REPORT NUMBER: SINCAP-CAL-24-011

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

General Motors LLC
2024 Chevrolet Traverse
5 Door SUV

NHTSA No: M20240108

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

January 2, 2025

FINAL REPORT

PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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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

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15. Supplementary Notes		

16. Abstract

A 55/28, (61.90kph / 38.5 mph), 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2024 Chevrolet Traverse 5 Door SUV 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 September 19, 2024.

The impact velocity of the Moving Deformable Barrier (MDB) was 62.07 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 272 mm located at level 2. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	64.171
Maximum Thorax Rib Deflection	mm	44	16.382
Total Abdominal Force	N	2500	325.646
Pubic Symphysis Force	N	6000	1653.432
Lower Spine (T12) Resultant Acceleration	G	82*	16.649
Measurement Description	**Passenger ATD (SID-IIs)**		
	Units	**IARV**	**Result**
Head Injury Criteria (HIC36)		1000	112.697
Maximum Thorax Rib Deflection	mm	38*	15.087
Lower Spine (T12) Resultant Acceleration	G	82	47.658
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2302.722
Maximum Abdominal Rib Deflection	mm	45*	11.794

**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

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SECTION 1

TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2024 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number 693JJ920D000016. The purpose of this test is to generate comparative side impact performance in a 2024 Chevrolet Traverse 5 Door SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated March 2020.

SECTION 2

SUMMARY OF TEST RESULTS

A 2024 Chevrolet Traverse 5 Door SUV was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.07 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 September 19, 2024. Pre-test and post-test photographs of the test vehicle, the MDB and the dummies (ES-2re and SID-IIs) are included in this report.

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

The Dummies were instrumented in the following manner:

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

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

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

DUMMY INJURY VALUES

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	64.171
Maximum Thorax Rib Deflection	mm	44	16.382
Total Abdominal Force	N	2500	325.646
Pubic Symphysis Force	N	6000	1653.432
Lower Spine (T12) Resultant Acceleration	G	82*	16.649

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	112.697
Maximum Thorax Rib Deflection	mm	38*	15.087
Lower Spine (T12) Resultant Acceleration	G	82	47.658
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2302.722
Maximum Abdominal Rib Deflection	mm	45*	11.794

**Proposed IARV*

SUPPLEMENTAL RESTRAINT INFORMATION

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

GENERAL COMMENTS:

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

Data Anomalies:

The following channel was questionable for:

- Left Rear Sill Y Acceleration, Exceeded calibration range at 11.1 ms 14.4 ms 42.4 ms
- Left B-Pillar Lower Y Acceleration, Exceeded calibration range and saturated at 18.1 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: 2024 Chevrolet Traverse 5 Door SUV
NHTSA No.: M20240108
Test Program: NCAP Side MDB Impact Test
Test Date: 09/19/2024

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20240108
Model Year	2024
Make	Chevrolet
Model	Traverse
Body Style	SUV
VIN	1GNERGKS0RJ201060
Body Color	Lakeshore Blue Metallic
Odometer Reading (km/mi)	8 mi
Engine Displacement (L)	2.5
Type / No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	8-Speed
Overdrive	Yes
Final Drive	Front Wheel Drive
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

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

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

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors LLC
Date of Manufacture	07/24
Vehicle Type	MPV

GVWR (KG)	2800
GVWR Front (KG)	1450
GVWR Rear (KG)	1600

VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity (DSC)	2	2	3	7	
Vehicle Capacity Weight (VCW) (kg)				770	(A)
DSC x 68.0 kg				476	(B)
Cargo Weight (RCLW) (kg)				136	

VEHICLE SEAT TYPE

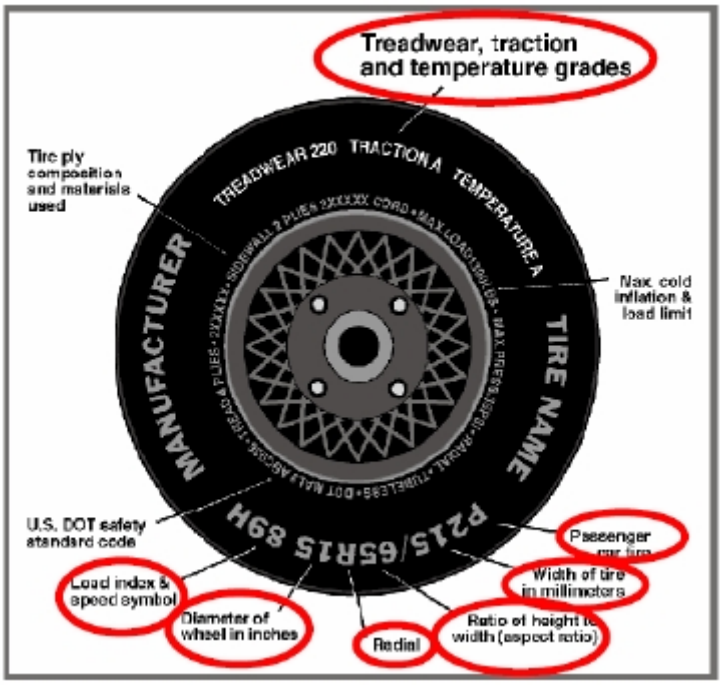
Seating Location	Type Of Seat Pan				Type Of Seat Back		
	Bucket	Bench	Split Bench	Contour	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front	X						X
Rear or Second Row Seat	X					X	
Third Row Seat			X		X		

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

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024

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)	240	240
Recommended Tire Size	255/65R18	255/65R18
Tire Size on Vehicle	255/65R18	255/65R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Alenza	Alenza
Treadwear	700	700
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index / Speed Symbol	111T	111T
Tire Material	Rubber	Rubber
DOT Safety Code Left	17XAXAA022224	17XAXAA022224
DOT Safety Code Right	17XAXAA022224	17XAXAA022224

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

Test Vehicle: 2024 Chevrolet Traverse 5 Door SUV | NHTSA No.: M20240108
Test Program: NCAP Side MDB Impact Test | Test Date: 09/19/2024

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	235	238	236	235
Tire Placard	kPa	240	240	240	240
Owner's Manual	kPa	240	240	240	240
As Tested	kPa	240	240	240	240

MDB TIRE SPECIFICATIONS

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

TEST VEHICLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	634	401		650	527		672	531	
Right	kg	534	451		546	553		534	549	
Ratio	%	57.8	42.2		52.5	47.5		52.8	47.2	
Totals	kg	1168	852	2020	1196	1080	2276	1206	1080	2286

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	2020	(A)
Actual Weight of 2 P572V (ES-2re and SID-IIs) ATDs Used	kg	127	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	136	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2283	(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	948	945	Yes
RF	mm	959	954	Yes
RR	mm	965	967	Yes
LR	mm	959	967	Yes
Vehicle CG (Aft of Front Axle)	mm	1458	1451	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	29	45	

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

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

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

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Spare Tire	18
Truck carpeting	13
Ballast / Equipment Added	124.7

TEST SURFACE MARKINGS

	Distance from 63° Impact Location Line (mm)
Fore 25 mm target	963
Aft 25 mm target	962
Pre-Impact Angle Line	235

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

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

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL(°)		
	Max	Min	Mid
Driver Seat	18.0	10.1	14.0
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	N/A	N/A	N/A

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	14.0	4	Max	64	66	70
			Mid	33	37	40
			Min	1	4	9
Front Passenger Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Front Center Seat*			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Non-Struck Side Rear Seat	Fixed	Fixed	Max			
			Mid			
			Min			
Rear Center Seat*	N/A	N/A	Max			
			Mid			
			Min			

**If applicable*

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

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024

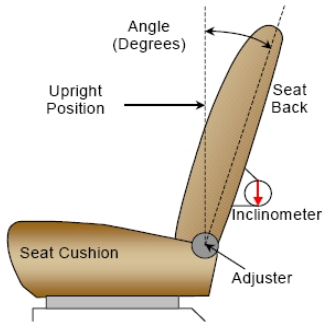
SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	240	Power	120	Power
Front Passenger Seat	260	27 (0-26)	130	13
Front Center Seat				
Struck Side Rear Seat	140	15 (0-14)	140	14
Non-Struck Side Rear Seat	140	15 (0-14)	140	14
Rear Center Seat	N/A	N/A	N/A	N/A

**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	55.5	Power	-12.8	Power
Front Passenger Seat	65.8	26 (0-27)	-12.8	9
Front Center Seat				
Struck Side Rear Seat	11.9	7 (0-6)	12.3	0
Non-Struck Side Rear Seat	11.9	7 (0-6)	12.1	0
Rear Center Seat	N/A	N/A	N/A	N/A

**if applicable*

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

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024

SEAT BELT ANCHORAGE ADJUSTMENT

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

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

HEAD RESTRAINT ADJUSTMENT

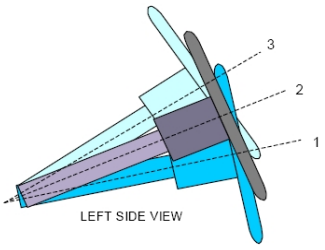
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

Seat	Total # of Positions	Placed in Position #
Driver Seat	9 (0-8)	Uppermost
Rear Seat	2 (0-1)	Lowermost

STEERING COLUMN ADJUSTMENT

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

	Degrees	Fore / Aft Position (mm)
Lowermost - Position No. 1	20.2	
Geometric center - Position No. 2	22.6	
Uppermost - Position No. 3	25.0	
Telescoping Steering Wheel Travel		68
Test Position	22.6	34

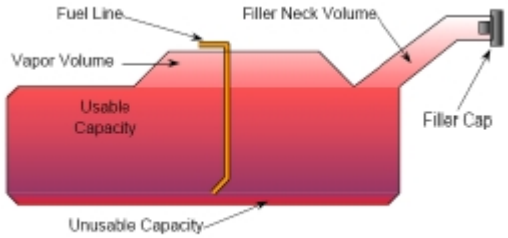


STEERING COLUMN ASSEMBLY

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:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024

FUEL TANK CAPACITY

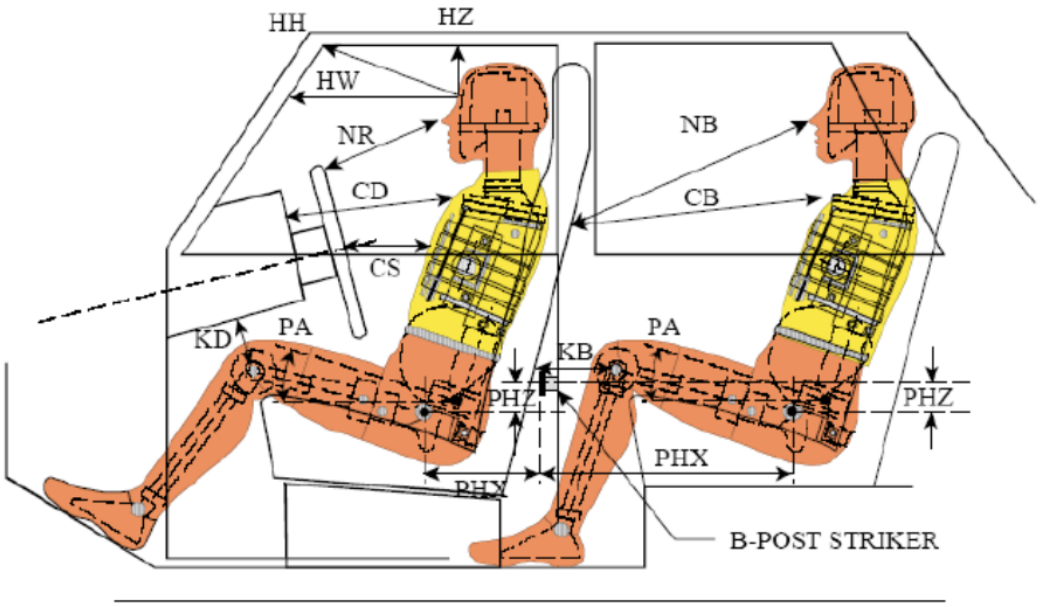
Description	Liters
Usable Capacity of “Standard Tank” (see Form No. 1)	73.4
Usable Capacity of “Optional Tank” (see Form No. 1)	N/A
Usable Capacity of “Standard Tank” (see Owner’s Manual)	73.4
Usable Capacity of “Optional Tank” (see Owner’s Manual)	N/A
93% of Usable Capacity	68.3
Actual Amount of Solvent Used in Test	68.3
1/3 of Usable Capacity	24.5

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:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024

DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION



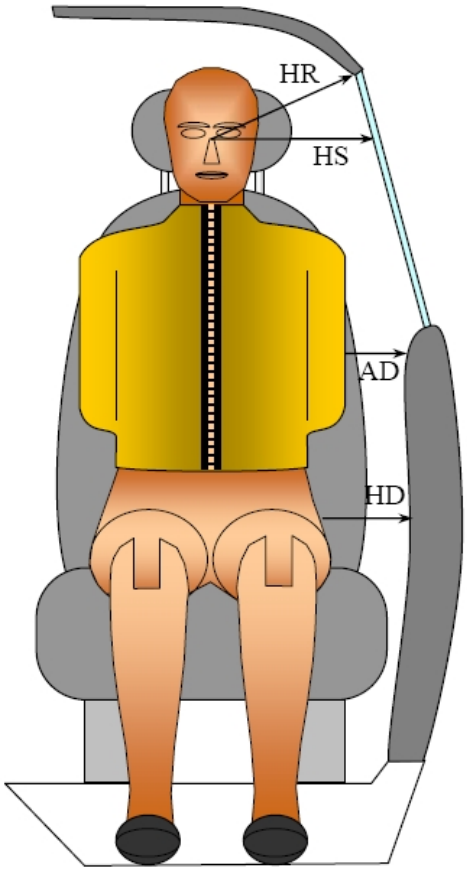
LEFT SIDE VIEW

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

Driver Code	Pass. Code	Description	Driver (Serial No. F033)		Left Rear Passenger (Serial No. DG8012)	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Header to Header	531			
HW		Header to Windshield	768			
HZ	HZ	Head to Roof Liner	262		356	
NR	NB	Nose to Rim/Seat Back	478		587	
CD	CB	Chest to Dash/Seat Back	674		585	
CS		Chest to Steering Wheel	410			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	202	33.0	320	13.2
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	207	18.0	321	8.9
PAX°	PAX°	Pelvic Tilt Angle X		24.3		22.4
	PAY°	Pelvic Tilt Angle Y				0.2
PHX	PHX	Hip Point to Striker (X-Axis)	167		304	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	54		153	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024



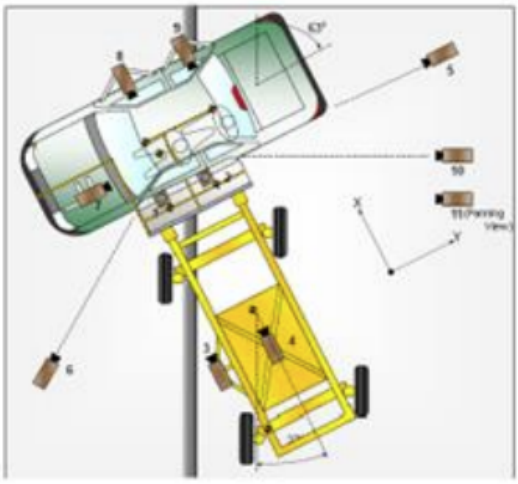
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver (Serial No. F033)	Left Rear Passenger (Serial No. DG8012)
HR	Head to Side Header	mm	269	314
HS	Head to Side Window	mm	380	395
AD	Arm to Door	mm	121	178
HD	Hip Point to Door	mm	181	200

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2024 Chevrolet Traverse 5 Door SUV
NHTSA No.: M20240108
Test Program: NCAP Side MDB Impact Test
Test Date: 09/19/2024



CAMERA LOCATIONS AND DATA

No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Overhead Overall	0	0	-8520	12.5	1000
2	Overhead Close-up	0	41	-8580	25	1000
3	Left Impact Point (MDB)	-1470	0	-847	25	1000
4	Side Overall (MDB)	-1140	878	-1587	8	1000
5	Rear	0	13380	-1440	24	1000
6	Left Front	-4375	-7380	-1310	35	1000
7	Driver Front (OB)				25	1000
8	Driver Side (OB)				12.5	1000
9	Passenger Side (OB)				12.5	1000
10	Real-time Left Rear				Zoom	60
11	Real-time In Run				Zoom	60

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

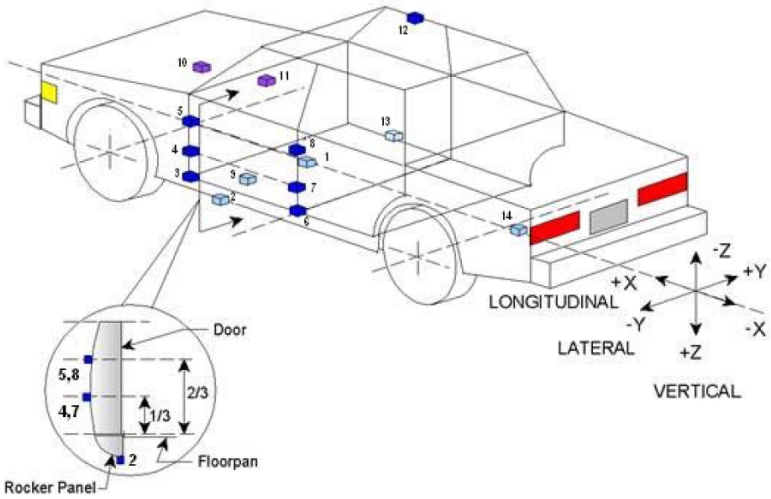
If applicable, explain why camera(s) did not operate as intended: All cameras operated as intended.

INSTRUMENTATION

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

DATA SHEET NO. 6
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024



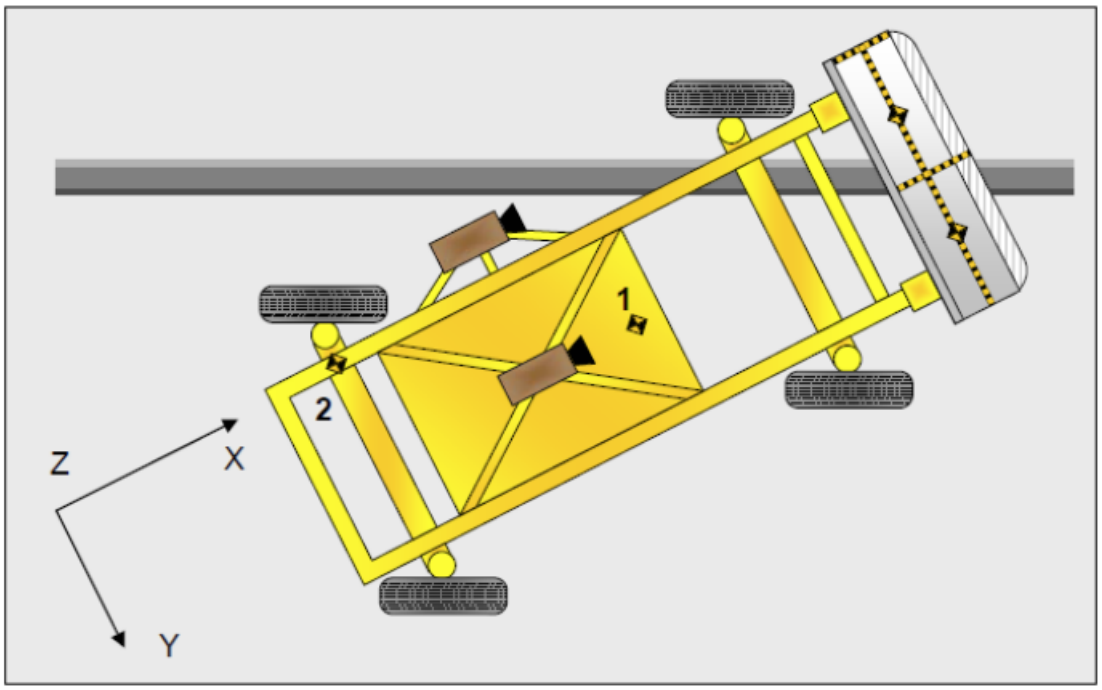
TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2533	13	64
2	Right Sill at Front Seat	3312	714	56
3	Right Sill at Rear Seat	2352	727	30
4	Left Sill at Front Door	3294	-712	57
5	Left Sill at Rear Door	2370	-721	38
6	A-Post Lower	3699	-691	-199
7	A-Post Middle	3583	-705	-734
8	B-Post Lower	2606	-734	-175
9	B-Post Middle	2540	-726	-677
10	Front Seat Track	2788	-598	-26
11	Rear Seat Structure	1733	-707	-108
12	Rt. Rear Occ. Compartment	2465	443	104
13	Engine Block	4399	205	-532
14	Rear Above Axle	751	-15	239

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

DATA SHEET NO. 7
MDB ACCELEROMETER LOCATIONS

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024



MDB ACCELEROMETER LOCATIONS

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

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

Width between left and right contact switches (mm): 1477

DATA SHEET NO. 8
POST-TEST OBSERVATIONS

Test Vehicle: 2024 Chevrolet Traverse 5 Door SUV | NHTSA No.: M20240108
Test Program: NCAP Side MDB Impact Test | Test Date: 09/19/2024

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	Curtain Airbag
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag & Headrest	Curtain Airbag
Left Shoulder	Door Panel	Door Panel
Upper Torso	Seatback & Torso/Pelvis Airbag	Door Panel
Lower Torso	Seatback & Torso/Pelvis Airbag	Door Panel
Left Hip	Seatpan & Torso/Pelvis Airbag	Seatpan & 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	A-Pillar, B-Pillar & C-Pillar Buckled
Sill Separation	505 mm Starting at the front wheel well
Windshield Damage	None
Side Window Damage	None
Other Notable Effects	None

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

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		3072
Vertical Impact Reference Line (Aft of Front Axle - Intended Impact Point)	mm		508
Actual Impact Point (Aft of Frontal Axle)	mm		506
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	+2
Vertical Offset (+ down / - up)	mm	+/- 20 of Intended Impact Point	-5

DATA SHEET NO. 9
MDB SUMMARY OF RESULTS

Test Vehicle: 2024 Chevrolet Traverse 5 Door SUV
NHTSA No.: M20240108
Test Program: NCAP Side MDB Impact Test
Test Date: 09/19/2024

MDB SPECIFICATIONS

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

MDB WEIGHTS

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

SPEED AND ANGLE AT IMPACT DATA

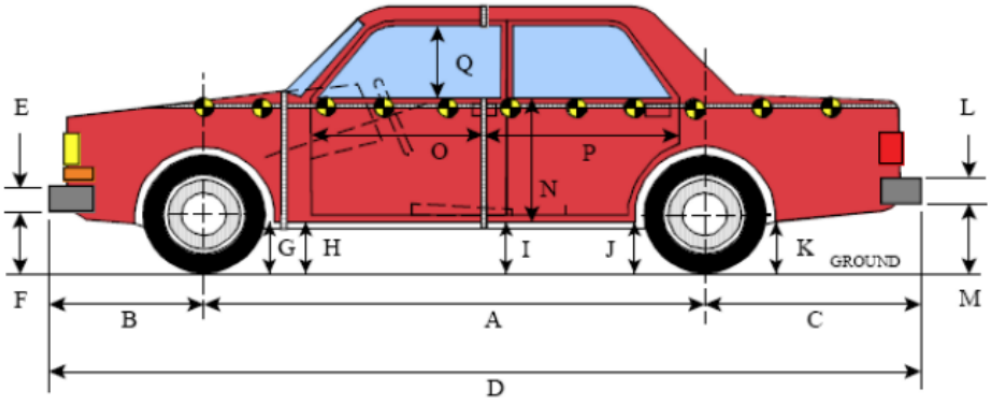
Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.10 to 62.70	62.07
Trap No. 2 Velocity (Redundant)	km/h	61.10 to 62.70	62.03
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.0

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Right	273
B	Top of Bumper	533	800	Right	142
C	Mid-Level	686	0	Center	98
D	Top of Stack	813	800	Left	129

DATA SHEET NO. 10
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024



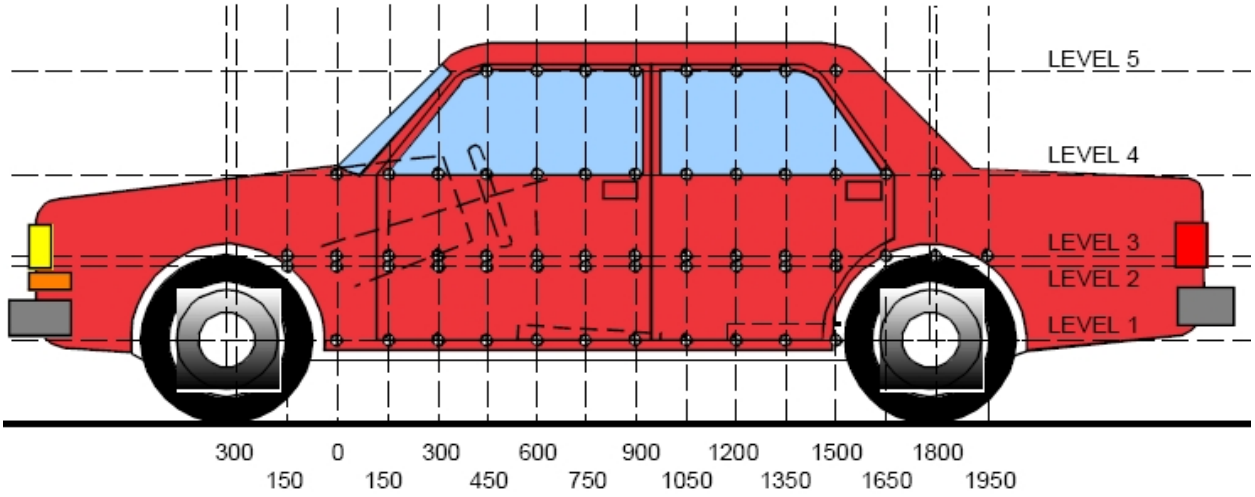
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code.	Measurement Description	Pre-Test	Post-Test	Change
A	Wheelbase	3072	3097	25
B	Front Axle to FSOV	1027	997	-30
C	Rear Axle to RSOV	1092	1090	-2
D	Total Length at Centerline	5184	5184	0
E	Front Bumper Thickness	95	95	0
F	Front Bumper Bottom to Ground	541	539	-2
G	Sill Height at Front Wheel Well	257	253	-4
H	Sill Height at Front Door Leading Edge	258	242	-16
I	Sill Height at B Pillar	278	236	-42
J1	Sill Height at Rear Wheel Well	256	297	41
J2	Pinch Weld Height at Rear Wheel Well	284	249	-35
K	Sill Height Aft of Rear Wheel Well	285	281	-4
L	Rear Bumper Thickness	140	140	0
M	Rear Bumper Bottom to Ground	482	483	1
N	Sill Height to Bottom of Front Window Sill	916	915	-1
O	Front Door Leading Edge to Impact CL	799	791	-8
P	Rear Door Trailing Edge to Impact CL	1394	1378	-16
Q	Front Window Opening	477	474	-3
R	Right Side Length	5072	5073	1
S	Left Side Length	5071	5070	-1
T	Maximum Vehicle Width	1971	1745	-226
U	Front Wheel Track Width	1715	1710	-5
V	Rear Wheel Track Width	1712	1708	-4

DATA SHEET NO.11
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	457	191	1500
2	Driver H-Point	mm	731	272	1650
3	Mid-Door	mm	805	259	1650
4	Window Sill	mm	1159	39	1200
5	Window Top	mm	1691	5	1200

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

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

Test Vehicle: 2024 Chevrolet Traverse 5 Door SUV | NHTSA No.: M20240108
Test Program: NCAP Side MDB Impact Test | Test Date: 09/19/2024

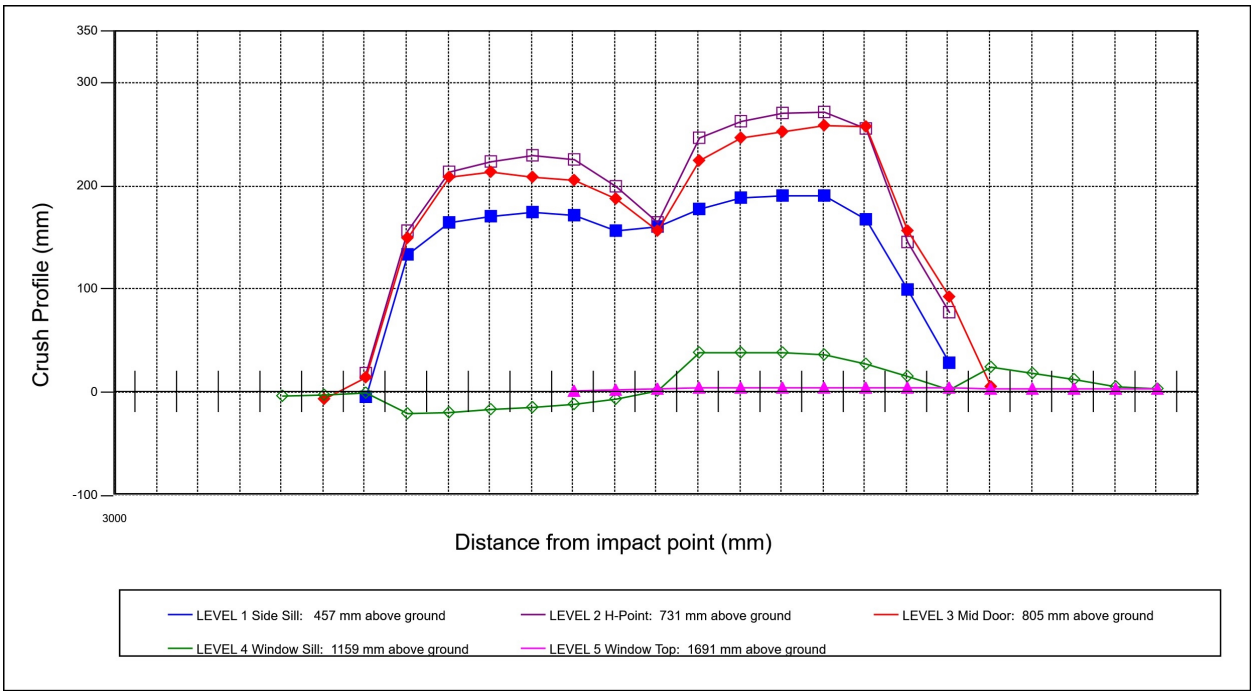
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Crush				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300				878					881					-3	
-150			993	885				999	887				-6	-2	
0	969	985	985	890		973	966	970	890		-4	19	15	0	
150	969	975	975	894		835	818	825	914		134	157	150	-20	
300	970	969	969	898		805	755	760	917		165	214	209	-19	
450	971	970	966	903		800	746	752	919		171	224	214	-16	
600	972	972	966	907		797	742	757	921		175	230	209	-14	
750	972	975	967	911	673	800	749	761	922	671	172	226	206	-11	2
900	973	977	968	914	680	816	777	780	920	677	157	200	188	-6	3
1050	973	978	969	917	682	812	813	812	915	678	161	165	157	2	4
1200	974	980	972	921	683	796	733	747	882	678	178	247	225	39	5
1350	973	980	973	923	683	784	717	726	884	678	189	263	247	39	5
1500	972	980	975	925	683	781	709	722	886	678	191	271	253	39	5
1650	972	979	977	926	682	781	707	718	889	677	191	272	259	37	5
1800	970	980	982	927	681	802	724	724	899	676	168	256	258	28	5
1950	969	987	989	931	678	869	841	832	915	673	100	146	157	16	5
2100	967	992	996	938	674	938	914	903	935	669	29	78	93	3	5
2250			998	944	669			992	919	665			6	25	4
2400				948	664				929	660				19	4
2550				948	656				935	652				13	4
2700				942	645				936	641				6	4
2850				938	631				934	627				4	4
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

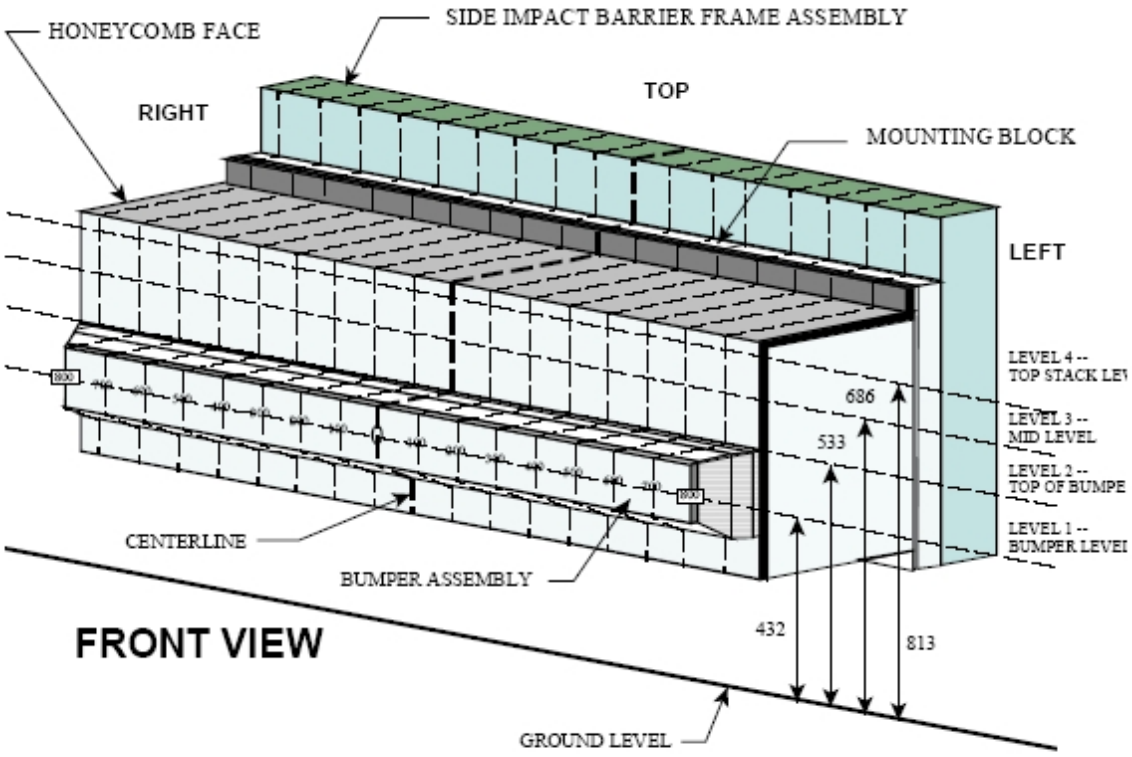
Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO.12
MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024



NOTE: Dimensions are shown in millimeters, mm

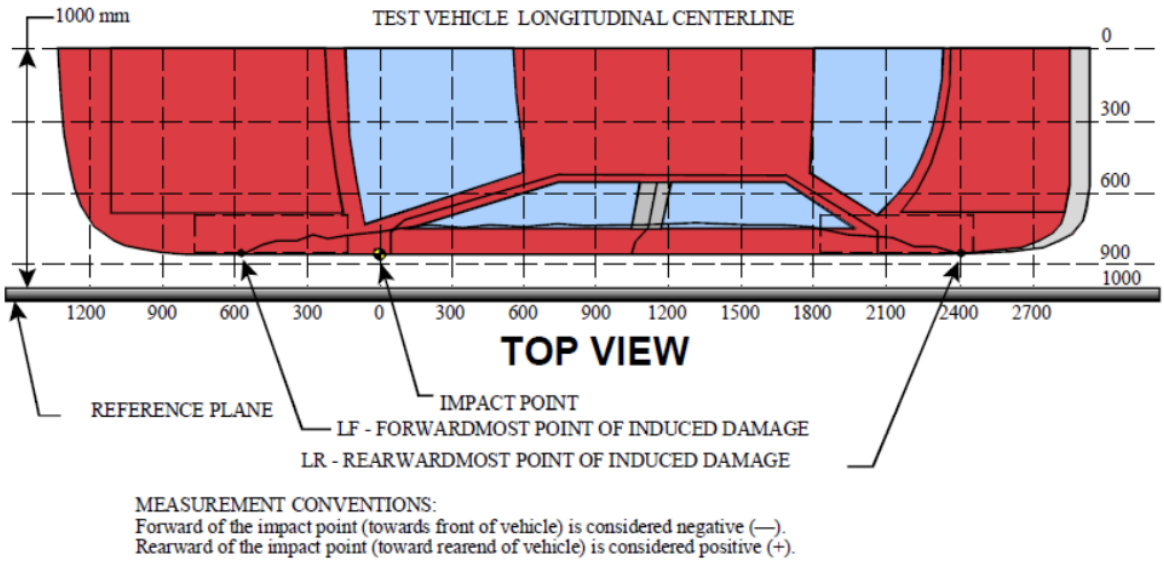
DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	273	261	257	255	254	251	250	247	245	241	238	234	231	228	225	225	226
2	142	139	137	134	132	134	135	134	126	119	118	116	112	107	105	104	106
3	60	56	57	60	60	69	76	85	98	69	48	44	44	51	58	64	91
4	83	71	64	60	56	60	83	98	126	86	70	68	70	75	82	88	129

DATA SHEET NO.13
VEHICLE AND MDB DAMAGE PROFILE DISTANCE

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024

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



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

VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-150	3	1	7	-6
2	330	3	242	32	210
3	810	3	231	33	198
4	1290	3	266	27	239
5	1770	3	277	19	258
6	2250	3	8	2	6

MDB DAMAGE PROFILE DISTANCES

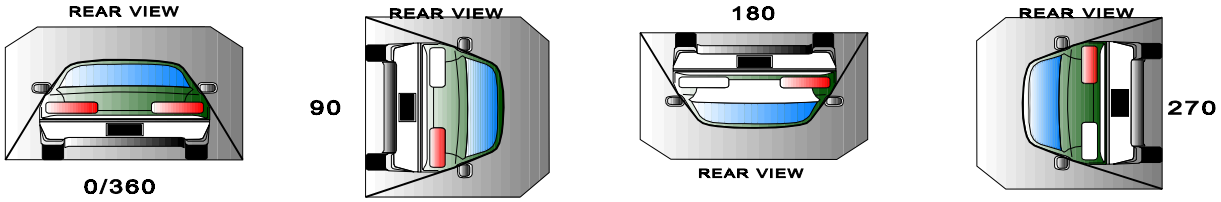
DPD	Distance From Center of MDB	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	800 mm left of center	1	279	505	-226
2	480 mm left of center	1	285	514	-229
3	160 mm left of center	1	275	514	-239
4	160 mm right of center	1	265	513	-249
5	480 mm right of center	1	258	513	-255
6	800 mm right of center	1	228	501	-273

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

Test Vehicle:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024
Test Time:	12:17 PM	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°	66	300	366
90° to 180°	66	300	306
180° to 270°	65	300	365
270° to 360°	67	300	367

FMVSS 301 SPILLAGE TABLE

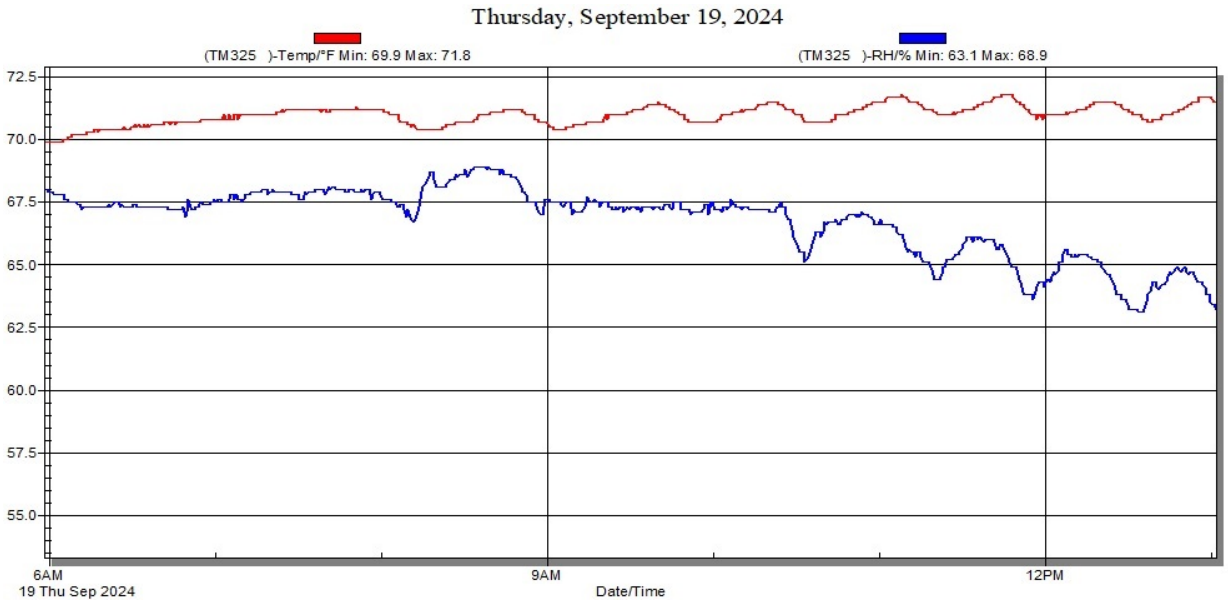
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	0
90° to 180°	0	0	0	0
180° to 270°	0	0	0	0
270° to 360°	0	0	0	0

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:	2024 Chevrolet Traverse 5 Door SUV	NHTSA No.:	M20240108
Test Program:	NCAP Side MDB Impact Test	Test Date:	09/19/2024



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

APPENDIX A

PHOTOGRAPHS

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



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



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



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



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



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



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



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



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



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



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



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



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



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



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

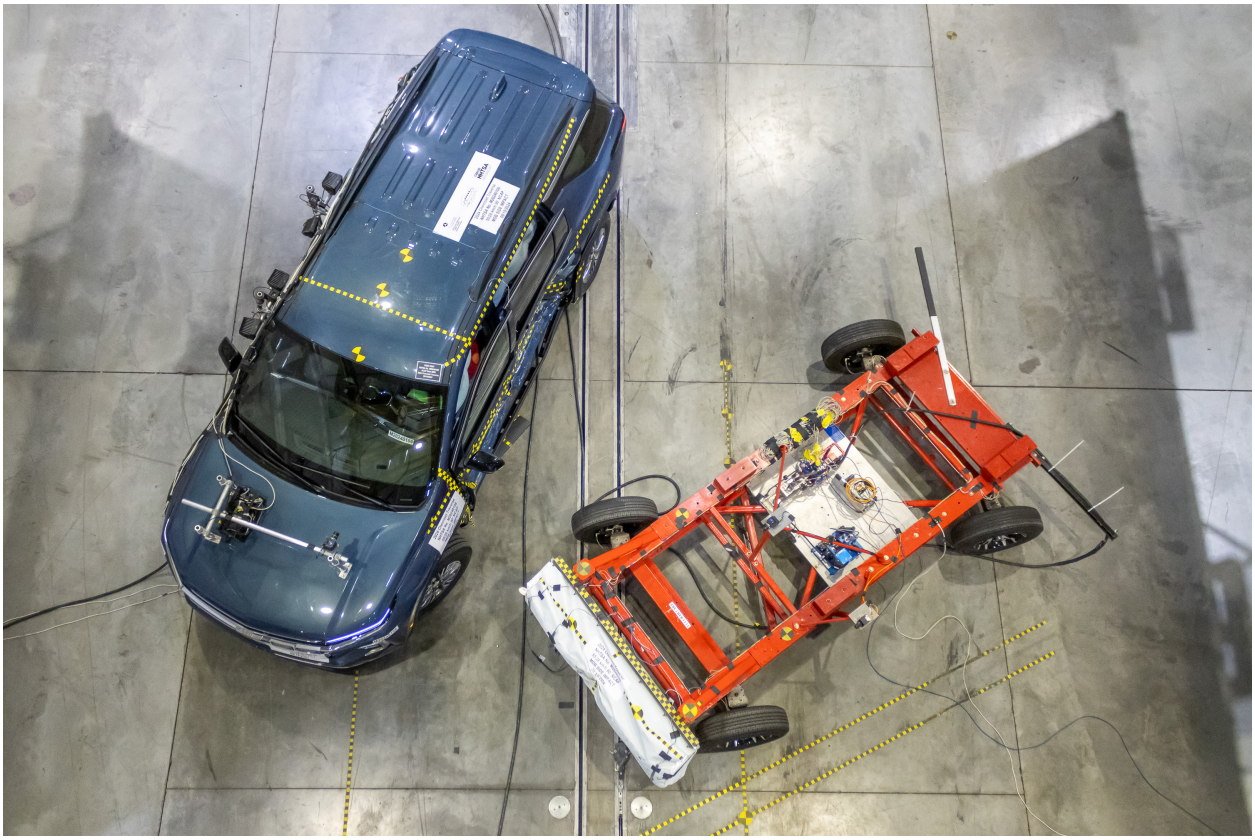

Figure A-16: Post-Test Overhead View of Test Area



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



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



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



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



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

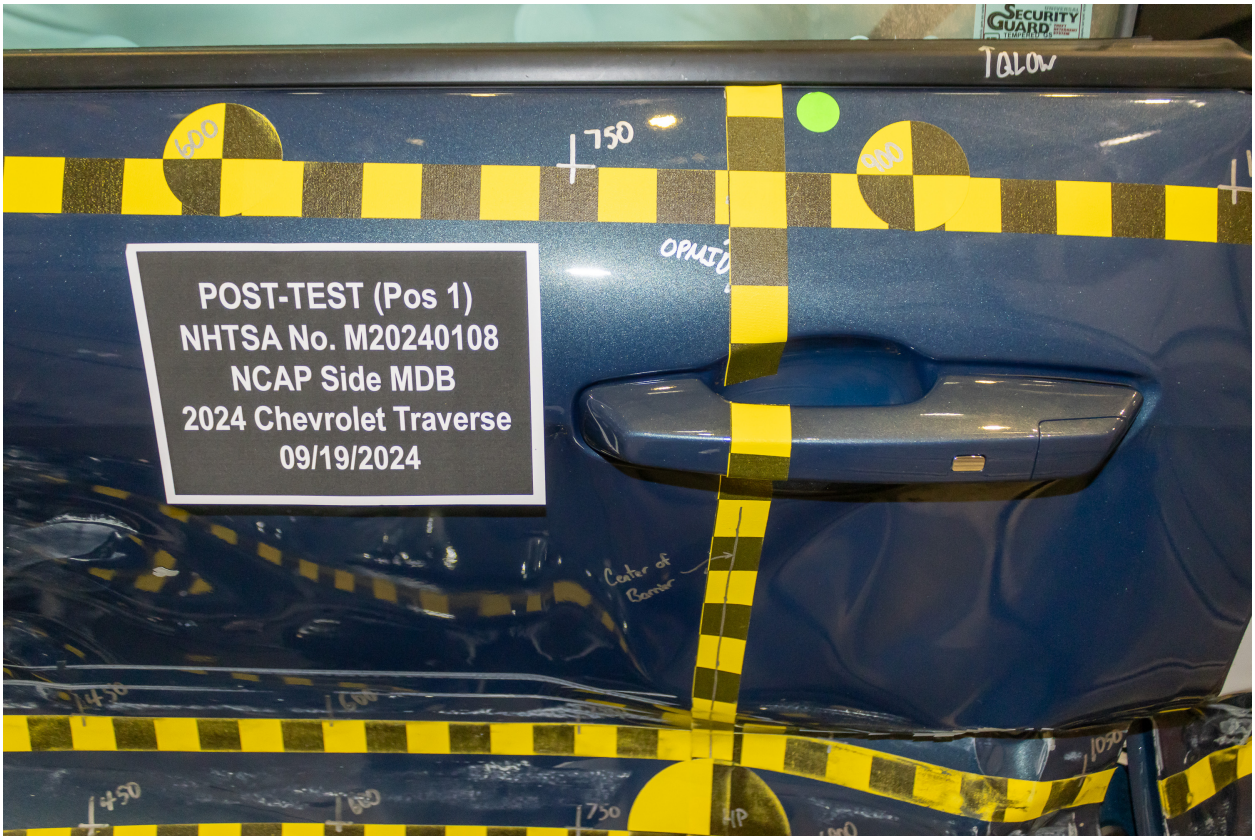

Figure A-22: Post-Test Left Front Door Latch Close-Up



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



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



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



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



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



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



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



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



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



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



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



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



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



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



Figure A-37: View of Disengaged Parking Brake



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



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



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



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



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



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



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



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



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



Figure A-47: Post-Test Driver Inner Door Panel View



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



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



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



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



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



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



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



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



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



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



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

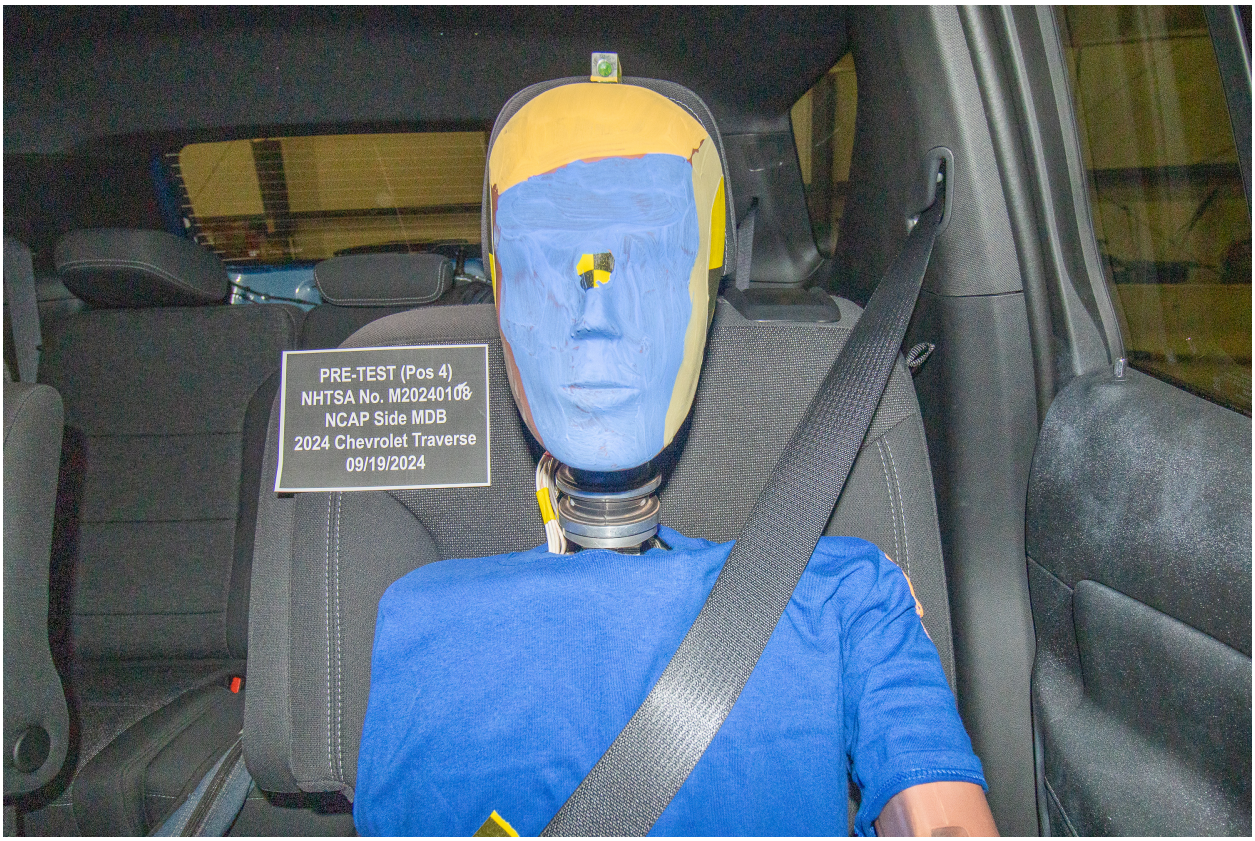

Figure A-59: Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint



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



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

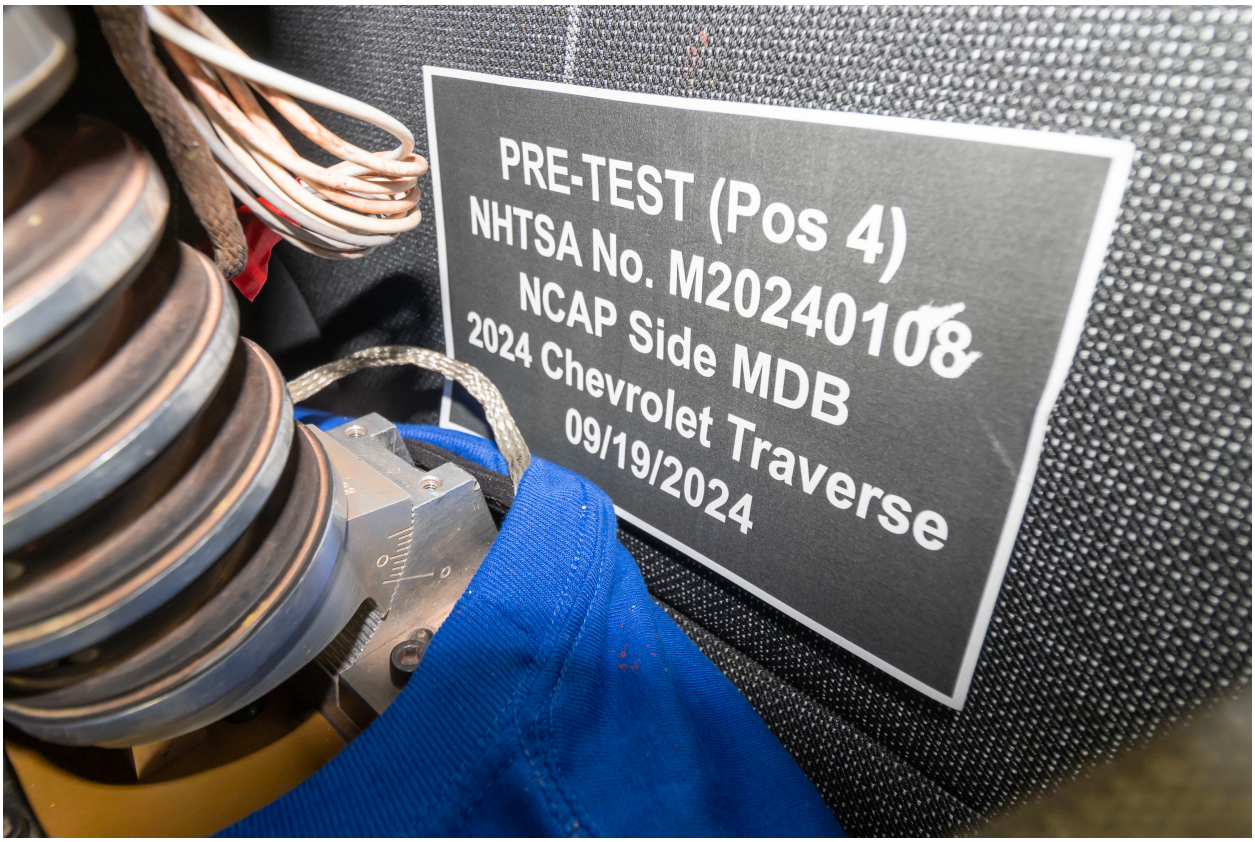

Figure A-62: Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket



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



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



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



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



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

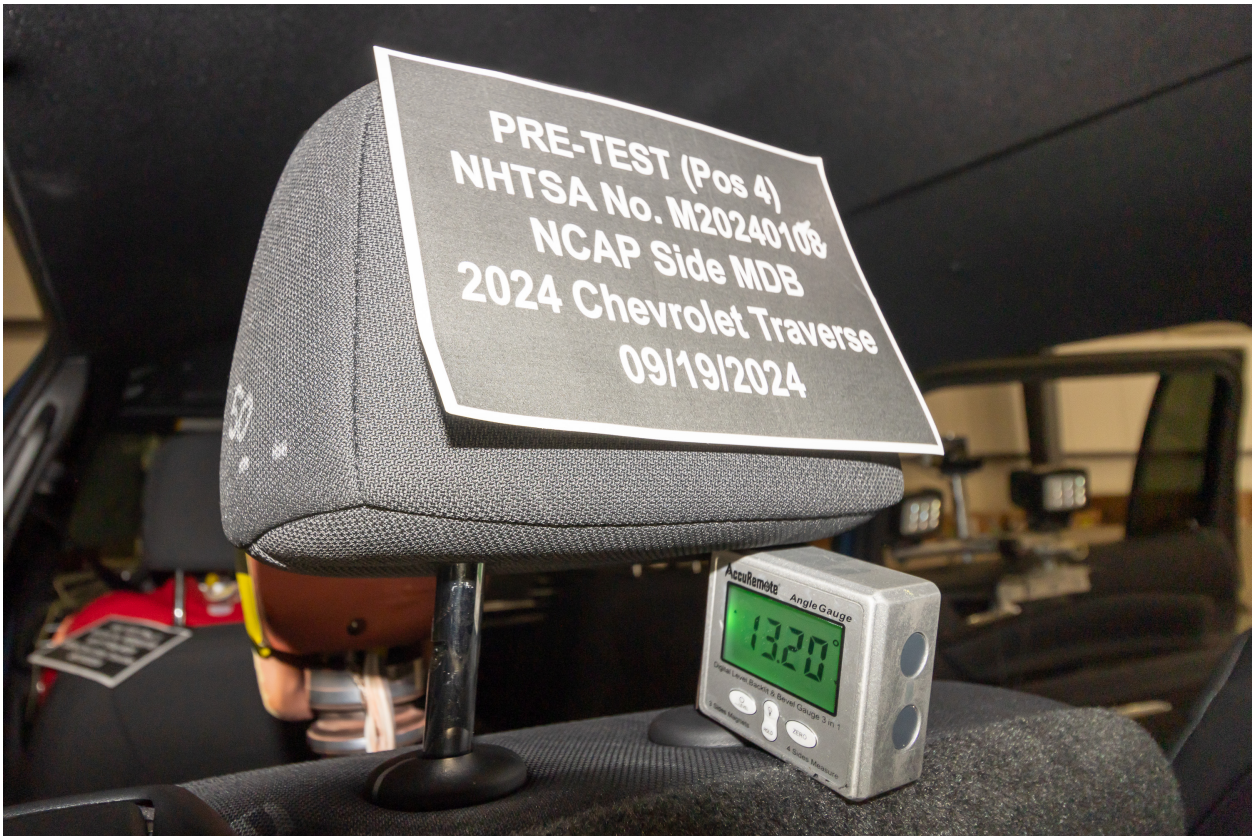

Figure A-68: Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint



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



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



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



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



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



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

Photo Not Applicable

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



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



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

Photo Not Applicable

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



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

Photo Not Applicable

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



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



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



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

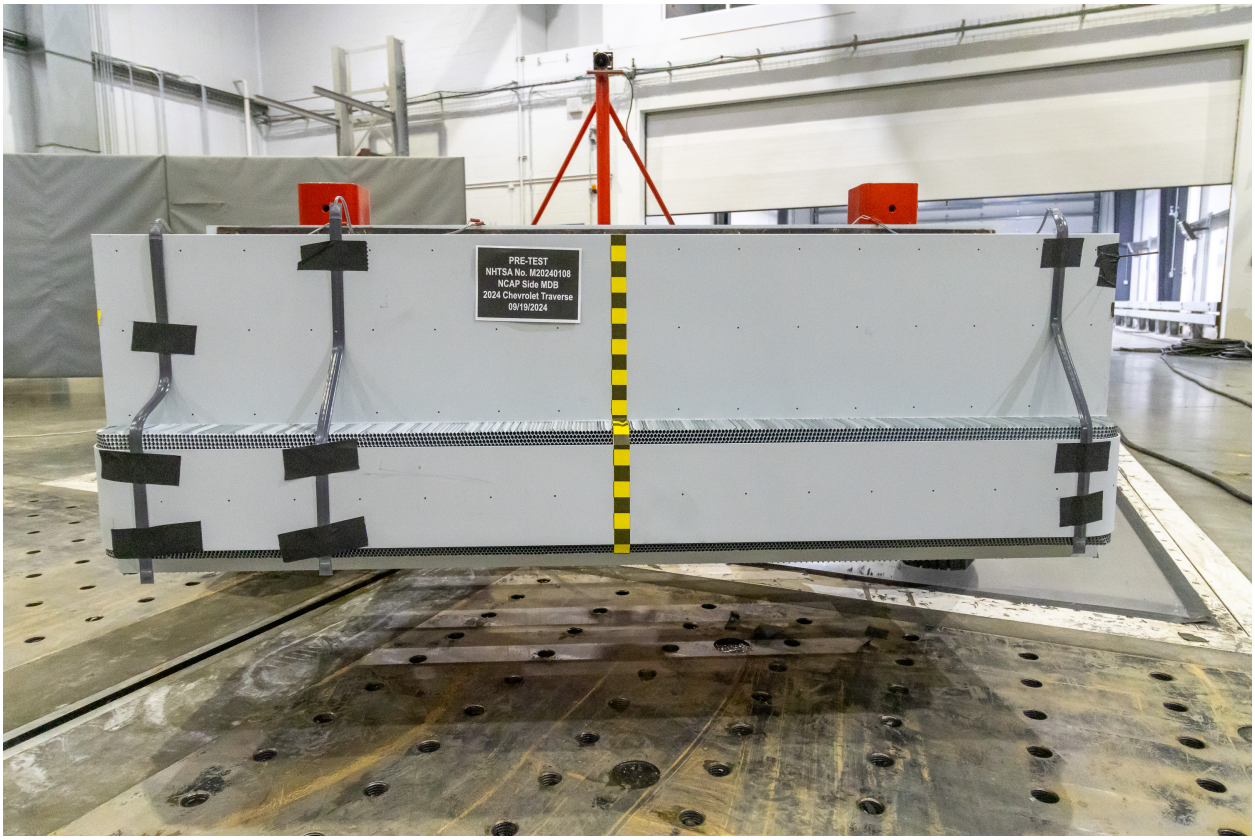

Figure A-84: Pre-Test Front View of MDB Impactor Face



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

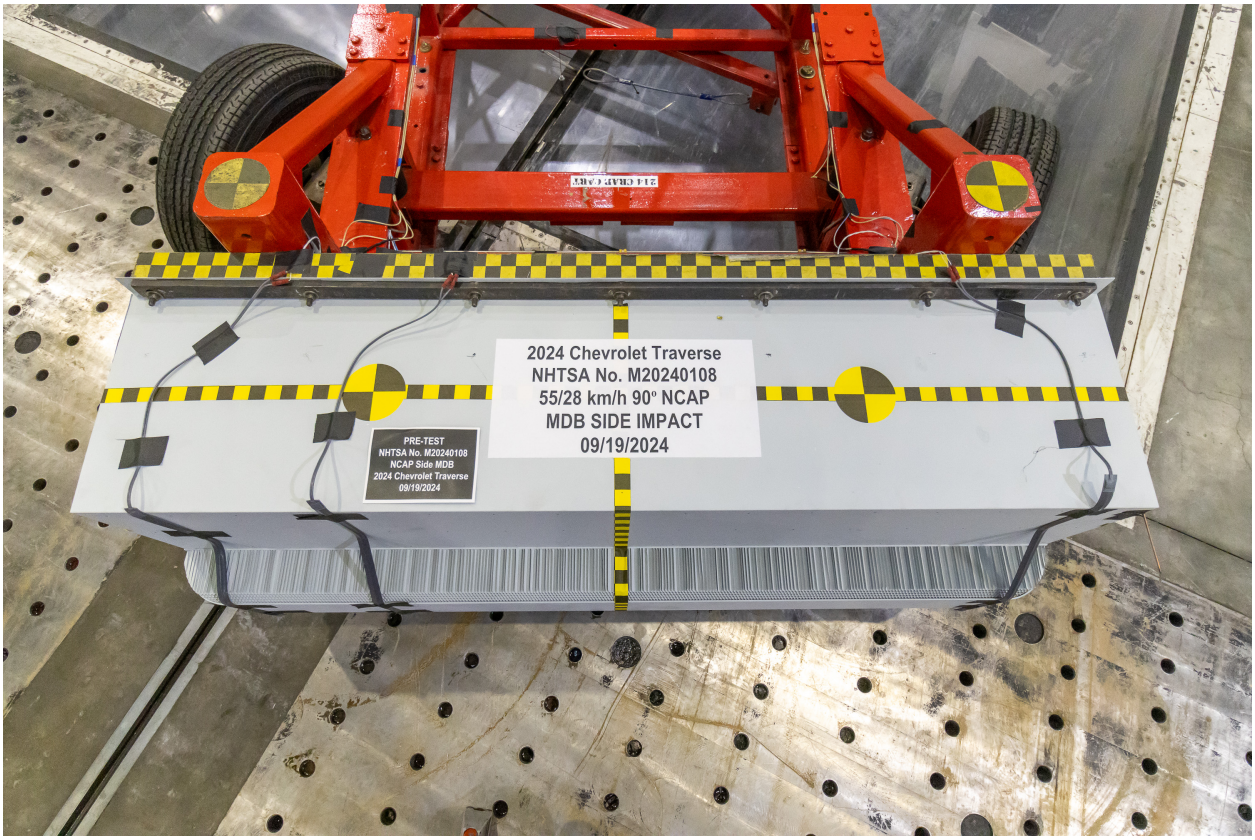

Figure A-86: Pre-Test Top View of MDB Impactor Face



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

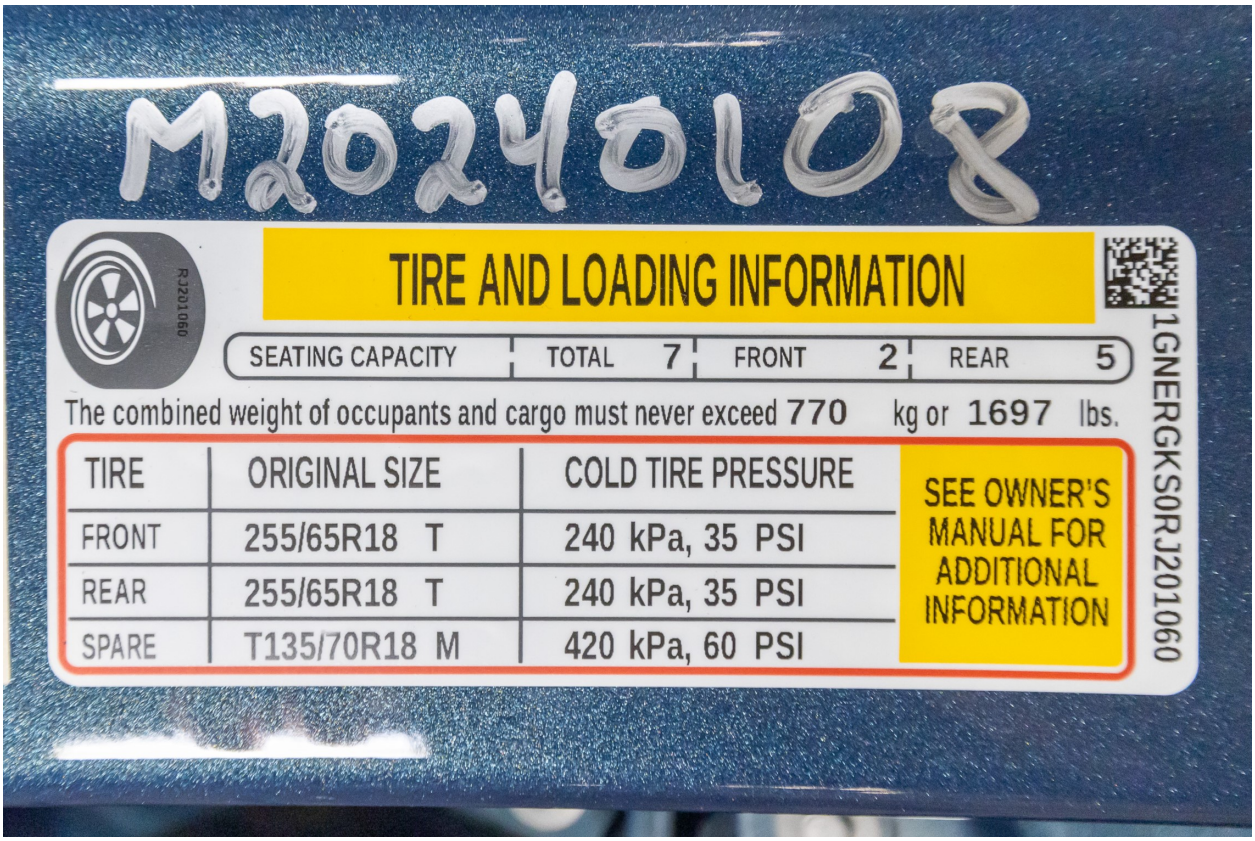

Figure A-93: Close-Up View of Vehicle's Tire Information Placard or Label

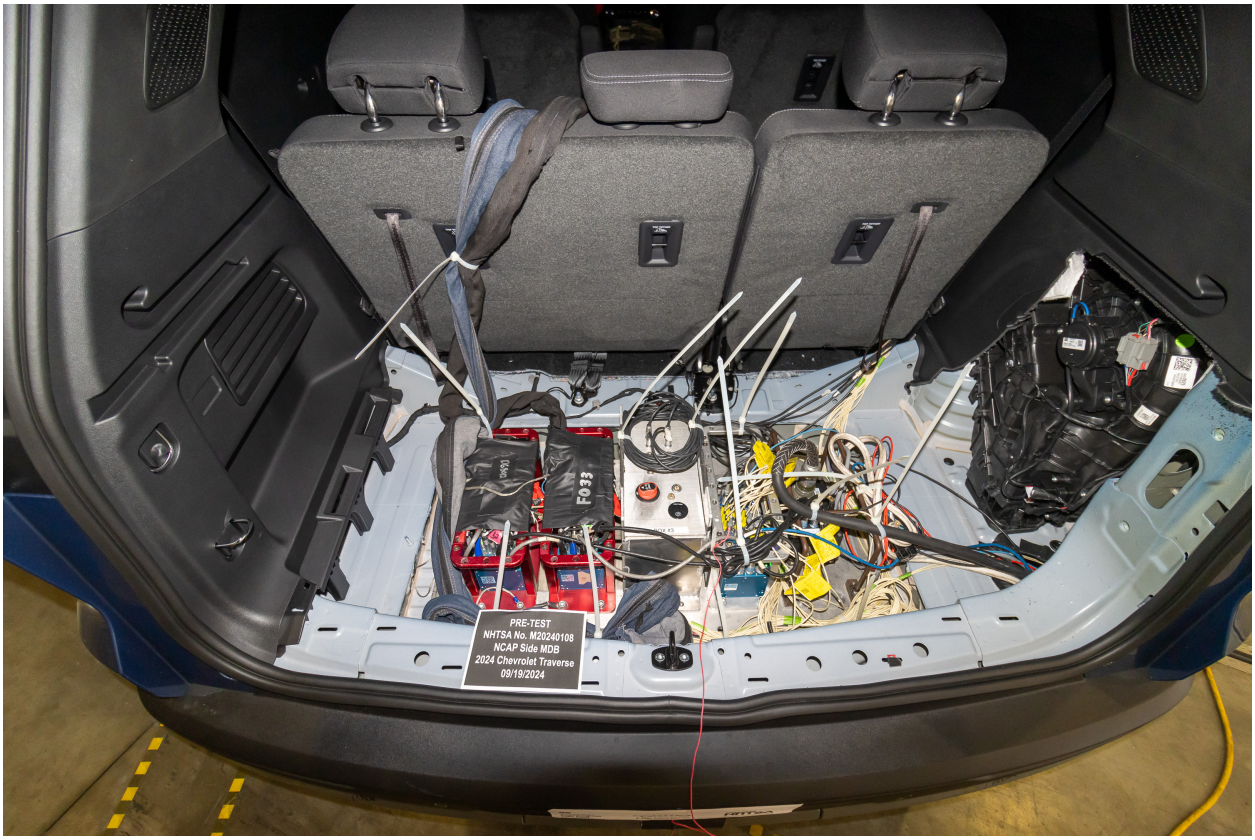

Figure A-94: Pre-Test Ballast View



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



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

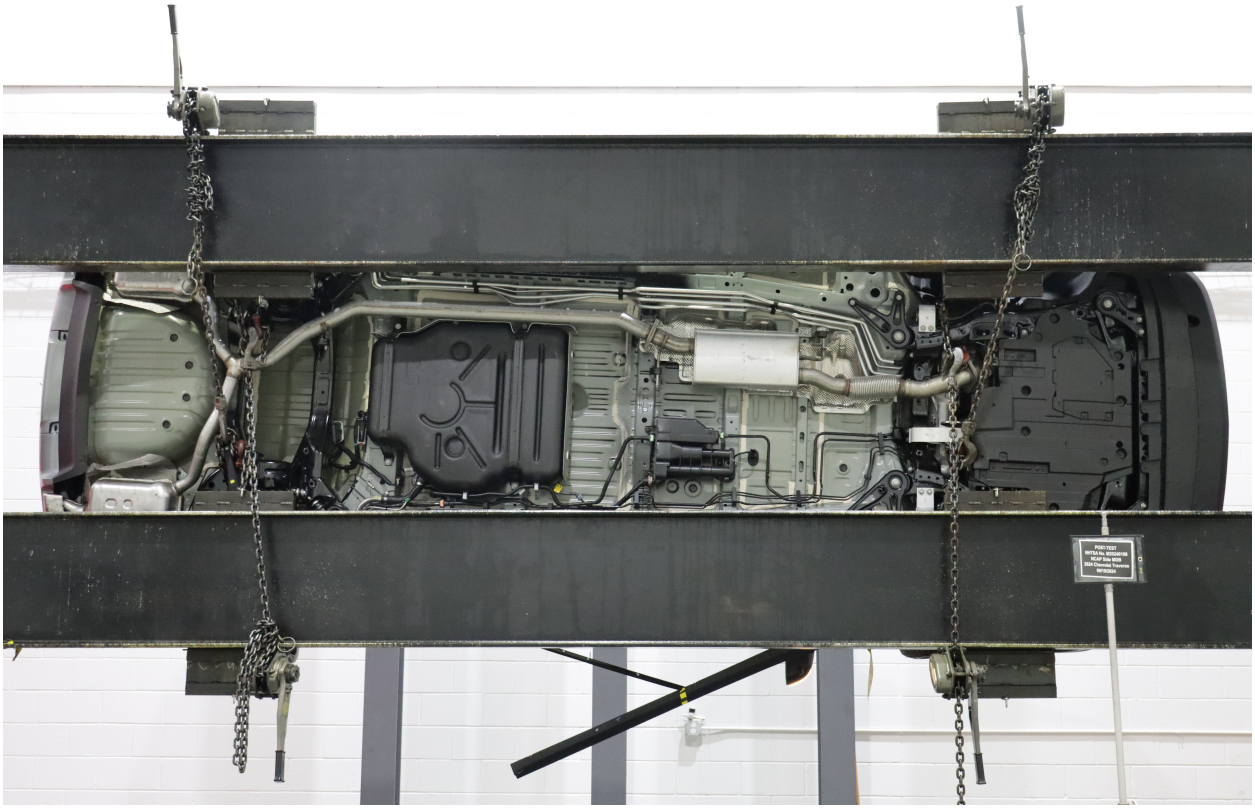

Figure A-97: FMVSS No. 301 Static Rollover 90 Degrees

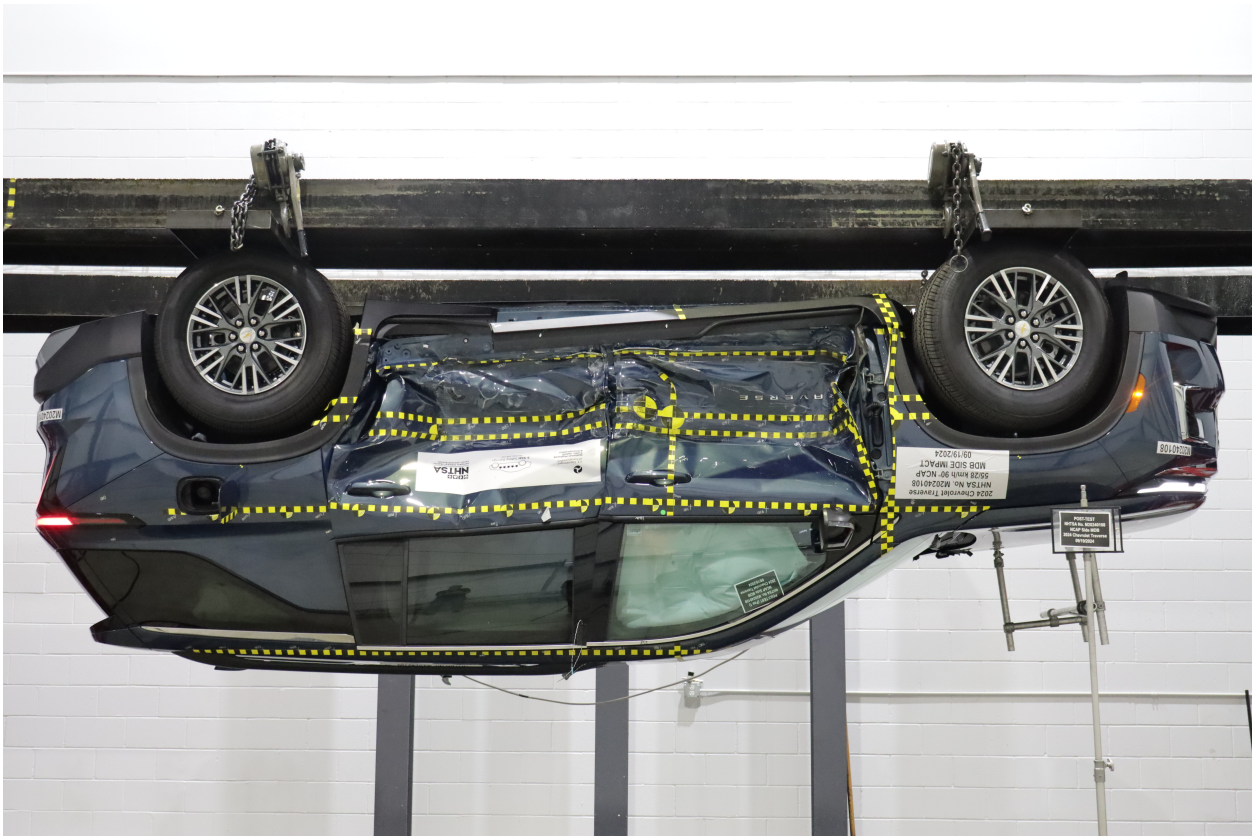

Figure A-98: FMVSS No. 301 Static Rollover 180 Degrees



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

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INTERIOR: JET BLACK CLOTH

ENGINE, 2.5L TURBO DOHC SIDI
TRANSMISSION, 8-SPEED AUTO

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- 5 YEAR/60,000 MILE* POWERTRAIN LIMITED WARRANTY, ROADSIDE ASSISTANCE & COURTESY TRANSPORTATION
- FIRST MAINTENANCE VISIT *WHICHEVER COMES FIRST SEE CHEVROLET.COM OR DEALER FOR TERMS, DETAILS & LIMITS

PERFORMANCE & MECHANICAL
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- AUTOSENSE POWER LIFTGATE
- 6 USB PORTS - TWO PER ROW
- DRIVER INFORMATION CENTER, 11" DIAGONAL DISPLAY

INTERIOR
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- SEAT ADJUSTER, DRIVER 8-WAY POWER
- WIRELESS PHONE CHARGING
- HEADREST, 3RD ROW CENTER

EXTERIOR
- ROOF RAILS, BLACK
- WHEELS, 18" GRAZEN METALLIC MACHINED-FACE ALUMINUM

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- REAR PARK ASSIST
- FOLLOWING DISTANCE INDICATOR
- FORWARD COLLISION ALERT
- LANE KEEP ASSIST WITH LANE DEPARTURE WARNING
- INTELLIBEAM

MANUFACTURER'S SUGGESTED RETAIL PRICE

STANDARD VEHICLE PRICE	**$40,000.00**

OPTIONS & PRICING

OPTIONS INSTALLED BY THE MANUFACTURER (MAY REPLACE STANDARD EQUIPMENT SHOWN)

TOTAL OPTIONS	$0.00
TOTAL VEHICLE & OPTIONS	$40,000.00
DESTINATION CHARGE	1,395.00
TOTAL VEHICLE PRICE*	**$41,395.00**

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

TRAVERSE FWD

Fuel Economy **23** MPG combined city/hwy — 20 city — 27 highway

4.3 gallons per 100 miles

Standard SUVs range from 11 to 100 MPG. The best vehicle rates 140 MPGe.

You spend **$2,000** more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost **$2,350**

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 5 (1 — 10 Best)

Smog Rating (tailpipe only): 6 (1 — 10 Best)

This vehicle emits 387 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs $9,750 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $3.60 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

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GOVERNMENT 5-STAR SAFETY RATINGS

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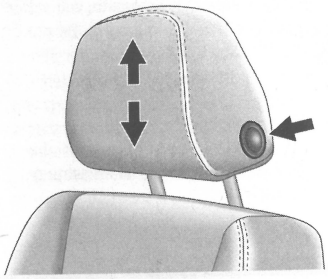
1GA3716900

Figure A-102: Monroney Label

Adjust the head restraint so that the top of the restraint is at the same height as the top of the occupant's head. This position reduces the chance of a neck injury in a crash.

The height of the head restraint can be adjusted.



To raise or lower the head restraint, press the button located on the side of the head restraint, and pull up or push the head restraint down, and release the button. Pull and push on the head restraint after the button is released to make sure that it is locked in place.

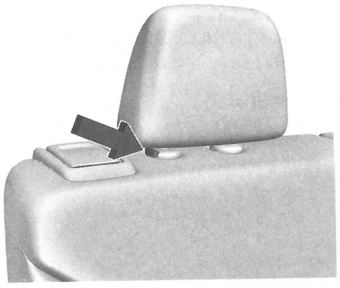
The front seat outboard head restraints are not removable.

Rear Seats

Second Row Seats

The vehicle's rear second row seats have adjustable head restraints in the outboard and center seating positions.

The height of the head restraint can be adjusted. Pull the head restraint up to raise it. Try to move the head restraint to make sure that it is locked in place.



Outboard Shown, Center Similar

To lower the head restraint, press the button, located on the top of the seatback, and push the head restraint down. Try to move the head restraint after the button is released to make sure that it is locked in place.

Always adjust the head restraint so that the top of the restraint is at the same height as the top of the occupant's head.

The rear second row outboard head restraints are not removable.

Third Row Seats

The vehicle's rear third row seats have head restraints in the outboard seating positions that cannot be adjusted up or down.

The rear third row outboard head restraints are not removable.

The rear third row outboard head restraints are designed to be folded.

The head restraint can be folded to allow for better visibility when the rear seat is unoccupied.

When folding the seatback down, the head restraint will automatically fold out of the way as the seat is folded down.

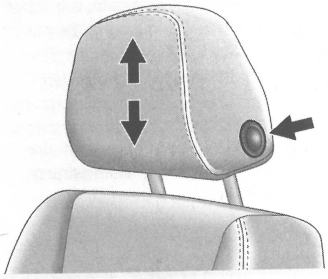
Return the lowered head restraint to the upright position until it locks into place. Push and pull on the head restraint to make sure it is locked.

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

12 Seats and Restraints

Adjust the head restraint so that the top of the restraint is at the same height as the top of the occupant's head. This position reduces the chance of a neck injury in a crash.

The height of the head restraint can be adjusted.



To raise or lower the head restraint, press the button located on the side of the head restraint, and pull up or push the head restraint down, and release the button. Pull and push on the head restraint after the button is released to make sure that it is locked in place.

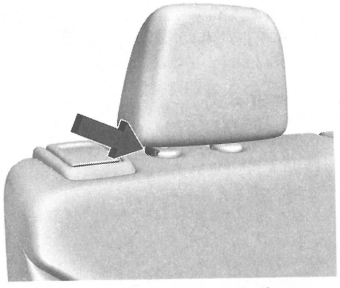
The front seat outboard head restraints are not removable.

Rear Seats

Second Row Seats

The vehicle's rear second row seats have adjustable head restraints in the outboard and center seating positions.

The height of the head restraint can be adjusted. Pull the head restraint up to raise it. Try to move the head restraint to make sure that it is locked in place.



Outboard Shown, Center Similar

To lower the head restraint, press the button, located on the top of the seatback, and push the head restraint down. Try to move the head restraint after the button is released to make sure that it is locked in place.

Always adjust the head restraint so that the top of the restraint is at the same height as the top of the occupant's head.

The rear second row outboard head restraints are not removable.

Third Row Seats

The vehicle's rear third row seats have head restraints in the outboard seating positions that cannot be adjusted up or down.

The rear third row outboard head restraints are not removable.

The rear third row outboard head restraints are designed to be folded.

The head restraint can be folded to allow for better visibility when the rear seat is unoccupied.

When folding the seatback down, the head restraint will automatically fold out of the way as the seat is folded down.

Return the lowered head restraint to the upright position until it locks into place. Push and pull on the head restraint to make sure it is locked.

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

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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)

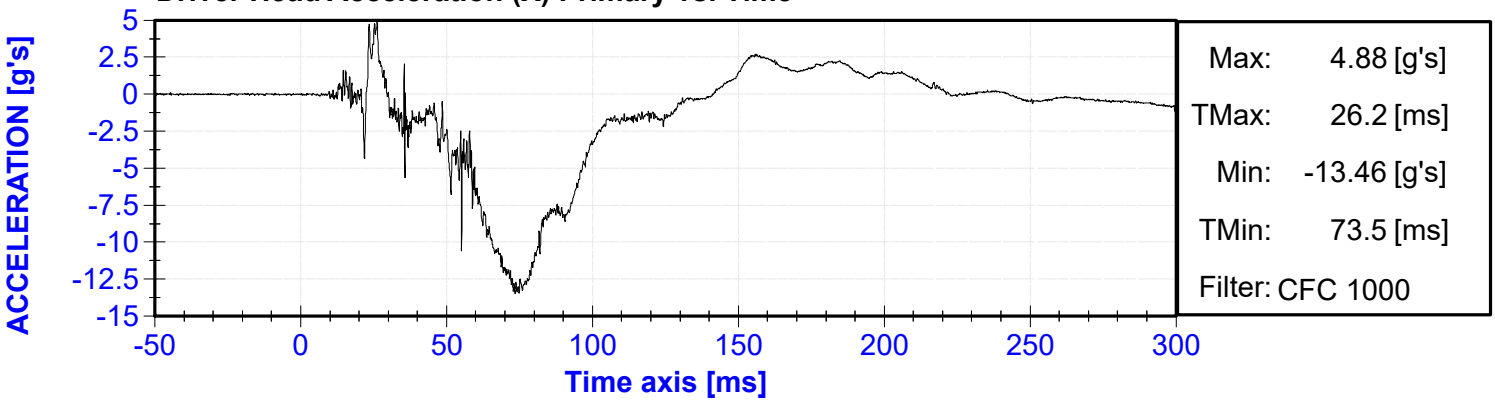
Vehicle Instrumentation Data

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)

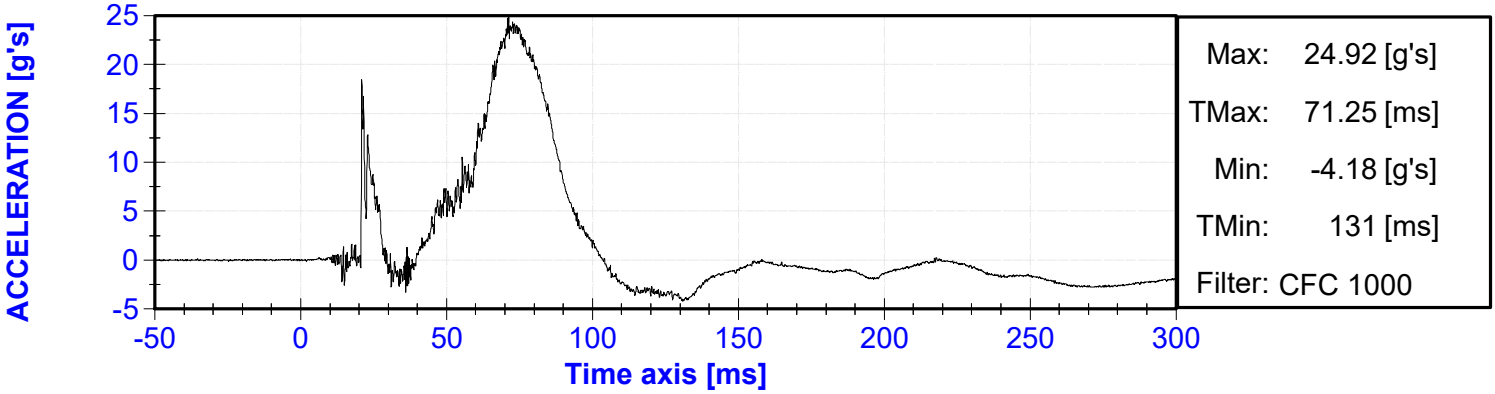
MDB Instrumentation Data

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

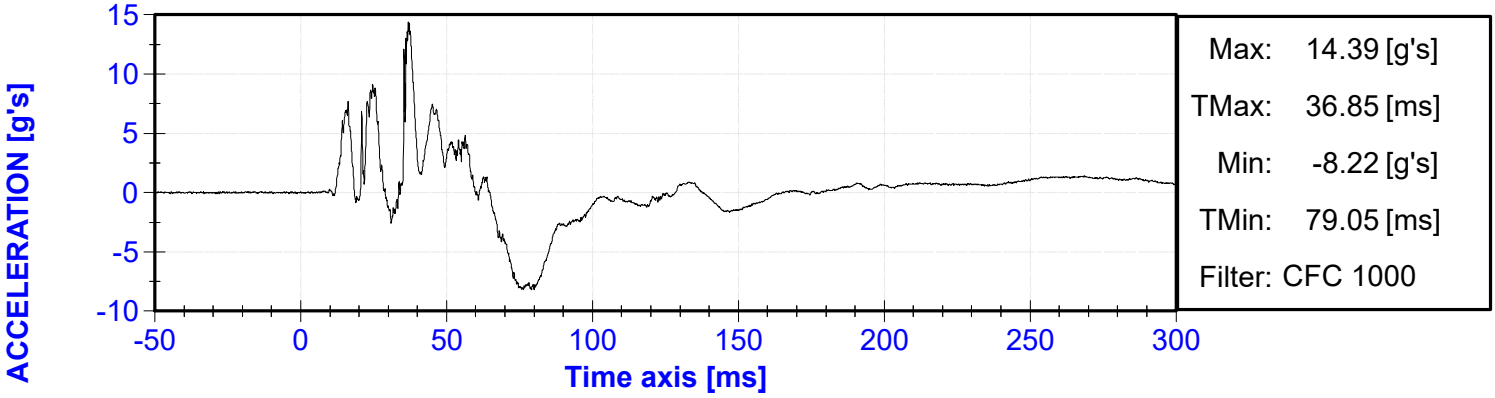
Driver Head Acceleration (X) Primary vs. Time



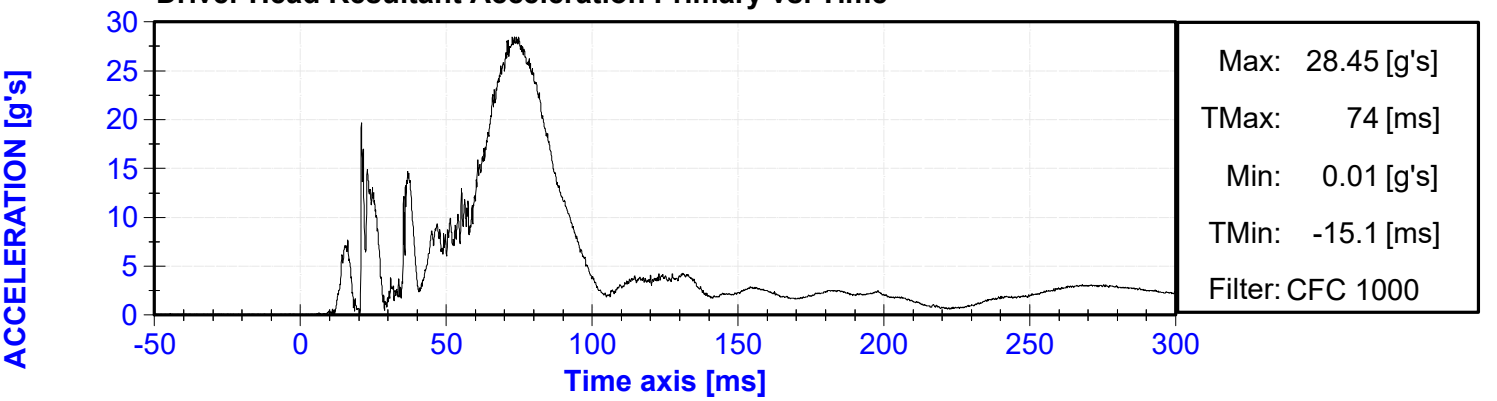
Driver Head Acceleration (Y) Primary vs. Time



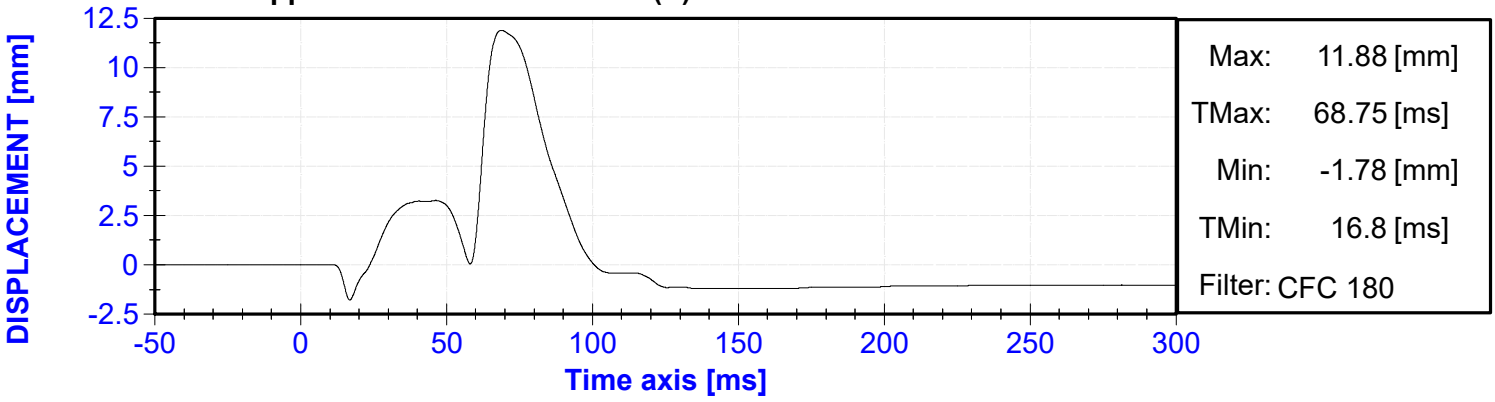
Driver Head Acceleration (Z) Primary vs. Time



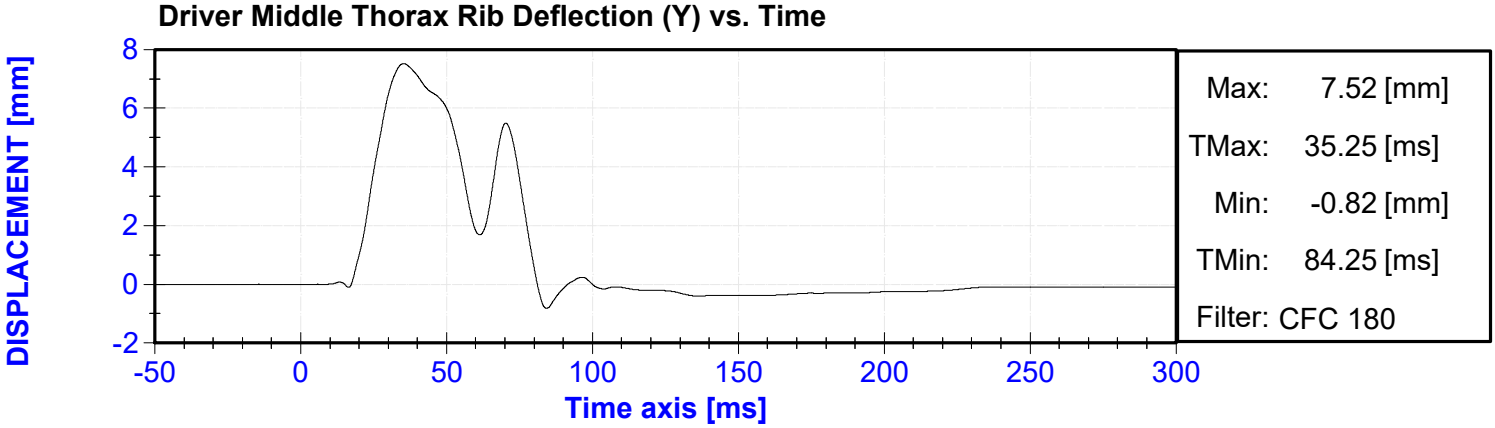
Driver Head Resultant Acceleration Primary vs. Time



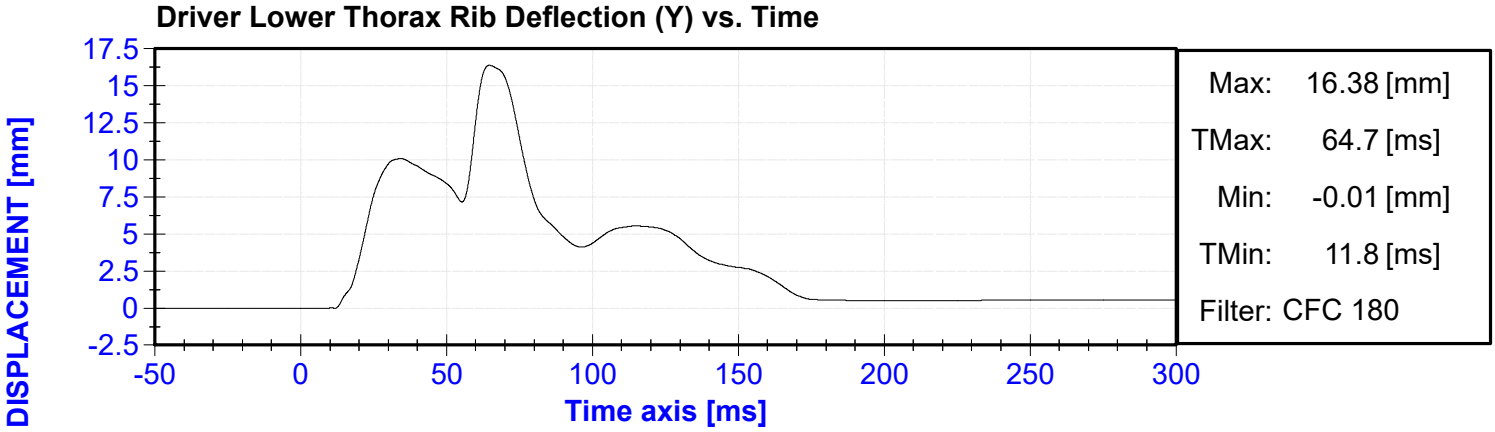
Driver Upper Thorax Rib Deflection (Y) vs. Time



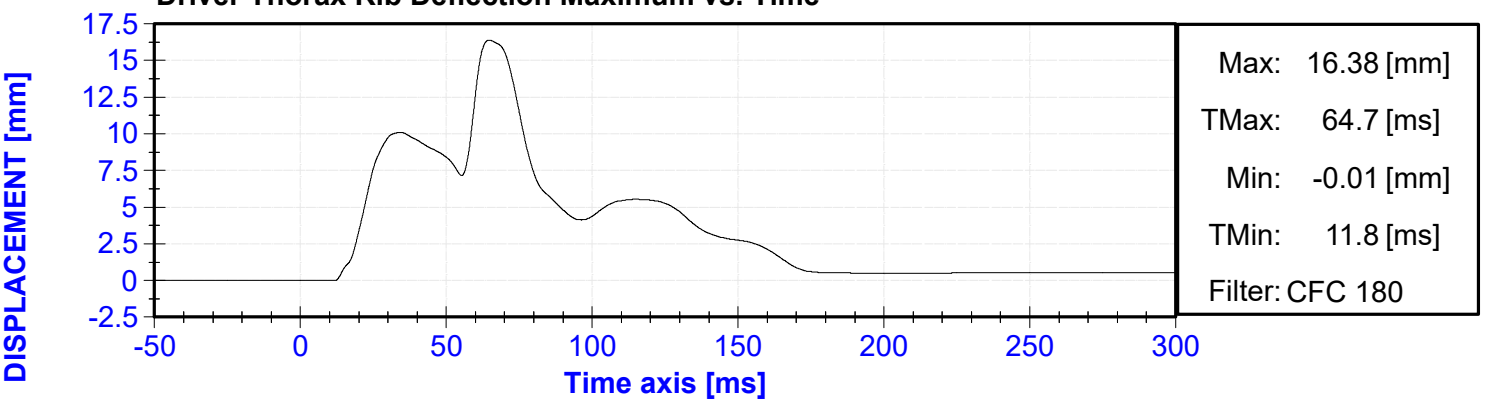
Driver Middle Thorax Rib Deflection (Y) vs. Time



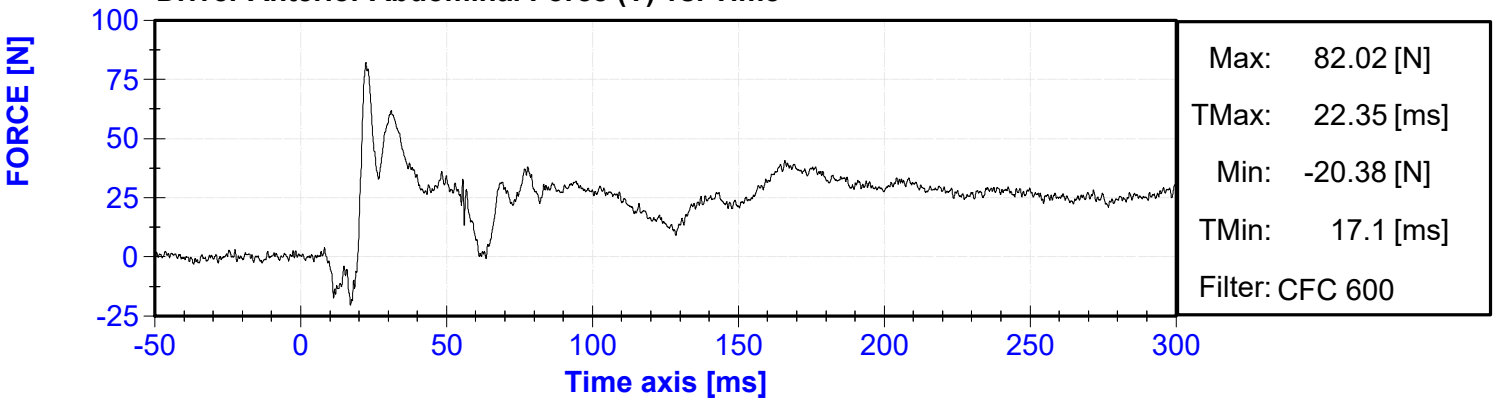
Driver Lower Thorax Rib Deflection (Y) vs. Time



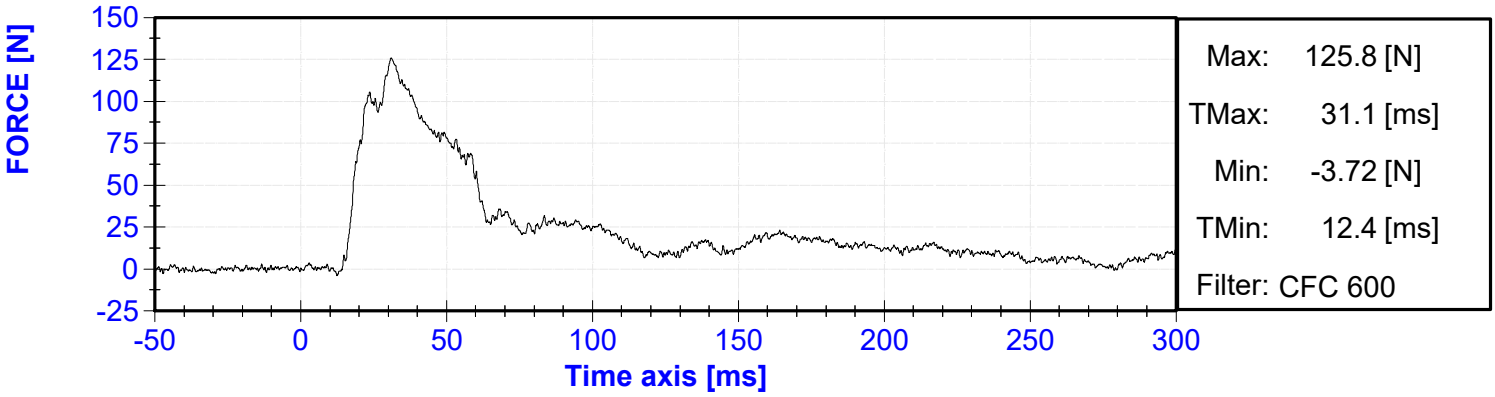
Driver Thorax Rib Deflection Maximum vs. Time



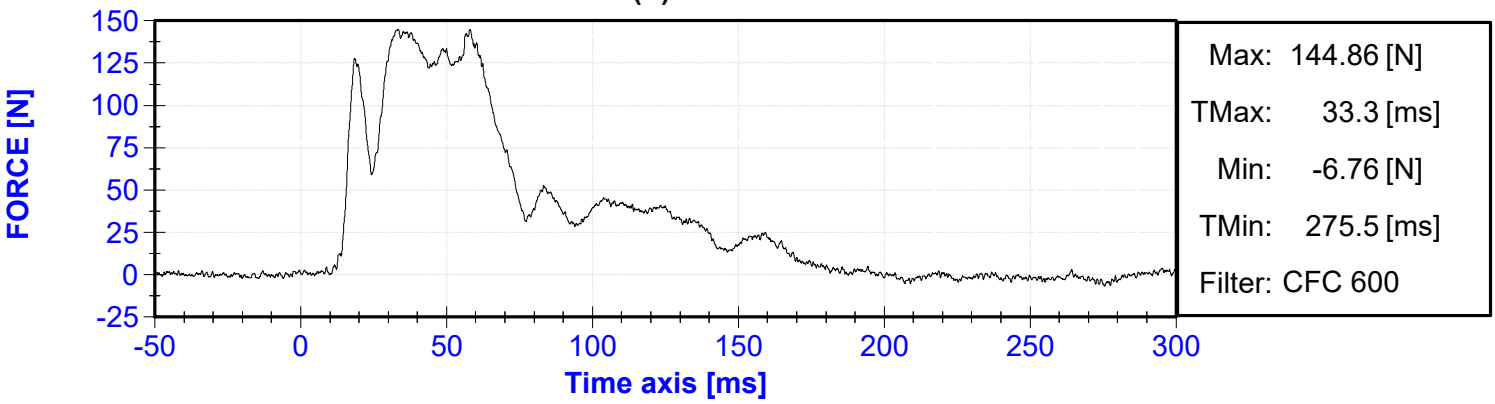
Driver Anterior Abdominal Force (Y) vs. Time



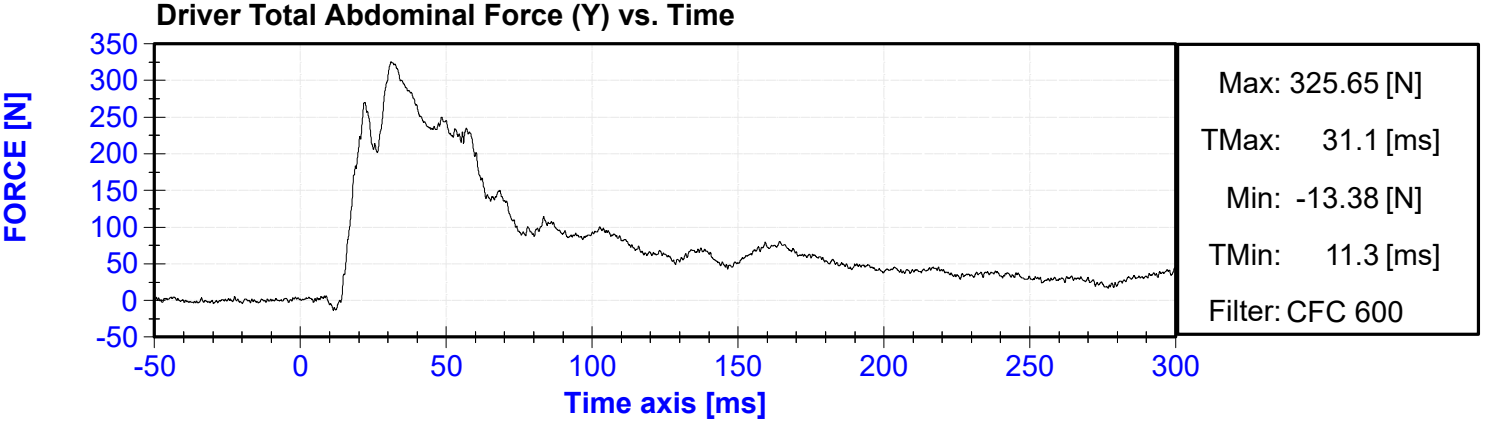
Driver Middle Abdominal Force (Y) vs. Time



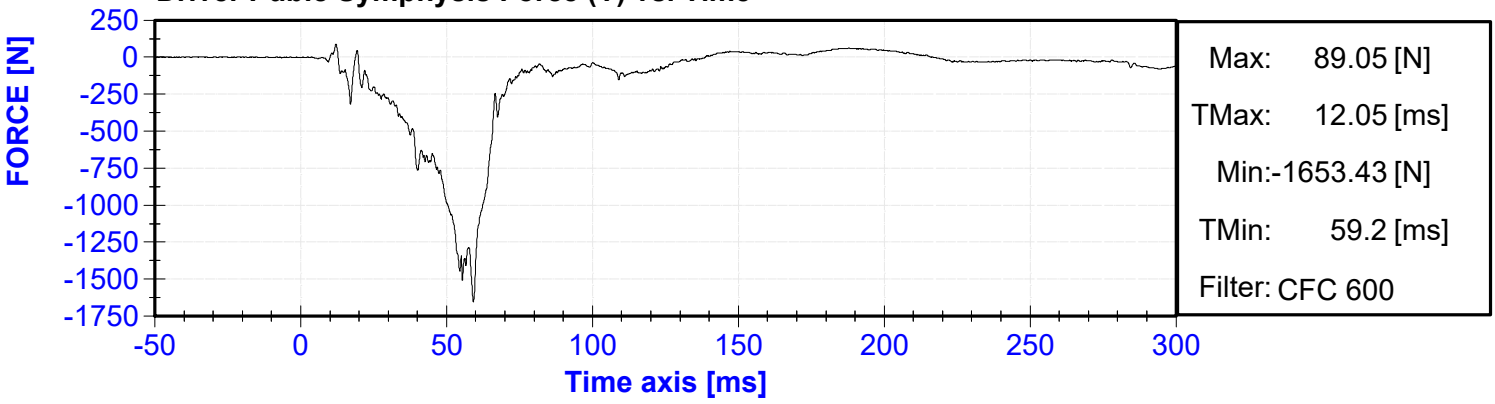
Driver Posterior Abdominal Force (Y) vs. Time



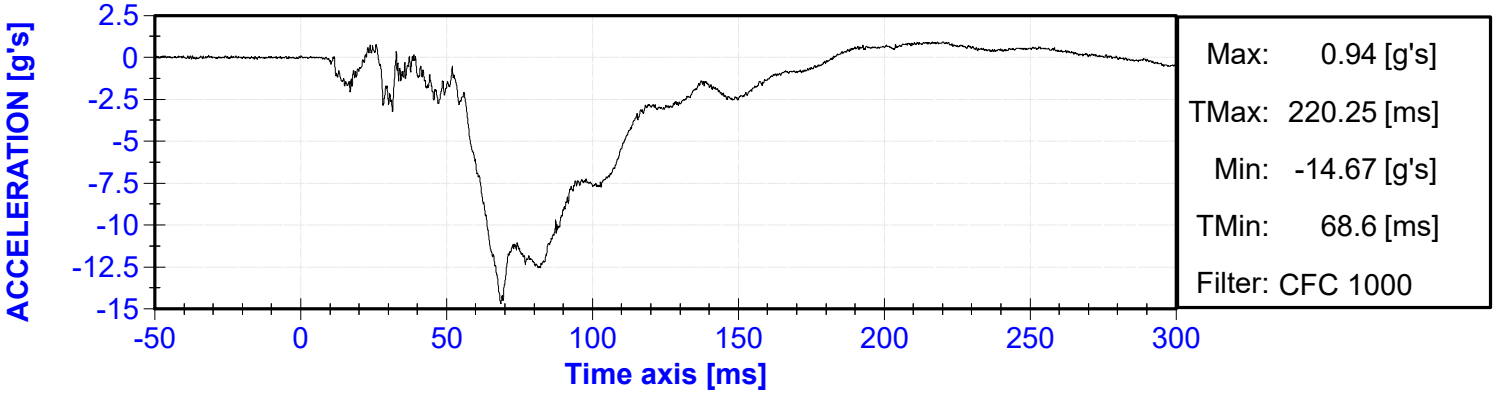
Driver Total Abdominal Force (Y) vs. Time



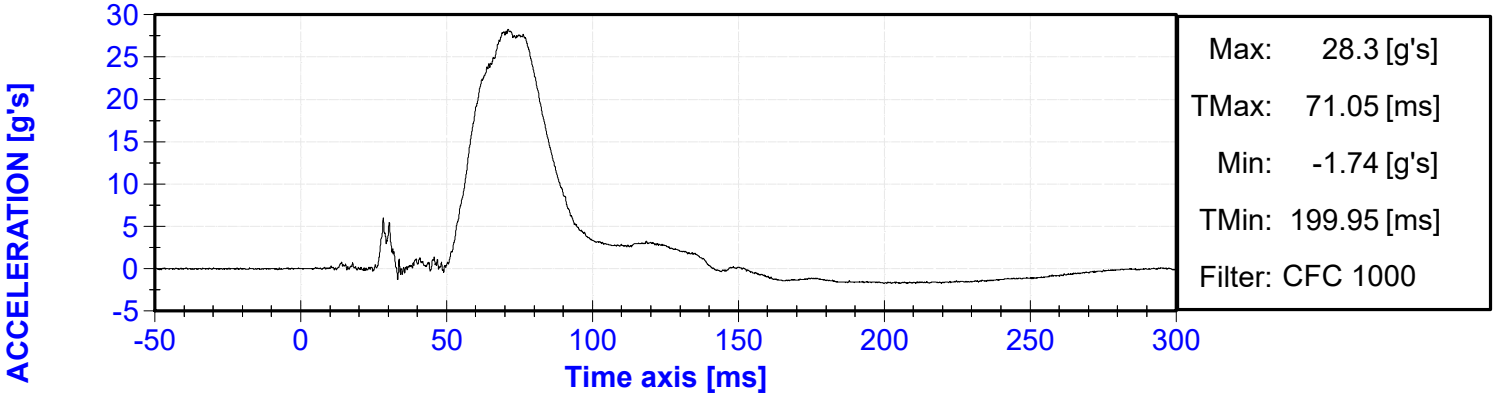
Driver Pubic Symphysis Force (Y) vs. Time



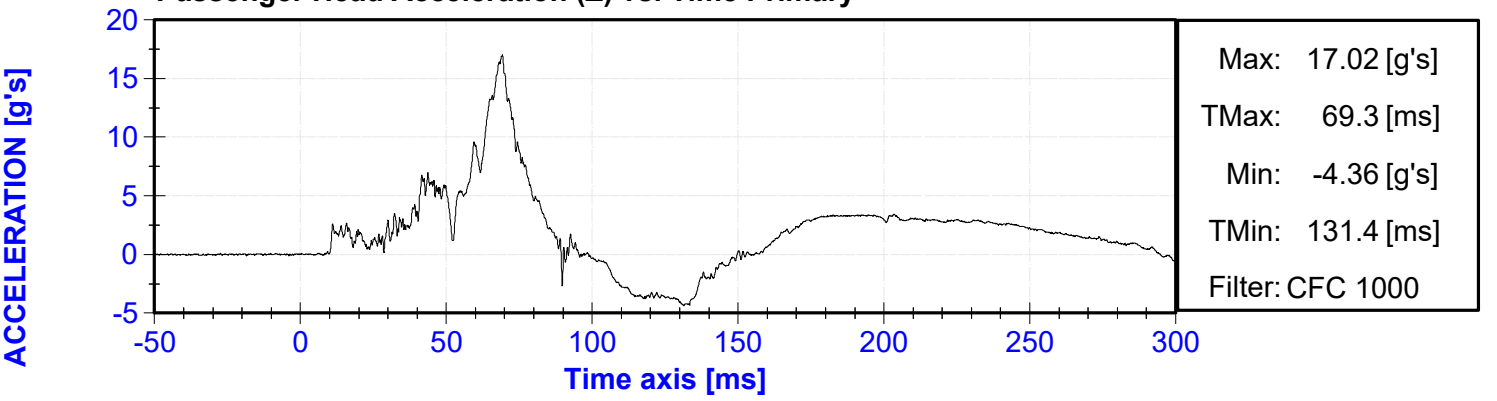
Passenger Head Acceleration (X) vs. Time Primary



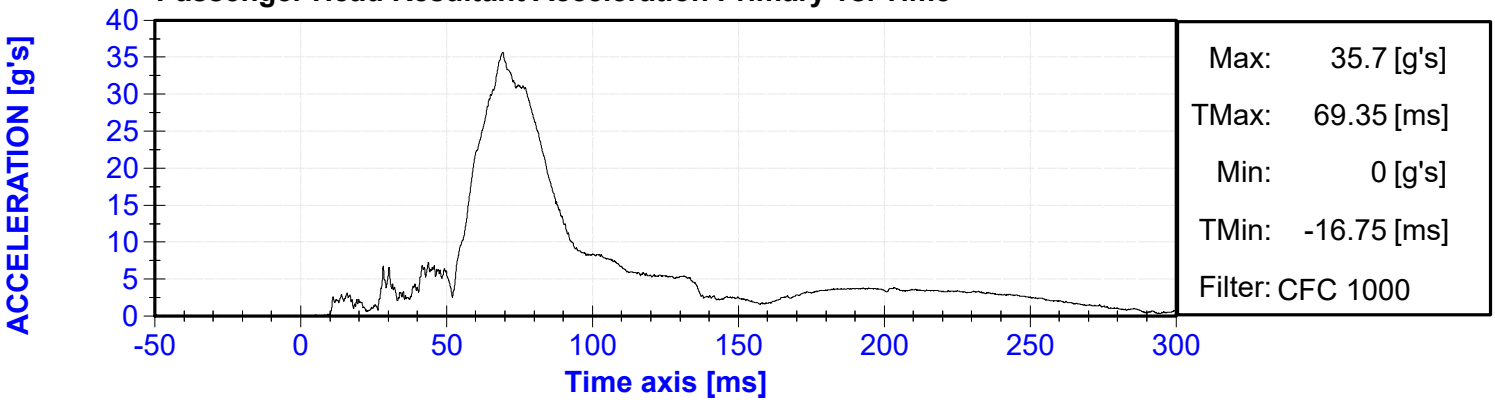
Passenger Head Acceleration (Y) vs. Time Primary



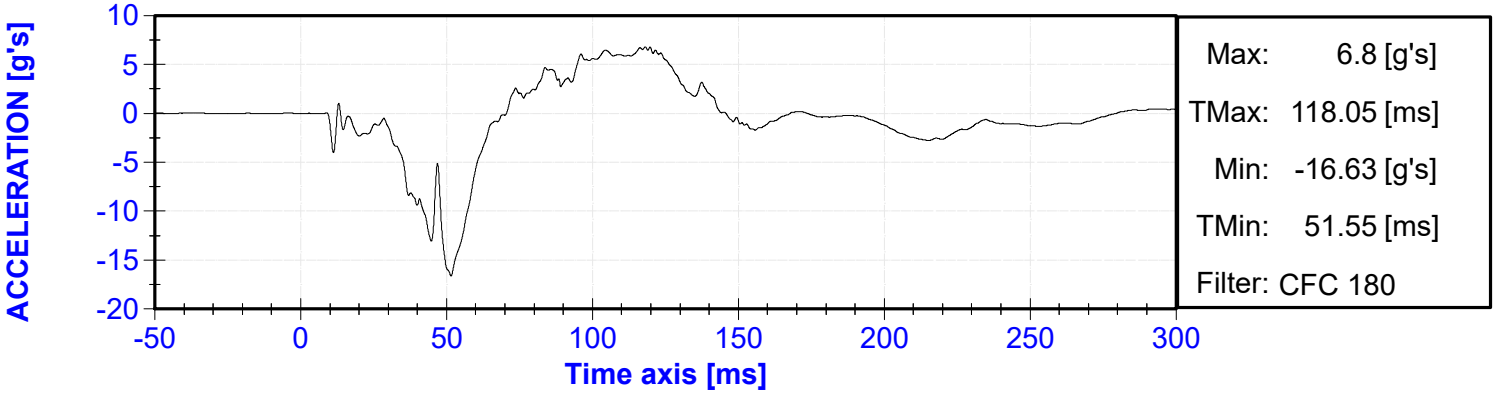
Passenger Head Acceleration (Z) vs. Time Primary



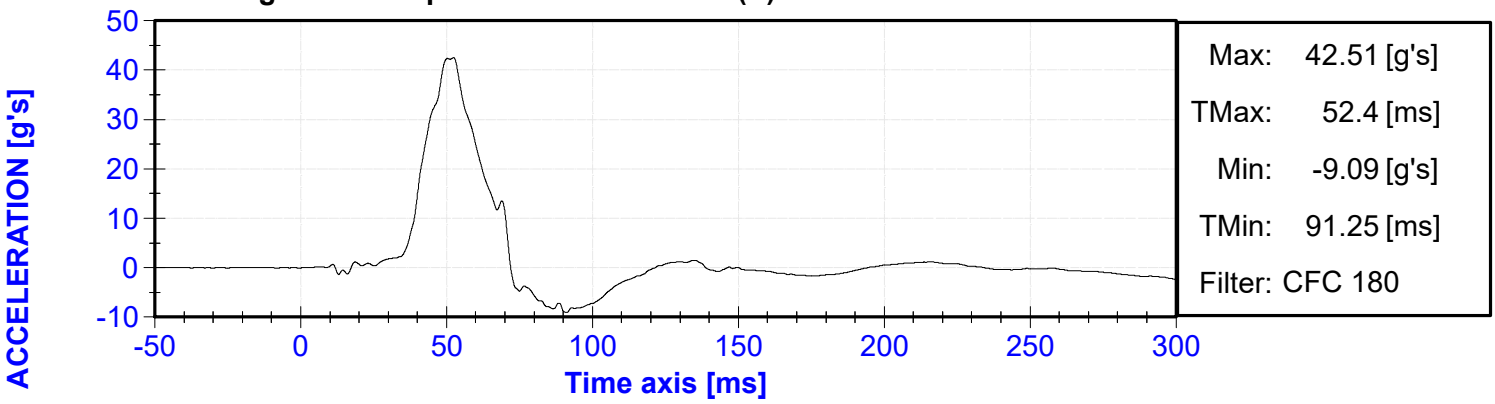
Passenger Head Resultant Acceleration Primary vs. Time



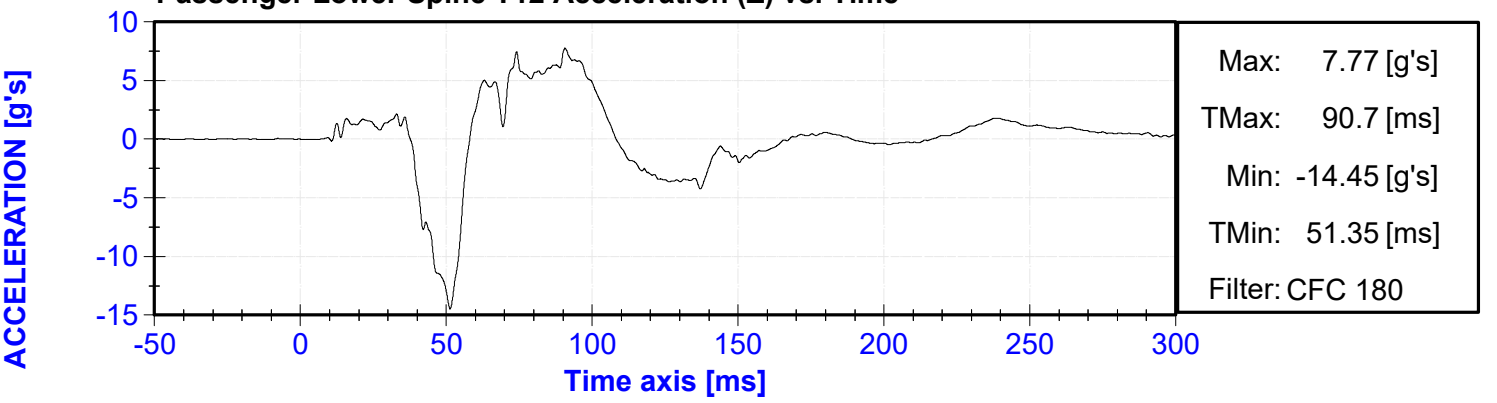
Passenger Lower Spine T12 Acceleration (X) vs. Time



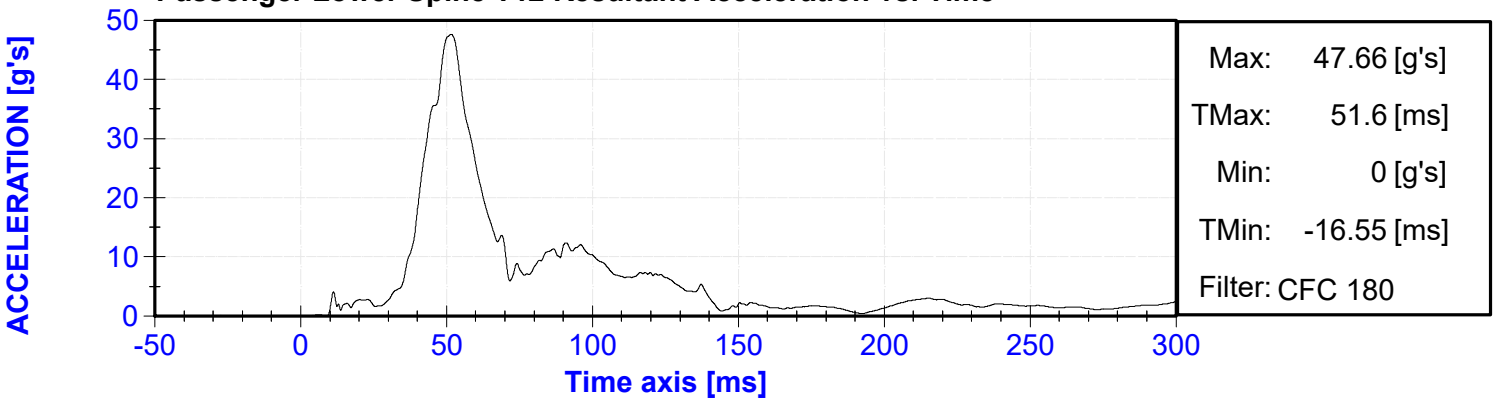
Passenger Lower Spine T12 Acceleration (Y) vs. Time



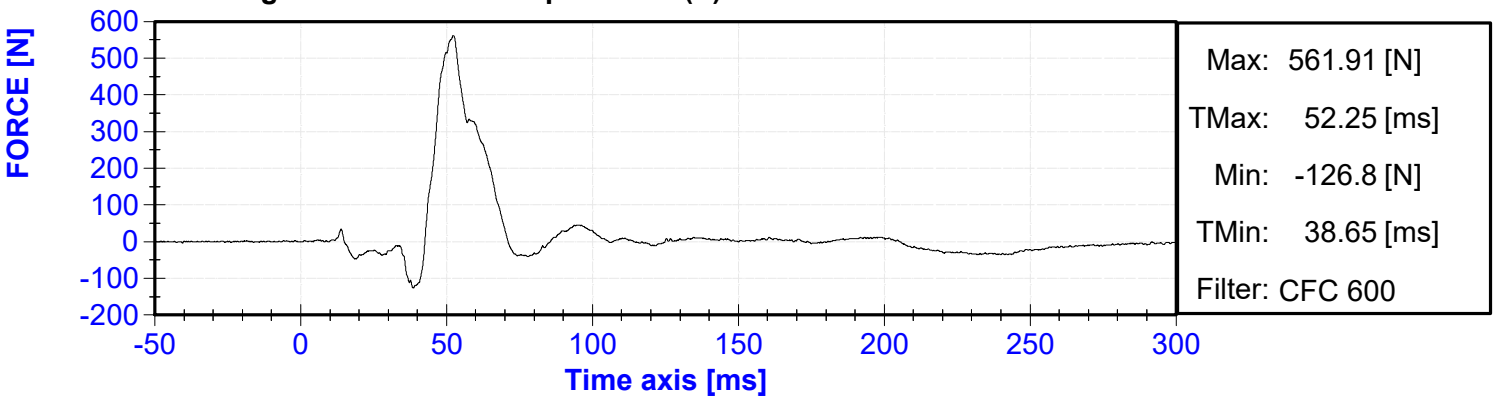
Passenger Lower Spine T12 Acceleration (Z) vs. Time



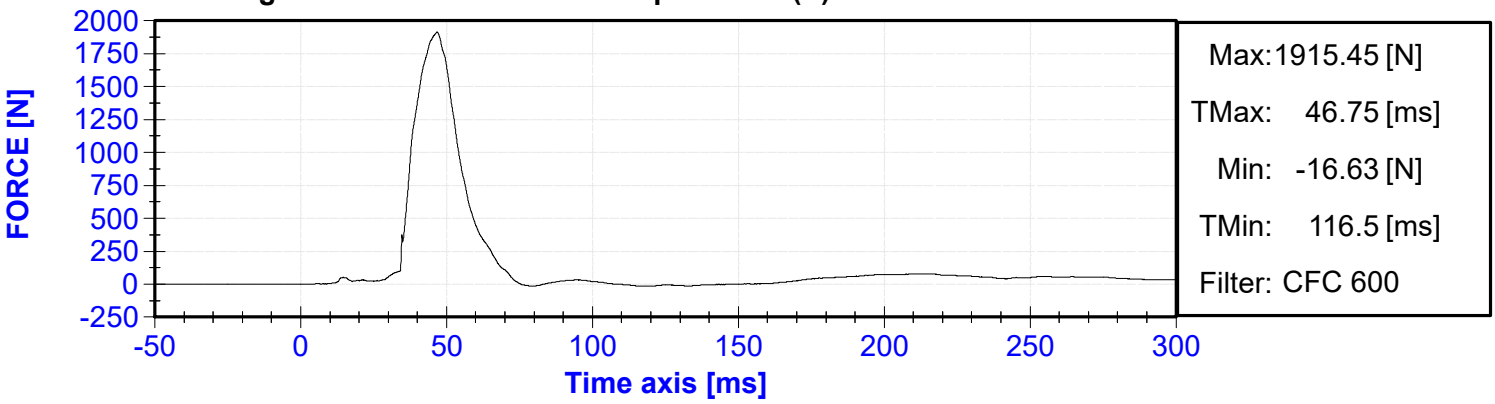
Passenger Lower Spine T12 Resultant Acceleration vs. Time



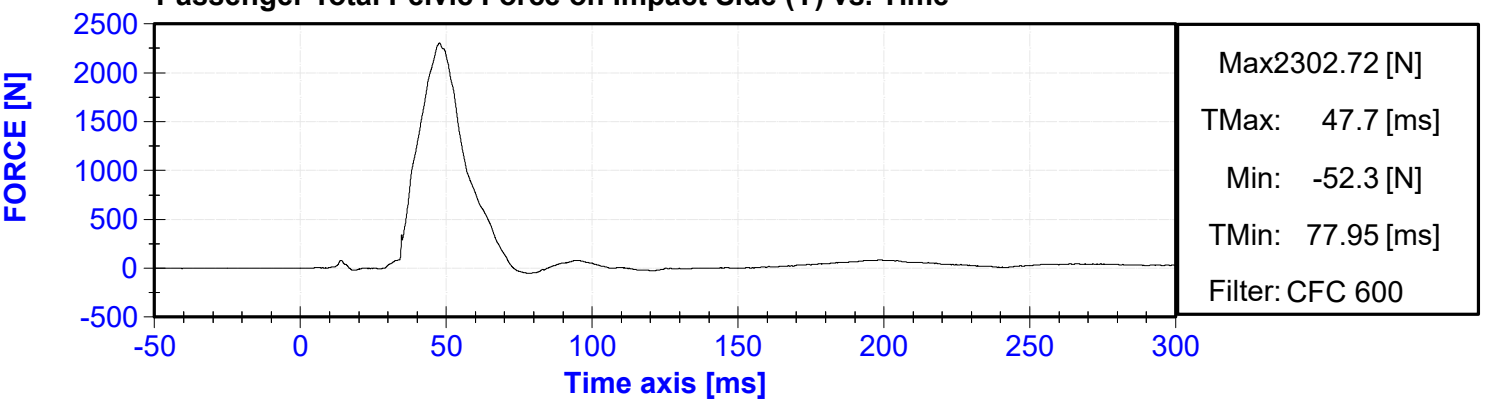
Passenger Iliac Force on Impact Side (Y) vs. Time



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

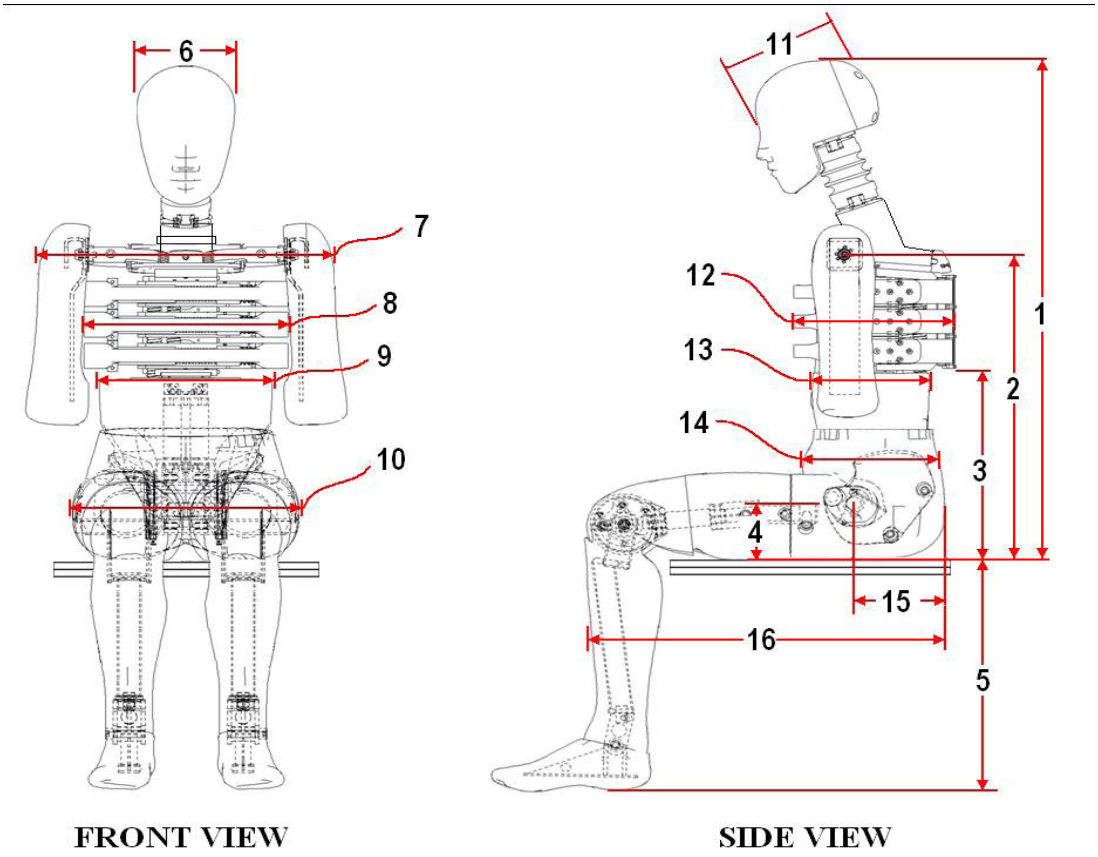
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - EuroSID-2re

Technician: J. Rios Date: 9/13/2024

Dummy Serial Number: F033



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	909	Pass
2	Seat to Shoulder Joint	558	572	562	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	353	Pass
4	Seat to Hip Joint (center of bolt)	97	103	99	Pass
5	Sole to Seat, Sitting	333	451	415	Pass
6	Head Width	152	158	156	Pass
7	Shoulder/Arm Width	461	479	470	Pass
8	Thorax Width	322	332	328	Pass
9	Abdomen Width	273	287	282	Pass
10	Pelvis Lap Width	359	373	366	Pass
11	Head Depth	196	206	203	Pass
12	Thorax Depth	262	272	267	Pass
13	Abdomen Depth	194	204	200	Pass
14	Pelvis Depth	235	245	240	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	154	Pass
16	Back of Buttocks to Front Knee	597	615	608	Pass

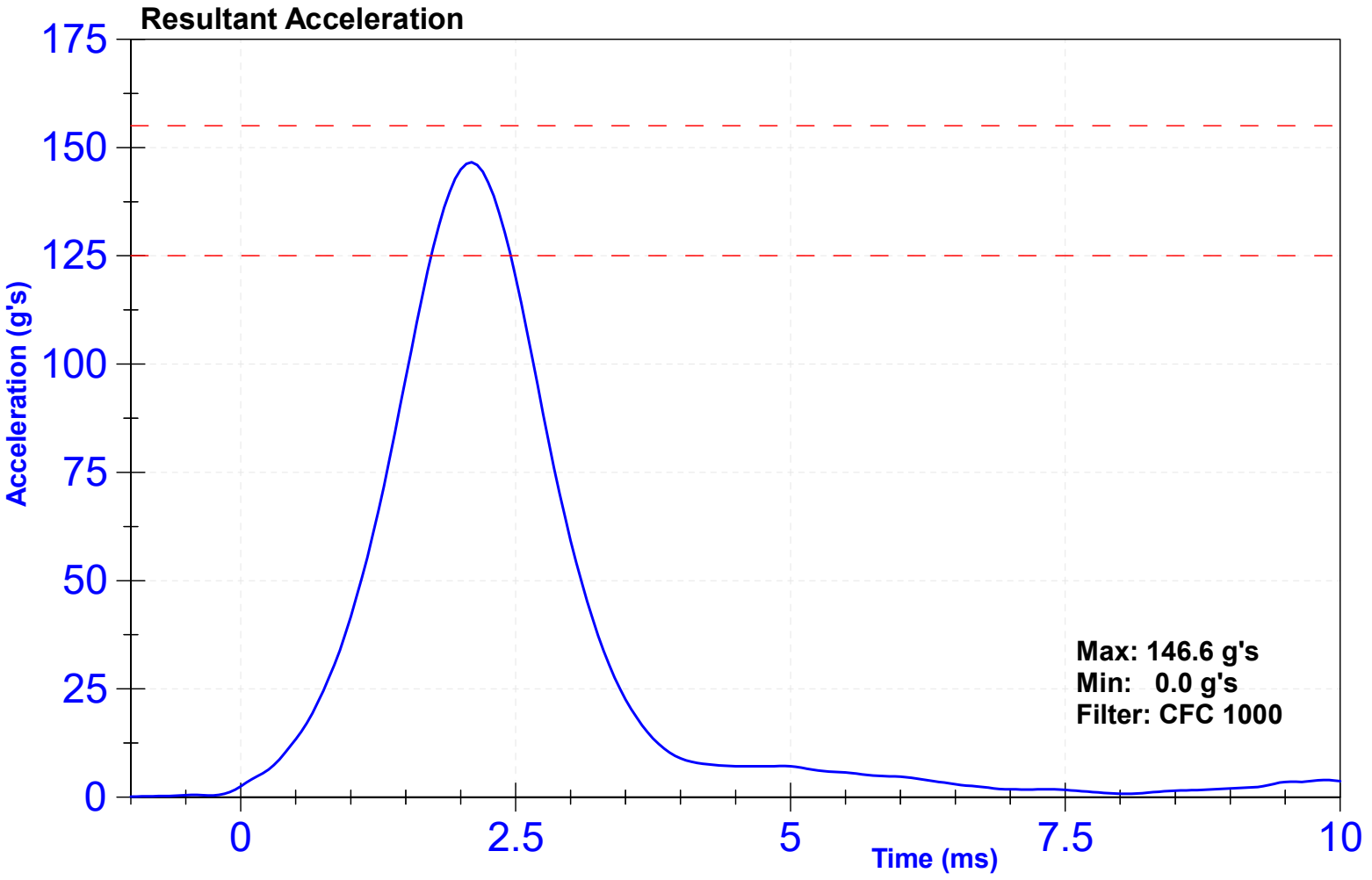
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

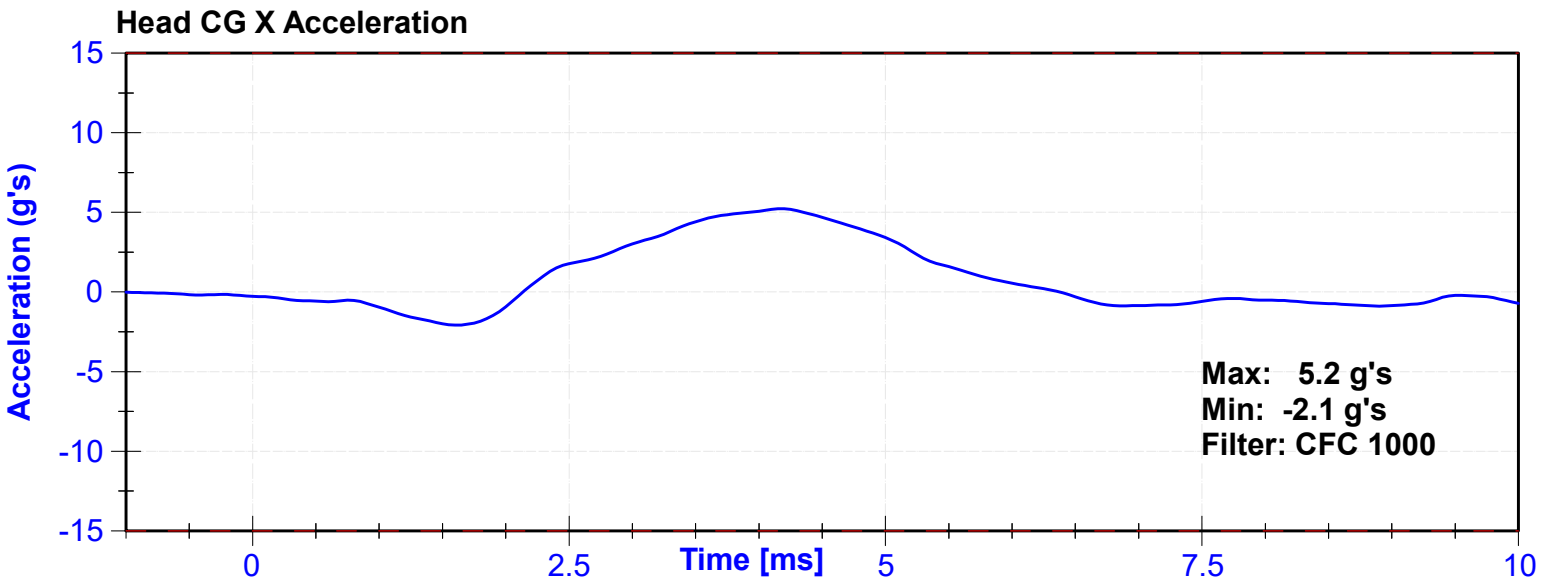
Results

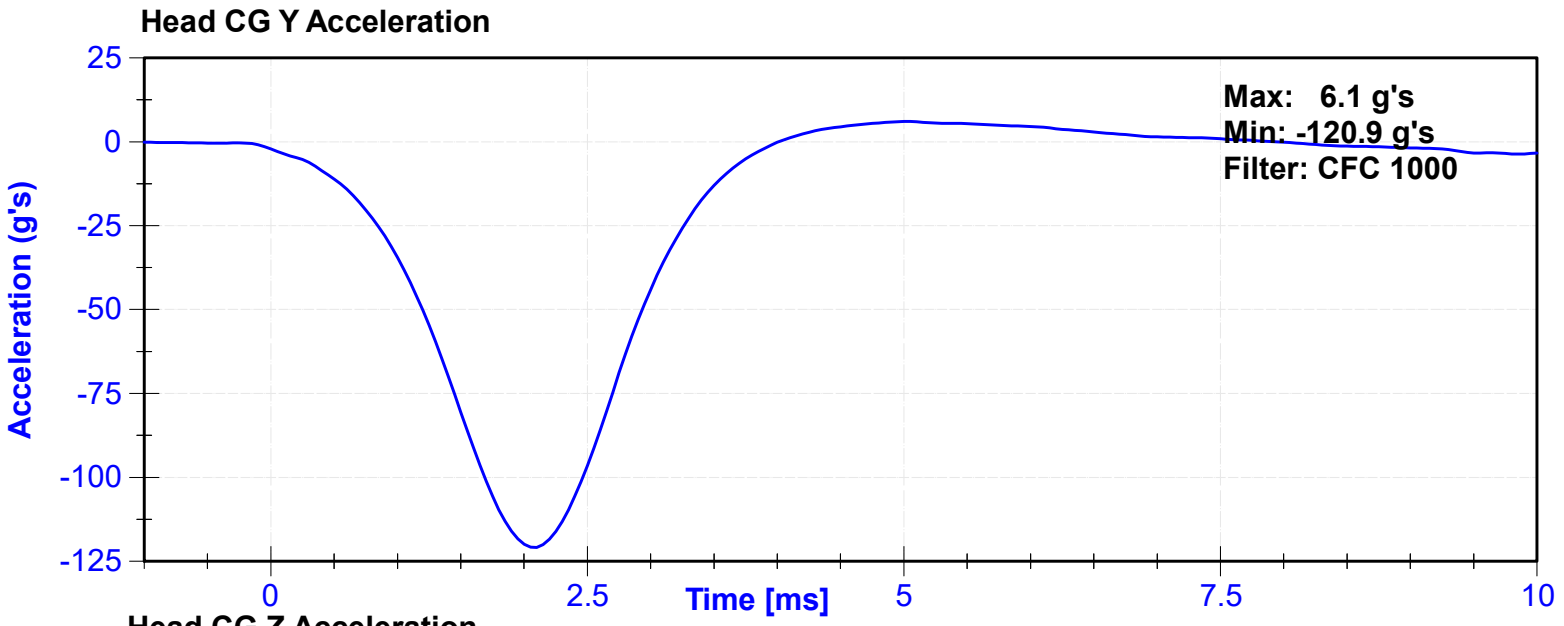
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	50	Pass
Resultant Acceleration	125	155	g's	146.6	Pass
Oscillation	0	15	%	4.89	Pass
Fore-Aft Acceleration	-15	15	g's	5.2	Pass

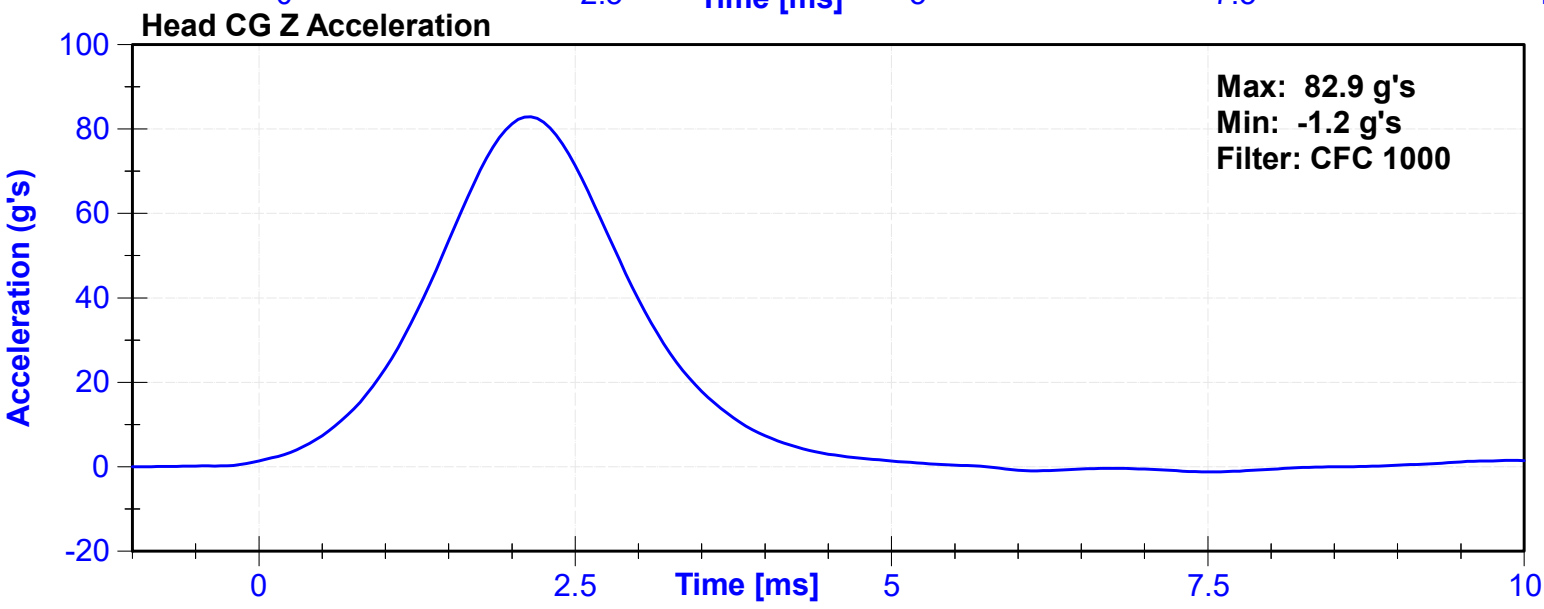
Transducer Calibrations

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




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
Time [ms]
5
7.5
10
Max: 5.2 g's
Min: -2.1 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
25
0
-25
-50
-75
-100
-125
0
2.5
Time [ms]
5
7.5
10
Max: 6.1 g's
Min: -120.9 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
Time [ms]
5
7.5
10
Max: 82.9 g's
Min: -1.2 g's
Filter: CFC 1000

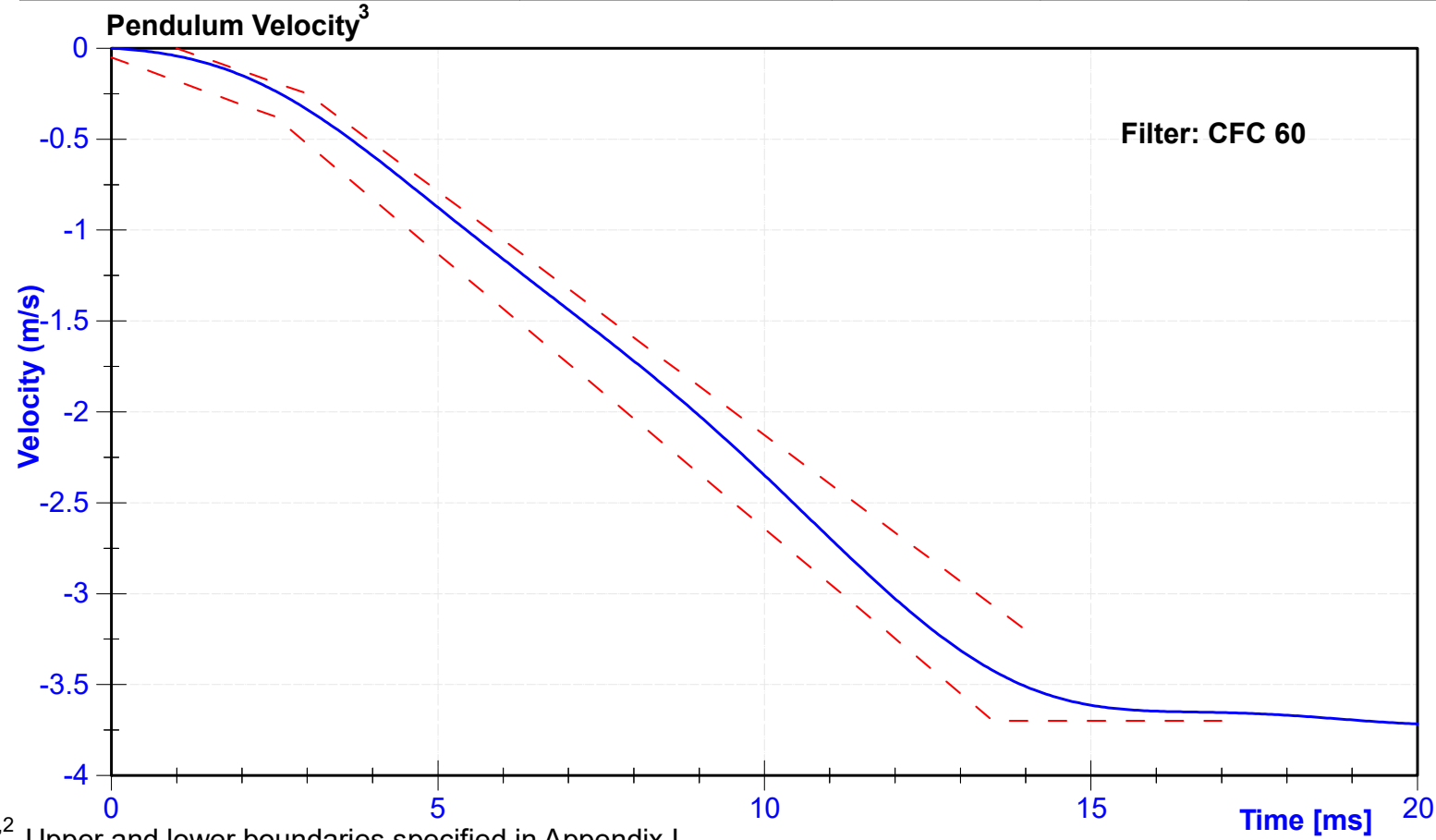
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

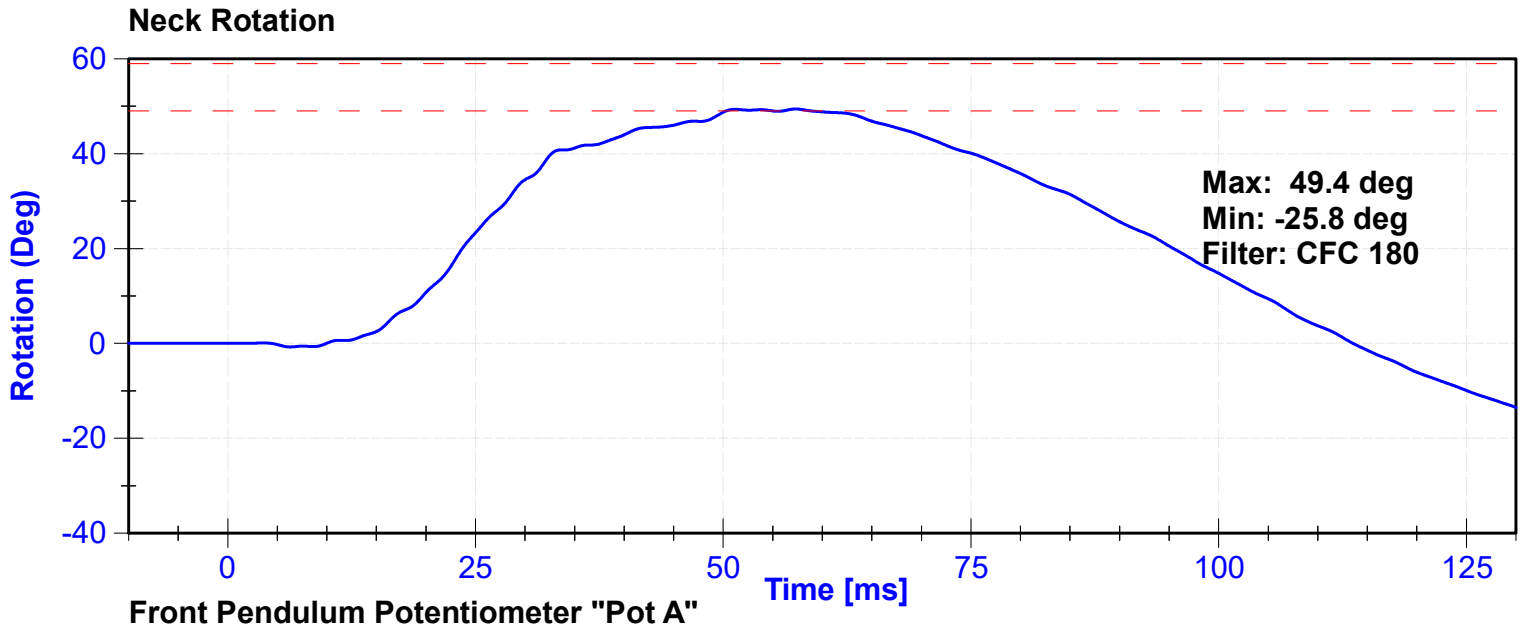
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	50	Pass
Velocity	3.3	3.5	m/s	3.42	Pass
Lateral Neck Rotation	49	59	deg	49.4	Pass
Time at Maximum Rotation	54	66	ms	57.3	Pass
Time of Rotation Decay from Maximum	53	88	ms	56.2	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

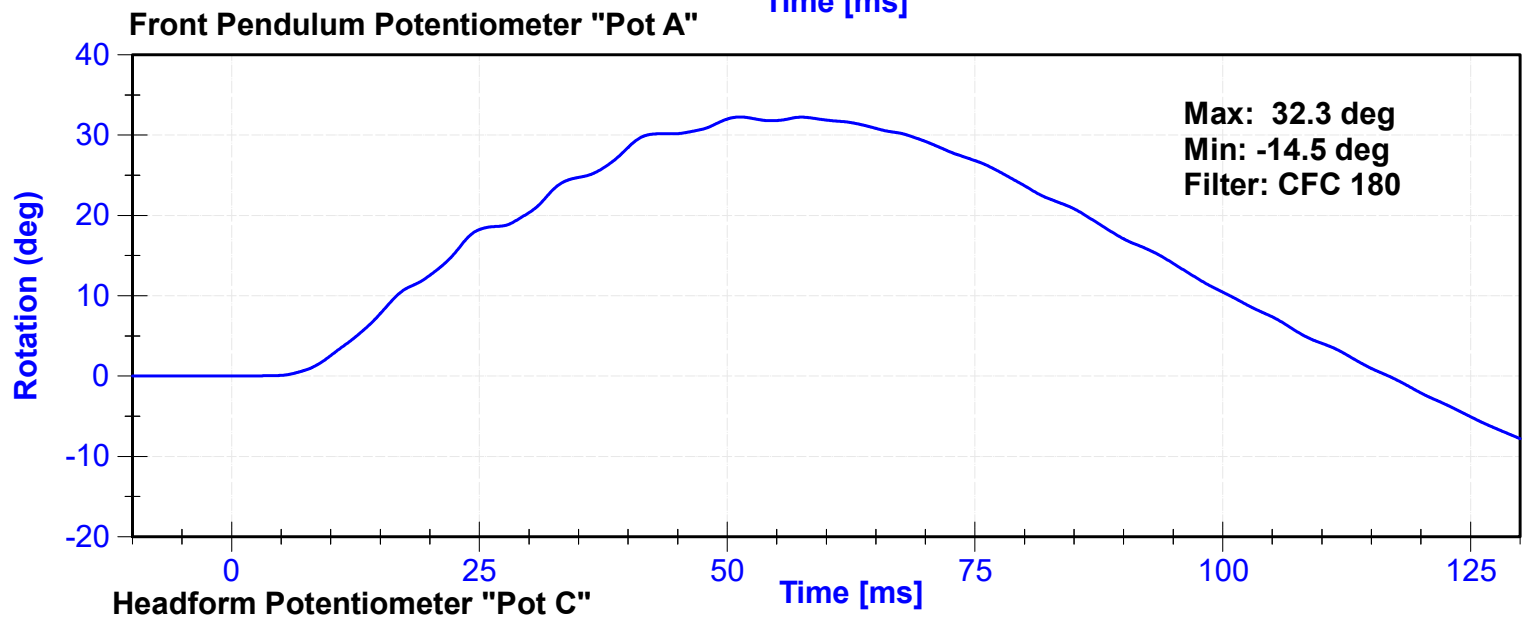
Transducer Calibrations

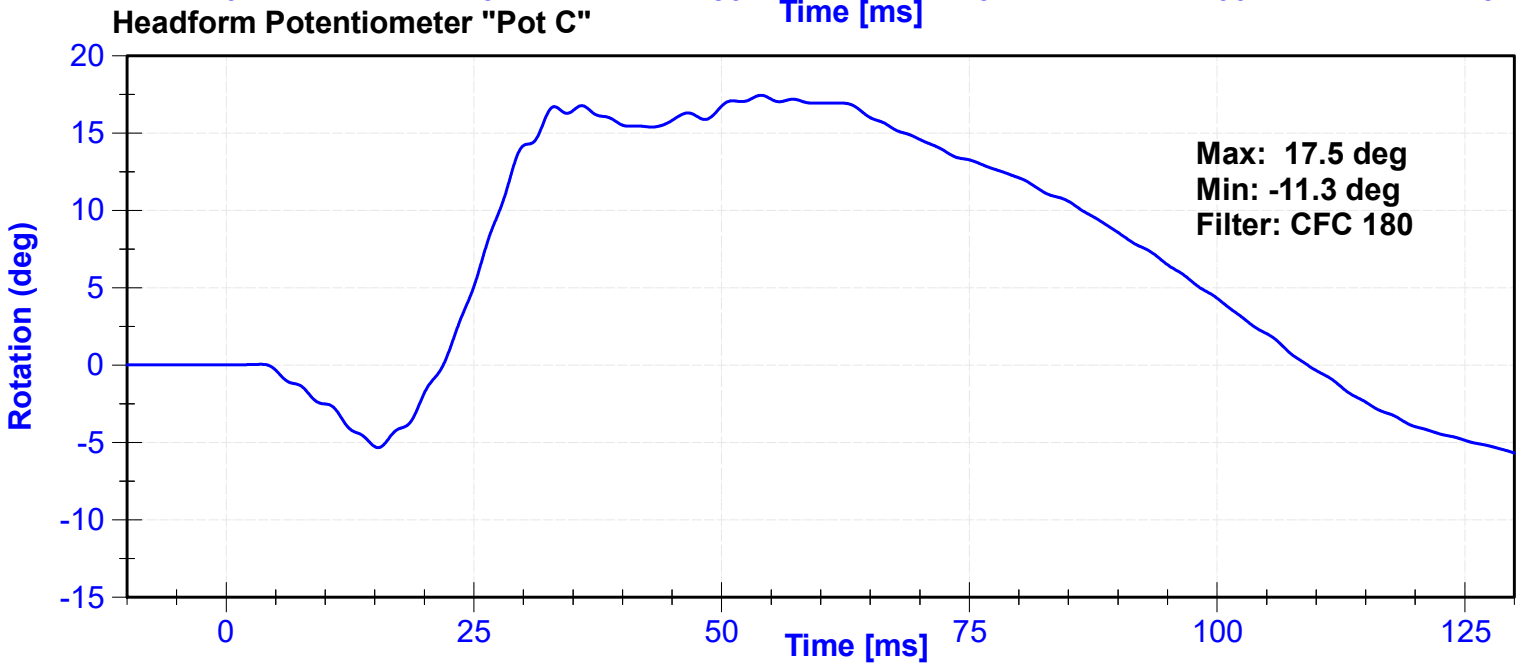
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	10/31/2023	10/30/2024
Front Pendulum Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Headform Potentiometer	Sfernice	095	9/29/2023	9/28/2024



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


Neck Rotation
Rotation (Deg)
Time [ms]
Max: 49.4 deg
Min: -25.8 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 32.3 deg
Min: -14.5 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 17.5 deg
Min: -11.3 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

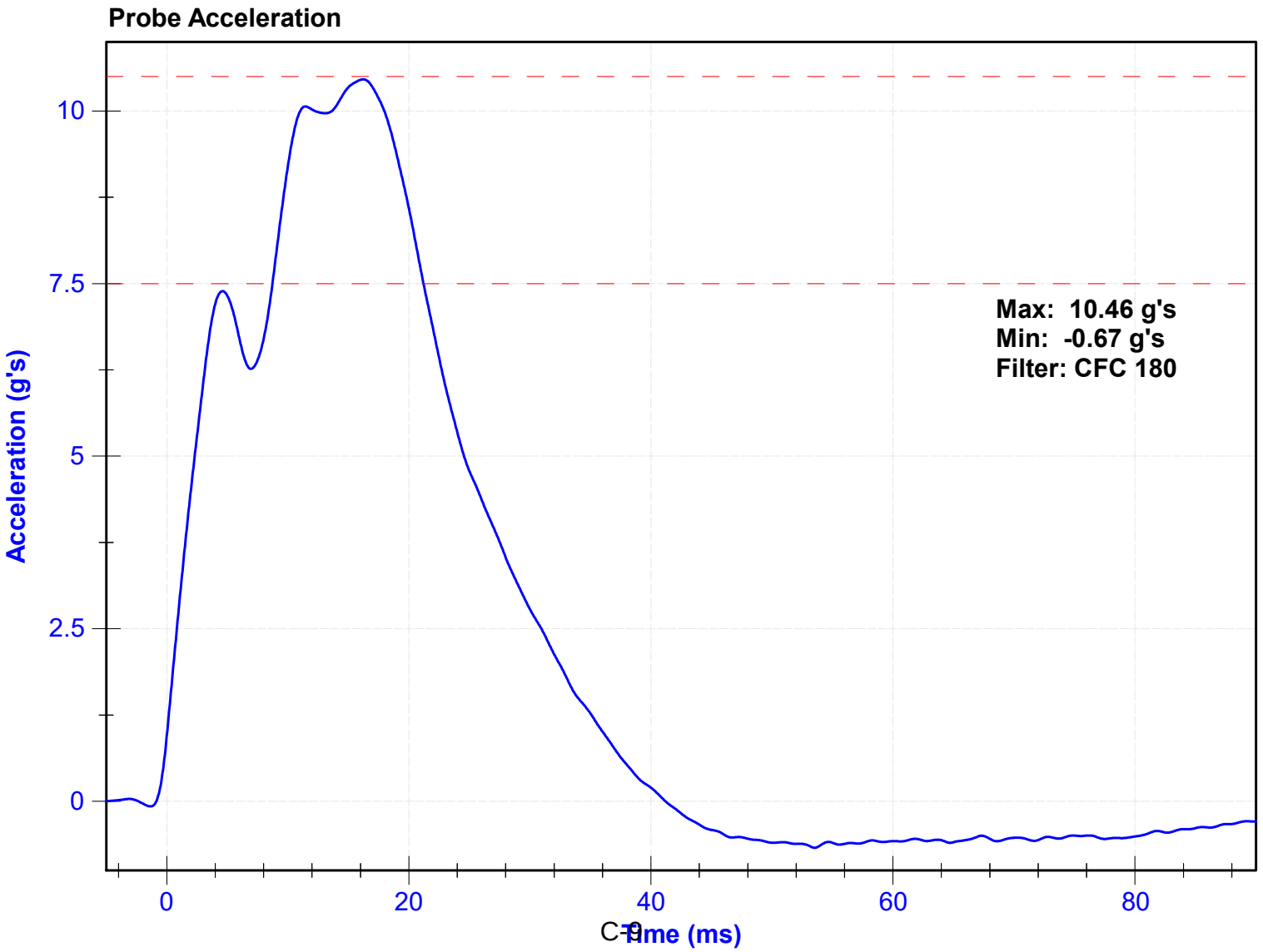
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	56	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	7.5	10.5	g's	10.46	Pass

Transducer Calibrations

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



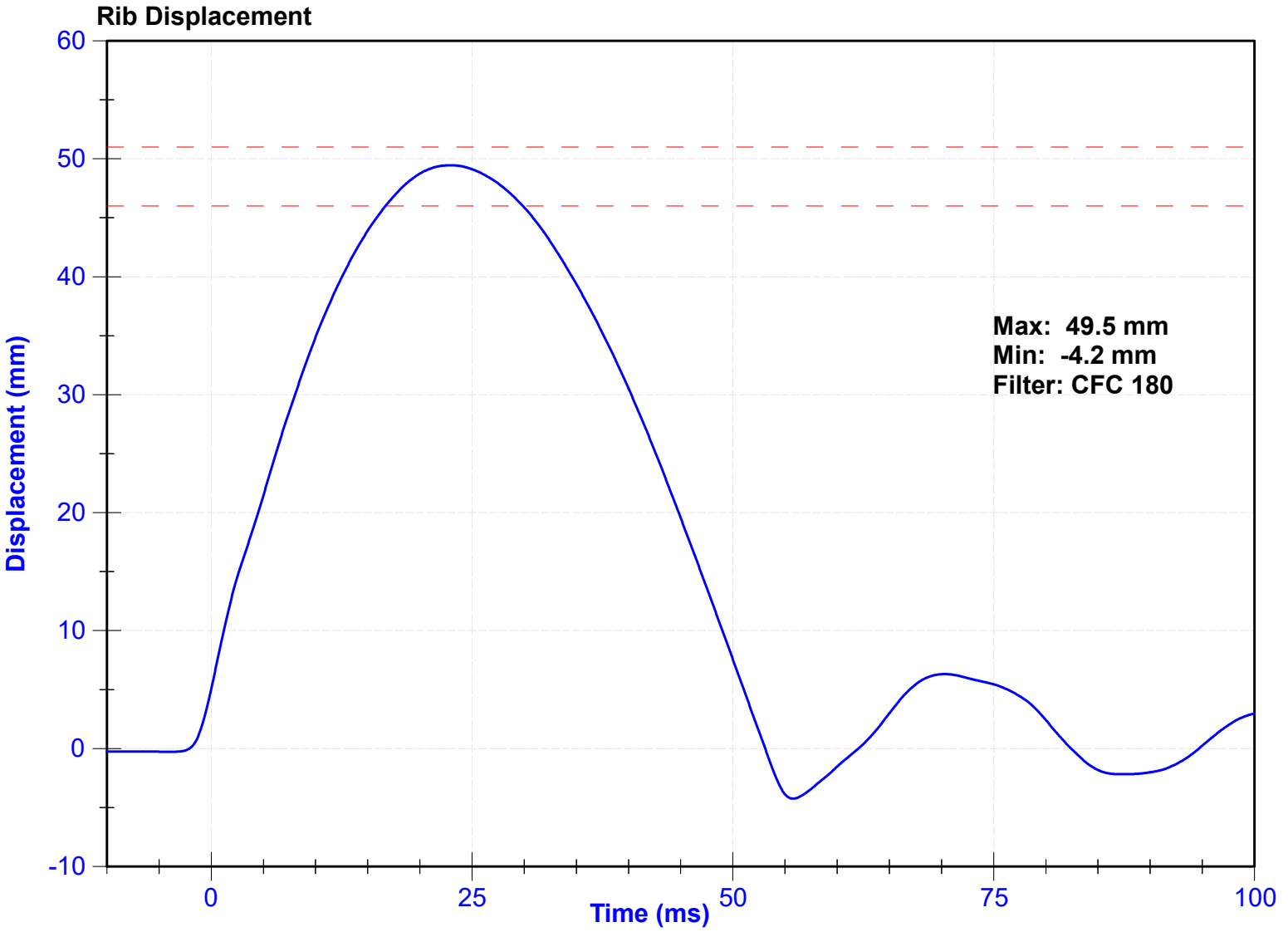
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	50	Pass
Rib Displacement	46	51	mm	49.5	Pass

Transducer Calibrations

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



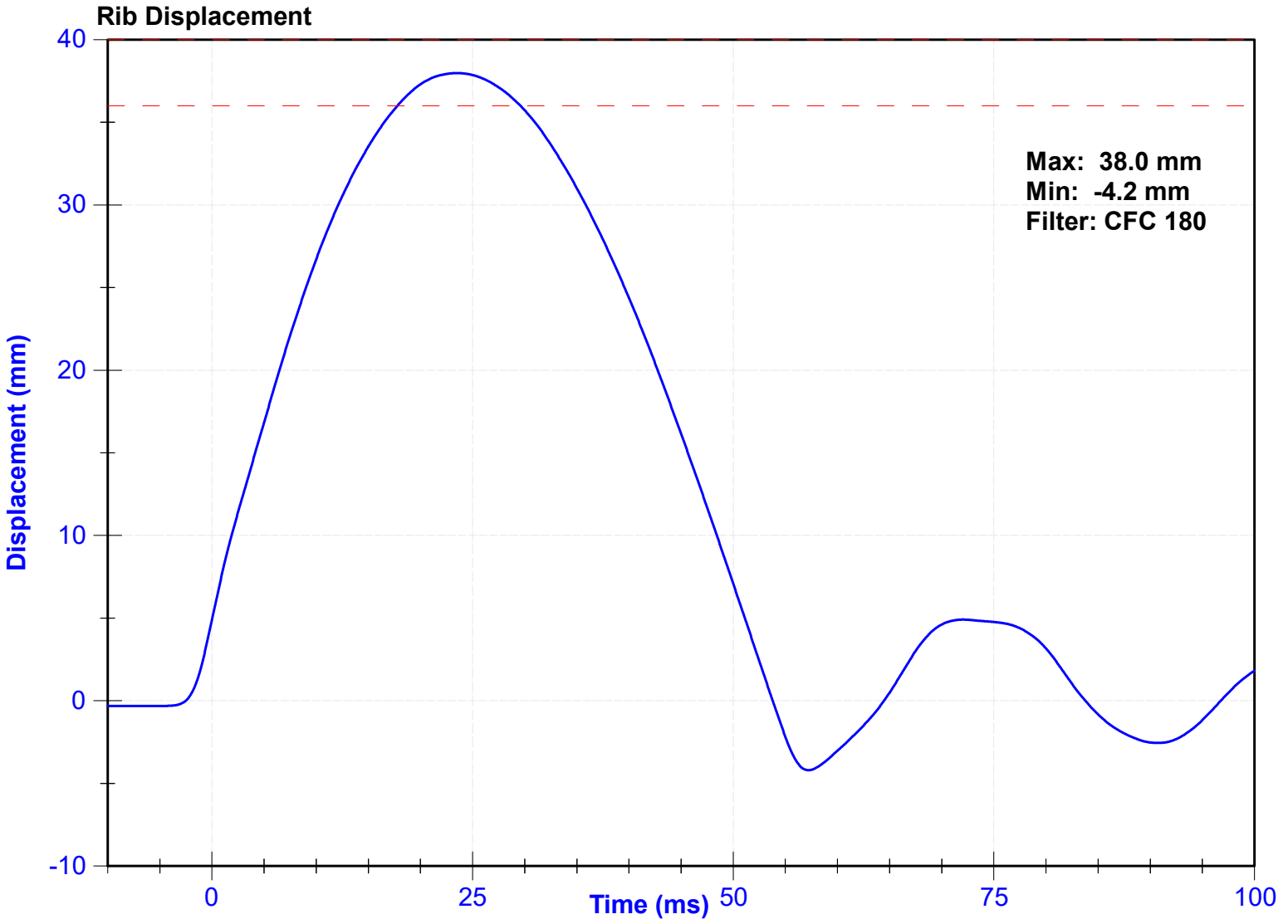
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	50	Pass
Rib Displacement	36	40	mm	38.0	Pass

Transducer Calibrations

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



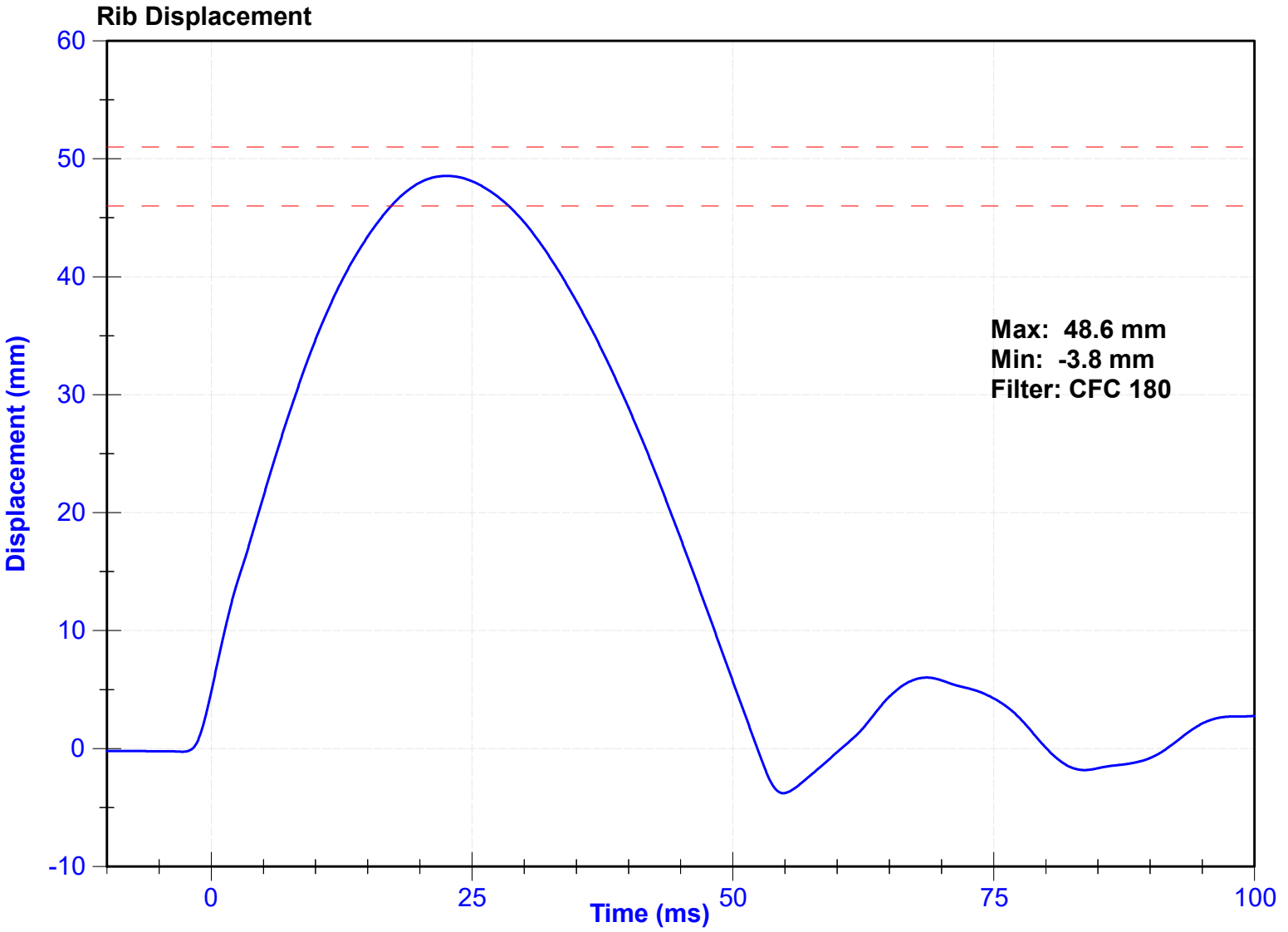
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	51	Pass
Rib Displacement	46	51	mm	48.6	Pass

Transducer Calibrations

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



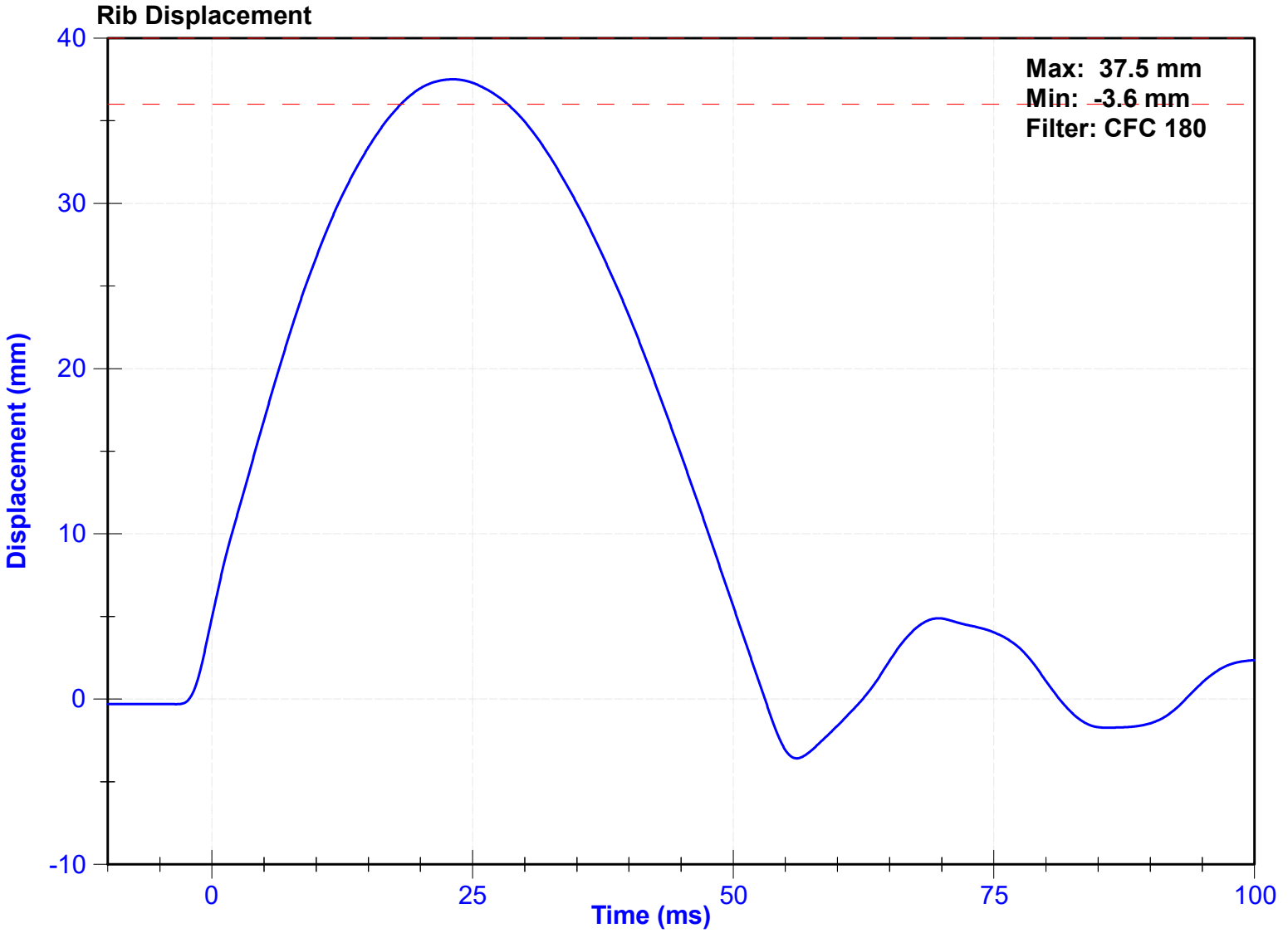
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	50	Pass
Rib Displacement	36	40	mm	37.5	Pass

Transducer Calibrations

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



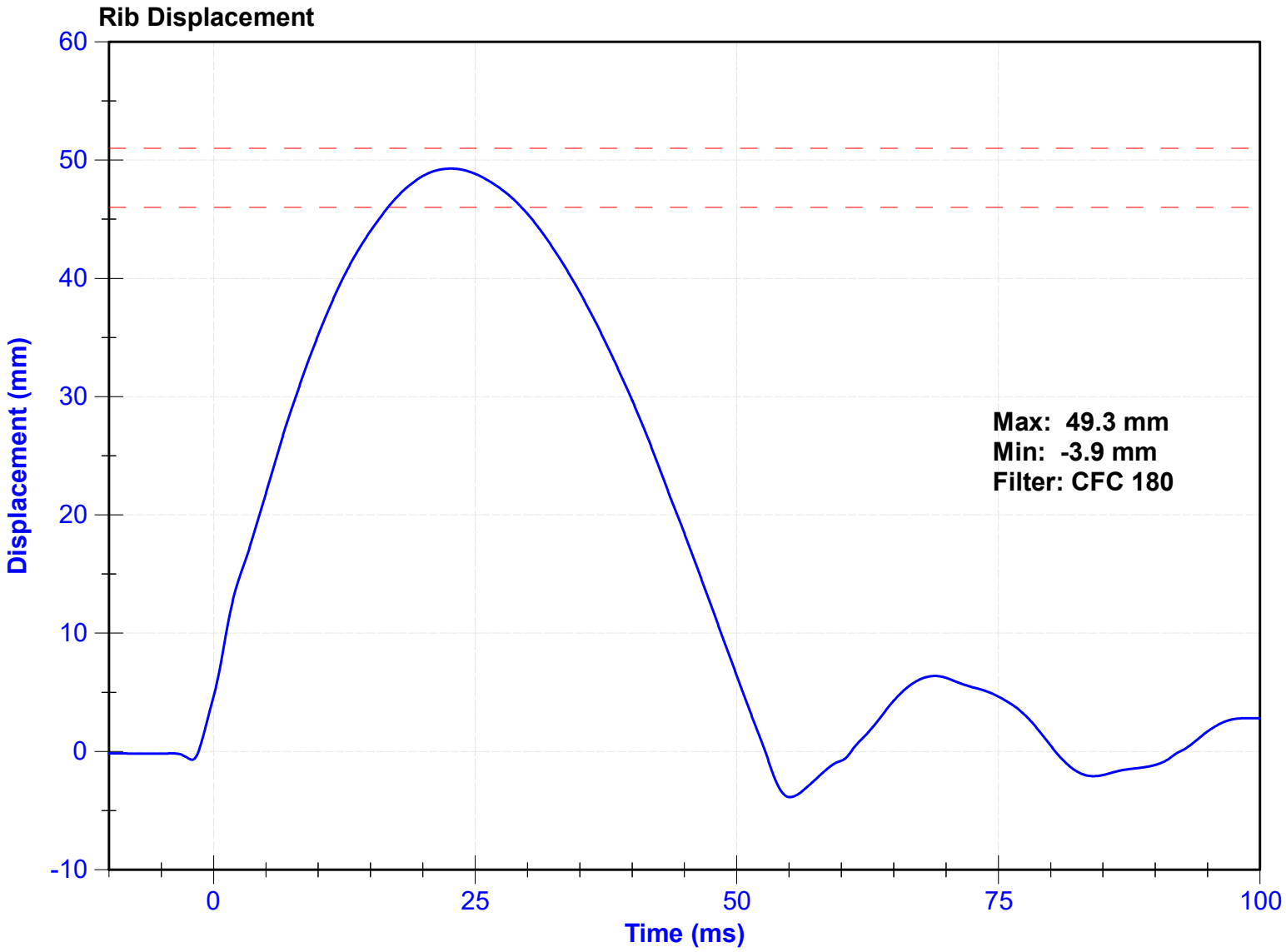
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	51	Pass
Rib Displacement	46	51	mm	49.3	Pass

Transducer Calibrations

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



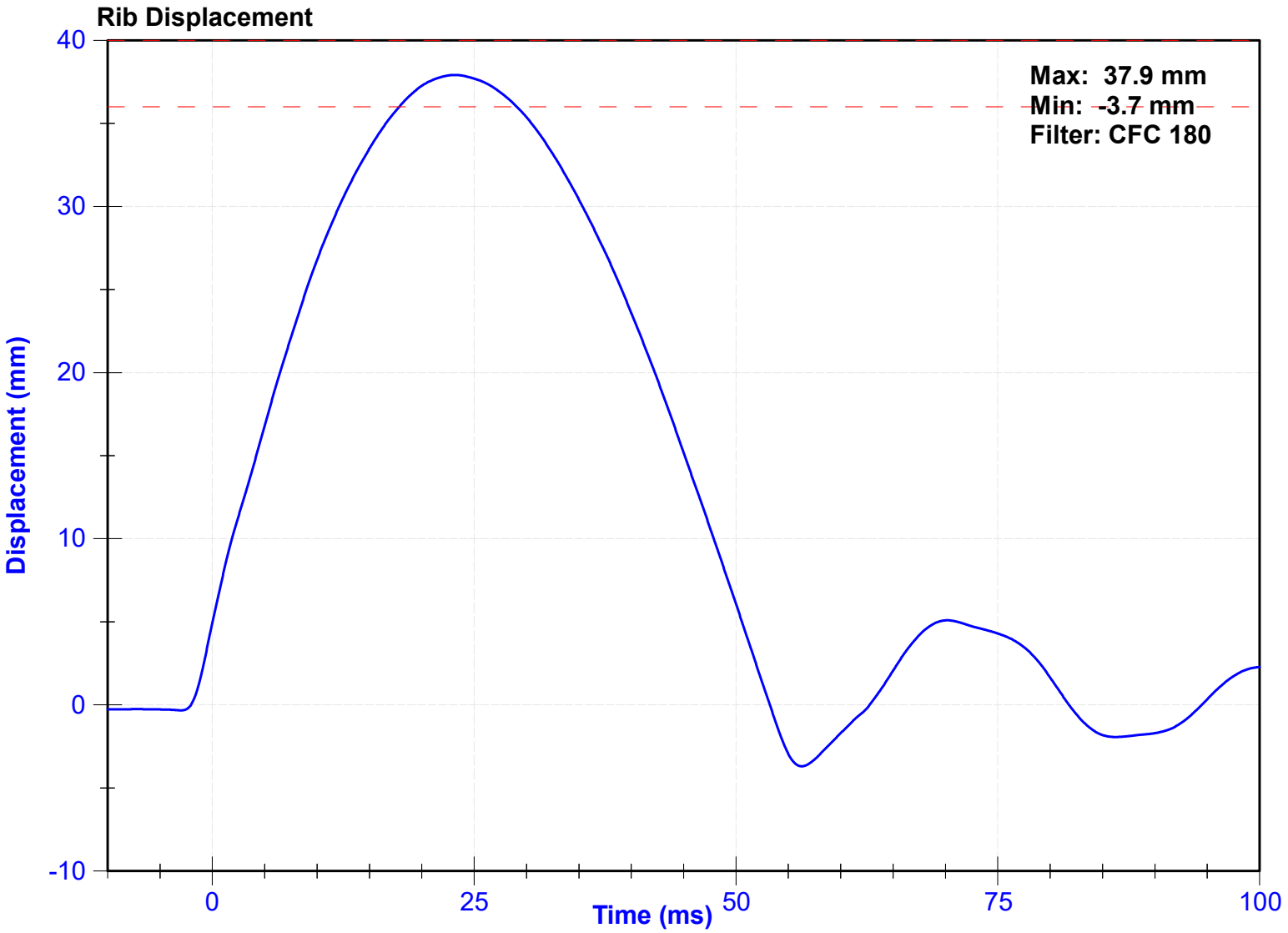
ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	50	Pass
Rib Displacement	36	40	mm	37.9	Pass

Transducer Calibrations

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



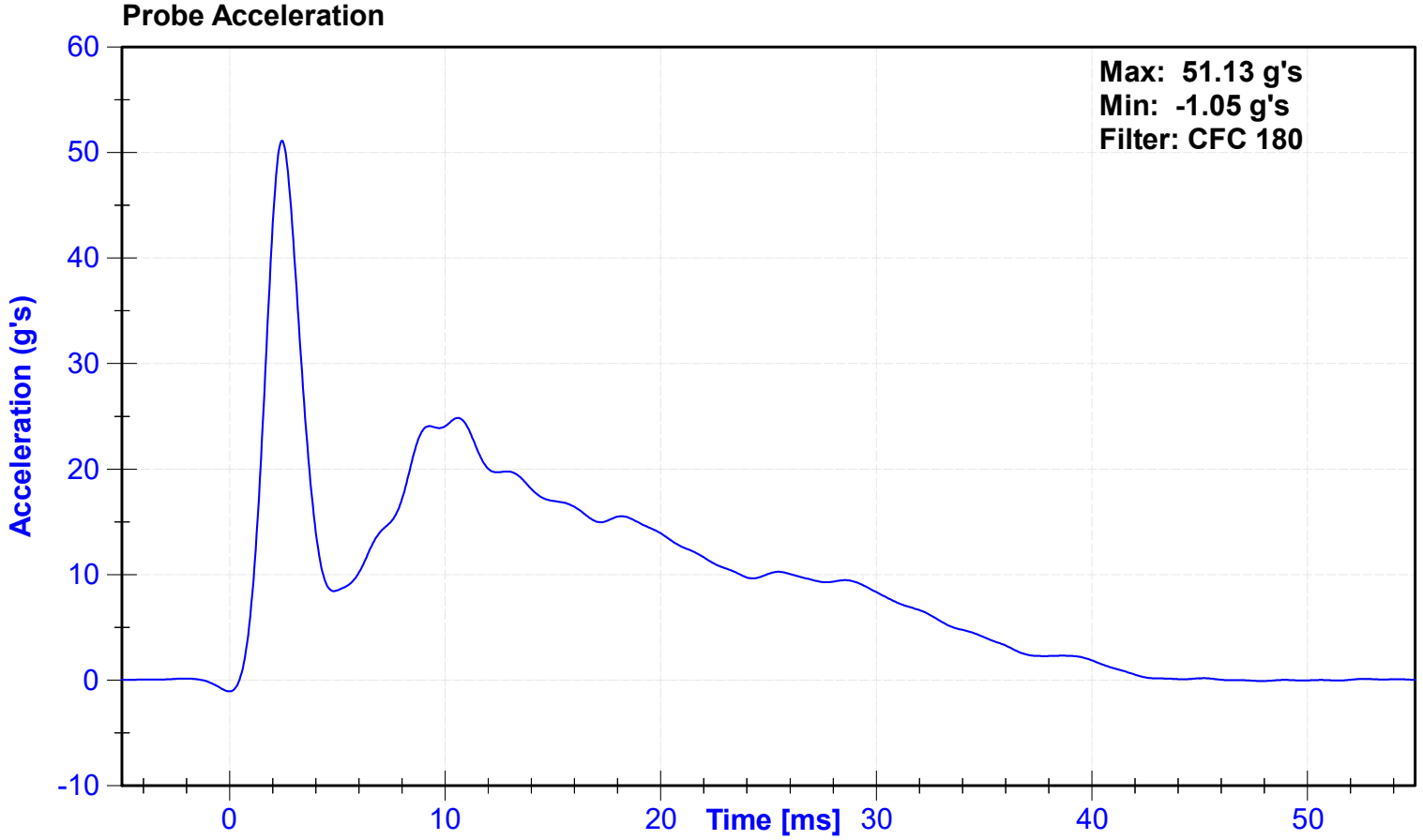
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

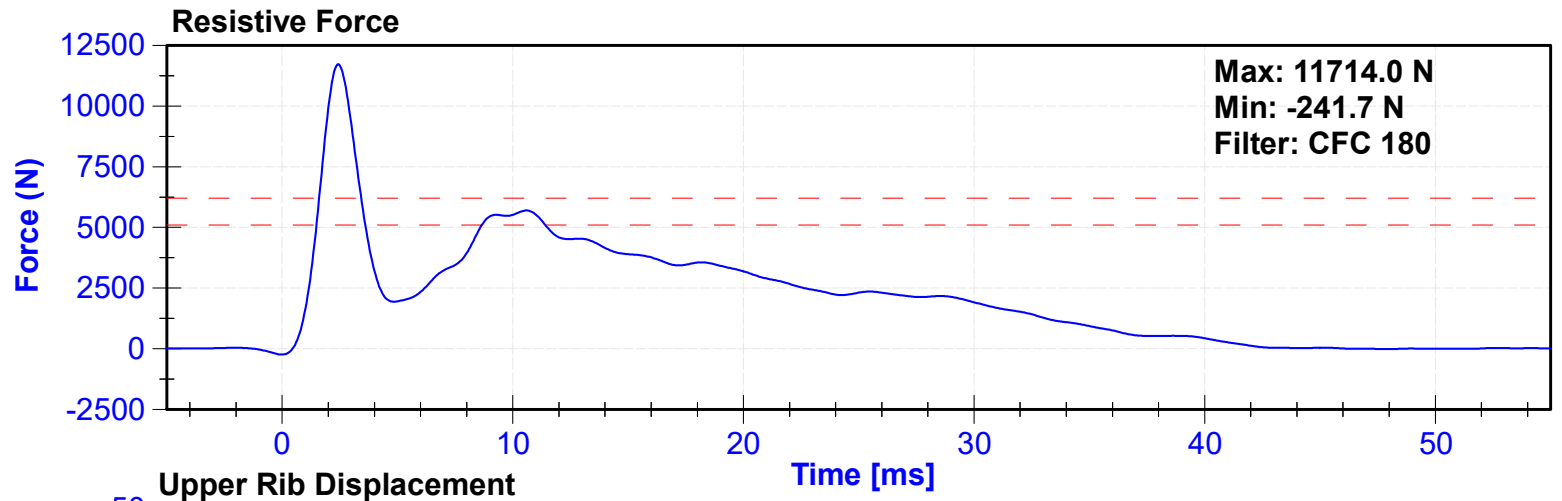
Results

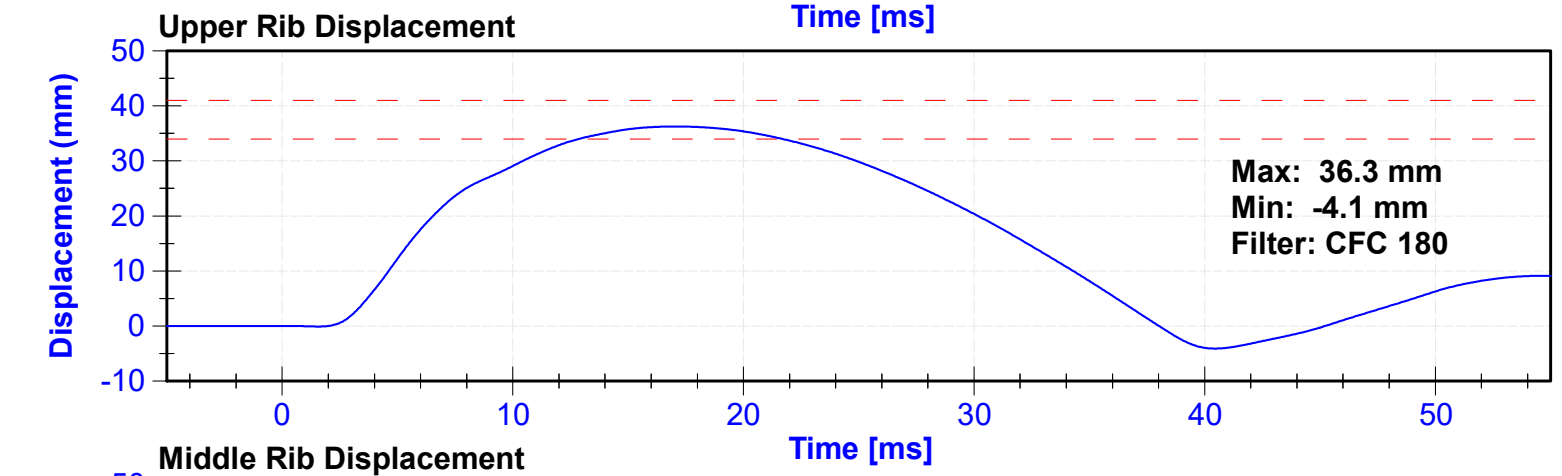
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	56	Pass
Velocity	5.4	5.6	m/s	5.53	Pass
Resistive Force after 6ms	5100	6200	N	5695.6	Pass
Upper Thorax Rib Deflection	34	41	mm	36.3	Pass
Mid Thorax Rib Deflection	37	45	mm	40.9	Pass
Lower Thorax Rib Deflection	37	44	mm	40.6	Pass

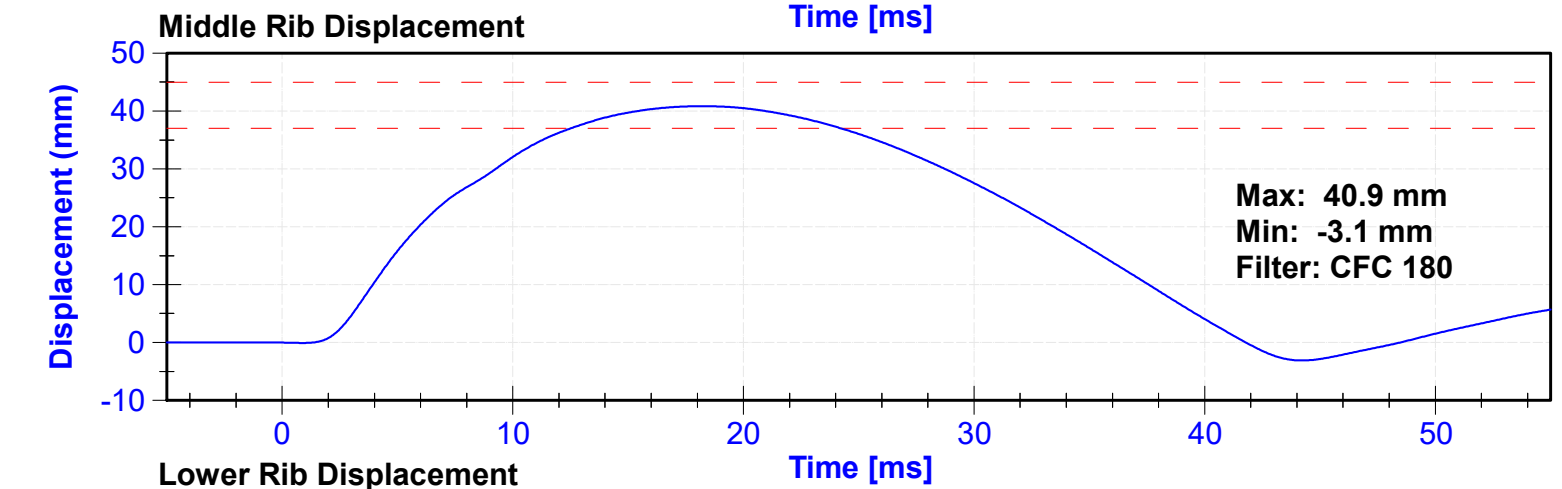
Transducer Calibrations

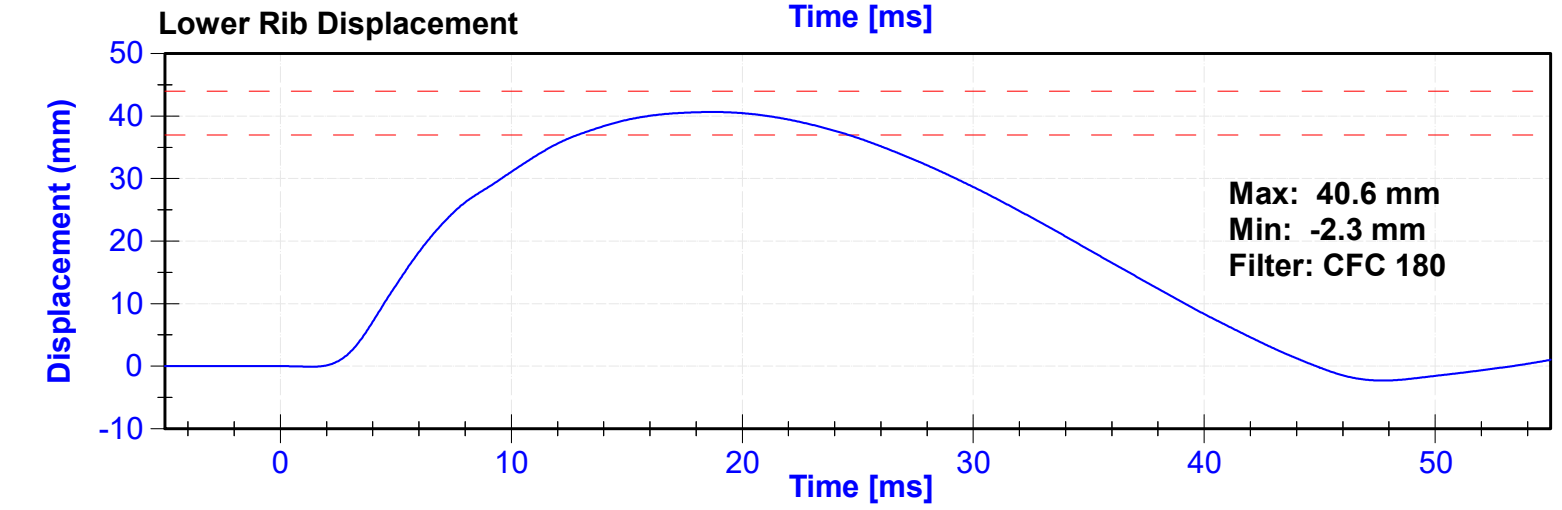
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Upper Thorax Rib Potentiometer	Honeywell	179GFE	5/6/2024	11/4/2024
Middle Thorax Rib Potentiometer	Honeywell	185GFE	5/6/2024	11/4/2024
Lower Thorax Rib Potentiometer	Honeywell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




Resistive Force
Max: 11714.0 N
Min: -241.7 N
Filter: CFC 180
Force (N)
12500
10000
7500
5000
2500
0
-2500
0
10
20
30
40
50
Time [ms]


Upper Rib Displacement
Max: 36.3 mm
Min: -4.1 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]


Middle Rib Displacement
Max: 40.9 mm
Min: -3.1 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]


Lower Rib Displacement
Max: 40.6 mm
Min: -2.3 mm
Filter: CFC 180
Displacement (mm)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]

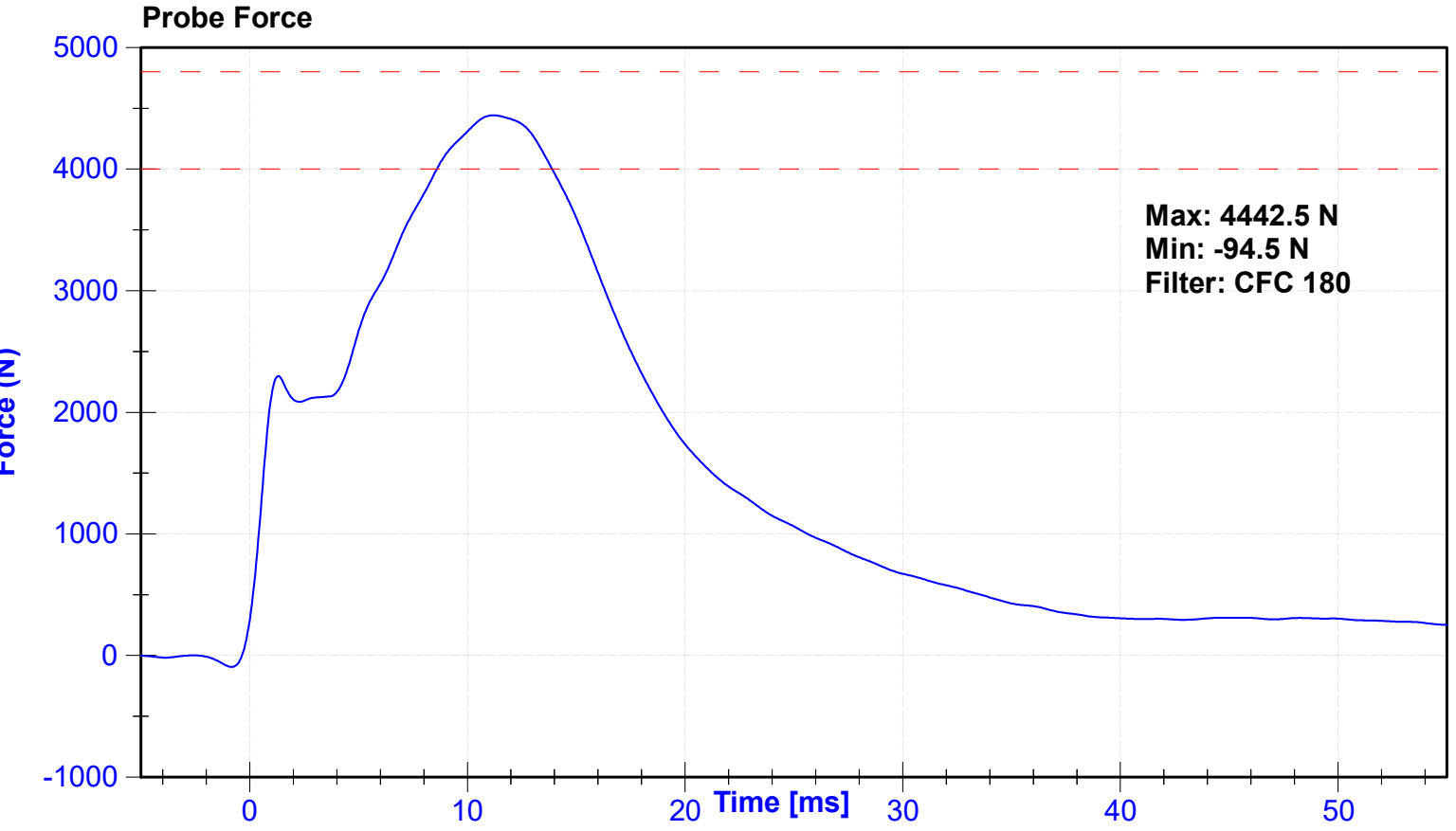
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

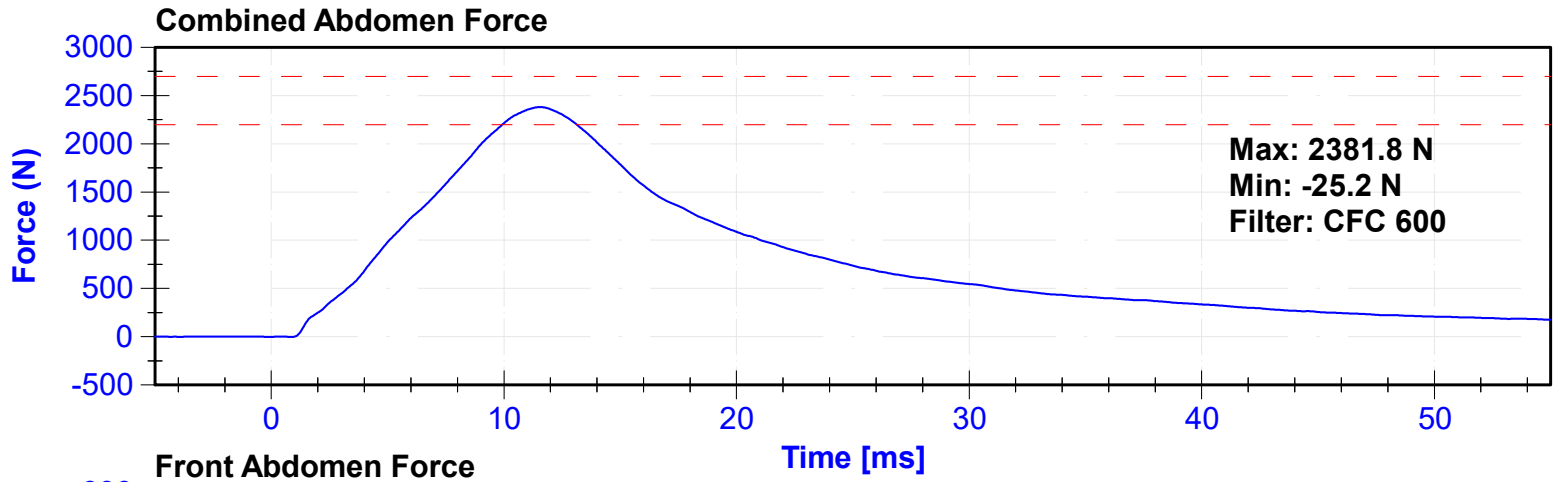
Results

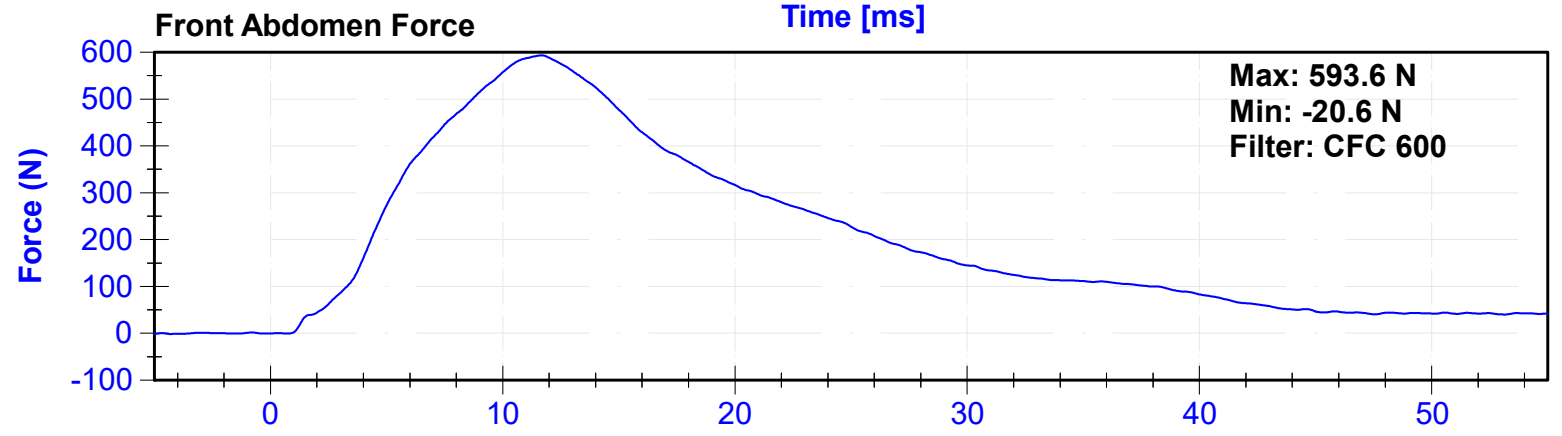
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	62	Pass
Velocity	3.9	4.1	m/s	4.01	Pass
Combined Abdomen Force	2200	2700	N	2381.8	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.55	Pass
Resistive Probe Force	4000	4800	N	4442.5	Pass
Time at Peak Resistive Force	10.6	13.0	ms	11.20	Pass

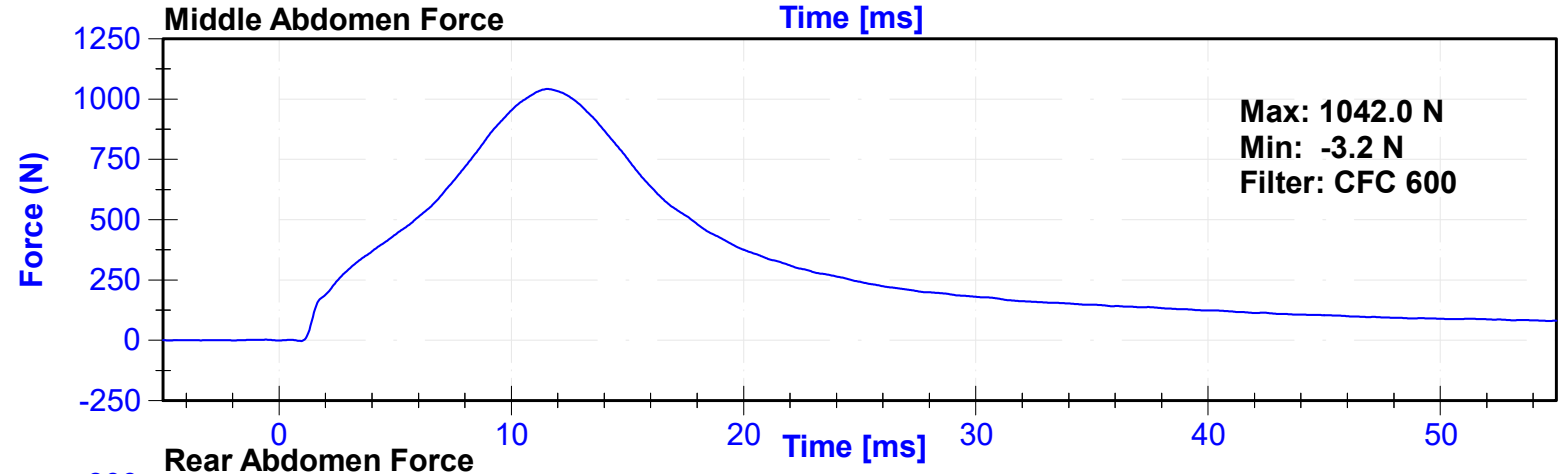
Transducer Calibrations

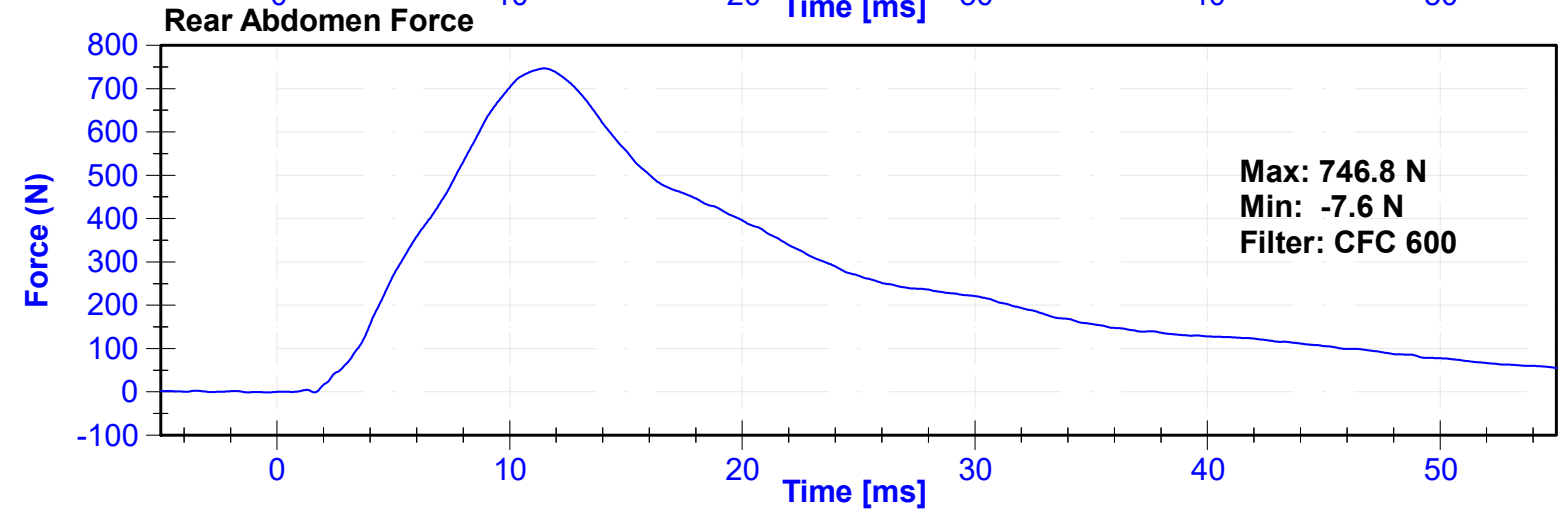
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18587	11/20/2023	11/19/2024
Front Abdomen Load Cell	Denton	1523	12/5/2023	12/4/2024
Middle Abdomen Load Cell	Denton	1524	12/5/2023	12/4/2024
Rear Abdomen Load Cell	Denton	1530	12/5/2023	12/4/2024




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2381.8 N
Min: -25.2 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 593.6 N
Min: -20.6 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1042.0 N
Min: -3.2 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 746.8 N
Min: -7.6 N
Filter: CFC 600

ATD Manufacturer	FTSS	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

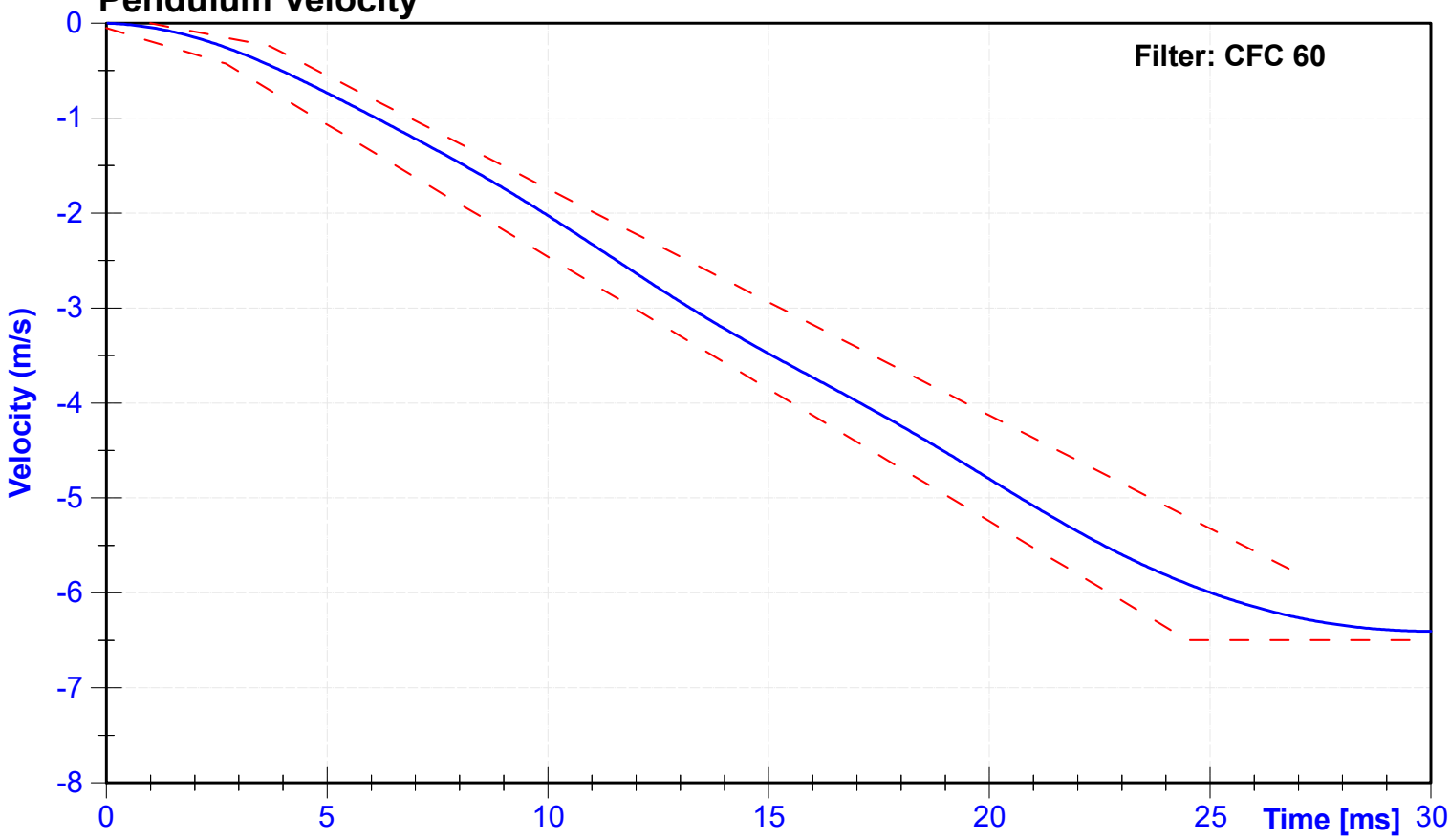
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	50	Pass
Velocity	5.95	6.15	m/s	6.099	Pass
Lateral Spine Rotation	45	55	deg	47.6	Pass
Time at Maximum Rotation	39	53	ms	42.8	Pass
Time of Decay to Zero Degrees	37	57	ms	38.1	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

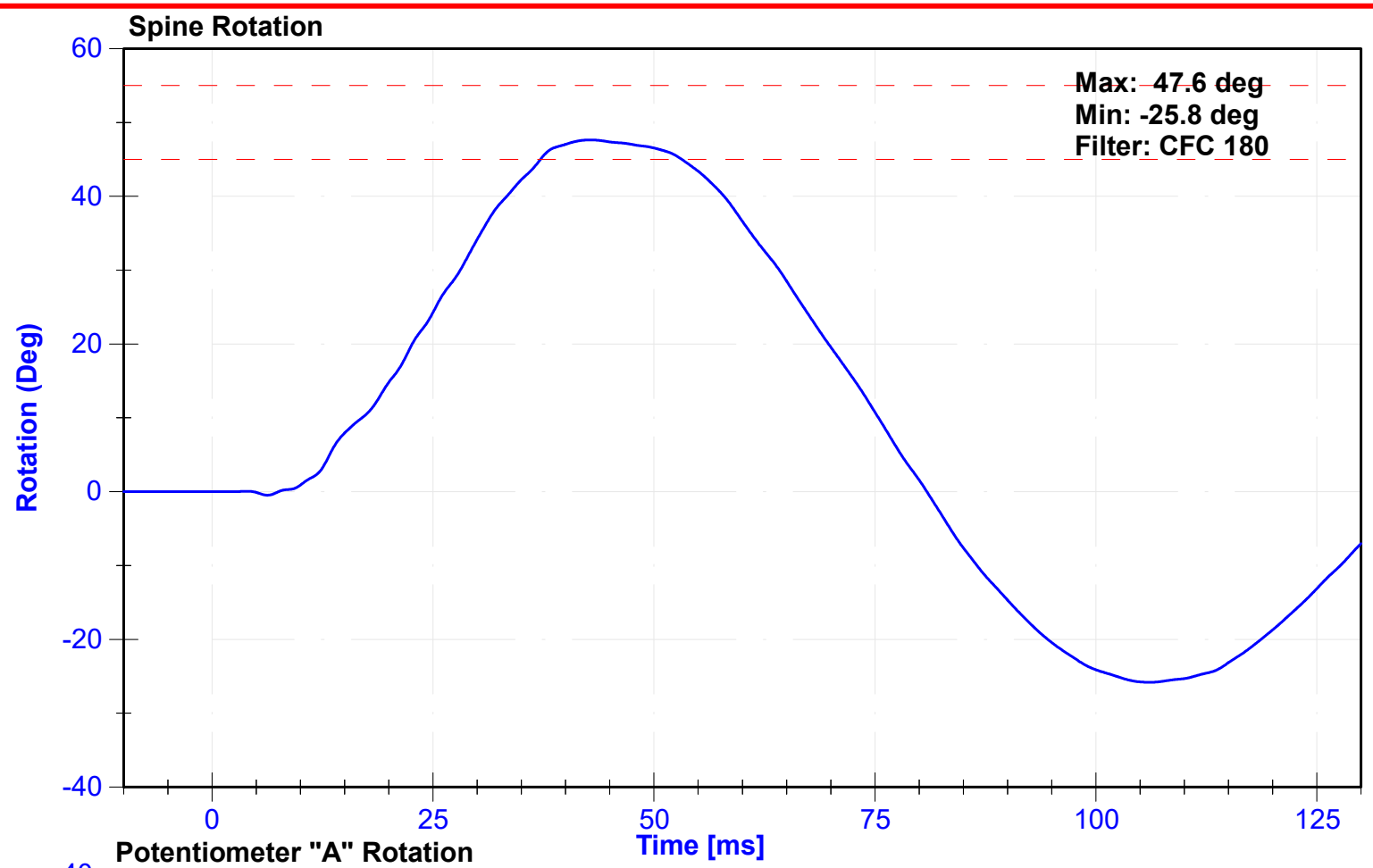
Transducer Calibrations

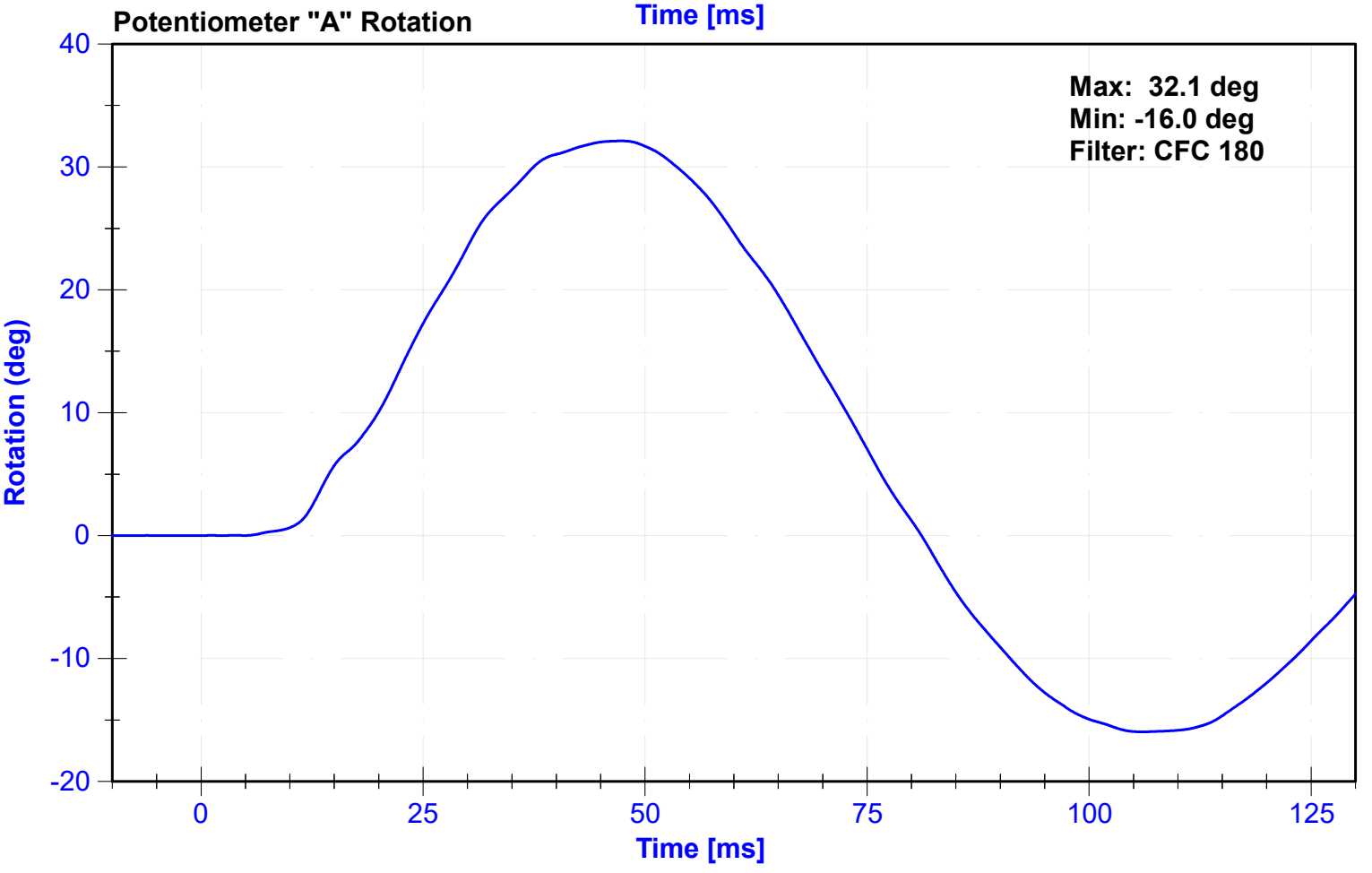
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	10/31/2023	10/30/2024
Pendulum "A" Potentiometer	Sfernice	2247	12/5/2023	12/4/2024
Condyle "B" Potentiometer	Sfernice	095	9/29/2023	9/28/2024

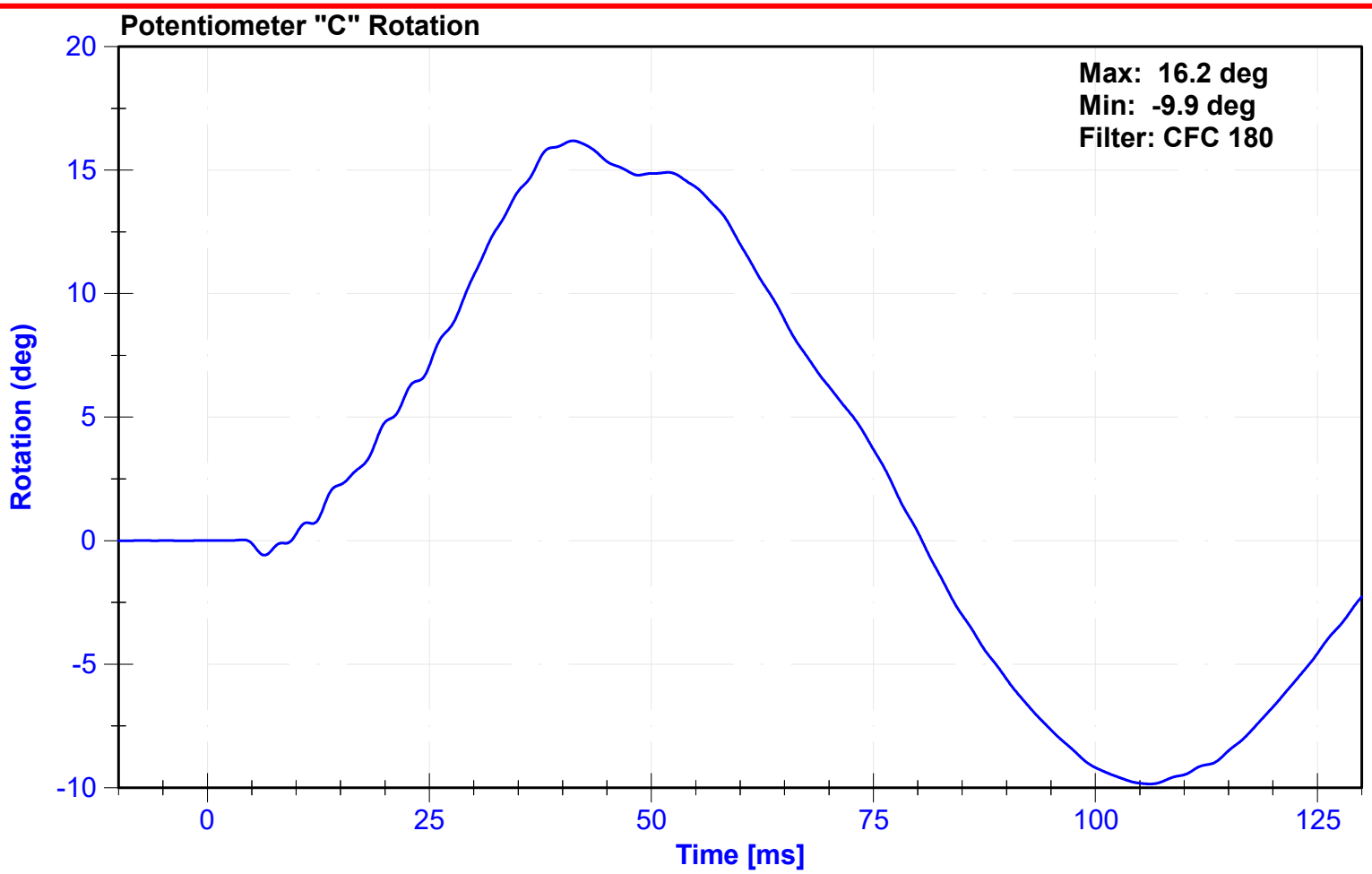
Pendulum Velocity[3]



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


Spine Rotation
Max: 47.6 deg
Min: -25.8 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 32.1 deg
Min: -16.0 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

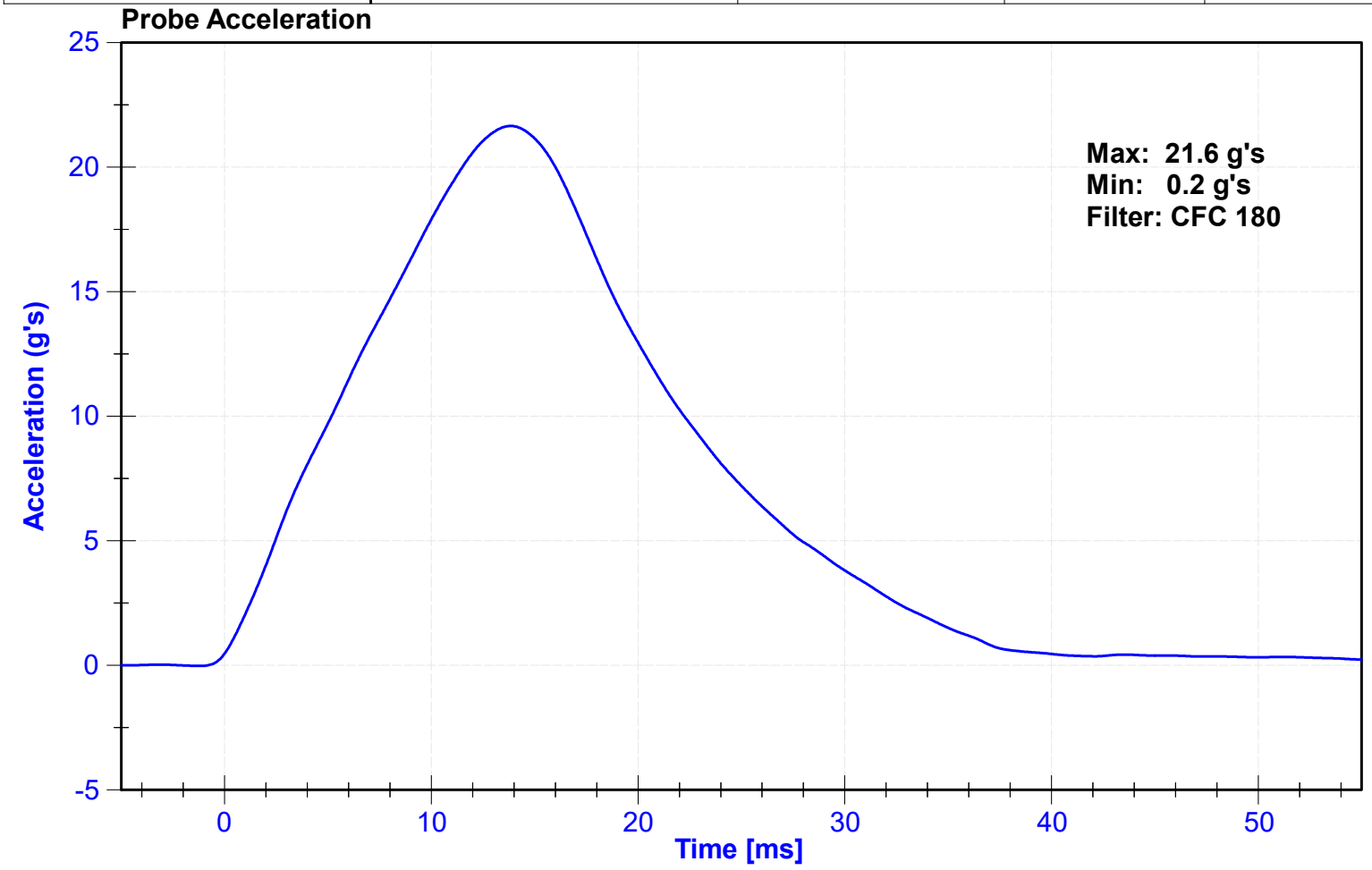
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

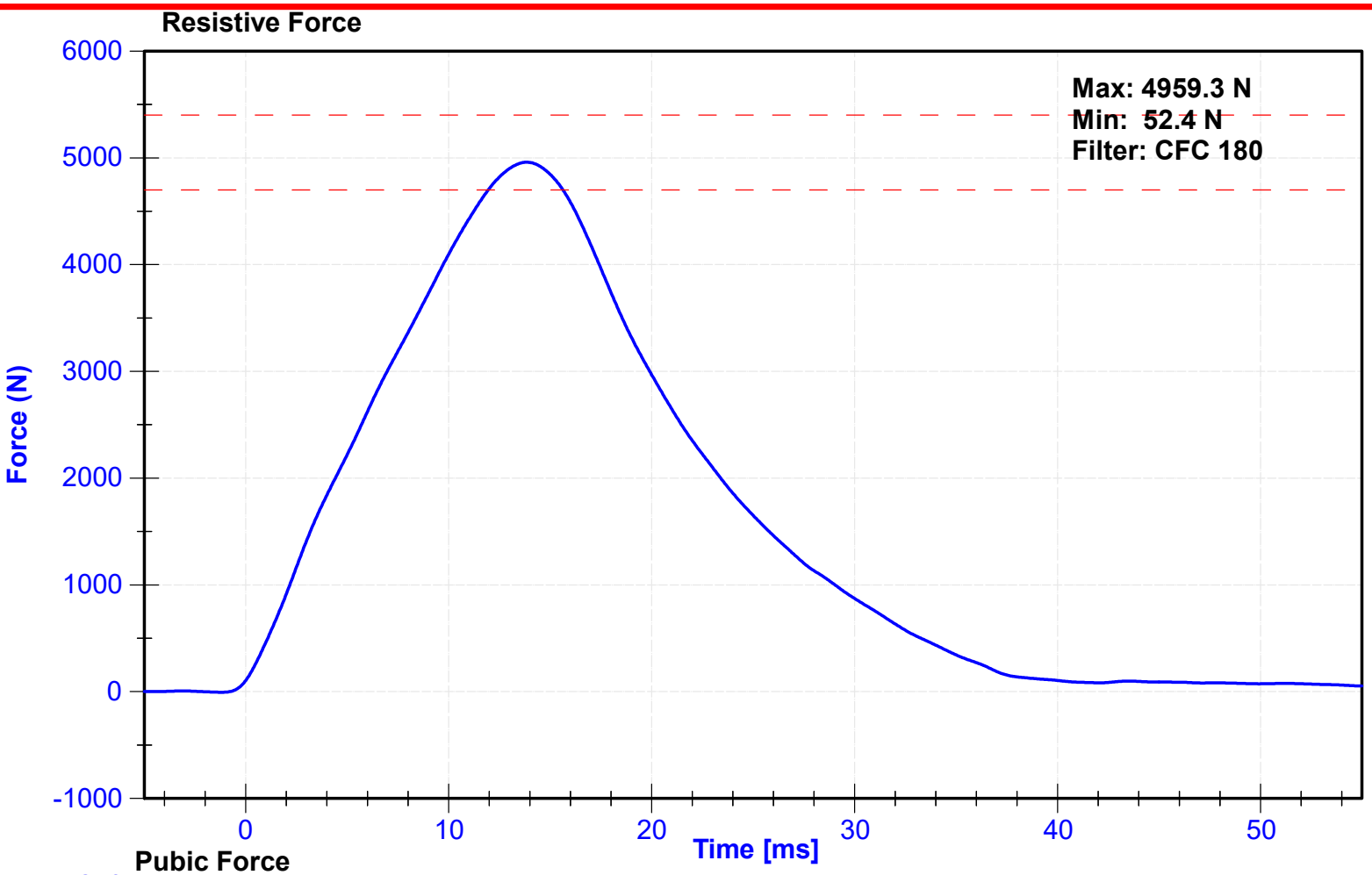
Results

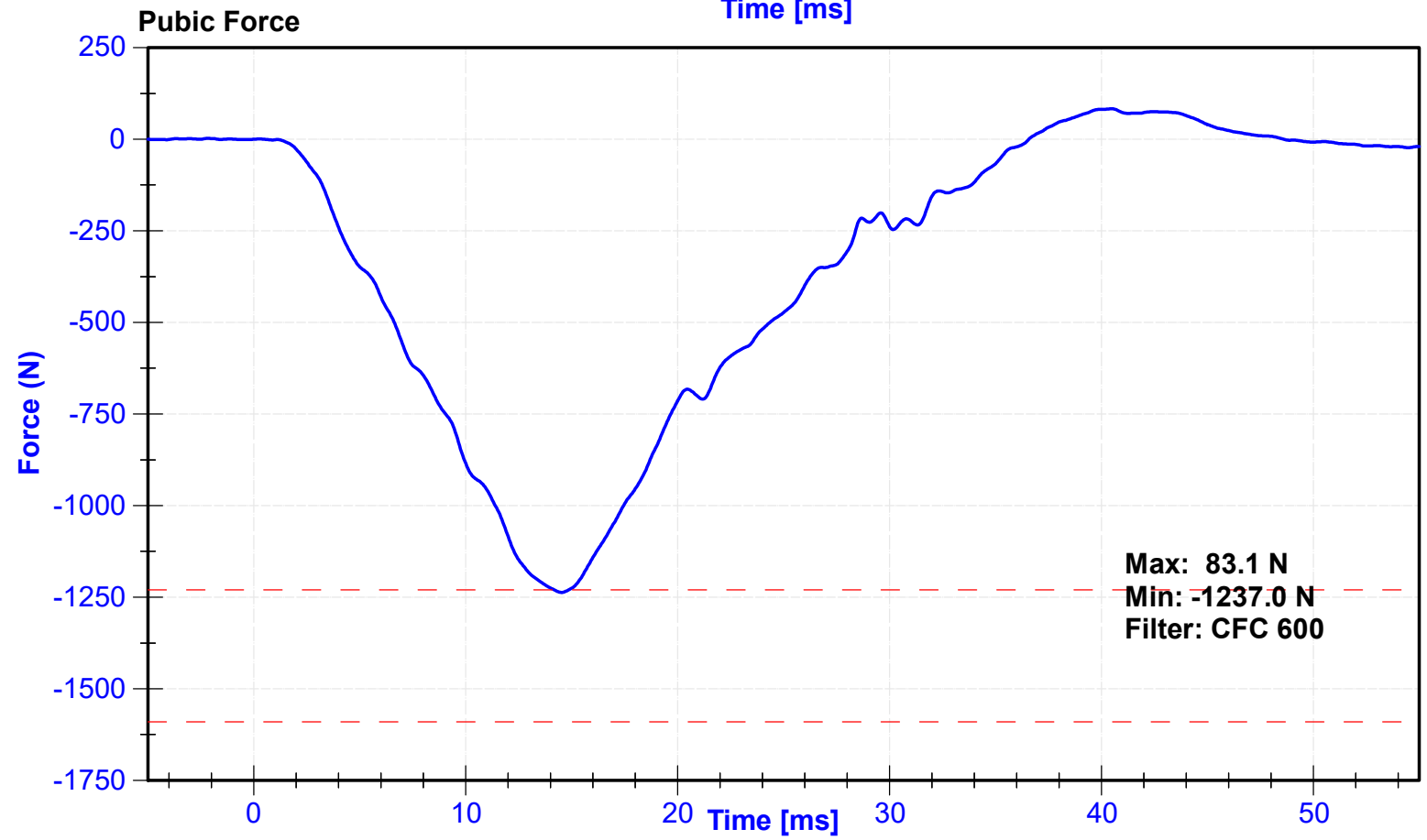
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	63	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Resistive Force	4700	5400	N	4959.3	Pass
Time at Peak Resistive Force	11.8	16.1	ms	13.85	Pass
Pubic Force	-1590	-1230	N	-1237.0	Pass
Time at Peak Pubic Force	12.2	17.0	ms	14.50	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Pubic Load Cell	Denton	458-FY	12/5/2023	12/4/2024




Resistive Force
Max: 4959.3 N
Min: 52.4 N
Filter: CFC 180
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]


Pubic Force
Max: 83.1 N
Min: -1237.0 N
Filter: CFC 600
Force (N)
250
0
-250
-500
-750
-1000
-1250
-1500
-1750
0
10
20
30
40
50
Time [ms]

CALIBRATION TEST RESULTS

PRE-TEST

SID-IIS 5TH PERCENTILE FEMALE – PASSENGER ATD

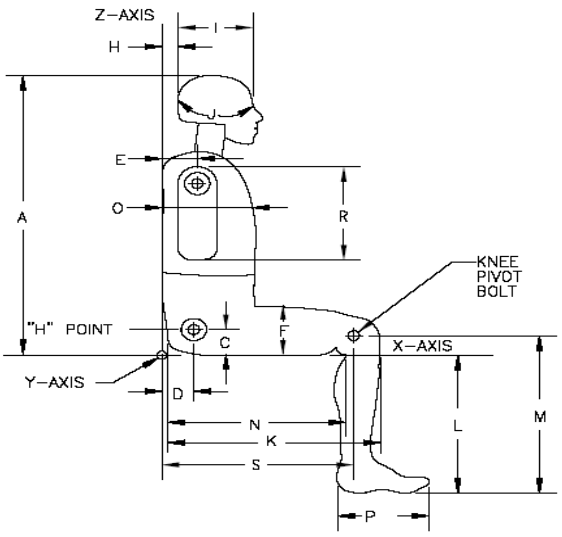
SERIAL NO:DG8012

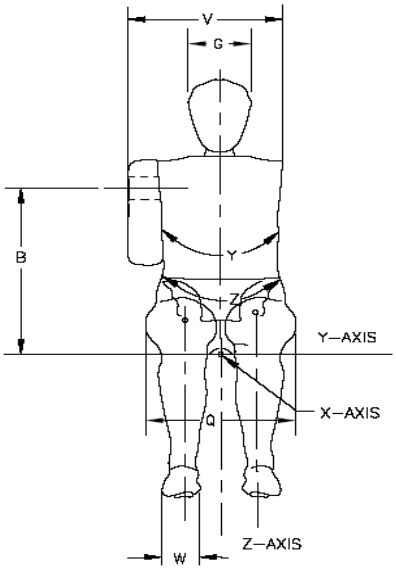
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: J. Rios Date: 09/13/2024

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	778	Pass
B	Shoulder Pivot Height	437	453	447	Pass
C	H-point Height	79	89	81	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	102	Pass
F	Thigh Clearance	119	135	127	Pass
G	Head Breadth	140	148	144	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	181	Pass
J	Head Circumference	541	551	548	Pass
K	Buttock to Knee Length	514	540	525	Pass
L	Popliteal Height	343	369	357	Pass
M	Knee Pivot to floor height	392	409	401	Pass
N	Buttock Popliteal Length	416	442	429	Pass
O	Chest Depth w/o jacket	195	211	205	Pass
P	Foot Length	216	232	222	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	315	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	482	Pass
V	Shoulder Width	341	357	351	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	868	Pass
Z	Waist Circumference	761	791	775	Pass

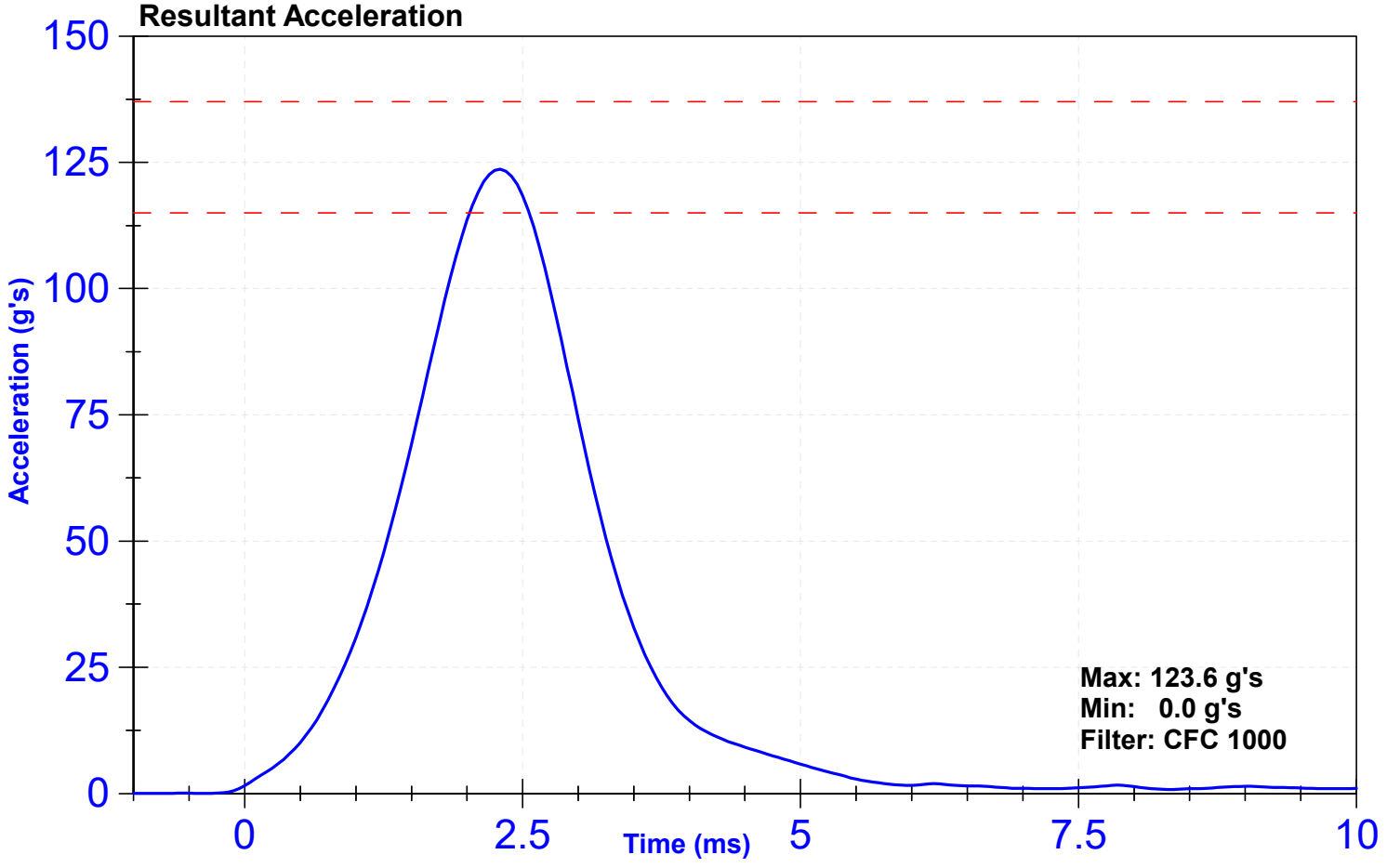
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

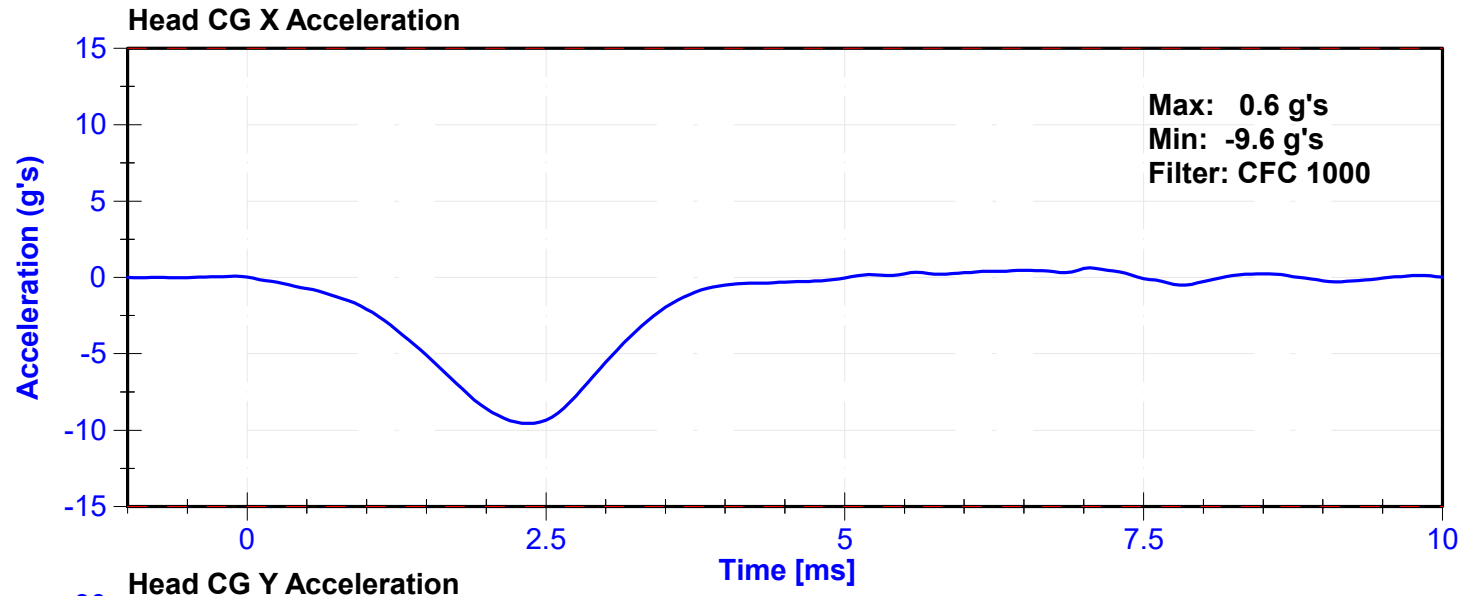
Results

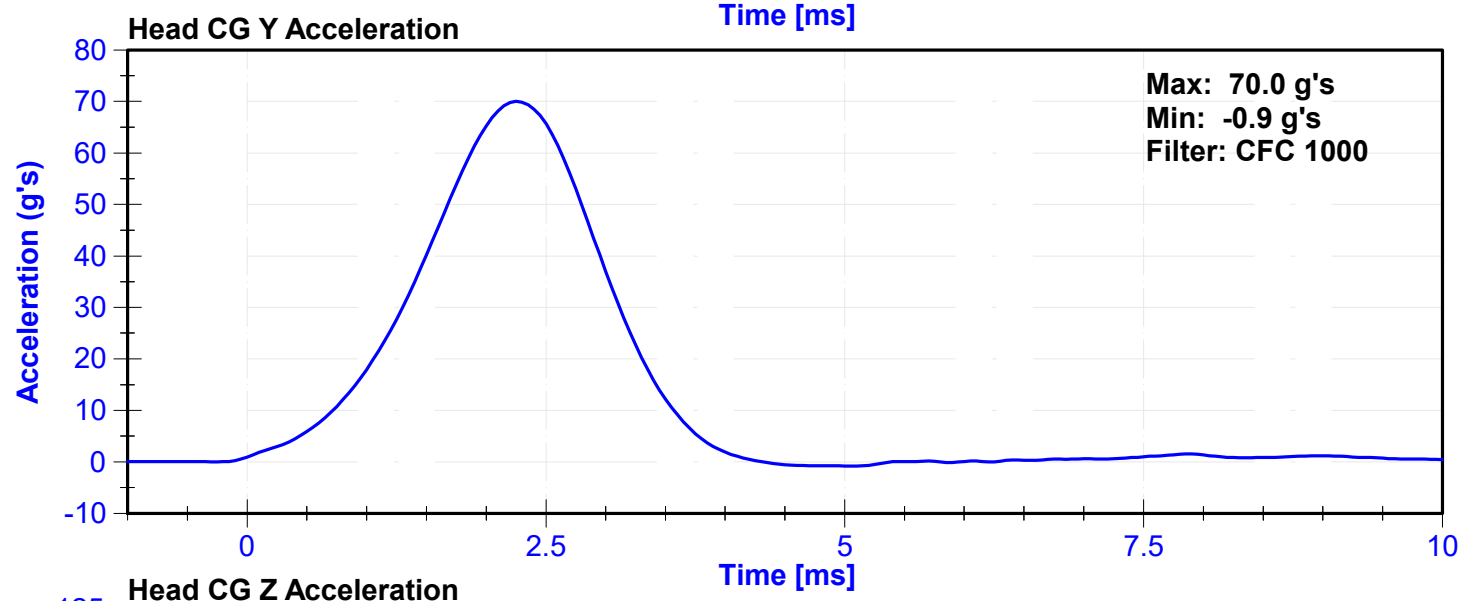
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	60	Pass
Resultant Acceleration	115	137	g's	123.6	Pass
Oscillation	0	15	%	1.5	Pass
Fore-Aft Acceleration	-15	15	g's	-9.6	Pass

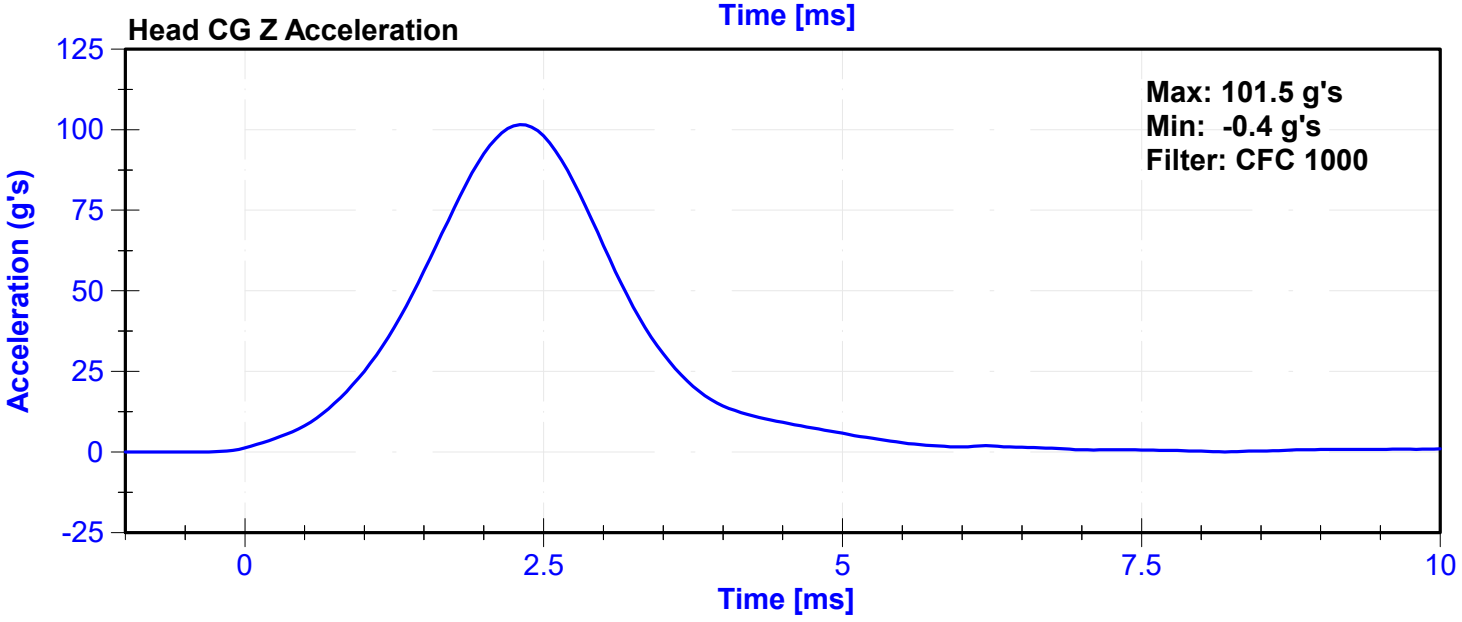
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	T21184	5/6/2024	11/2/2024
Y Accelerometer	Endevco	T31030	9/10/2024	3/9/2025
Z Accelerometer	Endevco	P83319	5/6/2024	11/2/2024




Head CG X Acceleration
Max: 0.6 g's
Min: -9.6 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 70.0 g's
Min: -0.9 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 101.5 g's
Min: -0.4 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

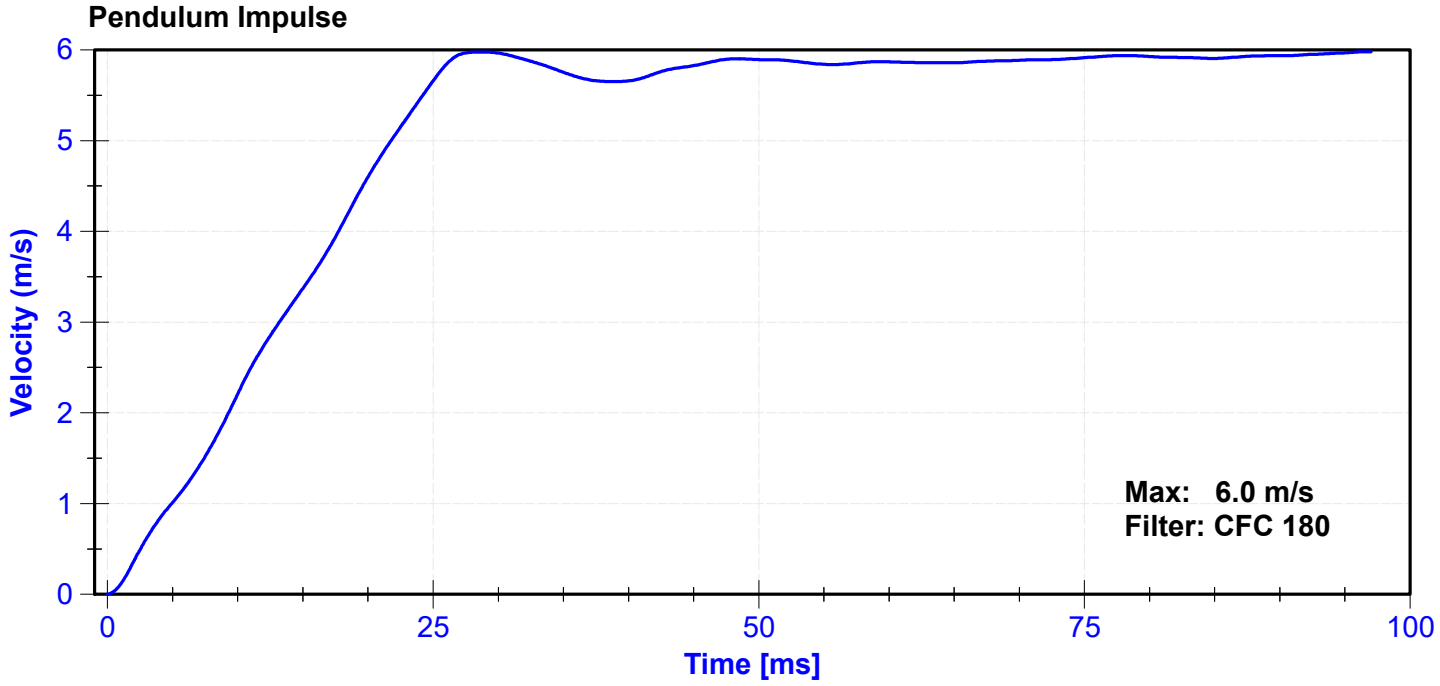
ATD Manufacturer	FTSS	Test Technician	J. Kinderman
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

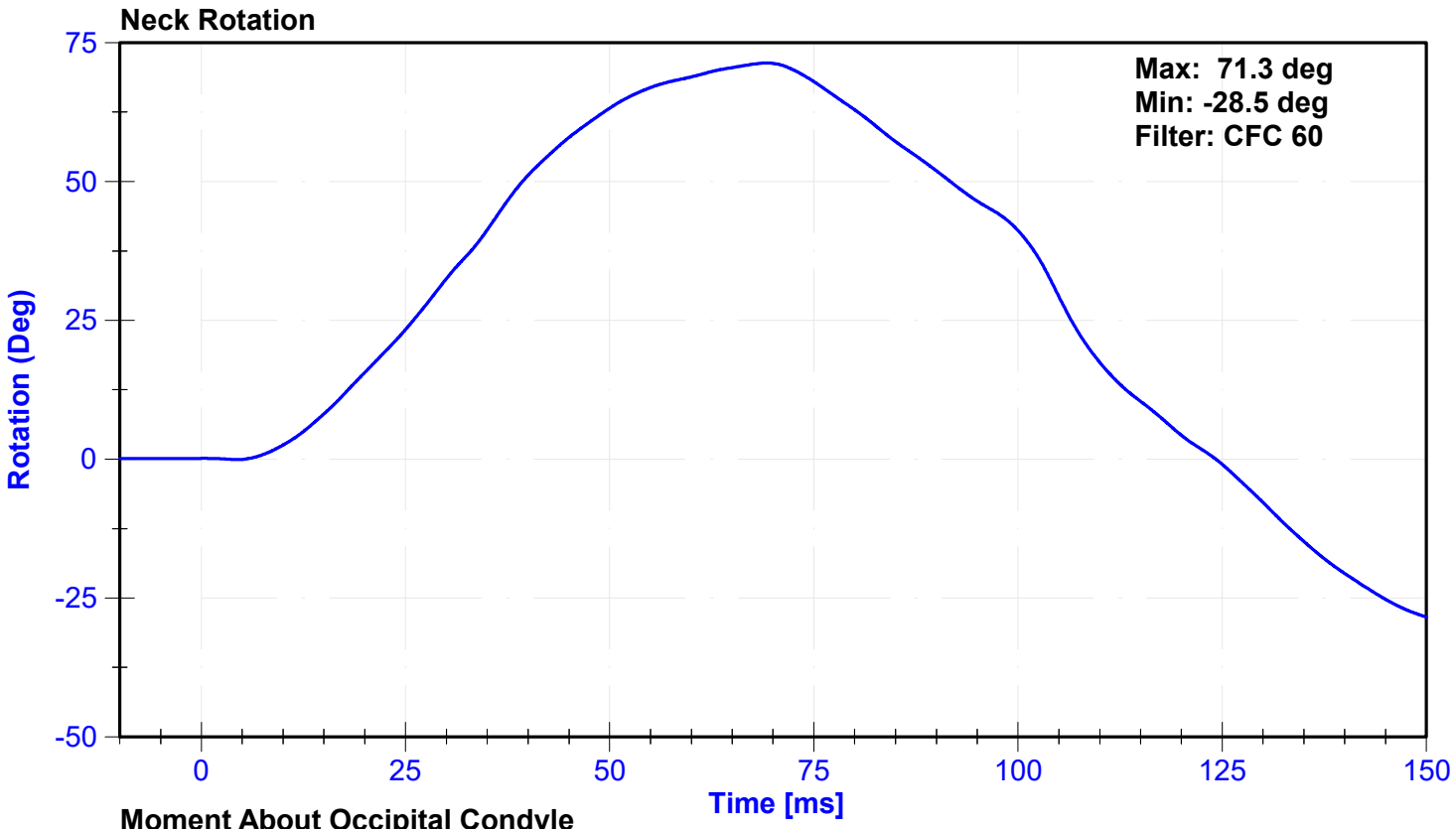
Results

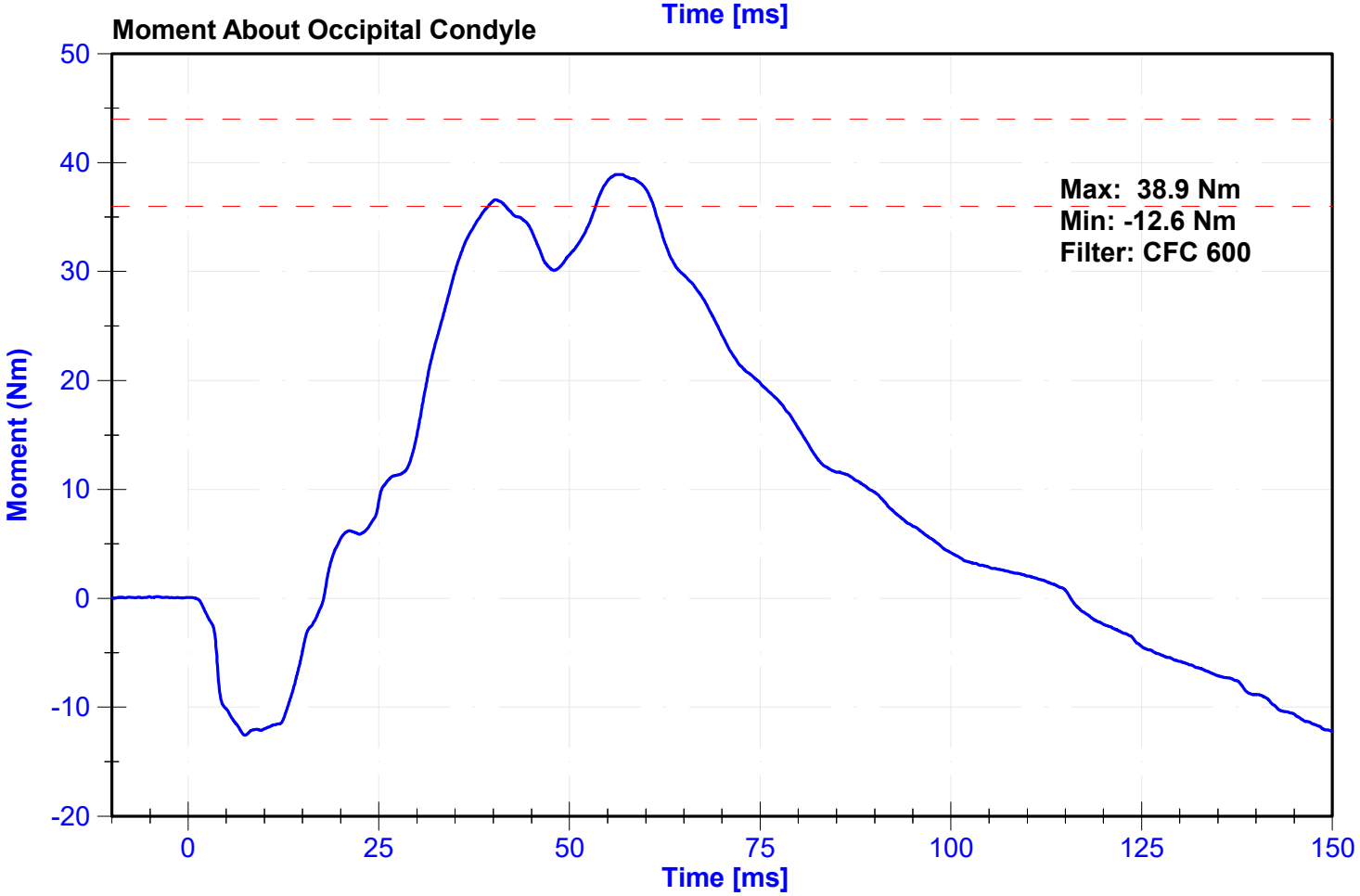
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	60	Pass
Velocity	5.51	5.63	m/s	5.580	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.21	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.37	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.60	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.65	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.98	Pass
Neck Rotation	71	81	deg	71.3	Pass
Time at Maximum Rotation	50	70	ms	69.2	Pass
Moment about the OC	36	44	Nm	38.9	Pass
Moment Decay to 0 Nm	102	126	ms	115.7	Pass

Transducer Calibrations

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




Neck Rotation
Max: 71.3 deg
Min: -28.5 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: 38.9 Nm
Min: -12.6 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

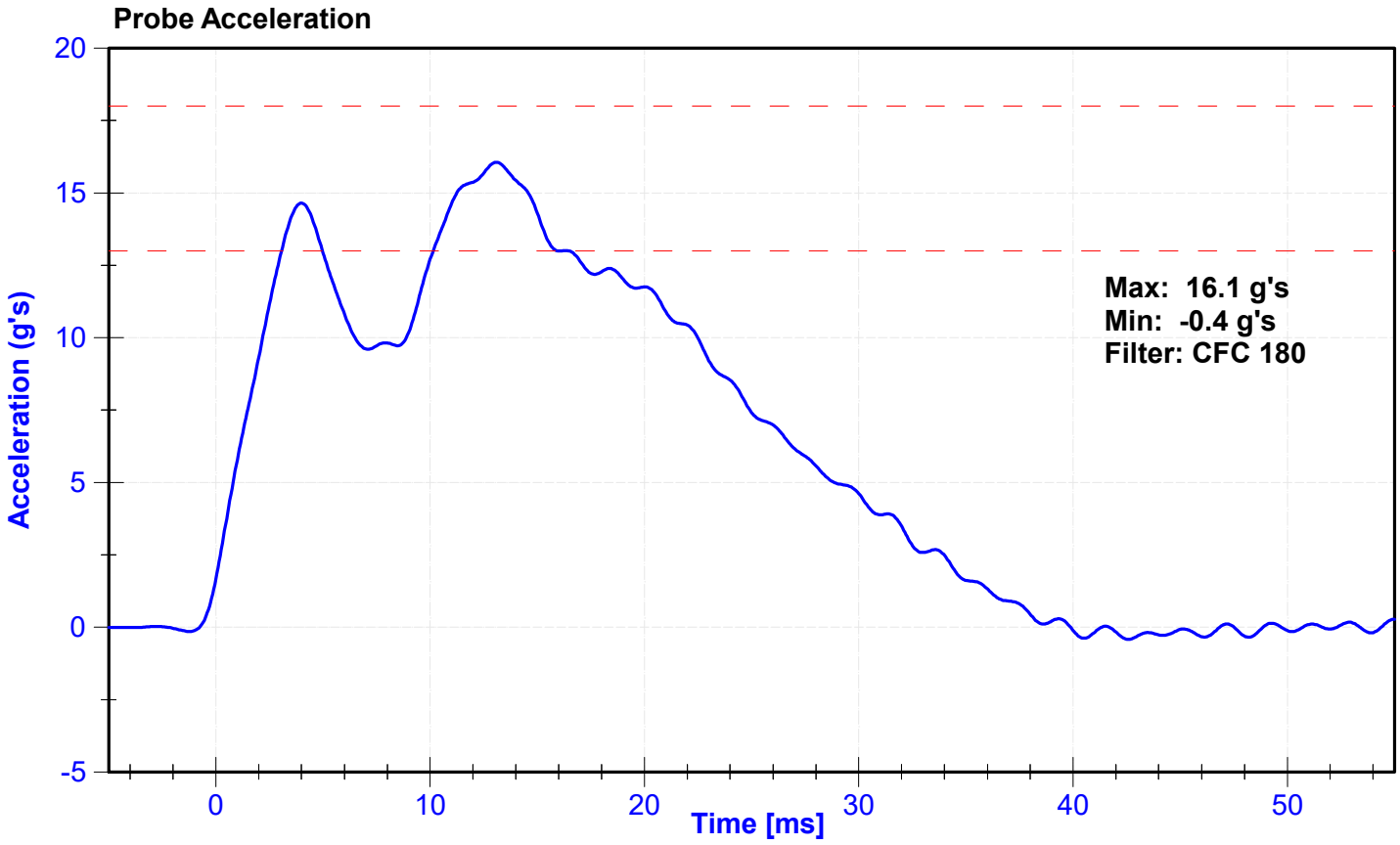
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

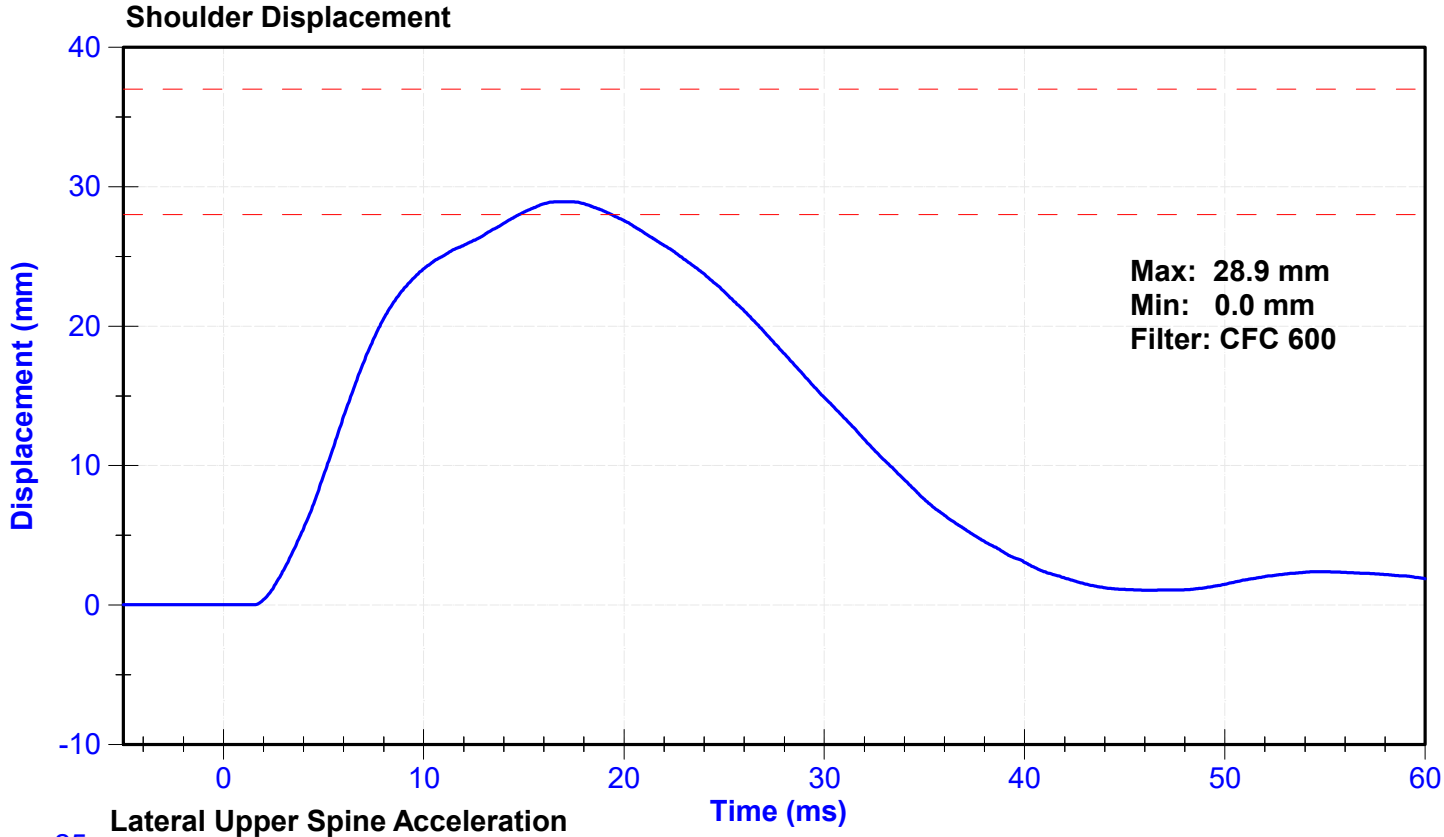
Results

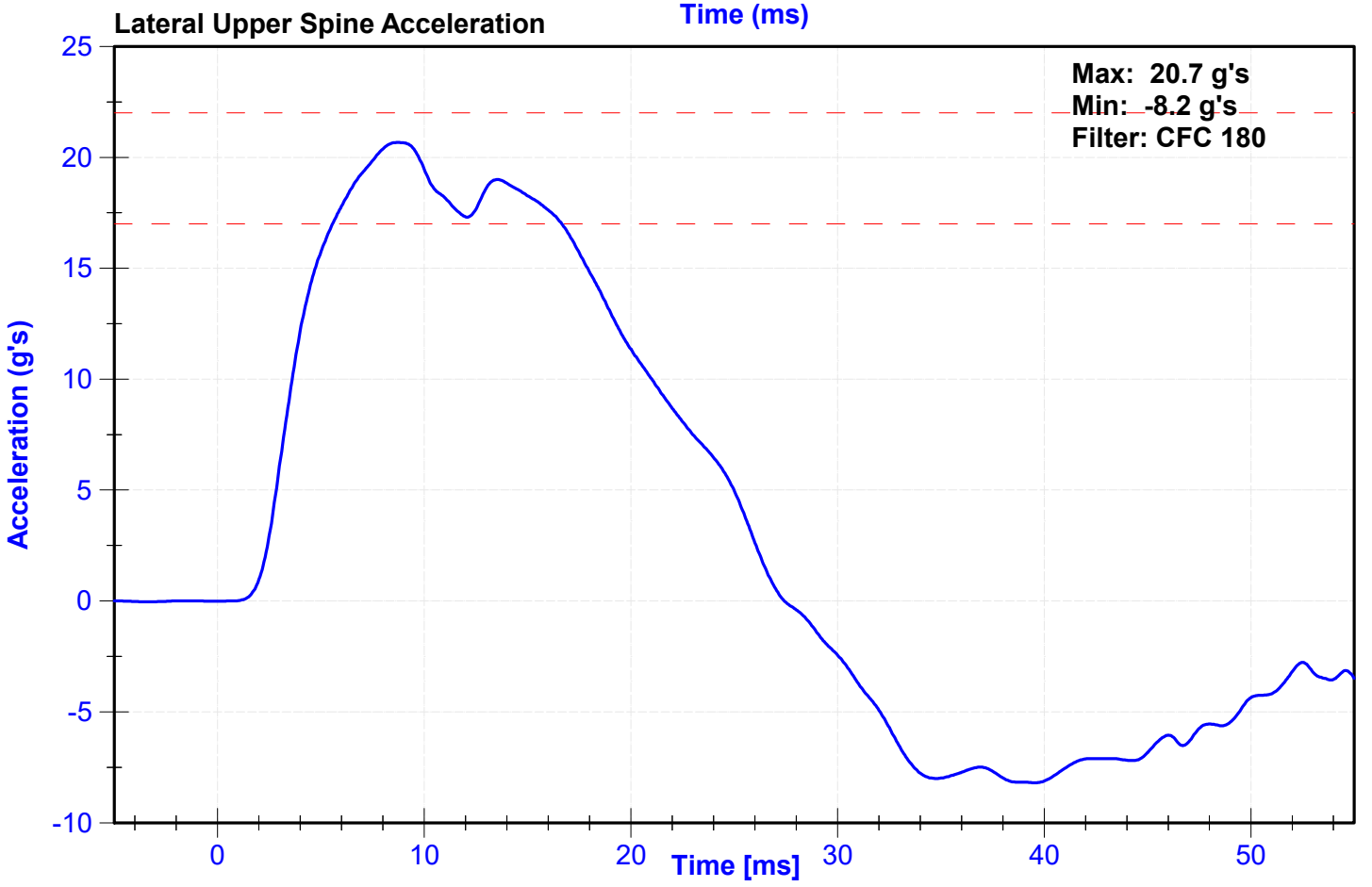
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	56	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	13	18	g's	16.1	Pass
Shoulder Deflection	28	37	mm	28.9	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.7	Pass

Transducer Calibrations

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




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 28.9 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 20.7 g's
Min: -8.2 g's
Filter: CFC 180

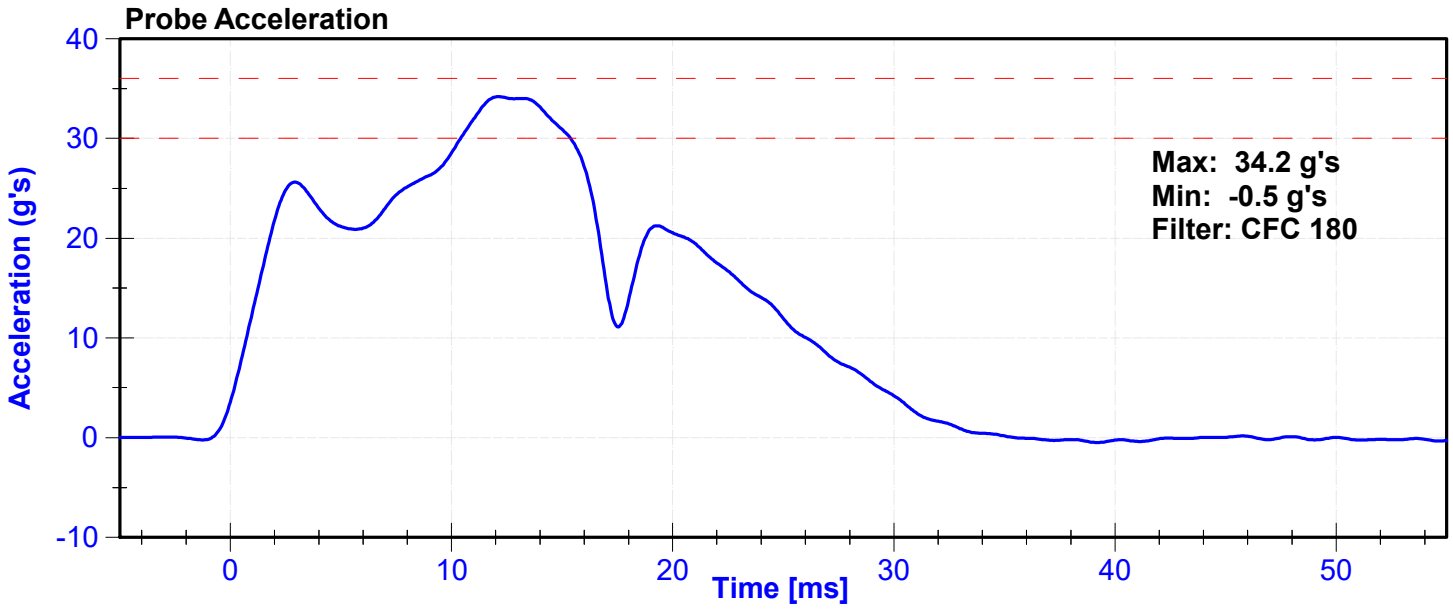
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

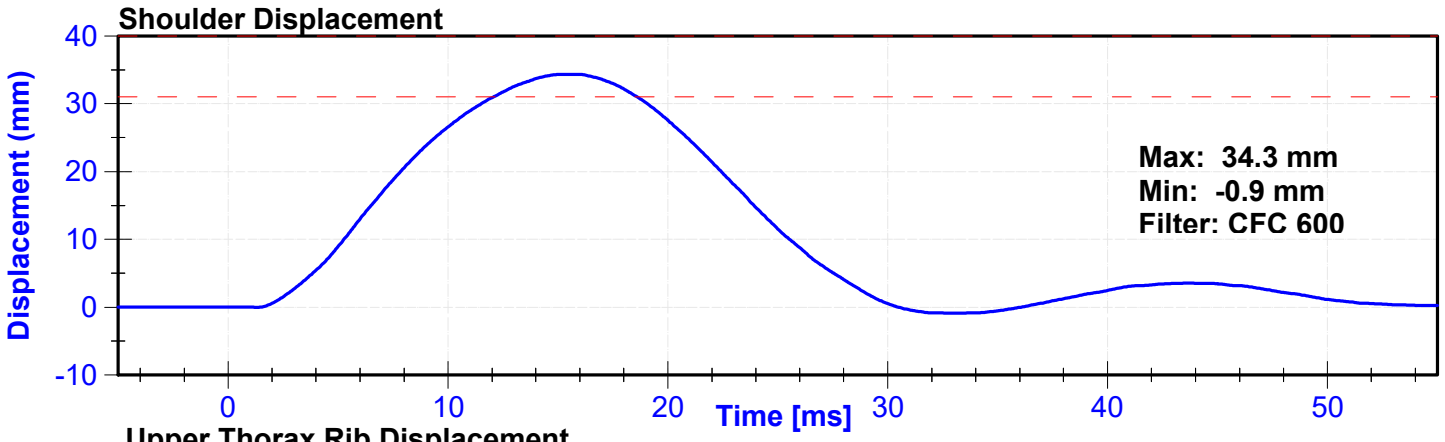
Results

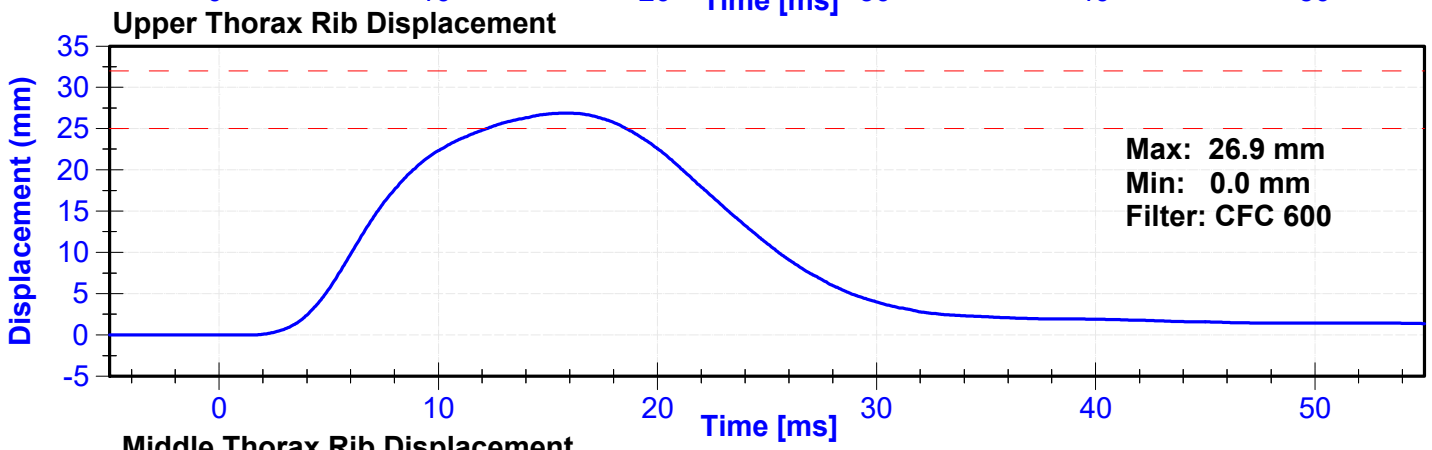
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	56	Pass
Velocity	6.6	6.8	m/s	6.66	Pass
Probe Acceleration after 5 ms	30	36	g's	34.2	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.3	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.2	Pass
Shoulder Deflection	31	40	mm	34.3	Pass
Upper Thorax Rib Deflection	25	32	mm	26.9	Pass
Mid Thorax Rib Deflection	30	36	mm	30.0	Pass
Lower Thorax Rib Deflection	32	38	mm	32.2	Pass

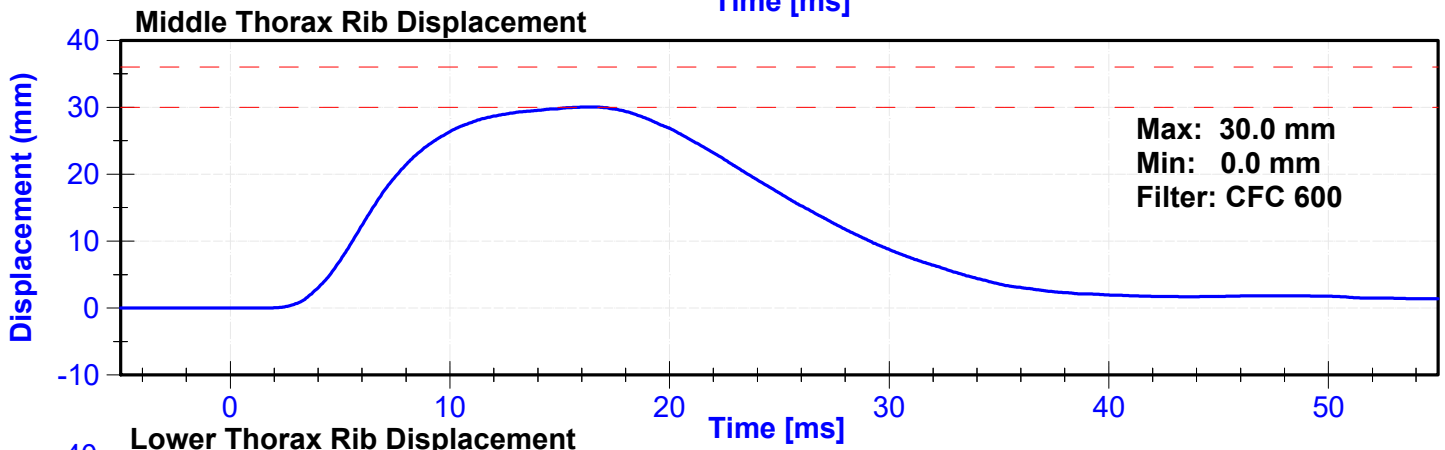
Transducer Calibrations

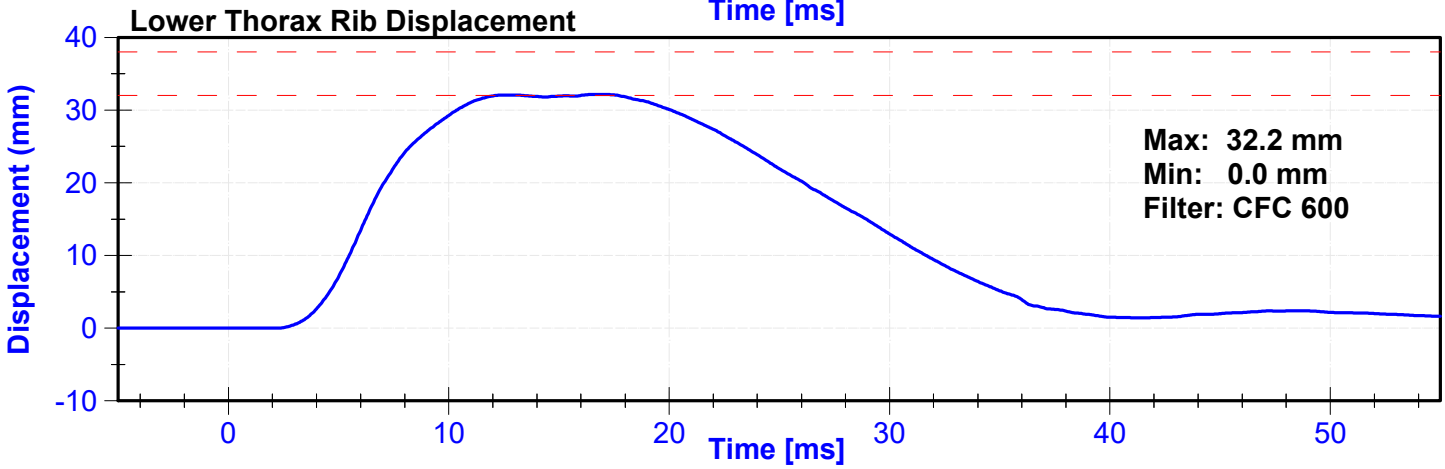
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Upper Spine T1 Y Accelerometer	Endevco	P64148	5/6/2024	11/2/2024
Upper Spine T12 Y Accelerometer	Endevco	P51327	5/6/2024	11/2/2024
Shoulder Potentiometer	Servo	1274GFE	5/6/2024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

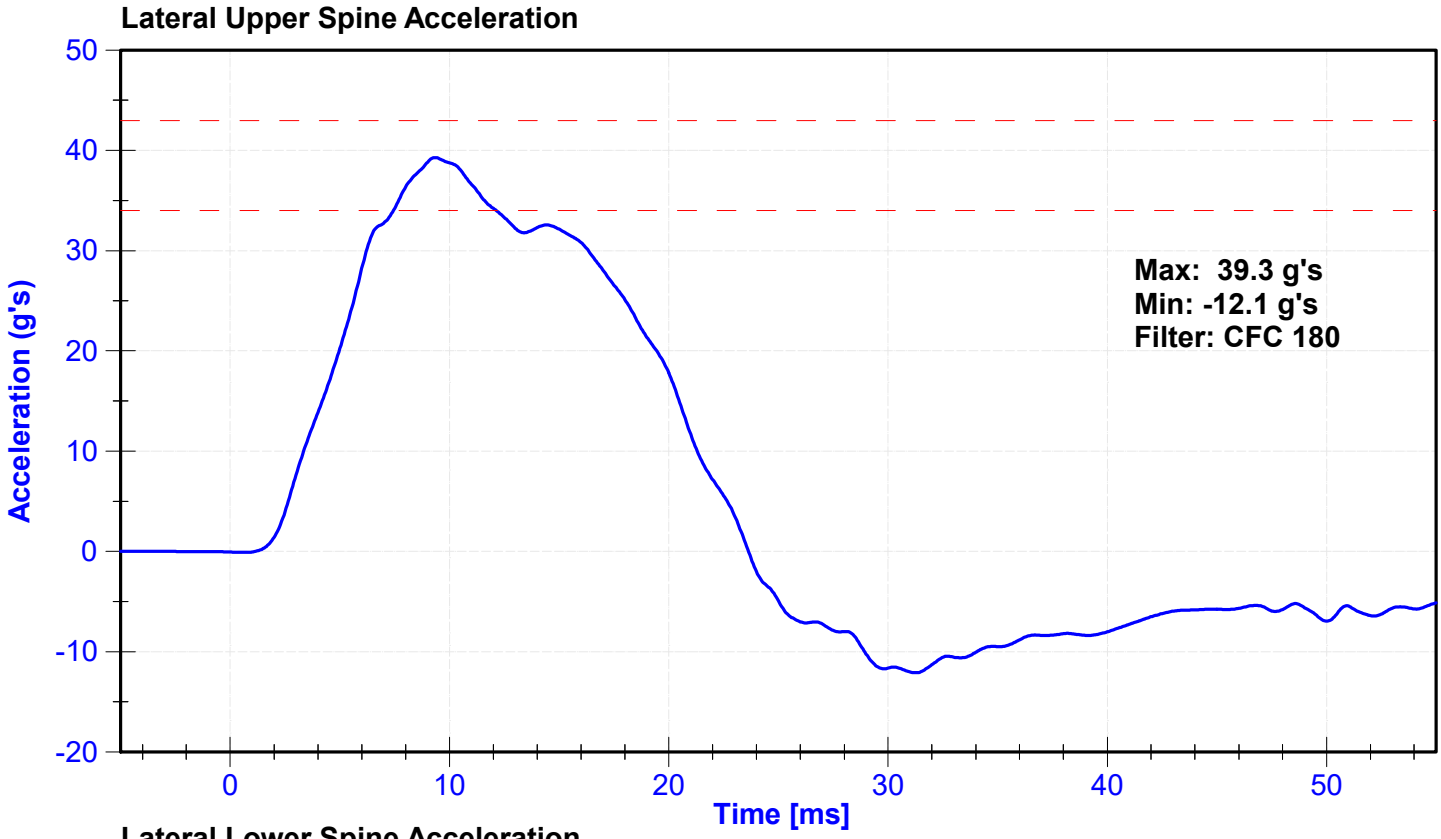


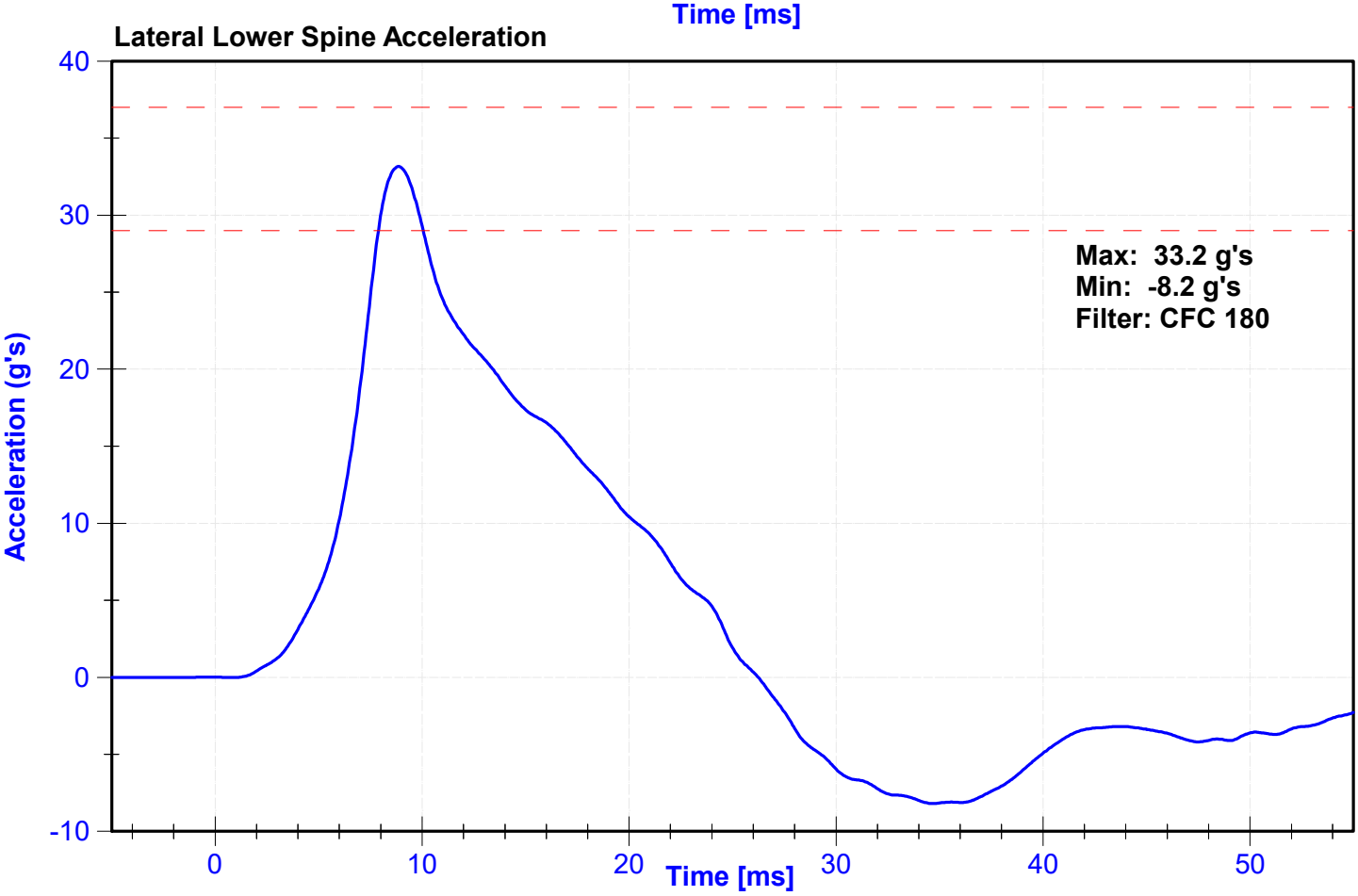

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 34.3 mm
Min: -0.9 mm
Filter: CFC 600


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


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.0 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.2 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 39.3 g's
Min: -12.1 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 33.2 g's
Min: -8.2 g's
Filter: CFC 180

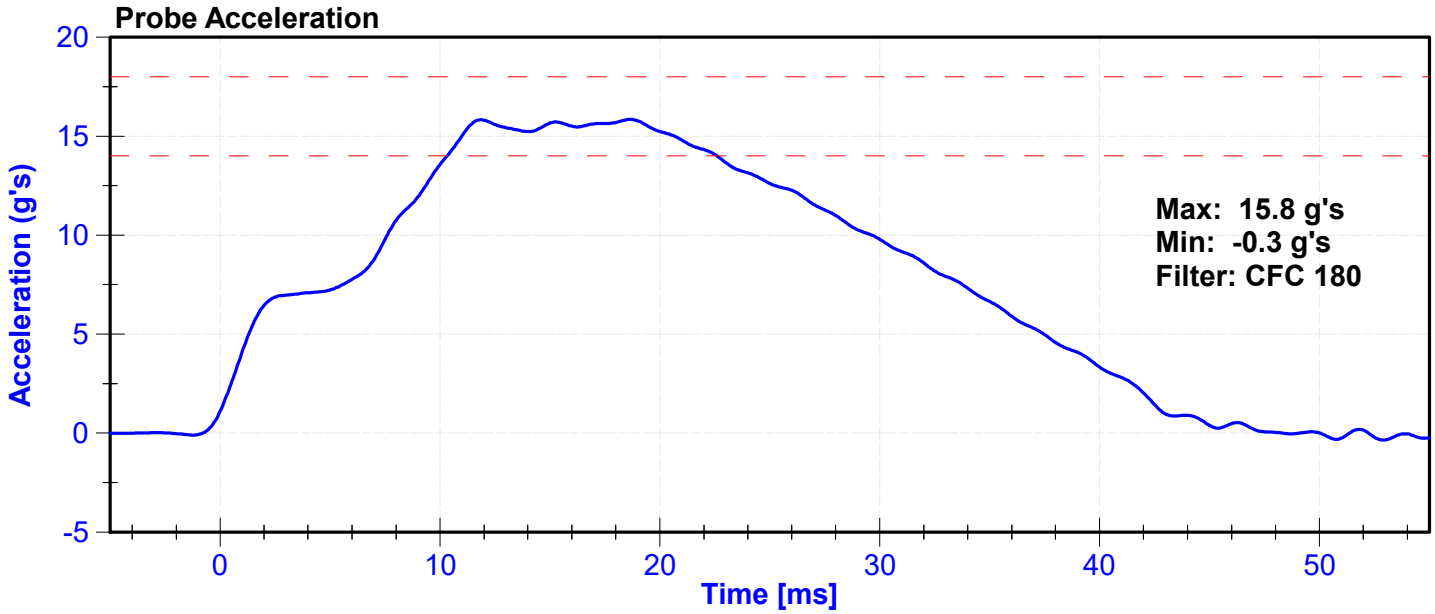
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

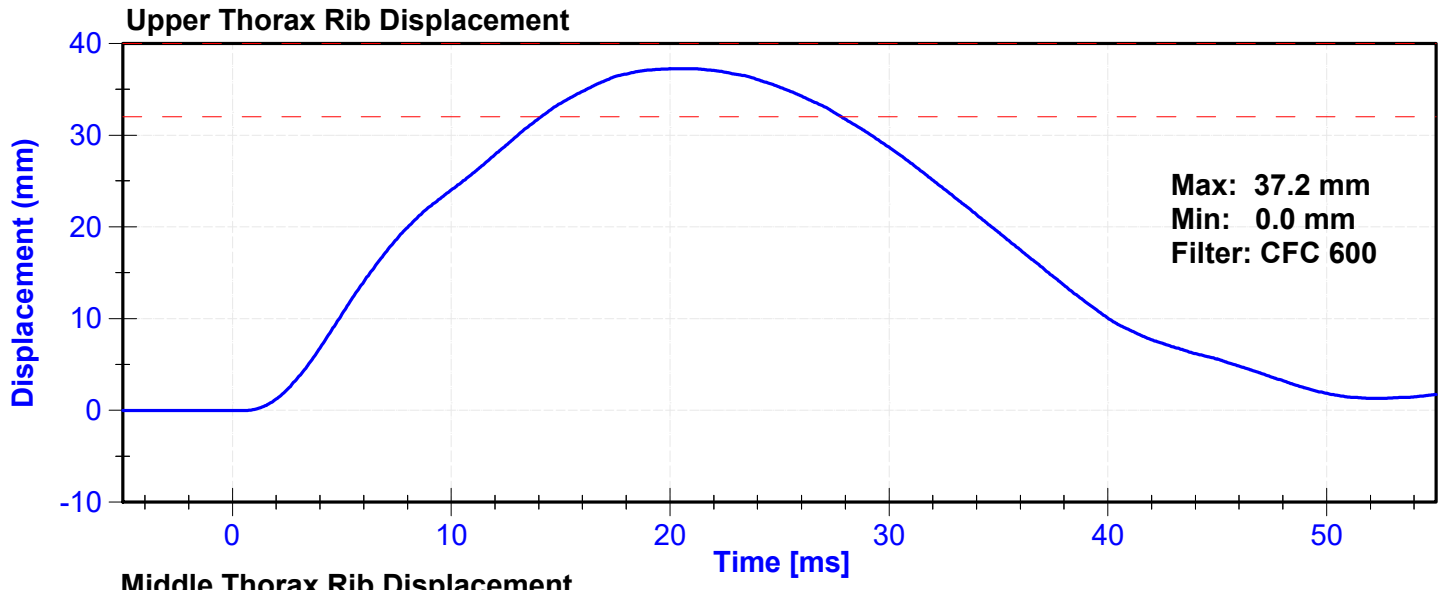
Results

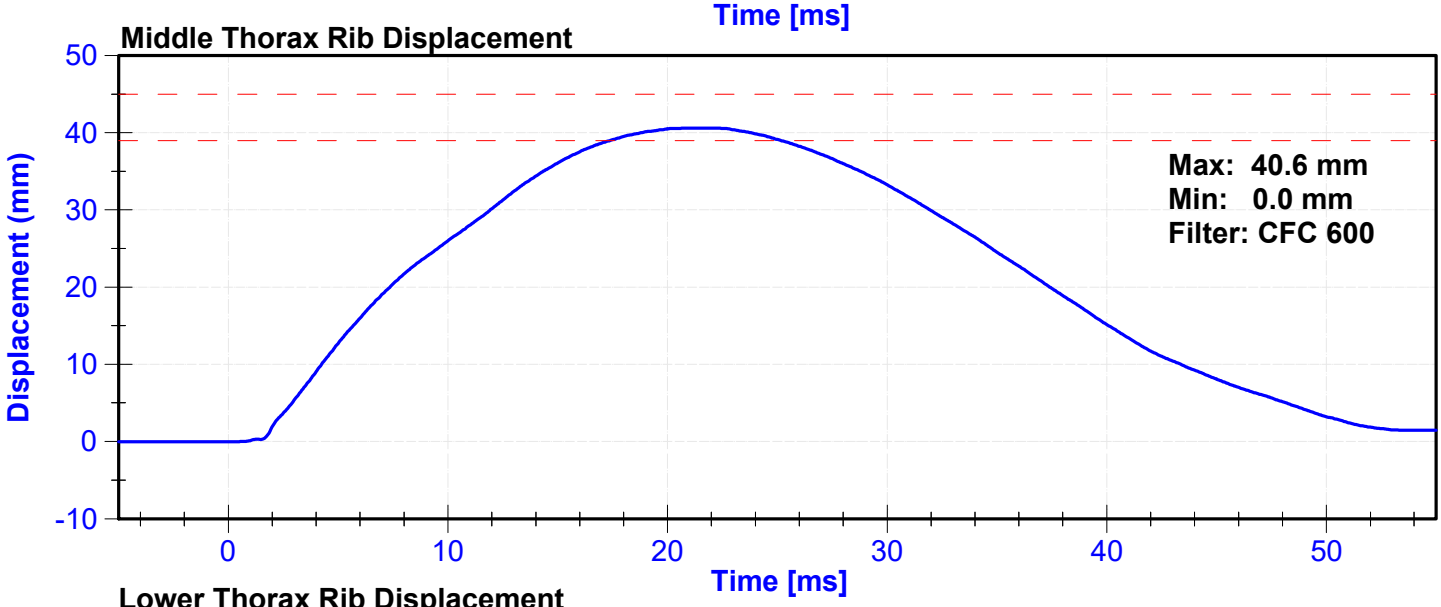
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	56	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	14	18	g's	15.8	Pass
Lateral Upper Spine Acceleration	13	17	g's	16.3	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.2	Pass
Upper Thorax Rib Deflection	32	40	mm	37.2	Pass
Middle Thorax Rib Deflection	39	45	mm	40.6	Pass
Lower Thorax Rib Deflection	35	43	mm	36.9	Pass

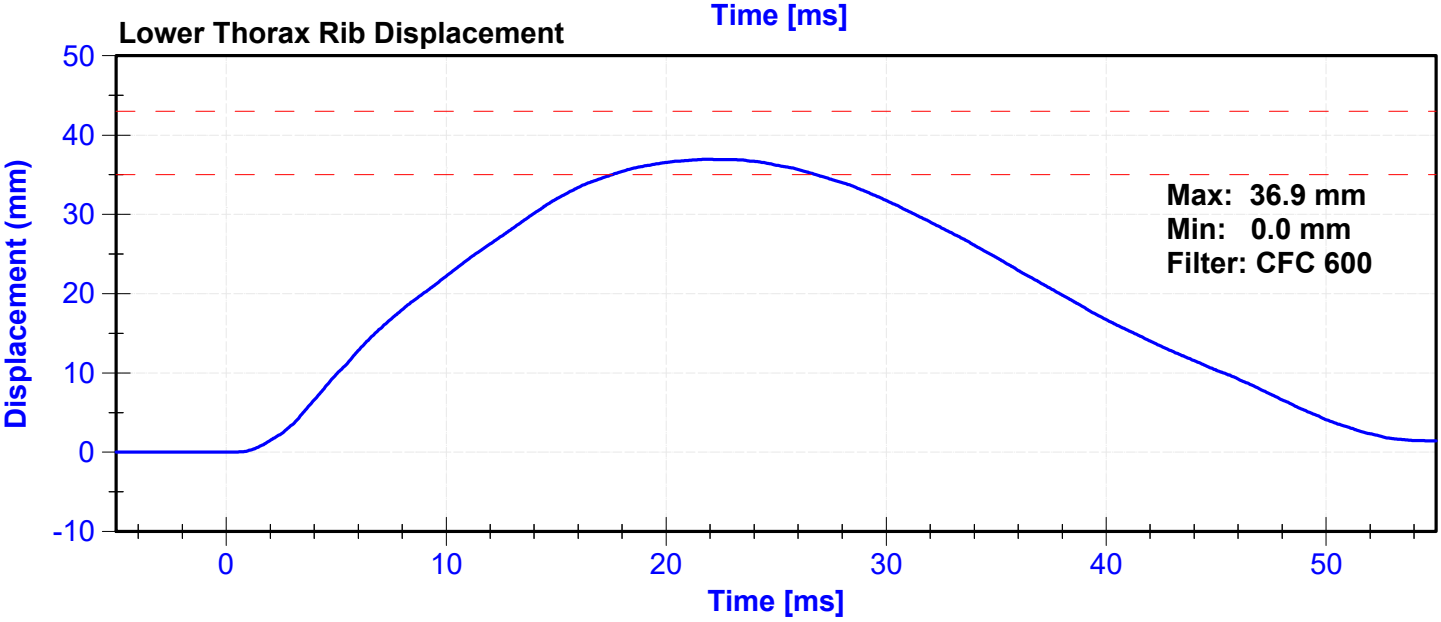
Transducer Calibrations

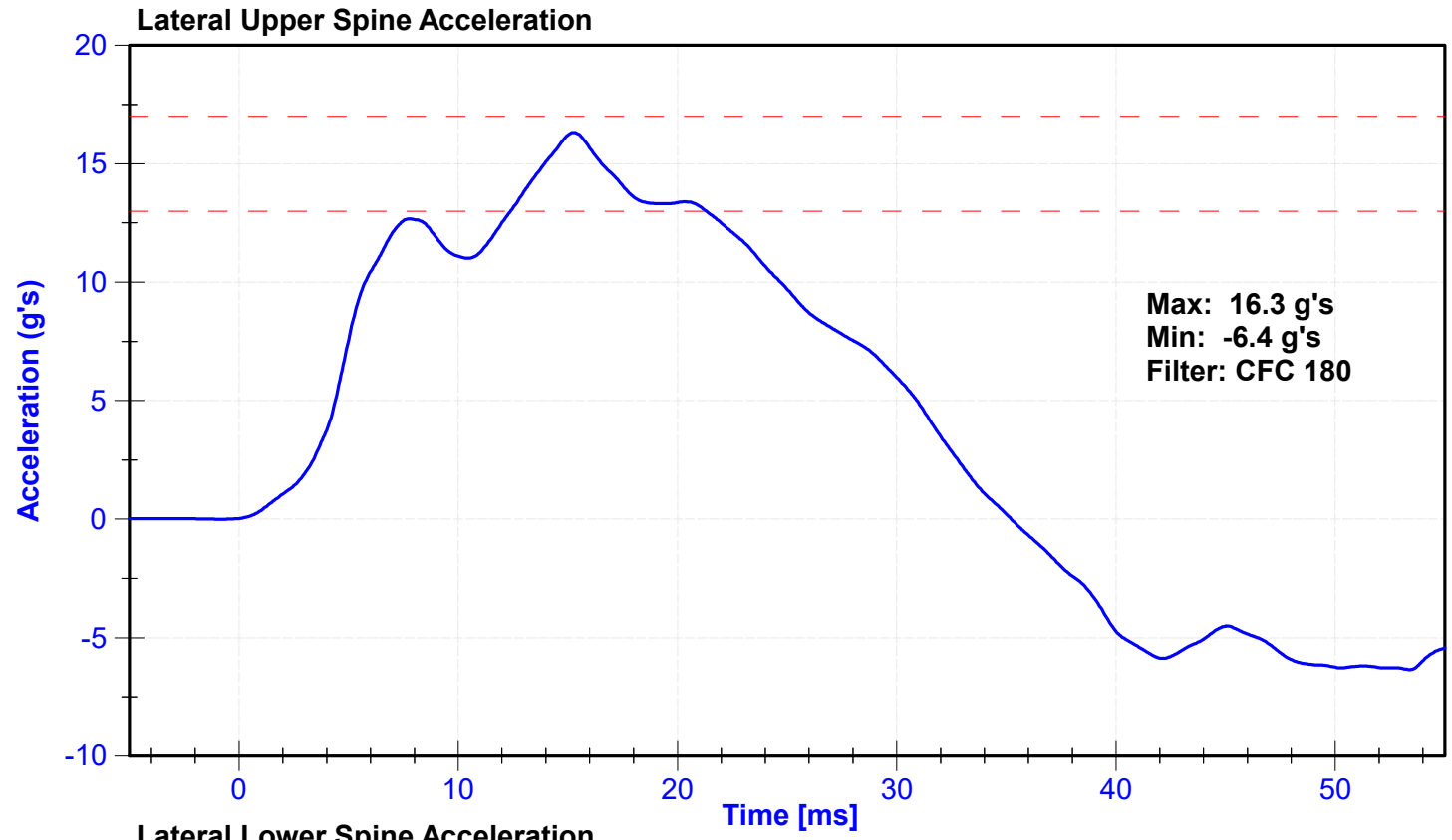
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Upper Spine Y Accelerometer	Endevco	P64148	5/6/2024	11/2/2024
Lower Spine Y Accelerometer	Endevco	P51327	5/6/2024	11/2/2024
Upper Thorax Rib Potentiometer	Servo	1199GFE	5/6/2024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

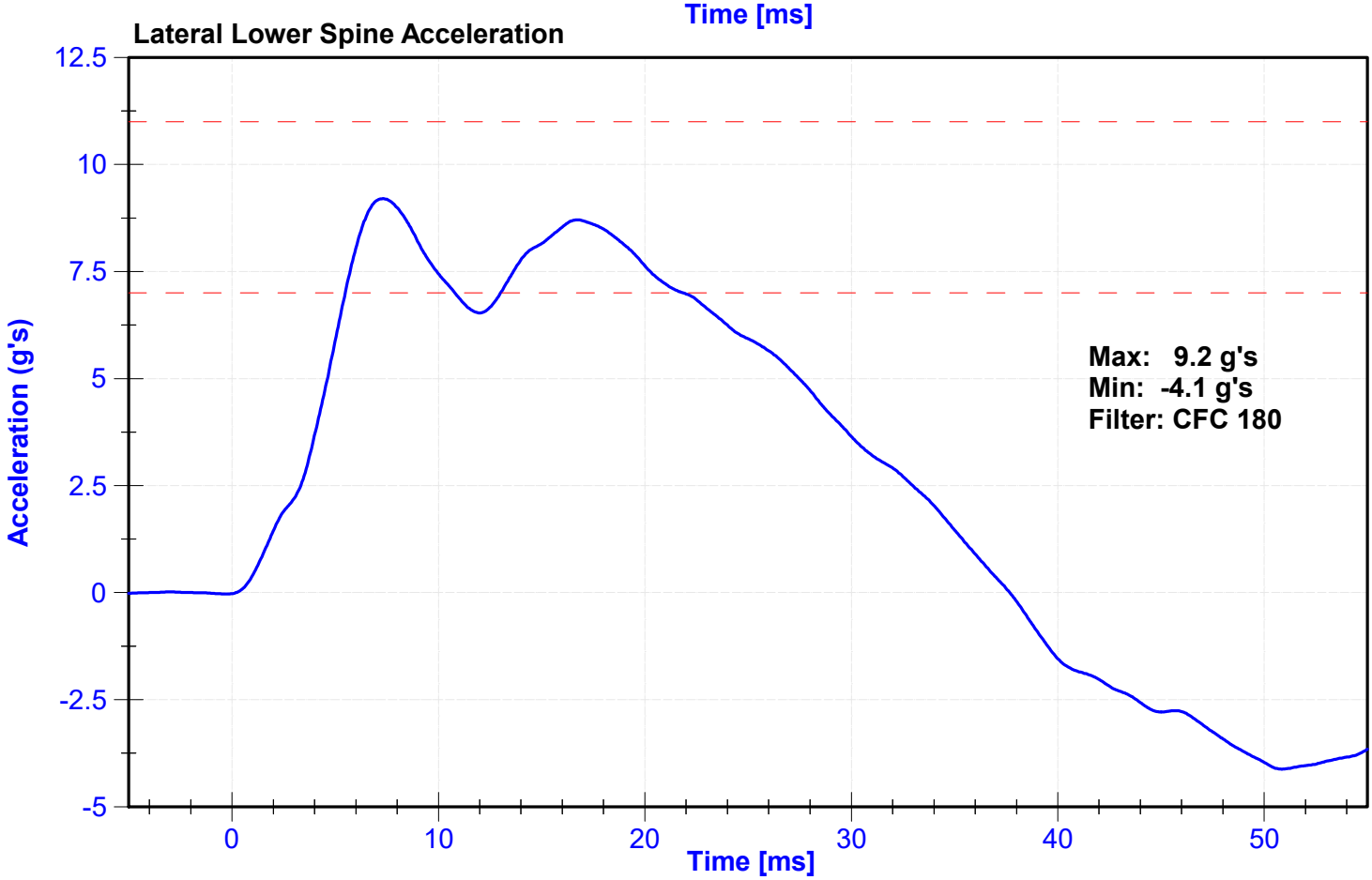



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.2 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.6 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 36.9 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 16.3 g's
Min: -6.4 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.2 g's
Min: -4.1 g's
Filter: CFC 180

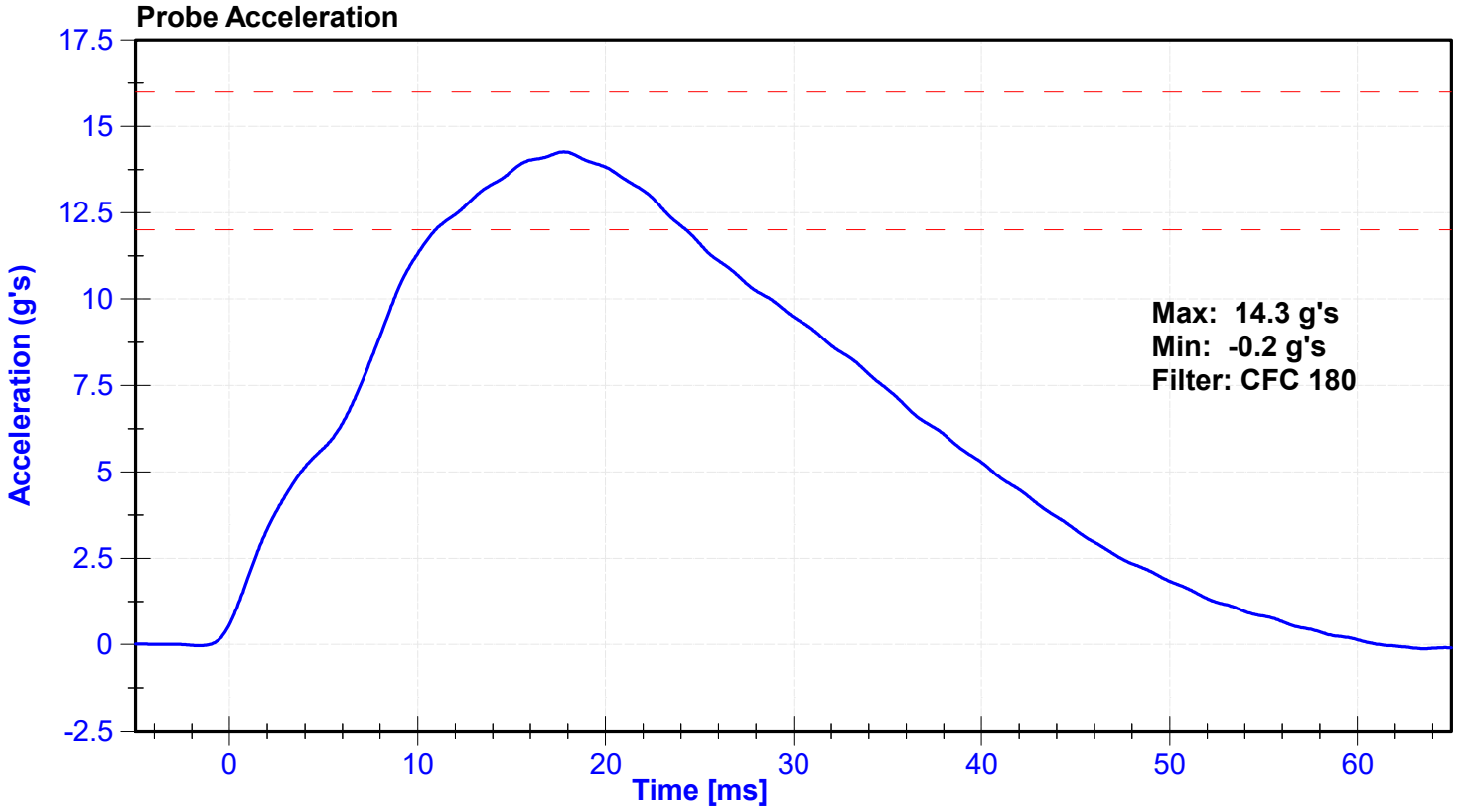
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

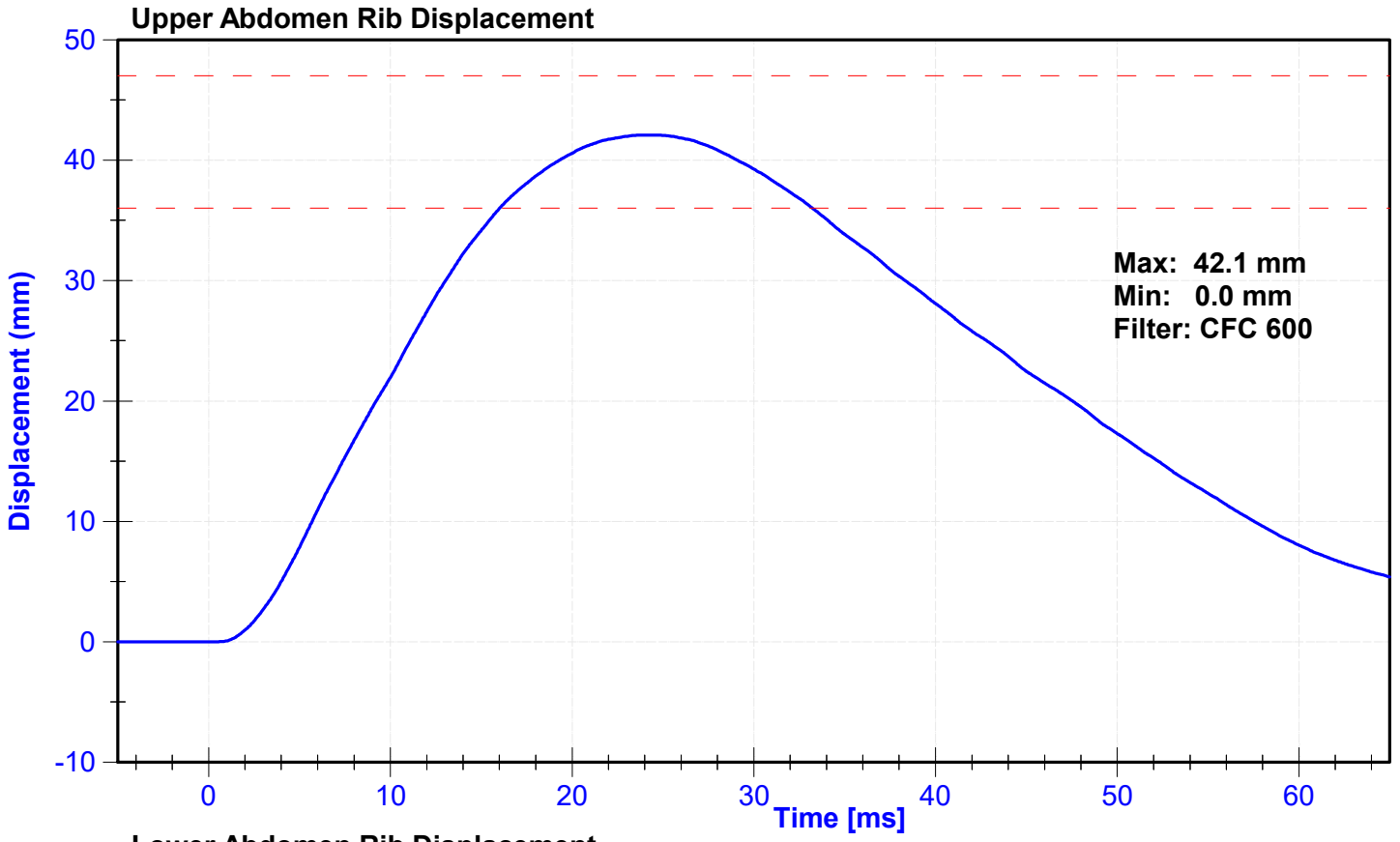
Results

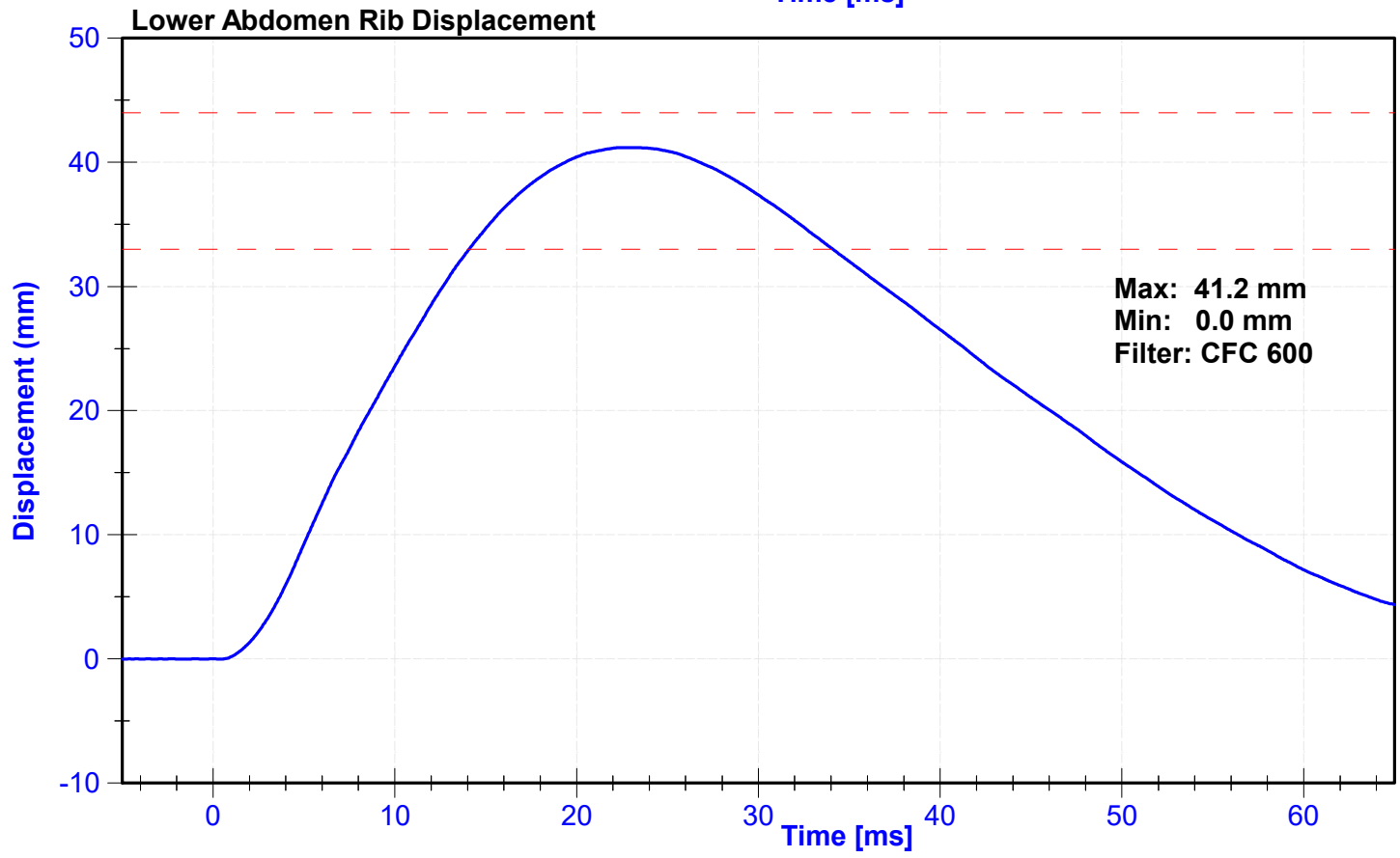
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	56	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	12	16	g's	14.3	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.3	Pass
Upper Abdomen Rib Deflection	36	47	mm	42.1	Pass
Lower Abdomen Rib Deflection	33	44	mm	41.2	Pass

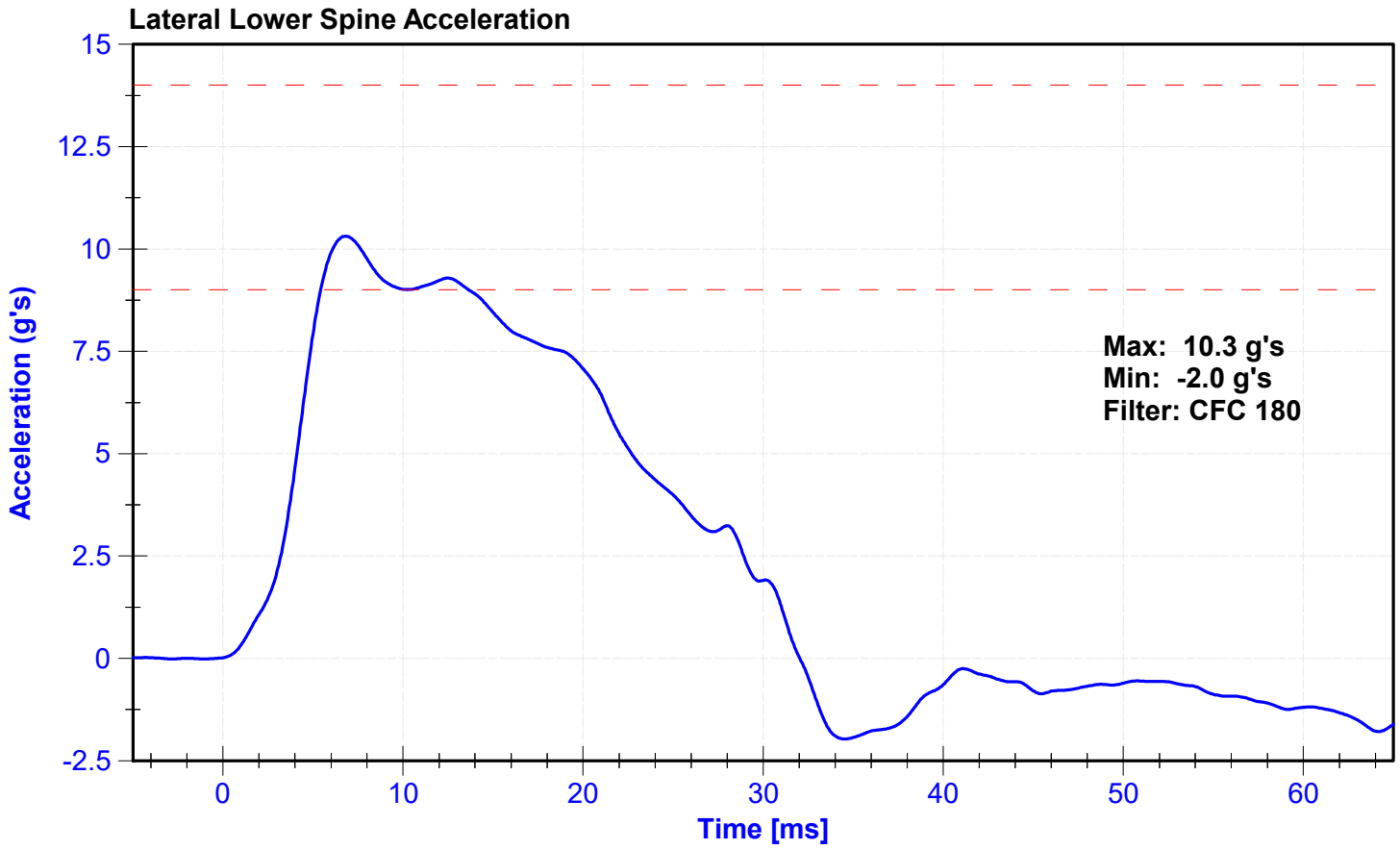
Transducer Calibrations

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




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 42.1 mm
Min: 0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 41.2 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
0
10
20
30
40
50
60
Time [ms]
Max: 10.3 g's
Min: -2.0 g's
Filter: CFC 180

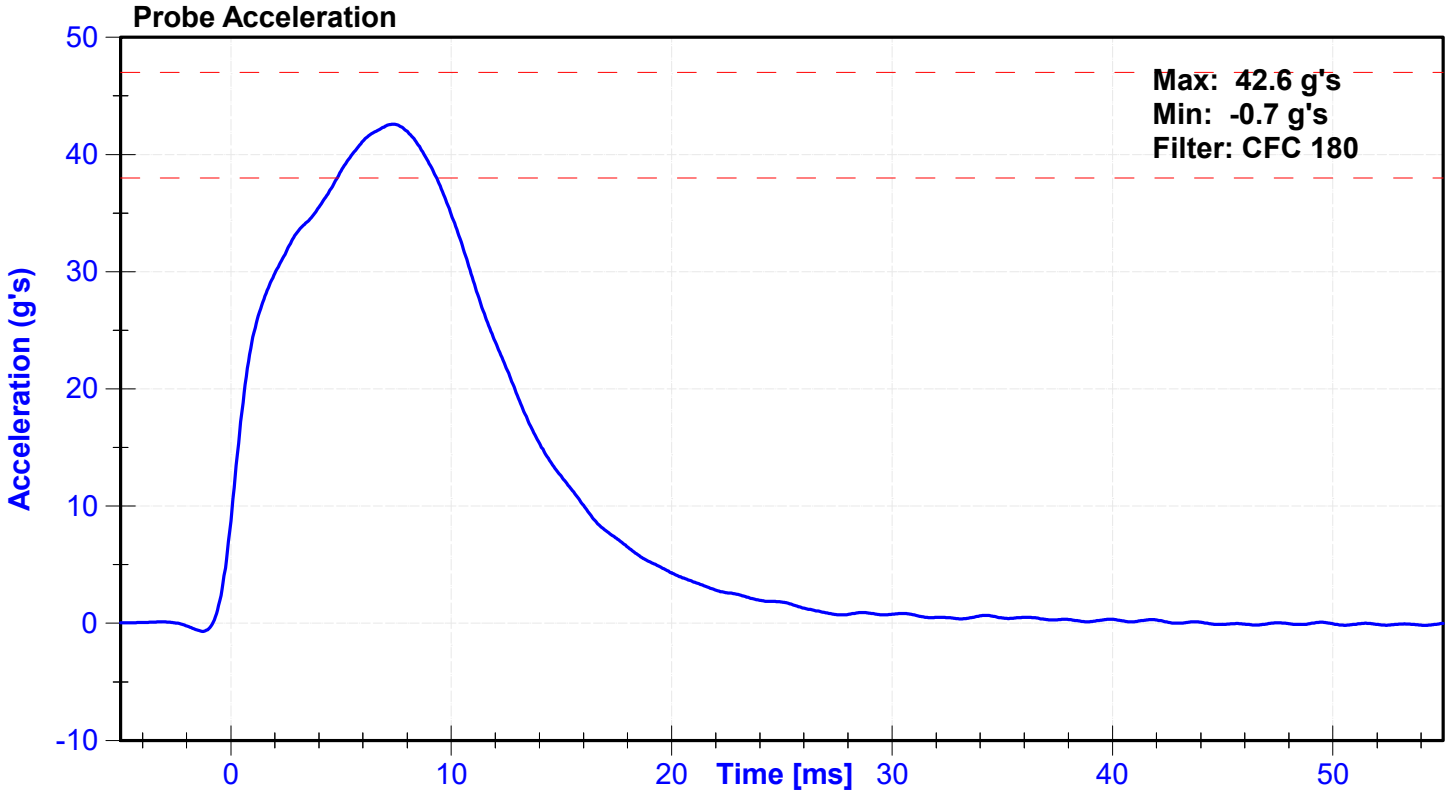
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

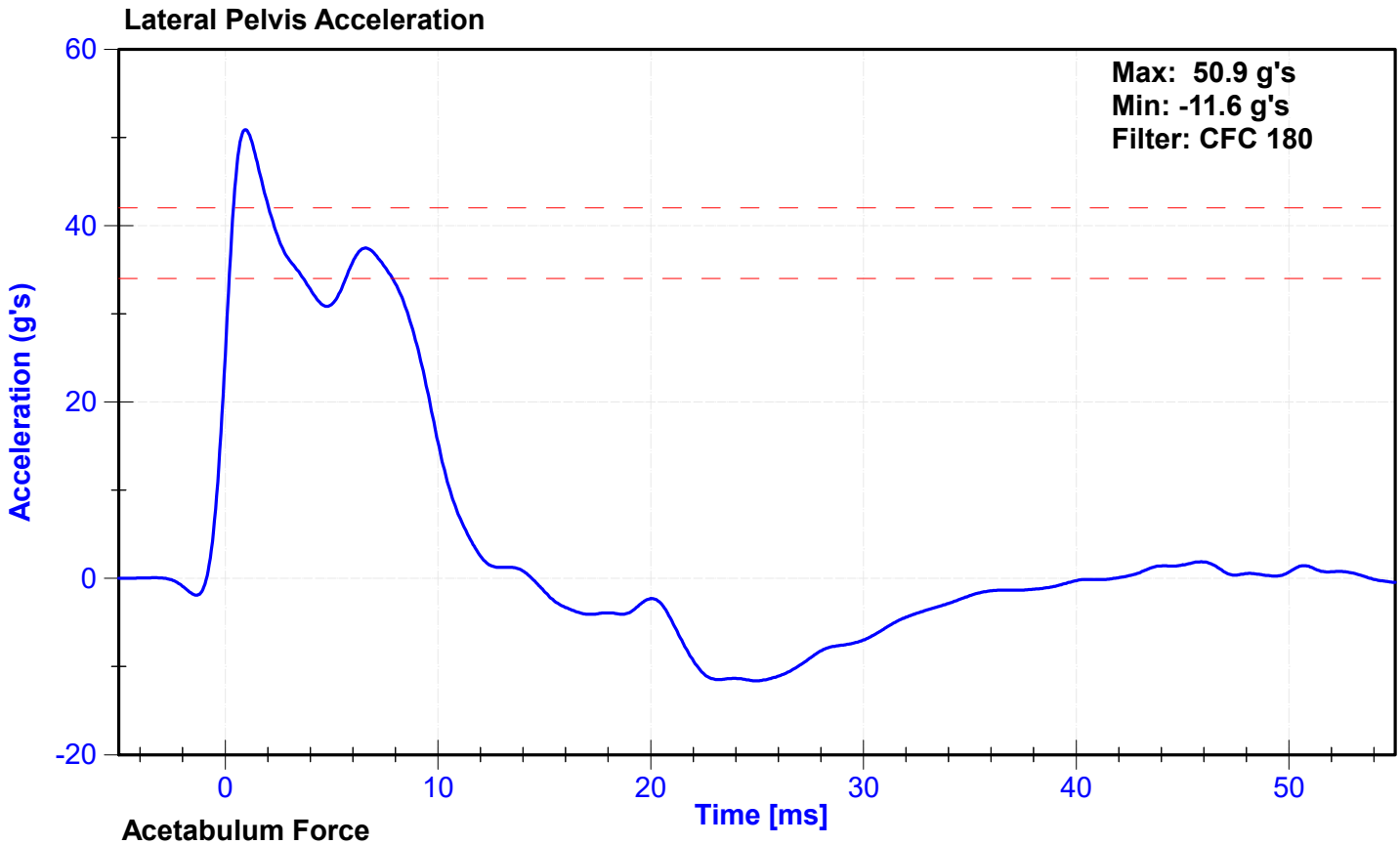
Results

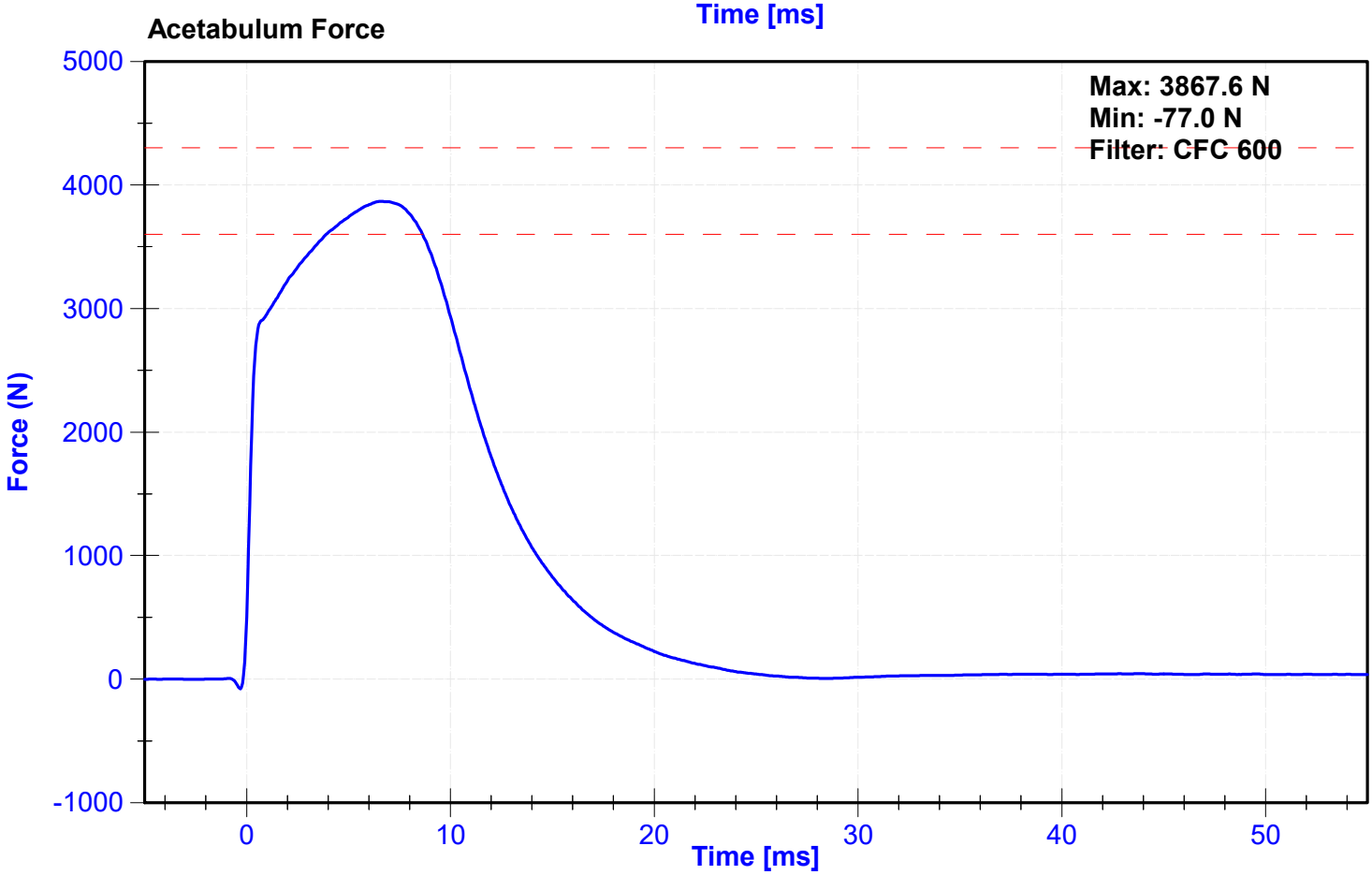
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	56	Pass
Velocity	6.6	6.8	m/s	6.67	Pass
Probe Acceleration	38	47	g's	42.6	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	37.4	Pass
Acetabulum Force	3600	4300	N	3867.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Pelvis Y Accelerometer	Endevco	P50078	5/6/2024	11/2/2024
Acetabulum Load Cell	Humanetics	DS3133-FY	10/25/2023	10/24/2024
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 50.9 g's
Min: -11.6 g's
Filter: CFC 180
Acceleration (g's)
60
40
20
0
-20
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 3867.6 N
Min: -77.0 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 16423
Test Number 22992
Report Number 23050
Test Date 5/23/2022 10:42:37 AM

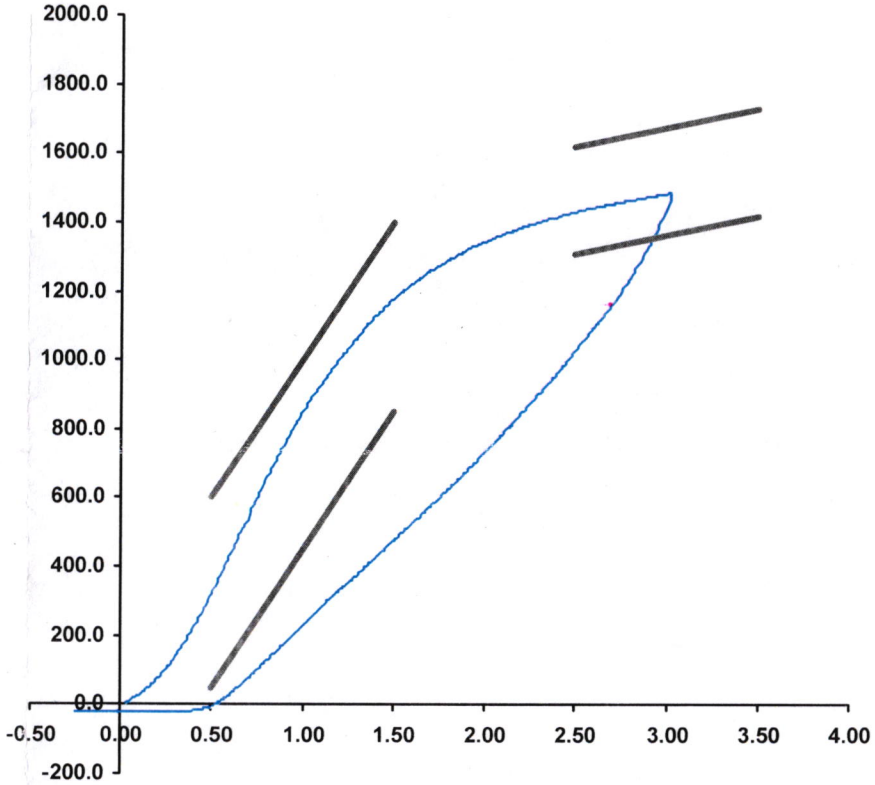
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	320	50	600
Force @ 1.5 mm (N)	1,179	850	1,400
Force @ 2.5 mm (N)	1,430	1,306	1,618
Force @ 3.0 mm (N)	1,482	1,361	1,673

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:
DG8012 Cert Plug 9-12-24

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 23-May-22
SACO Research

By : DC Date : 5/23/2022

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16334
Test Number 22901
Report Number 22958
Test Date 5/20/2022 11:43:02 AM

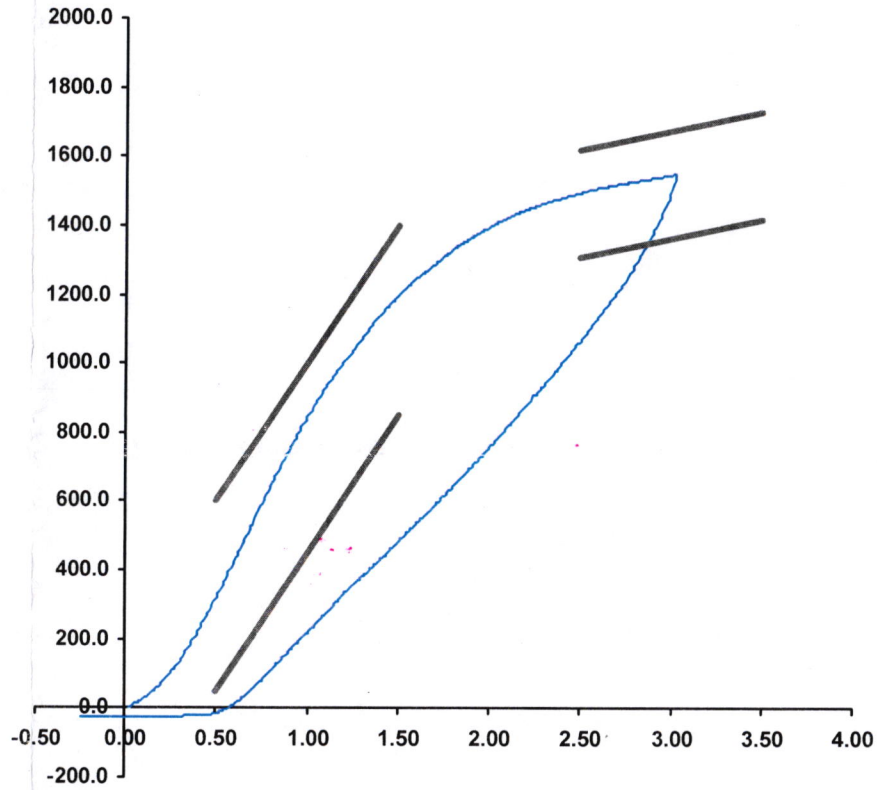
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	322	50	600
Force @ 1.5 mm (N)	1,201	850	1,400
Force @ 2.5 mm (N)	1,494	1,306	1,618
Force @ 3.0 mm (N)	1,546	1,361	1,673

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:
PG8012 Impact 9/12/24

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 20-May-22
SACO Research

By : DC Date : 5/20/2022

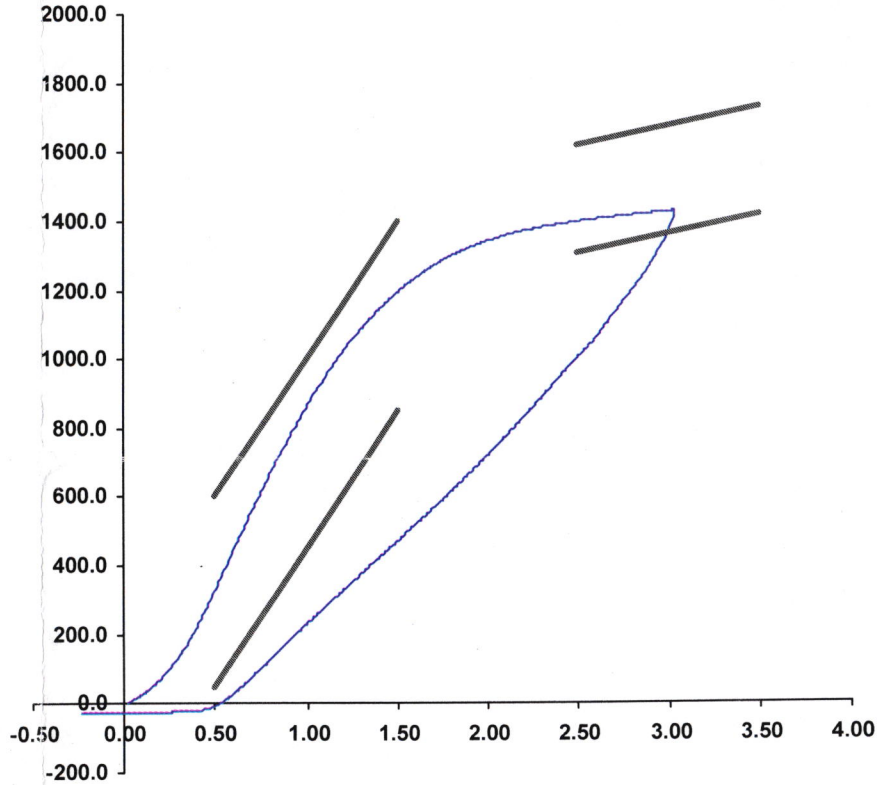
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 13812
Test Number 13246
Report Number 13291
Test Date 5/8/2020 11:56:26 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	333.68	50.00	600.00
Force @ 1.5 mm (N)	1,190.67	850.00	1,400.00
Force @ 2.5 mm (N)	1,395.55	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,424.62	1,361.00	1,673.00

Force (-N) vs Extension (-mm)



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

Notes:
DG8012 Non-Impact 9/12/24

Operator

Part Number 180-4450

Template No 107 08-May-20
SACO Research

By : DC Date : 5/8/2020

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

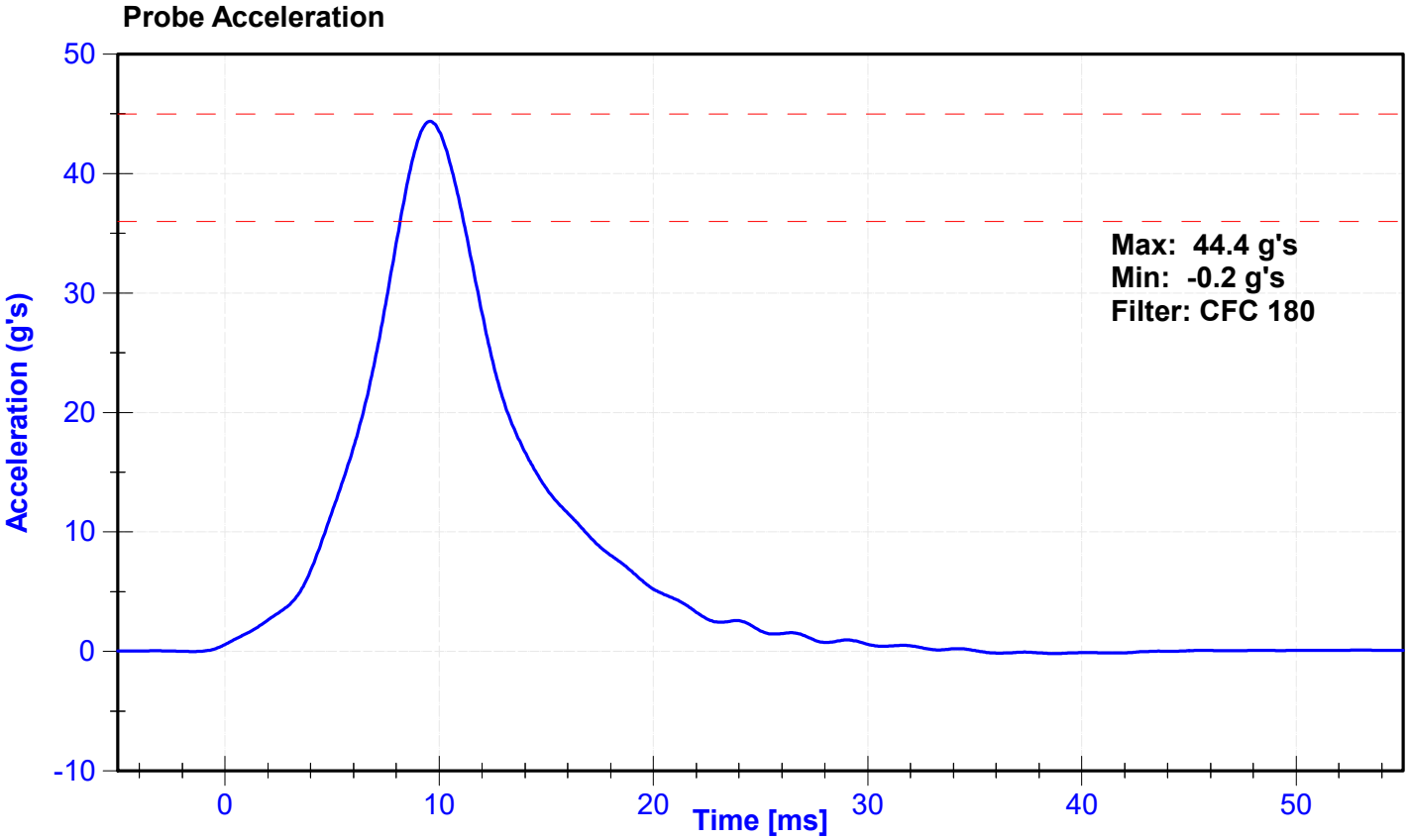
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

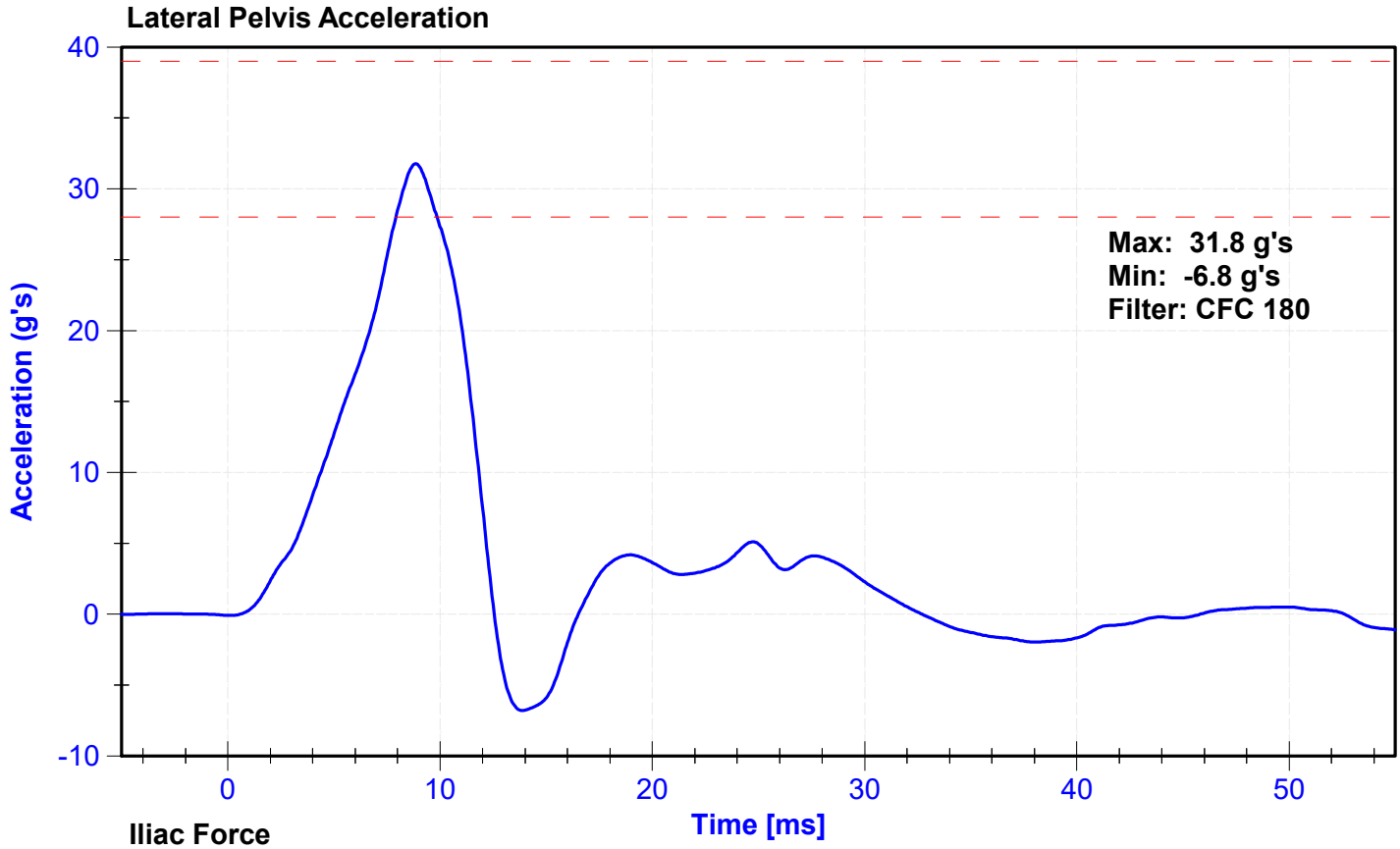
Results

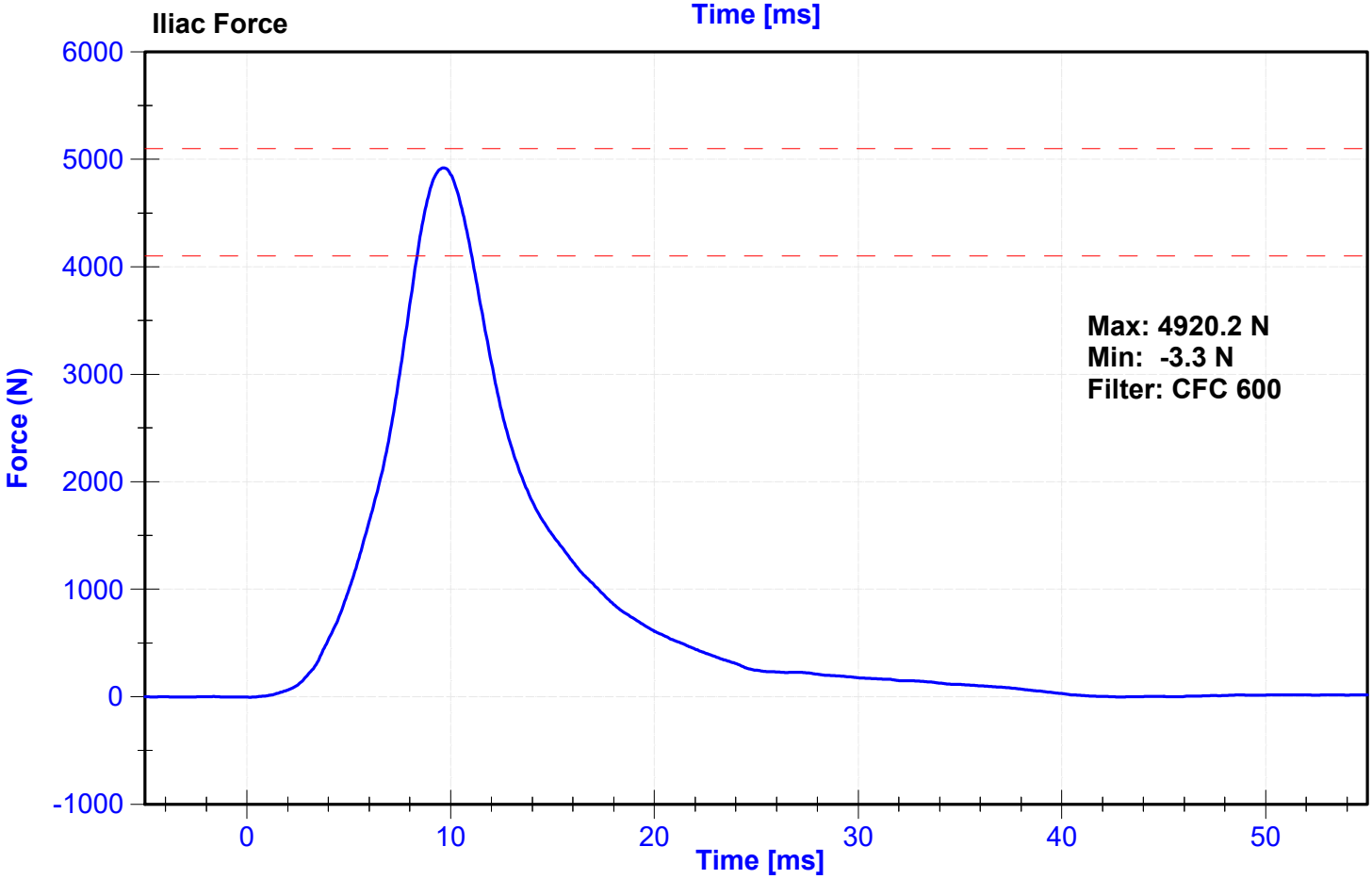
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	56	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	36	45	g's	44.4	Pass
Lateral Pelvis Acceleration	28	39	g's	31.8	Pass
Iliac Force	4100	5100	N	4920.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Pelvis Y Accelerometer	Endevco	P50078	5/6/2024	11/2/2024
Iliac Load Cell	FTSS	225-FY	10/25/2023	10/24/2024




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 31.8 g's
Min: -6.8 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: 4920.2 N
Min: -3.3 N
Filter: CFC 600

CALIBRATION TEST RESULTS

POST-TEST

EUROSID 2 (ES-2RE) MALE – DRIVER ATD

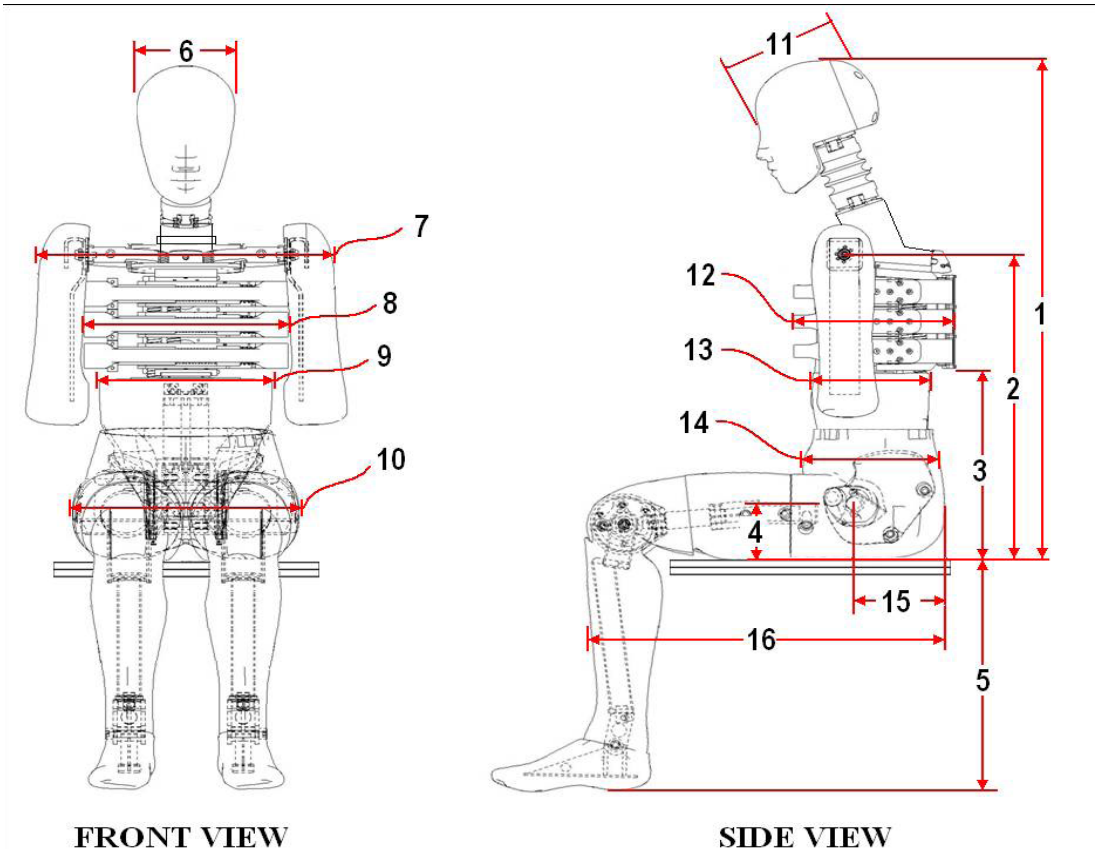
SERIAL NO:F033

(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - EuroSID-2re

Technician: J. Rios Date: 9/23/2024

Dummy Serial Number: F033



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	907	Pass
2	Seat to Shoulder Joint	558	572	562	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	352	Pass
4	Seat to Hip Joint (center of bolt)	97	103	99	Pass
5	Sole to Seat, Sitting	333	451	409	Pass
6	Head Width	152	158	156	Pass
7	Shoulder/Arm Width	461	479	466	Pass
8	Thorax Width	322	332	328	Pass
9	Abdomen Width	273	287	280	Pass
10	Pelvis Lap Width	359	373	365	Pass
11	Head Depth	196	206	203	Pass
12	Thorax Depth	262	272	268	Pass
13	Abdomen Depth	194	204	198	Pass
14	Pelvis Depth	235	245	239	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

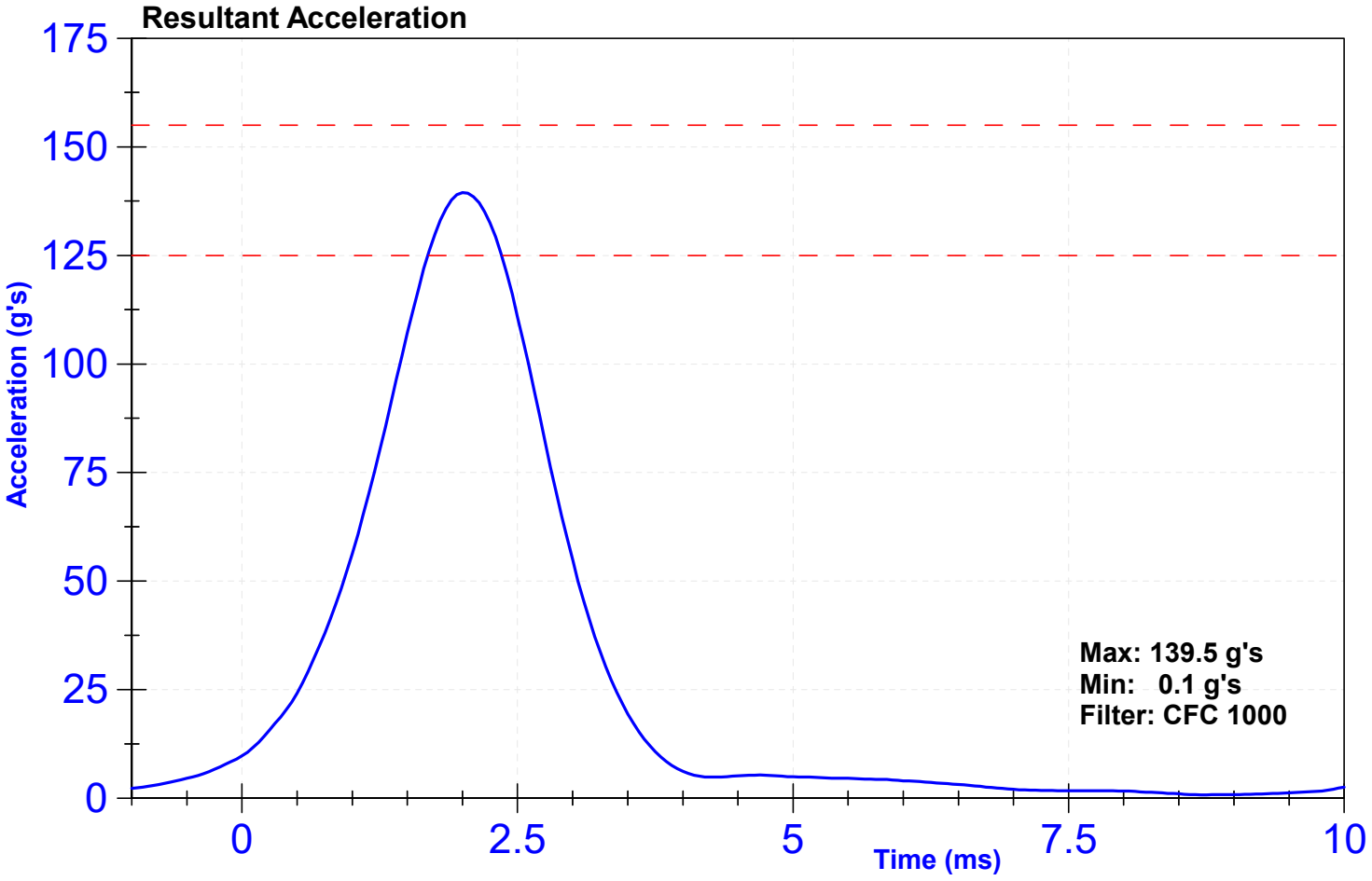
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

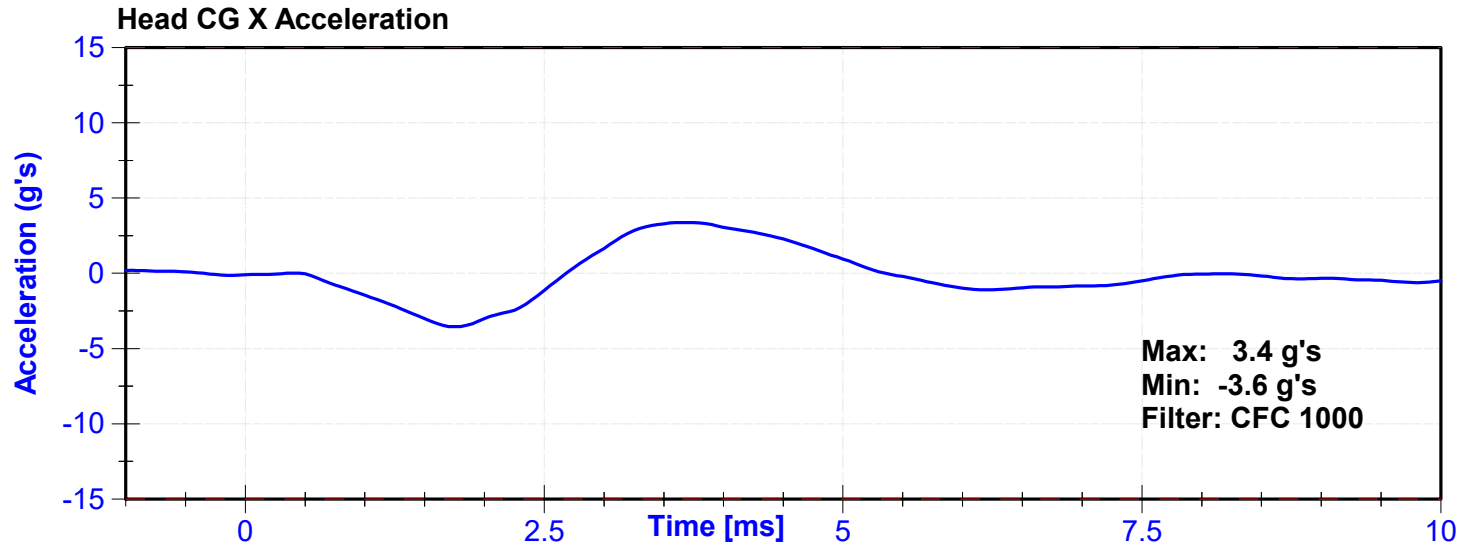
Results

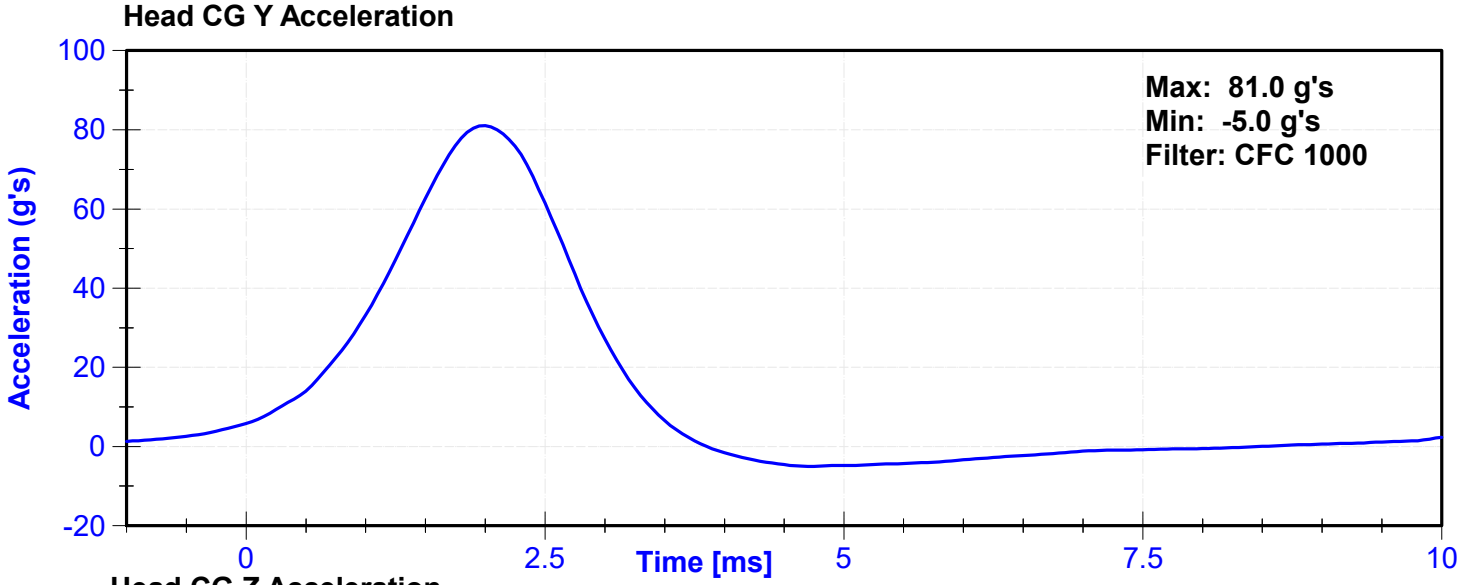
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	58	Pass
Resultant Acceleration	125	155	g's	139.5	Pass
Oscillation	0	15	%	3.81	Pass
Fore-Aft Acceleration	-15	15	g's	-3.6	Pass

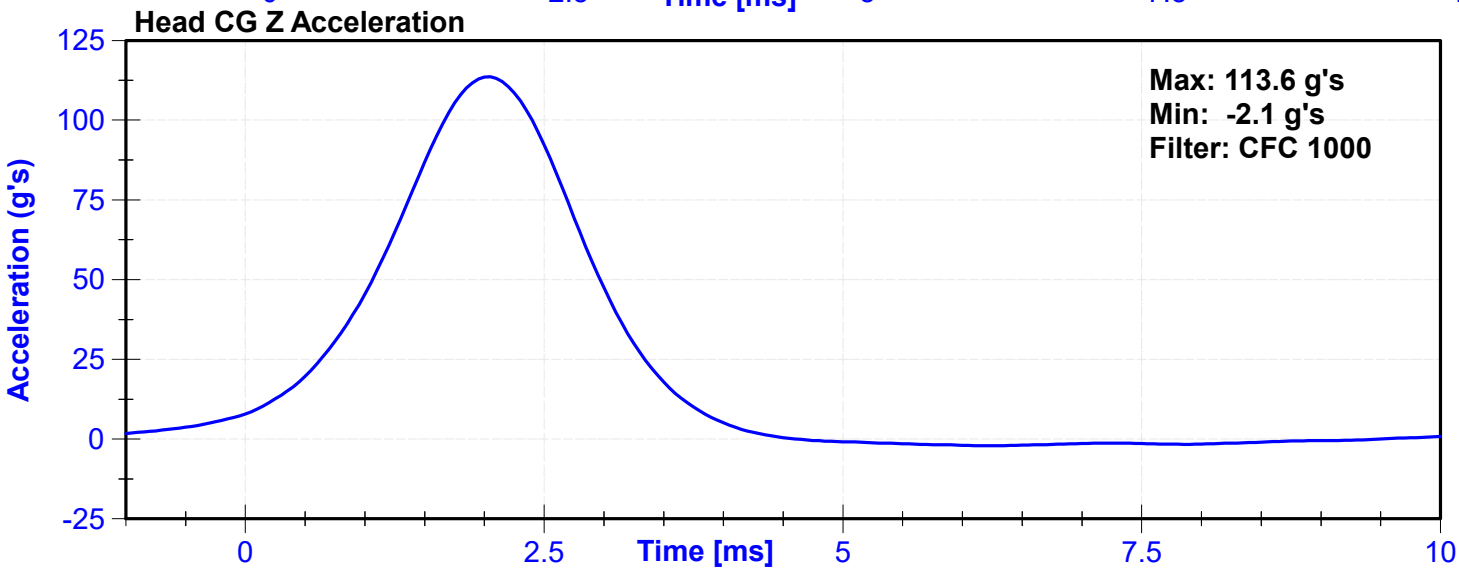
Transducer Calibrations

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




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
Time [ms]
5
7.5
10
Max: 3.4 g's
Min: -3.6 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
100
80
60
40
20
0
-20
0
2.5
Time [ms]
5
7.5
10
Max: 81.0 g's
Min: -5.0 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2.5
Time [ms]
5
7.5
10
Max: 113.6 g's
Min: -2.1 g's
Filter: CFC 1000

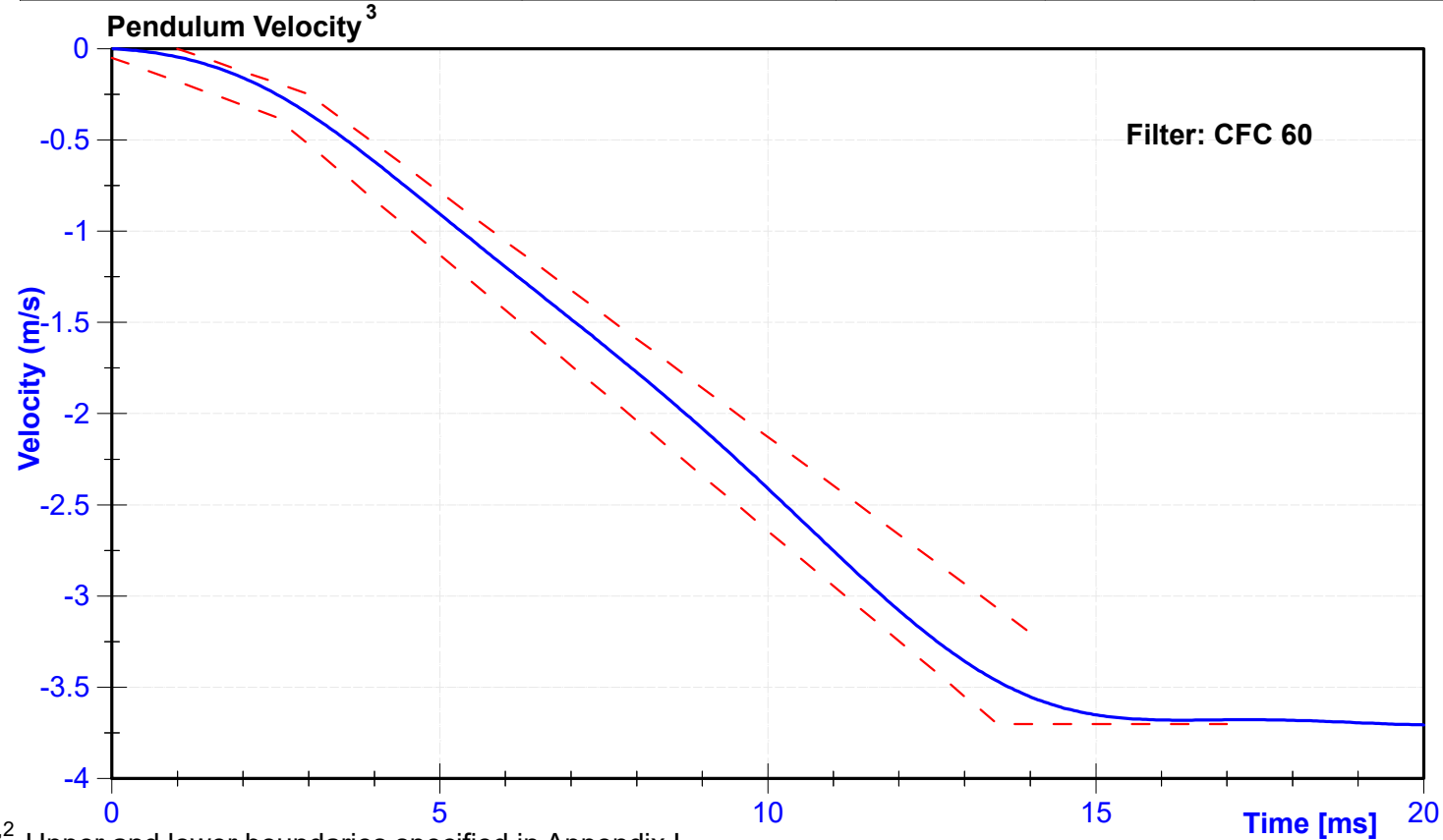
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

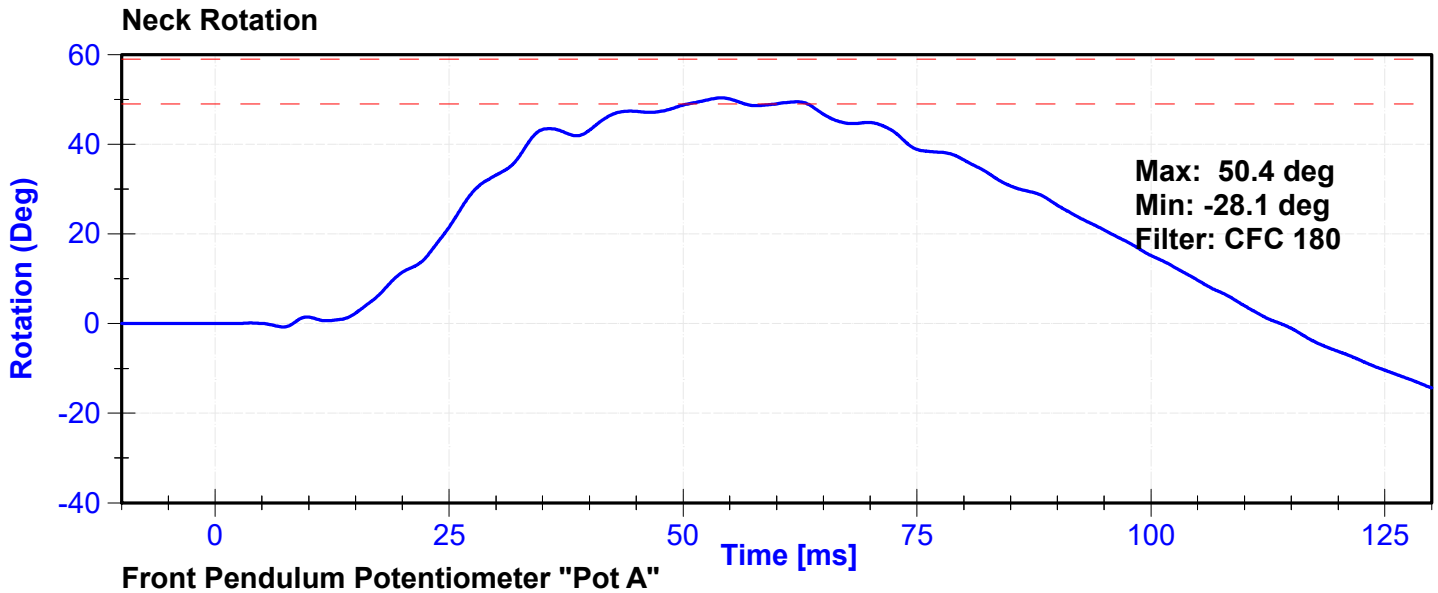
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	53.0	Pass
Velocity	3.3	3.5	m/s	3.49	Pass
Lateral Neck Rotation	49	59	deg	50.4	Pass
Time at Maximum Rotation	54	66	ms	54.1	Pass
Time of Rotation Decay from Maximum	53	88	ms	59.8	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

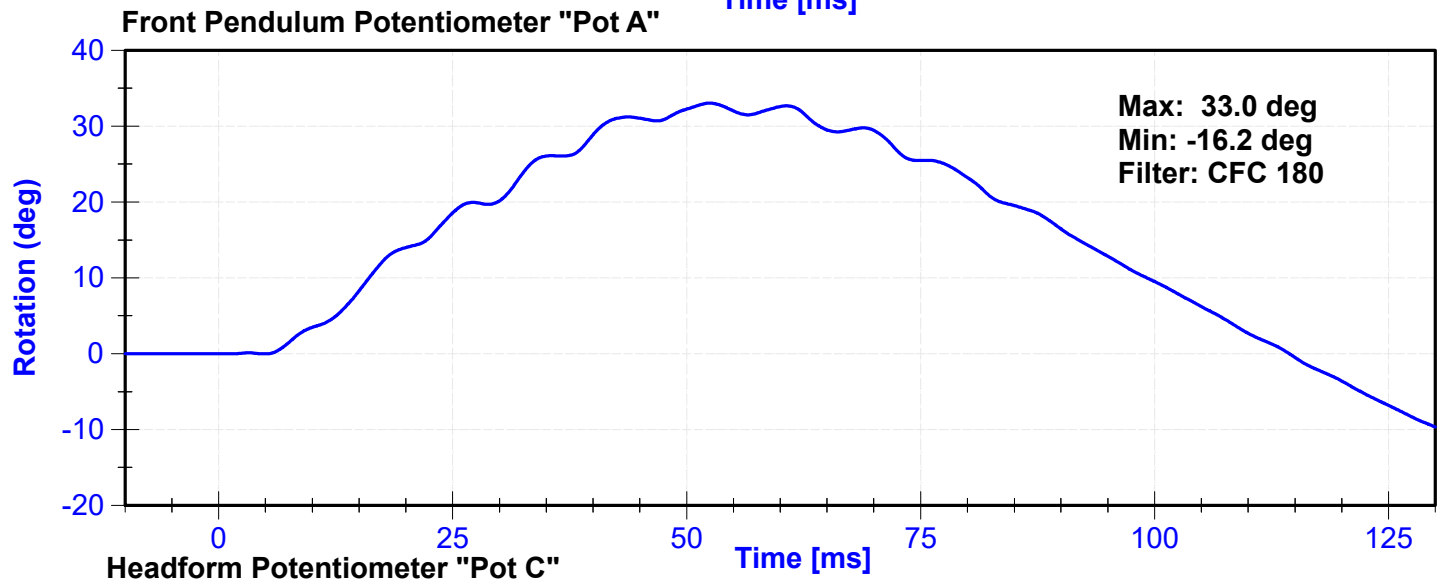
Transducer Calibrations

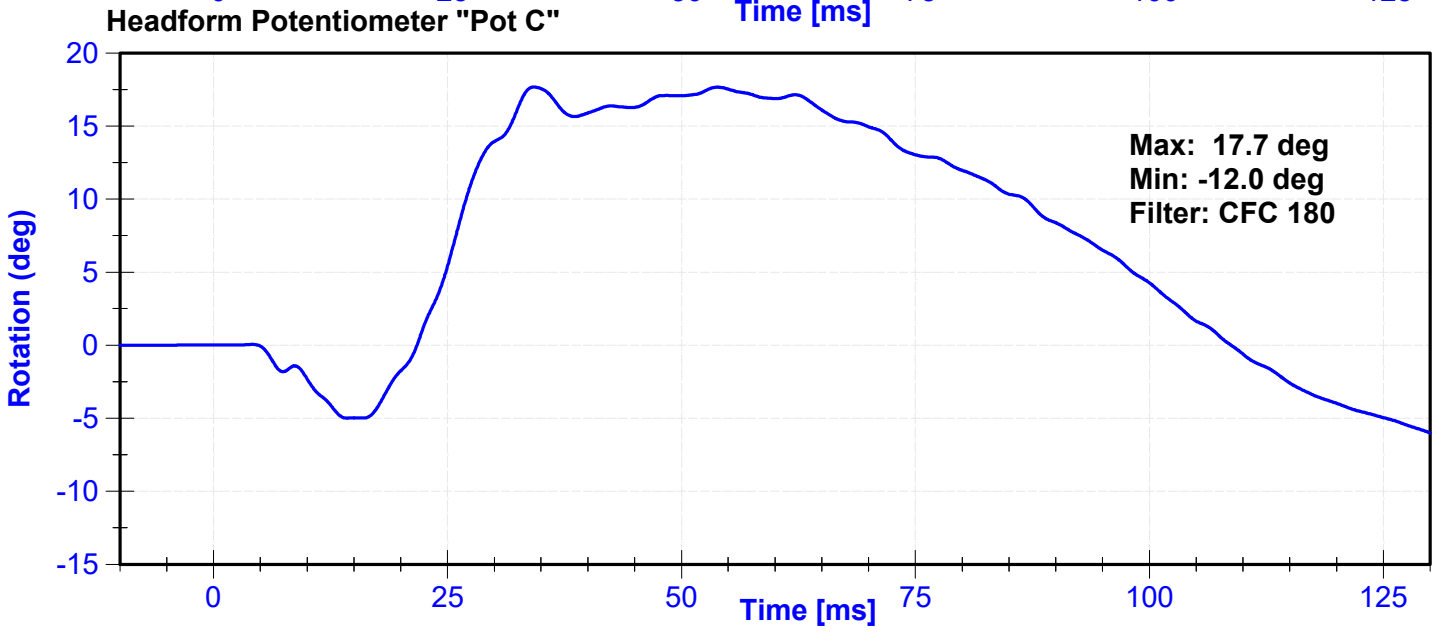
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	4/29/2024	10/26/2024
Front Pendulum Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Headform Potentiometer	Sfernice	095	9/13/2024	9/13/2025



[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: -28.1 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: 33.0 deg
Min: -16.2 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
20
15
10
5
0
-5
-10
-15
0
25
50
75
100
125
Time [ms]
Max: 17.7 deg
Min: -12.0 deg
Filter: CFC 180

Appendix I

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

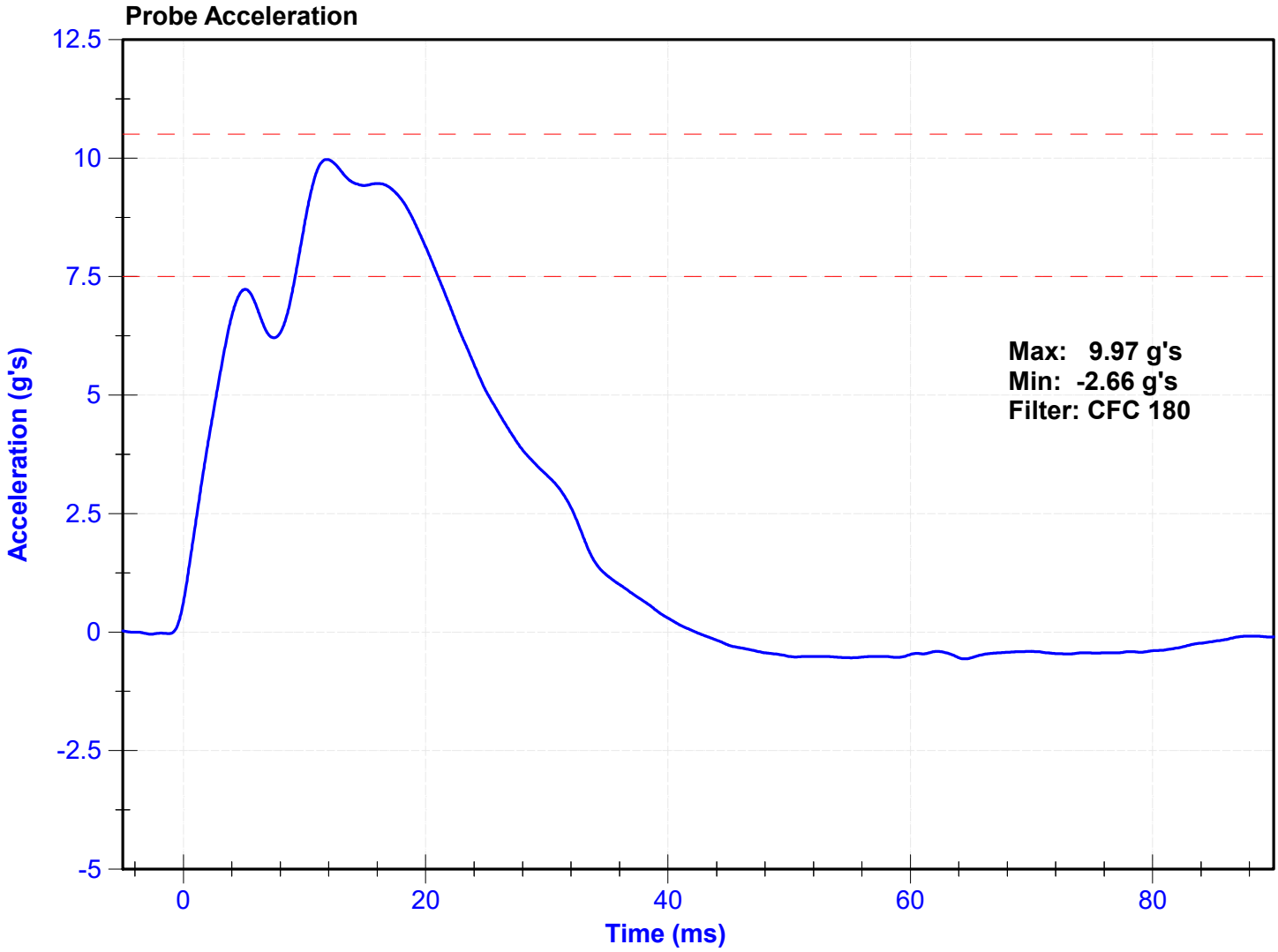
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	62	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	7.5	10.5	g's	9.97	Pass

Transducer Calibrations

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



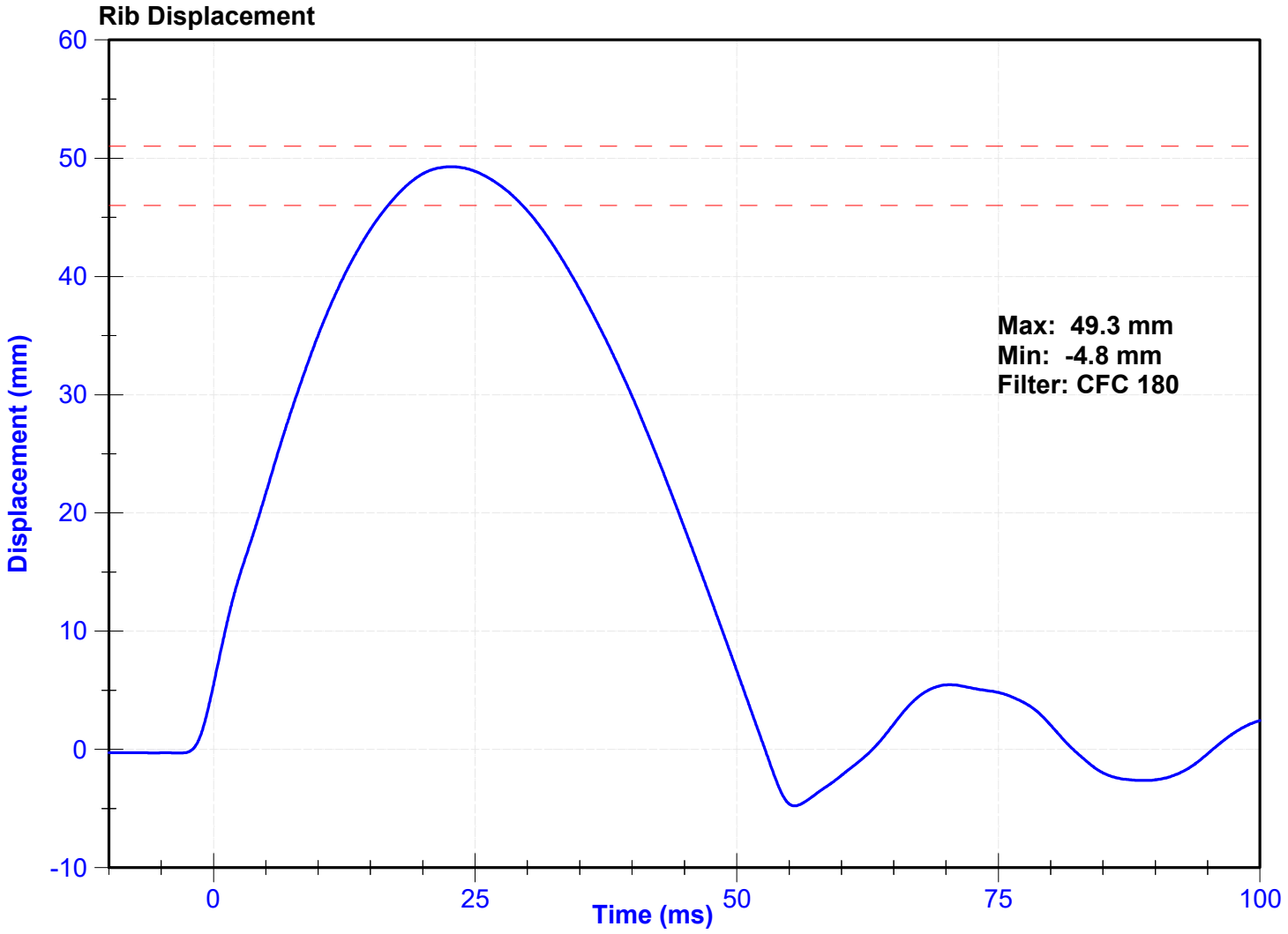
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	59	Pass
Rib Displacement	46	51	mm	49.3	Pass

Transducer Calibrations

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



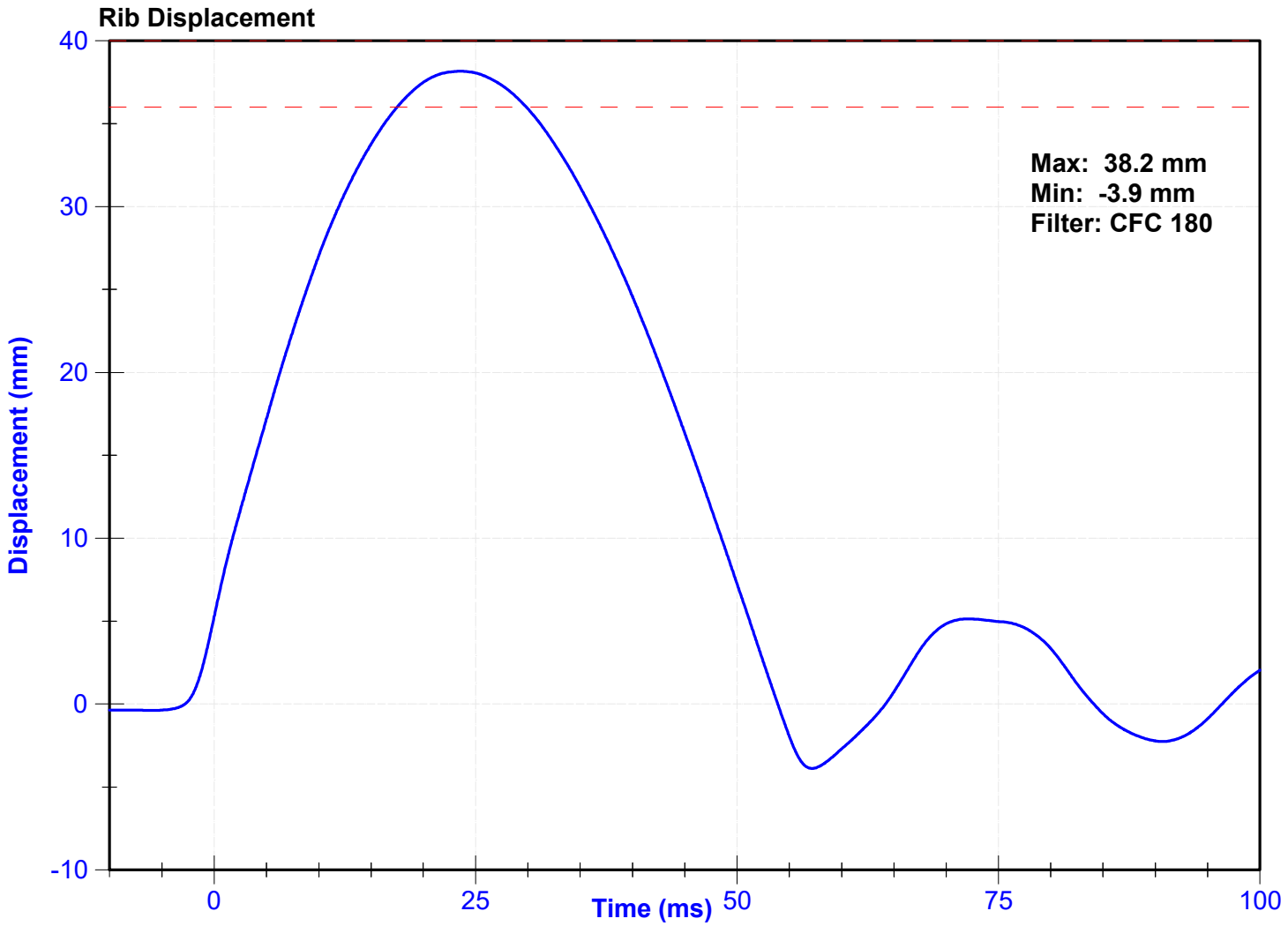
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	59	Pass
Rib Displacement	36	40	mm	38.2	Pass

Transducer Calibrations

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



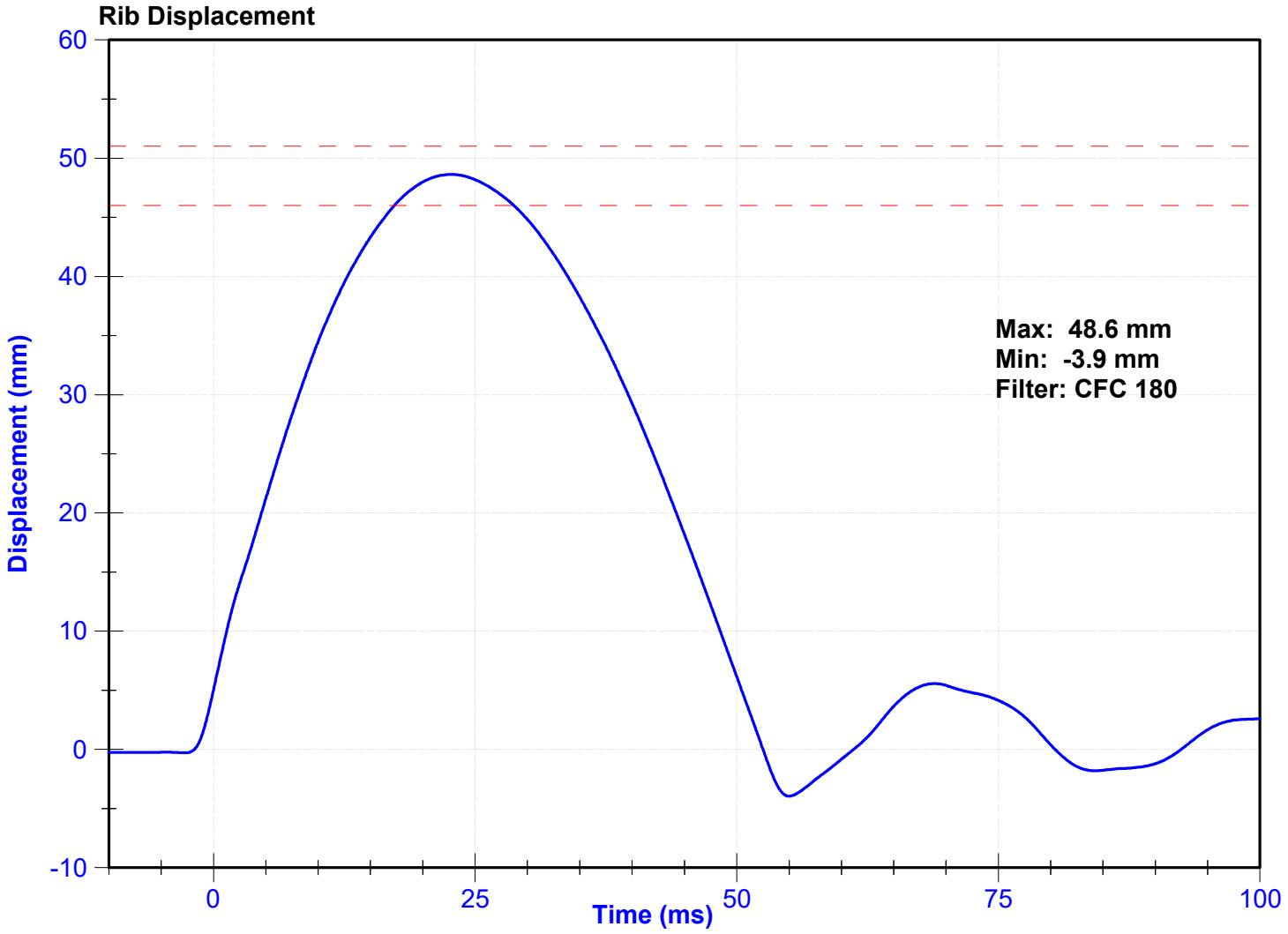
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	59	Pass
Rib Displacement	46	51	mm	48.6	Pass

Transducer Calibrations

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



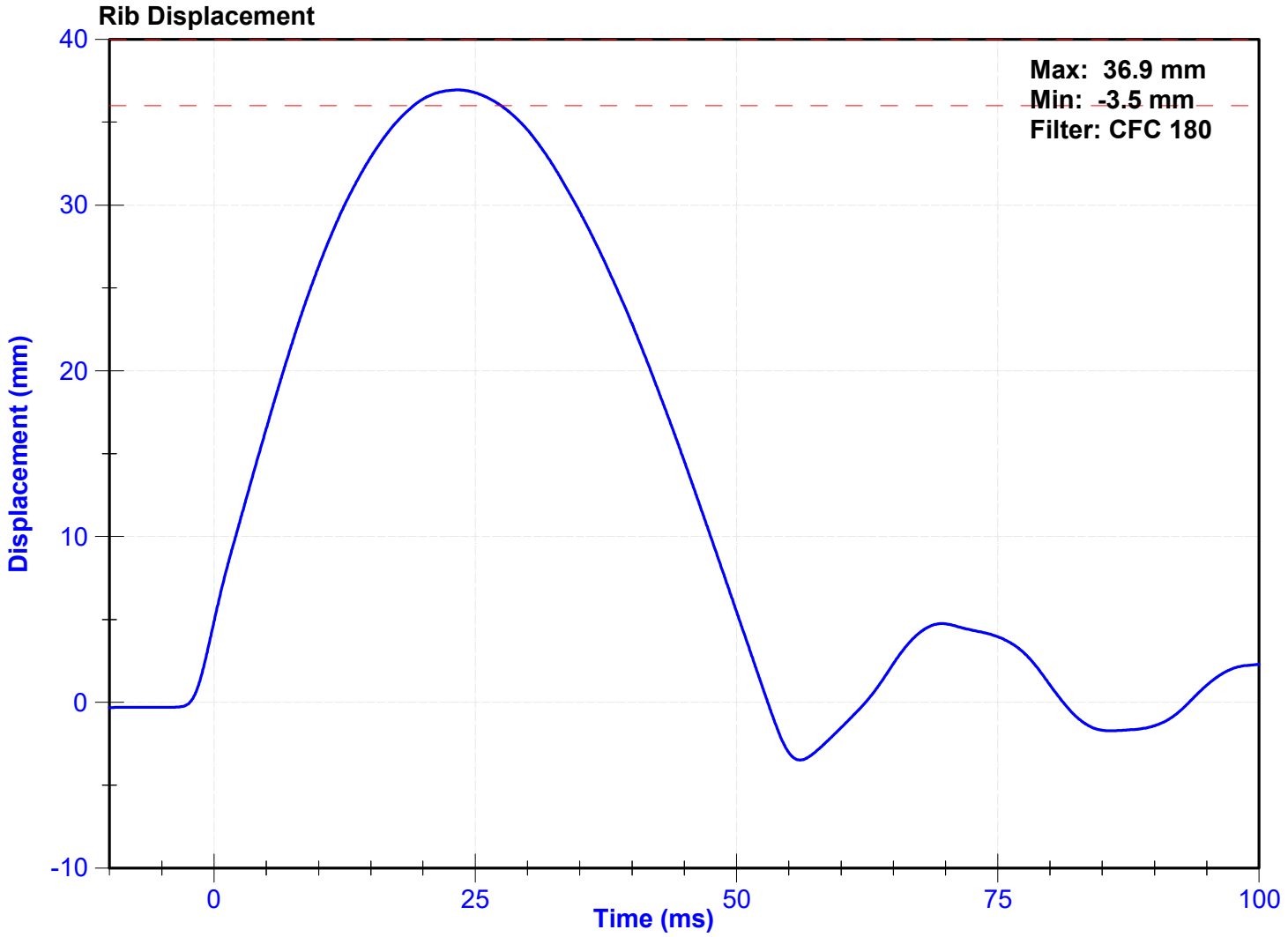
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	59	Pass
Rib Displacement	36	40	mm	36.9	Pass

Transducer Calibrations

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



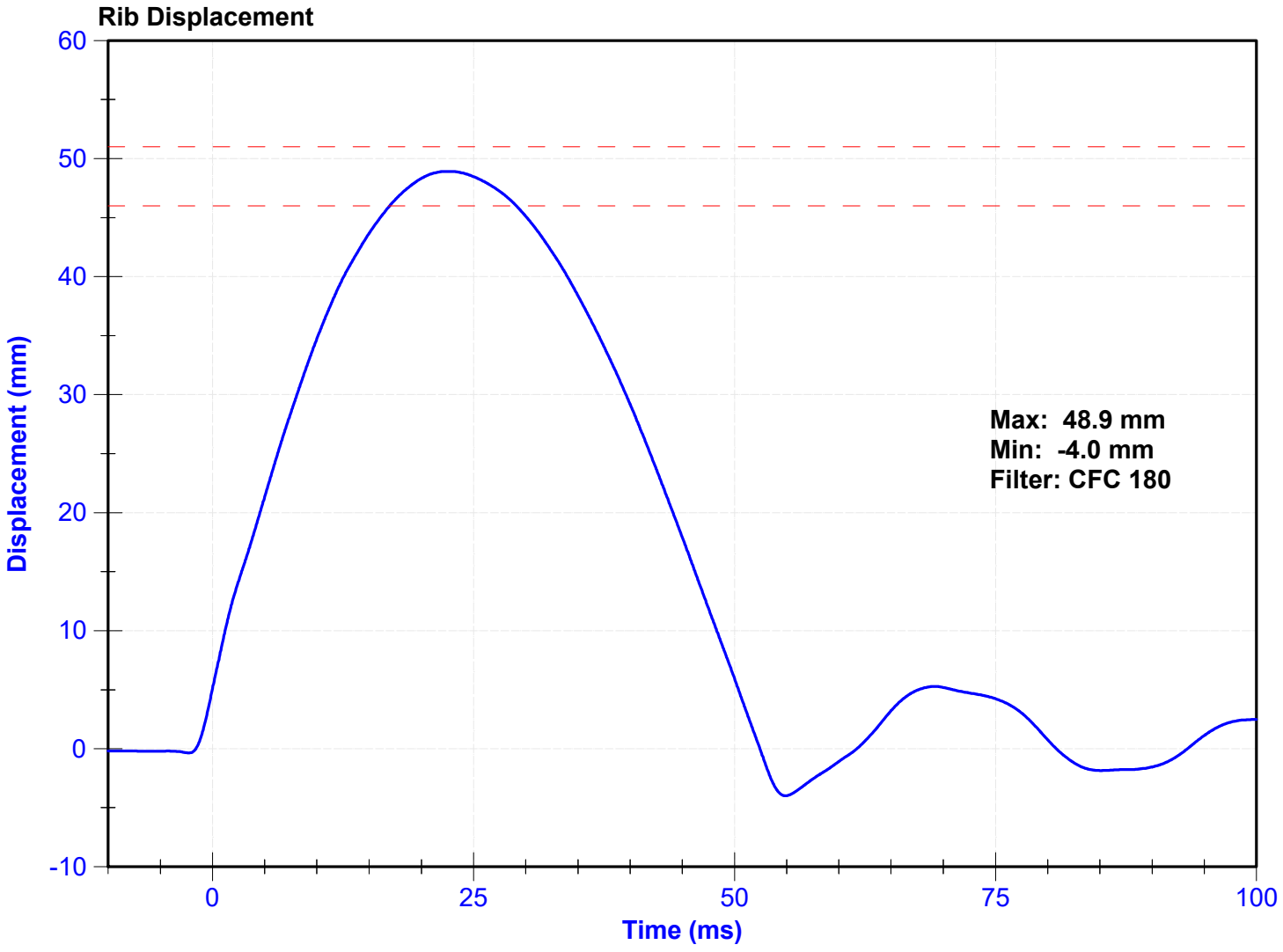
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	59	Pass
Rib Displacement	46	51	mm	48.9	Pass

Transducer Calibrations

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



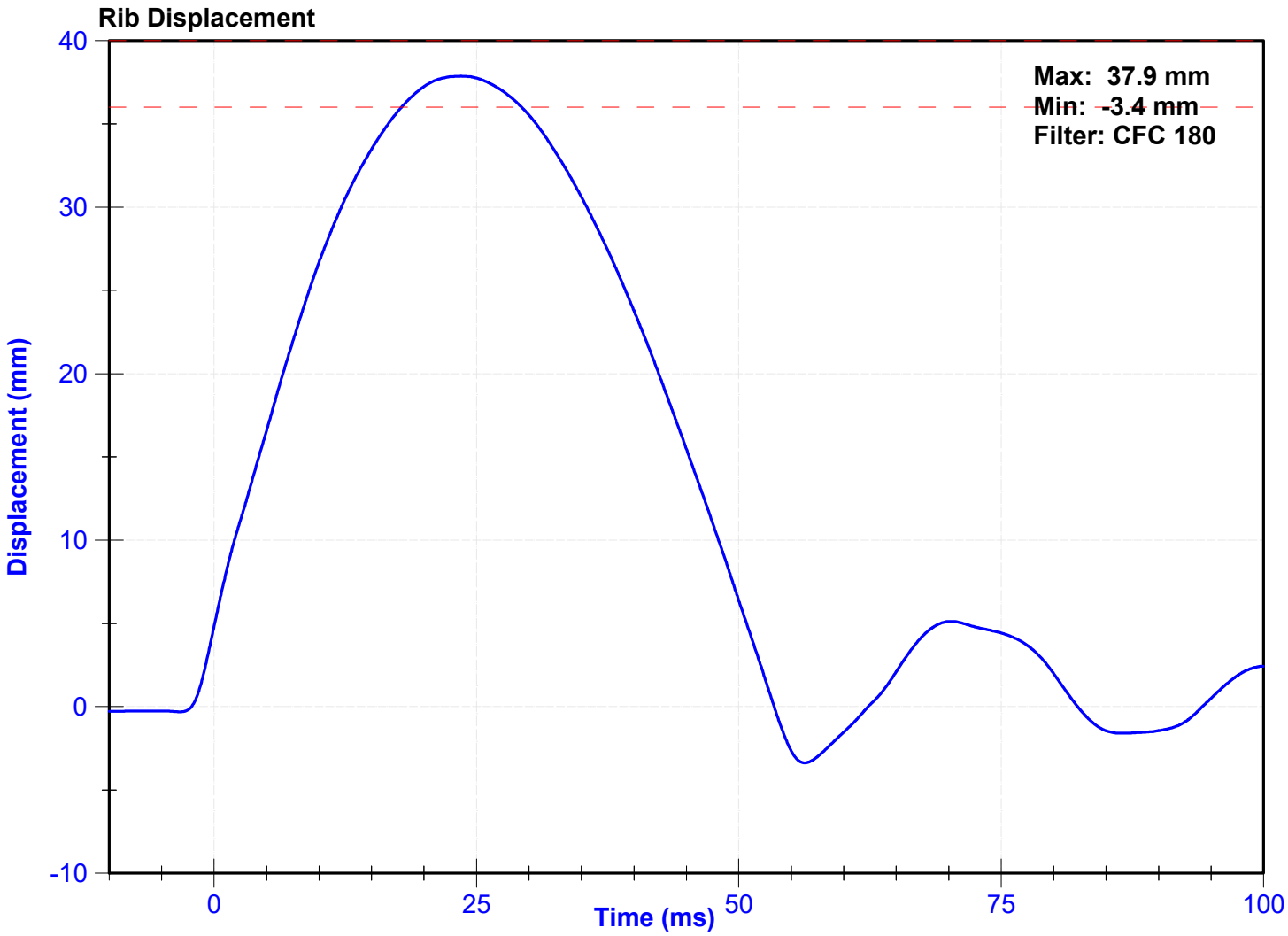
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C.Mantell

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	59	Pass
Rib Displacement	36	40	mm	37.9	Pass

Transducer Calibrations

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



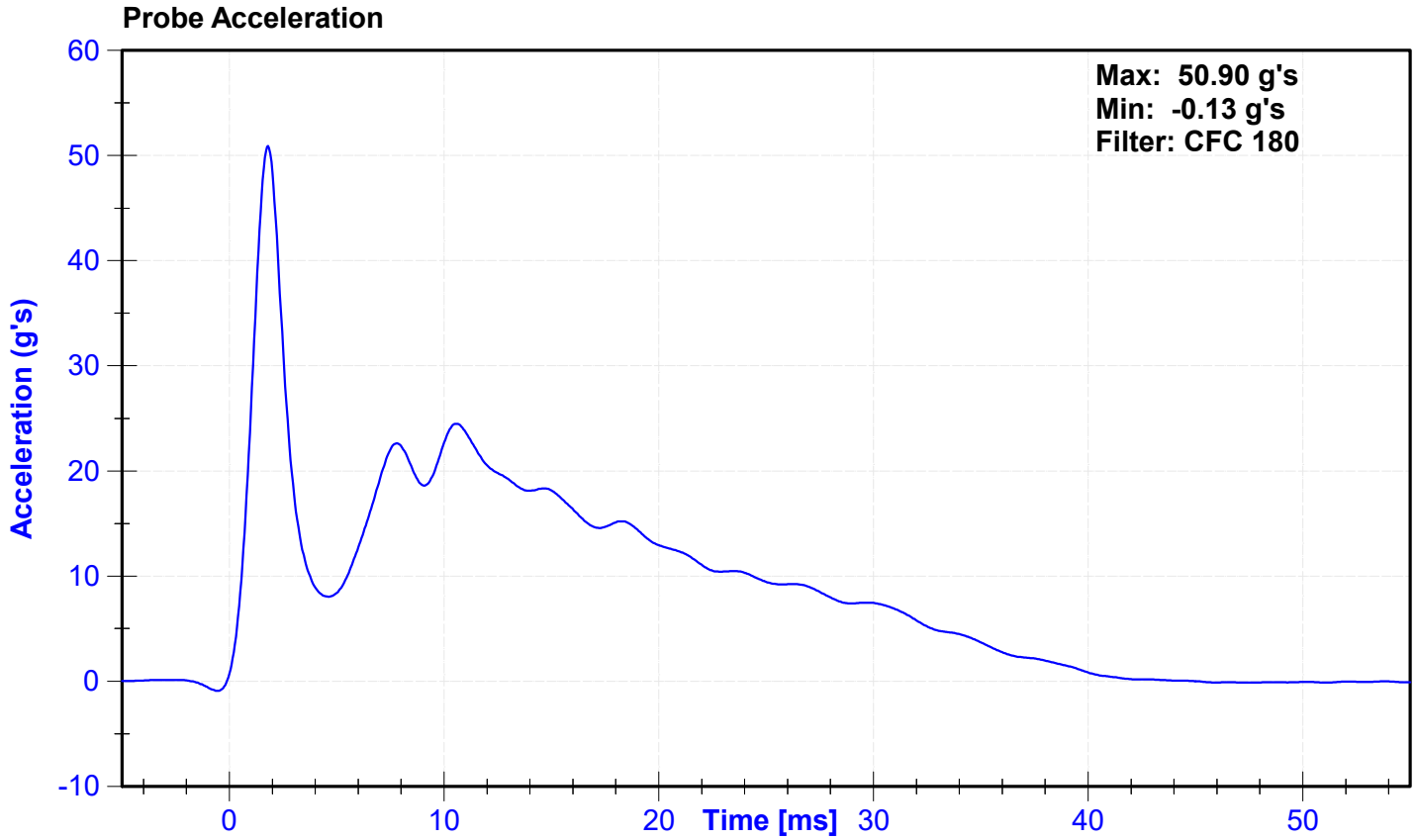
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

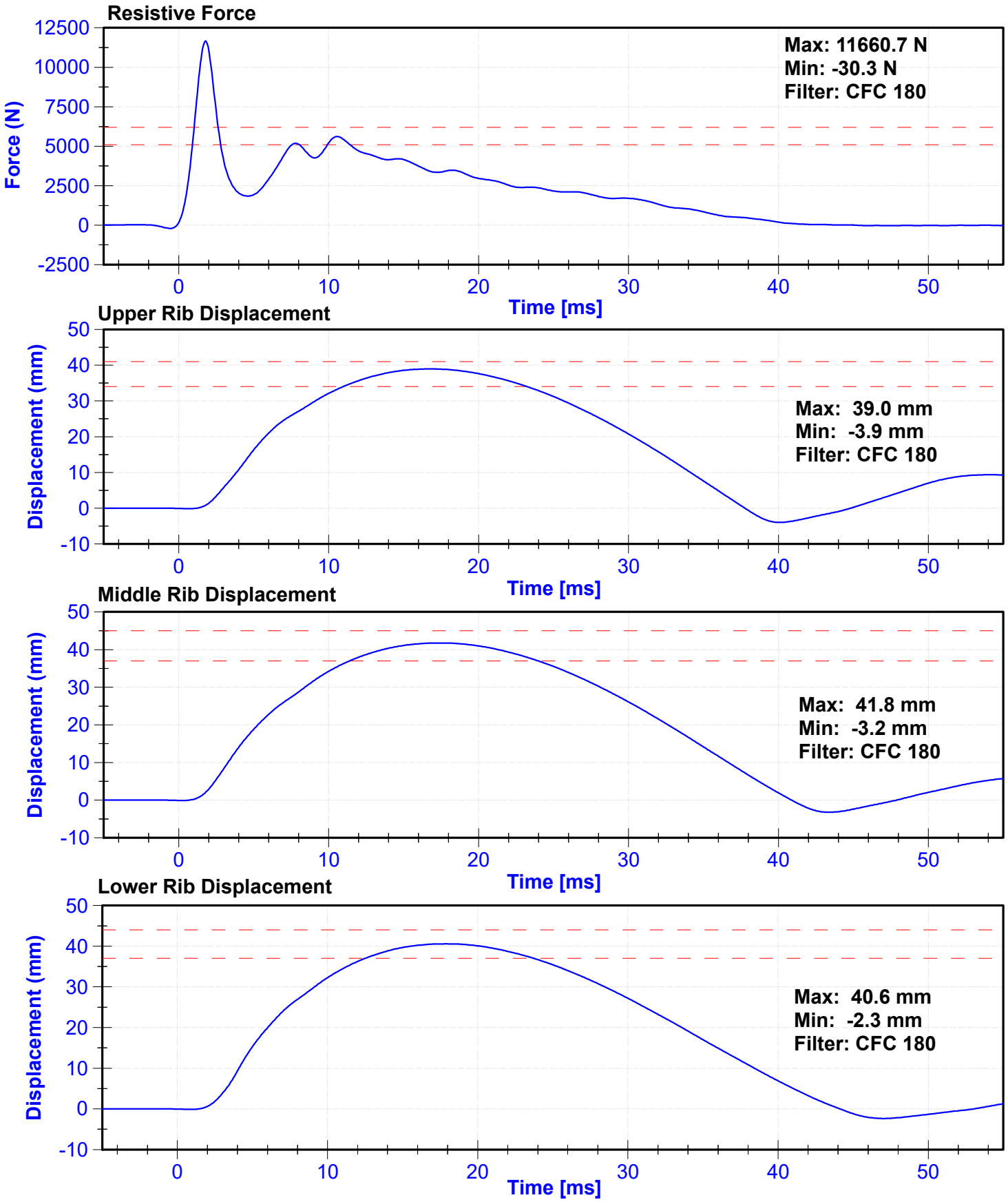
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	62	Pass
Velocity	5.4	5.6	m/s	5.53	Pass
Resistive Force after 6ms	5100	6200	N	5611.9	Pass
Upper Thorax Rib Deflection	34	41	mm	39.0	Pass
Mid Thorax Rib Deflection	37	45	mm	41.8	Pass
Lower Thorax Rib Deflection	37	44	mm	40.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Upper Thorax Rib Potentiometer	Honeywell	179GFE	5/6/2024	11/4/2024
Middle Thorax Rib Potentiometer	Honeywell	185GFE	5/6/2024	11/4/2024
Lower Thorax Rib Potentiometer	Honeywell	178GFE	5/6/2024	11/4/2024




Resistive Force
Force (N)
Max: 11660.7 N
Min: -30.3 N
Filter: CFC 180
Time [ms]
Upper Rib Displacement
Displacement (mm)
Max: 39.0 mm
Min: -3.9 mm
Filter: CFC 180
Time [ms]
Middle Rib Displacement
Displacement (mm)
Max: 41.8 mm
Min: -3.2 mm
Filter: CFC 180
Time [ms]
Lower Rib Displacement
Displacement (mm)
Max: 40.6 mm
Min: -2.3 mm
Filter: CFC 180
Time [ms]

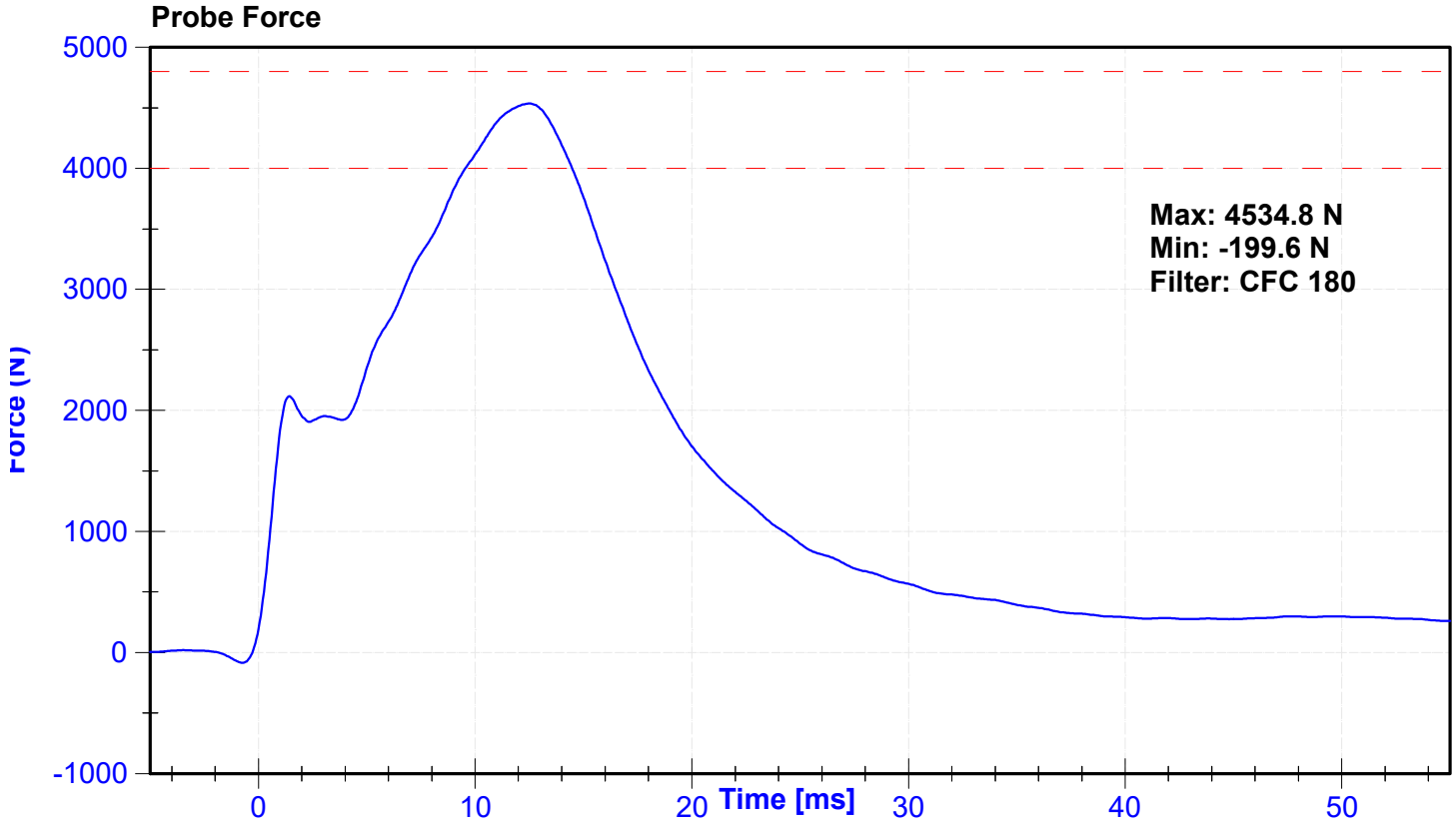
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

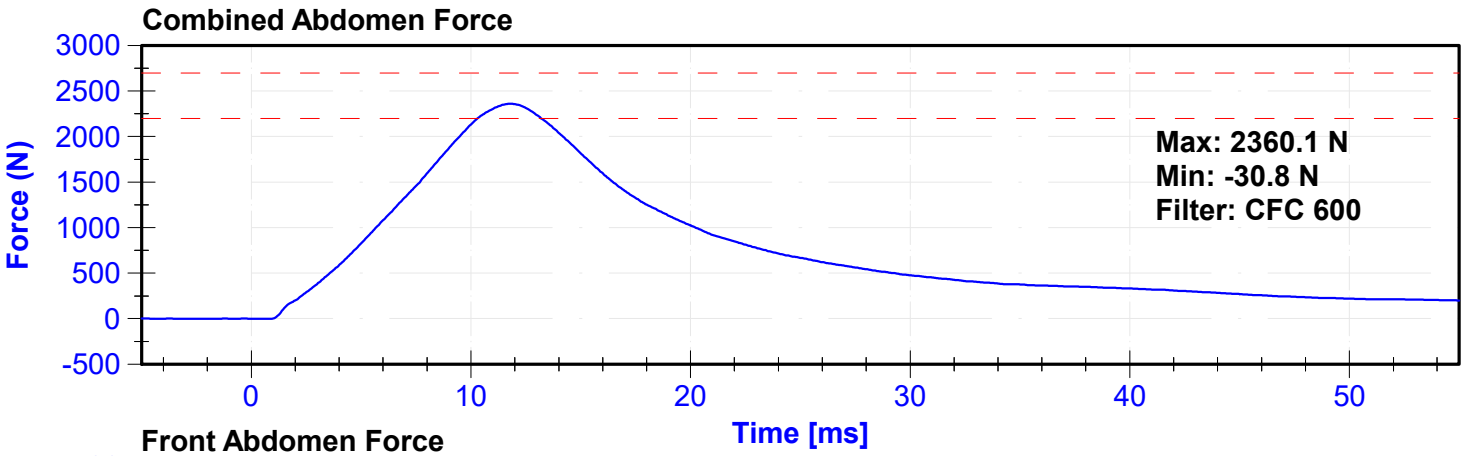
Results

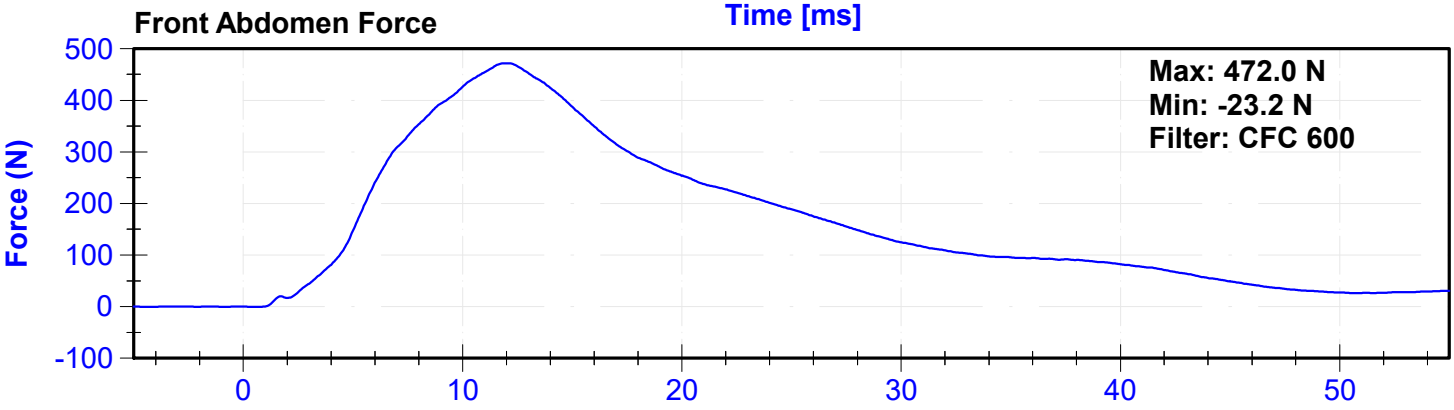
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	62	Pass
Velocity	3.9	4.1	m/s	4.02	Pass
Combined Abdomen Force	2200	2700	N	2360.1	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.80	Pass
Resistive Probe Force	4000	4800	N	4534.8	Pass
Time at Peak Resistive Force	10.6	13.0	ms	12.50	Pass

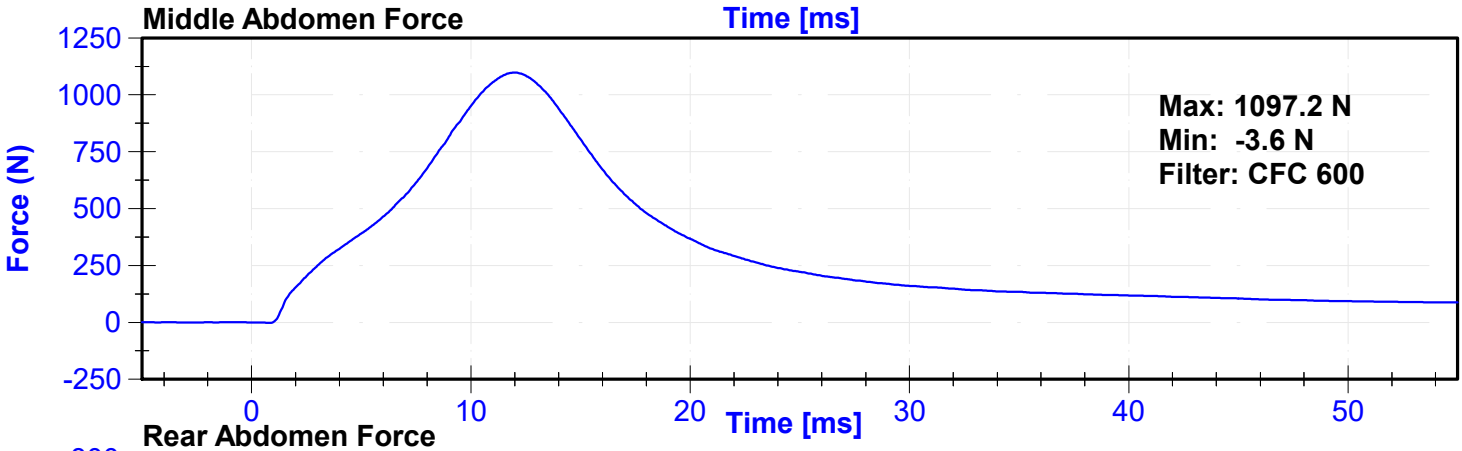
Transducer Calibrations

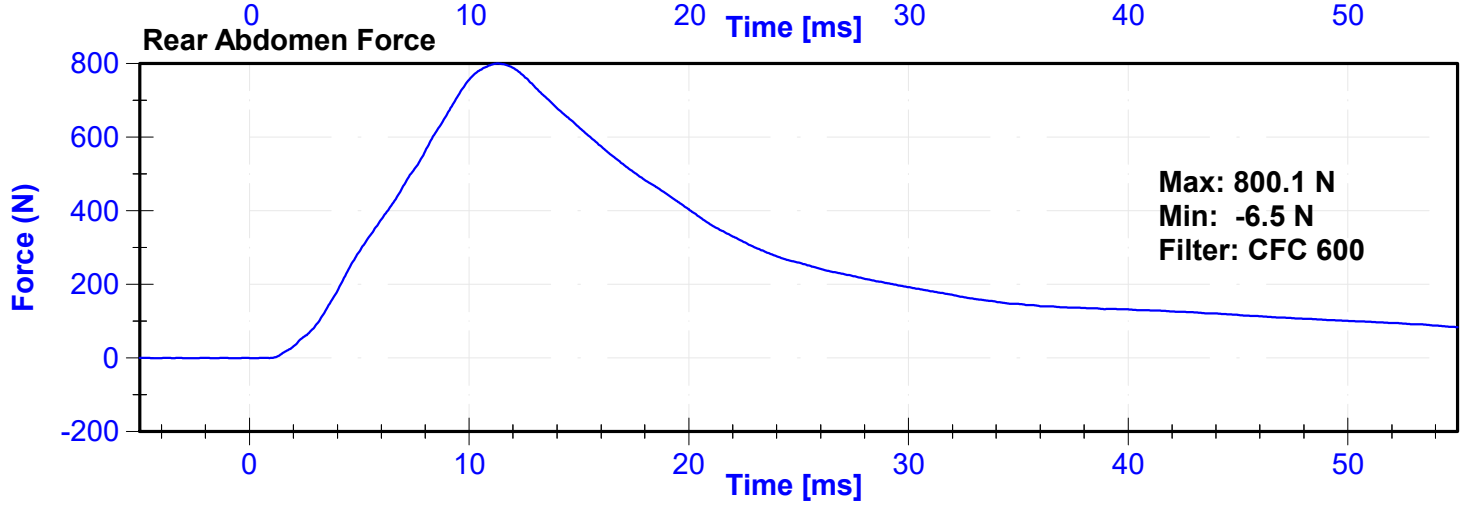
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Front Abdomen Load Cell	Denton	1523	12/5/2023	12/4/2024
Middle Abdomen Load Cell	Denton	1524	12/5/2023	12/4/2024
Rear Abdomen Load Cell	Denton	1530	12/5/2023	12/4/2024




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2360.1 N
Min: -30.8 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 472.0 N
Min: -23.2 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1097.2 N
Min: -3.6 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 800.1 N
Min: -6.5 N
Filter: CFC 600

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

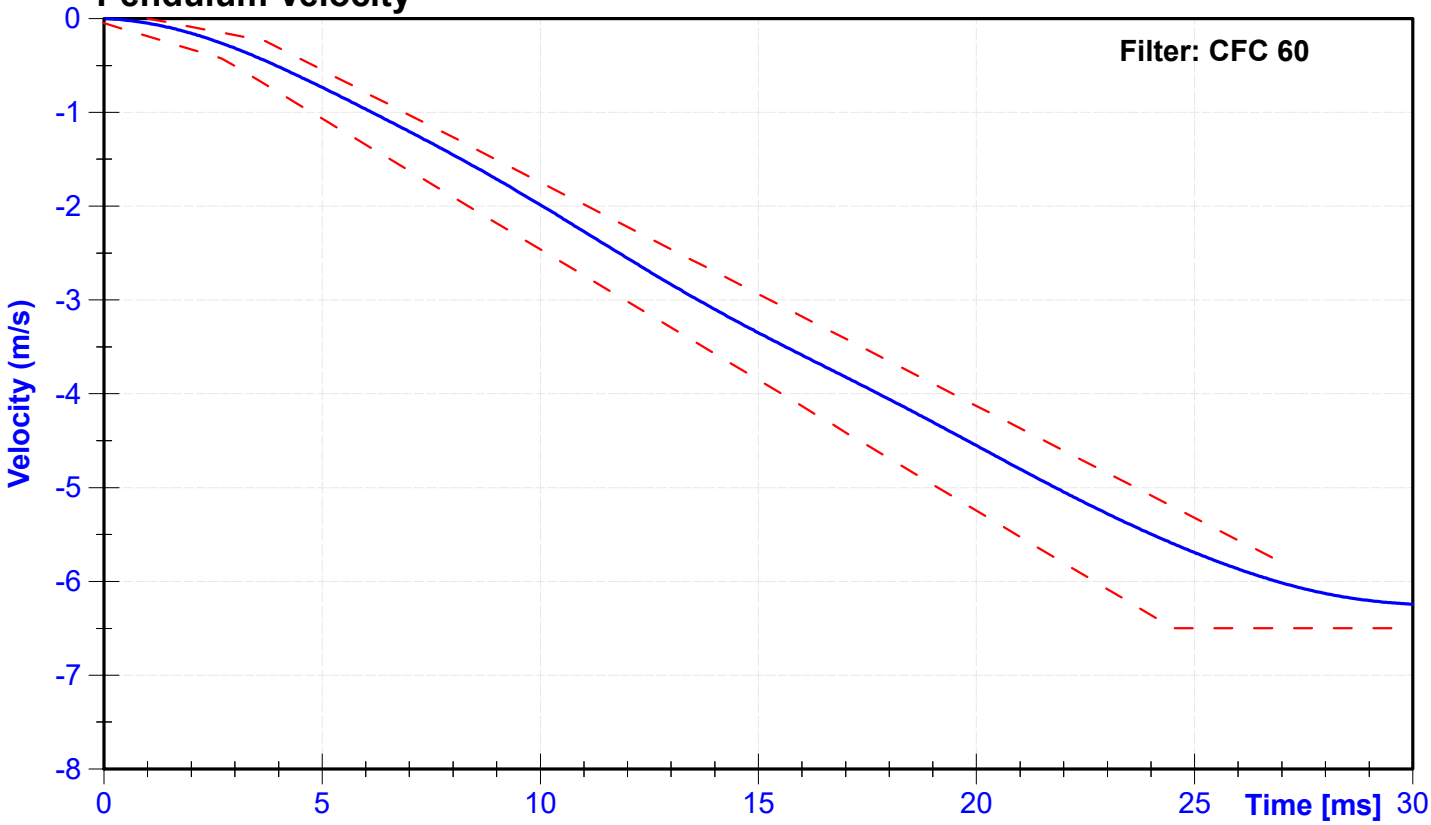
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	53.0	Pass
Velocity	5.95	6.15	m/s	6.131	Pass
Lateral Spine Rotation	45	55	deg	46.7	Pass
Time at Maximum Rotation	39	53	ms	42.6	Pass
Time of Decay to Zero Degrees	37	57	ms	37.0	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

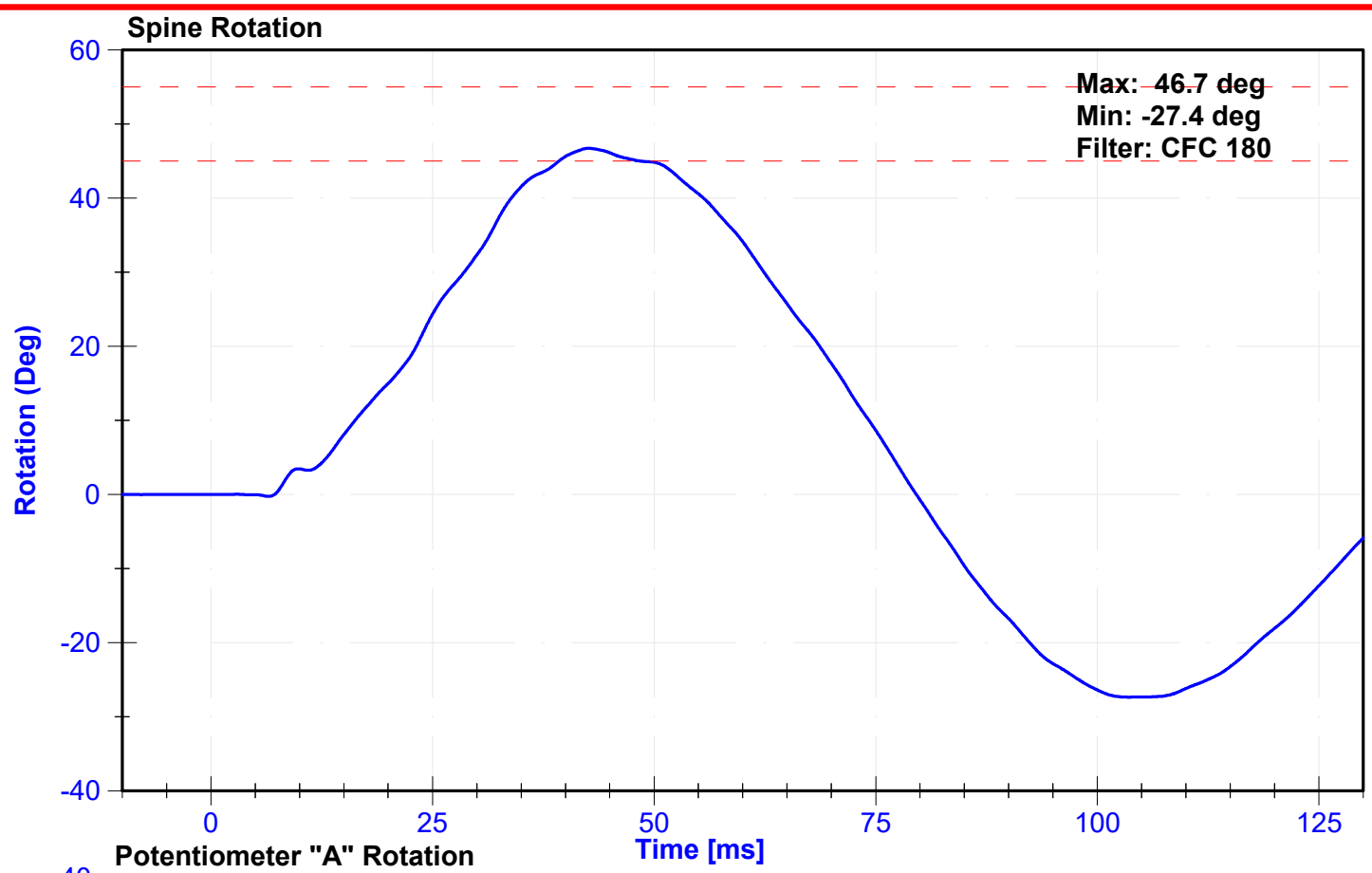
Transducer Calibrations

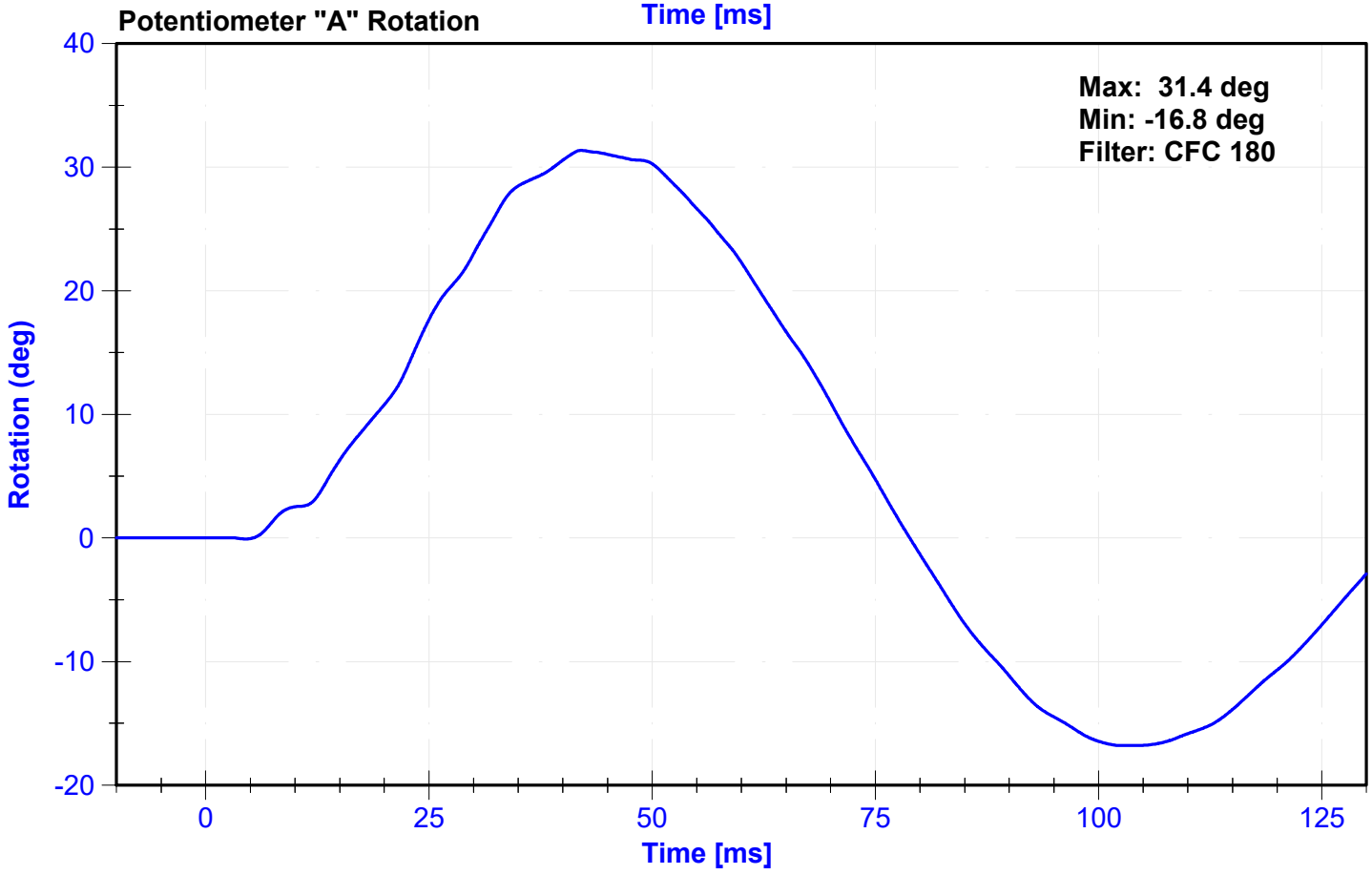
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	4/29/2024	10/26/2024
Pendulum "A" Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Condyle "B" Potentiometer	Sfernice	095	9/13/2024	9/13/2025

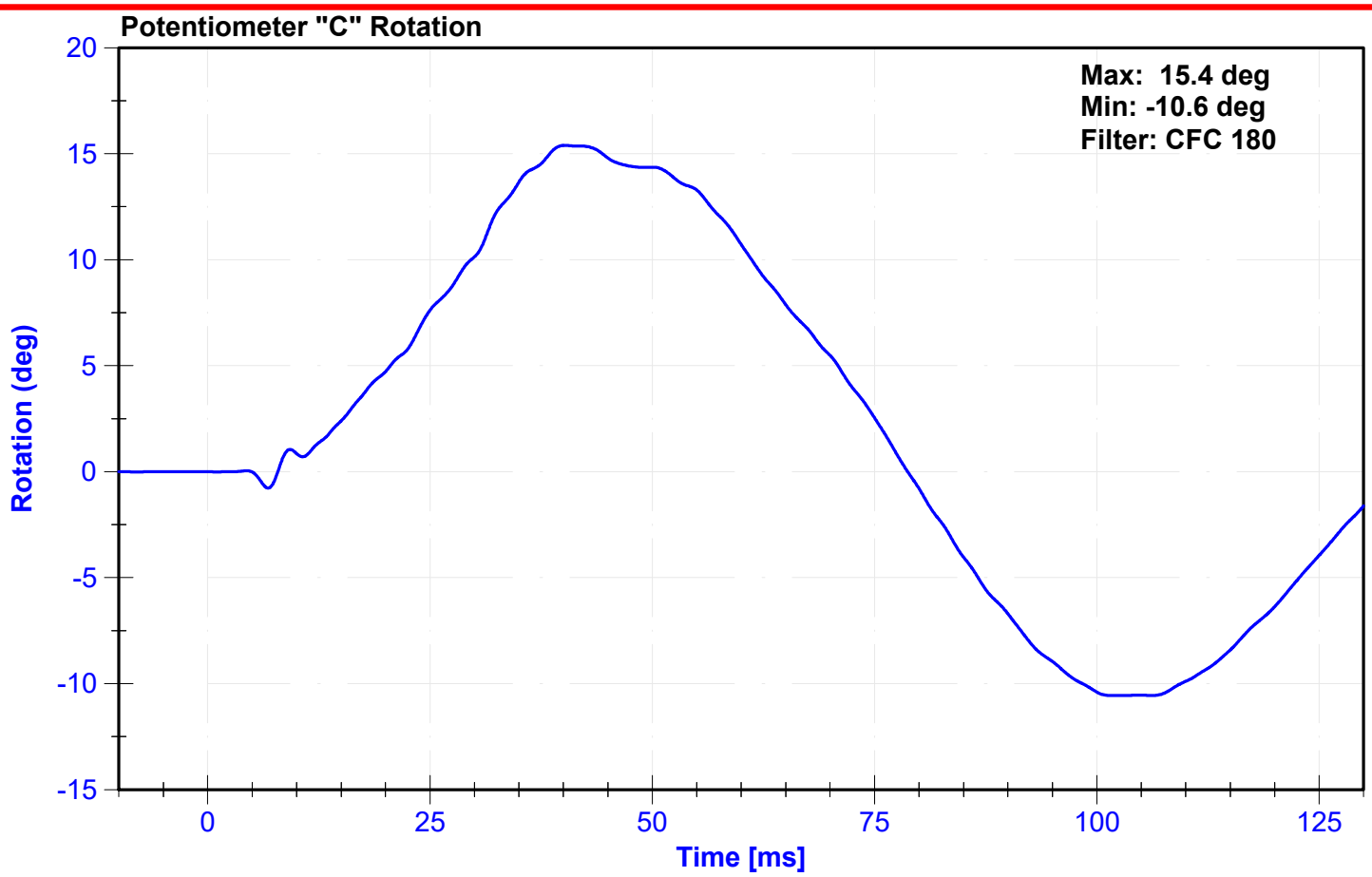
Pendulum Velocity[3]



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


Spine Rotation
Max: 46.7 deg
Min: -27.4 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: -16.8 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]



Appendix I

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

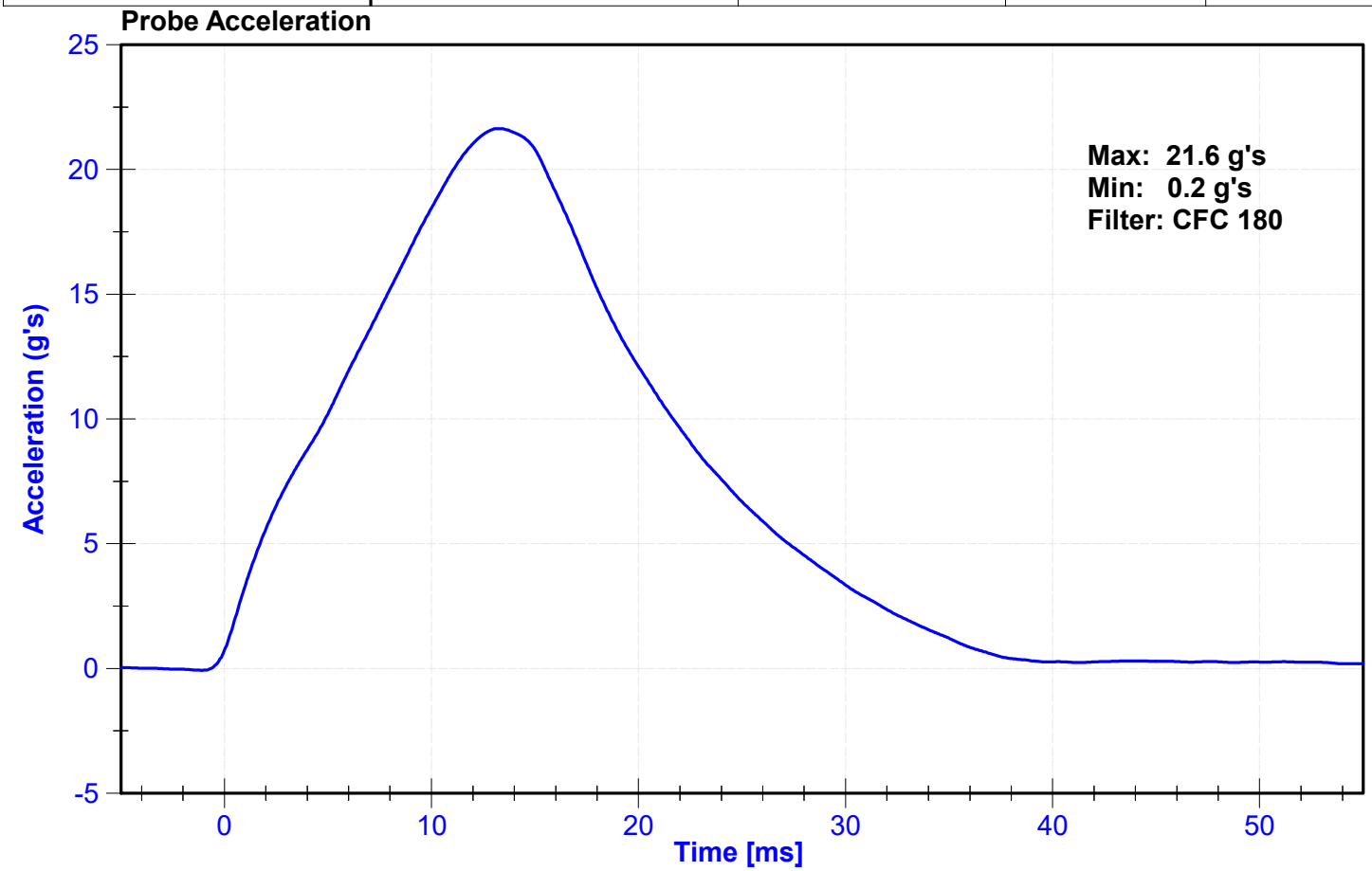
ATD Manufacturer	FTSS	Test Technician	J.Kinderman
ATD Serial Number	F033	Laboratory Supervisor	C. Mantell

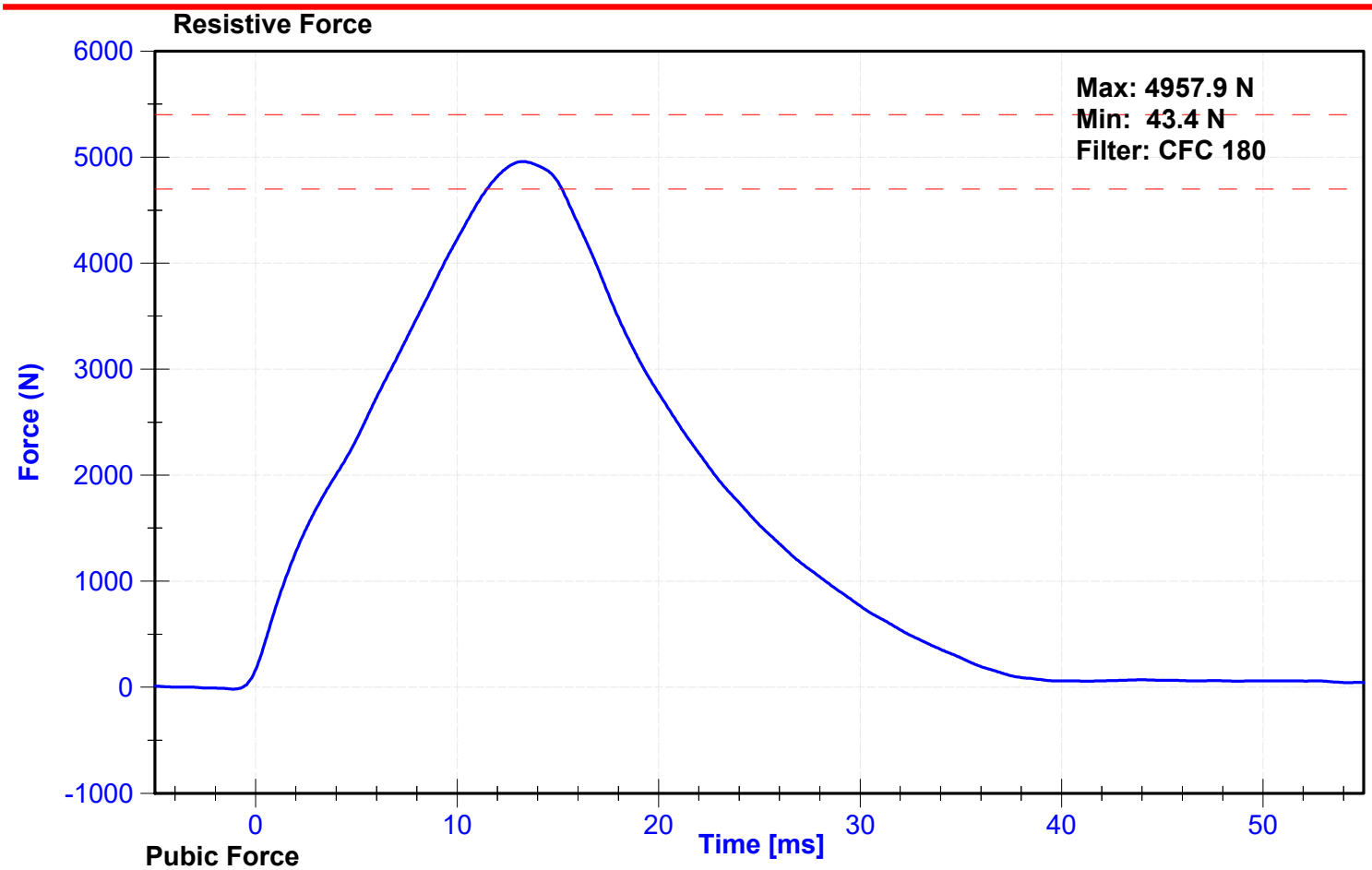
Results

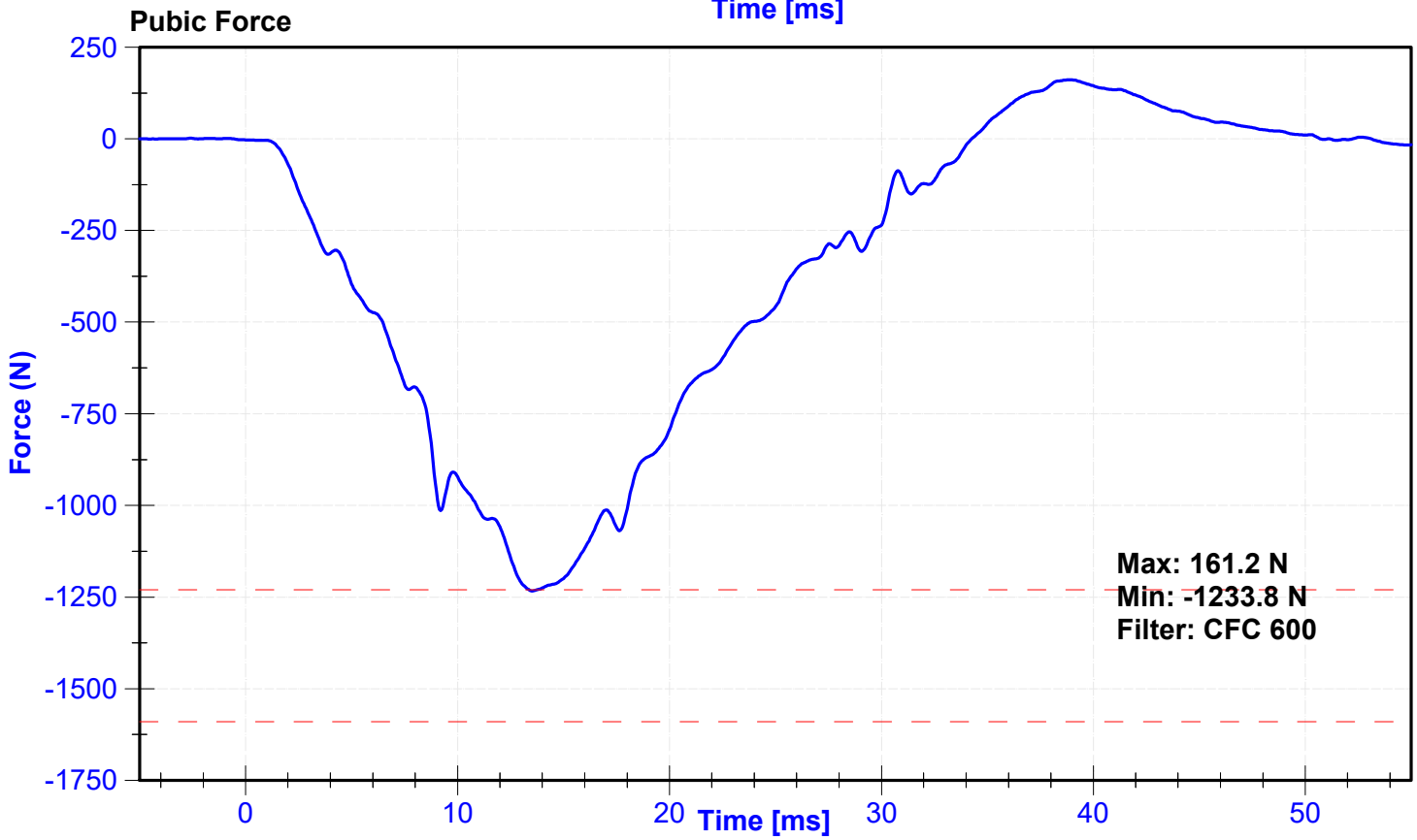
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.4	Pass
Humidity	10	70	%	62	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Resistive Force	4700	5400	N	4957.9	Pass
Time at Peak Resistive Force	11.8	16.1	ms	13.25	Pass
Pubic Force	-1590	-1230	N	-1233.8	Pass
Time at Peak Pubic Force	12.2	17.0	ms	13.50	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	12/5/2023	12/4/2024




Resistive Force
Max: 4957.9 N
Min: 43.4 N
Filter: CFC 180
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]


Pubic Force
Max: 161.2 N
Min: -1233.8 N
Filter: CFC 600
Force (N)
250
0
-250
-500
-750
-1000
-1250
-1500
-1750
0
10
20
30
40
50
Time [ms]

CALIBRATION TEST RESULTS

POST-TEST

SID-IIS 5TH PERCENTILE FEMALE – PASSENGER ATD

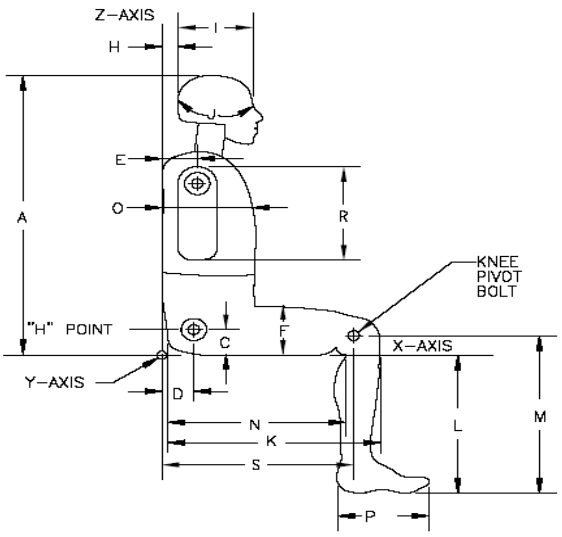
SERIAL NO:DG8012

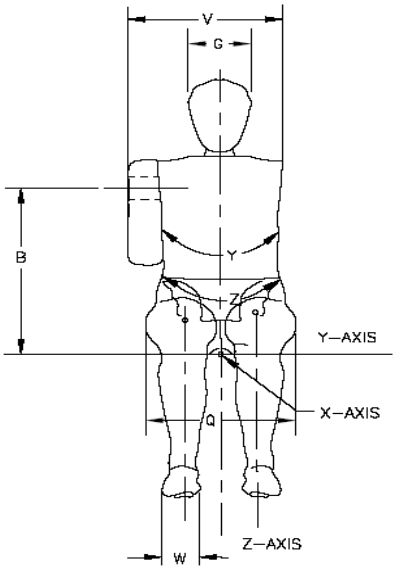
(CONFIGURED FOR LEFT SIDE IMPACT)

External Measurements - SID-IIs

Technician: J. Rios Date: 09/20/2024

Dummy Serial Number: DG8012





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	776	Pass
B	Shoulder Pivot Height	437	453	450	Pass
C	H-point Height	79	89	82	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	99	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	525	Pass
L	Popliteal Height	343	369	359	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	429	Pass
O	Chest Depth w/o jacket	195	211	199	Pass
P	Foot Length	216	232	222	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	321	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	777	Pass

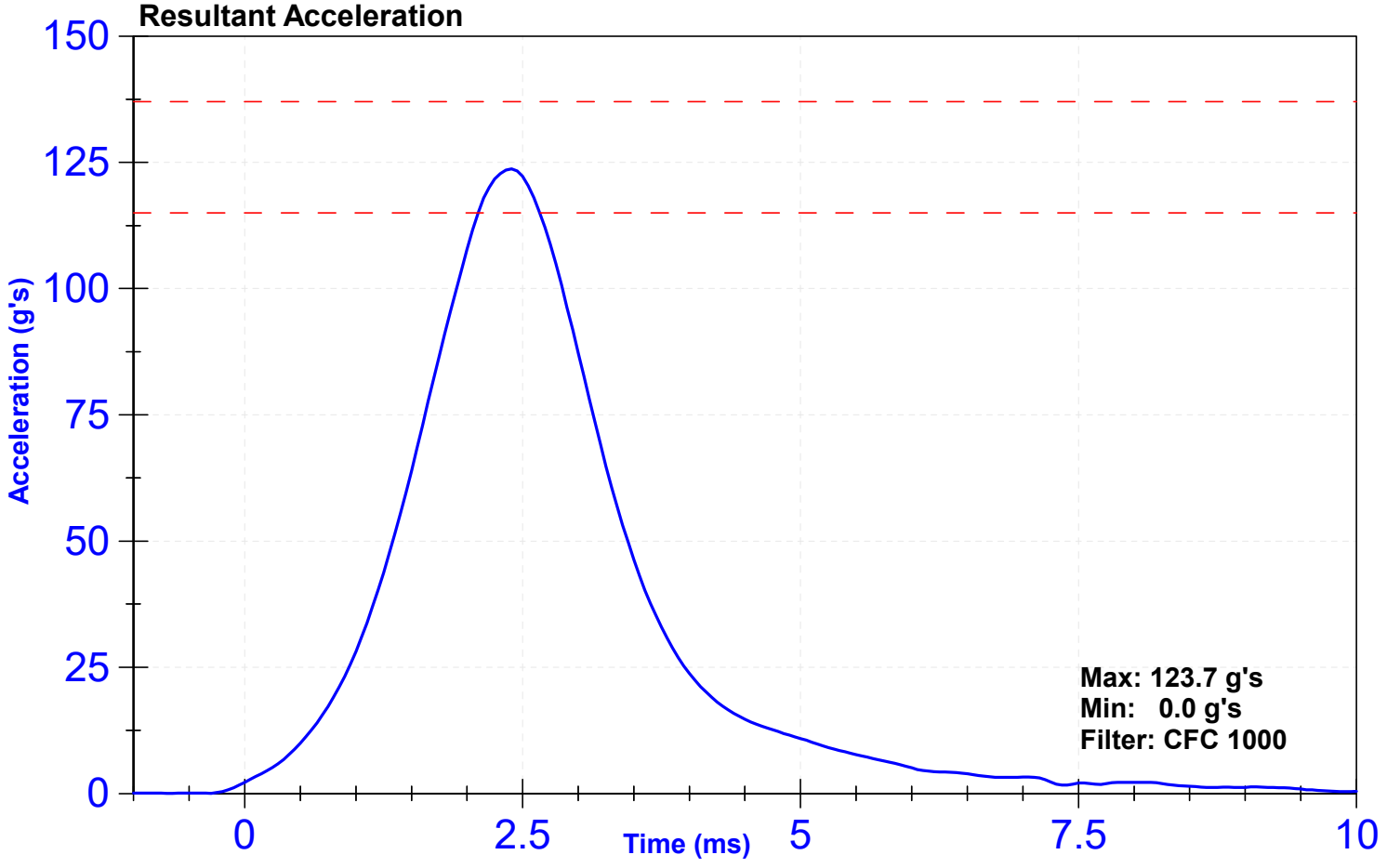
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

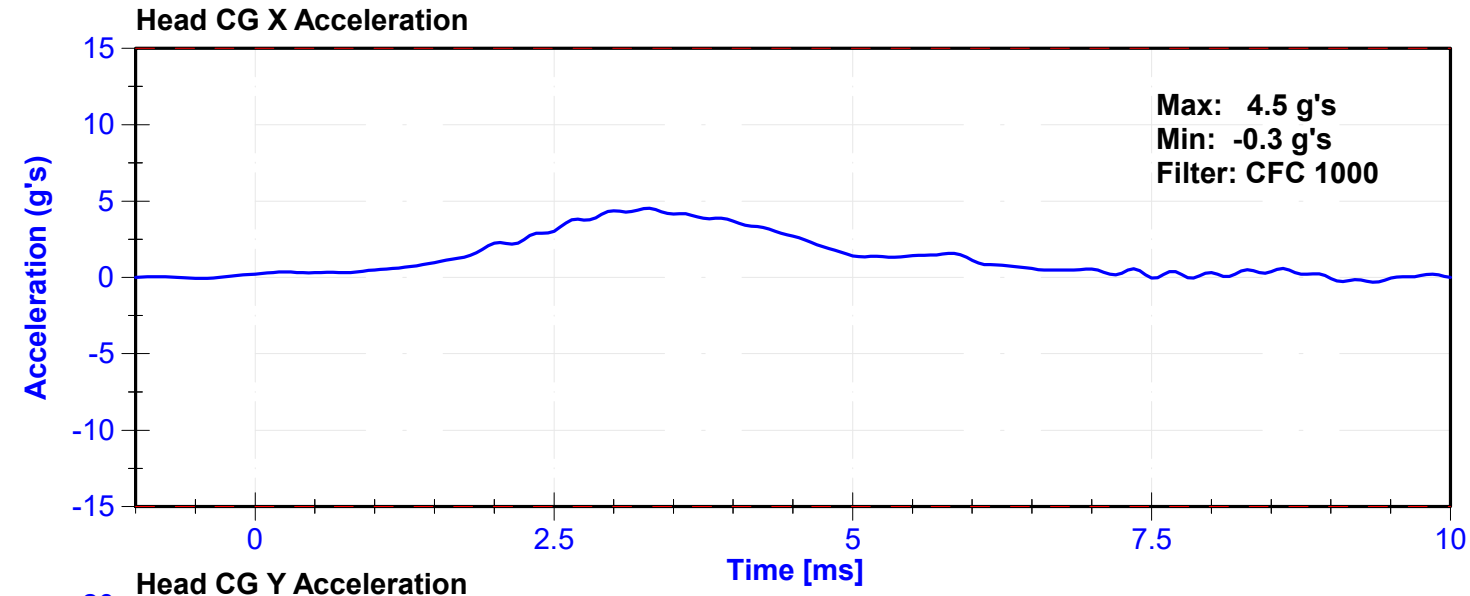
Results

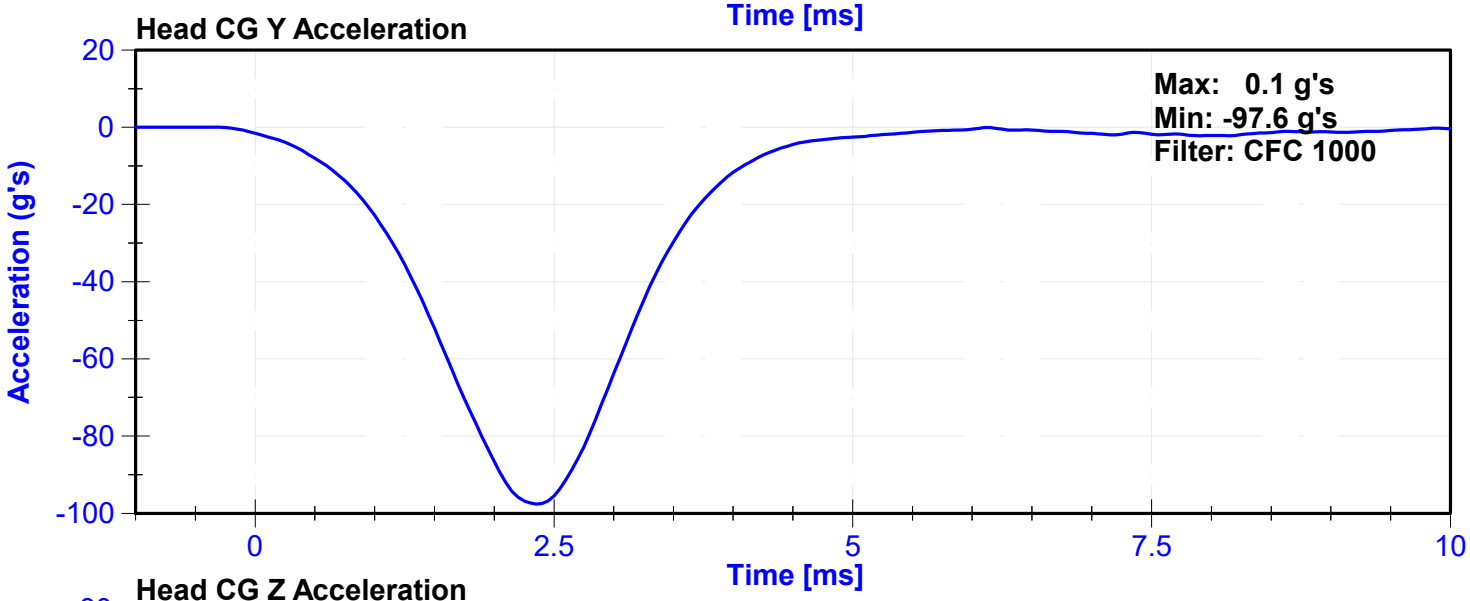
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	57	Pass
Resultant Acceleration	115	137	g's	123.7	Pass
Oscillation	0	15	%	2.6	Pass
Fore-Aft Acceleration	-15	15	g's	4.5	Pass

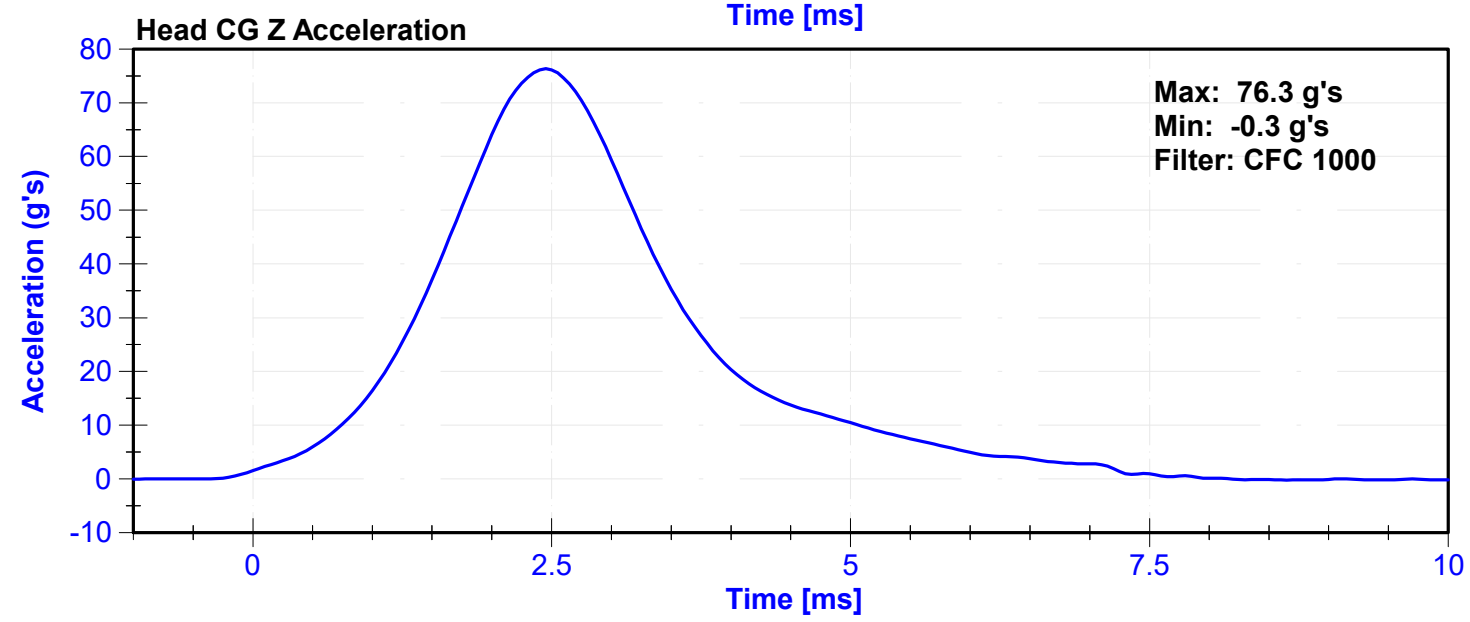
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	T21184	5/6/2024	11/2/2024
Y Accelerometer	Endevco	T31030	9/10/2024	3/9/2025
Z Accelerometer	Endevco	P83319	5/6/2024	11/2/2024




Head CG X Acceleration
Max: 4.5 g's
Min: -0.3 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 0.1 g's
Min: -97.6 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 76.3 g's
Min: -0.3 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

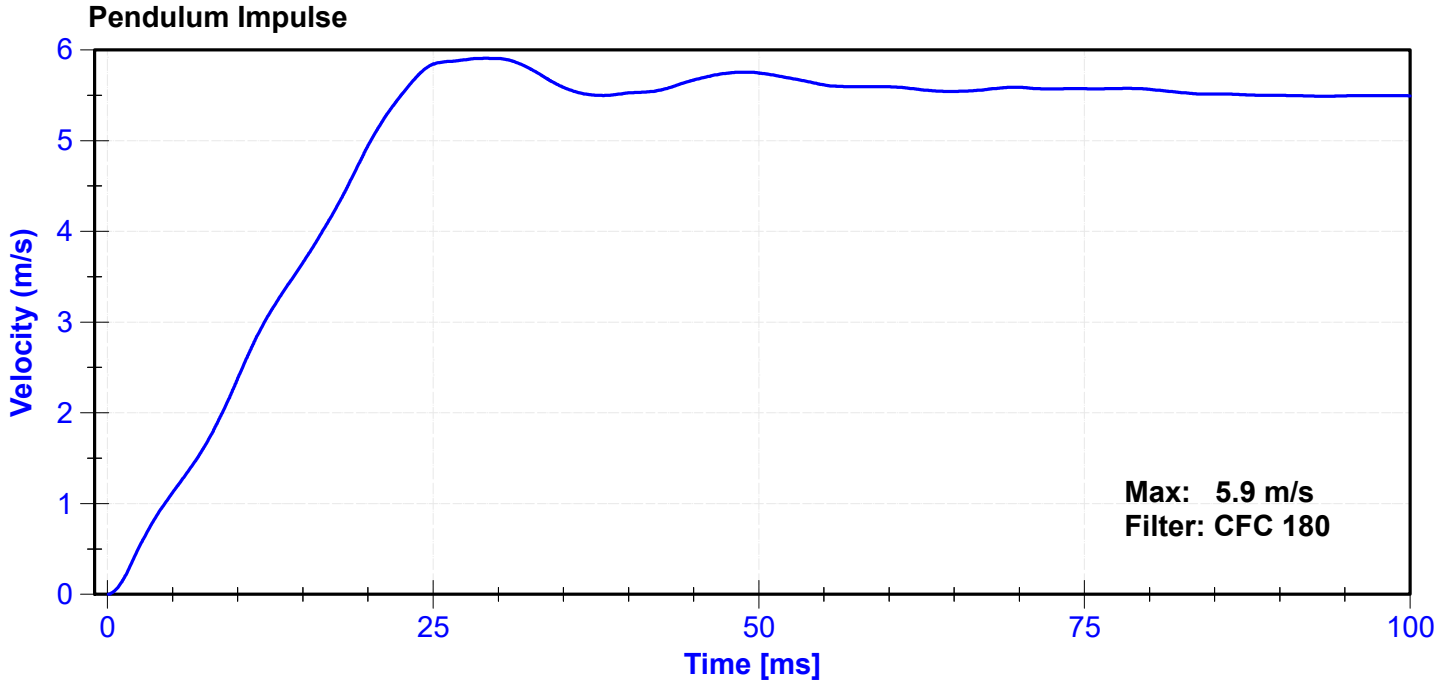
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

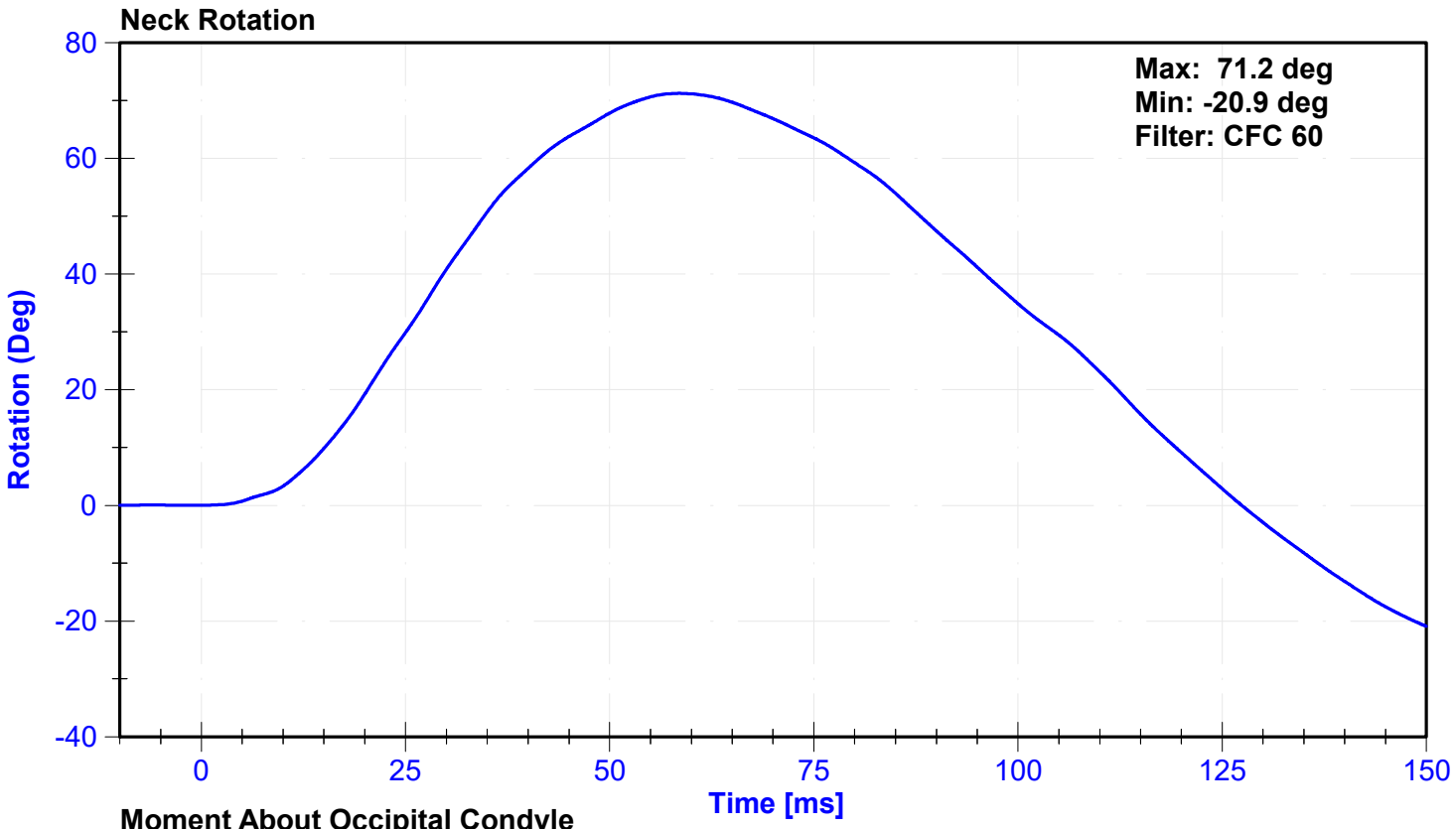
Results

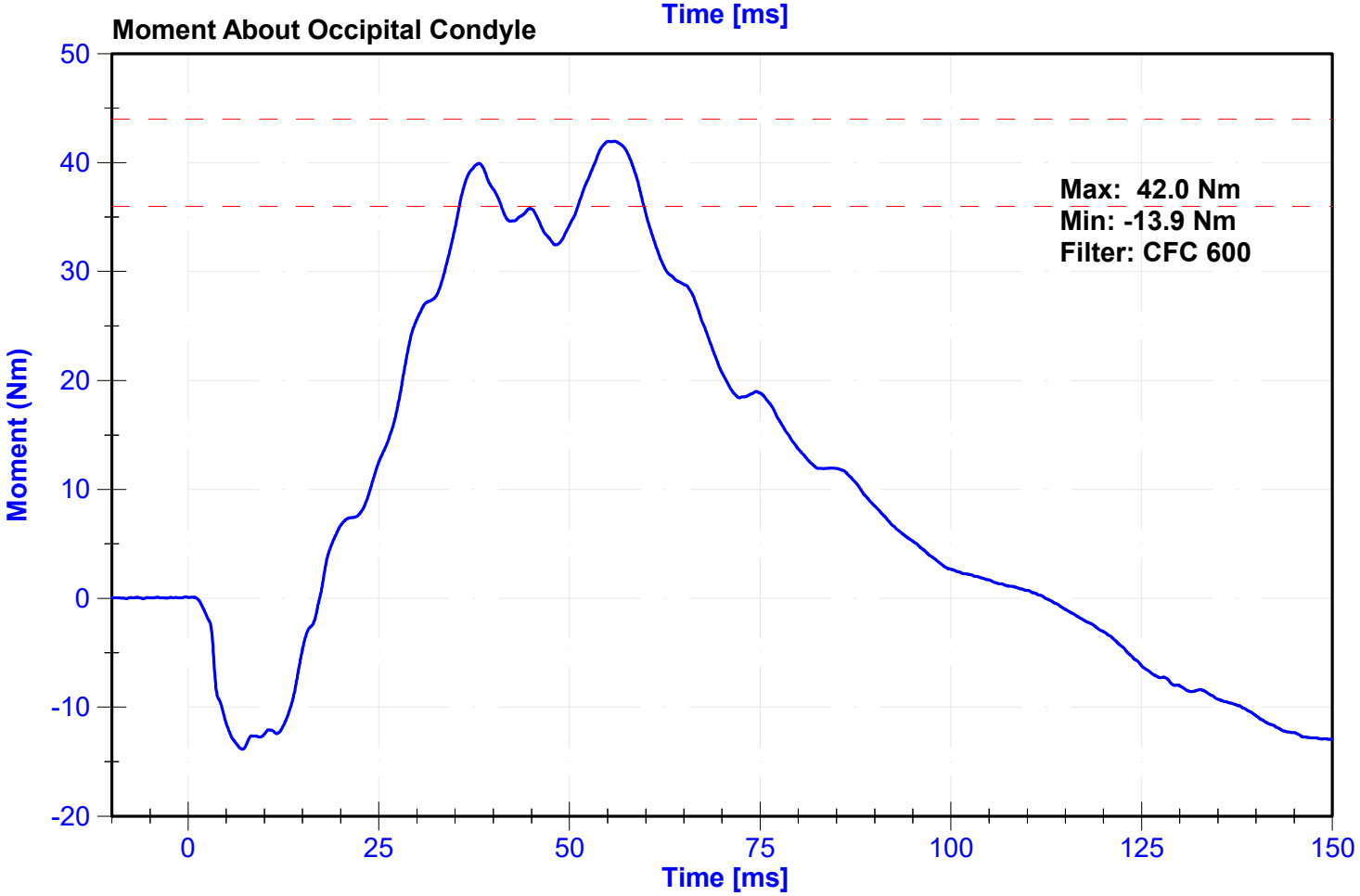
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	55	Pass
Velocity	5.51	5.63	m/s	5.547	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.38	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.66	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.94	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.84	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.91	Pass
Neck Rotation	71	81	deg	71.2	Pass
Time at Maximum Rotation	50	70	ms	58.5	Pass
Moment about the OC	36	44	Nm	42.0	Pass
Moment Decay to 0 Nm	102	126	ms	112.4	Pass

Transducer Calibrations

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




Neck Rotation
Max: 71.2 deg
Min: -20.9 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: 42.0 Nm
Min: -13.9 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

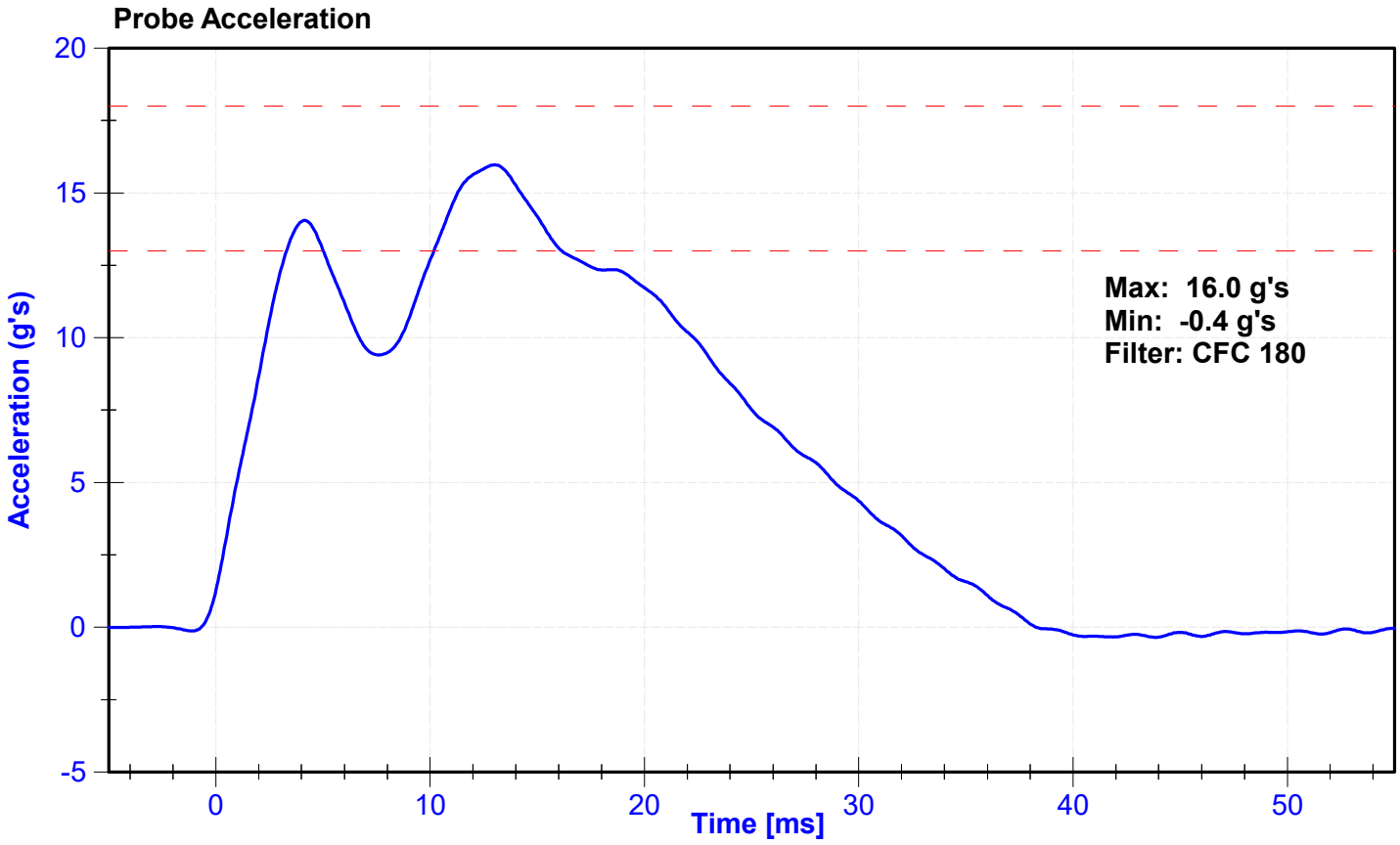
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

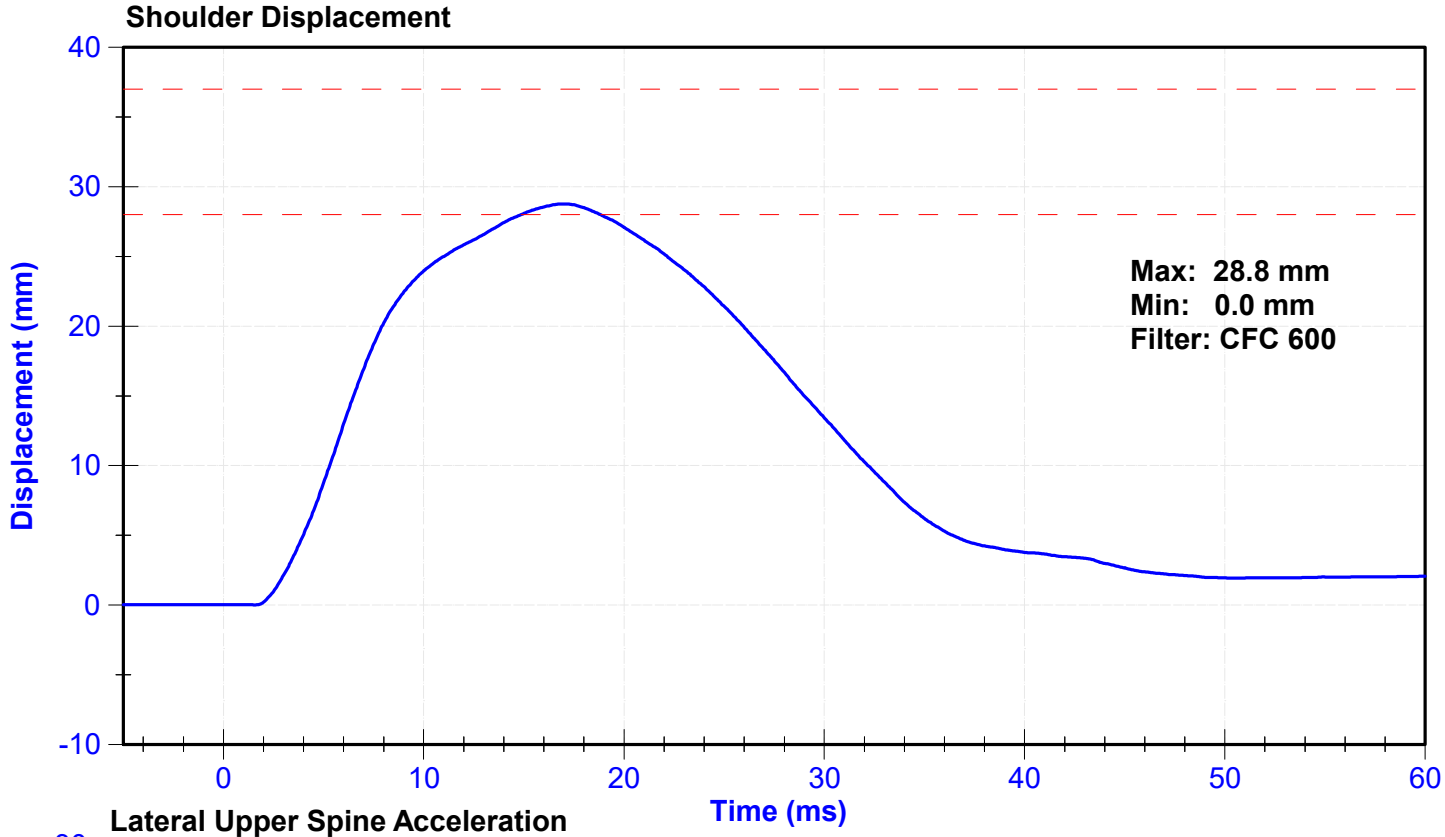
Results

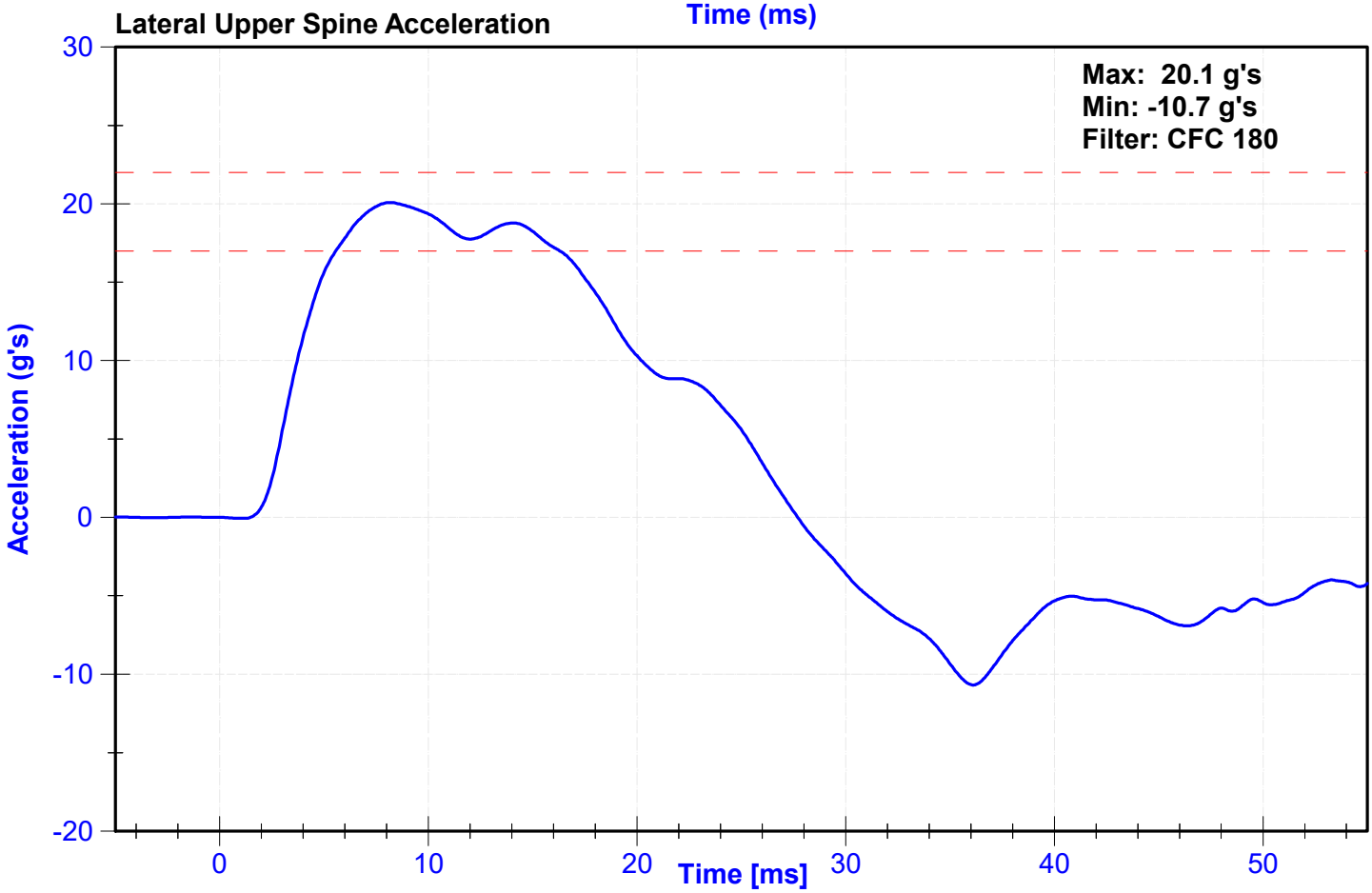
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	59	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	13	18	g's	16.0	Pass
Shoulder Deflection	28	37	mm	28.8	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.1	Pass

Transducer Calibrations

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




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 28.8 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 20.1 g's
Min: -10.7 g's
Filter: CFC 180

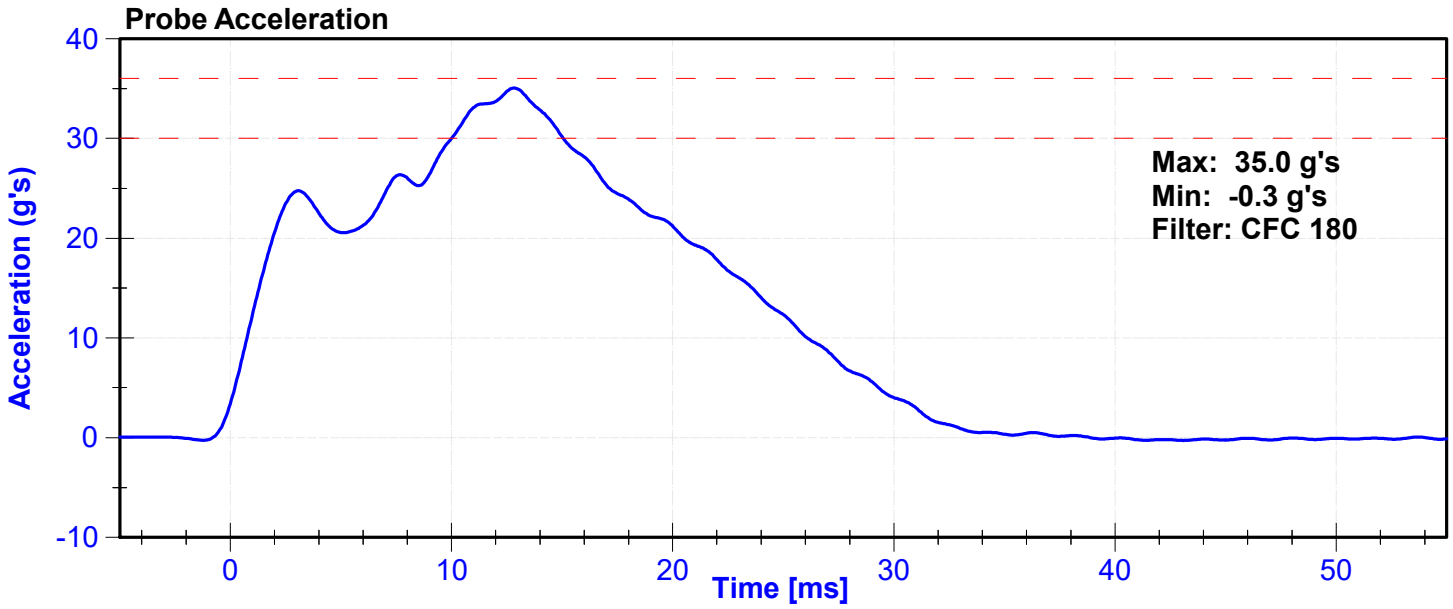
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

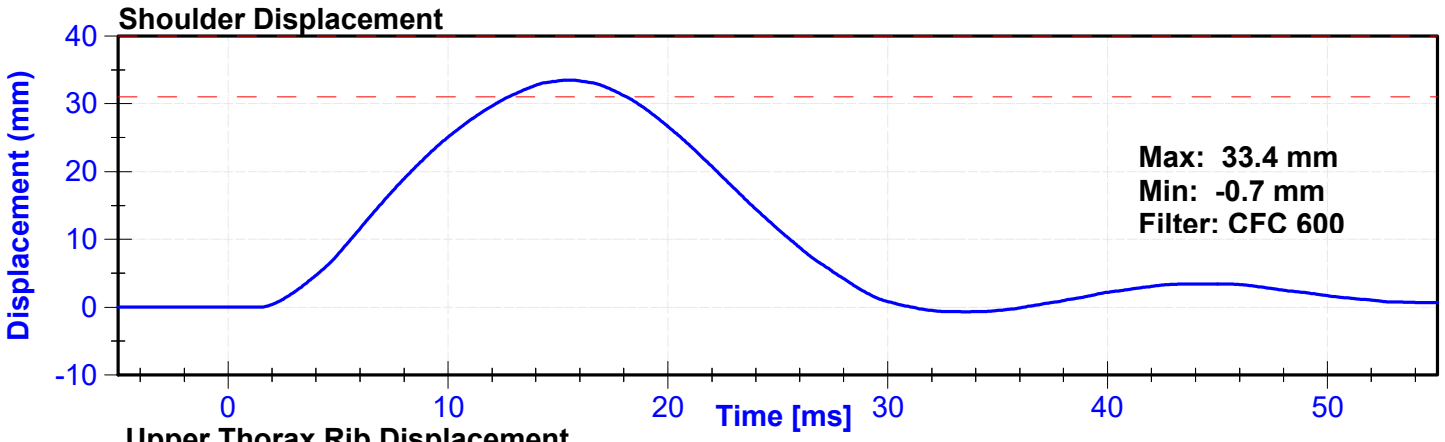
Results

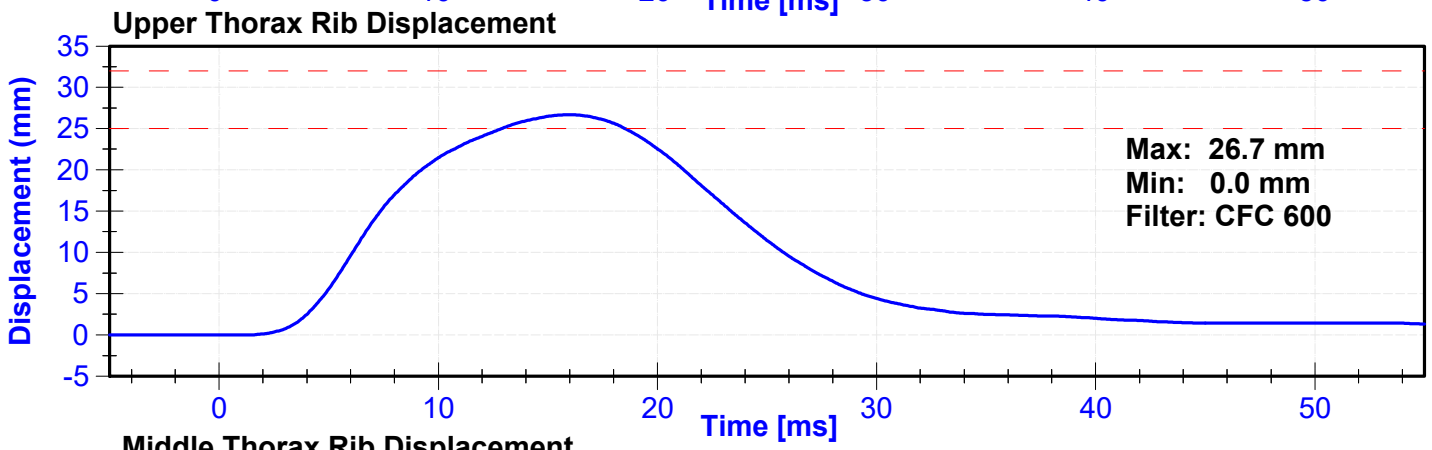
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	59	Pass
Velocity	6.6	6.8	m/s	6.67	Pass
Probe Acceleration after 5 ms	30	36	g's	35.0	Pass
Lateral Upper Spine Acceleration	34	43	g's	38.5	Pass
Lateral Lower Spine Acceleration	29	37	g's	32.6	Pass
Shoulder Deflection	31	40	mm	33.4	Pass
Upper Thorax Rib Deflection	25	32	mm	26.7	Pass
Mid Thorax Rib Deflection	30	36	mm	30.3	Pass
Lower Thorax Rib Deflection	32	38	mm	32.9	Pass

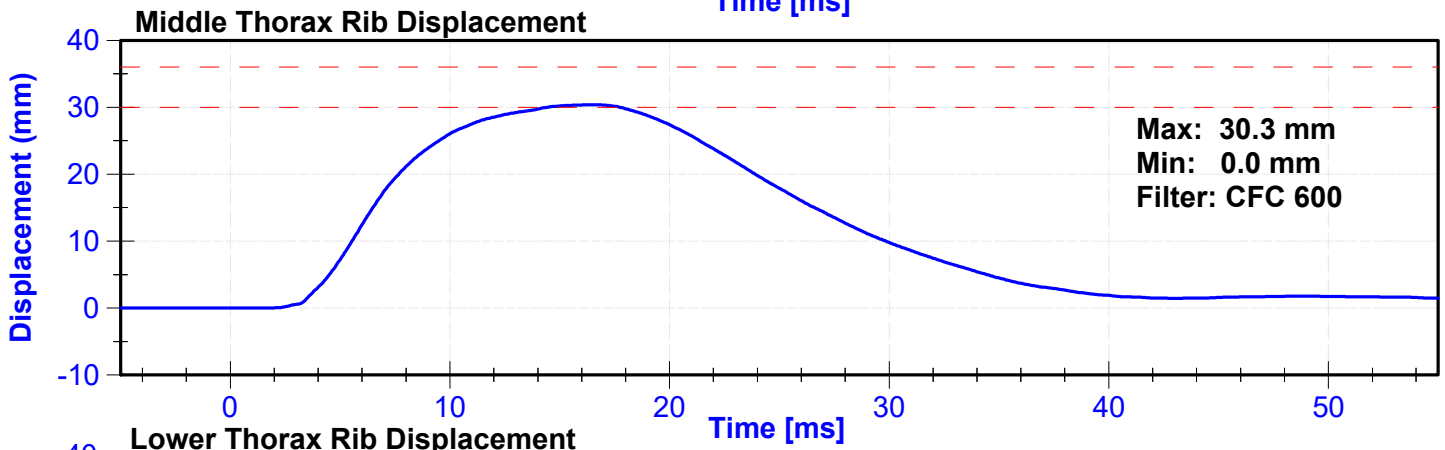
Transducer Calibrations

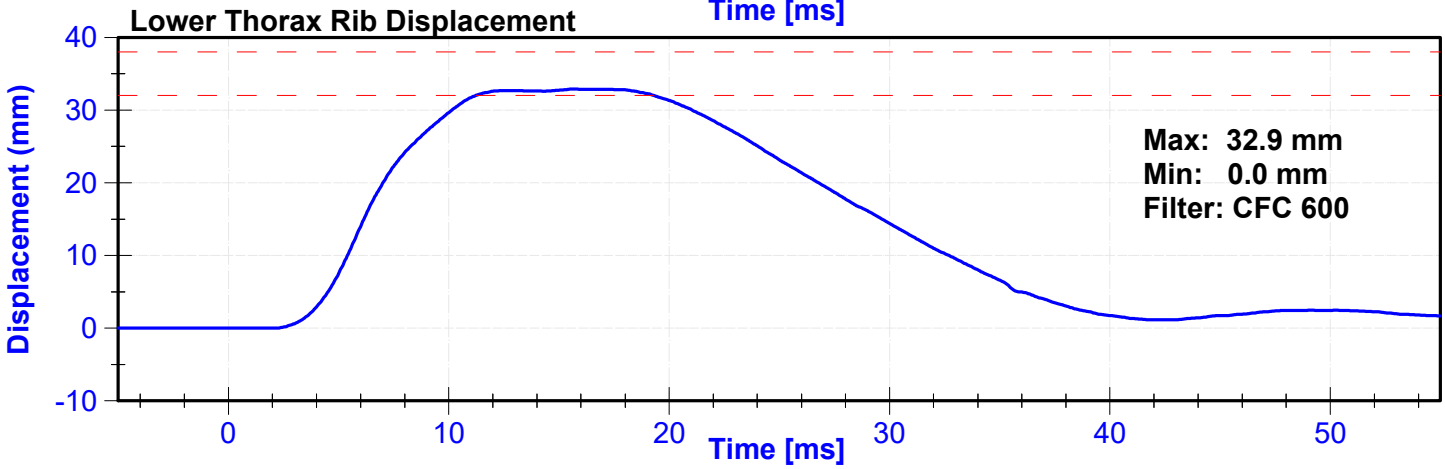
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Upper Spine T1 Y Accelerometer	Endevco	P64148	5/6/2024	11/2/2024
Upper Spine T12 Y Accelerometer	Endevco	P51327	5/6/2024	11/2/2024
Shoulder Potentiometer	Servo	1274GFE	5/6/2024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

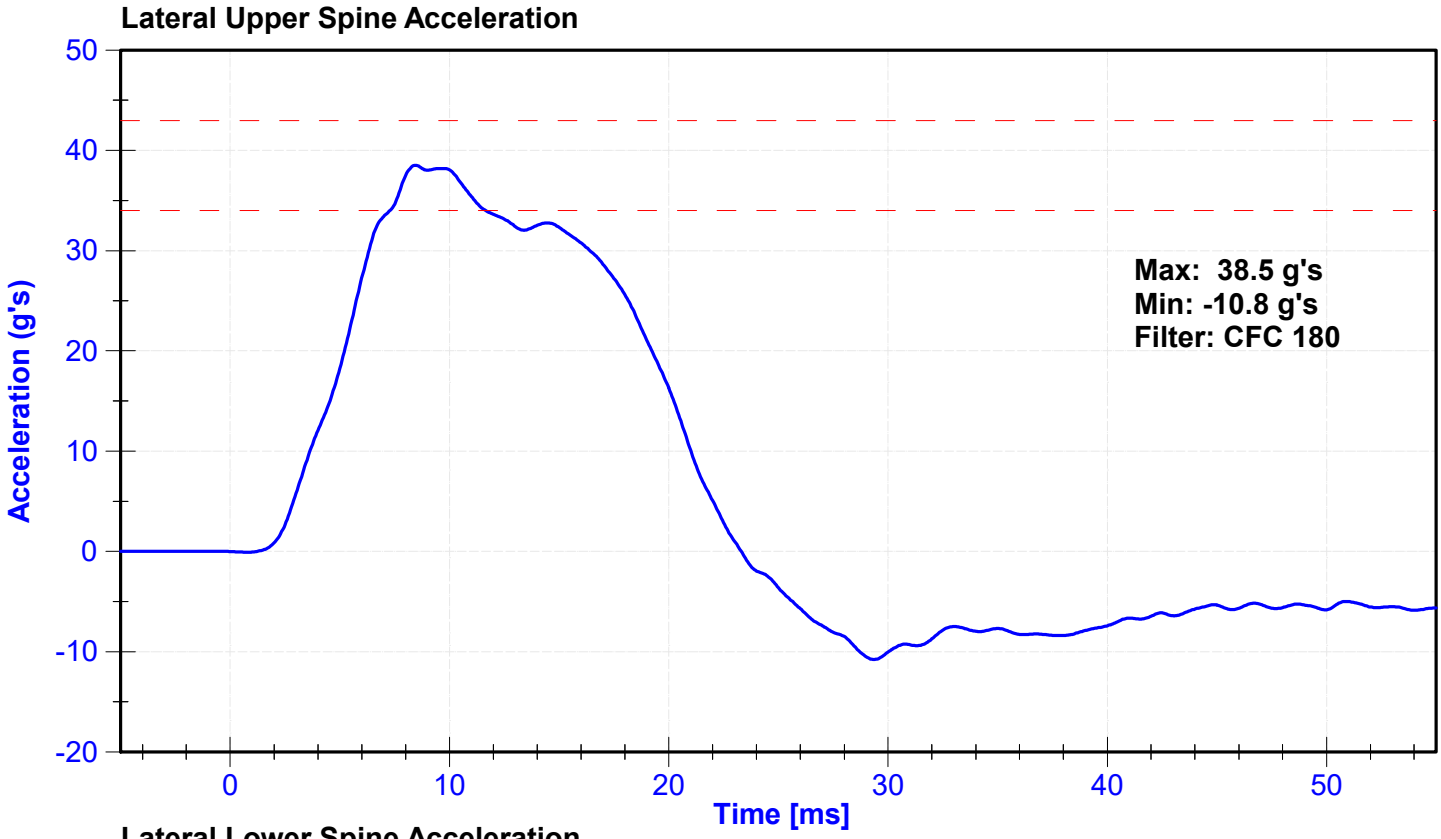


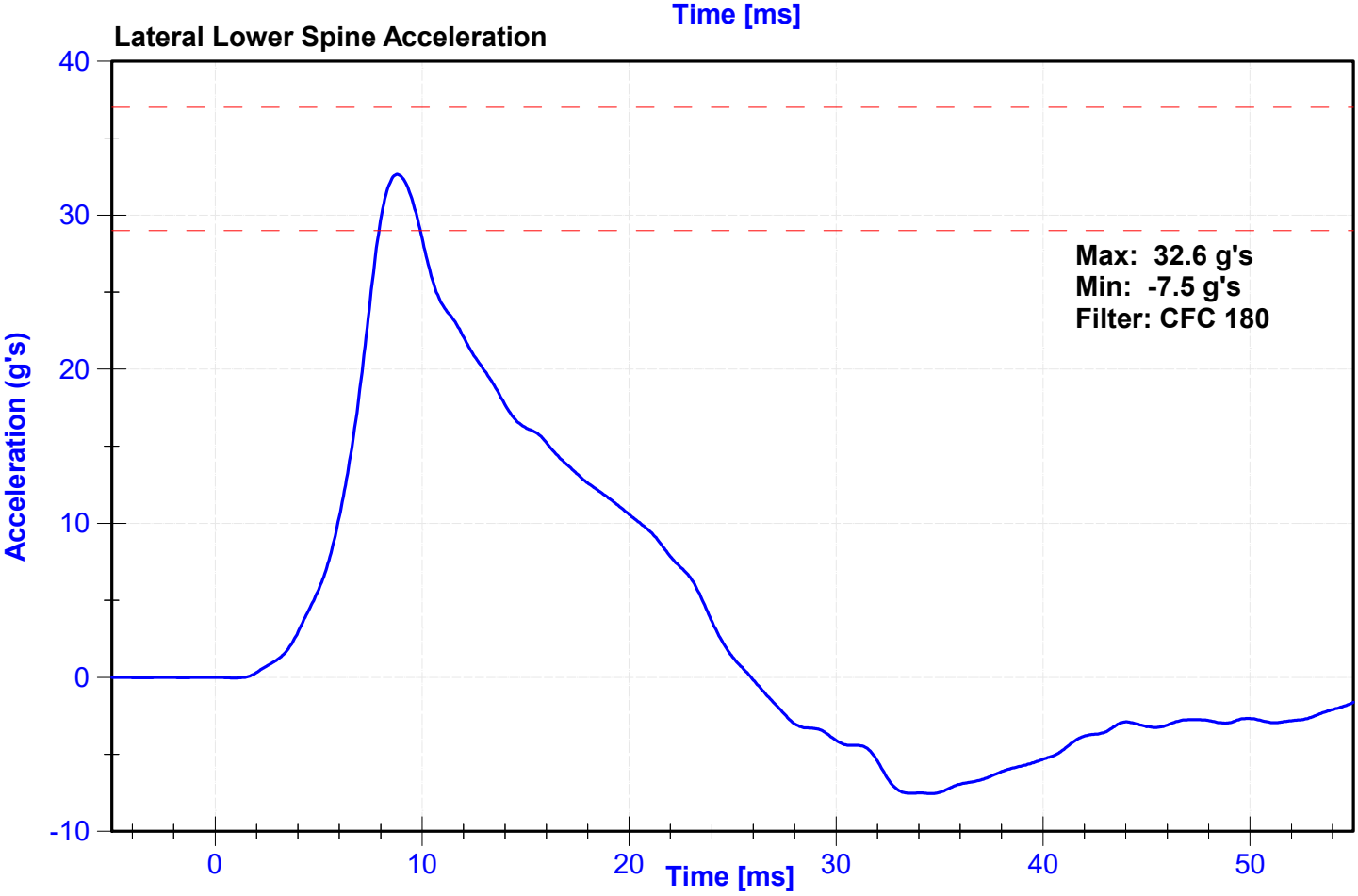

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 33.4 mm
Min: -0.7 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.7 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.3 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.9 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 38.5 g's
Min: -10.8 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 32.6 g's
Min: -7.5 g's
Filter: CFC 180

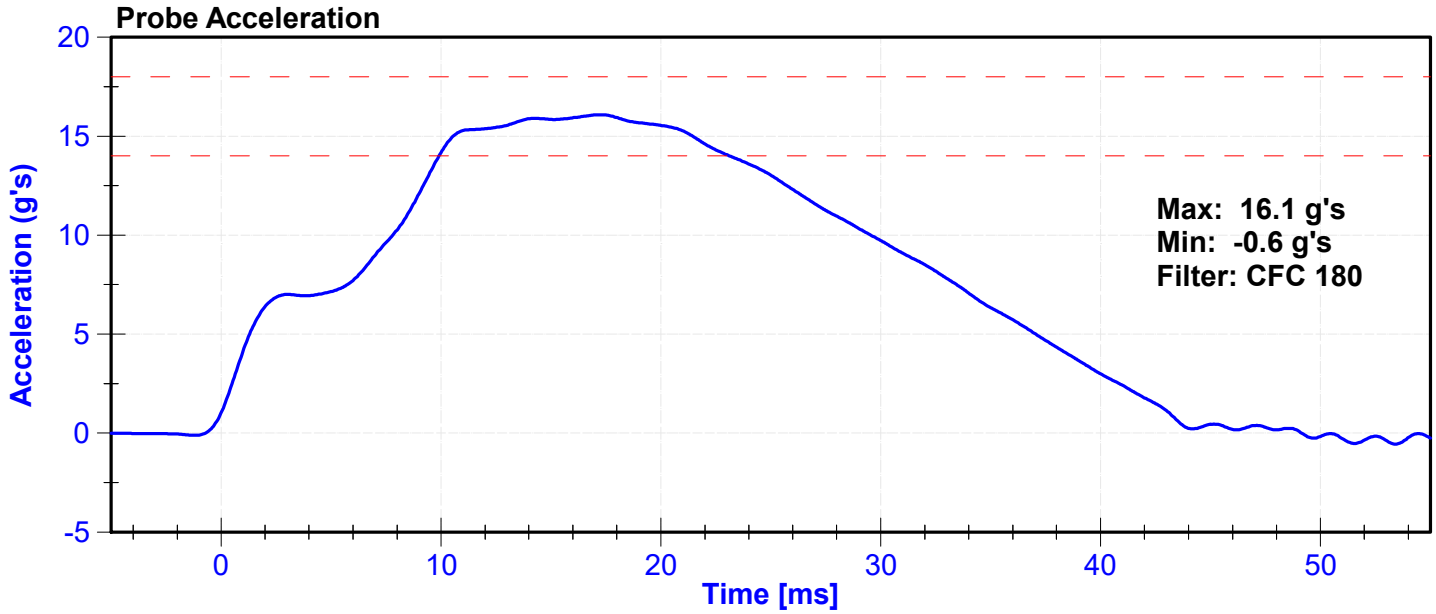
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

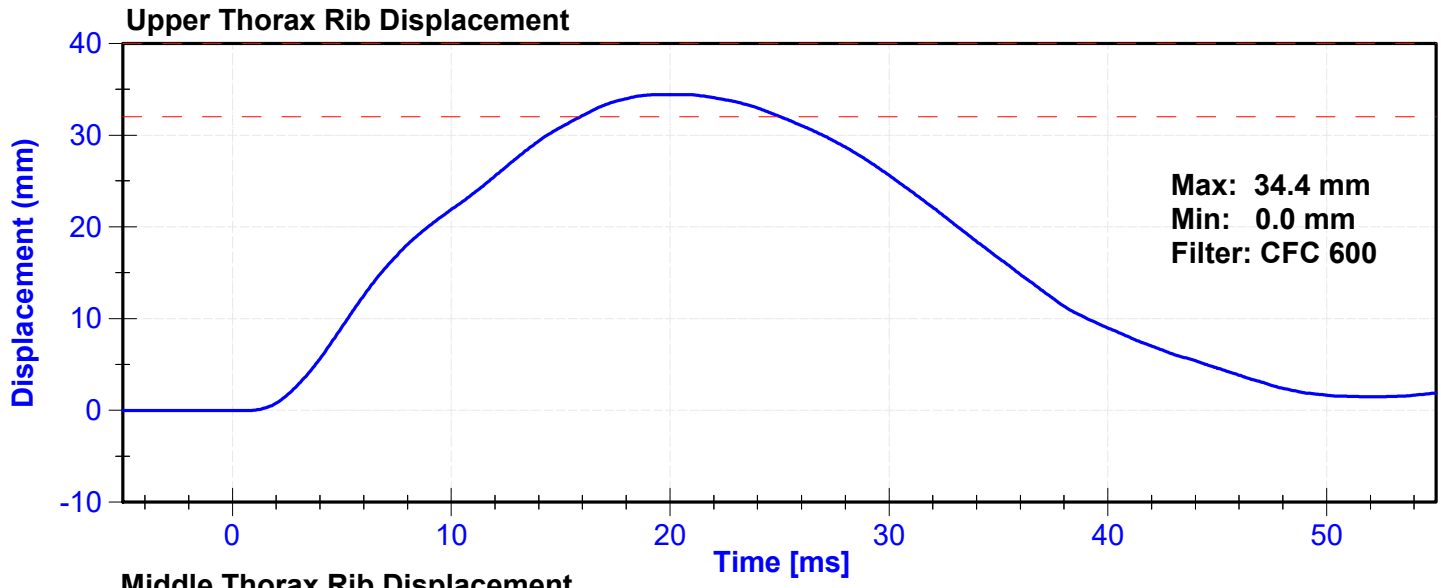
Results

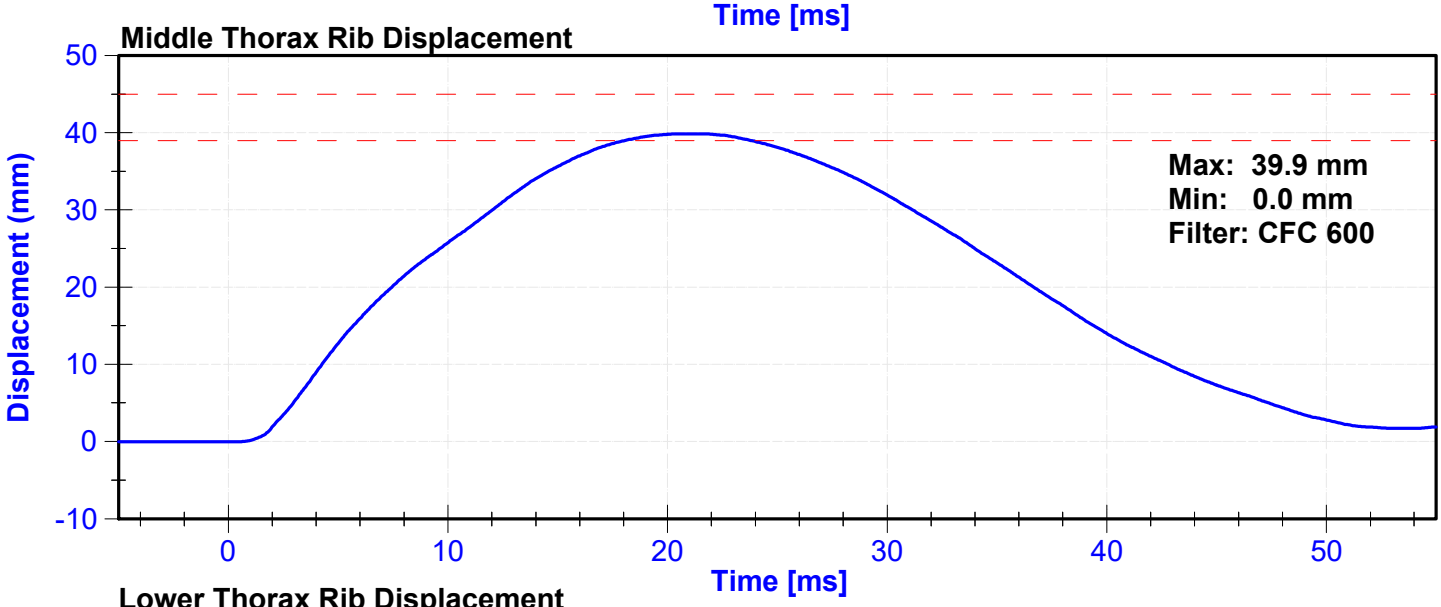
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	59	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	14	18	g's	16.1	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.3	Pass
Lateral Lower Spine Acceleration	7	11	g's	9.0	Pass
Upper Thorax Rib Deflection	32	40	mm	34.4	Pass
Middle Thorax Rib Deflection	39	45	mm	39.9	Pass
Lower Thorax Rib Deflection	35	43	mm	38.9	Pass

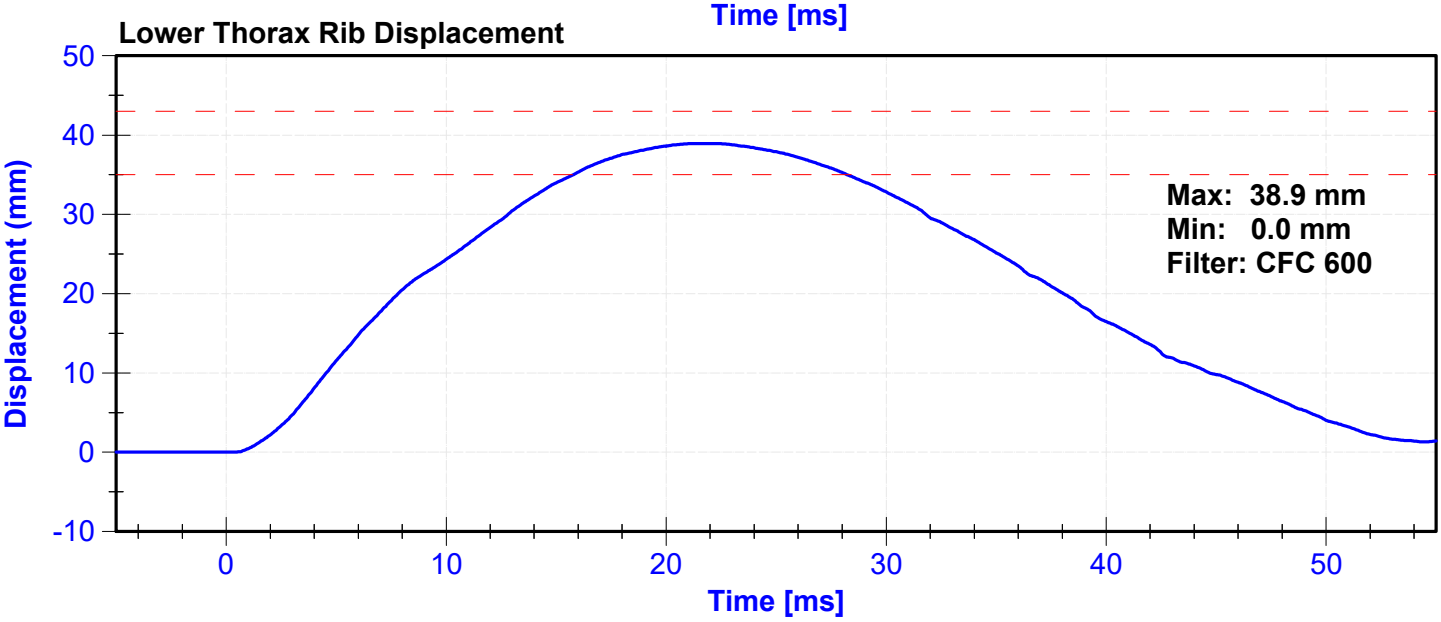
Transducer Calibrations

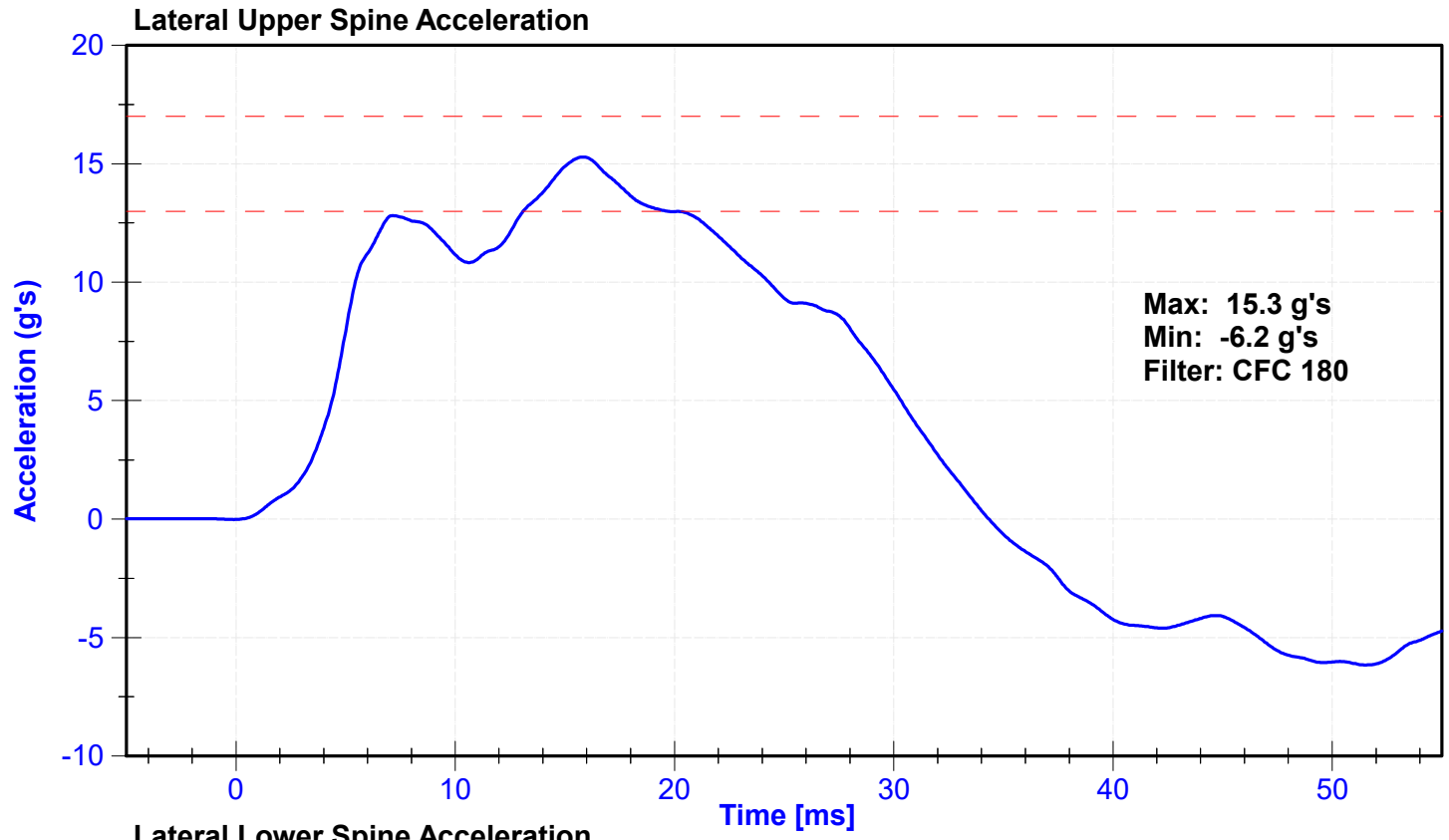
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Upper Spine Y Accelerometer	Endevco	P64148	5/6/2024	11/2/2024
Lower Spine Y Accelerometer	Endevco	P51327	5/6/2024	11/2/2024
Upper Thorax Rib Potentiometer	Servo	1199GFE	5/6/2024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

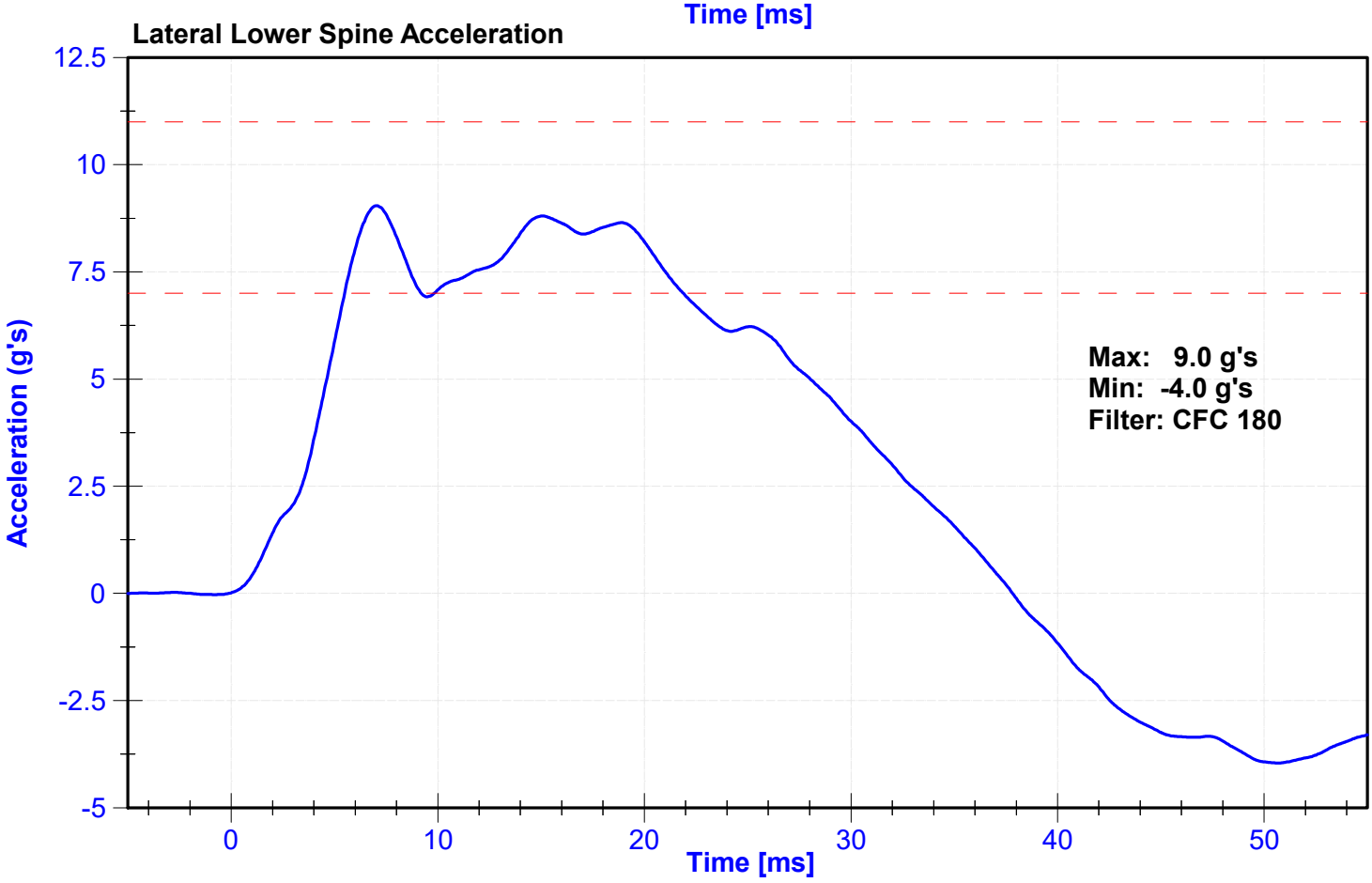



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.4 mm
Min: 0.0 mm
Filter: CFC 600


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


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 38.9 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 15.3 g's
Min: -6.2 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 9.0 g's
Min: -4.0 g's
Filter: CFC 180

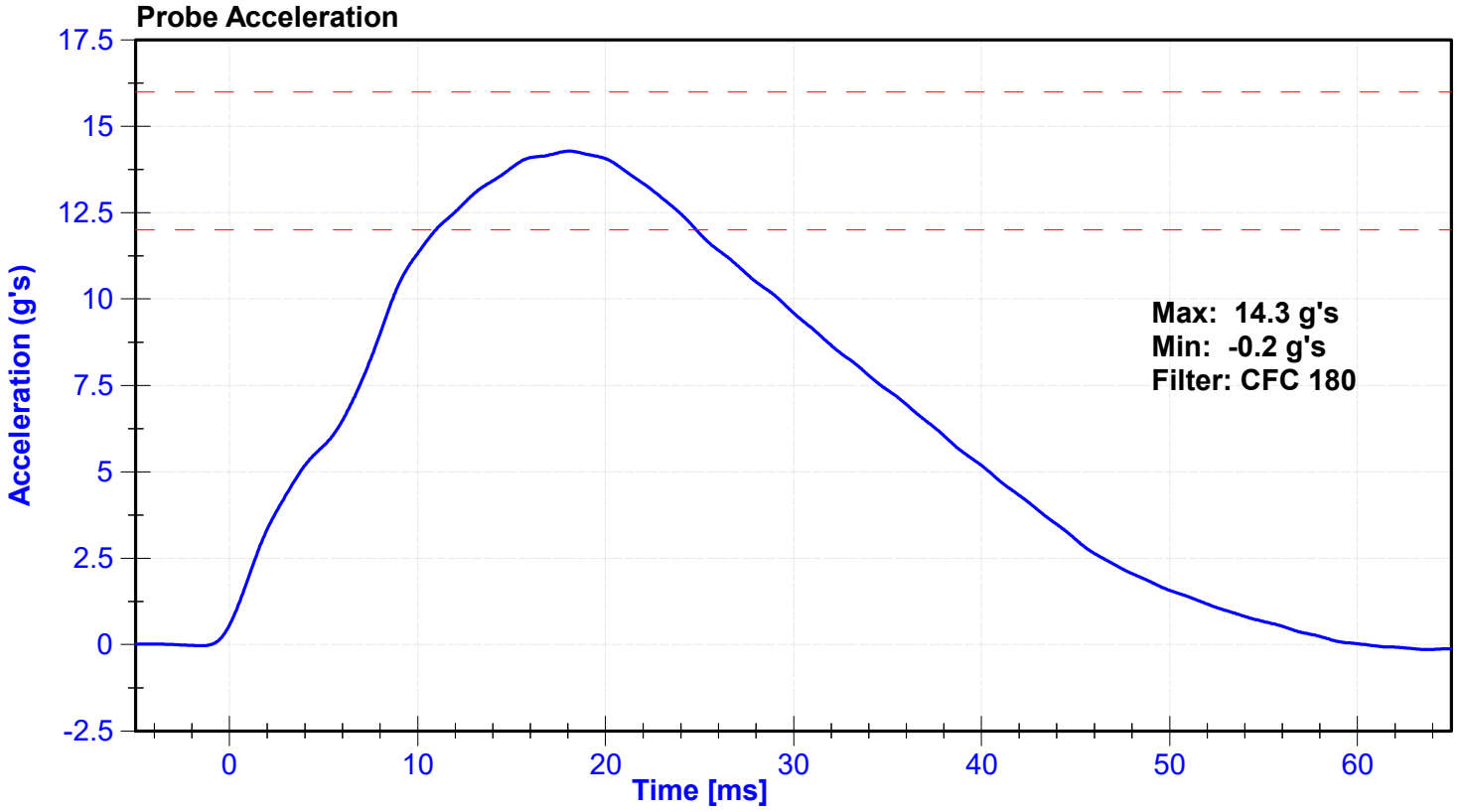
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

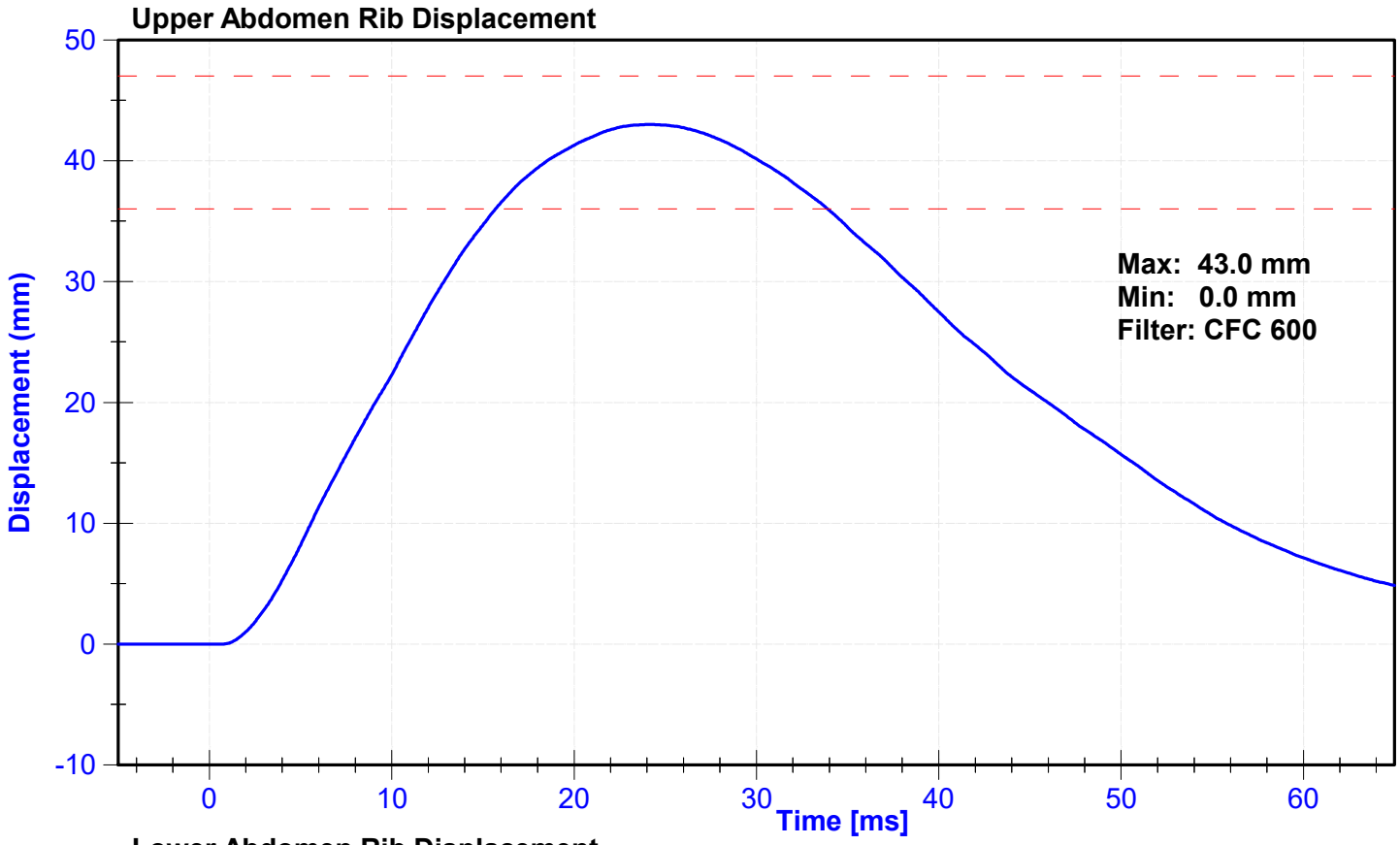
Results

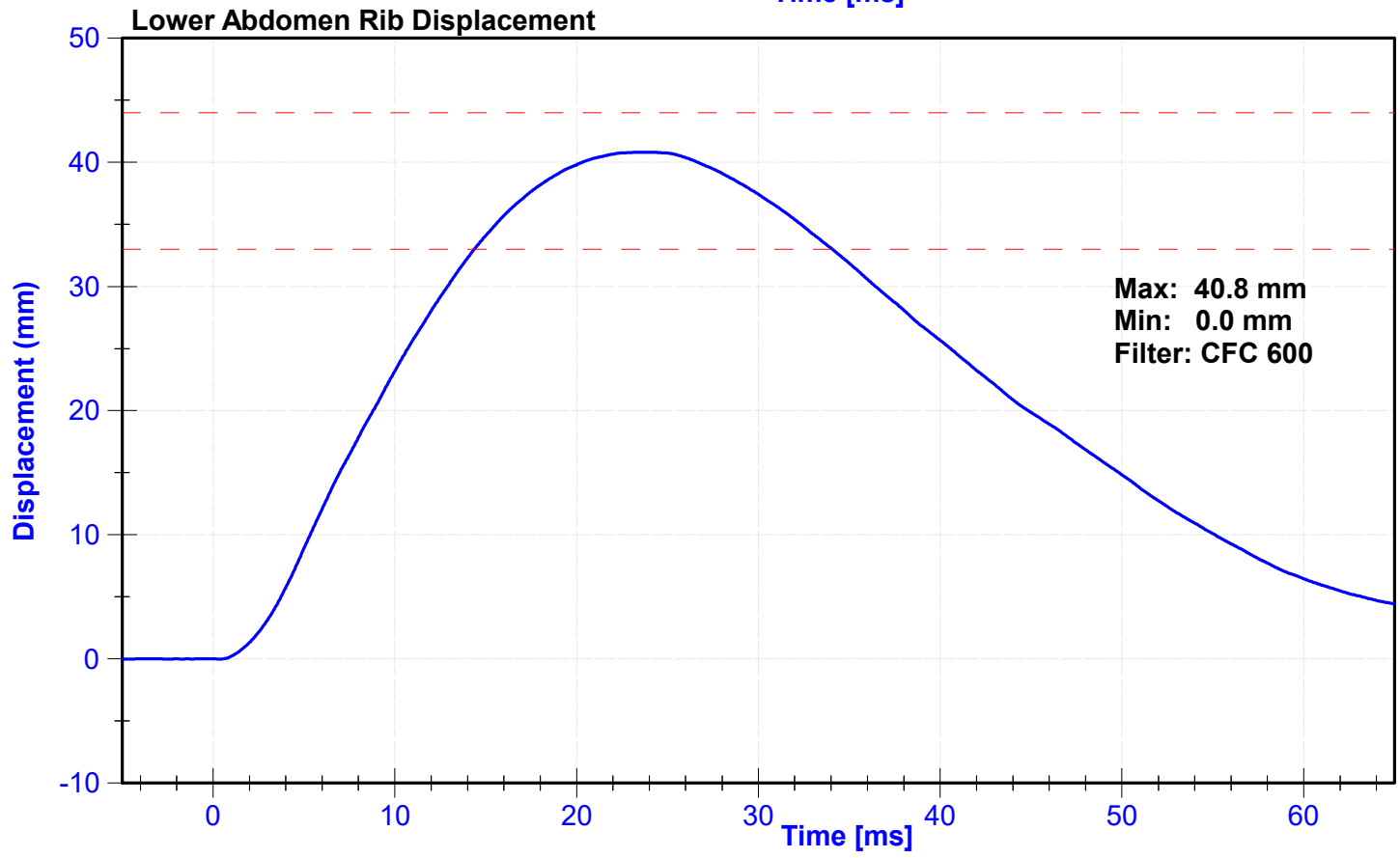
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	59	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	12	16	g's	14.3	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.5	Pass
Upper Abdomen Rib Deflection	36	47	mm	43.0	Pass
Lower Abdomen Rib Deflection	33	44	mm	40.8	Pass

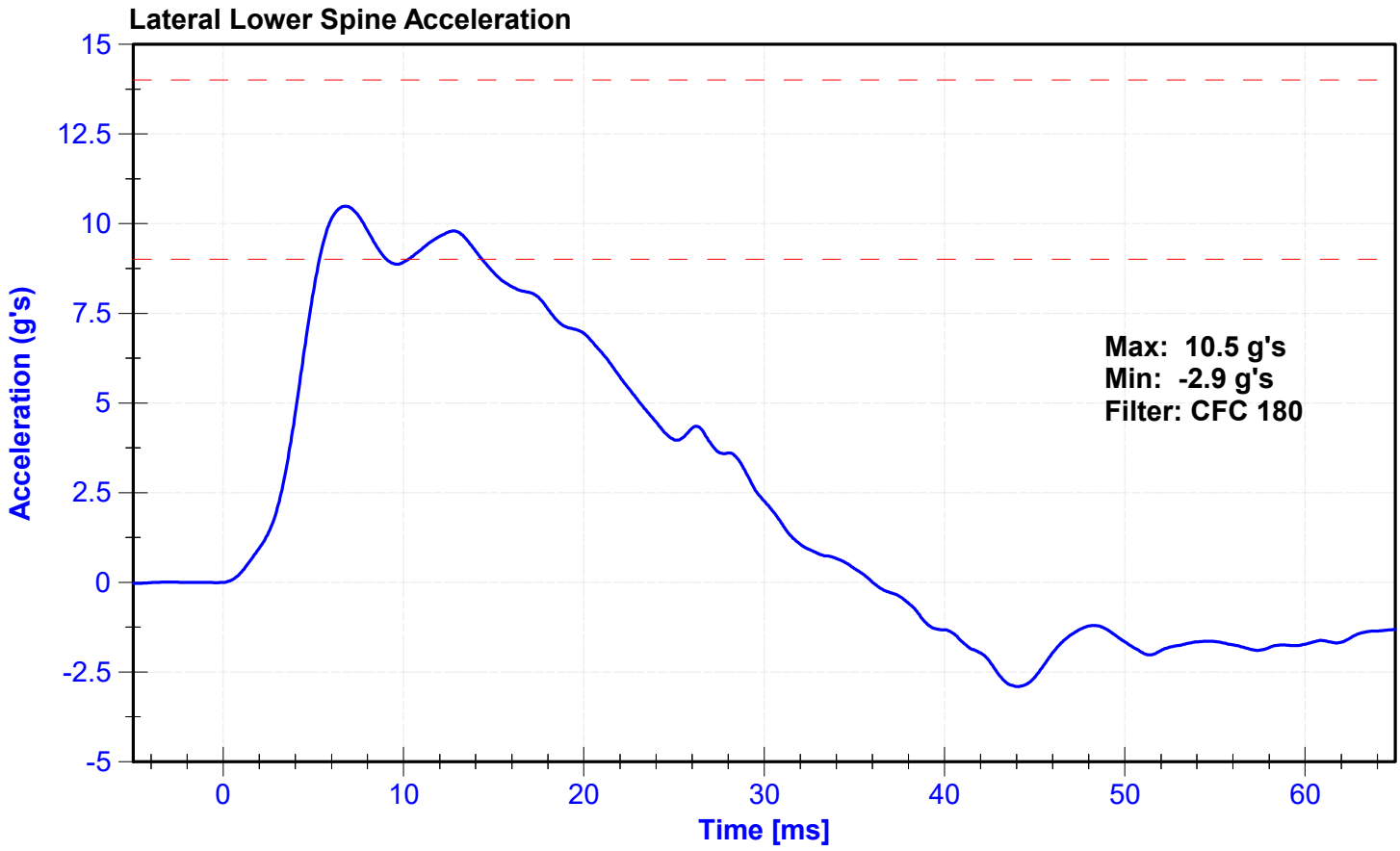
Transducer Calibrations

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




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 43.0 mm
Min: 0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 40.8 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Lower Spine Acceleration
Acceleration (g's)
15
12.5
10
7.5
5
2.5
0
-2.5
-5
0
10
20
30
40
50
60
Time [ms]
Max: 10.5 g's
Min: -2.9 g's
Filter: CFC 180

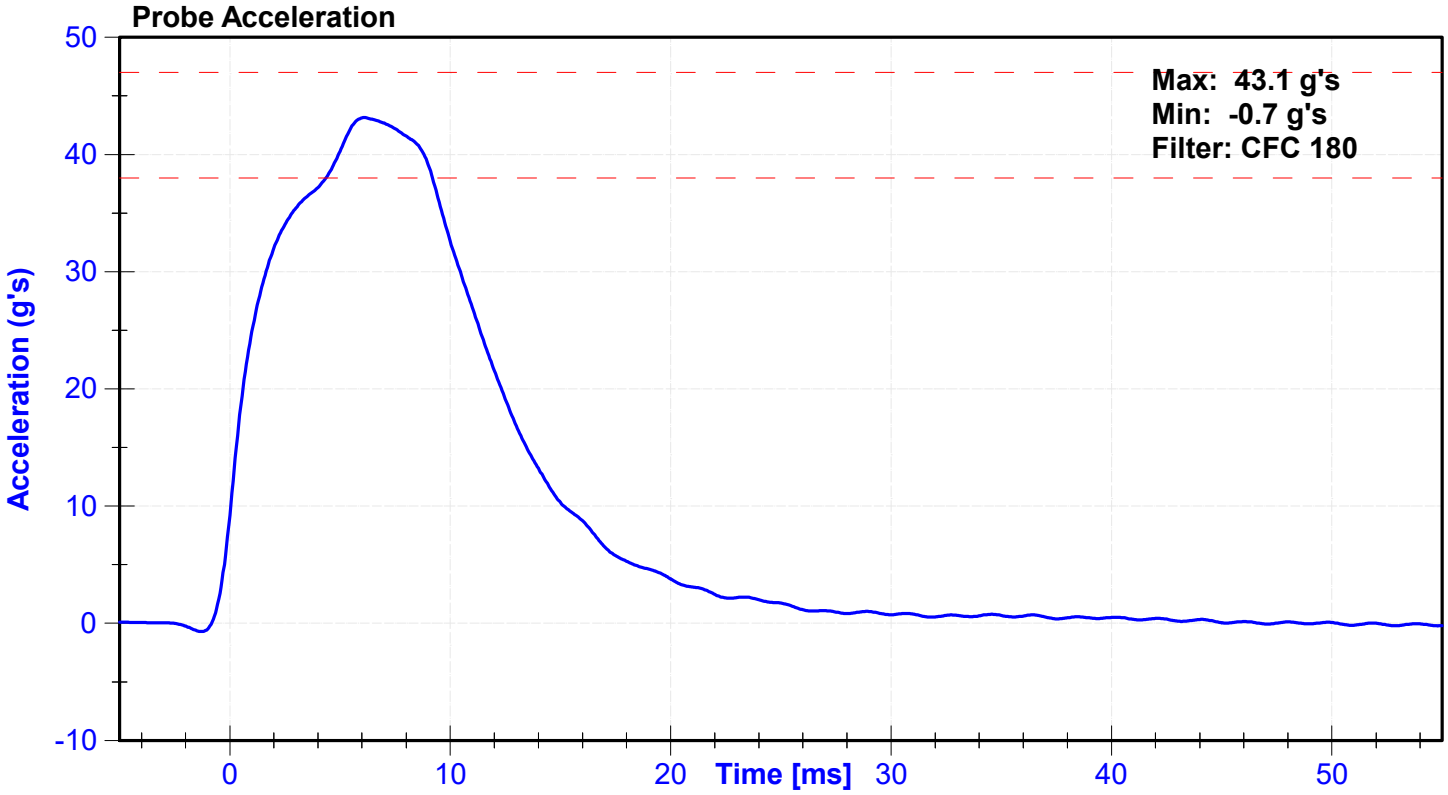
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

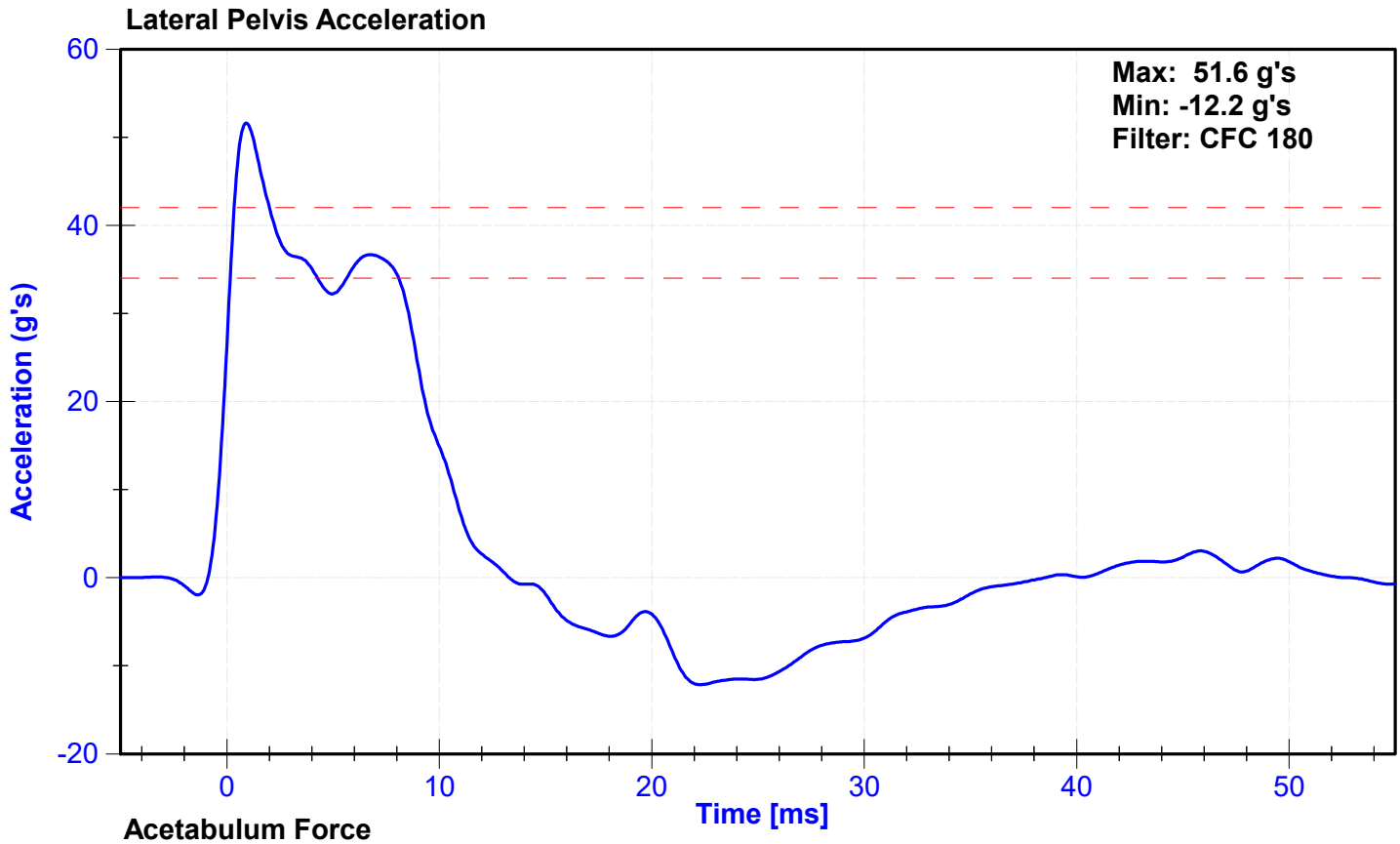
Results

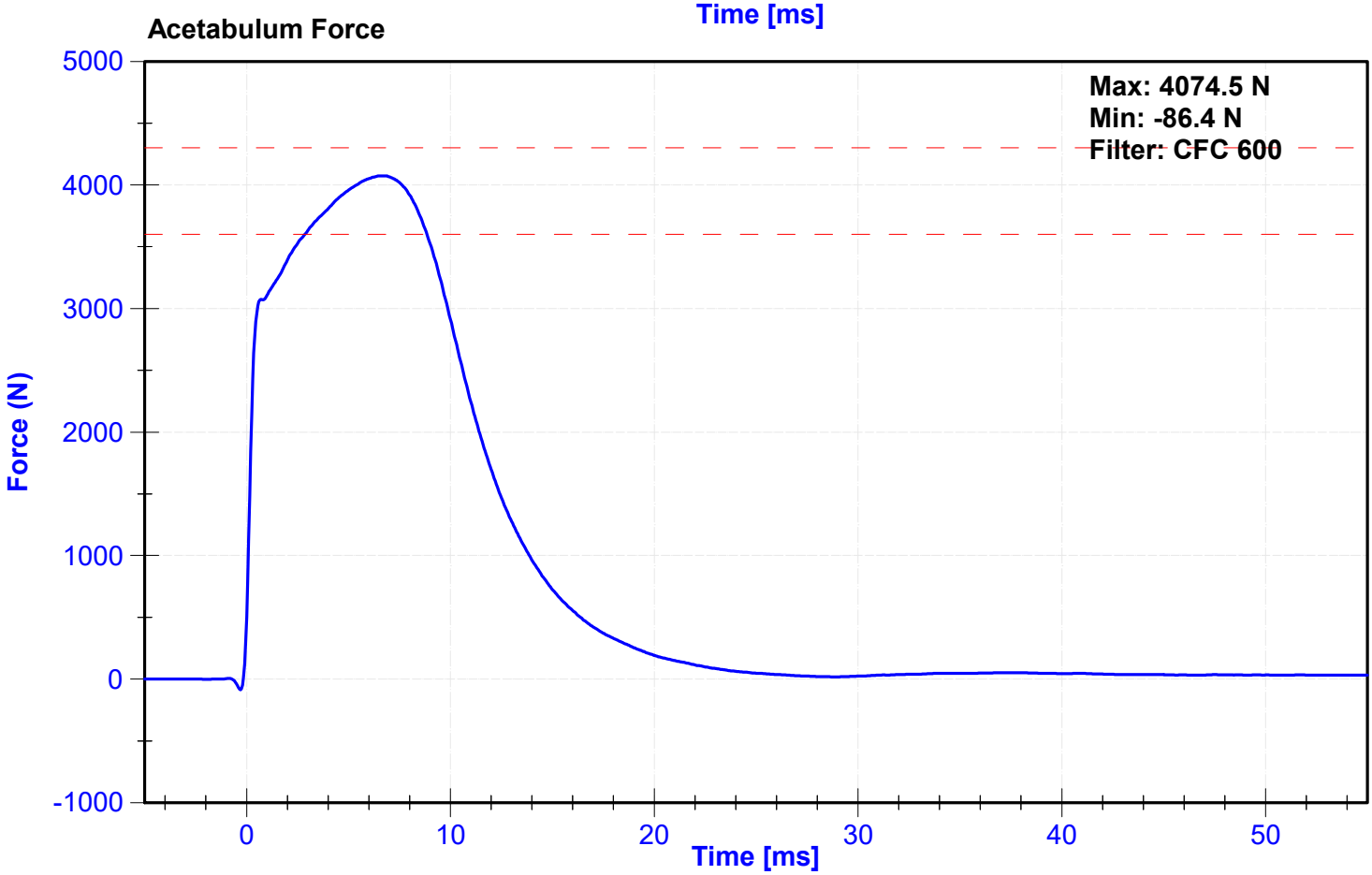
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	59	Pass
Velocity	6.6	6.8	m/s	6.65	Pass
Probe Acceleration	38	47	g's	43.1	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	36.7	Pass
Acetabulum Force	3600	4300	N	4074.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Pelvis Y Accelerometer	Endevco	P50078	5/6/2024	11/2/2024
Acetabulum Load Cell	Humanetics	DS3133-FY	10/25/2023	10/24/2024
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 51.6 g's
Min: -12.2 g's
Filter: CFC 180
Acceleration (g's)
60
40
20
0
-20
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 4074.5 N
Min: -86.4 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

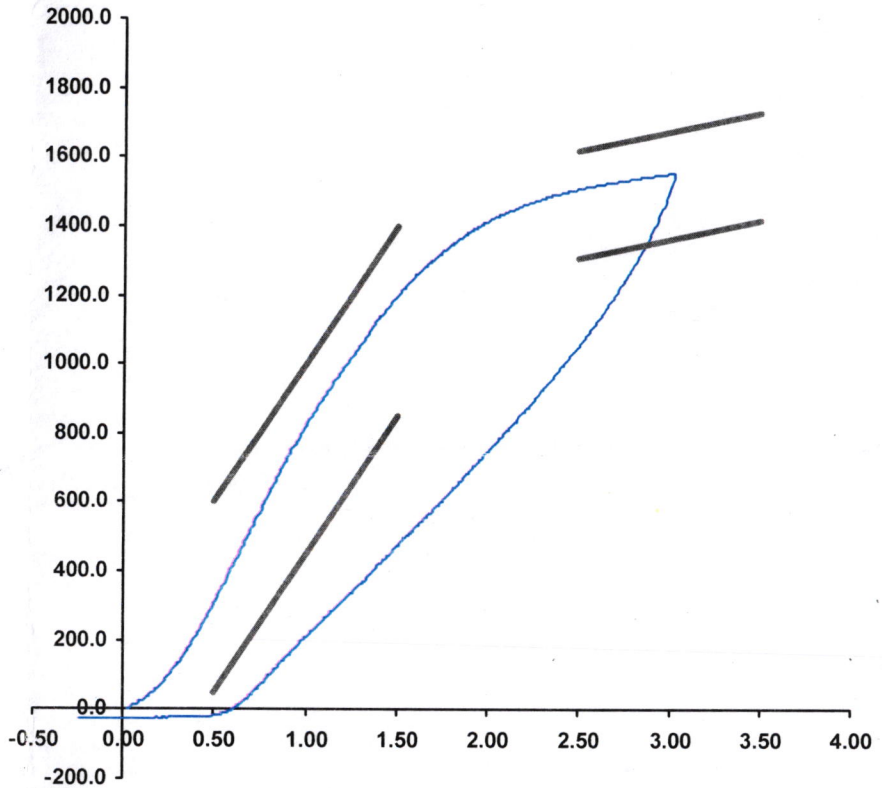
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16795
Test Number 23605
Report Number 23662
Test Date 7/25/2022 8:43:32 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	316	50	600
Force @ 1.5 mm (N)	1,199	850	1,400
Force @ 2.5 mm (N)	1,509	1,306	1,618
Force @ 3.0 mm (N)	1,553	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 D68012 9-20-24

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

C-90

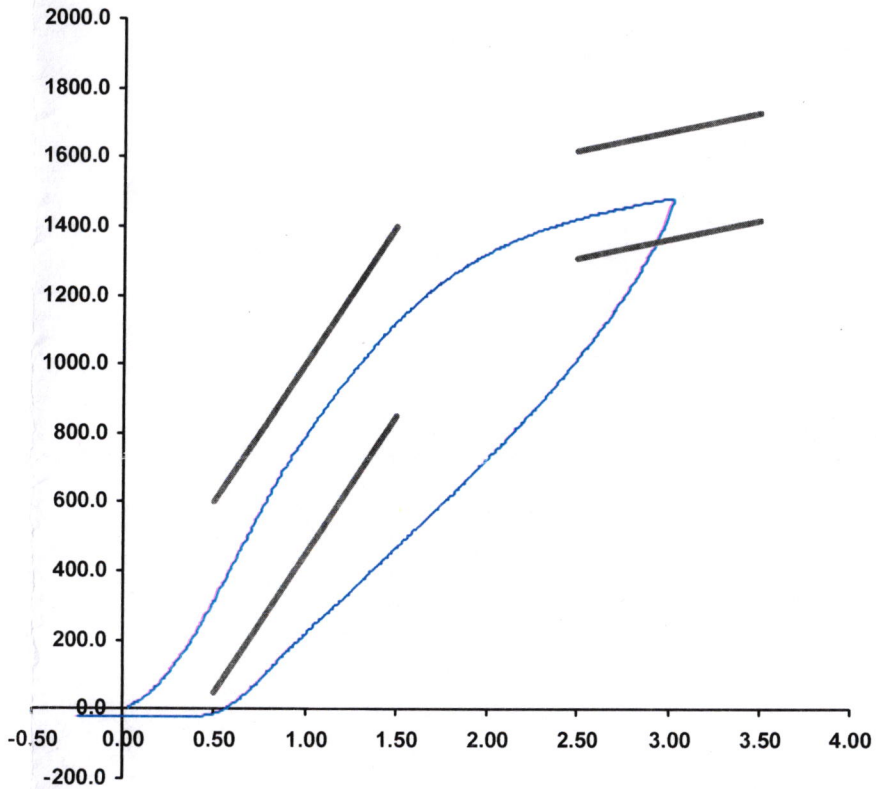
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16807
Test Number 23618
Report Number 23675
Test Date 7/25/2022 9:16:03 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	314	50	600
Force @ 1.5 mm (N)	1,121	850	1,400
Force @ 2.5 mm (N)	1,424	1,306	1,618
Force @ 3.0 mm (N)	1,481	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 Plug DG8012 9-20-24

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

C-91

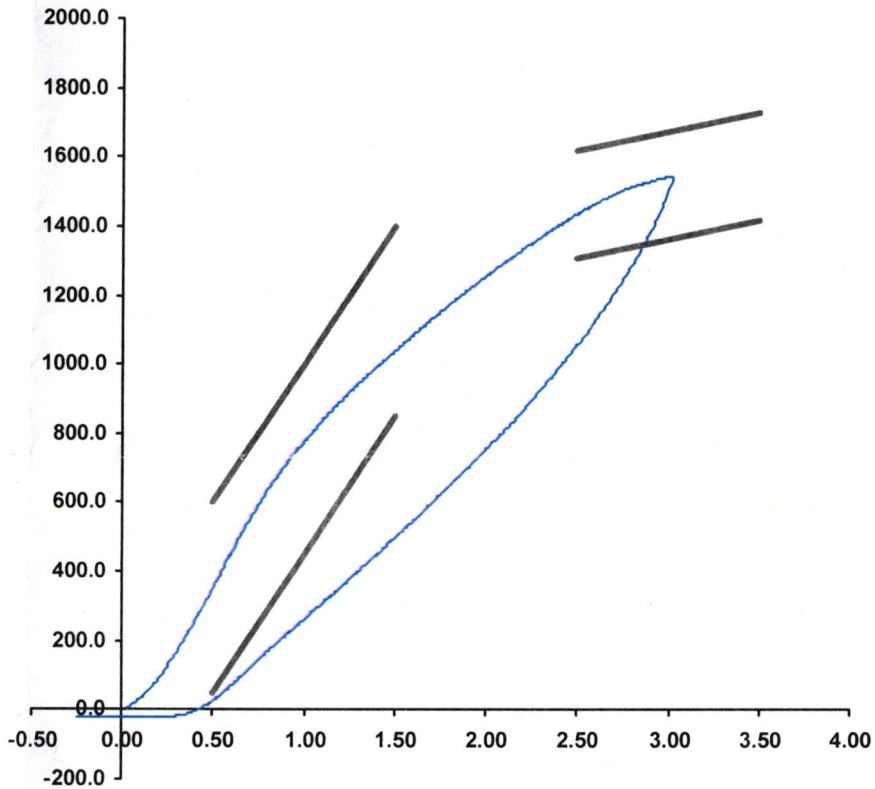
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16803
Test Number 23614
Report Number 23671
Test Date 7/25/2022 9:02:41 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	359	50	600
Force @ 1.5 mm (N)	1,039	850	1,400
Force @ 2.5 mm (N)	1,437	1,306	1,618
Force @ 3.0 mm (N)	1,543	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:
NEW IMPACT DG8012 9-20-24

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

C-92

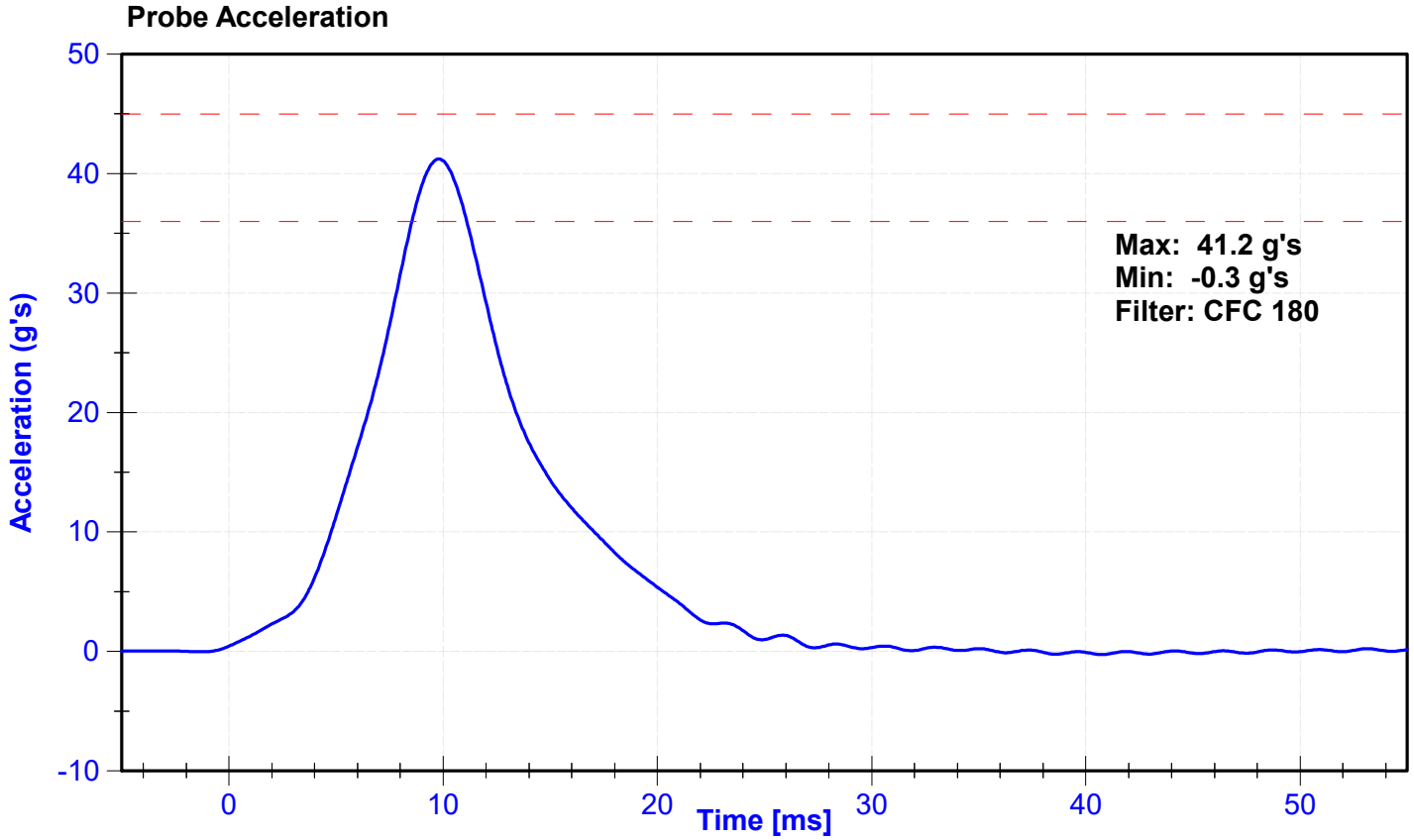
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	DG8012	Laboratory Supervisor	C. Mantell

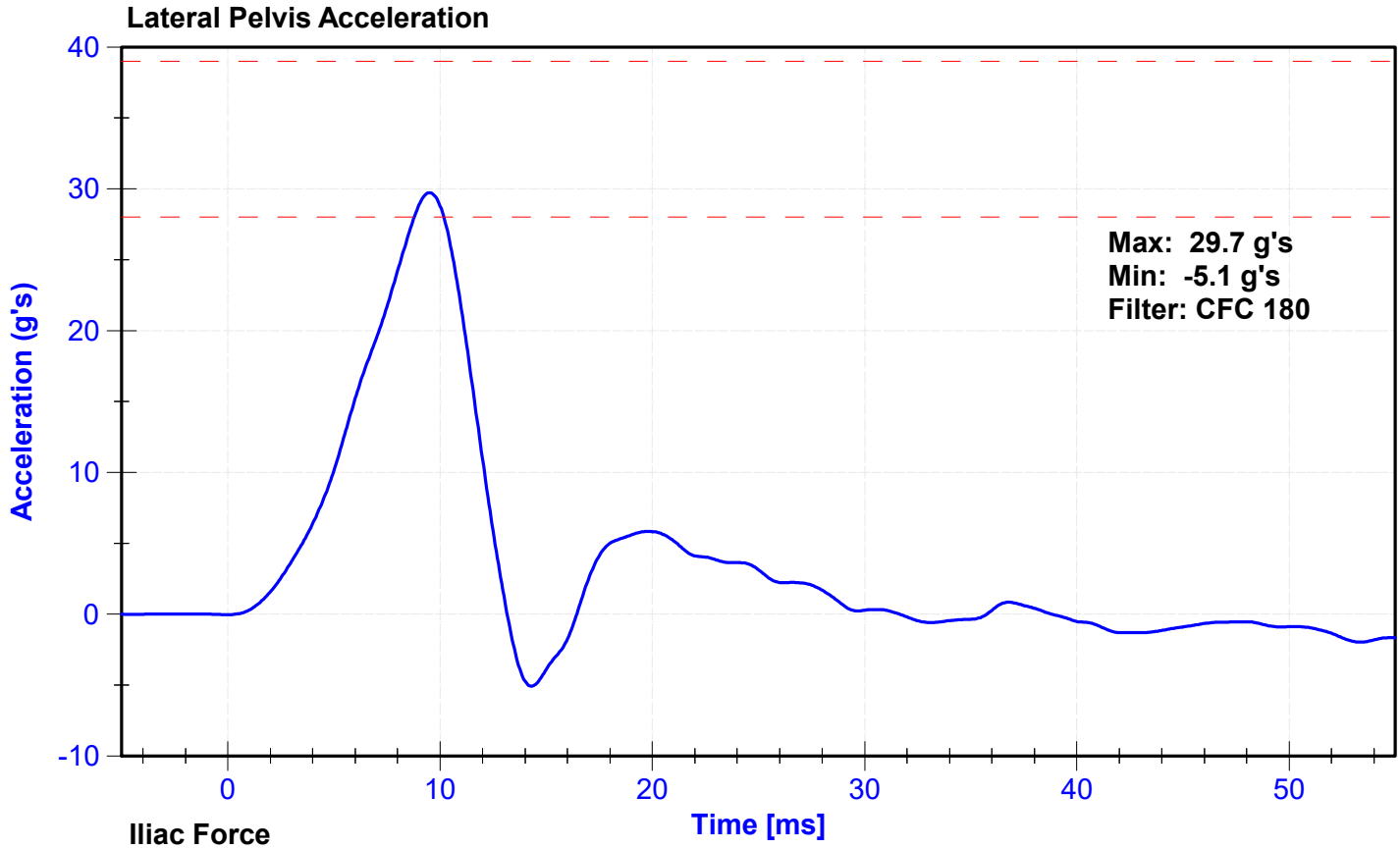
Results

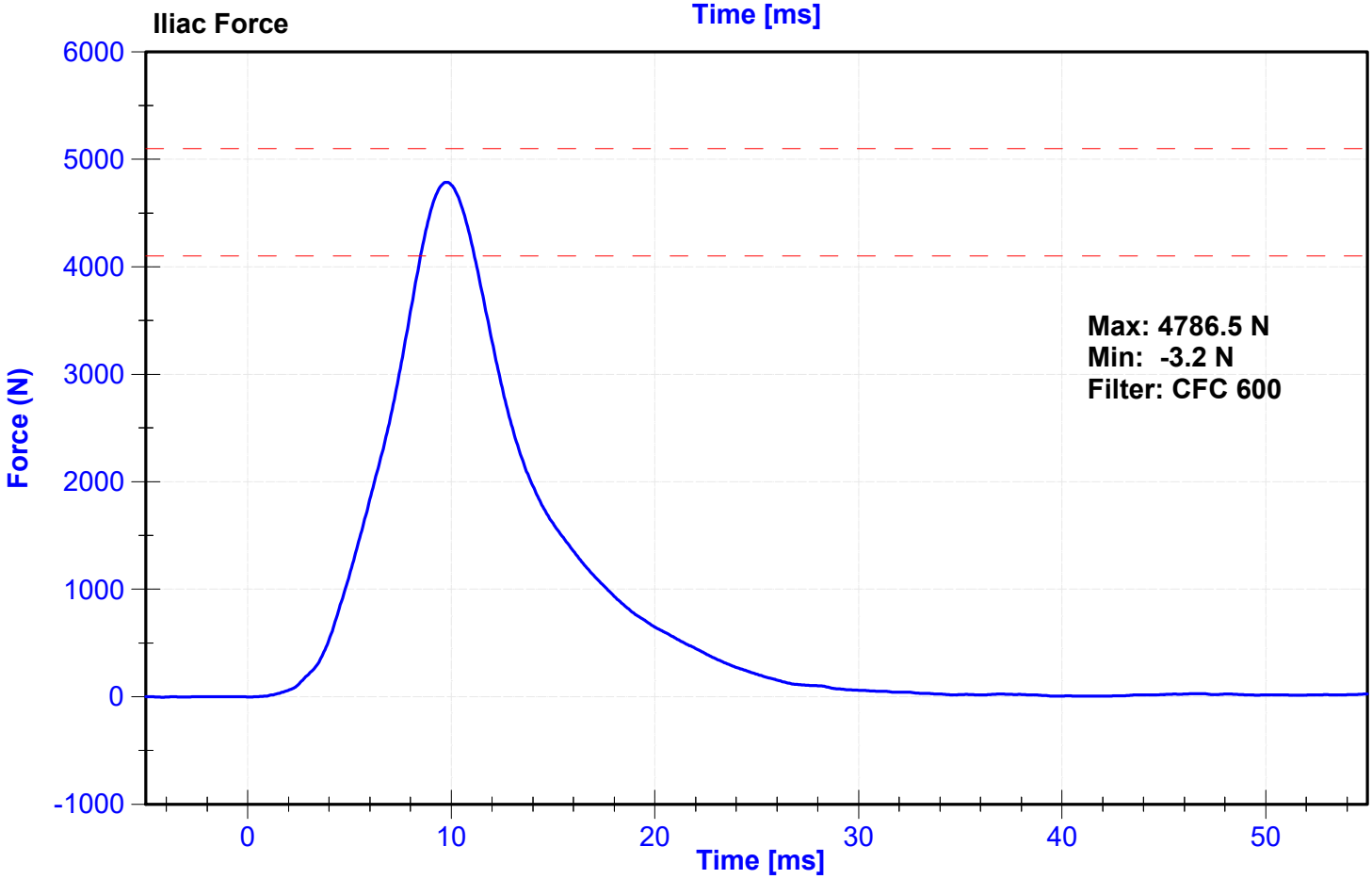
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.7	Pass
Humidity	10	70	%	59	Pass
Velocity	4.2	4.4	m/s	4.22	Pass
Probe Acceleration	36	45	g's	41.2	Pass
Lateral Pelvis Acceleration	28	39	g's	29.7	Pass
Iliac Force	4100	5100	N	4786.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18527	8/2/2024	1/29/2025
Pelvis Y Accelerometer	Endevco	P50078	5/6/2024	11/2/2024
Iliac Load Cell	FTSS	225-FY	10/25/2023	10/24/2024




Lateral Pelvis Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 29.7 g's
Min: -5.1 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: 4786.5 N
Min: -3.2 N
Filter: CFC 600

APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N _F033__		
			Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers	Primary	X	P63861	Endevco	05/06/2024
		Y	P49216	Endevco	05/06/2024
		Z	P51303	Endevco	05/06/2024
	Redundant	X	P58868	Endevco	05/06/2024
		Y	P59020	Endevco	05/06/2024
		Z	P52132	Endevco	05/06/2024
Thorax Rib Displacement Potentiometers	Upper	Y	179GFE	Honeywell	05/06/2024
	Middle	Y	185GFE	Honeywell	05/06/2024
	Lower	Y	178GFE	Honeywell	05/06/2024
Abdomen Load Cells	Forward	Y	1523	Denton	12/05/2023
	Middle	Y	1524	Denton	12/05/2023
	Rear	Y	1530	Denton	12/05/2023
Lower Spine Accelerometers (T12)		X	P35790	Endevco	05/06/2024
		Y	T31029	Endevco	05/06/2024
		Z	P52033	Endevco	05/06/2024
Pubic Symphysis Load Cell		Y	458-FY	Denton	12/05/2023

TABLE 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N __DG8012__		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers		Primary	X	T21184	Endevco	05/06/2024
			Y	T31030	Endevco	09/10/2024
			Z	P83319	Endevco	05/06/2024
		Redundant	X	T21354	Endevco	05/06/2024
			Y	P52155	Endevco	05/06/2024
			Z	P83322	Endevco	05/06/2024
Displacement Potentiometers	Thoracic Rib	Upper	Y	1199GFE	Servo	05/06/2024
		Middle	Y	1246GFE	Servo	05/06/2024
		Lower	Y	011GFE	Servo	05/06/2024
	Abdominal Rib	Upper	Y	008GFE	Servo	05/06/2024
		Lower	Y	046GFE	Servo	05/06/2024
Lower Spine Accelerometers (T12)			X	P71272	Endevco	05/06/2024
			Y	P51327	Endevco	05/06/2024
			Z	P52067	Endevco	05/06/2024
Acetabulum Load Cell			Y	DS3133-FY	Humanetics	10/25/2023
Iliac Wing Load Cell			Y	225-FY	FTSS	10/25/2023
Pelvis Plug (struck side)				16334	SACO	05/20/2024
Pelvis Plug (non-struck side)				13812	SACO	05/08/2020

TABLE 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	A281024	Measurement Specialties	07/18/2024
	Vehicle Center of Gravity	Y	A372865	Measurement Specialties	07/18/2024
	Vehicle Center of Gravity	Z	A374309	Measurement Specialties	07/18/2024
2	Right Sill at Front Seat	X	A400013	Measurement Specialties	04/24/2024
	Right Sill at Front Seat	Y	A413598	Measurement Specialties	04/24/2024
	Right Sill at Front Seat	Z	A431247	Measurement Specialties	04/24/2024
3	Right Sill at Rear Seat	X	G22198	Endevco	04/09/2024
	Right Sill at Rear Seat	Y	G22232	Endevco	04/09/2024
	Right Sill at Rear Seat	Z	A315727	Measurement Specialties	05/21/2024
4	Left Sill at Front Door	Y	G24328	Endevco	06/03/2024
5	Left Sill at Rear Door	Y	G25848	Endevco	06/03/2024
6	Left A-Post Lower	Y	G23688	Endevco	05/07/2024
7	Left A-Post Middle	Y	A373242	Measurement Specialties	06/10/2024
8	Left B-Post Lower	Y	G25564	Endevco	05/09/2024
9	Left B-Post Middle	Y	G25854	Endevco	06/03/2024
10	Front Seat Track	Y	G25556	Endevco	05/08/2024
11	Rear Seat Track or Structure	Y	A374235	Measurement Specialties	07/26/2024
12	Right Rear Occ. Compartment	Y	G23446	Endevco	05/31/2024
13	Engine Block	X	G22718	Endevco	04/29/2024
	Engine Block	Y	G22746	Endevco	04/29/2024
14	Rear Floorpan Above Axle	X	G23828	Endevco	06/18/2024
	Rear Floorpan Above Axle	Y	G23833	Endevco	06/18/2024
	Rear Floorpan Above Axle	Z	G23839	Endevco	06/18/2024

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