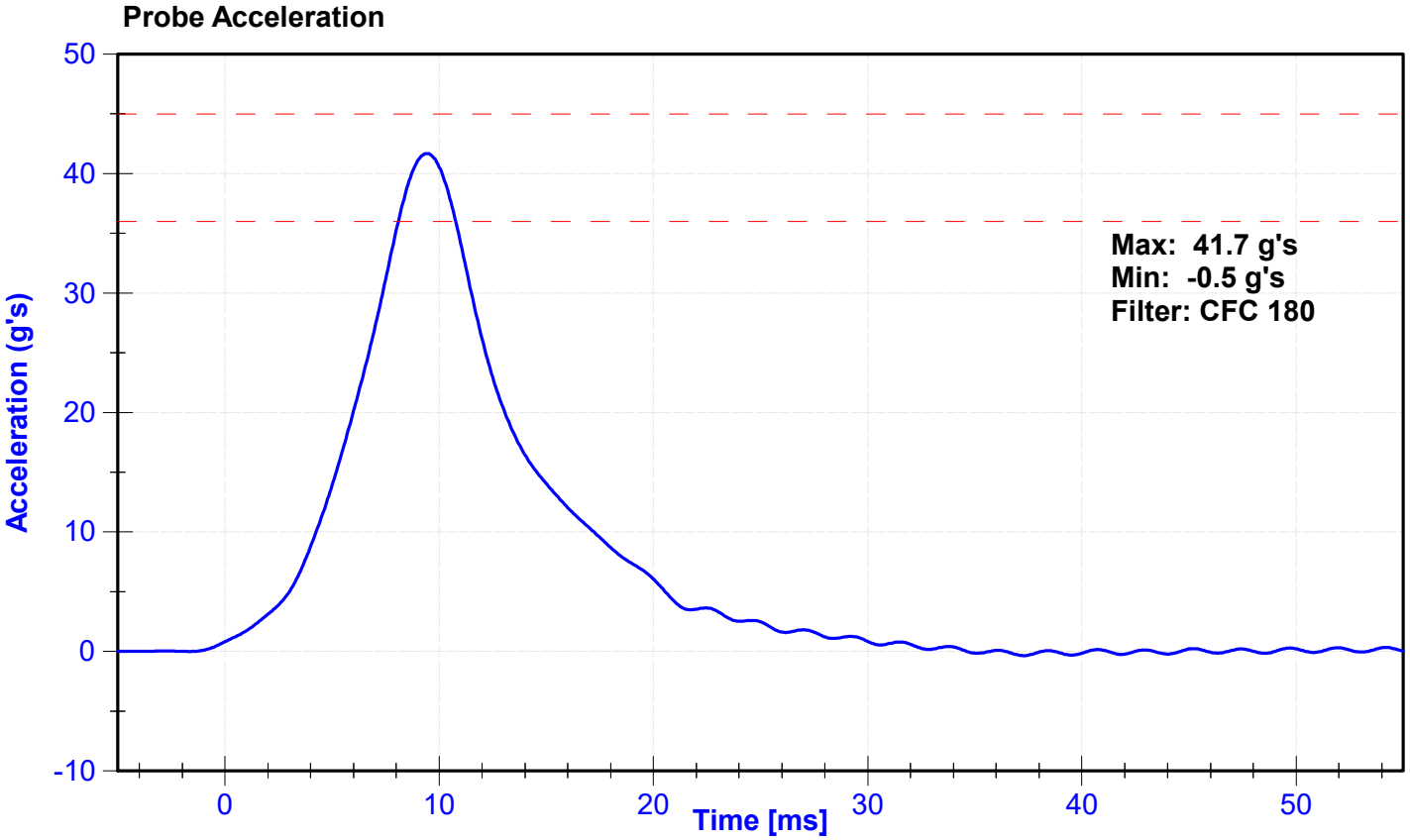
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

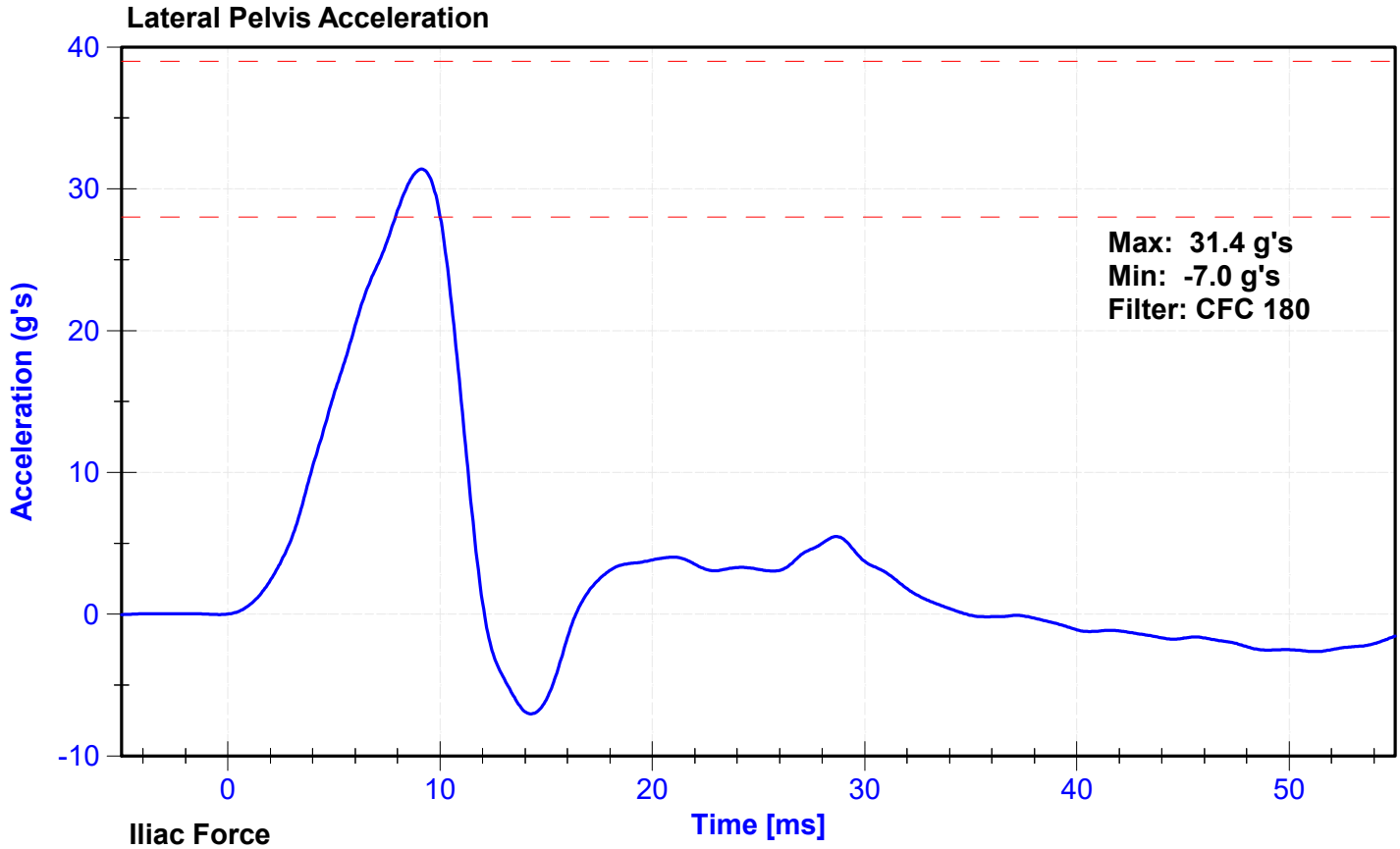
Results

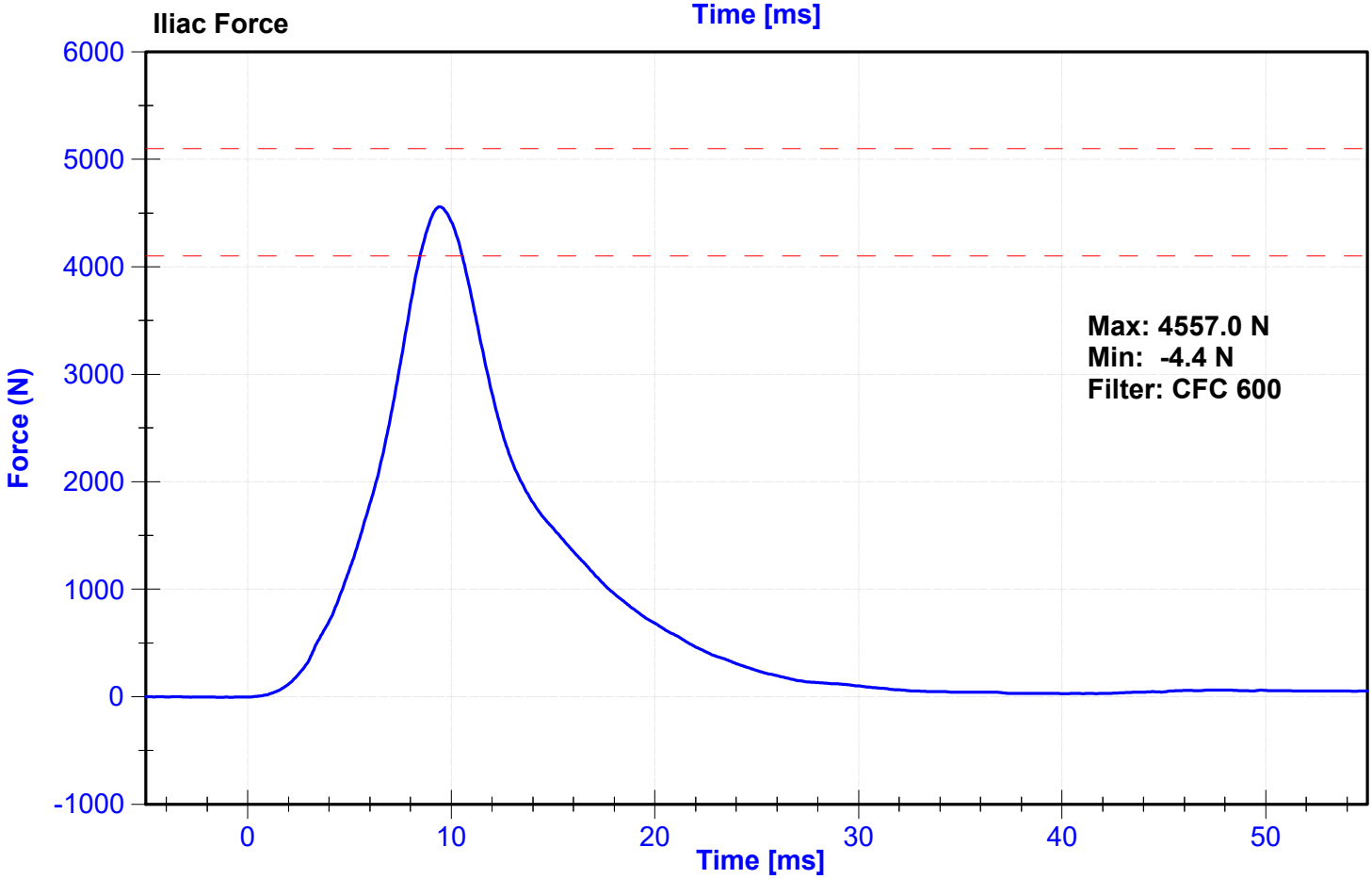
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	31	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	36	45	g's	41.7	Pass
Lateral Pelvis Acceleration	28	39	g's	31.4	Pass
Iliac Force	4100	5100	N	4557.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Pelvis Y Accelerometer	Endevco	P51731	10/17/2024	4/15/2025
Iliac Load Cell	Denton	279-FY	10/28/2024	10/28/2025




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 31.4 g's
Min: -7.0 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: 4557.0 N
Min: -4.4 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

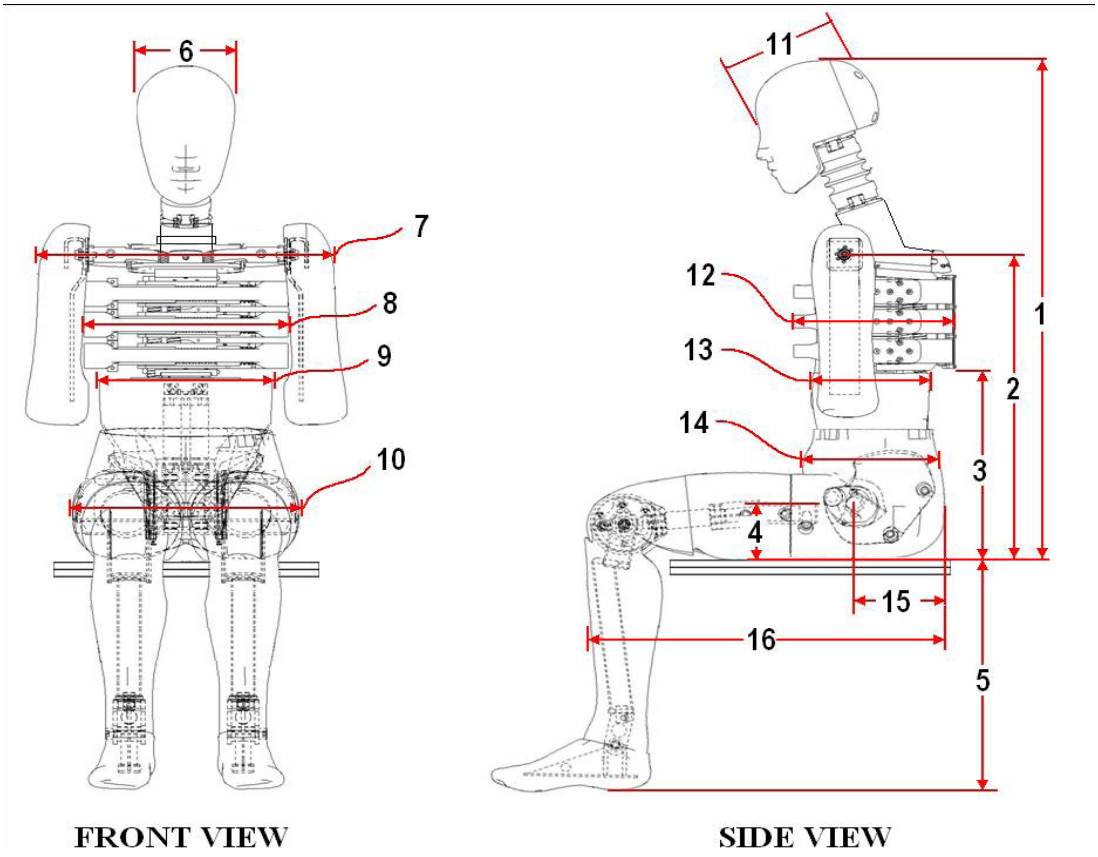
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - EuroSID-2re

Technician: J. Rios Date: 1/14/2025

Dummy Serial Number: F033



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	910	Pass
2	Seat to Shoulder Joint	558	572	563	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	351	Pass
4	Seat to Hip Joint (center of bolt)	97	103	101	Pass
5	Sole to Seat, Sitting	333	451	411	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	470	Pass
8	Thorax Width	322	332	328	Pass
9	Abdomen Width	273	287	283	Pass
10	Pelvis Lap Width	359	373	364	Pass
11	Head Depth	196	206	201	Pass
12	Thorax Depth	262	272	268	Pass
13	Abdomen Depth	194	204	197	Pass
14	Pelvis Depth	235	245	241	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	154	Pass
16	Back of Buttocks to Front Knee	597	615	603	Pass

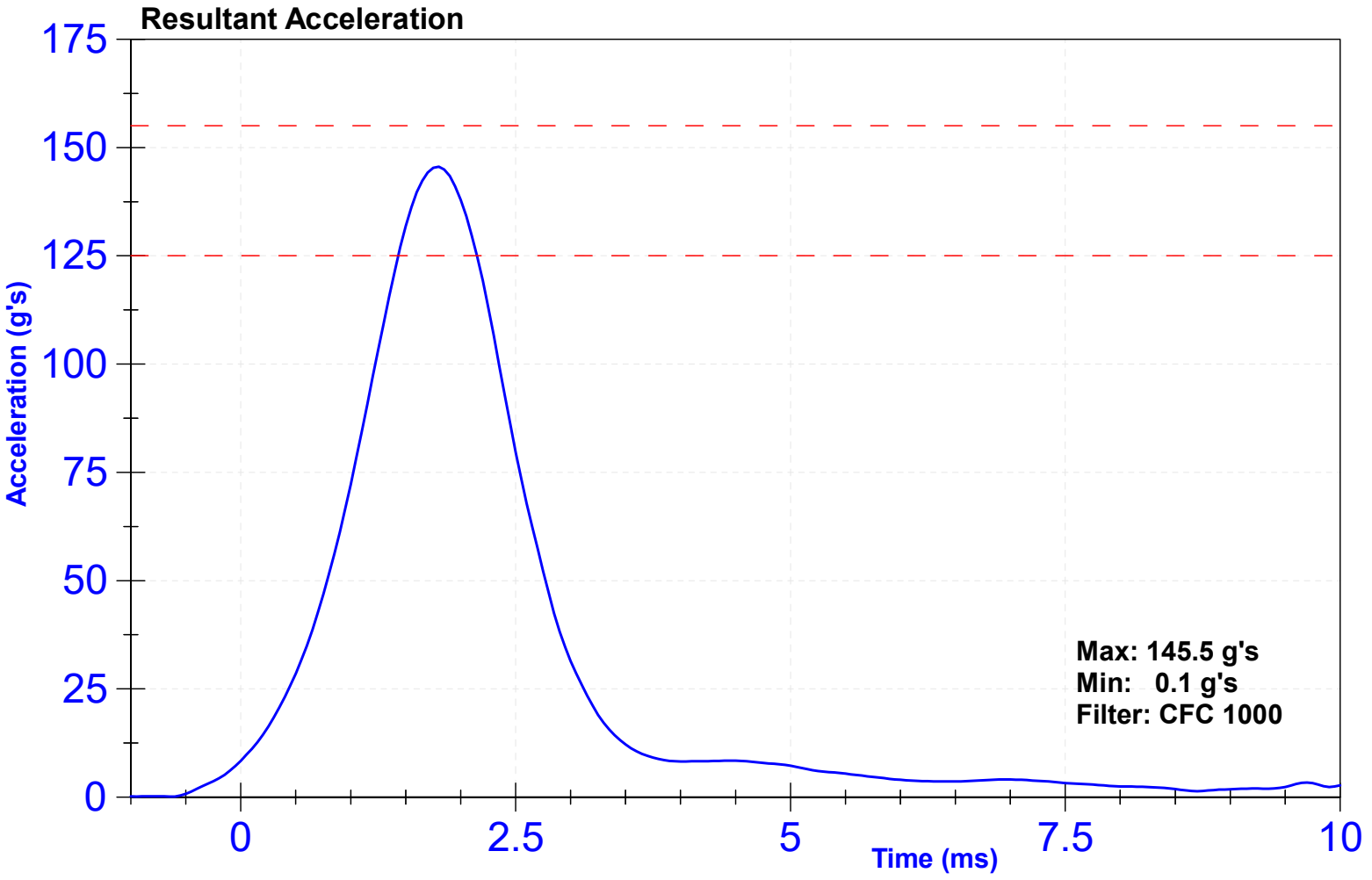
ATD Manufacturer	FTSS	Test Technician	K. Koineczny
ATD Serial Number	F033	Laboratory Supervisor	J. Kinderman

Results

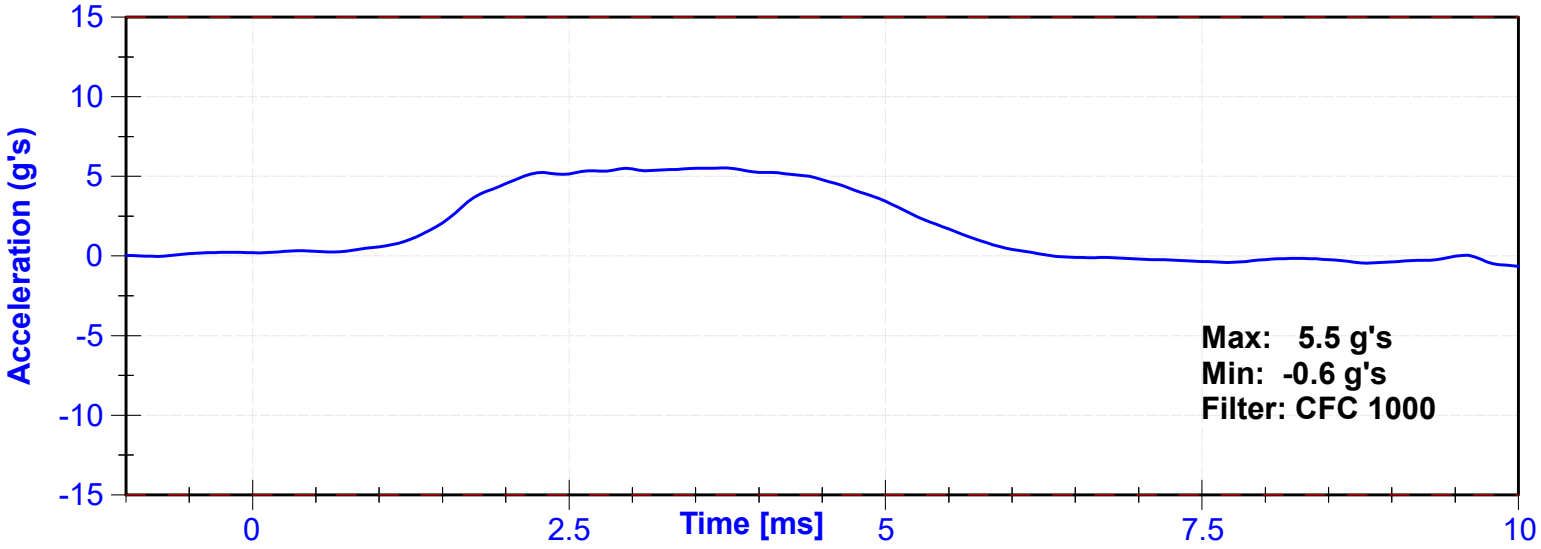
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	17	Pass
Resultant Acceleration	125	155	g's	145.5	Pass
Oscillation	0	15	%	5.79	Pass
Fore-Aft Acceleration	-15	15	g's	5.5	Pass

Transducer Calibrations

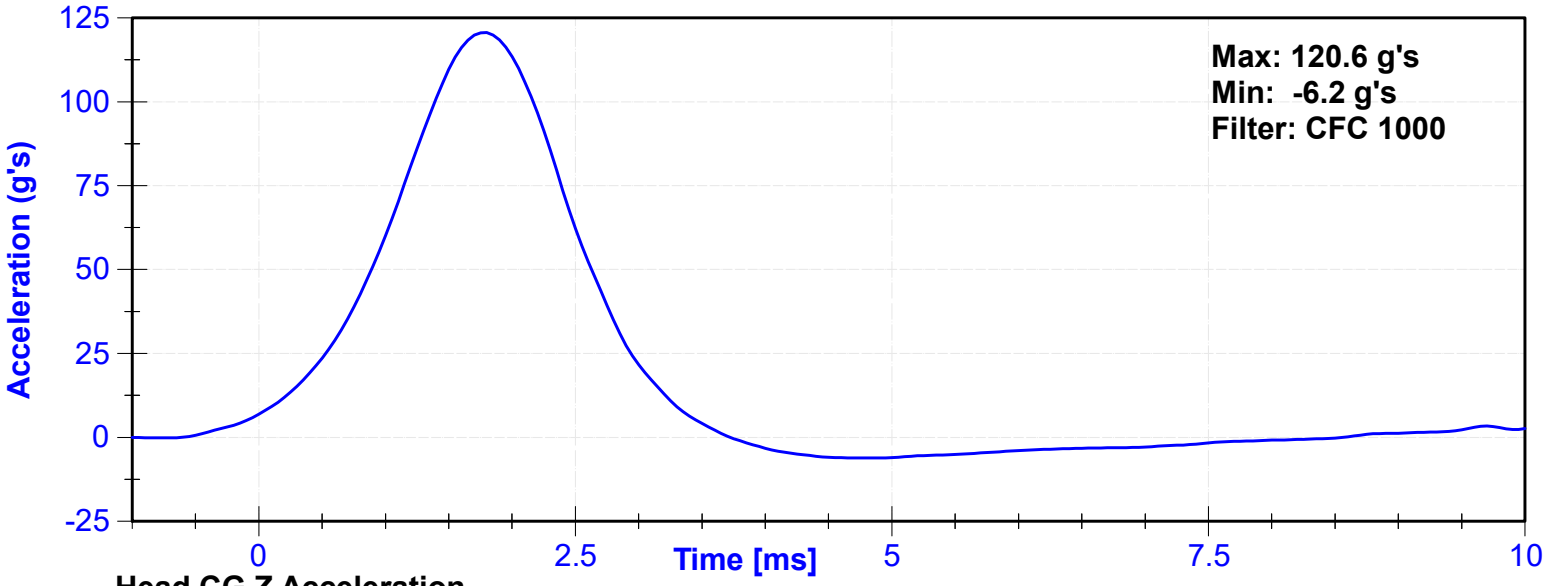
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P63861	10/17/2024	4/15/2025
Y Accelerometer	Endevco	P49216	10/17/2024	4/15/2025
Z Accelerometer	Endevco	P51303	10/17/2024	4/15/2025



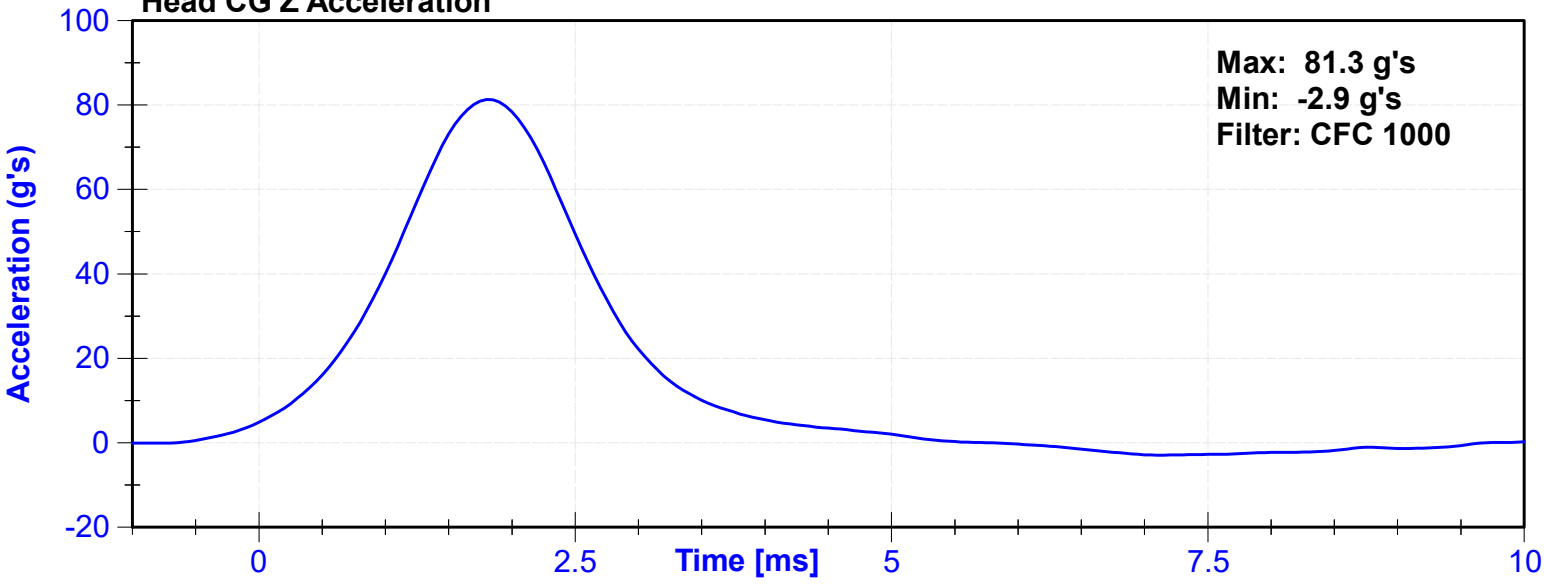
Head CG X Acceleration



Head CG Y Acceleration



Head CG Z Acceleration



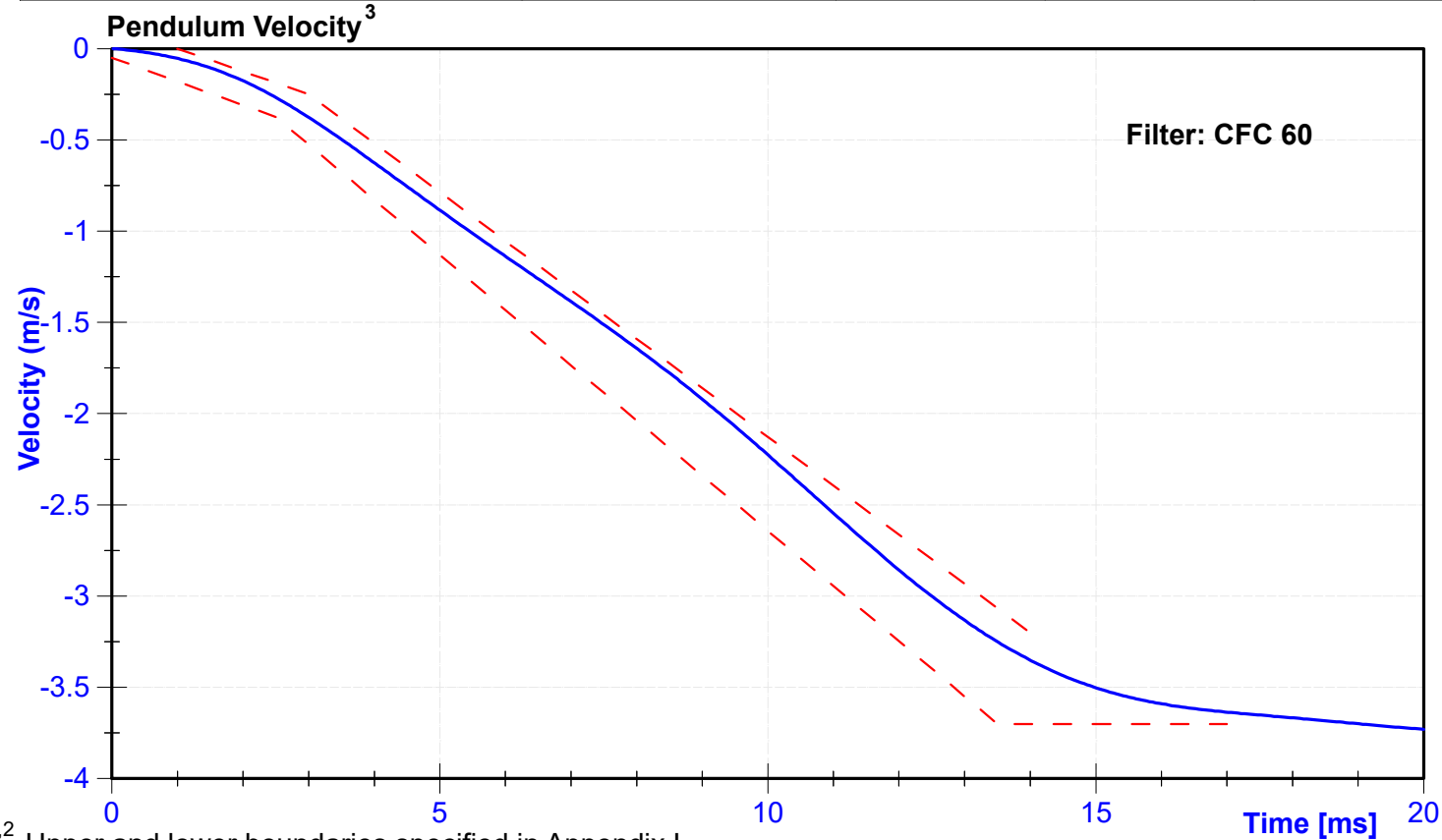
ATD Manufacturer	ftss	Test Technician	E. Andruczyk
ATD Serial Number	f033	Laboratory Supervisor	J. Kinderman

Results

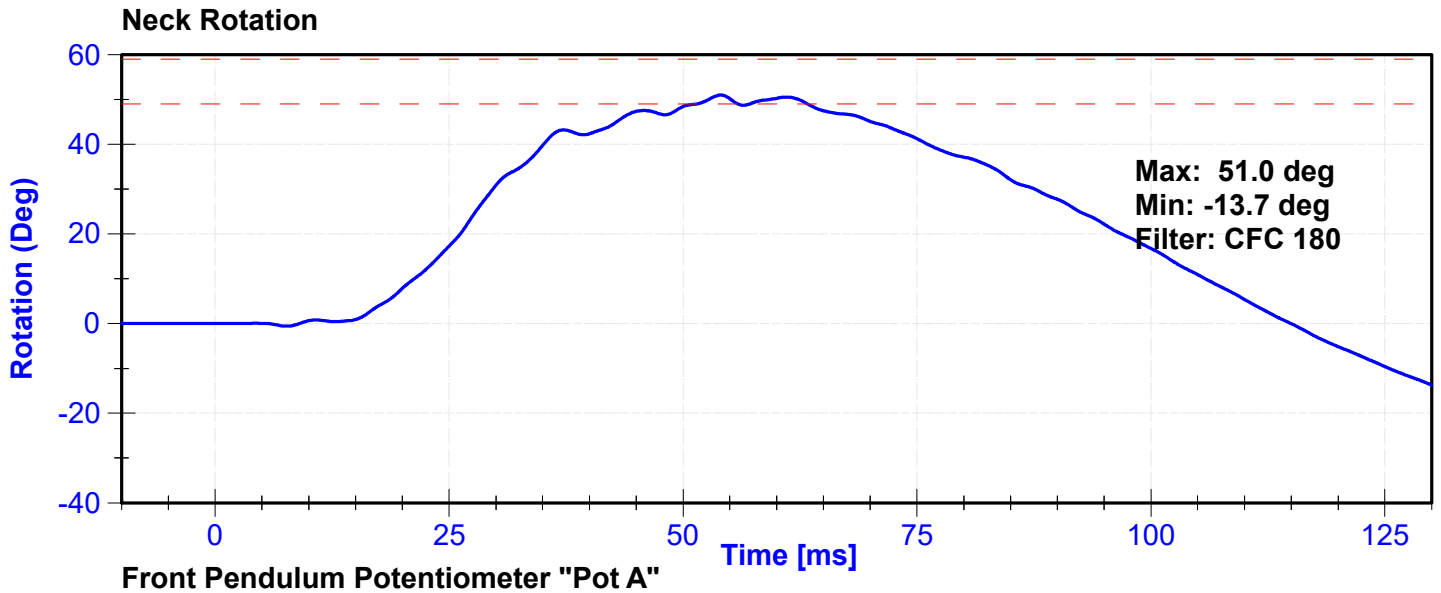
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	3.3	3.5	m/s	3.44	Pass
Lateral Neck Rotation	49	59	deg	51.0	Pass
Time at Maximum Rotation	54	66	ms	54.1	Pass
Time of Rotation Decay from Maximum	53	88	ms	61.0	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

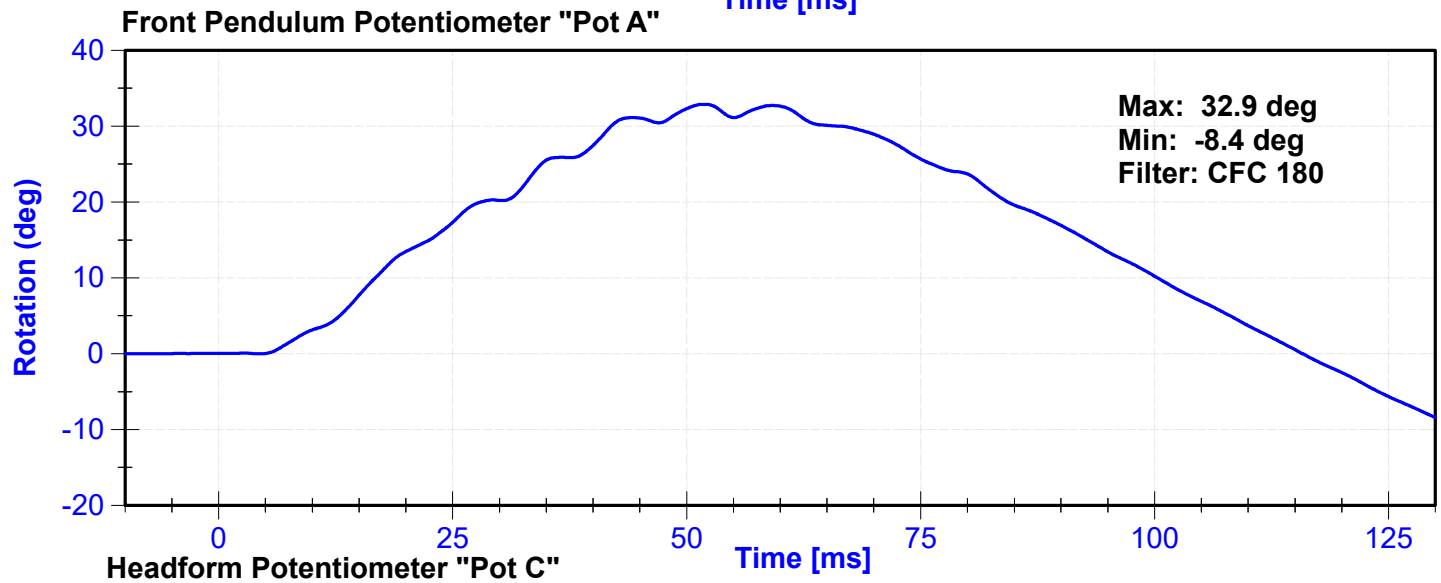
Transducer Calibrations

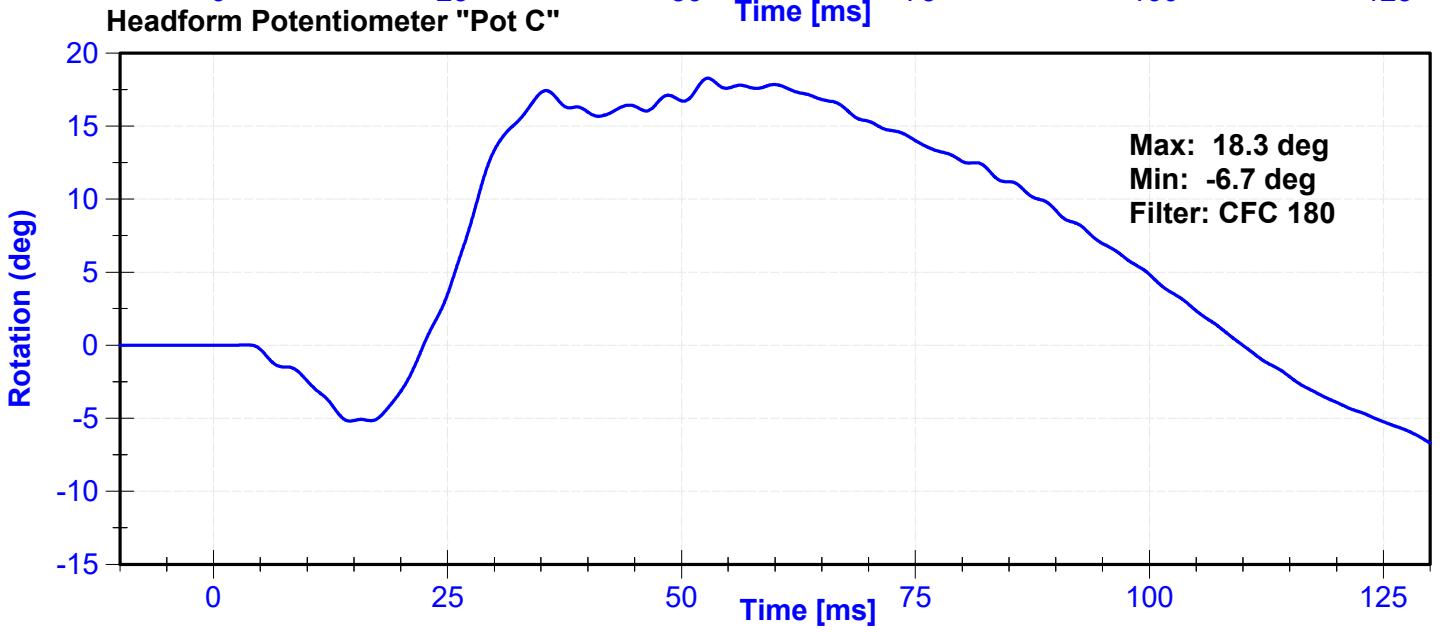
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Front Pendulum Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Headform Potentiometer	Sfernice	095	9/13/2024	9/13/2025



[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: 51.0 deg
Min: -13.7 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: 32.9 deg
Min: -8.4 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: 18.3 deg
Min: -6.7 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

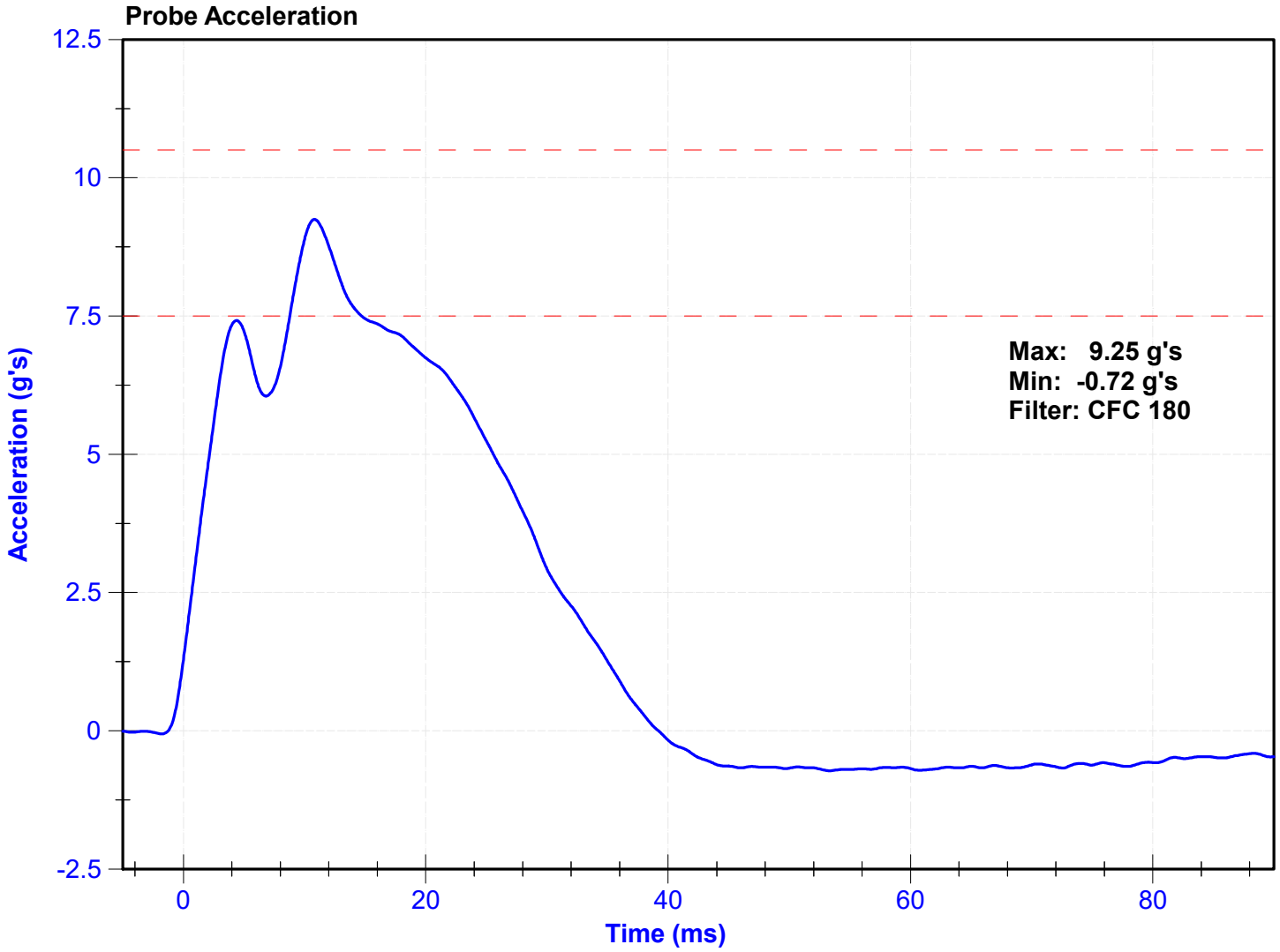
ATD Manufacturer	FTSS	Test Technician	E. Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	7.5	10.5	g's	9.25	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18599	9/13/2024	3/12/2025



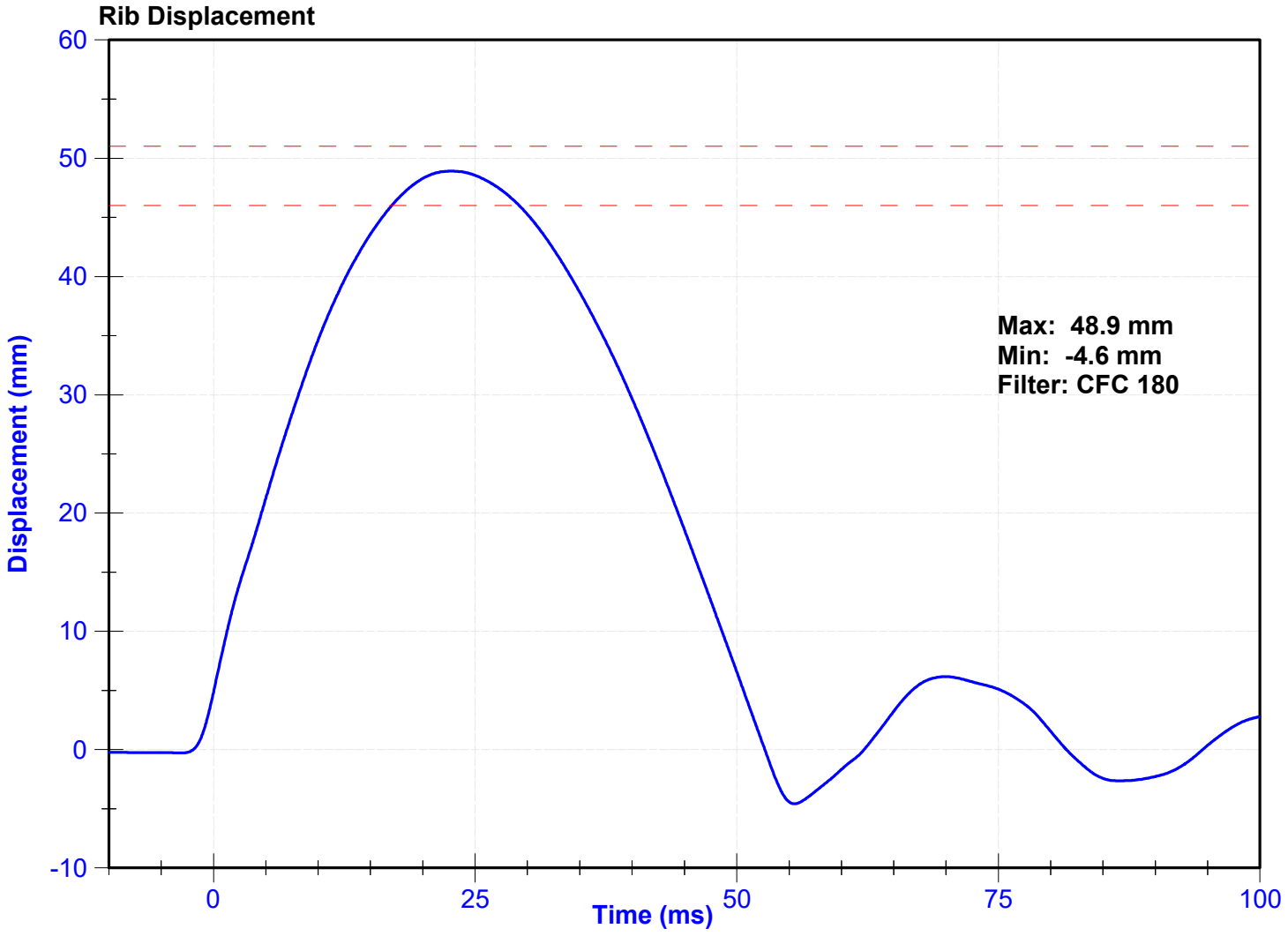
ATD Manufacturer	FTSS	Test Technician	E. Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J.Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	46	51	mm	48.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	10/16/2024	4/16/2025



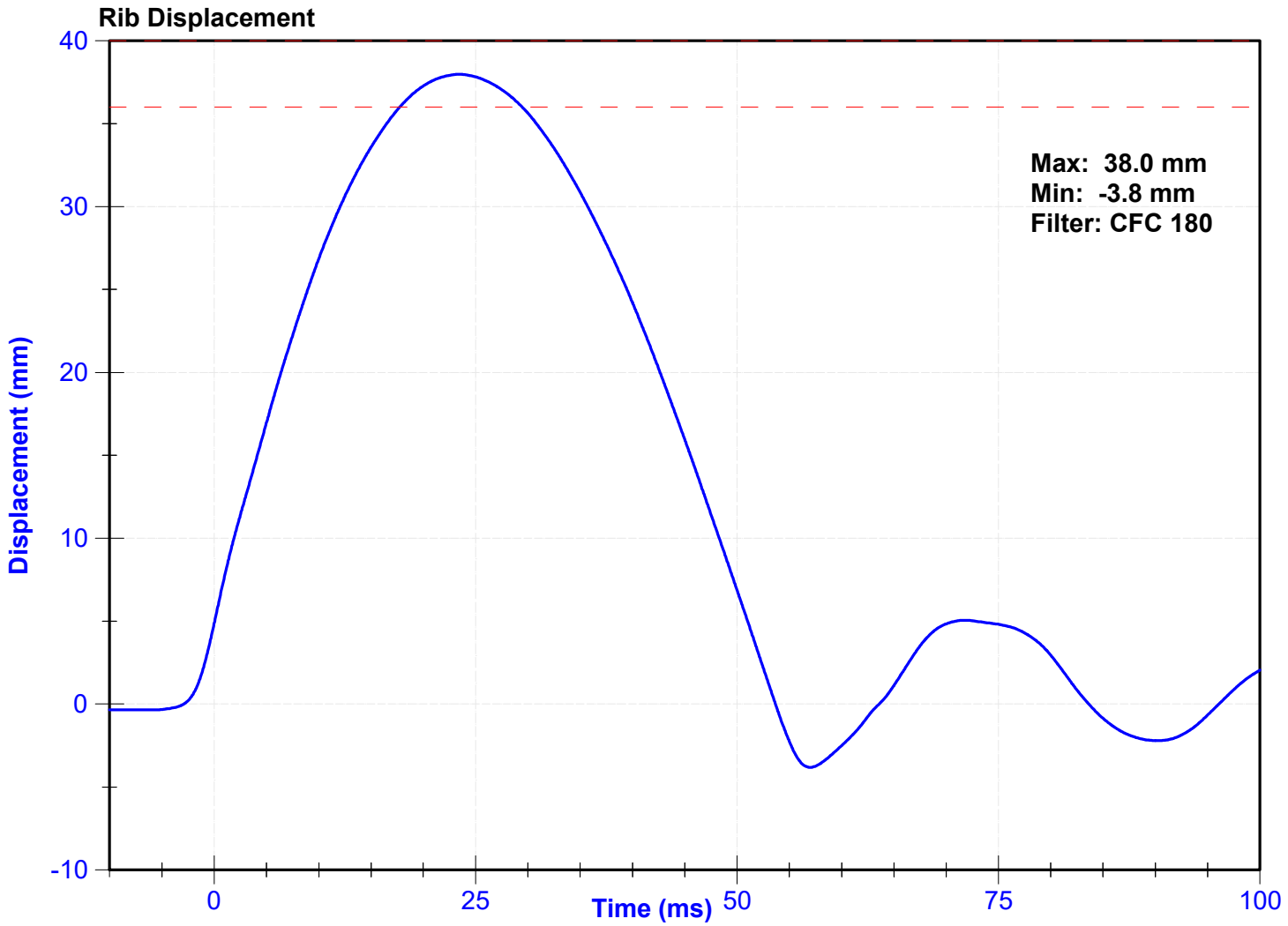
ATD Manufacturer	FTSS	Test Technician	E. Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J.Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	36	40	mm	38.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	179GFE	10/16/2024	4/16/2025



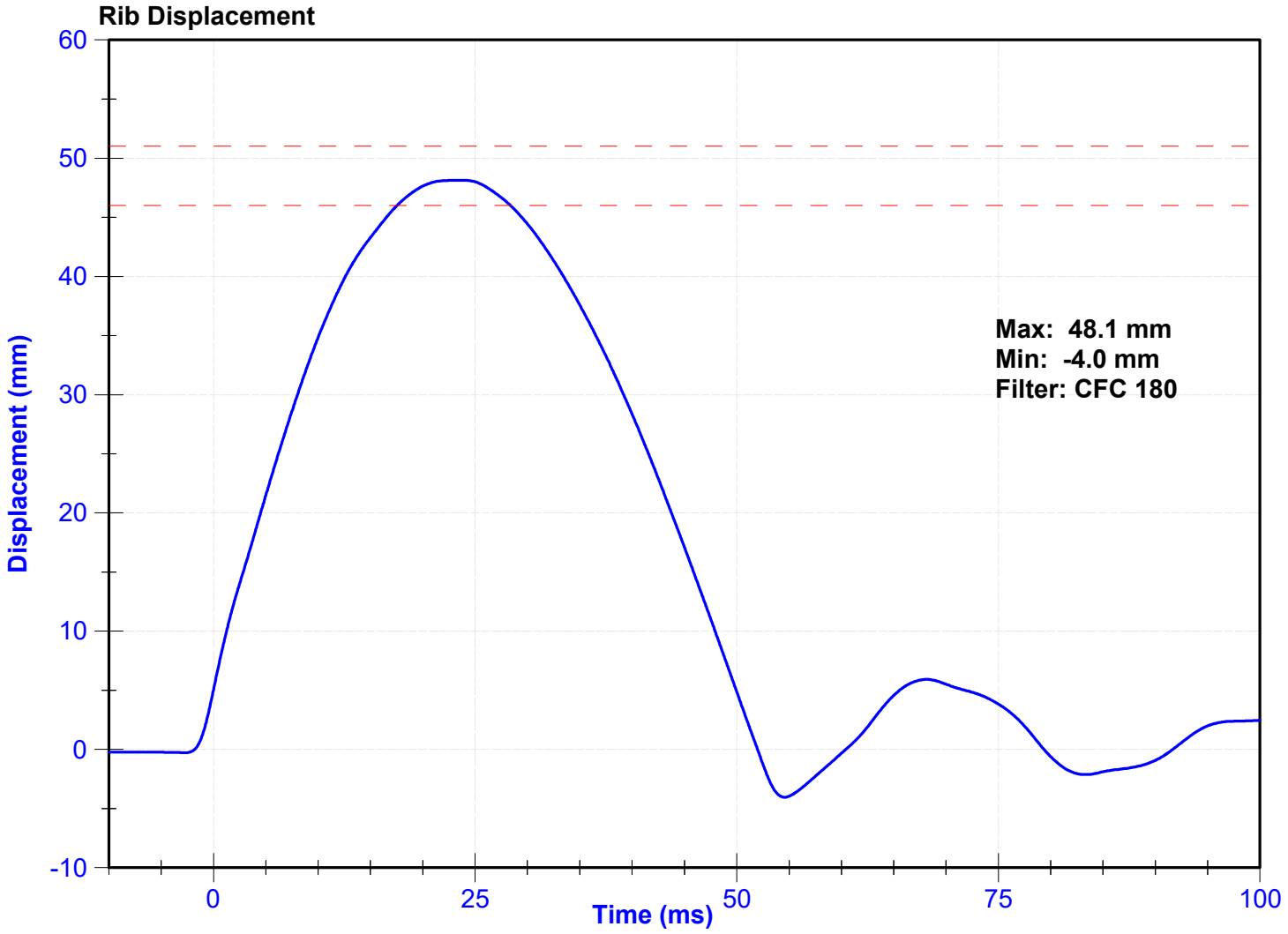
ATD Manufacturer	FTSS	Test Technician	E. Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J.Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	46	51	mm	48.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	10/16/2024	4/16/2025



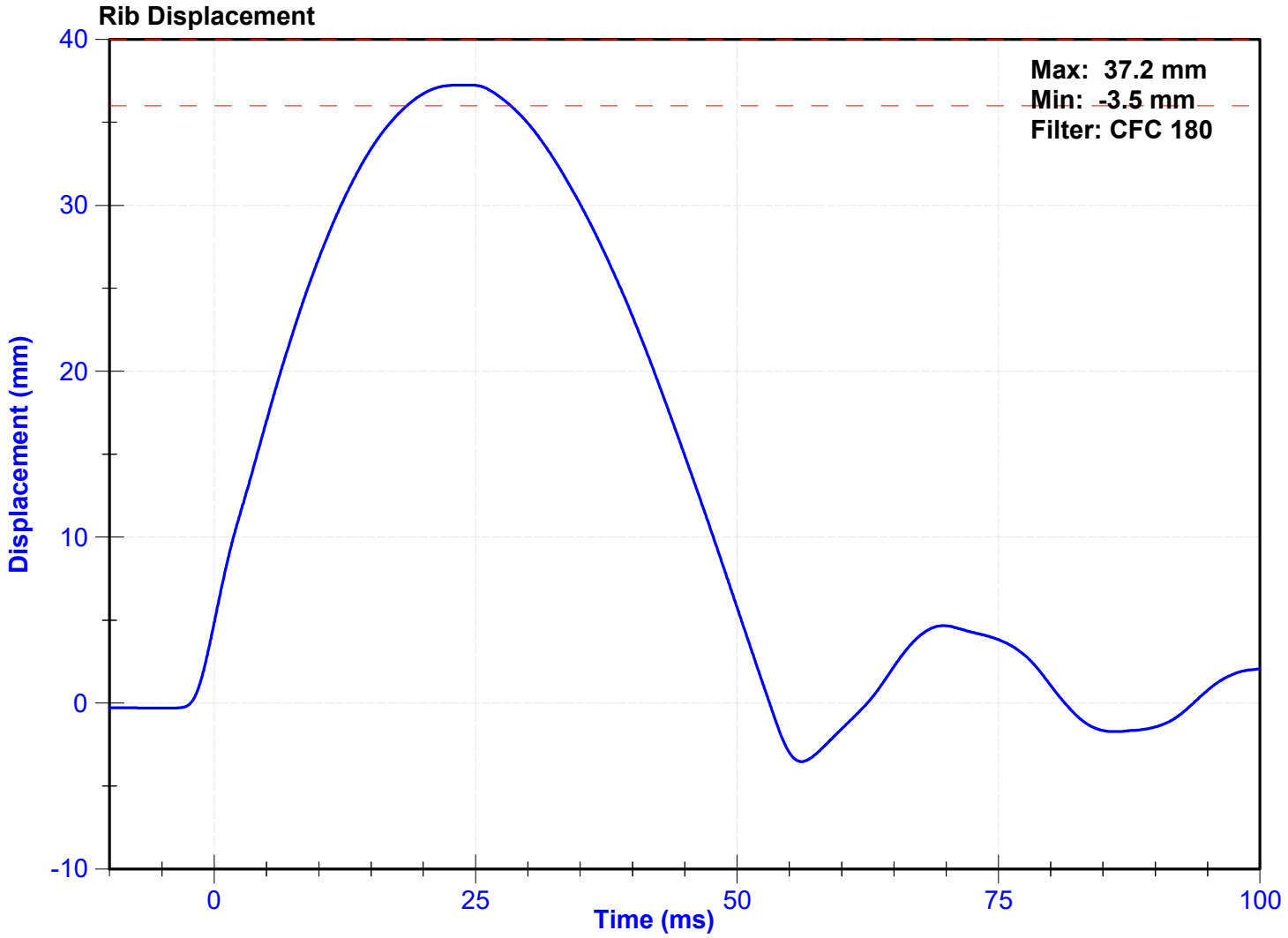
ATD Manufacturer	FTSS	Test Technician	E. Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	36	40	mm	37.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	185GFE	10/16/2024	4/16/2025



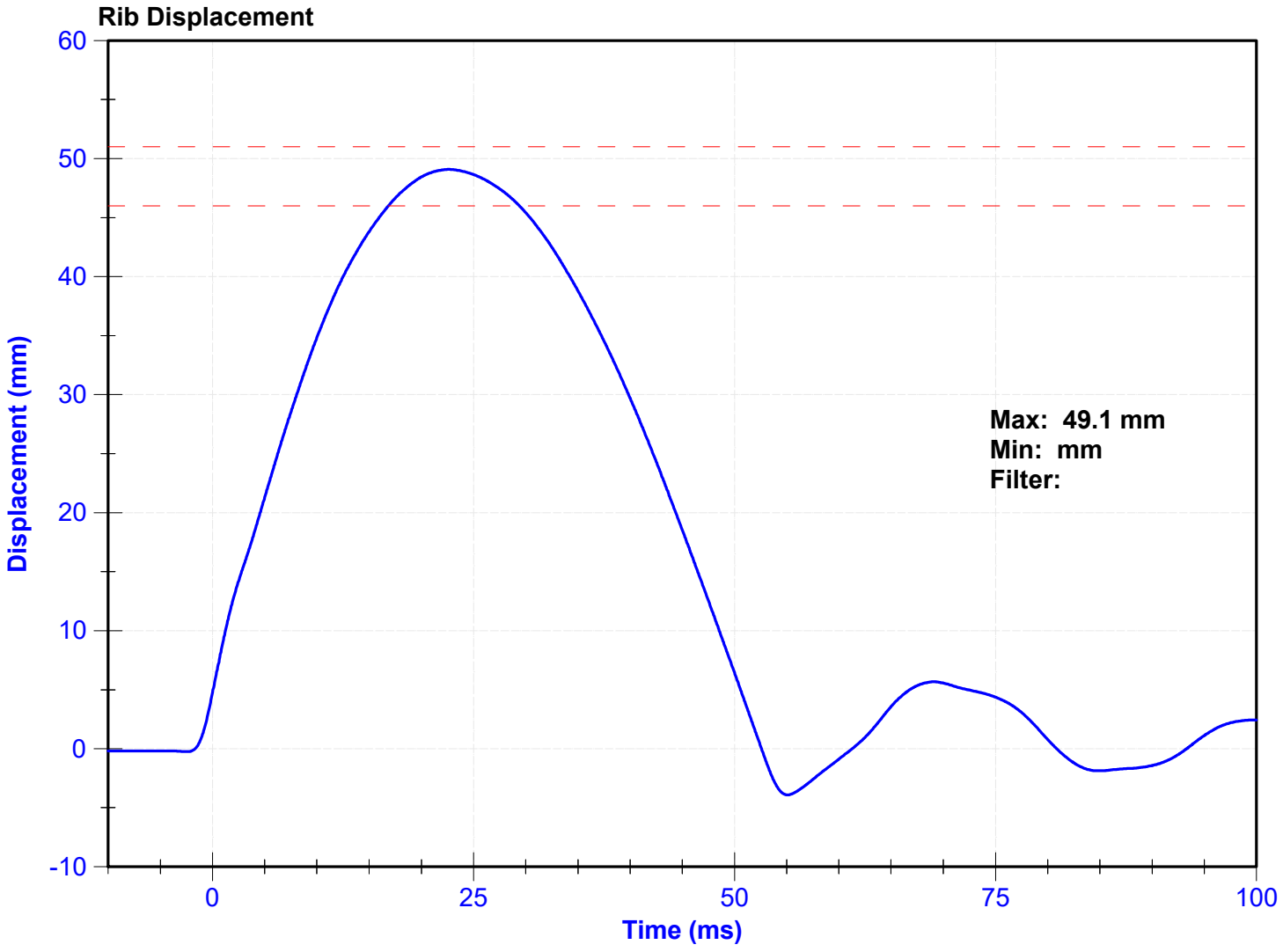
ATD Manufacturer	FTSS	Test Technician	E. Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J.Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	46	51	mm	49.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	184GFE	11/19/2024	5/20/2025



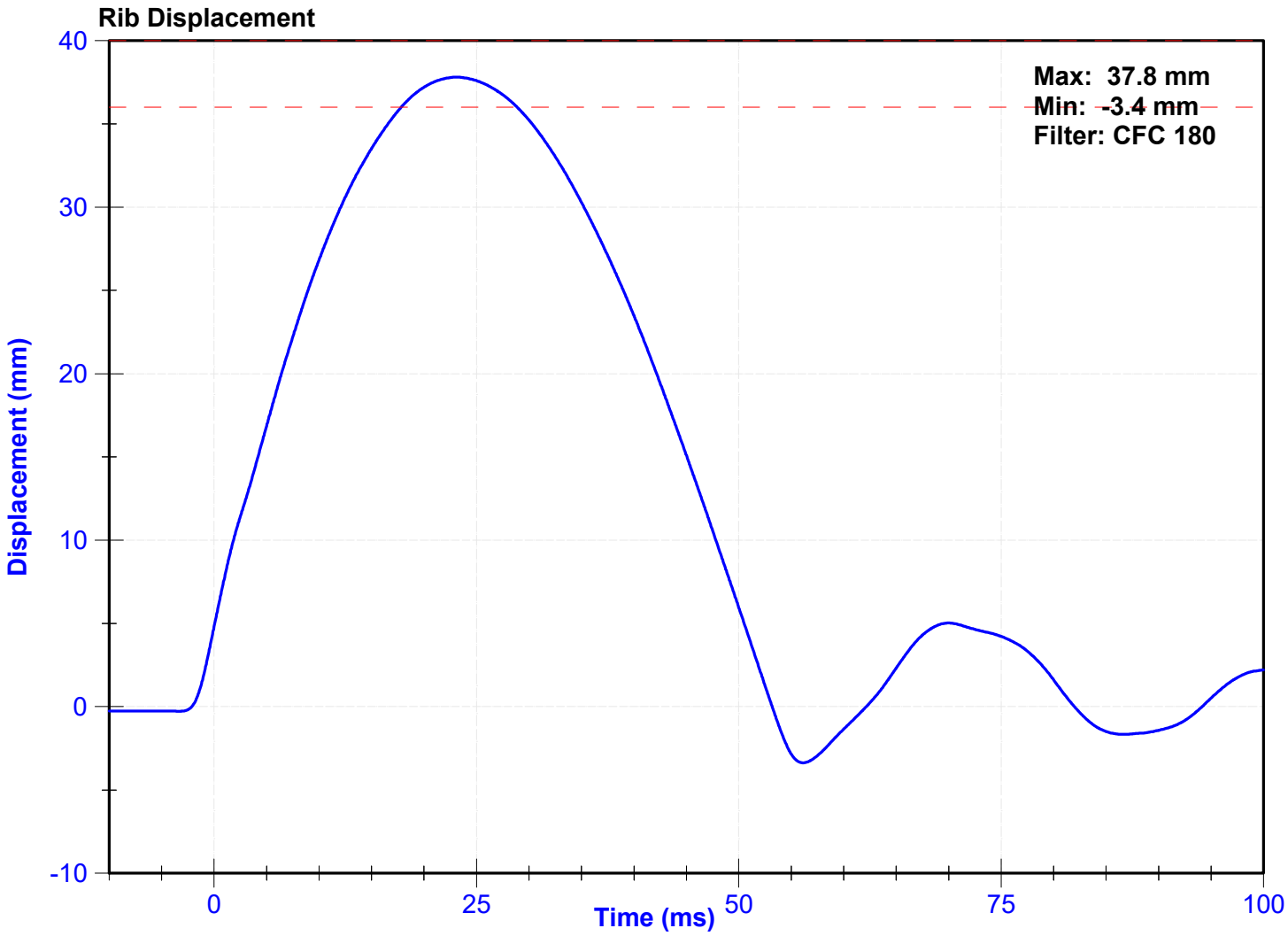
ATD Manufacturer	FTSS	Test Technician	E. Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J.Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	36	40	mm	37.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	184GFE	11/19/2024	5/20/2025



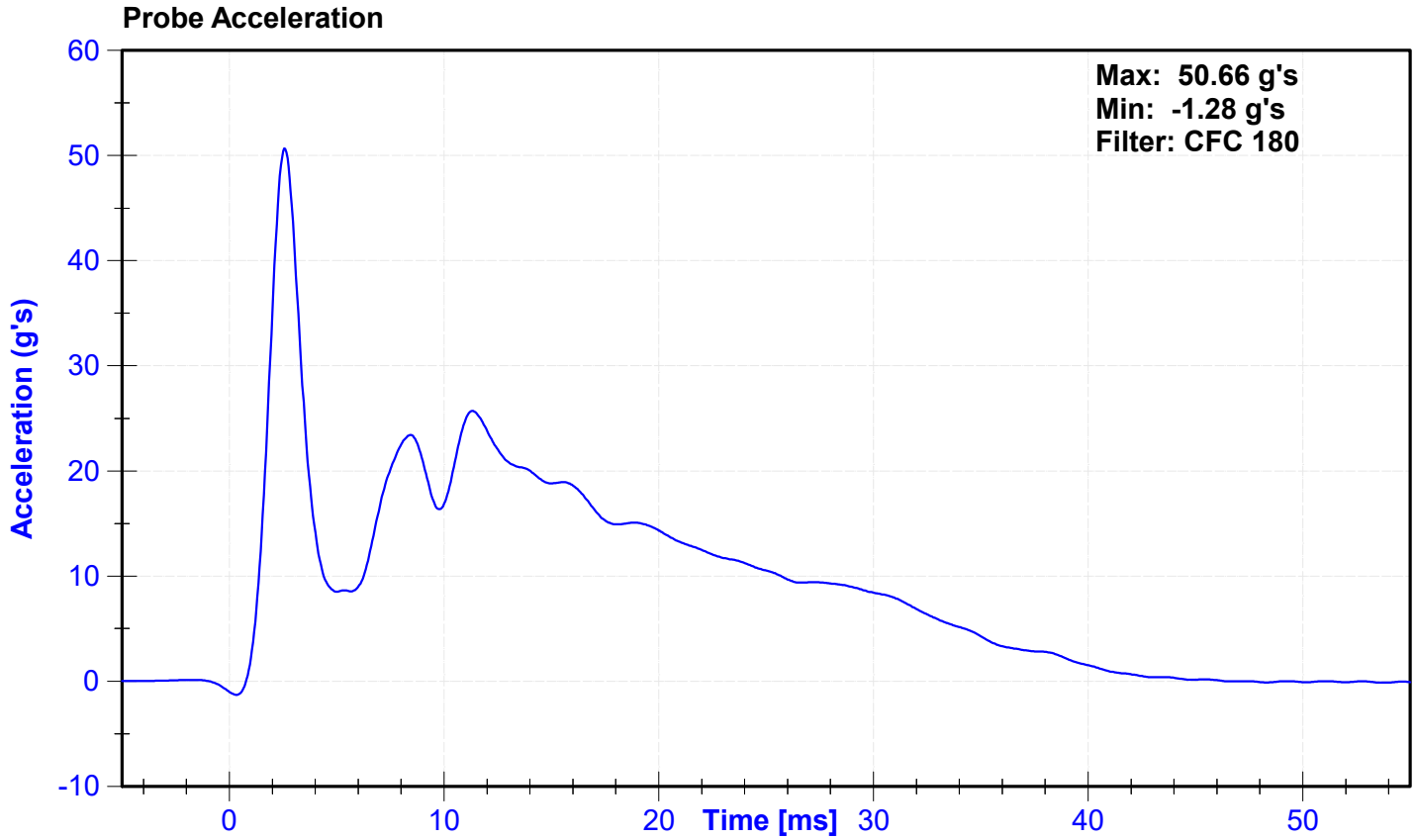
ATD Manufacturer	FTSS	Test Technician	E. Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J. Kinderman

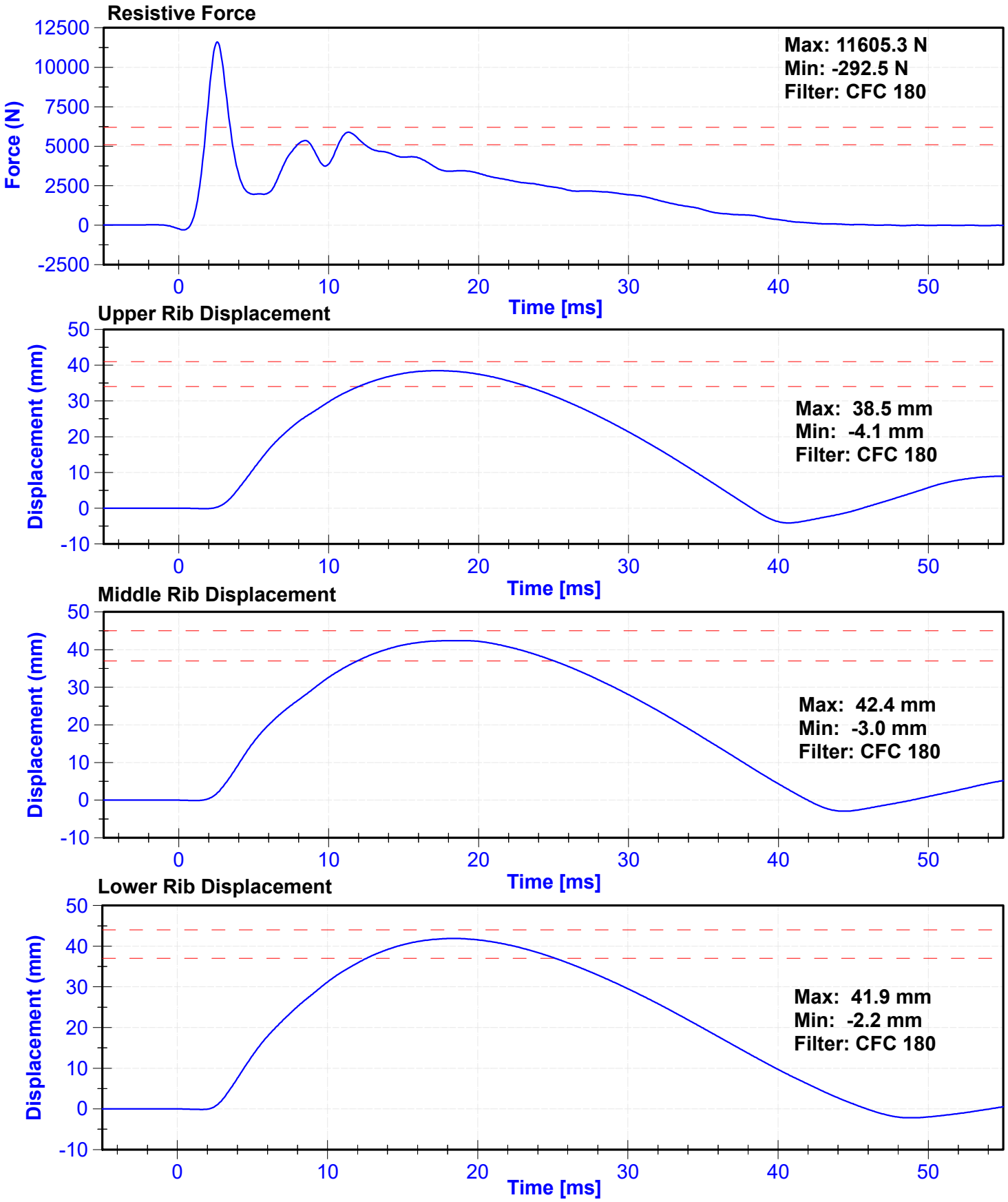
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	5.4	5.6	m/s	5.54	Pass
Resistive Force after 6ms	5100	6200	N	5891.0	Pass
Upper Thorax Rib Deflection	34	41	mm	38.5	Pass
Mid Thorax Rib Deflection	37	45	mm	42.4	Pass
Lower Thorax Rib Deflection	37	44	mm	41.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Upper Thorax Rib Potentiometer	Honeywell	179GFE	10/16/2024	4/16/2025
Middle Thorax Rib Potentiometer	Honeywell	185GFE	10/16/2024	4/16/2025
Lower Thorax Rib Potentiometer	Honeywell	184GFE	11/19/2024	5/20/2025




Resistive Force
Force (N)
Max: 11605.3 N
Min: -292.5 N
Filter: CFC 180
Time [ms]
Upper Rib Displacement
Displacement (mm)
Max: 38.5 mm
Min: -4.1 mm
Filter: CFC 180
Time [ms]
Middle Rib Displacement
Displacement (mm)
Max: 42.4 mm
Min: -3.0 mm
Filter: CFC 180
Time [ms]
Lower Rib Displacement
Displacement (mm)
Max: 41.9 mm
Min: -2.2 mm
Filter: CFC 180
Time [ms]

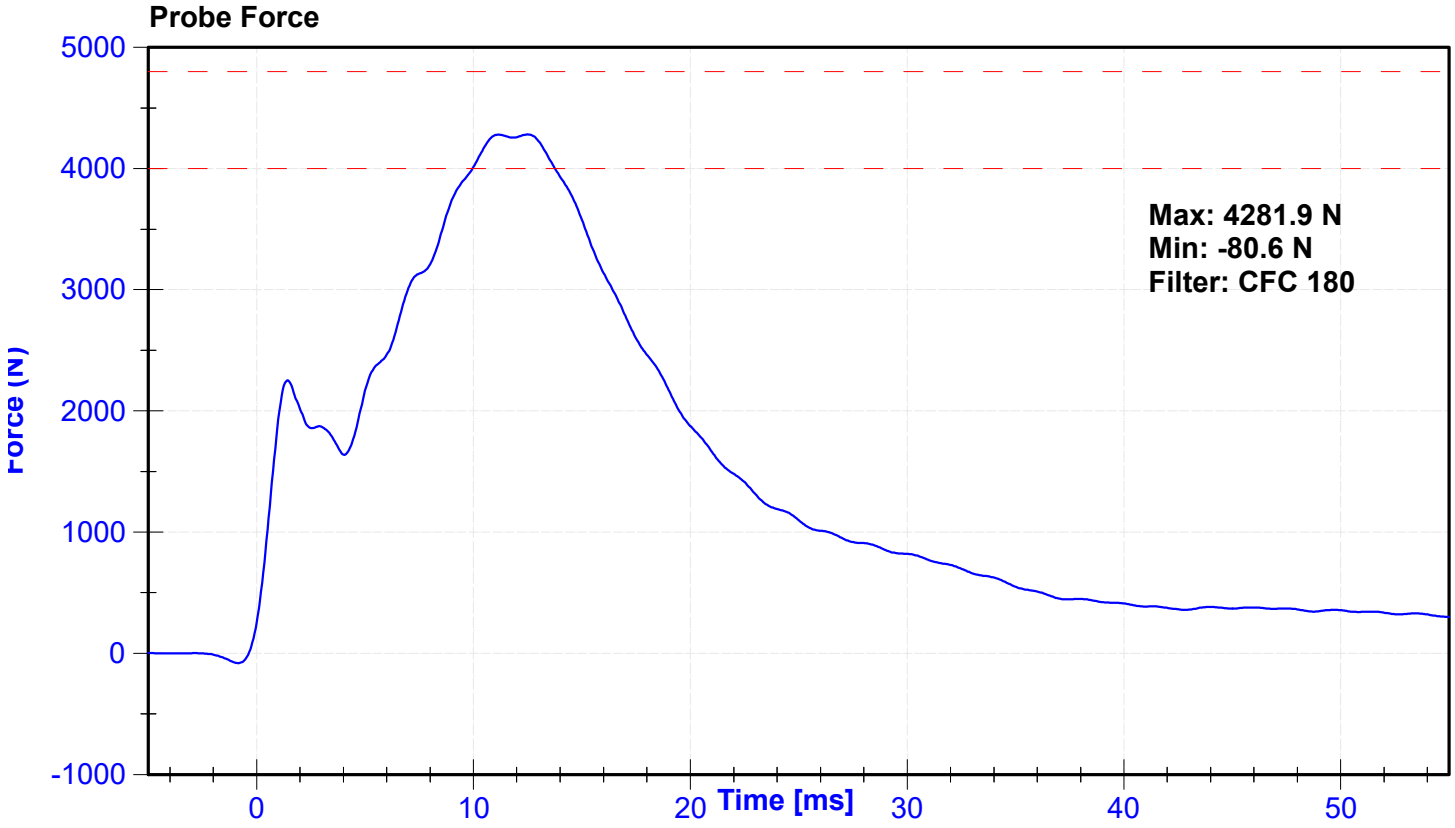
ATD Manufacturer	FTSS	Test Technician	E. Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J. Kinderman

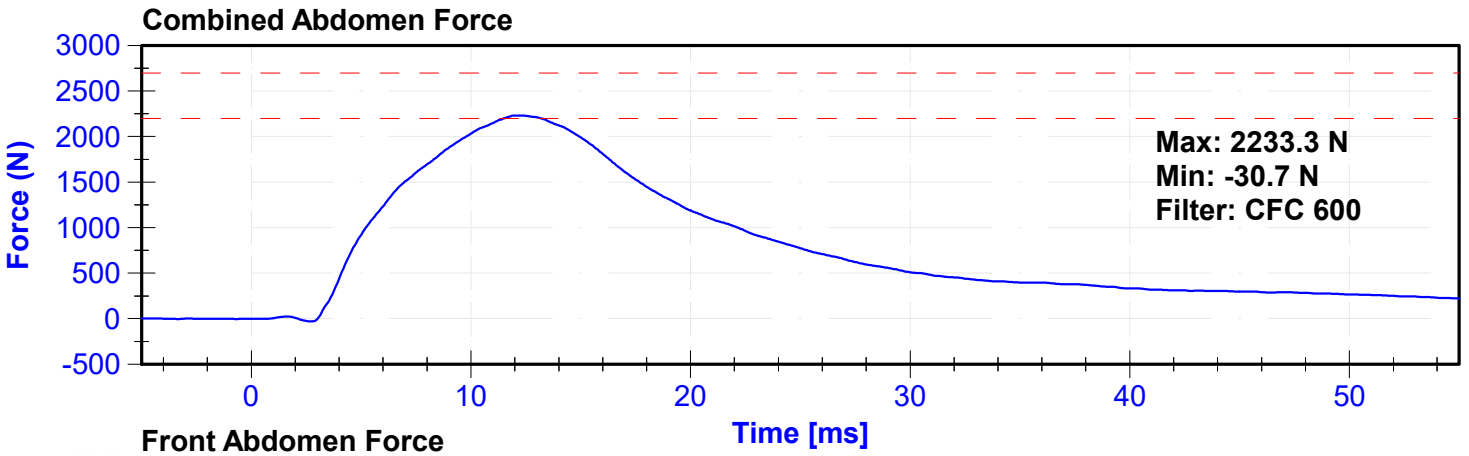
Results

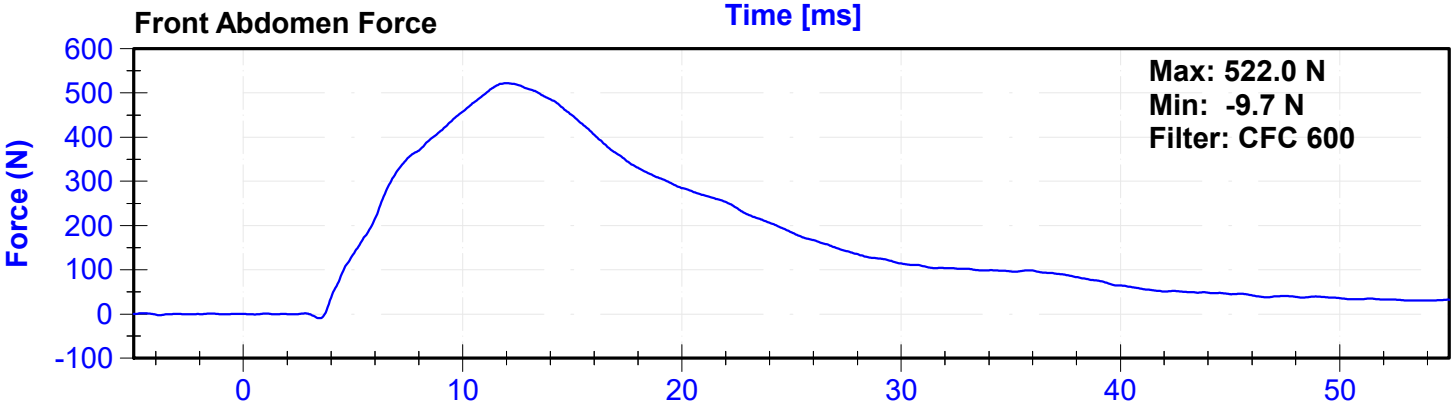
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	3.9	4.1	m/s	4.03	Pass
Combined Abdomen Force	2200	2700	N	2233.3	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	12.15	Pass
Resistive Probe Force	4000	4800	N	4281.9	Pass
Time at Peak Resistive Force	10.6	13.0	ms	12.50	Pass

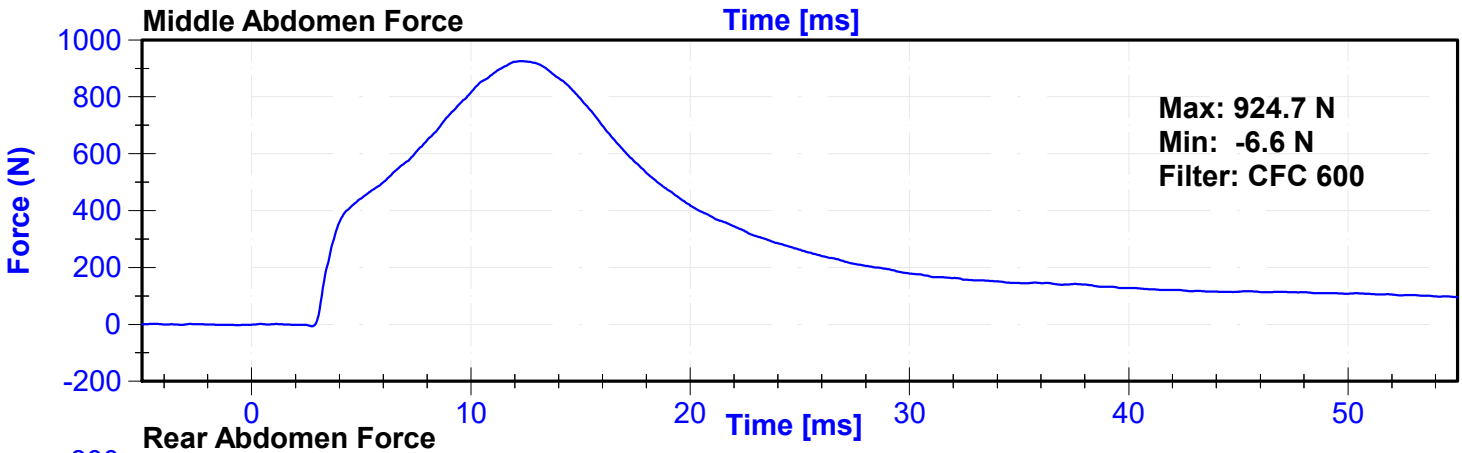
Transducer Calibrations

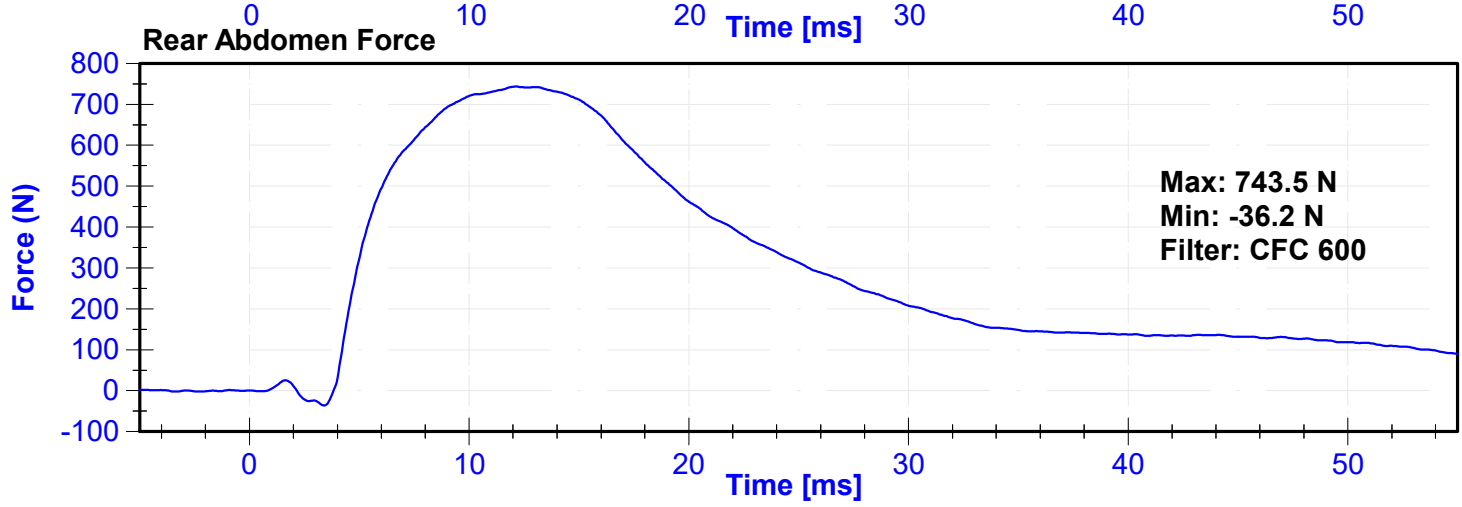
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Front Abdomen Load Cell	Denton	1523	10/28/2024	10/28/2025
Middle Abdomen Load Cell	Denton	1524	10/28/2024	10/28/2025
Rear Abdomen Load Cell	Denton	1530	10/28/2024	10/28/2025




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2233.3 N
Min: -30.7 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 522.0 N
Min: -9.7 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 924.7 N
Min: -6.6 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 743.5 N
Min: -36.2 N
Filter: CFC 600

ATD Manufacturer	ftss	Test Technician	E. Andruczyk
ATD Serial Number	f033	Laboratory Supervisor	J. Kinderman

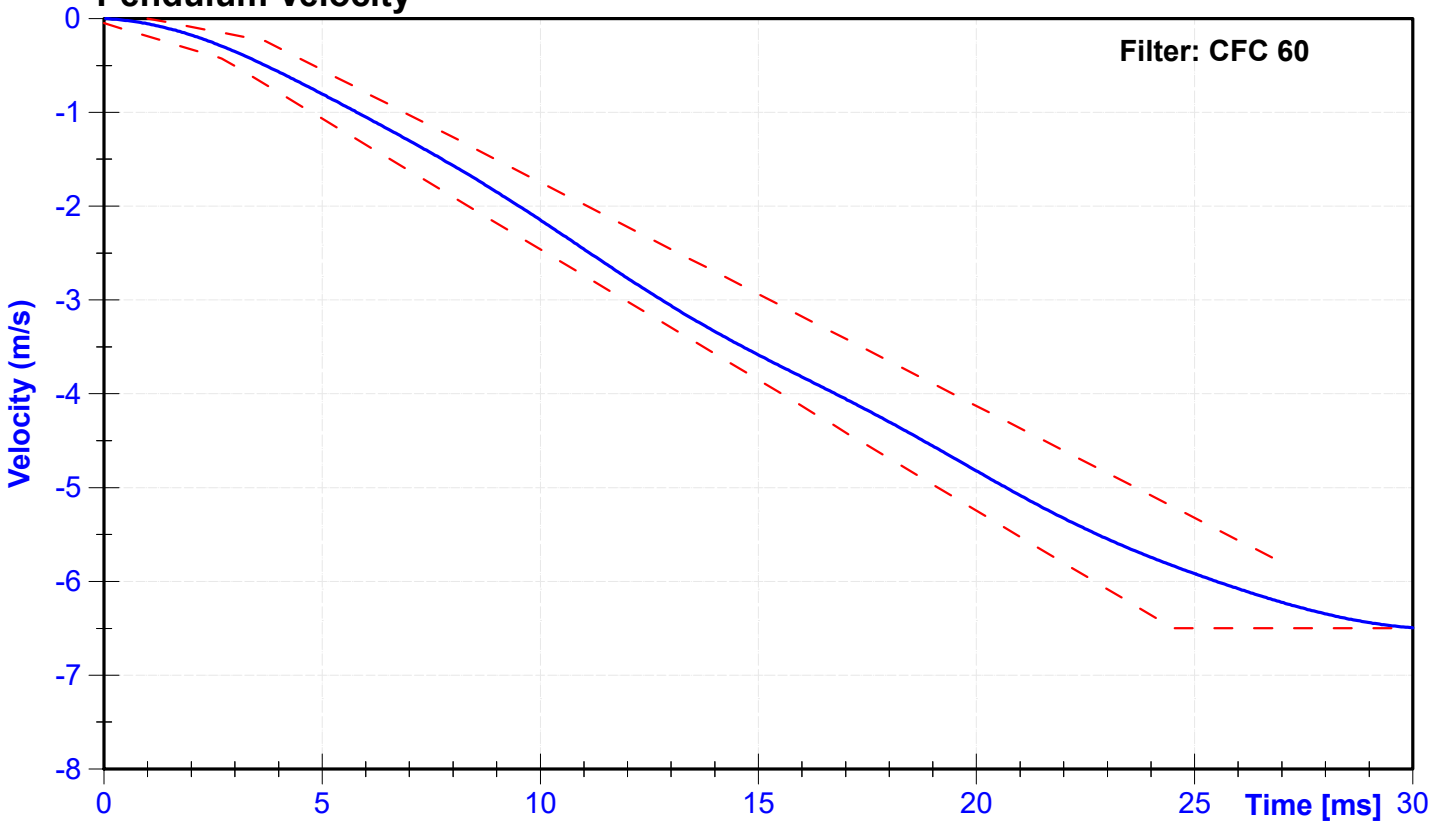
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	5.95	6.15	m/s	6.138	Pass
Lateral Spine Rotation	45	55	deg	49.9	Pass
Time at Maximum Rotation	39	53	ms	45.9	Pass
Time of Decay to Zero Degrees	37	57	ms	37.6	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

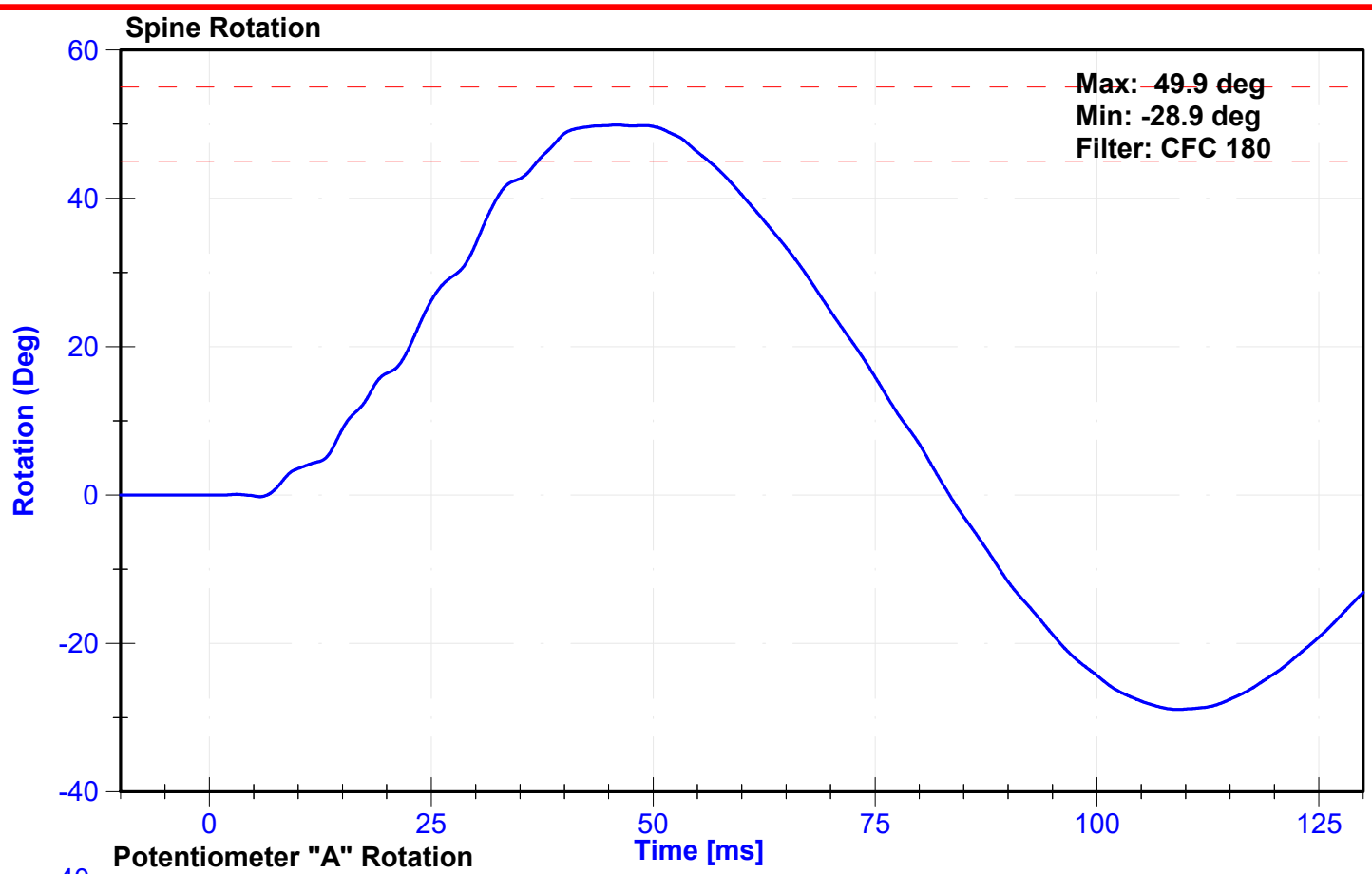
Transducer Calibrations

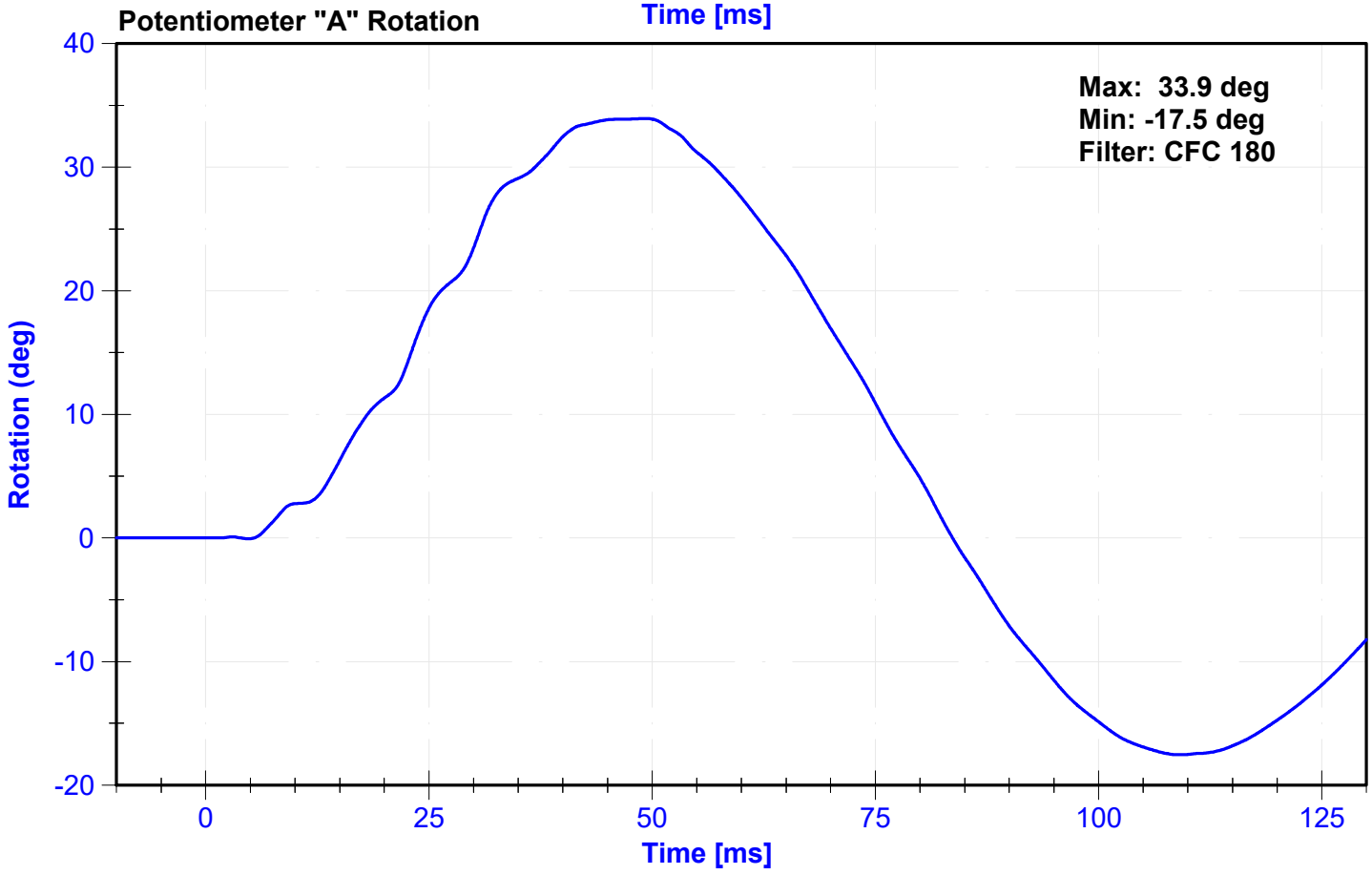
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Pendulum "A" Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Condyle "B" Potentiometer	Sfernice	095	9/13/2024	9/13/2025

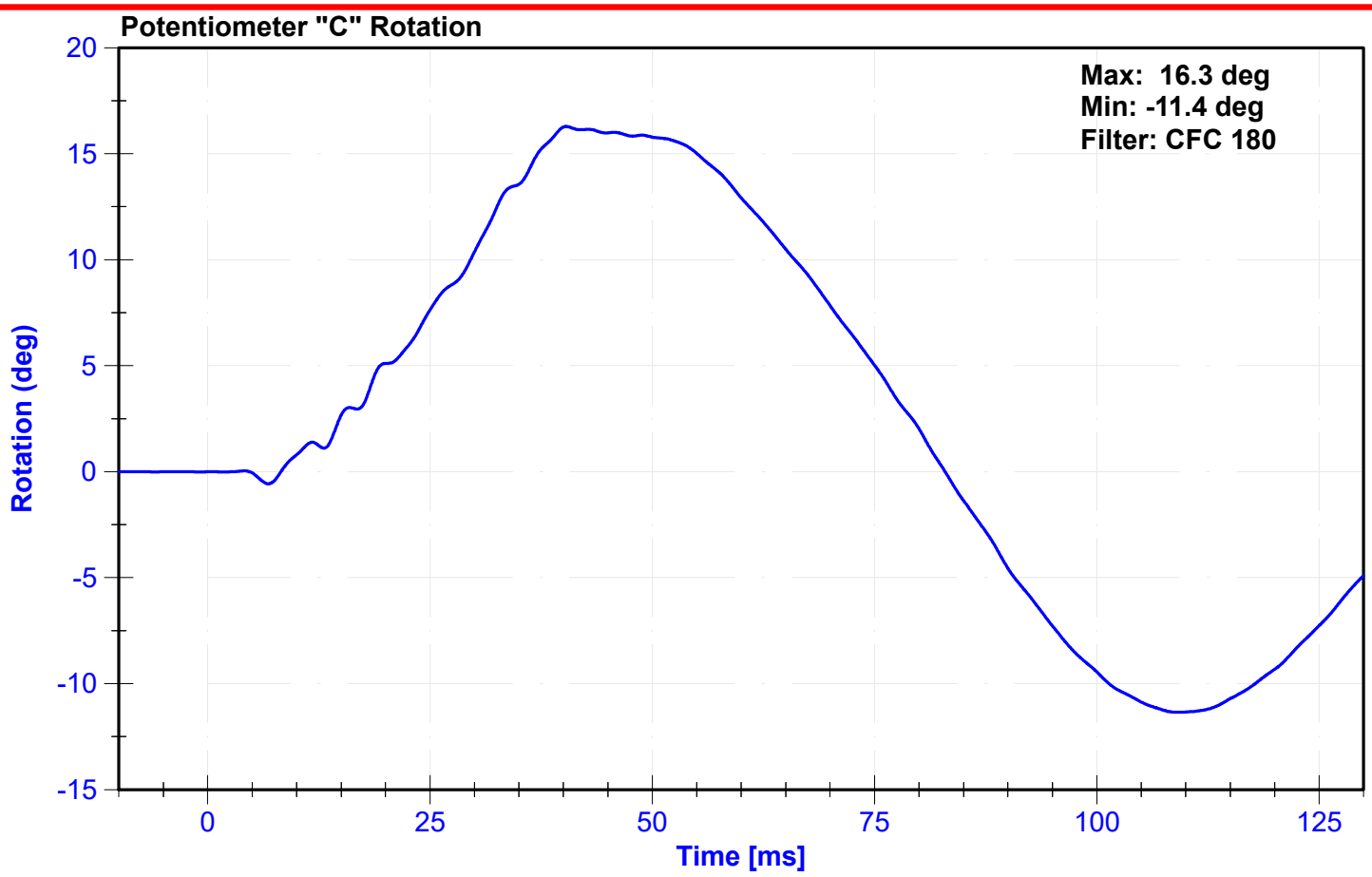
Pendulum Velocity[3]



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


Spine Rotation
Max: 49.9 deg
Min: -28.9 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 33.9 deg
Min: -17.5 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

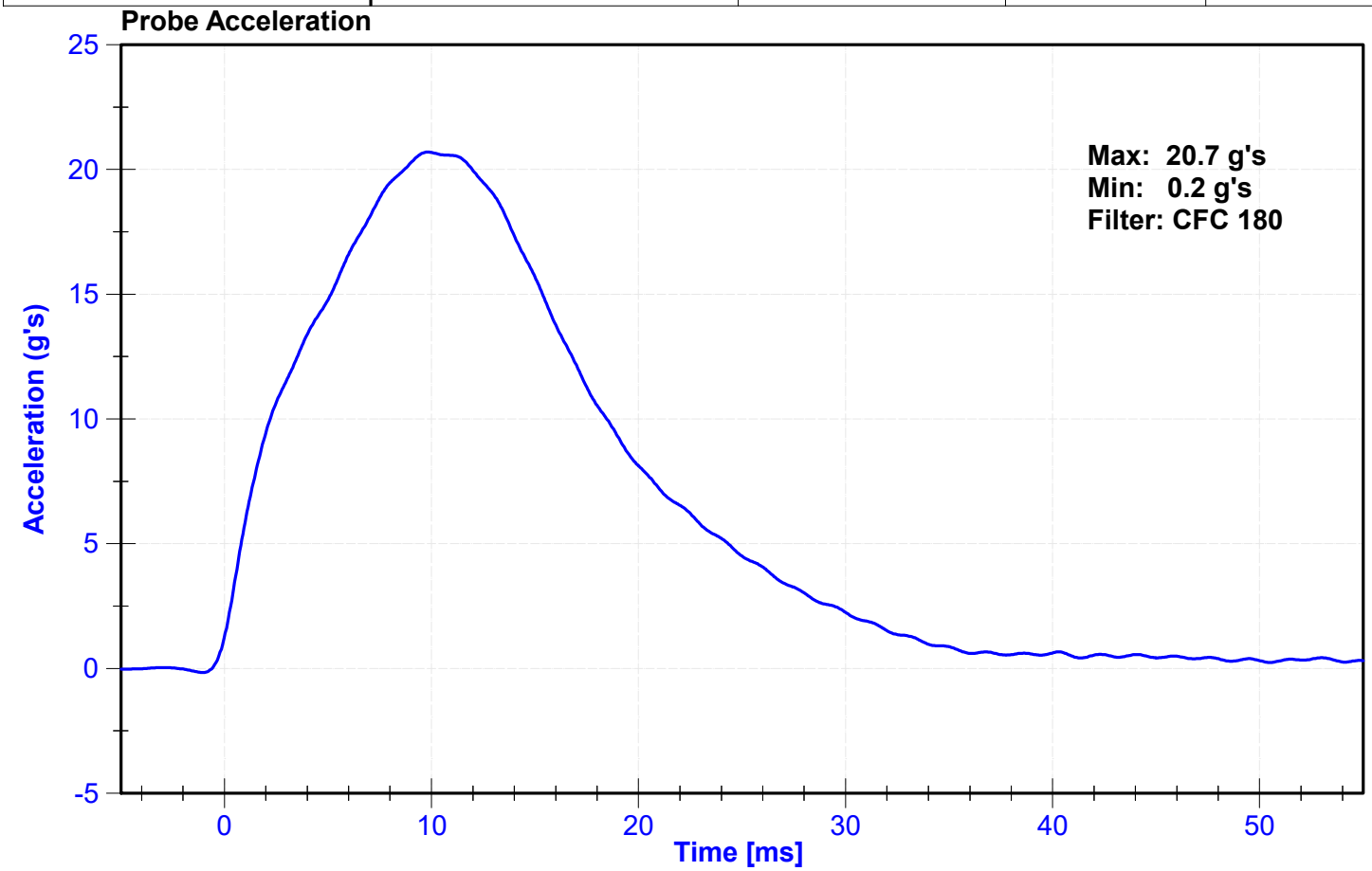
ATD Manufacturer	FTSS	Test Technician	E. Andruczyk
ATD Serial Number	F033	Laboratory Supervisor	J. Kinderman

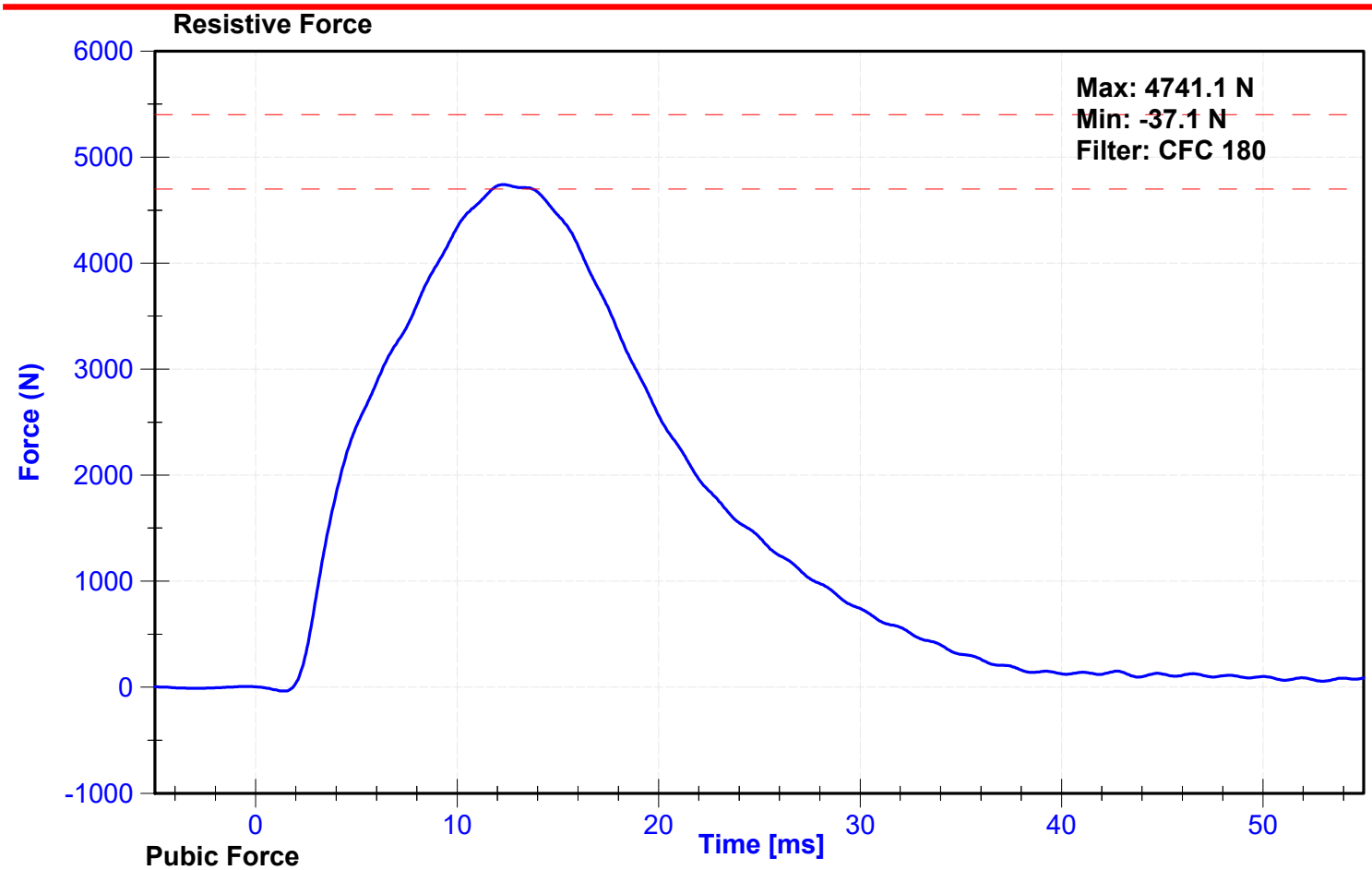
Results

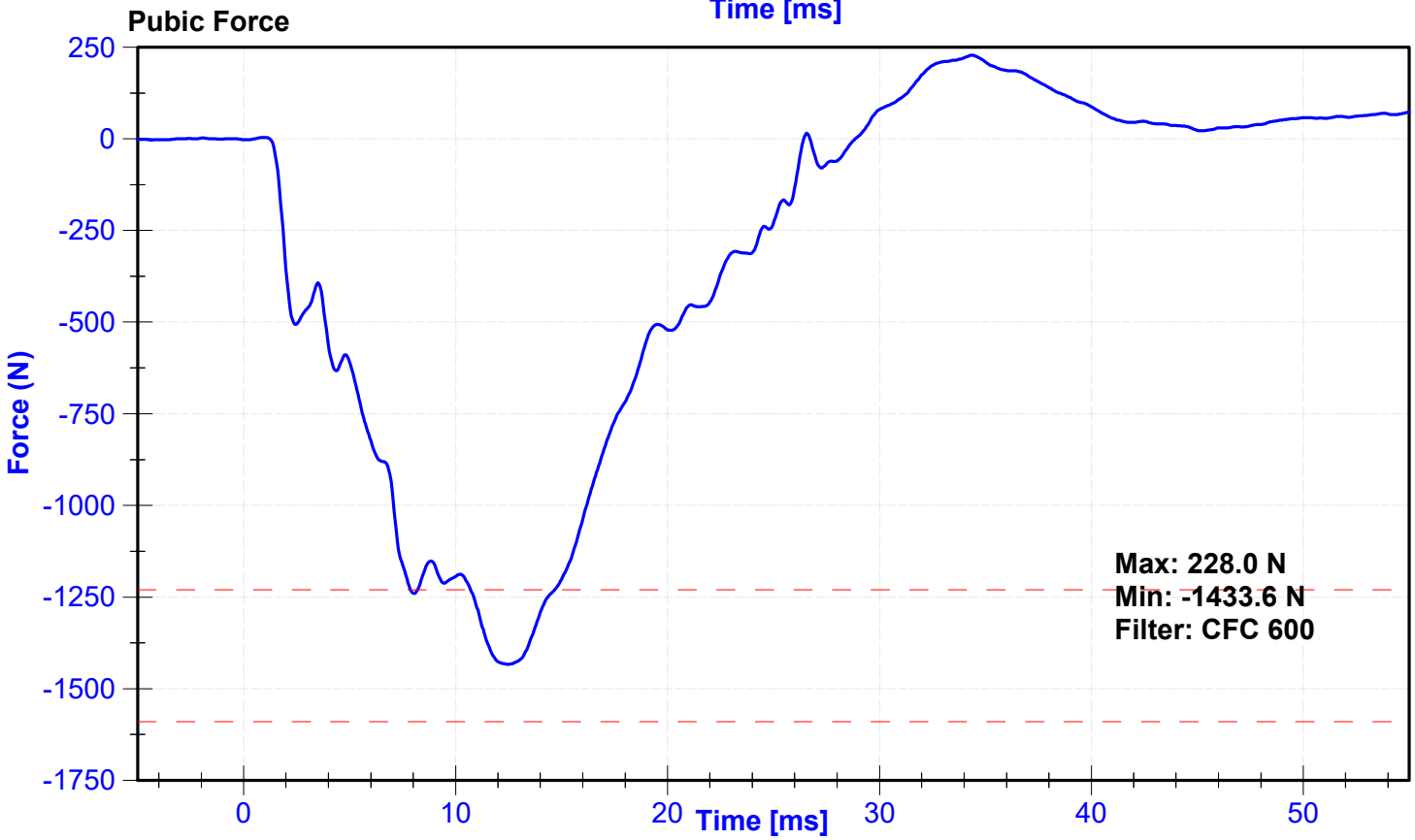
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Resistive Force	4700	5400	N	4741.1	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.25	Pass
Pubic Force	-1590	-1230	N	-1433.6	Pass
Time at Peak Pubic Force	12.2	17.0	ms	12.50	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Pubic Load Cell	Denton	458-FY	10/28/2024	10/28/2025




Resistive Force
Max: 4741.1 N
Min: -37.1 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: 228.0 N
Min: -1433.6 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

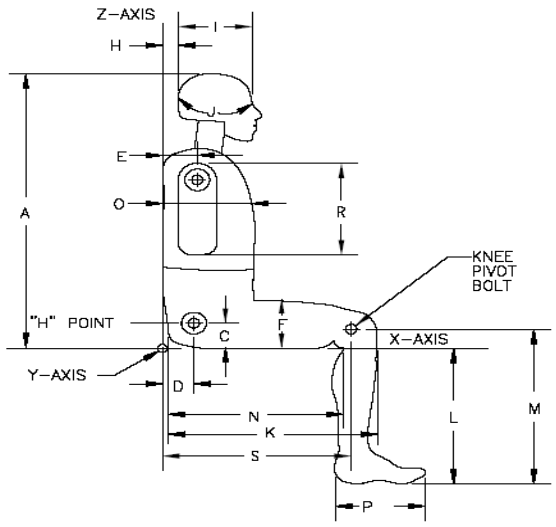
SERIAL NO:300

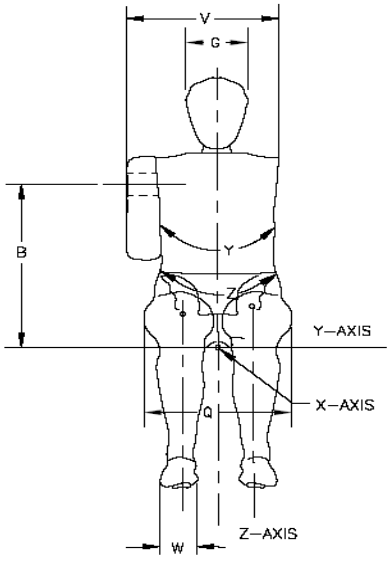
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: J. Rios Date: 1/14/2024

Dummy Serial Number: 300





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	777	Pass
B	Shoulder Pivot Height	437	453	439	Pass
C	H-point Height	79	89	83	Pass
D	H-point from seatback	141	151	144	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	127	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	548	Pass
K	Buttock to Knee Length	514	540	528	Pass
L	Popliteal Height	343	369	354	Pass
M	Knee Pivot to floor height	392	409	405	Pass
N	Buttock Popliteal Length	416	442	428	Pass
O	Chest Depth w/o jacket	195	211	206	Pass
P	Foot Length	216	232	223	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	318	Pass
R	Arm Length	249	259	254	Pass
S	Knee Joint to seatback	477	493	484	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	80	Pass
Y	Chest Circumference w/jacket	851	881	867	Pass
Z	Waist Circumference	761	791	775	Pass

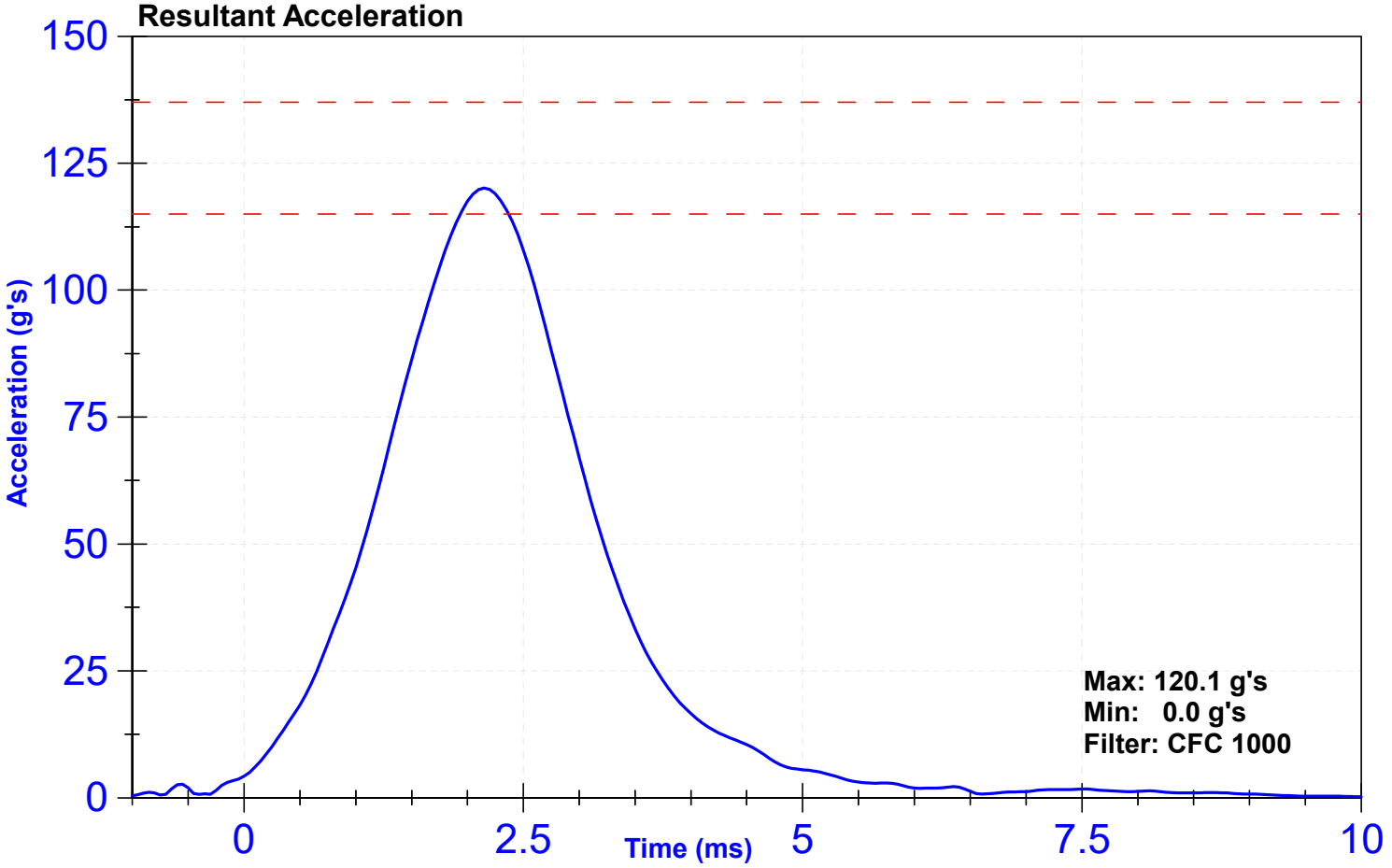
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

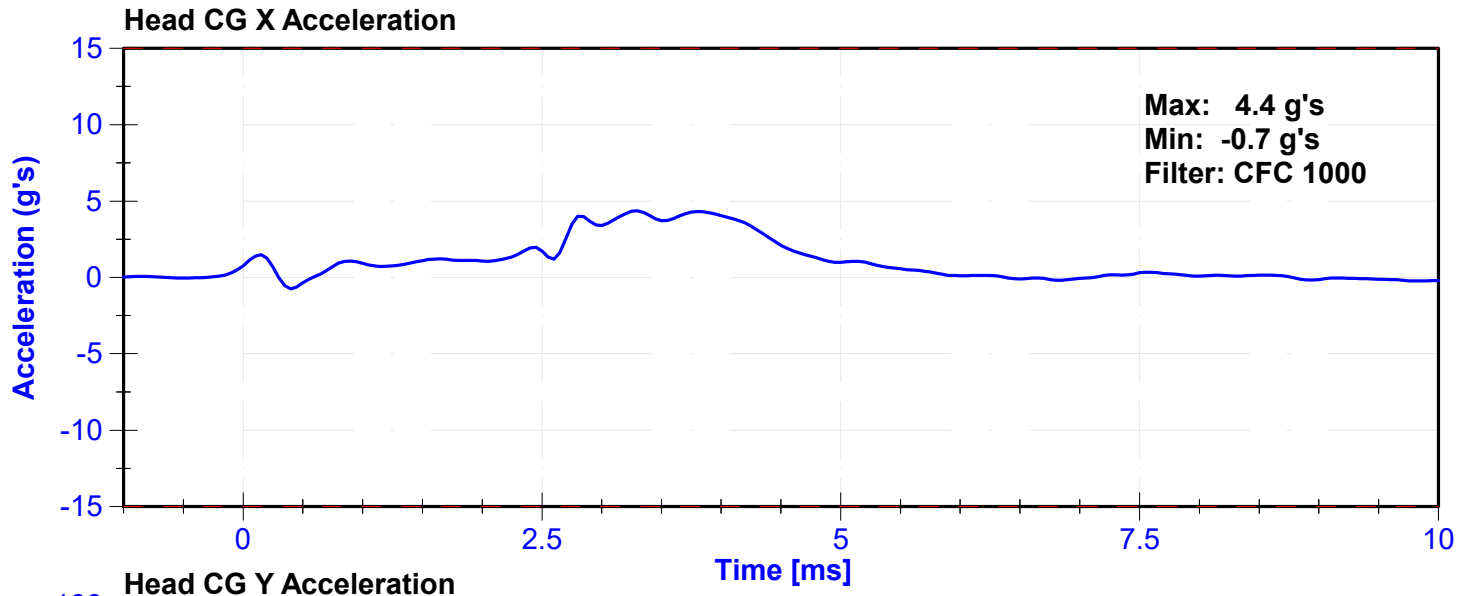
Results

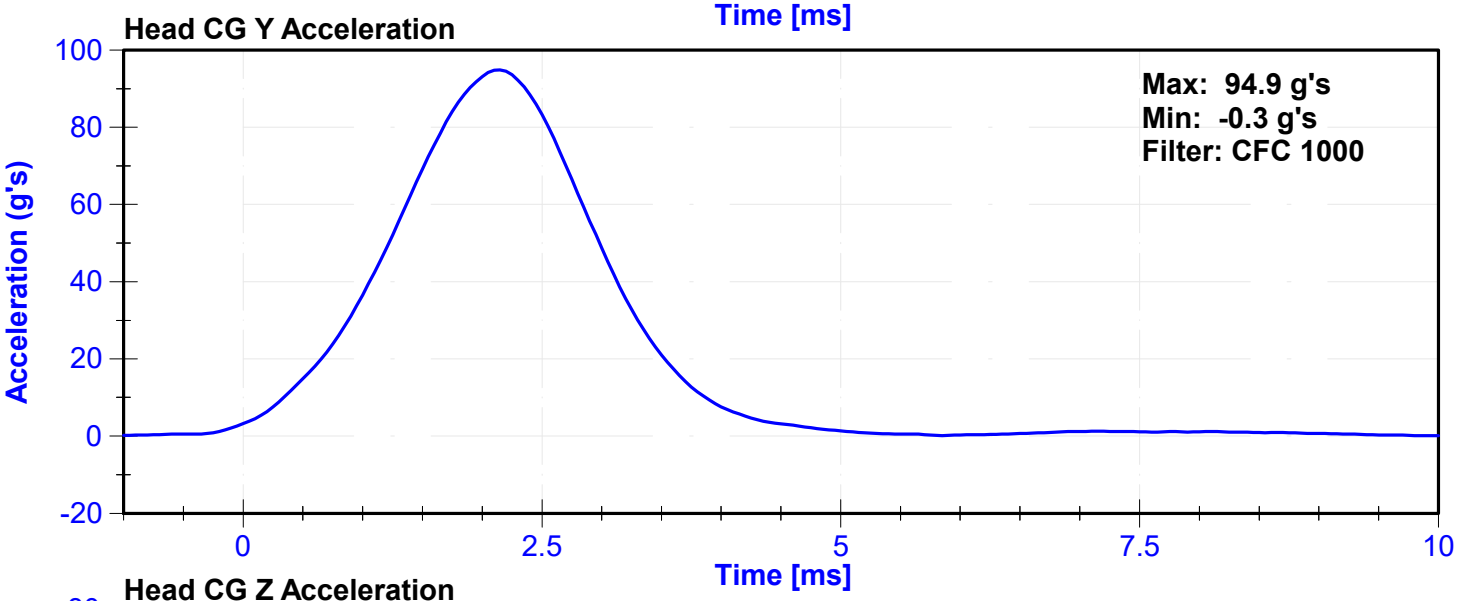
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	18	Pass
Resultant Acceleration	115	137	g's	120.1	Pass
Oscillation	0	15	%	2.4	Pass
Fore-Aft Acceleration	-15	15	g's	4.4	Pass

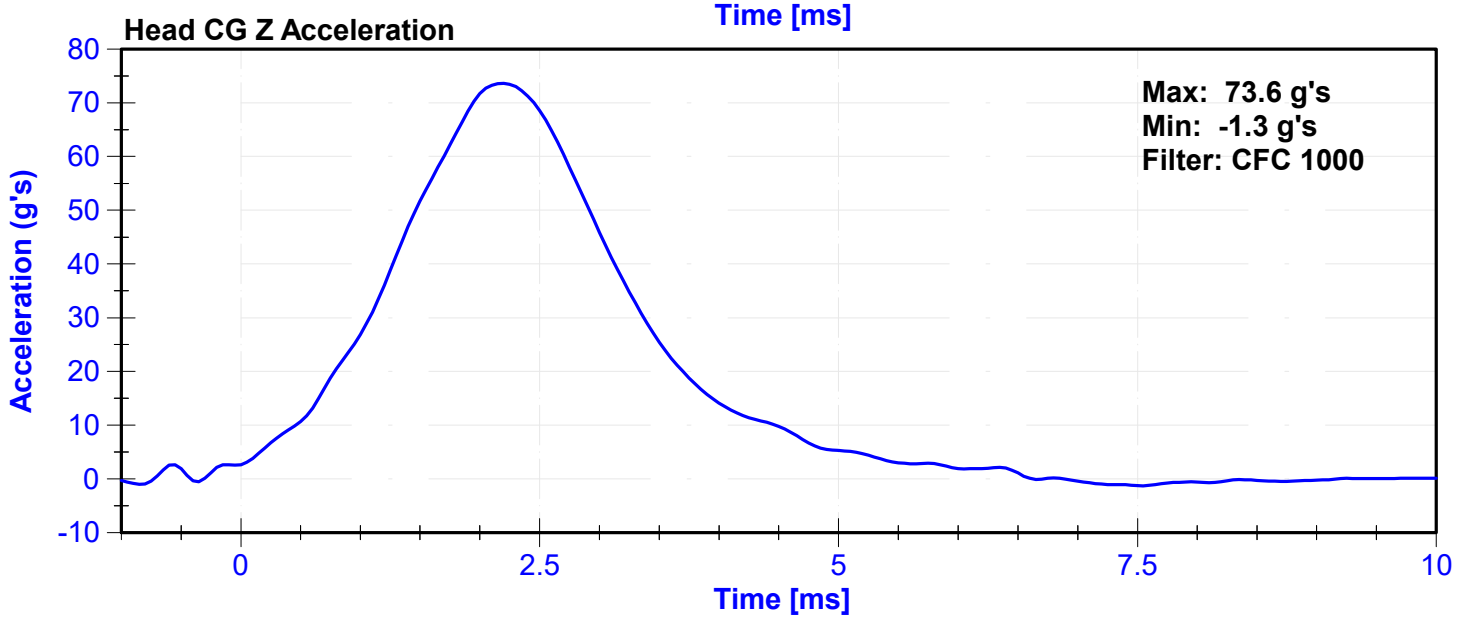
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P59018	10/17/2024	4/15/2025
Y Accelerometer	Endevco	P79189	10/17/2024	4/15/2025
Z Accelerometer	Endevco	P79587	10/17/2024	4/15/2025




Head CG X Acceleration
Max: 4.4 g's
Min: -0.7 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 94.9 g's
Min: -0.3 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 73.6 g's
Min: -1.3 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

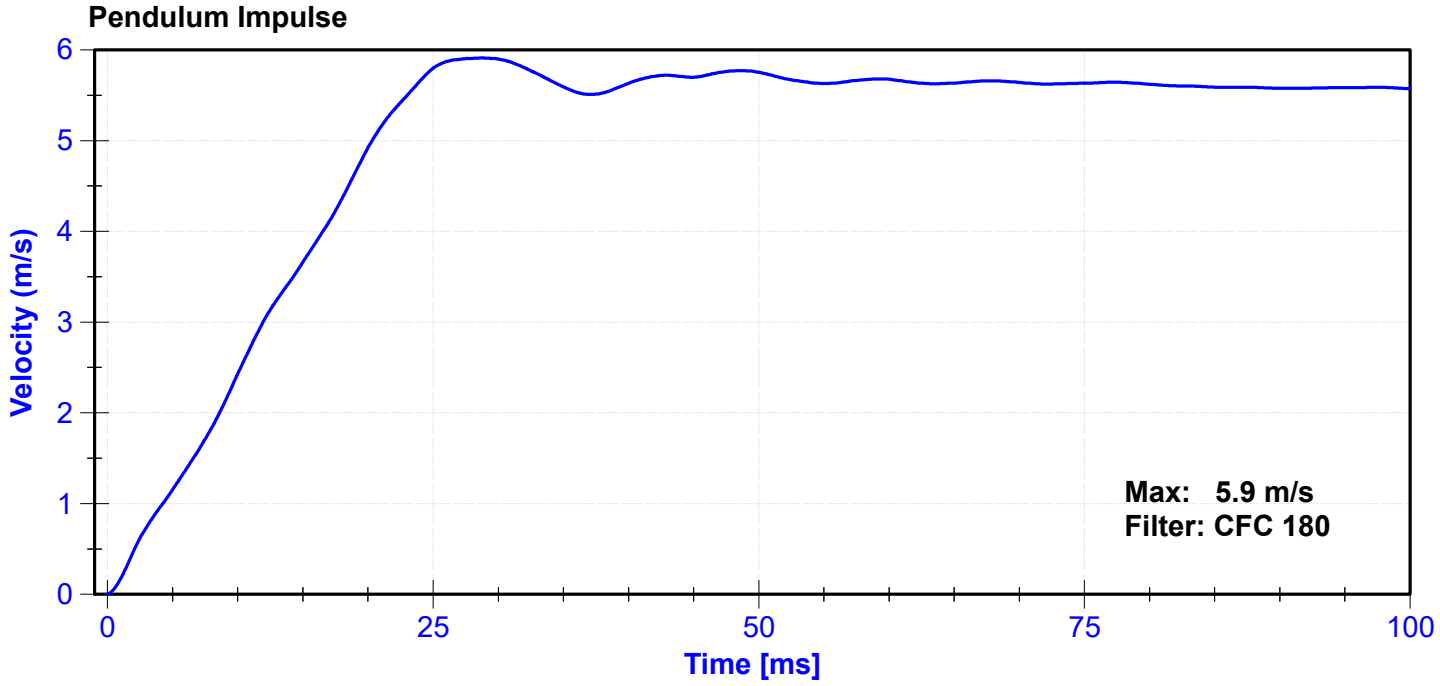
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

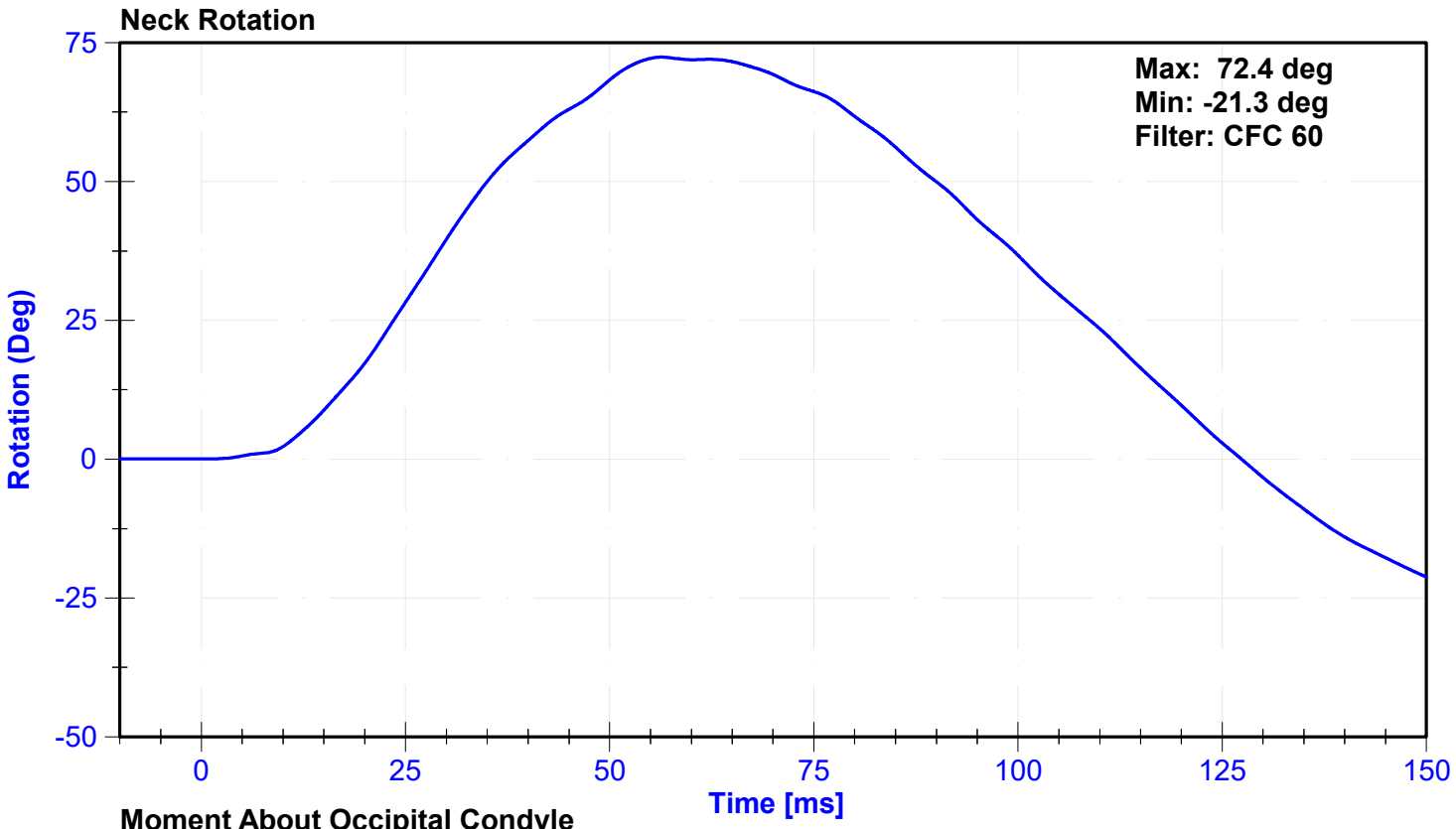
Results

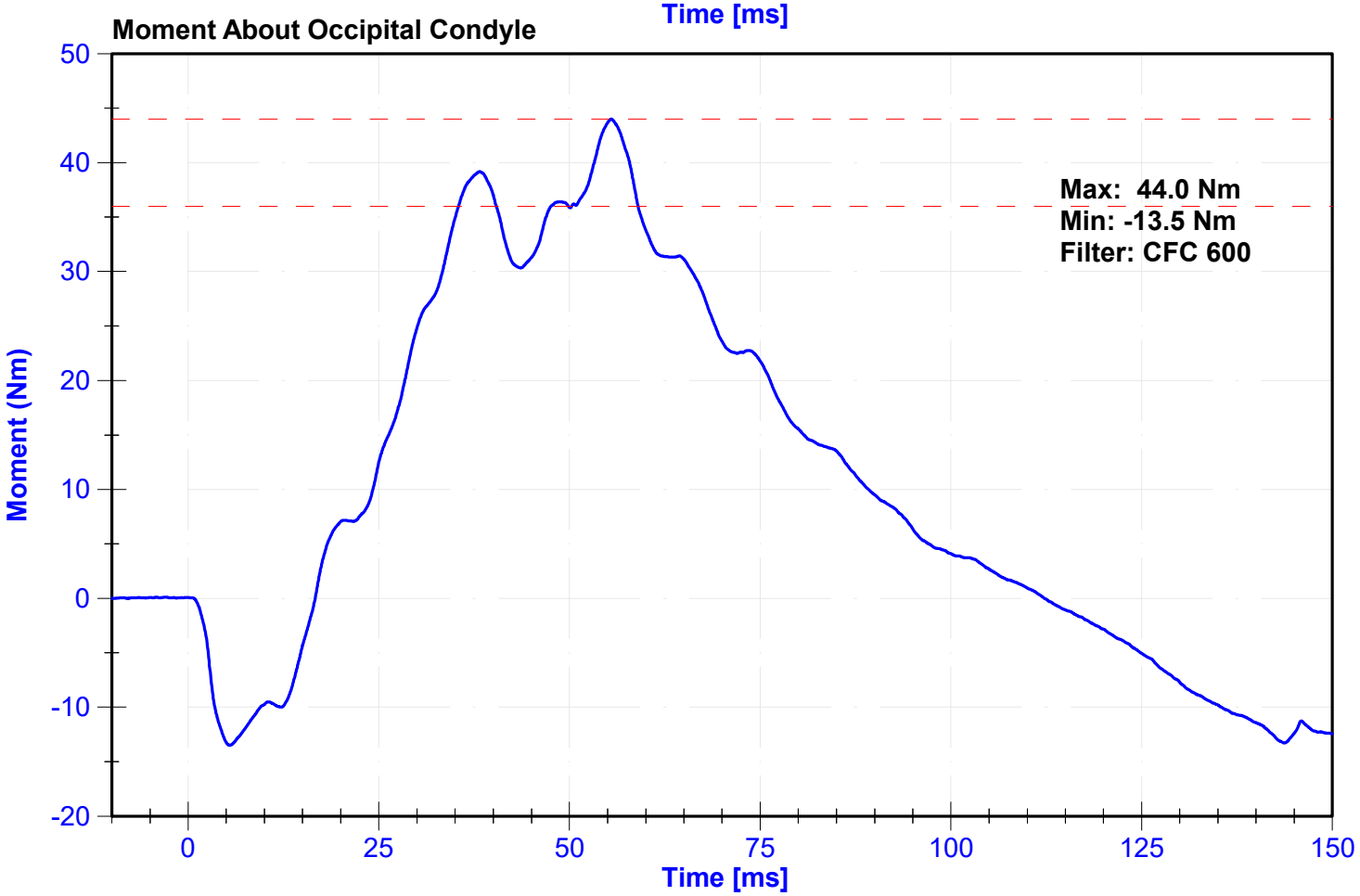
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	29	Pass
Velocity	5.51	5.63	m/s	5.575	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.43	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.66	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.92	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.80	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.91	Pass
Neck Rotation	71	81	deg	72.4	Pass
Time at Maximum Rotation	50	70	ms	56.3	Pass
Moment about the OC	36	44	Nm	44.0	Pass
Moment Decay to 0 Nm	102	126	ms	112.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	10/30/2024	4/28/2025
Pendulum Potentiometer	Servo	4961	9/23/2024	9/23/2025
Condyle Potentiometer	Servo	DS185	9/23/2024	9/23/2025
Upper Neck Load Cell	Kistler	M555A6CFM_1935H01696-FY	1/2/2025	1/2/2026




Neck Rotation
Max: 72.4 deg
Min: -21.3 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: 44.0 Nm
Min: -13.5 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

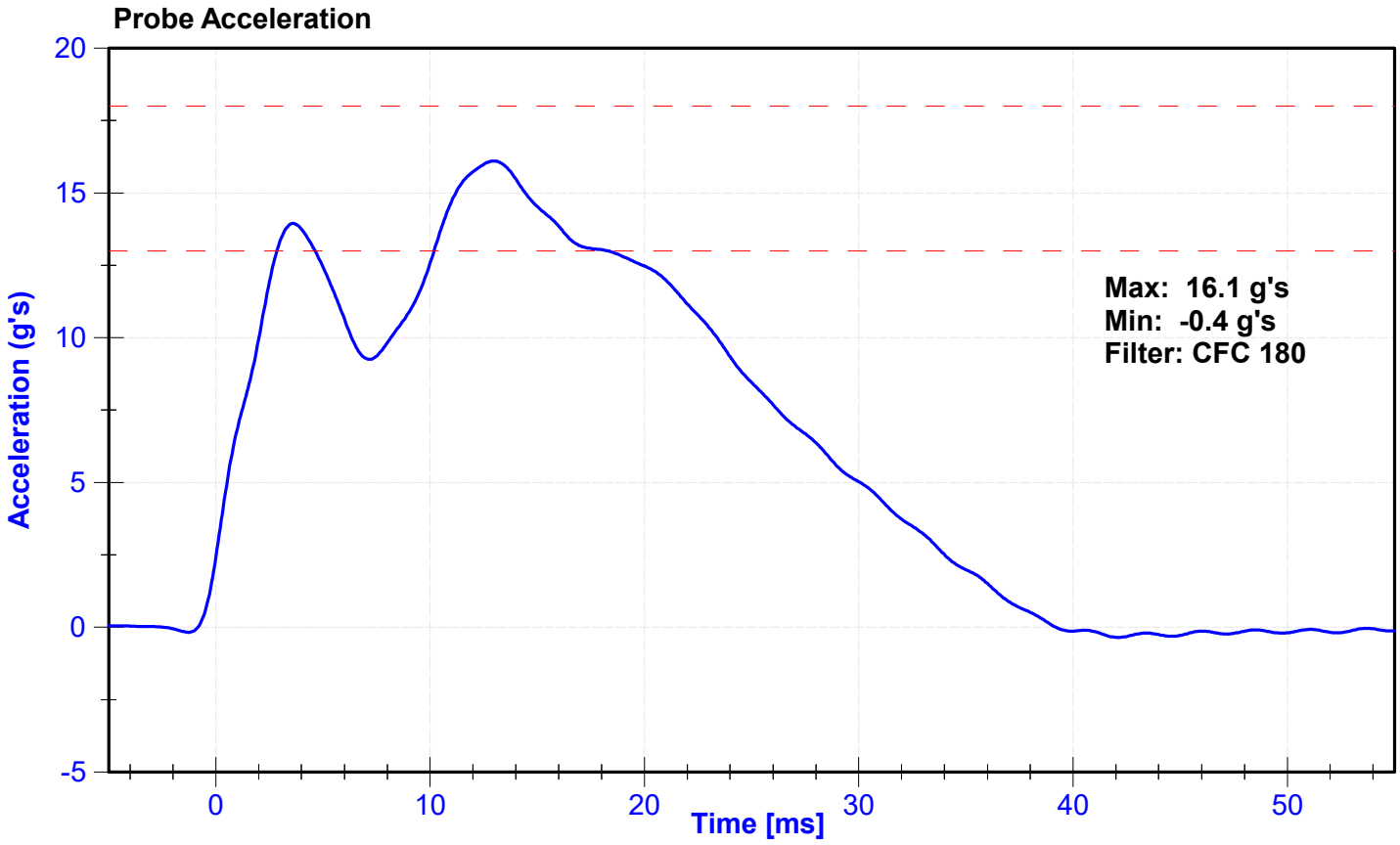
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

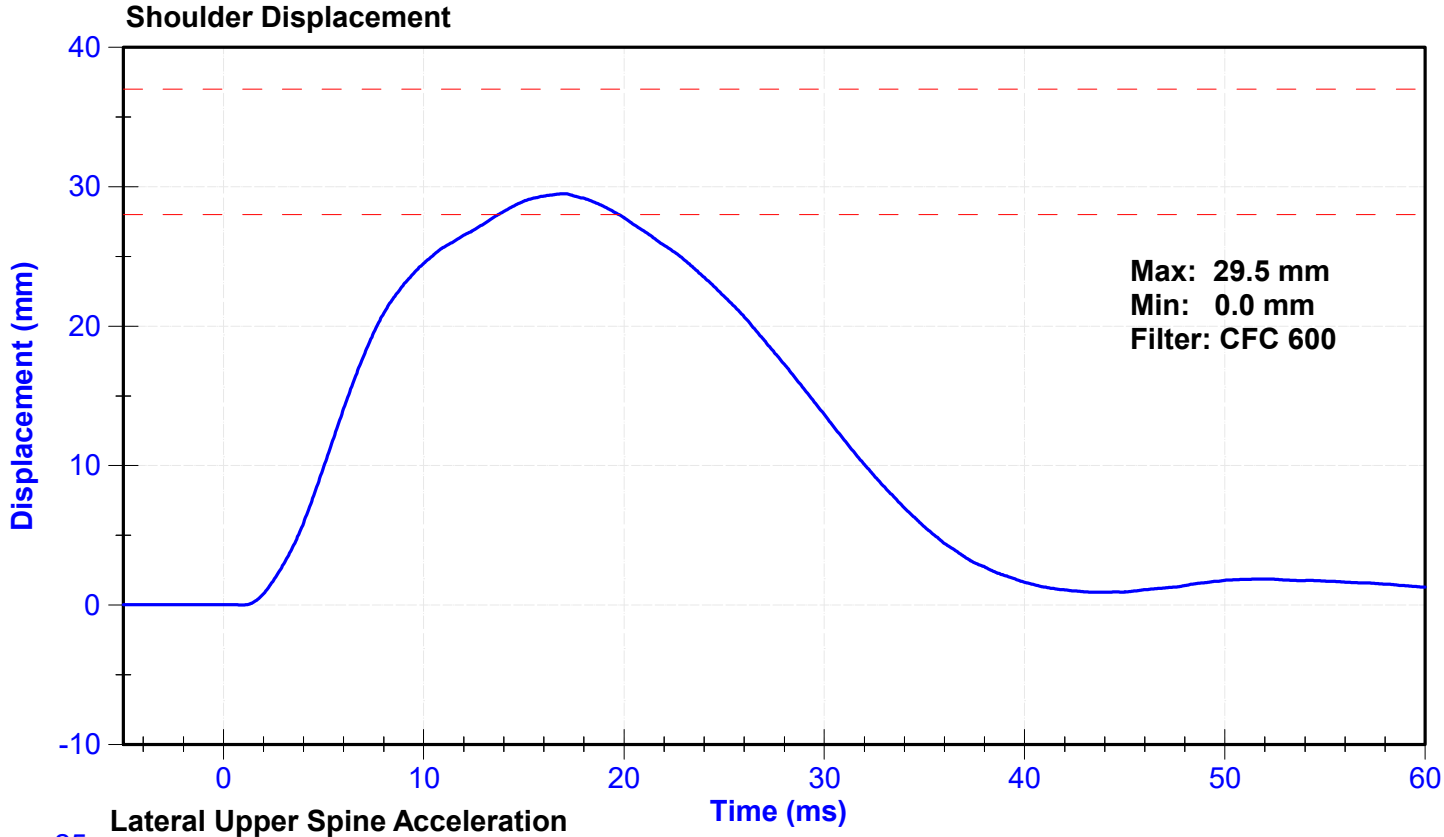
Results

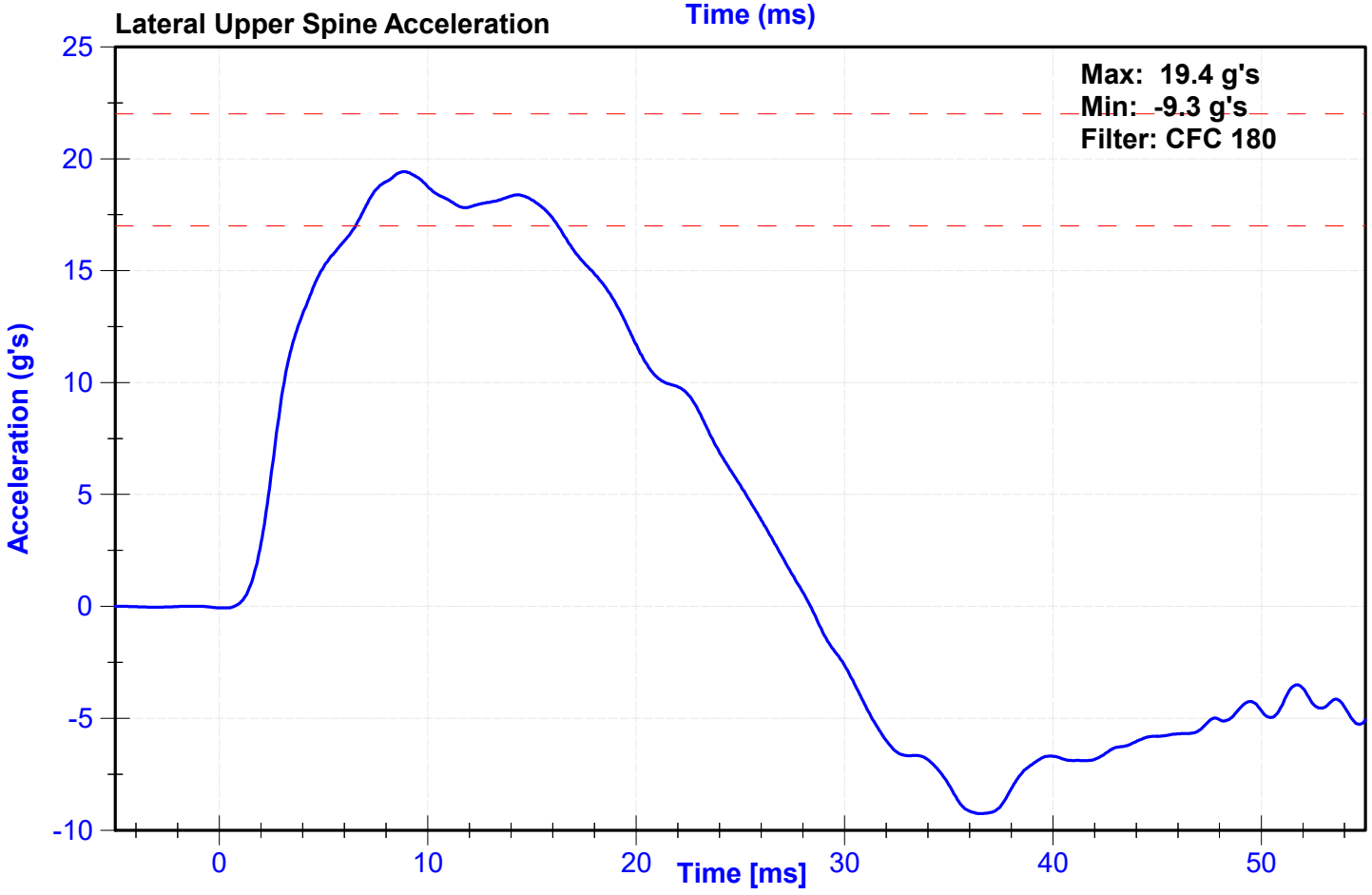
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	19	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	13	18	g's	16.1	Pass
Shoulder Deflection	28	37	mm	29.5	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Shoulder Potentiometer	Servo	053GFE	10/16/2024	4/16/2025
Upper Spine Y Accelerometer	Endevco	P52018	11/25/2024	5/24/2025




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 29.5 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 19.4 g's
Min: -9.3 g's
Filter: CFC 180

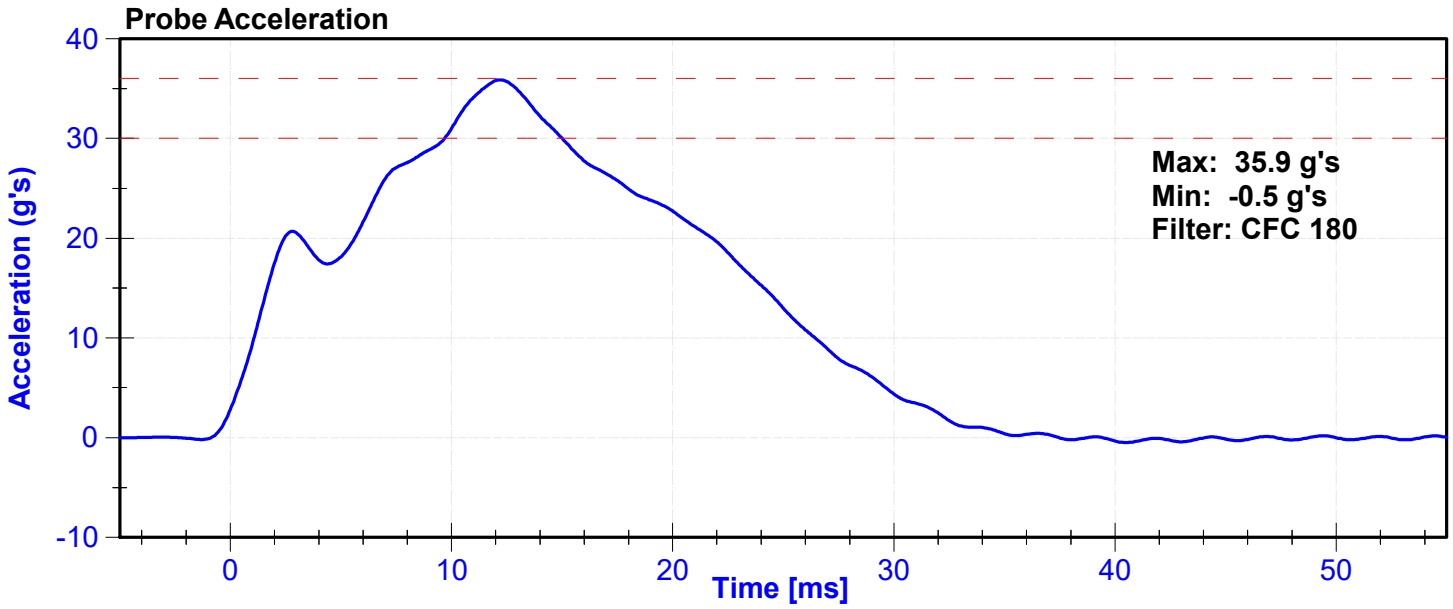
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

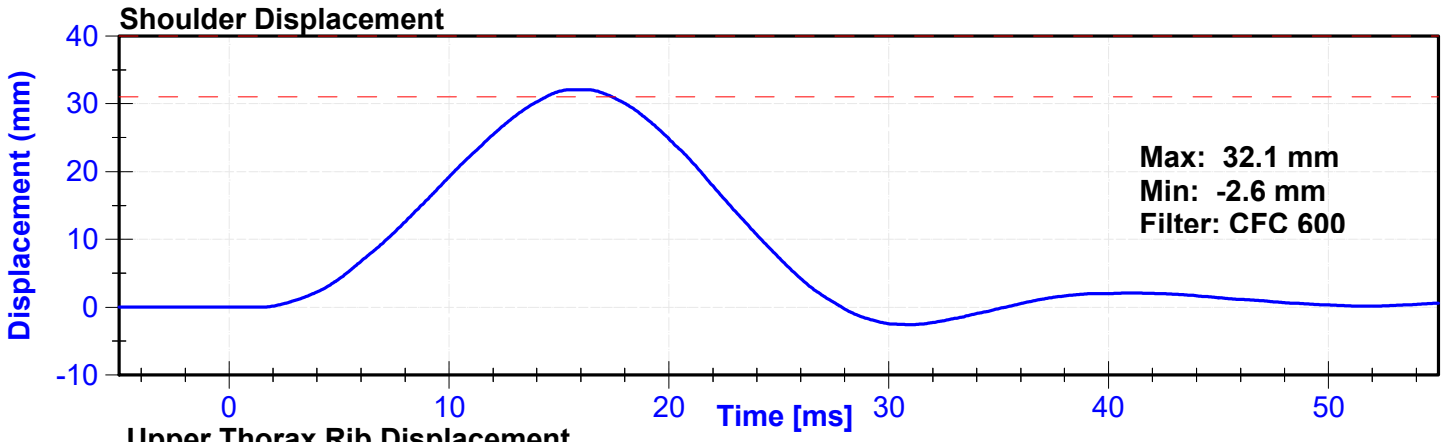
Results

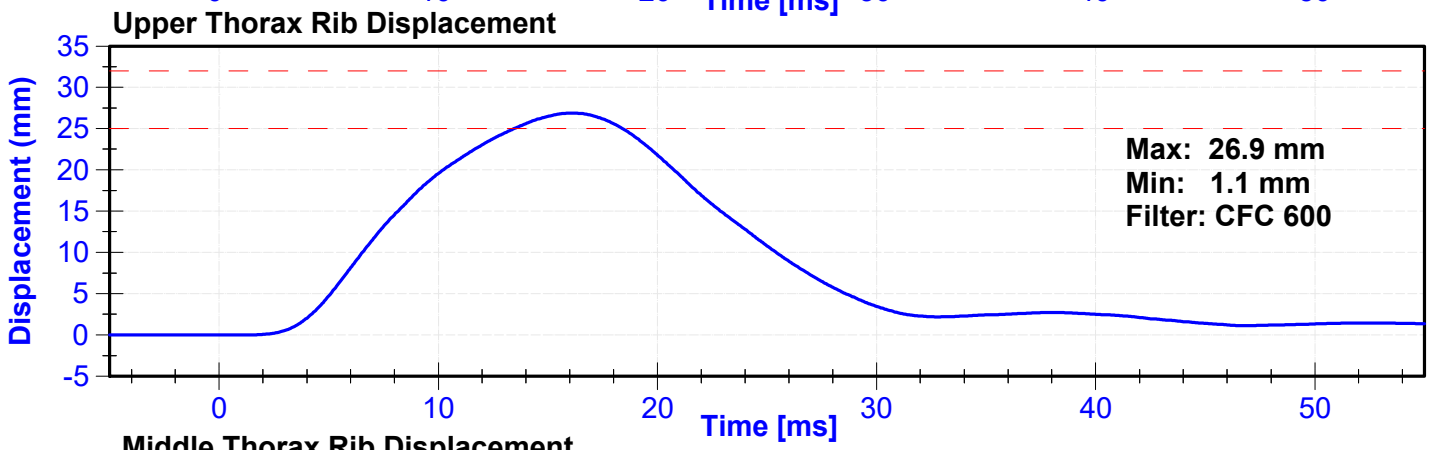
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	19	Pass
Velocity	6.6	6.8	m/s	6.66	Pass
Probe Acceleration after 5 ms	30	36	g's	35.9	Pass
Lateral Upper Spine Acceleration	34	43	g's	34.6	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.5	Pass
Shoulder Deflection	31	40	mm	32.1	Pass
Upper Thorax Rib Deflection	25	32	mm	26.9	Pass
Mid Thorax Rib Deflection	30	36	mm	31.0	Pass
Lower Thorax Rib Deflection	32	38	mm	33.1	Pass

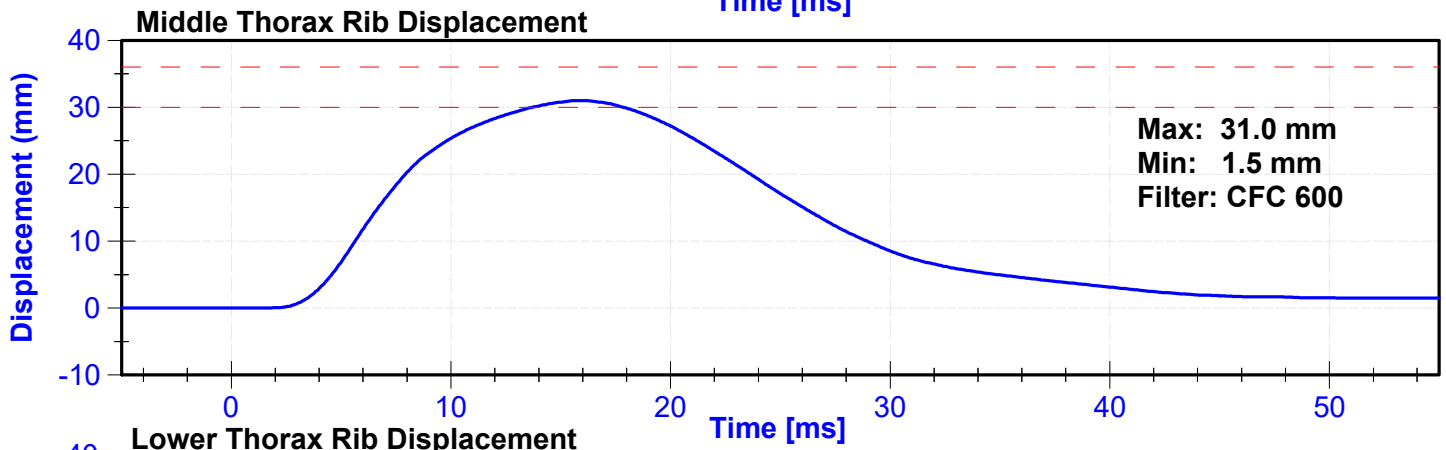
Transducer Calibrations

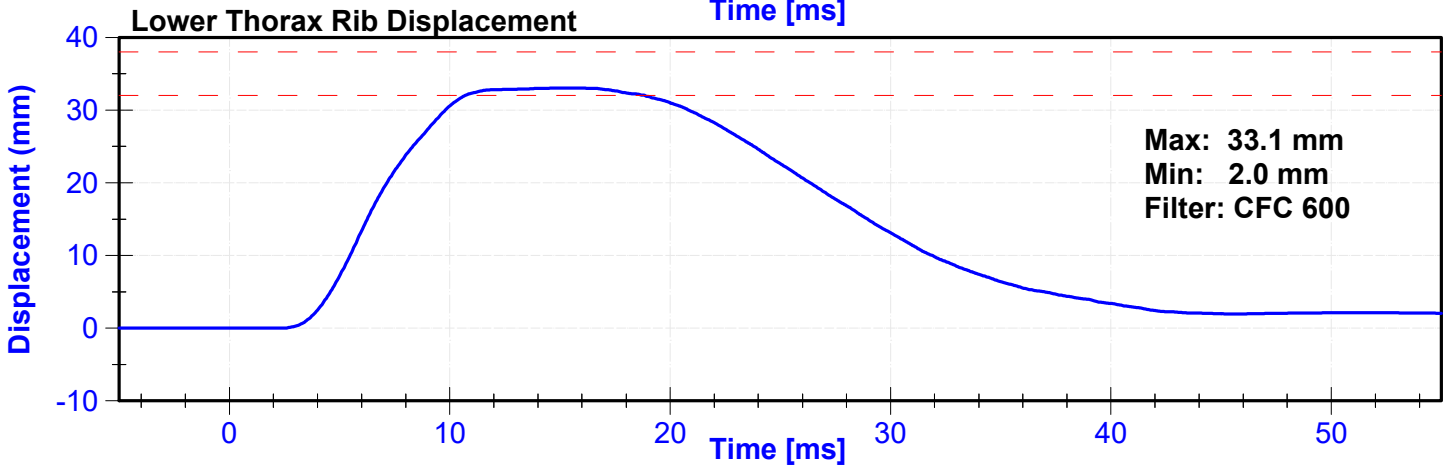
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Upper Spine T1 Y Accelerometer	Endevco	P52018	11/25/2024	5/24/2025
Upper Spine T12 Y Accelerometer	Endevco	P52071	10/17/2024	4/15/2025
Shoulder Potentiometer	Servo	053GFE	10/16/2024	4/16/2025
Upper Thorax Rib Potentiometer	Servo	2316GFE	10/16/2024	4/16/2025
Middle Thorax Rib Potentiometer	Servo	085GFE	10/16/2024	4/16/2025
Lower Thorax Rib Potentiometer	Servo	1156GFE	10/16/2024	4/16/2025

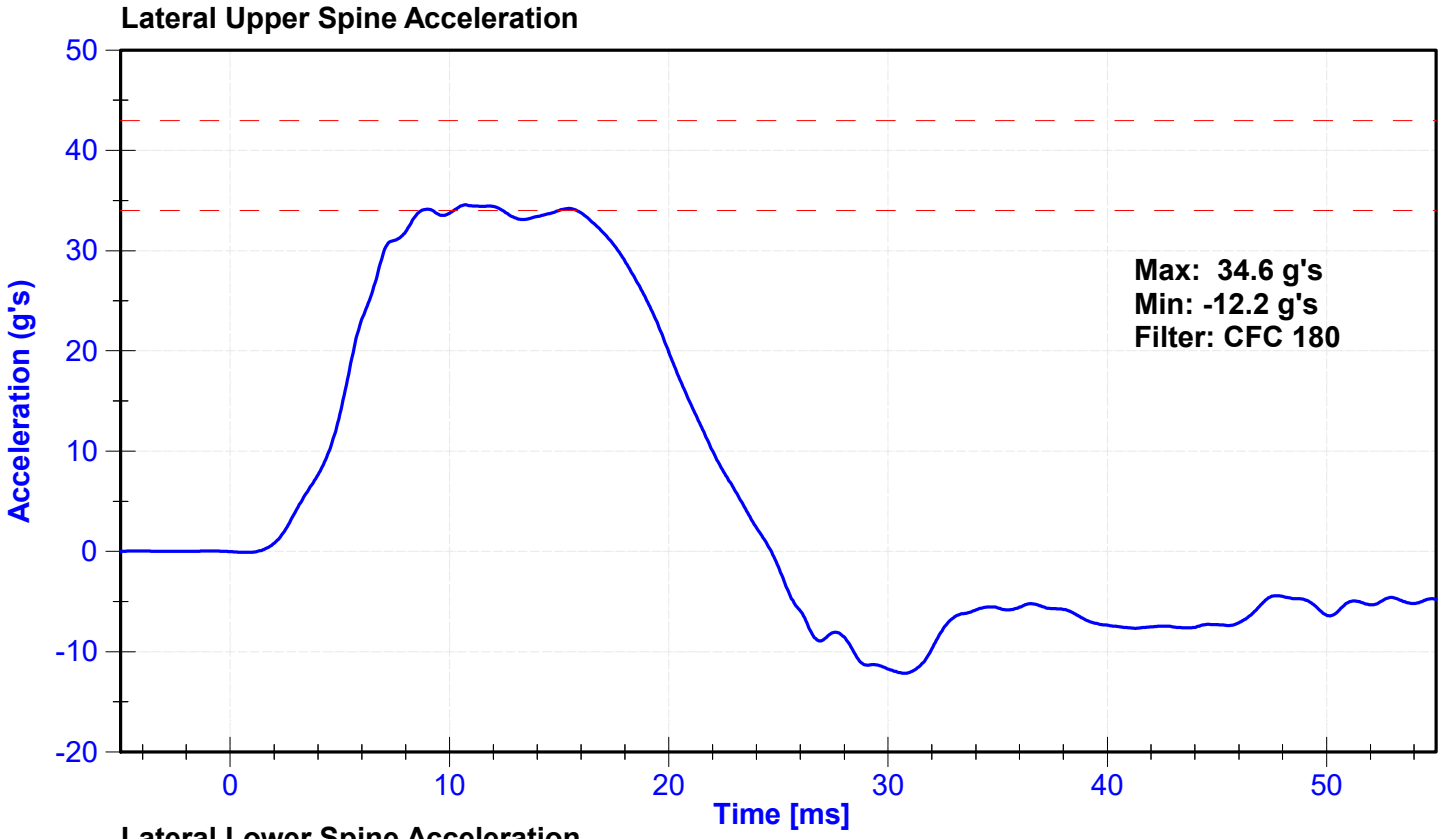


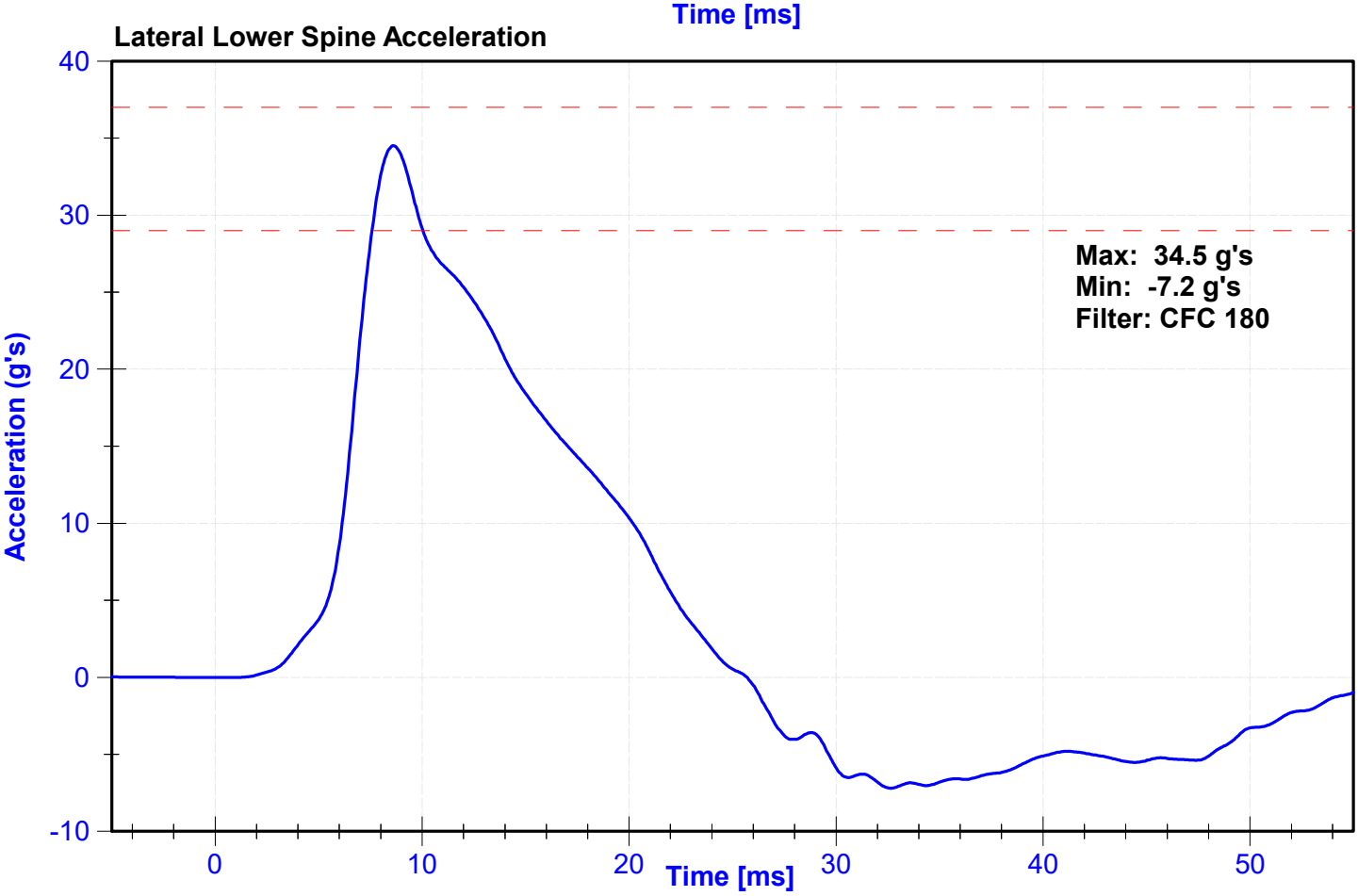

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 32.1 mm
Min: -2.6 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.9 mm
Min: 1.1 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 31.0 mm
Min: 1.5 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.1 mm
Min: 2.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 34.6 g's
Min: -12.2 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 34.5 g's
Min: -7.2 g's
Filter: CFC 180

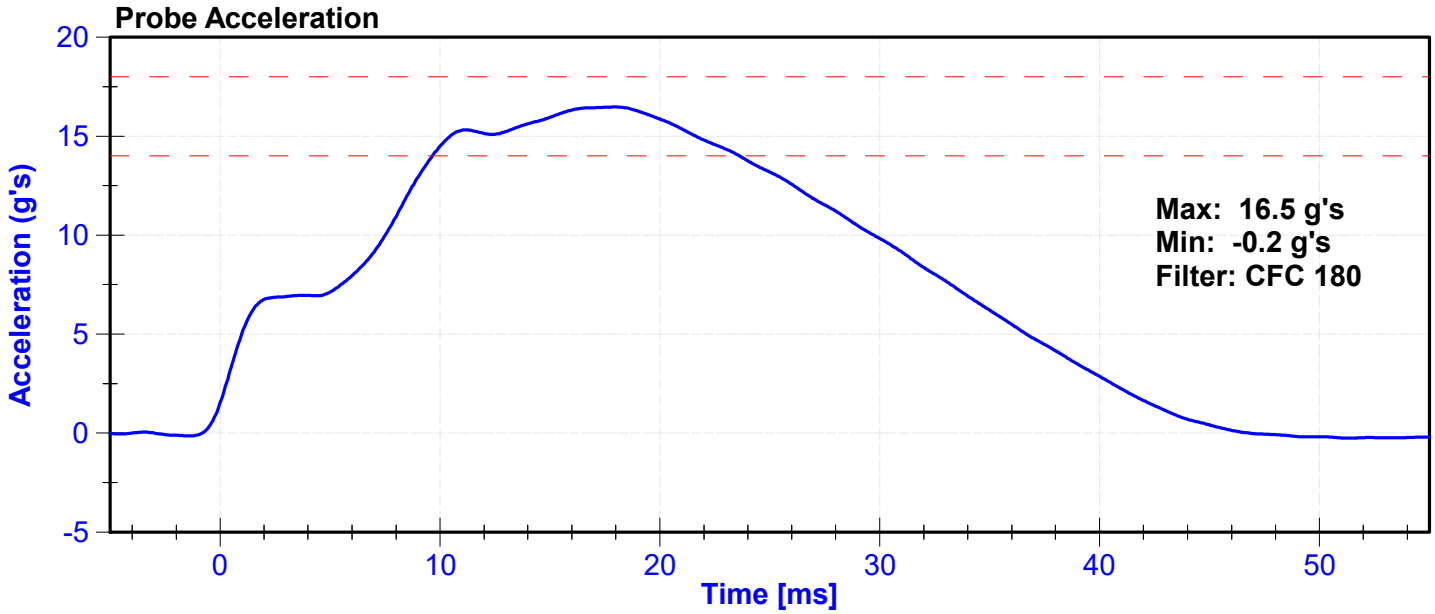
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

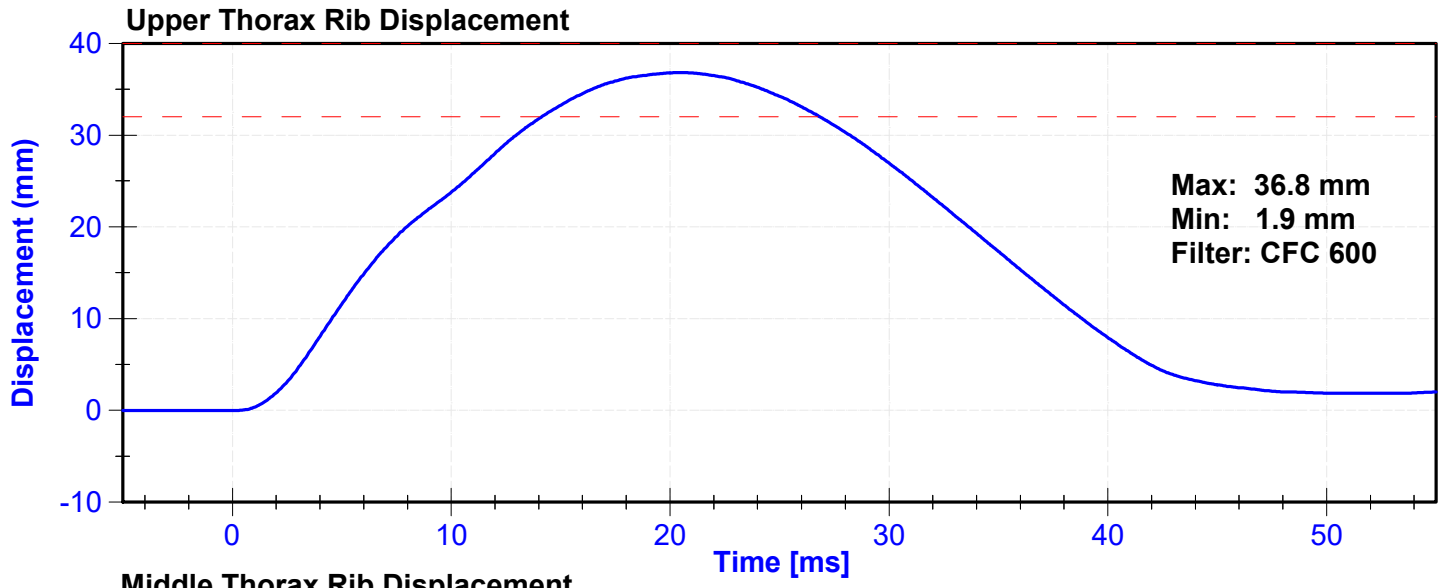
Results

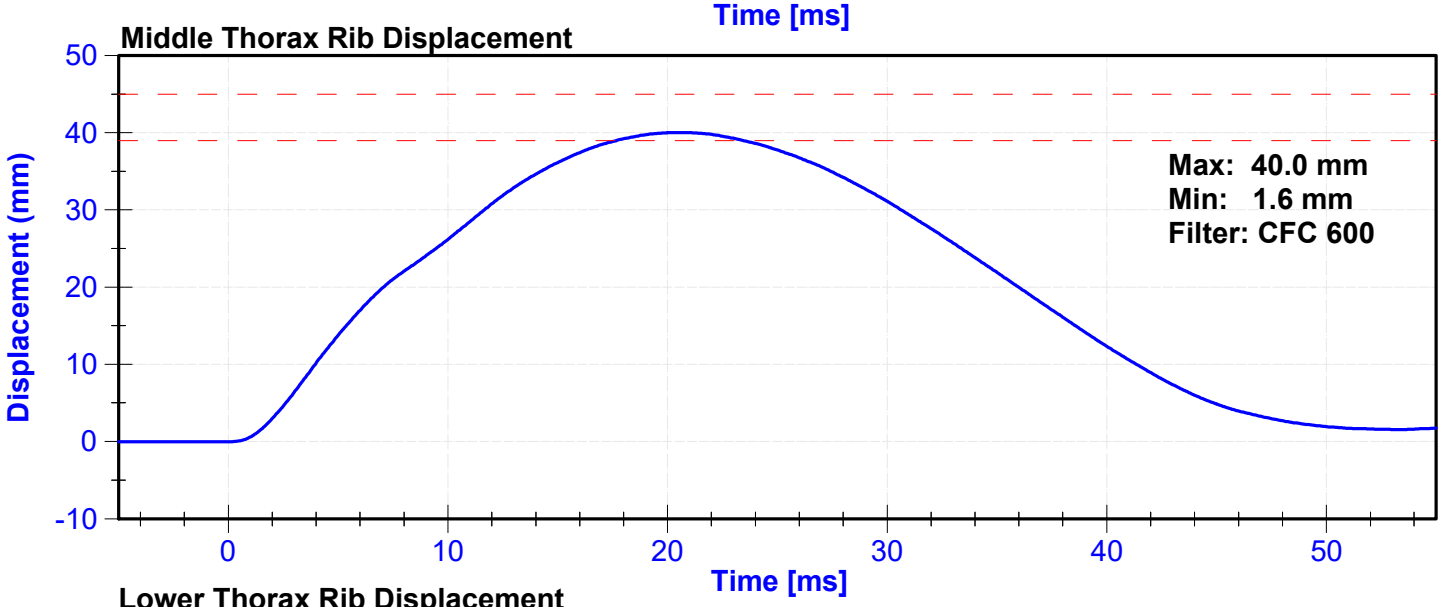
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	19	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	14	18	g's	16.5	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.7	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.6	Pass
Upper Thorax Rib Deflection	32	40	mm	36.8	Pass
Middle Thorax Rib Deflection	39	45	mm	40.0	Pass
Lower Thorax Rib Deflection	35	43	mm	36.0	Pass

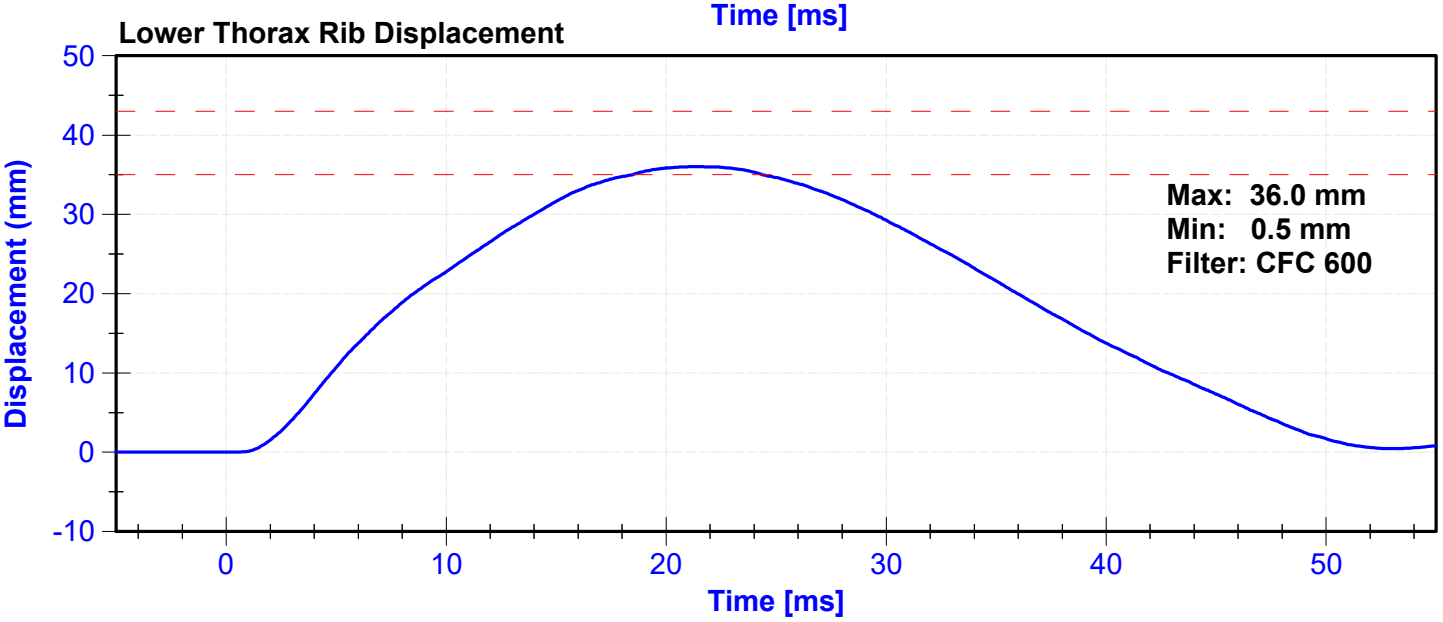
Transducer Calibrations

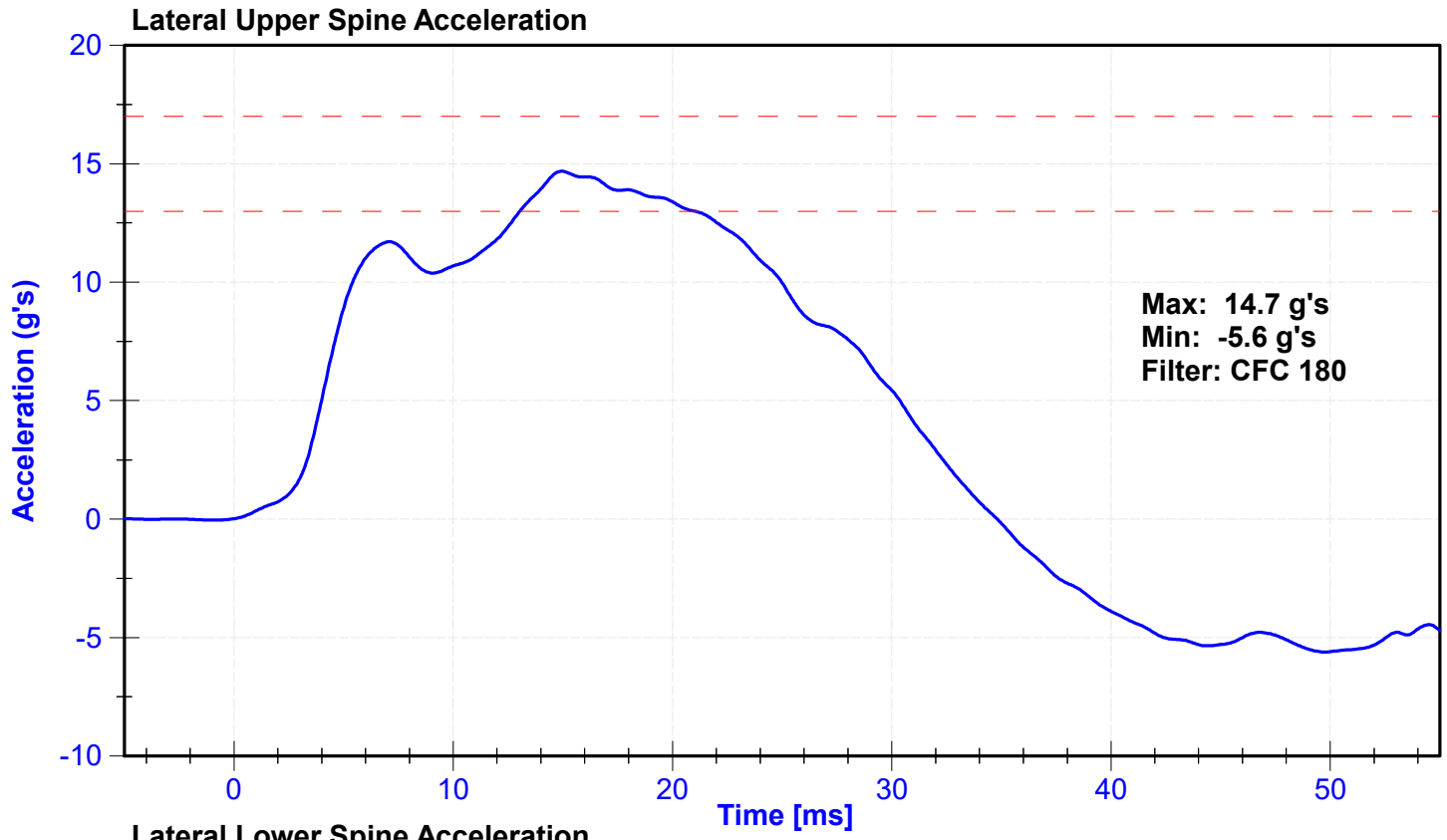
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Upper Spine Y Accelerometer	Endevco	P52018	11/25/2024	5/24/2025
Lower Spine Y Accelerometer	Endevco	P52071	10/17/2024	4/15/2025
Upper Thorax Rib Potentiometer	Servo	2316GFE	10/16/2024	4/16/2025
Middle Thorax Rib Potentiometer	Servo	085GFE	10/16/2024	4/16/2025
Lower Thorax Rib Potentiometer	Servo	1156GFE	10/16/2024	4/16/2025

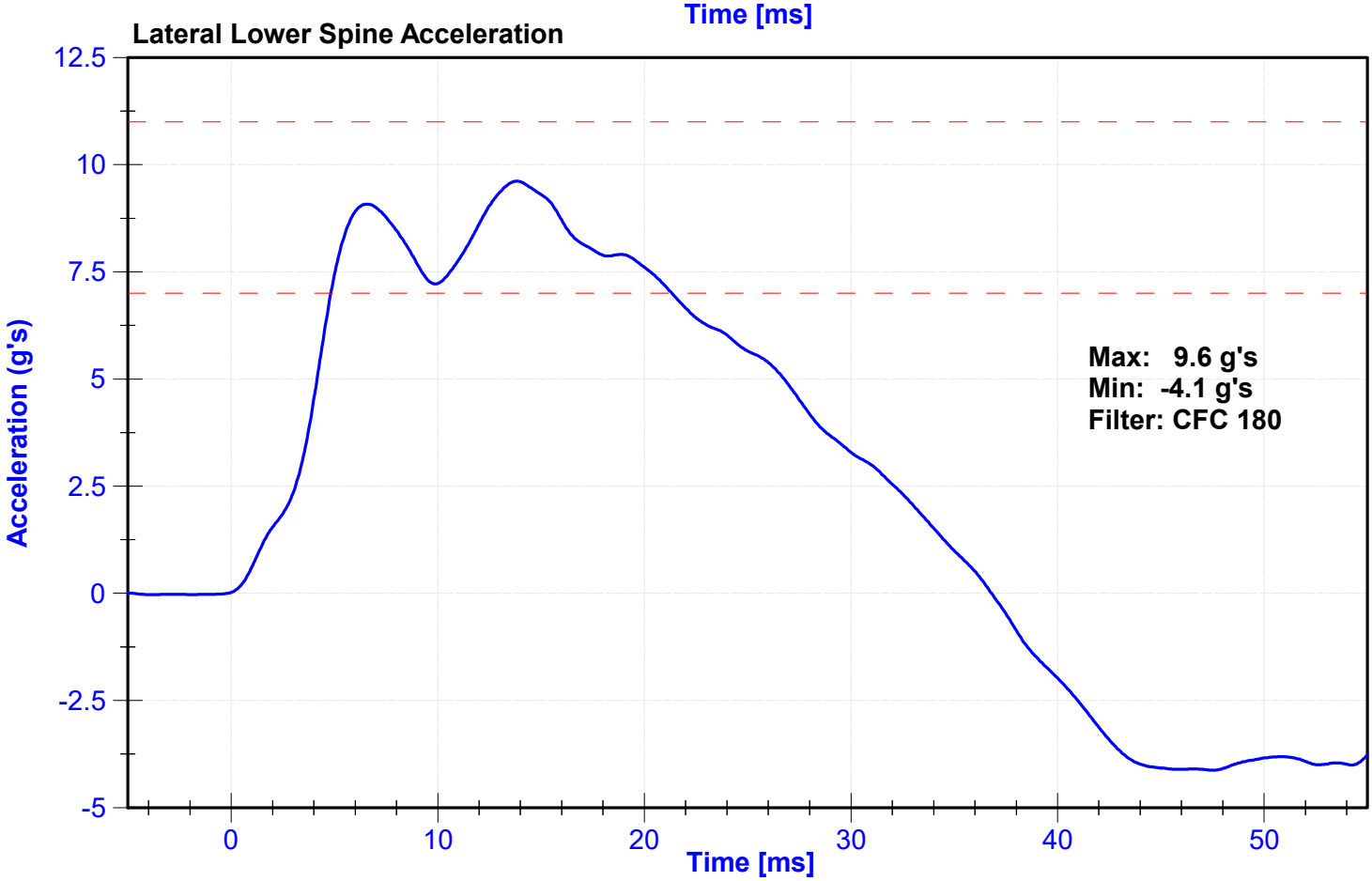



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 36.8 mm
Min: 1.9 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.0 mm
Min: 1.6 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 36.0 mm
Min: 0.5 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 14.7 g's
Min: -5.6 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.6 g's
Min: -4.1 g's
Filter: CFC 180

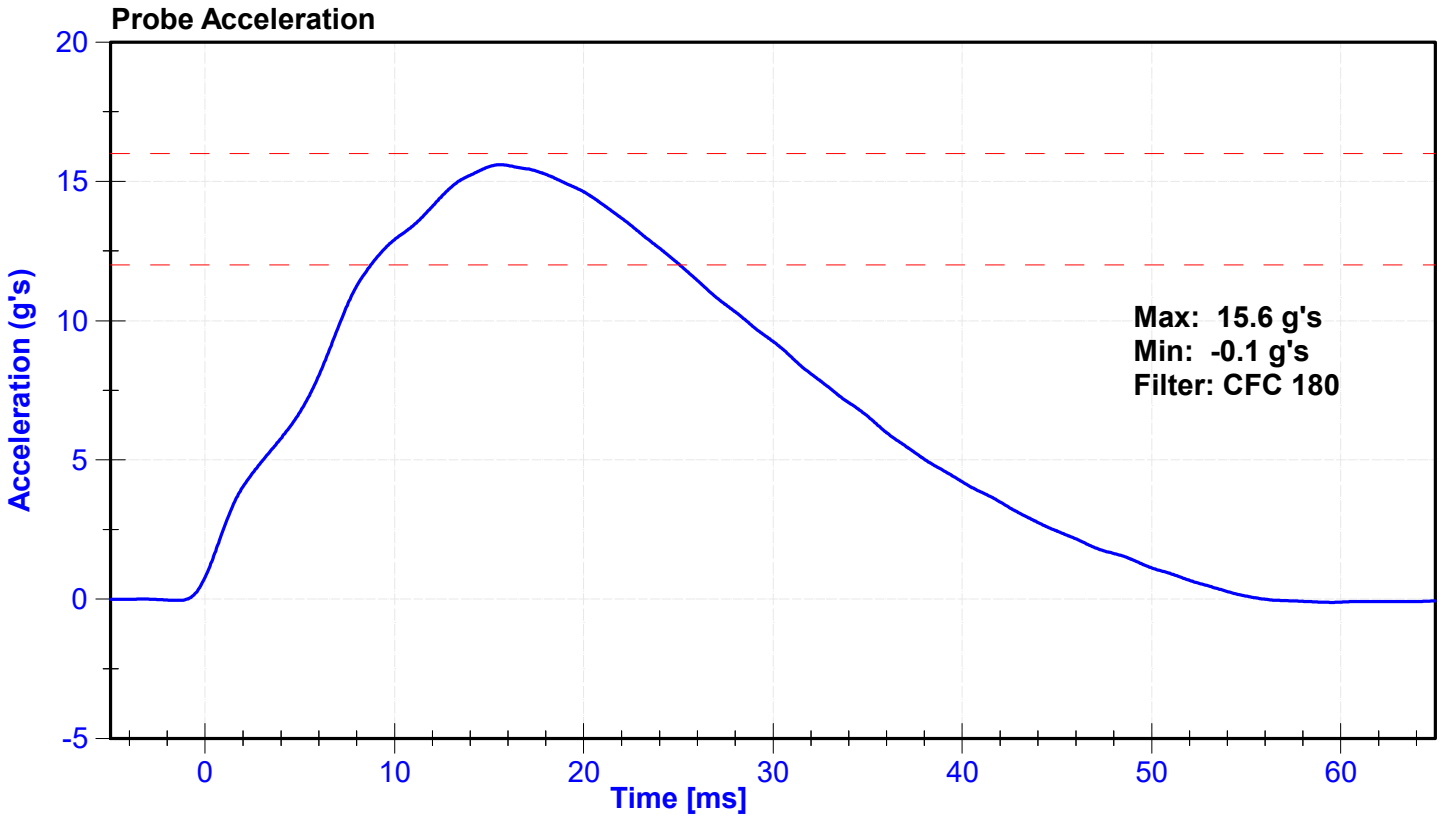
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

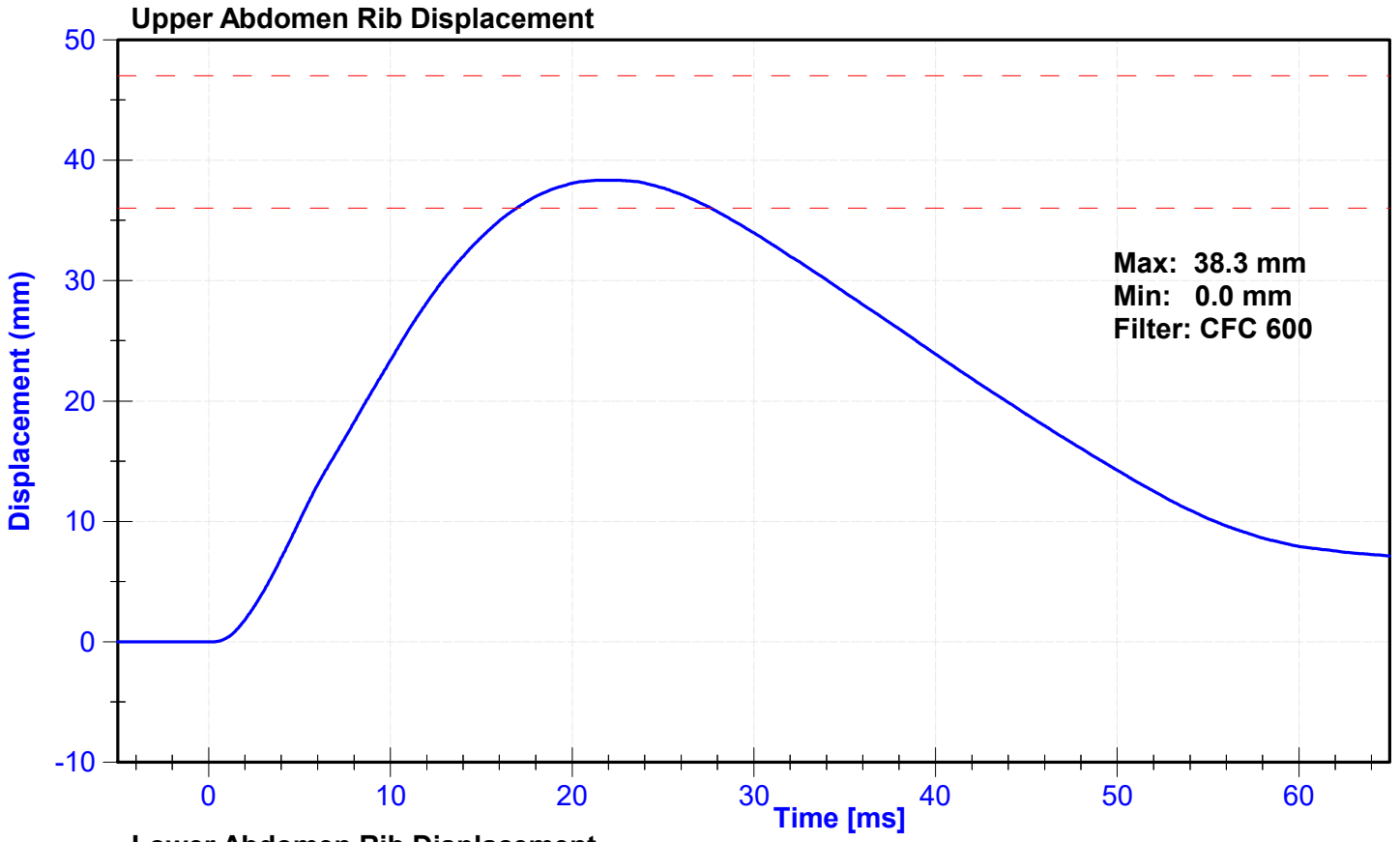
Results

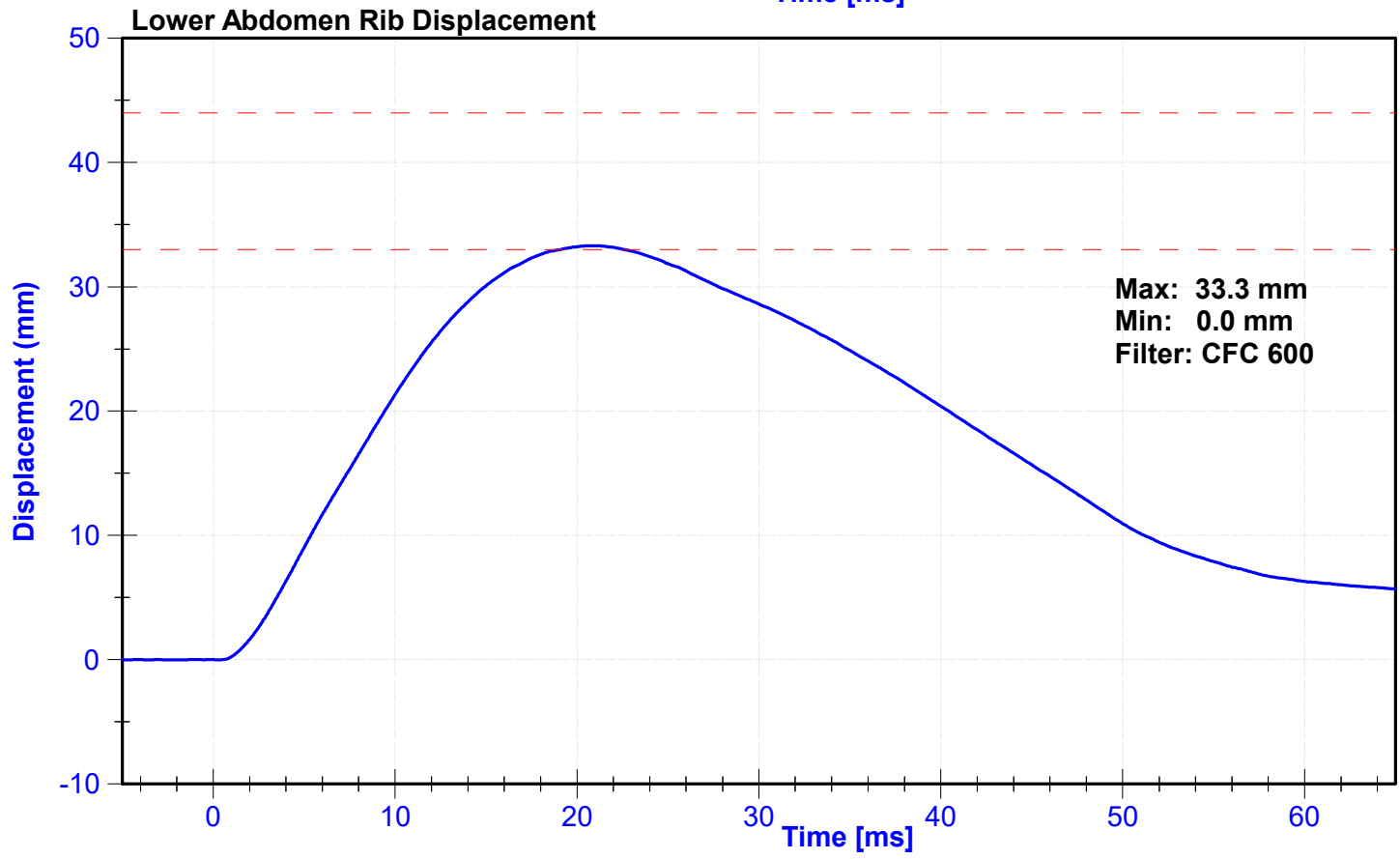
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	19	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	12	16	g's	15.6	Pass
Lateral Lower Spine Acceleration	9	14	g's	13.1	Pass
Upper Abdomen Rib Deflection	36	47	mm	38.3	Pass
Lower Abdomen Rib Deflection	33	44	mm	33.3	Pass

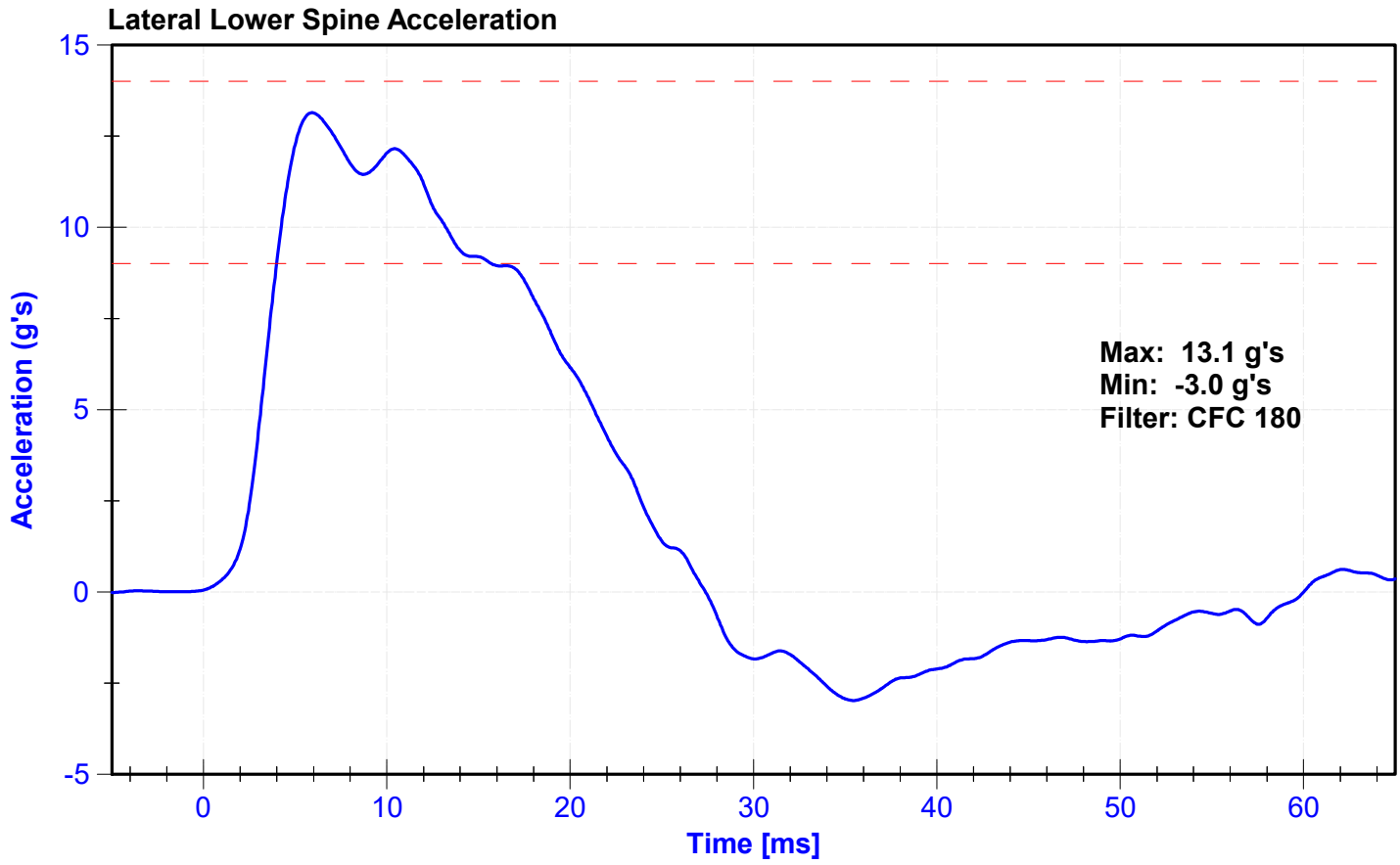
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Lower Spine Y Accelerometer	Endevco	P52071	10/17/2024	4/15/2025
Upper Abdomen Rib Potentiometer	Servo	074GFE	10/16/2024	4/16/2025
Lower Abdomen Rib Potentiometer	Servo	075GFE	10/16/2024	4/16/2025




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.3 mm
Min: 0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.3 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
10
5
0
-5
0
10
20
30
40
50
60
Time [ms]
Max: 13.1 g's
Min: -3.0 g's
Filter: CFC 180

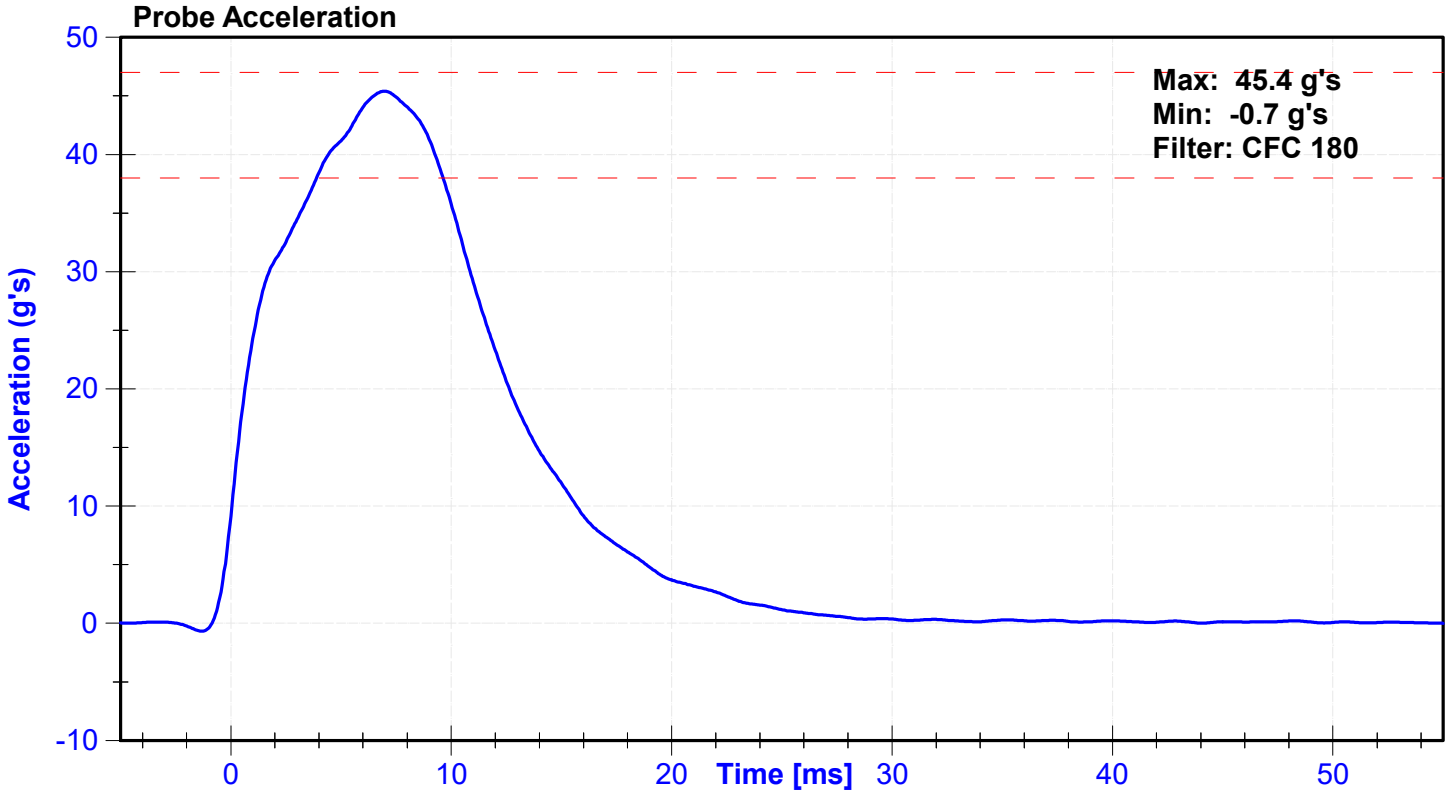
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

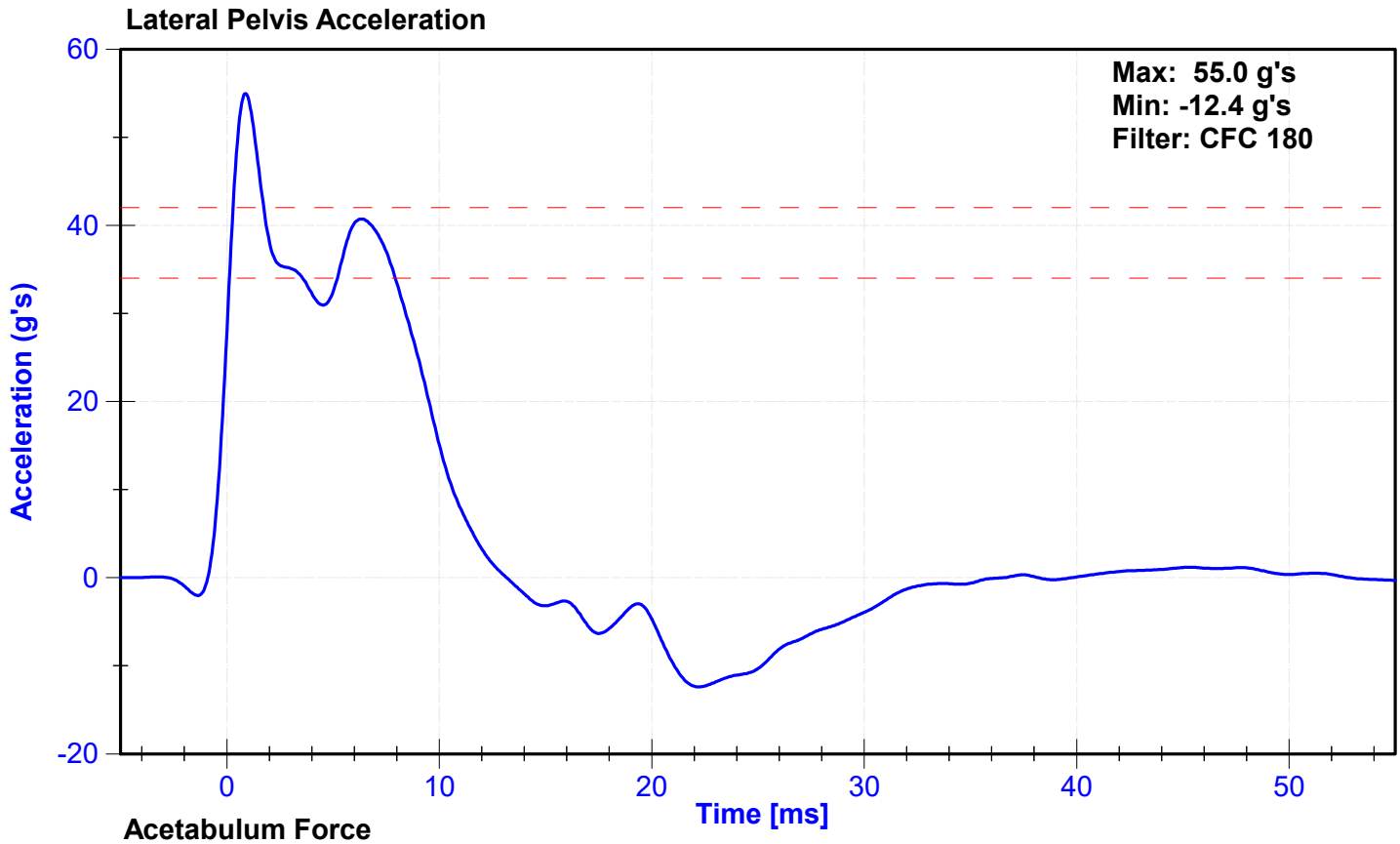
Results

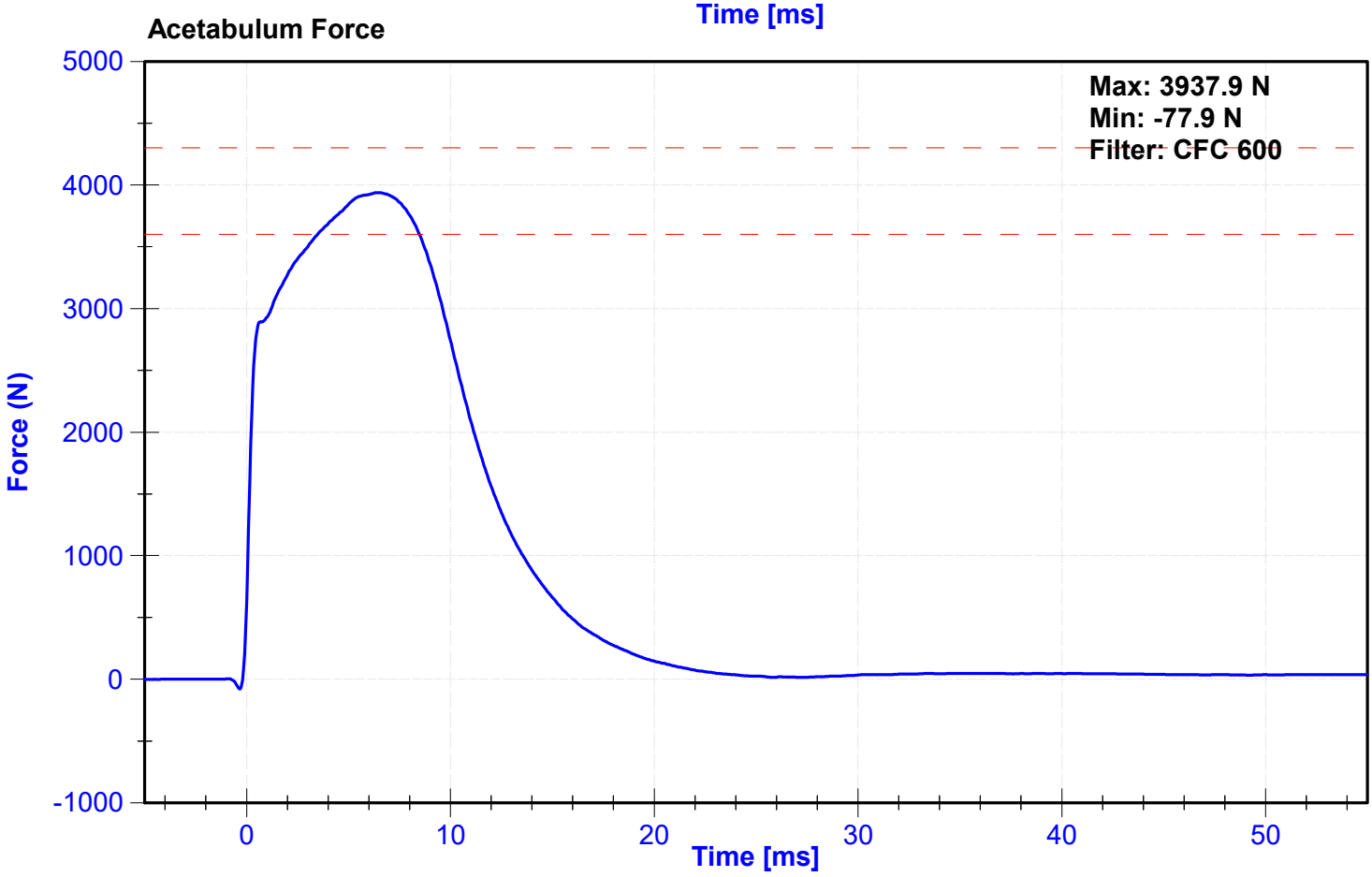
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	19	Pass
Velocity	6.6	6.8	m/s	6.65	Pass
Probe Acceleration	38	47	g's	45.4	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	40.7	Pass
Acetabulum Force	3600	4300	N	3937.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Pelvis Y Accelerometer	Endevco	P51731	10/17/2024	4/15/2025
Acetabulum Load Cell	Denton	275-FY	10/28/2024	10/28/2025
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 55.0 g's
Min: -12.4 g's
Filter: CFC 180
Acceleration (g's)
60
40
20
0
-20
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 3937.9 N
Min: -77.9 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

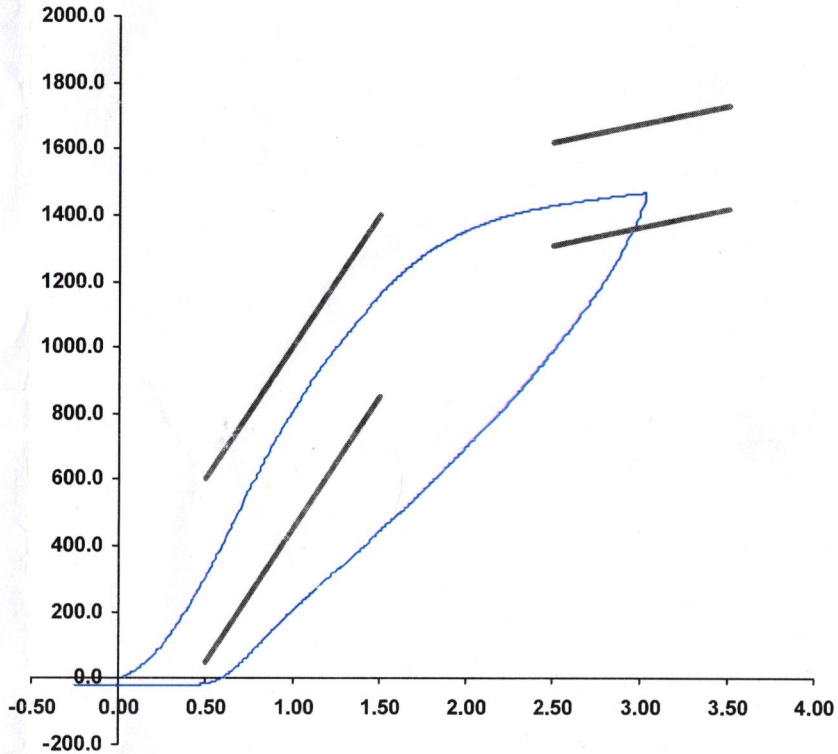
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16714
Test Number 23514
Report Number 23571
Test Date 7/22/2022 11:52:08 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	306	50	600
Force @ 1.5 mm (N)	1,161	850	1,400
Force @ 2.5 mm (N)	1,428	1,306	1,618
Force @ 3.0 mm (N)	1,466	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:
Cert Plug 1-14-2025 300

Operator

Part Number 180-4450

Template No 107 22-Jul-22
SACO Research

By : DC Date : 7/22/22

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

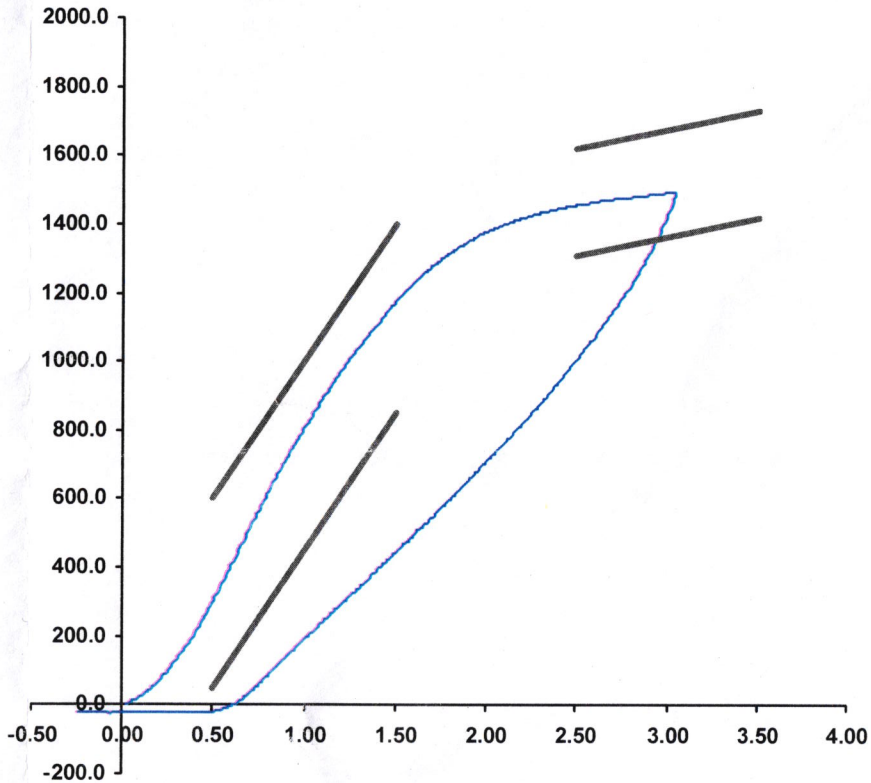
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16722
Test Number 23522
Report Number 23579
Test Date 7/22/2022 12:25:38 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	305	50	600
Force @ 1.5 mm (N)	1,174	850	1,400
Force @ 2.5 mm (N)	1,455	1,306	1,618
Force @ 3.0 mm (N)	1,490	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:
Impact 1-14-2025 300

Operator

Part Number 180-4450

Template No 107 22-Jul-22
SACO Research

By : DC Date : 7/22/22

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

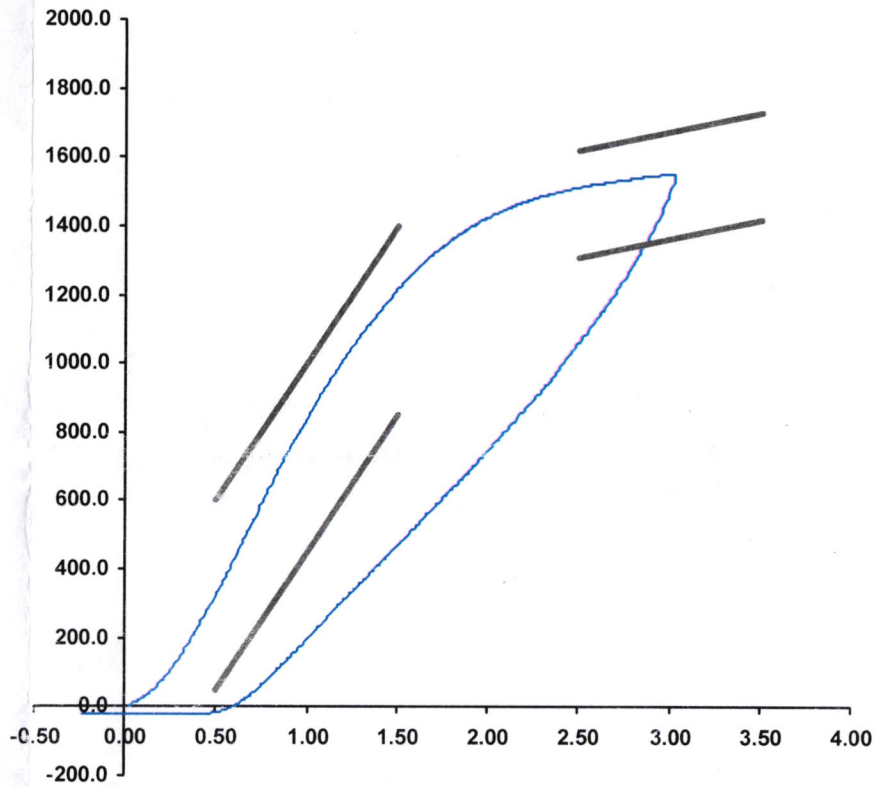
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16767
Test Number 23577
Report Number 23634
Test Date 7/25/2022 7:28:39 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	324	50	600
Force @ 1.5 mm (N)	1,218	850	1,400
Force @ 2.5 mm (N)	1,513	1,306	1,618
Force @ 3.0 mm (N)	1,551	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:
Non Impact 1-14-2025 300

Operator

Part Number 180-4450

Template No 107 25-Jul-22
SACO Research

By : DC Date : 7/25/22

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

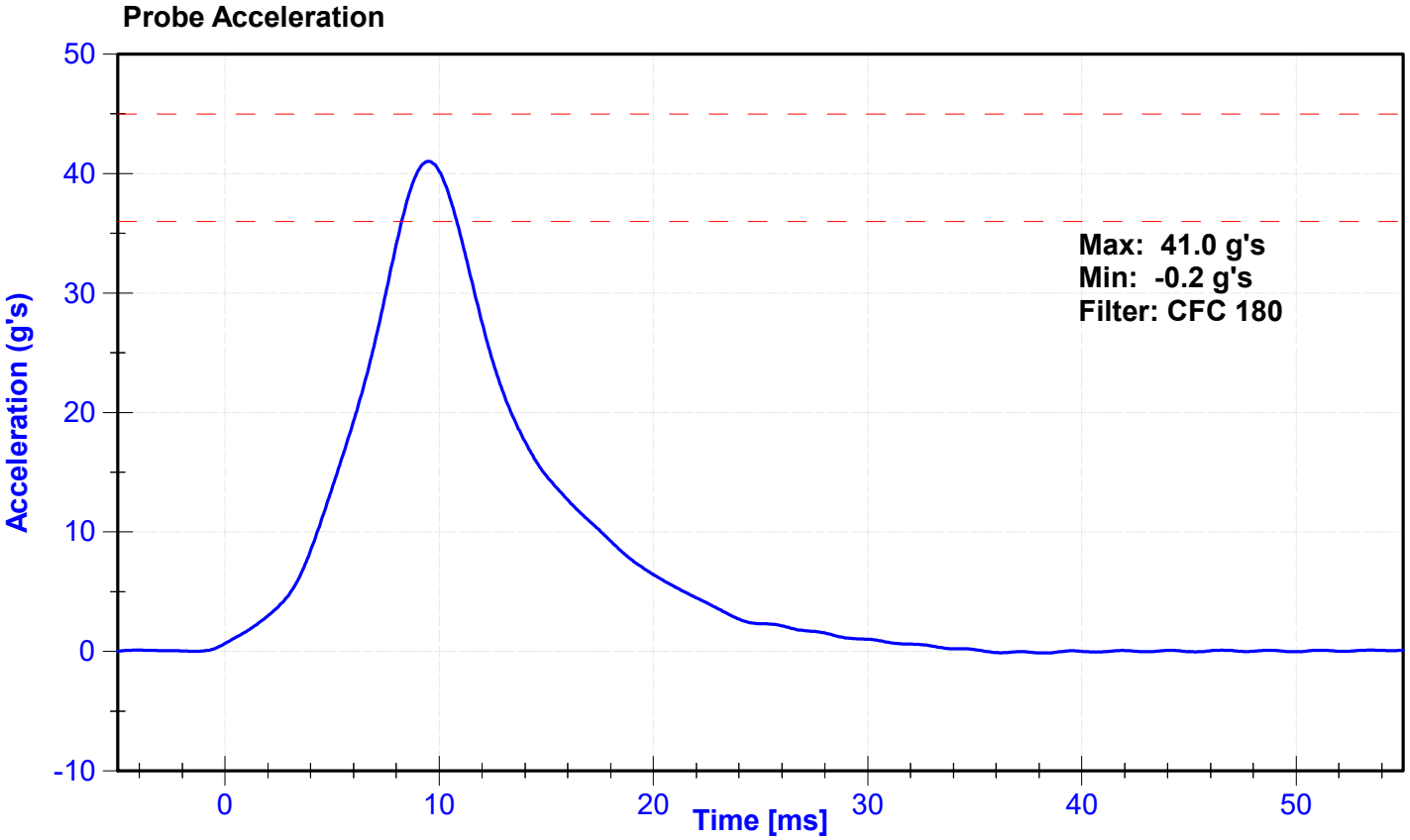
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	300	Laboratory Supervisor	J. Kinderman

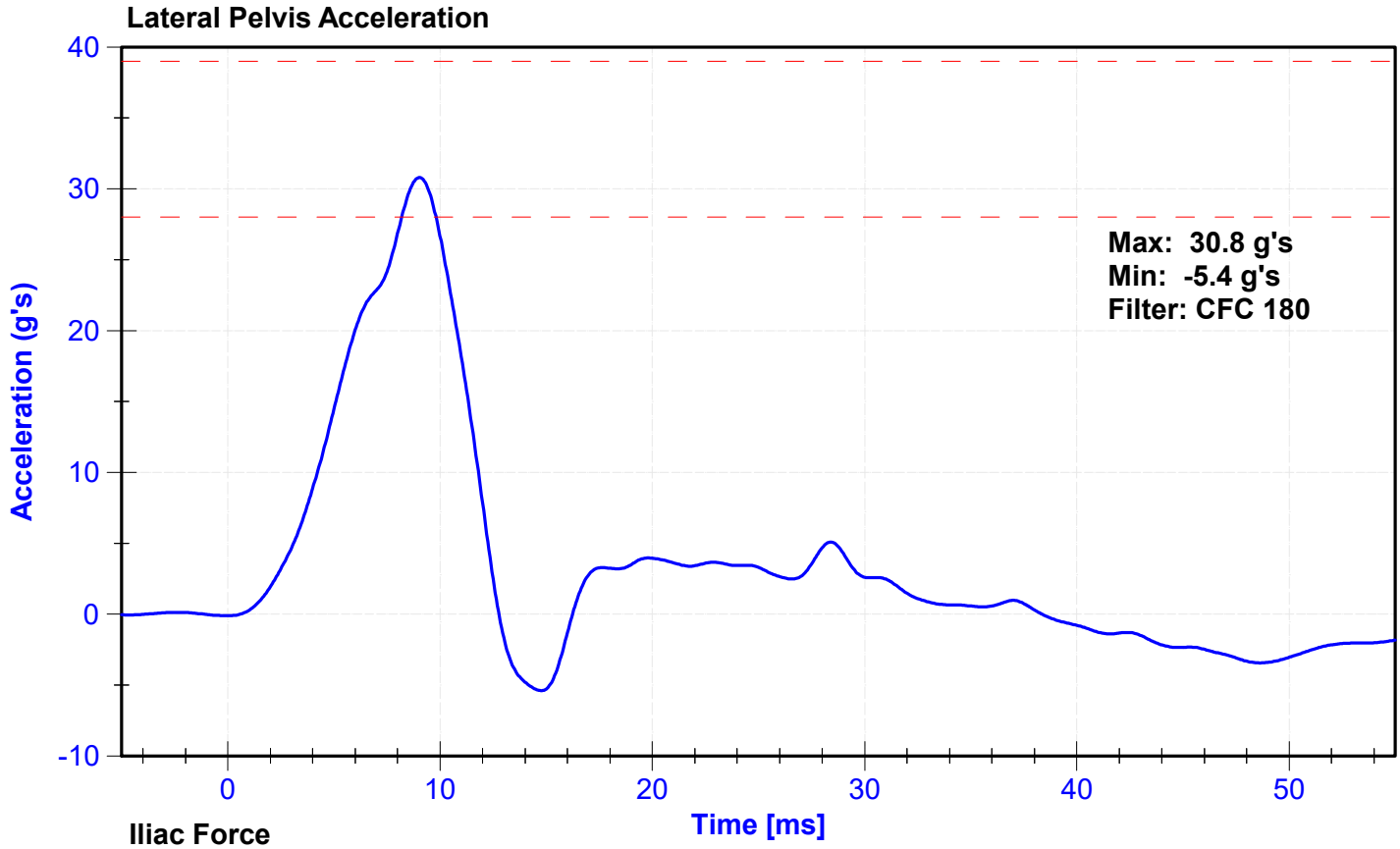
Results

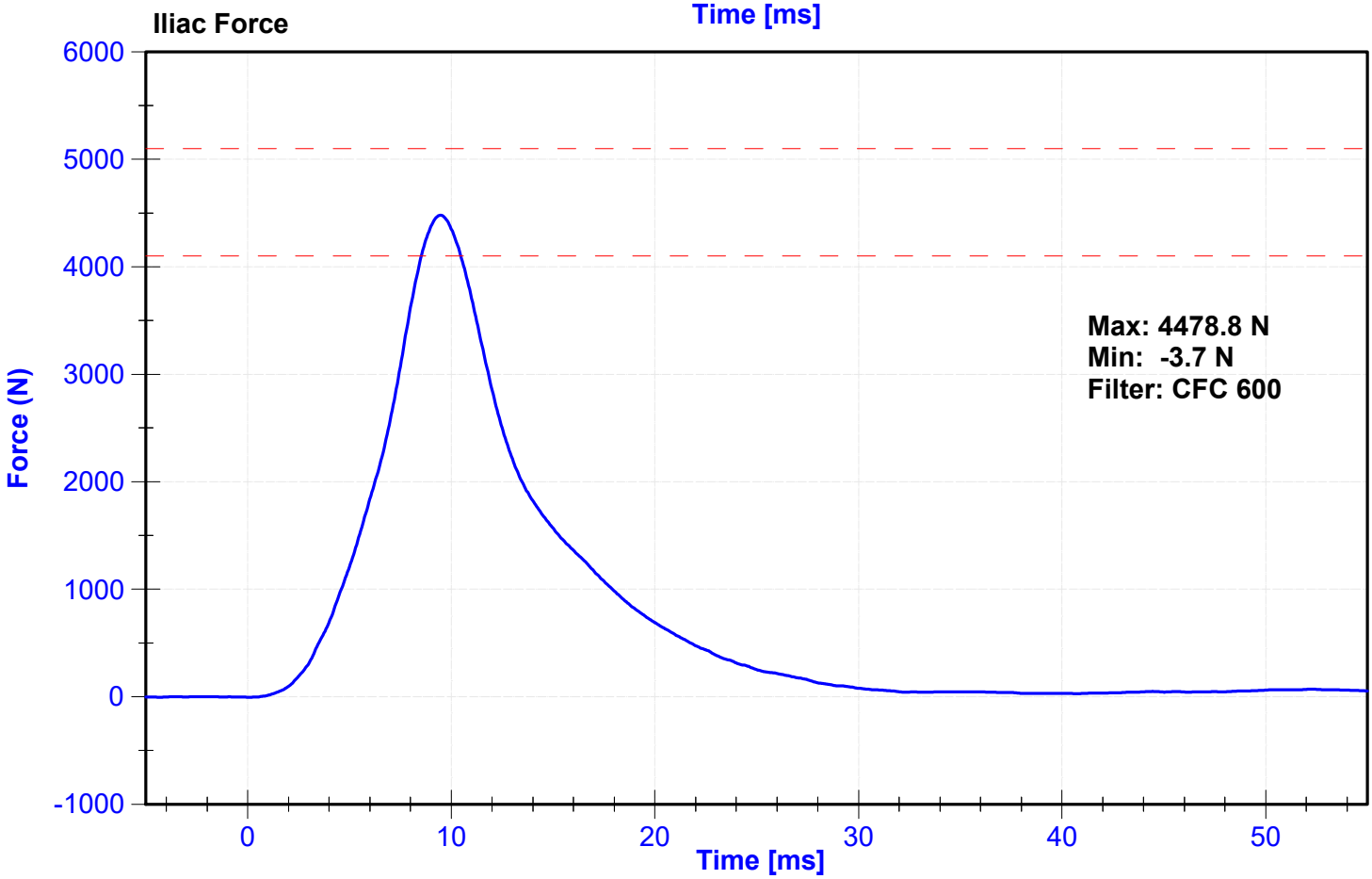
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	19	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	36	45	g's	41.0	Pass
Lateral Pelvis Acceleration	28	39	g's	30.8	Pass
Iliac Force	4100	5100	N	4478.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Pelvis Y Accelerometer	Endevco	P51731	10/17/2024	4/15/2025
Iliac Load Cell	Denton	279-FY	10/28/2024	10/28/2025




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 30.8 g's
Min: -5.4 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: 4478.8 N
Min: -3.7 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	10/17/2024
		Y	P49216	Endevco	10/17/2024
		Z	P51303	Endevco	10/17/2024
	Redundant	X	P58868	Endevco	10/17/2024
		Y	P59020	Endevco	10/17/2024
		Z	P52132	Endevco	10/17/2024
Thorax Rib Displacement Potentiometers	Upper	Y	179GFE	Honeywell	10/16/2024
	Middle	Y	185GFE	Honeywell	10/16/2024
	Lower	Y	184GFE	Honeywell	11/19/2024
Abdomen Load Cells	Forward	Y	1523	Denton	10/28/2024
	Middle	Y	1524	Denton	10/28/2024
	Rear	Y	1530	Denton	10/28/2024
Lower Spine Accelerometers (T12)		X	P35790	Endevco	10/17/2024
		Y	T31029	Endevco	10/17/2024
		Z	P52033	Endevco	10/17/2024
Pubic Symphysis Load Cell		Y	458-FY	Denton	10/28/2024

TABLE 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N _300_		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers		Primary	X	P59018	Endevco	10/17/2024
			Y	P79189	Endevco	10/17/2024
			Z	P52025	Endevco	10/17/2024
		Redundant	X	P49182	Endevco	11/25/2024
			Y	P58986	Endevco	10/17/2024
			Z	P79587	Endevco	10/17/2024
Displacement Potentiometers	Thoracic Rib	Upper	Y	2316GFE	Servo	10/16/2024
		Middle	Y	085GFE	Servo	10/16/2024
		Lower	Y	1156GFE	Servo	10/16/2024
	Abdominal Rib	Upper	Y	074GFE	Servo	10/16/2024
		Lower	Y	075GFE	Servo	10/16/2024
Lower Spine Accelerometers (T12)			X	P64003	Endevco	10/17/2024
			Y	P52071	Endevco	10/17/2024
			Z	P17283	Endevco	10/17/2024
Acetabulum Load Cell			Y	275-FY	Denton	10/28/2024
Iliac Wing Load Cell			Y	279-FY	Denton	10/28/2024
Pelvis Plug (struck side)				16482	SACO	07/14/2022
Pelvis Plug (non-struck side)				15623	SACO	10/07/2021

TABLE 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	G22721	Endevco	10/11/2024
	Vehicle Center of Gravity	Y	A315839	Measurement Specialties	10/16/2024
	Vehicle Center of Gravity	Z	A428009	Measurement Specialties	10/11/2024
2	Right Sill at Front Seat	X	G24624	Endevco	11/21/2024
	Right Sill at Front Seat	Y	A284346	Measurement Specialties	11/04/2024
	Right Sill at Front Seat	Z	A398329	Measurement Specialties	11/20/2024
3	Right Sill at Rear Seat	X	G24322	Endevco	12/14/2024
	Right Sill at Rear Seat	Y	G25374	Endevco	12/14/2024
	Right Sill at Rear Seat	Z	A413590	Measurement Specialties	12/14/2024
4	Left Sill at Front Door	Y	G25241	Endevco	12/03/2024
5	Left Sill at Rear Door	Y	G24629	Endevco	11/26/2024
6	Left A-Post Lower	Y	A372808	Measurement Specialties	12/03/2024
7	Left A-Post Middle	Y	G23839	Endevco	12/03/2024
8	Left B-Post Lower	Y	G25018	Endevco	11/26/2024
9	Left B-Post Middle	Y	G25001	Endevco	11/26/2024
10	Front Seat Track	Y	G22712	Endevco	11/26/2024
11	Rear Seat Track or Structure	Y	G23443	Endevco	11/25/2024
12	Right Rear Occ. Compartment	Y	G22185	Endevco	11/25/2024
13	Engine Block	X	G21416	Endevco	11/22/2024
	Engine Block	Y	G22596	Endevco	11/22/2024
14	Rear Floorpan Above Axle	X	G22431	Endevco	11/22/2024
	Rear Floorpan Above Axle	Y	G24234	Endevco	11/22/2024
	Rear Floorpan Above Axle	Z	G25256	Endevco	11/22/2024

TABLE 4 – MDB Instrumentation

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