REPORT NUMBER: 214D-CAL-24-010

SAFETY COMPLIANCE TESTING FOR FMVSS 214
SIDE IMPACT PROTECTION

Audi AG
2024 Audi e-tron GT quattro
4 Door Sedan

NHTSA No: C20245801

PREPARED BY:
CALSPAN CORPORATION
P.O. BOX 400
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February 24, 2025

FINAL REPORT

PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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WASHINGTON, D.C. 20590

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FINAL REPORT ACCEPTANCE BY OVSC:

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Accepted by

Date: 2-24-2025

TECHNICAL REPORT DOCUMENTATION PAGE

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Final Report of 214P Compliance Test Side Impact Protection Testing of 2024 Audi e-tron GT quattro 4 Door Sedan NHTSA No.: C20245801	February 24, 2025
	6. Performing Organization Code CAL
7. Author(s) Alexander Rudniski, Test Engineer Vanessa Hansen, Operations Manager	***8. Performing Organization Report No.*** CAL-DOT-2024-010
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operations P.O. Box 400 Buffalo, New York 14225	***10. Work Unit No.***
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15. Supplementary Notes

16. Abstract

A 48/24 kph 90° Impact (Moving Deformable Barrier) Compliance Tests was conducted on the subject 2024 Audi e-tron GT quattro 4 Door Sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-214D-09 for the determination of FMVSS No. 214 Side Impact Protection compliance. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on January 30, 2025.

The impact velocity of the Moving Deformable Barrier (MDB) was 53.11 kph, and the ambient temperature at the struck (driver side) of the target vehicle at the time of impact was 21°C. The target vehicle post-test maximum crush was 176 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	61.354
Maximum Thoracic Rib Deflection	mm	44	20.807
Total Abdominal Force	N	2500	266.883
Pubic Symphysis Force	N	6000	1020.817

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC36)		1000	65.374
Lower Spine Resultant Acceleration	G	82	22.191
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	989.152

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

17. Key Words	*18. Distribution Statement*
Compliance Testing Side Impact Protection MDB ES-2re SID-IIs	Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services (TIS) Room E12-100 East Bldg. 1200 New Jersey Ave. Washington, D.C. 20590 Telephone No. (202) 366-2588

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UNCLASSIFIED	UNCLASSIFIED	175	

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SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This moving deformable barrier side impact test was conducted as part of the MY 2024 214 Side Impact Protection Compliance Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. 693JJ923D000043. The purpose of this test was to evaluate side impact protection in a 2024 Audi e-tron GT quattro 4 Door Sedan. The side impact test was conducted in accordance with the Office of Vehicle Safety Compliance's Laboratory Test Procedure, TP-214D-09 dated September 2012.

SUMMARY

A 2024 Audi e-tron GT quattro 4 Door Sedan was impacted on the left side by a Moving Deformable Barrier (MDB) which was moving forward in a 27^{o} crabbed position to the tow road guidance system at a velocity if 53.11 kph. The target vehicle was stationary and was positioned at an angle of 63^{o} to the line of forward motion. The side impact test was conducted by the Calspan Corporation's Transportation Test Operations Center in Buffalo, New York on January 30, 2025. Pre-test and post-test photographs of the test vehicle. The MDB and the dummies are included in this report.

Test dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OVSC Test Procedure, dated September, 2012. The side impact event was documented by 9 cameras. Camera location and other pertinent information are included in this report.

The ES2re male dummy was instrumented with triaxial accelerometer packs located in the head, three rib displacement transducers located in the chest, three load cells located in the abdomen and a load cell located in the pubic symphysis.

The SID-IIs female dummy was instrumented with triaxial accelerometer packs located in the head and the spine and load cells located in the pubic symphysis and acetabulum. A summary of each dummy's configuration and performance verification test data has been included in the report along with the dummy response traces.

Injury readings for the dummies were recorded as follows:

INJURY READINGS

ES-2re Injury Criteria	Units	Max. Allowable IARV	Measured Value	Pass/Fail
Head Injury Criteria (HIC36)		1000	61.354	Pass
Upper Rib Deflection	mm	44	10.966	Pass
Mid Rib Deflection	mm	44	15.463	Pass
Lower Rib Deflection	mm	44	20.807	Pass
Abdominal Load (front)	N		58.401	
Abdominal Load (mid)	N		100.684	
Abdominal Load (rear)	N		145.402	
Total Abdominal Force	N	2500	266.883	Pass
Pubic Symphysis Force	N	6000	1020.817	Pass

INJURY READINGS

SIDIIs Injury Criteria	Units	Max. Allowable IARV	Measured Value	Pass/Fail
Head Injury Criteria (HIC36)		1000	65.374	Pass
Lower Spine Resultant Acceleration	G	82	22.191	Pass
Acetabulum Force	N		574.814	
Iliac Force	N		426.228	
Sum of Acetabular and Iliac	N	5525	989.152	Pass

SECTION 2

OCCUPANT AND VEHICLE INFORMATION

This section contains information reporting for the following Data Sheets:

DATA SHEET NO. 1
TEST VEHICLE INFORMATION AND OPTIONS

Test Vehicle: 2024 Audi e-tron GT quattro 4 Door Sedan NHTSA No.: C20245801
Test Facility: Calspan Test Date: 01/30/2025

TEST VEHICLE INFORMATION AND OPTIONS

Make	Audi
Model	e-tron GT quattro
Body Style	Four Door Sedan
VIN	WAUDJBFW5R7004620
Body Color	Suzuka Gray Metallic
Engine Displacement (L)	N/A
Type / No. Cylinders	N/A
Engine Placement	N/A
Transmission Type	Automatic
Transmission Speeds	1-Speed Front, 2-Speed Rear
Overdrive	No
Final Drive	All Wheel Drive
Odometer Reading	20 miles

Anti-Lock Brakes (ABS)	Yes
All-Wheel Drive (AWD)	Yes
Traction Control System (TCS)	Yes
Electric Stability Control (ECS)	Yes
Curtain Airbags	Yes
Torso Airbags – Front Seats	Yes
Torso Airbags – Rear Seats	Yes
Combination/Head Torso Bag	No
Pelvic Airbag – Front Seats	No
Pelvis Airbag – Rear Seats	No
Knee Airbag – Driver	Yes
Knee Airbag – Front Passenger	Yes
Seat Belt Pretensioners – Front Seats	Yes
Seat Belt Pretensioners – Rear Seats	Yes
Seat Belt Load Limiter – Front Seats	Yes
Seat Belt Load Limiter – Rear Seats	Yes
Tire Pressure Monitoring System (TPMS)	Yes
Tilt Steering Wheel	Yes
Automatic Door Locks (ADL)	Yes
Power Window Auto-reverse	Yes
Power Seats	Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Audi AG
Date of Manufacture	05/24
Vehicle Type	Passenger Car

GVWR (kg)	2840
GAWR Front (kg)	1395
GAWR Rear (kg)	1540

VEHICLE SEATING AND WEIGHT CAPACITY DATA

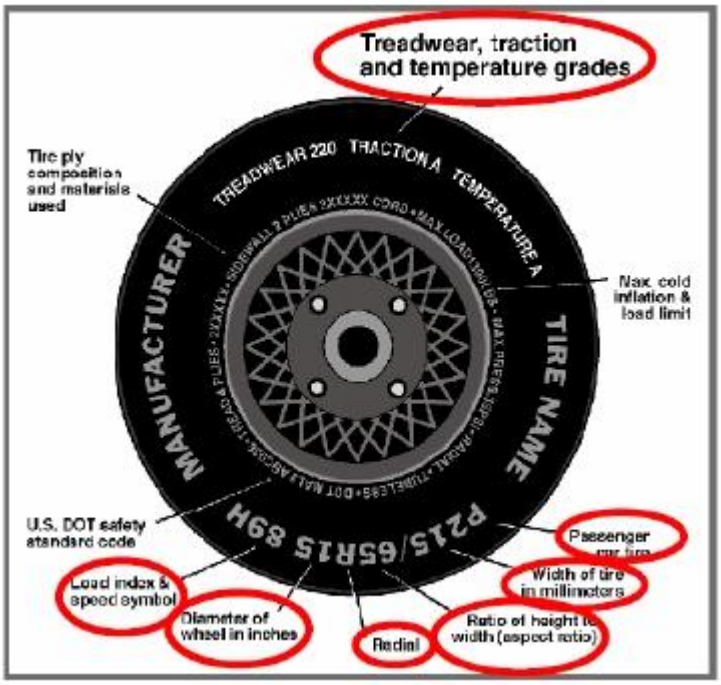
Measured Parameter	Front	Rear	Third	Total
Type of Seats (Bench or Bucket)	Bucket	Split Bench	N/A	
Designated Seating Capacity (DSC)	2	3	N/A	5
Capacity Weight (VCW) (kg)				470

DATA SHEET NO. 1 … (CONTINUED)
VEHICLE TIRE INFORMATION

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025

VEHICLE TIRE INFORMATION

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



TIRE SIDEWALL INFORMATION

Tire Placard	Front	Rear
Recommended Cold Pressure (kPa)	270	270
Recommended Tire Size	245/45R20	285/40R20
Tire Sidewall	**Front**	**Rear**
Maximum Tire Pressure (kPa)	340	340
Tire Size on Vehicle	245/45R20	285/40R20
Tire Manufacturer Model	Pirelli	Pirelli
Tire Name	Cinturato P7	Cinturato P7
Tire Type	All Season	All Season
Tire Width	245	285
Aspect Ratio	45	40
Radial	Yes	Yes
Wheel Diameter	20"	20"
Load Index / Speed Symbol	103H	108H
Treadwear	500	500
Traction Grade	A	A
Temperature Grades	A	A

DATA SHEET NO. 2
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2024 Audi e-tron GT quattro 4 Door Sedan
NHTSA No.: C20245801
Test Facility: Calspan
Test Date: 01/30/2025

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	262	262	262	262
Tire Placard	kPa	270	270	270	270

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			Fully Loaded			As Tested		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	539	626		595	722		604	705	
Right	kg	609	540		603	658		607	647	
Ratio	%	49.5	50.5		46.5	53.5		47.2	52.8	
Totals	kg	1145	1166	2311	1198	1380	2578	1211	1352	2563

TARGET TEST WEIGHT (TVTW) CALCULATION

Measured Parameter	Units	Value	
As Delivered Weight (UVW)	kg	2311	(A)
Weight of 2 P572 ATDs	kg	131	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	129.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2571.8	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

Wheel Opening Location	Distance (grd to ref. point above wheel opening in mm)		Difference (mm)	Meets Requirement***
	Fully Loaded	As Tested		
Left Front	763	762	1	Yes
Right Front	768	766	2	Yes
Left Rear	760	763	3	Yes
Right Rear	765	763	2	Yes

****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".*

MDB IMPACT POINT DATA

Measured Parameter	Distance (mm)	Met Requirement
Test Vehicle Wheelbase	2900	Yes
Target Vertical Impact Reference Line Aft of Front Axle	508	Yes
Actual Impact Point Location (fore-aft, above - below)	497 (+11 / -18)	Yes

Note: Fore or above the target impact point is positive (+). Aft or below the target impact point is negative (-)

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

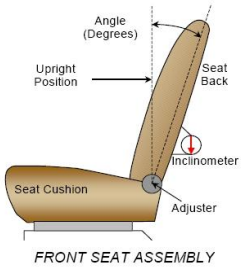
Component Description	Weight (kg)
Trunk Carpeting	11
Rear Speaker	6
HV Charger	5
Passenger Rear Window	3
Ballast (if any)	56.7

DATA SHEET NO. 3
SEAT AND SEAT BELT ANCHORAGE ADJUSTMENT DATA

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025

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	70.2	Power	17.8	Power
Front Passenger Seat	70.3	Power	17.8	Power
Rear passenger Seat	Fixed	Fixed	Fixed	Fixed

***Measured on seat back per Form 1**

SEAT POSITIONING

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

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	21.6	12	Max	72	82	92
			Mid	37	47	57
			Min	3	12	22
Front Passenger Seat	21.8	12	Max	72	82	91
			Mid	37	47	56
			Min	1	12	21

SEAT FORE / AFT POSITION

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	230	Power	115	Power
Front Passenger Seat	230	Power	115	Power
Rear Passenger Seat	Fixed	Fixed	Fixed	Fixed

SEAT BELT ANCHORAGE ADJUSTMENT

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

HEAD RESTRAINT ADJUSTMENT

Seat	Total # of Positions	Placed in Position #
Driver Seat	Fixed	Fixed
Rear Passenger Seat	Fixed	Fixed

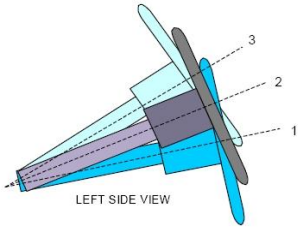
DATA SHEET NO. 4
FUEL SYSTEMS AND STEERING WHEEL POSITION DATA

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025

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	14.1	
Geometric center - Position No. 2	16.1	
Uppermost - Position No. 3	18.1	
Telescoping Steering Wheel Travel		65
Test Position	16.1	37.5

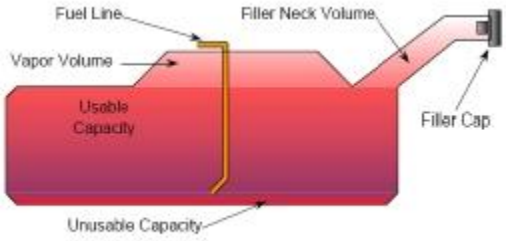


STEERING COLUMN ASSEMBLY

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 charge port on the left front and right front of the vehicle.



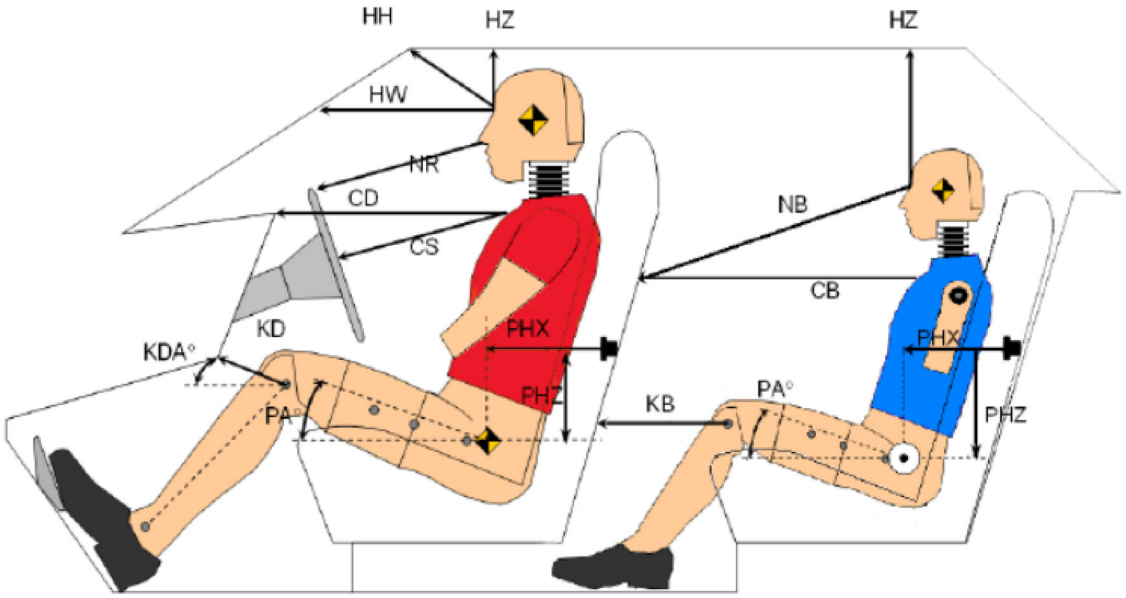
VEHICLE FUEL TANK ASSEMBLY

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of - Form No.1	
Usable Capacity of - Owner's Manual	
92 - 94% of Usable Capacity	
Actual Amount of Solvent Used in Test	Electric Vehicle

DATA SHEET NO. 5
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025

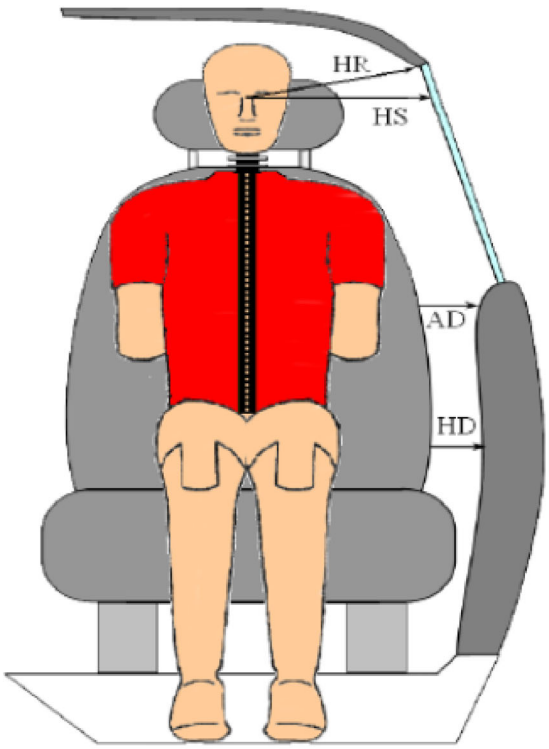


DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Code	Pass. Code	Description	ES2-re		SID-IIs	
			Length (mm)	Angle	Length (mm)	Angle
HH		Head to Header	393			
HW		Head to Windshield	581			
HZ	HZ	Head to Roof Liner	222		272	
NR	NB	Nose to Rim / Seatback	380		537	
CD	CB	Chest to Dash / Seatback	553		538	
CS		Chest to Steering Wheel	363			
KD(L) / KDA(L)◦	KB(L) / KBA(L)◦	Left Knee to Dash	237	27.5	248	22.0
KD(R) / KDA(R)◦	KB(R) / KBA(R)◦	Right Knee to Dash	237	37.8	250	21.0
PAX◦	PAX◦	Pelvic Tilt Angle (X-Axis)		22.3		26.6
PAY◦	PAY◦	Pelvic Tilt Angle (Y-Axis)				0.4
PHX	PHX	Hip Point to Striker (X-Axis)	105		104	
PHZ	PHZ	Hip Point to Striker (Z-Axis)	160		98	

DATA SHEET NO. 6
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025



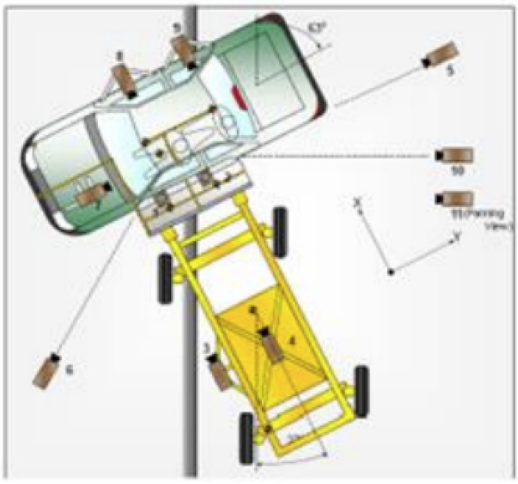
FRONT VIEW OF DUMMY

DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Front Occupant	Rear Occupant
HR	Head to Side Header	mm	223	229
HS	Head to Side Window	mm	353	350
AD	Arm to Door	mm	107	160
HD	Hip Point to Door	mm	158	215

DATA SHEET NO. 7
LOCATION OF CAMERAS

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025



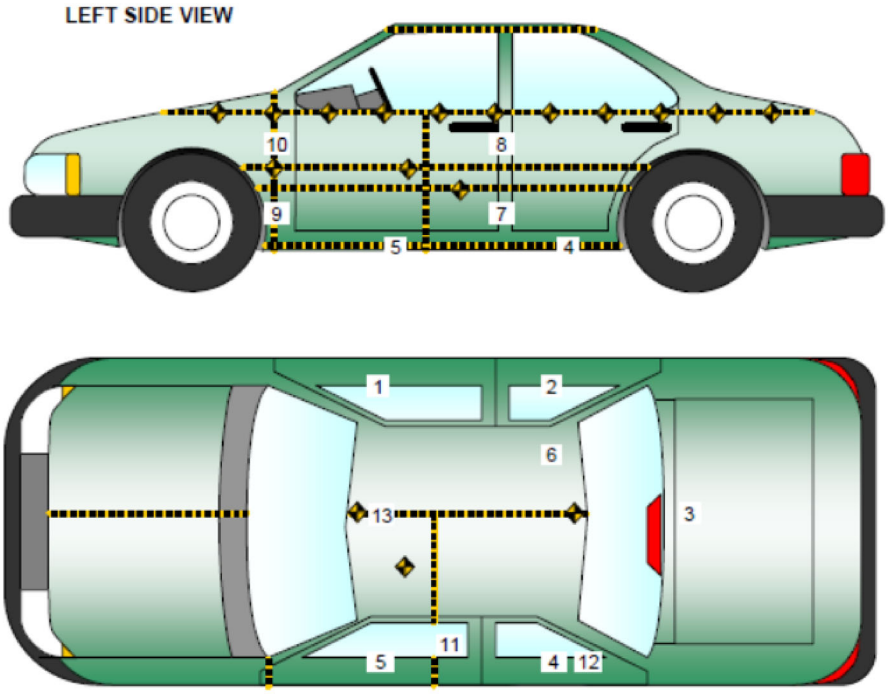
CAMERA LOCATIONS AND DATA

No.	Camera View	Location (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	0	-673	-9220	12.5	60
2	Overhead Close-up	0	0	-9220	24	1000
3	Impact Point Close-up				25	1000
4	Centerline of Impact (MDB)				8	1000
5	Right Side View	320	7703	-1343	24	1000
6	Left Side View	-2685	-5609	-1443	28	1000
7	Front Seat Occupant-Frontal View (OB)				25	1000
8	Front Seat Occupant-Side View (OB)				12.5	1000
9	Rear Passenger-Side View (OB)				12.5	1000
10	Real-time Coverage				Zoom	60

Notes: *Reference: Impact Point projected to Ground*
+X = To Front of MDB, +Y = To Right of MDB, +Z = Down

DATA SHEET NO. 8
TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025



TEST VEHICLE ACCELEROMETER LOCATIONS

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Left (or Rt.) Sill at Front Seat	2931	668	181
2	Left (or Rt.) Sill at Rear Seat	2148	670	172
3	Rear Floorpan Above Axle	878	2	-61
4	Left (or Rt.) Sill at Front Door	2282	-663	181
5	Left (or Rt.) Sill at Rear Door	2946	-671	181
6	Left (or Rt.) Rear Occ. Compartment	2241	415	352
7	Left (or Rt.) B-Post Lower	2335	-670	9
8	Left (or Rt.) B-Post Middle	2234	-669	-348
9	Left (or Rt.) A-Post Lower	3311	-643	-76
10	Left (or Rt.) A-Post Middle	3201	-686	-428
11	Front Seat Track	2531	-537	219
12	Rear Seat Track or Structure	1954	-704	140
13	Vehicle CG	2509	2	-131

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

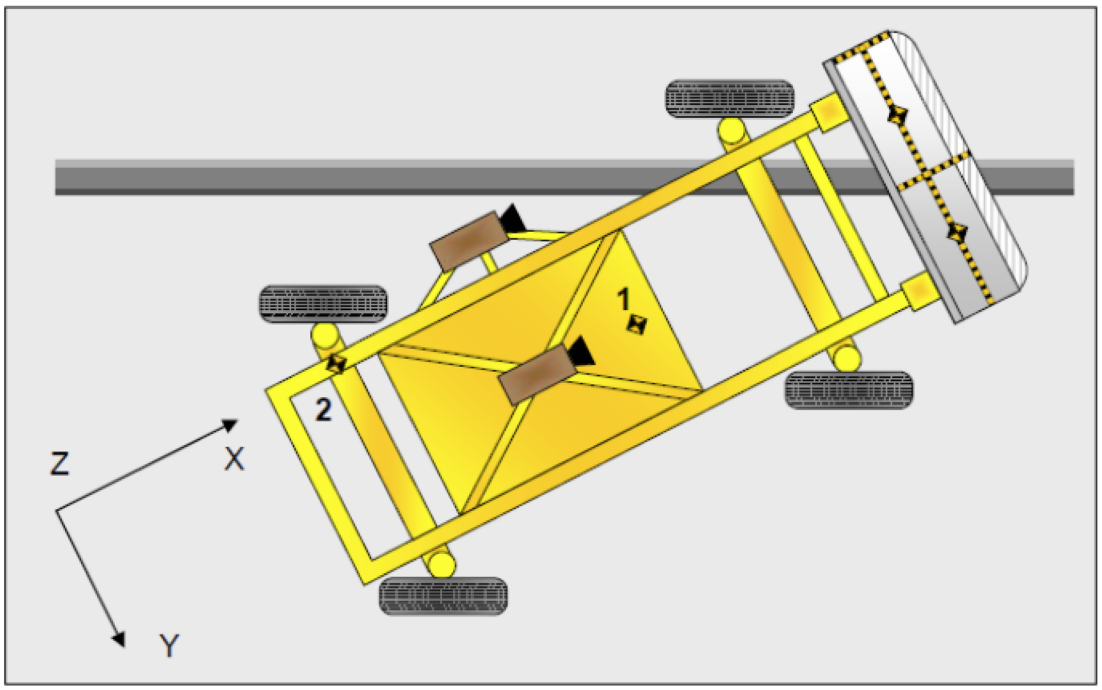
DATA SHEET NO. 9
TEST VEHICLE ACCELEROMETER DATA SUMMARY

Test Vehicle: 2024 Audi e-tron GT quattro 4Dr Sedan
NHTSA No.: C20245801
Test Facility: Calspan
Test Date: 01/30/2025

Loc. No	Description	Axes	Units	Peak Values (g's)			
				Max	Time (ms)	Min	Time (ms)
1	Left (or Rt.) Sill at Front Seat	X	g	0.67	83.95	-3.70	21.55
	Left (or Rt.) Sill at Front Seat	Y	g	12.55	20.55	-1.76	75.75
	Left (or Rt.) Sill at Front Seat	Z	g	8.34	20.25	-5.37	10.20
	Left (or Rt.) Sill at Front Seat Resultant	N/A	g	15.47	20.45	0.02	-30.60
2	Left (or Rt.) Sill at Rear Seat	X	g	2.86	34.65	-7.22	18.90
	Left (or Rt.) Sill at Rear Seat	Y	g	14.56	35.50	-2.26	113.70
	Left (or Rt.) Sill at Rear Seat	Z	g	10.55	27.55	-7.75	12.80
	Left (or Rt.) Sill at Rear Seat Resultant	N/A	g	17.91	27.50	0.01	-10.35
3	Rear Floor Pan Above Axle	X	g	1.79	52.75	-4.06	29.15
	Rear Floor Pan Above Axle	Y	g	15.50	35.30	-3.17	99.90
	Rear Floor Pan Above Axle	Z	g	20.92	29.95	-18.37	65.95
	Rear Floor Pan Above Axle Resultant	N/A	g	25.15	30.25	0.03	-33.40
4	Left (or Rt.) Sill at Rear Door	Y	g	141.55	5.60	-165.68	14.40
5	Left (or Rt.) Sill at Front Door	Y	g	31.36	4.00	-17.76	15.70
6	Left (or Rt.) Rear Occ. Compartment	Y	g	13.35	14.80	-1.41	105.15
7	Left (or Rt.) B-Post Lower	Y	g	127.18	12.65	-168.85	9.65
8	Left (or Rt.) B-Post Middle	Y	g	45.79	28.75	-63.35	20.55
9	Left (or Rt.) A-Post Lower	Y	g	40.60	6.25	-35.16	11.20
10	Left (or Rt.) A-Post Middle	Y	g	24.80	17.15	-3.51	78.80
11	Front Seat Track	Y	g	17.53	4.60	-14.39	14.20
12	Rear Seat Track or Structure	Y	g	70.58	31.55	-50.98	19.45
13	Vehicle CG	X	g	3.73	6.20	-8.15	18.00
	Vehicle CG	Y	g	21.70	44.50	-18.18	174.55
	Vehicle CG	Z	g	11.04	17.45	-13.66	24.90
	Vehicle CG Resultant	N/A	g	23.67	17.95	0.00	-14.15

DATA SHEET NO. 10
MDB ACCELEROMETER LOCATIONS DATA SUMMARY

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025



MDB ACCELEROMETER LOCATIONS

Loc No.	Description	Axes	Units	Peak Values (g's)			
				Max	Time (ms)	Min	Time (ms)
1	MDB CG	X	g	0.71	112.70	-23.91	43.85
		Y	g	1.02	63.00	-7.43	46.15
		Z	g	13.32	31.55	-12.81	43.70
		Resultant		27.89	43.75	0.02	-17.80
2	MDB Rear	Y	g	2.20	103.10	-24.88	42.35
		Z	g	3.99	25.90	-3.88	57.05

DATA SHEET NO. 11
MDB SUMMARY OF RESULTS

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025

MDB SPECIFICATIONS

Measurement Description	Requirement	Value
Overall Width of Framework Carriage	1241- 1261	1250
Overall Length Including Honeycomb Frame	4140 - 3990	4120
Wheelbase of Framework Carriage	2566 -2616	2600
CG Location of Front Axle		1120
MDB Front Axle Weight		764
MDB Rear Axle Weight		594
MDB Total Weight	1356.5 - 1365.5	1358

SPEED AND ANGLE AT IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	52.1 to 53.7	53.11
Trap No. 2 Velocity (Redundant)	km/h	52.1 to 53.7	53.19
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0

MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE

Vertical Location			From Centerline		Maximum Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	300	Right	237
B	Top of Bumper	533	300	Right	152
C	Mid-Level	686	800	Left	160
D	Top of Stack	813	800	Left	168

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Horizontal Offset (+ forward / - rearward)	mm	+/- 50 of Intended Impact Point	+11
Vertical Offset (- down / + up)	mm	+/- 20 of Intended Impact Point	-18

DATA SHEET NO. 12
DUMMY INJURY RESPONSE DATA
(Subpart U, ES-2re)

Test Vehicle: 2024 Audi e-tron GT quattro 4Dr Sedan NHTSA No.: C20245801
Test Facility: Calspan Test Date: 01/30/2025

Dummy Serial No. D037

Description	Axes	Positive Direction		Negative Direction	
		MAX	TIME (ms)	MAX	TIME (ms)
HEAD ACCELERATION (g)					
Longitudinal	X	1.61	281.10	-7.77	50.15
Lateral	Y	30.93	56.15	-11.22	236.55
Vertical	Z	7.22	17.75	-7.48	61.25
Resultant	N/A	31.87	56.10		
HIC36 (t1, t2)	N/A	61.35		**t1 =** 46.10	**t2 =** 65.60
THORAX DEFLECTION (mm)					
Upper Rib	Y	10.97	62.80	-8.65	21.65
Middle Rib	Y	15.46	63.30	-2.67	248.30
Lower Rib	Y	20.81	63.70	-0.88	255.45
ABDOMINAL FORCES (N)					
Front	Y	58.40	33.35	-18.12	17.05
Middle	Y	100.68	49.30	-7.53	92.55
Rear	Y	145.40	54.35	-7.25	9.40
SUM	N/A	266.88	54.35		
PELVIS FORCES (N)					
Pubic Symphysis	Y	91.97	119.85	-1020.82	62.35

Reference: Positive Direction - Longitudinal (X) = forward
- Lateral (Y) = to right
- Vertical (Z) = down

DATA SHEET NO. 13
DUMMY INJURY RESPONSE DATA
(Subpart V, SIDIIs)

Test Vehicle: 2024 Audi e-tron GT quattro 4Dr Sedan NHTSA No.: C20245801
Test Facility: Calspan Test Date: 01/30/2025

Dummy Serial No. 224

Description	Axes	Positive Direction		Negative Direction	
		MAX	TIME (ms)	MAX	TIME (ms)
HEAD ACCELERATION (g)					
Longitudinal	X	4.12	148.75	-6.00	55.60
Lateral	Y	29.87	64.45	-5.52	151.10
Vertical	Z	6.41	45.95	-3.73	66.00
Resultant	N/A	30.24	64.40		
HIC36 (t1, t2)	N/A	65.37		**t1 =** 50.30	**t2 =** 74.60
LOWER SPINE (g)					
Longitudinal	X	4.47	64.70	-18.58	15.75
Lateral	Y	20.36	58.10	-6.20	20.05
Vertical	Z	3.55	113.95	-11.43	68.55
Resultant	N/A	22.19	58.35	0.00	-2.60
PELVIS FORCES (N)					
Acetabular	Y	574.81	56.95	-42.14	80.15
Iliac	Y	426.23	59.10	-93.12	156.65

Reference: Positive Direction - Longitudinal (X) = forward
- Lateral (Y) = to right
- Vertical (Z) = down

DATA SHEET NO. 14
POST-TEST OBSERVATIONS

Test Vehicle: 2024 Audi e-tron GT quattro 4 Door Sedan
NHTSA No.: C20245801
Test Facility: Calspan
Test Date: 01/30/2025

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Occupant	Rear Occupant
Head Contact	Curtain Airbag, Grab Handle, Headliner, Headrest	Curtain Airbag, Headliner, Headrest
Upper Torso Contact	Torso/Pelvis Airbag, Seatback	Torso/Pelvis Airbag, Seatback
Lower Torso Contact	Torso/Pelvis Airbag, Seatback	Torso/Pelvis Airbag, Seatback
Left Knee Contact	Door Trim	Door Trim
Right Knee Contact	Left Knee	Left Knee

POST-TEST DOOR PERFORMANCE

Description	Front	Rear
Left Side Doors	Jammed Shut	Jammed Shut
Right Side Doors	Closed & Operational	Closed & Operational
Hatch and Other Doors		Closed & Operational
Seat Movement	None	None
Seatback Failure	None	None

*Note: Description for door opening must be specific with the following three categories: Remained closed and operational, opened/unlatched during the crash, or jammed shut. Sometimes the door is jammed and unlatched. If the door cannot be opened, then note the door as jammed shut. If open, measurement must be taken for the width of the door opening (mm).

POST-TEST STRUCTURAL OBSERVATIONS

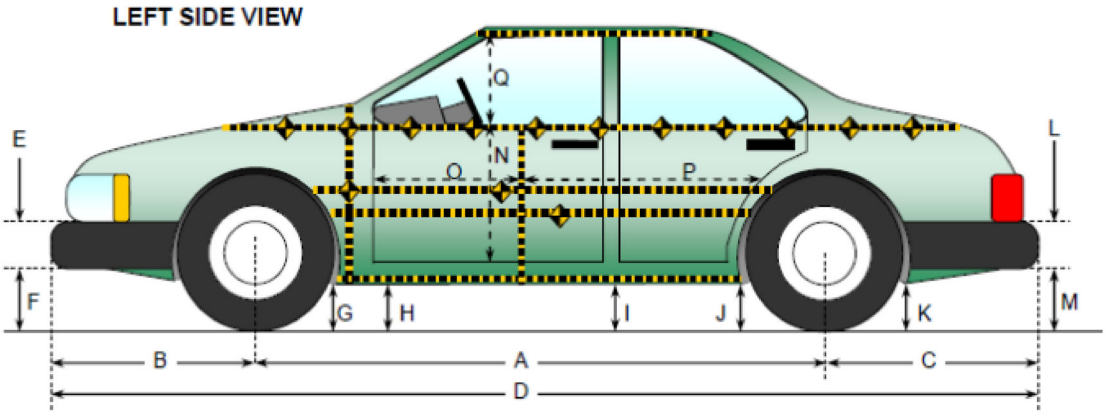
Critical Areas of Performance	Observations and Conclusions
Pillar Performance	B-Pillar & C-Pillar Buckled
Sill Separation	None
Windshield Damage	None
Side Window Damage	Struck side front and rear windows shattered but remained intact (laminated)
Other Notable Effects	None

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Front Occupant		Rear Occupant	
	Installed	Deployed	Installed	Deployed
Front Airbag	Yes	No		
Curtain Airbag	Yes	Yes	Yes	Yes
Side - Torso/Pelvis Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Other				

DATA SHEET NO. 15
TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025

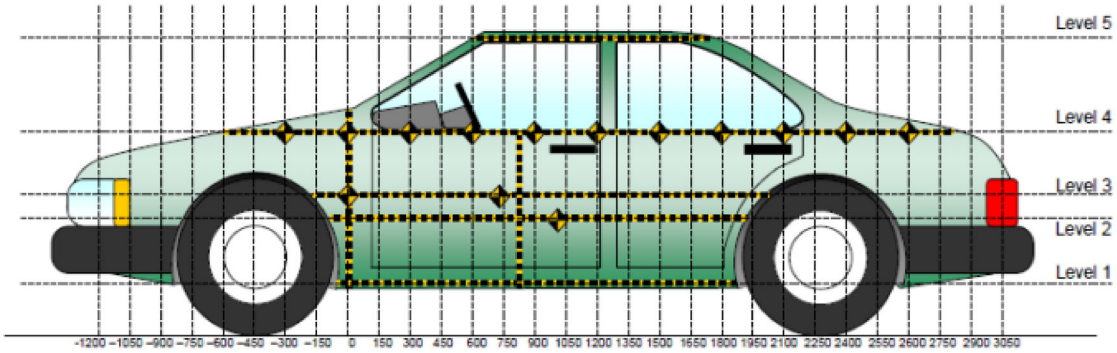


VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code.	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2900	2882	-19
B	Front Axle to FSOV	1020	1040	20
C	Rear Axle to RSOV	1075	1073	-2
D2	Total Vehicle Length at Centerline	4994	4995	1
E	Front Bumper Thickness	172	172	0
F	Front Bumper Bottom to Ground	386	380	-6
G	Sill Height at Front Wheel Well	136	124	-12
H	Sill Height at Front Door Leading Edge	142	133	-9
I	Sill Height at B Pillar	141	136	-5
J1	Sill Height at Rear Wheel Well	141	142	1
J2	Pinch Weld Height at Rear Wheel Well	138	140	2
K	Sill Height Aft of Rear Wheel Well	230	237	7
L	Rear Bumper Thickness	165	165	0
M	Rear Bumper Bottom to Ground	391	393	2
N	Sill Height to Window Bottom of Front Window Sill	739	732	-7
O	Front Door Leading Edge to Impact CL	681	678	-3
P	Rear Door Trailing Edge to Impact CL	1457	1409	-47
Q	Front Window Opening	354	353	-1
R	Right Side Length	4887	4888	1
S	Left Side Length	4892	4892	1
T	Vehicle Width at B-Pillars	1930	1825	-105

DATA SHEET NO.16
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025



All Measurements Shown in mm

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	209	2	1500
2	Occupant H-Point	mm	445	157	1500
3	Mid-Door	mm	604	176	1650
4	Window Sill	mm	912	141	1650
5	Window Top	mm	1309	2	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.17
VEHICLE EXTERIOR CRUSH PROFILES

Test Vehicle: 2024 Audi e-tron GT quattro 4 Door Sedan NHTSA No.: C20245801
Test Facility: Calspan Test Date: 01/30/2025

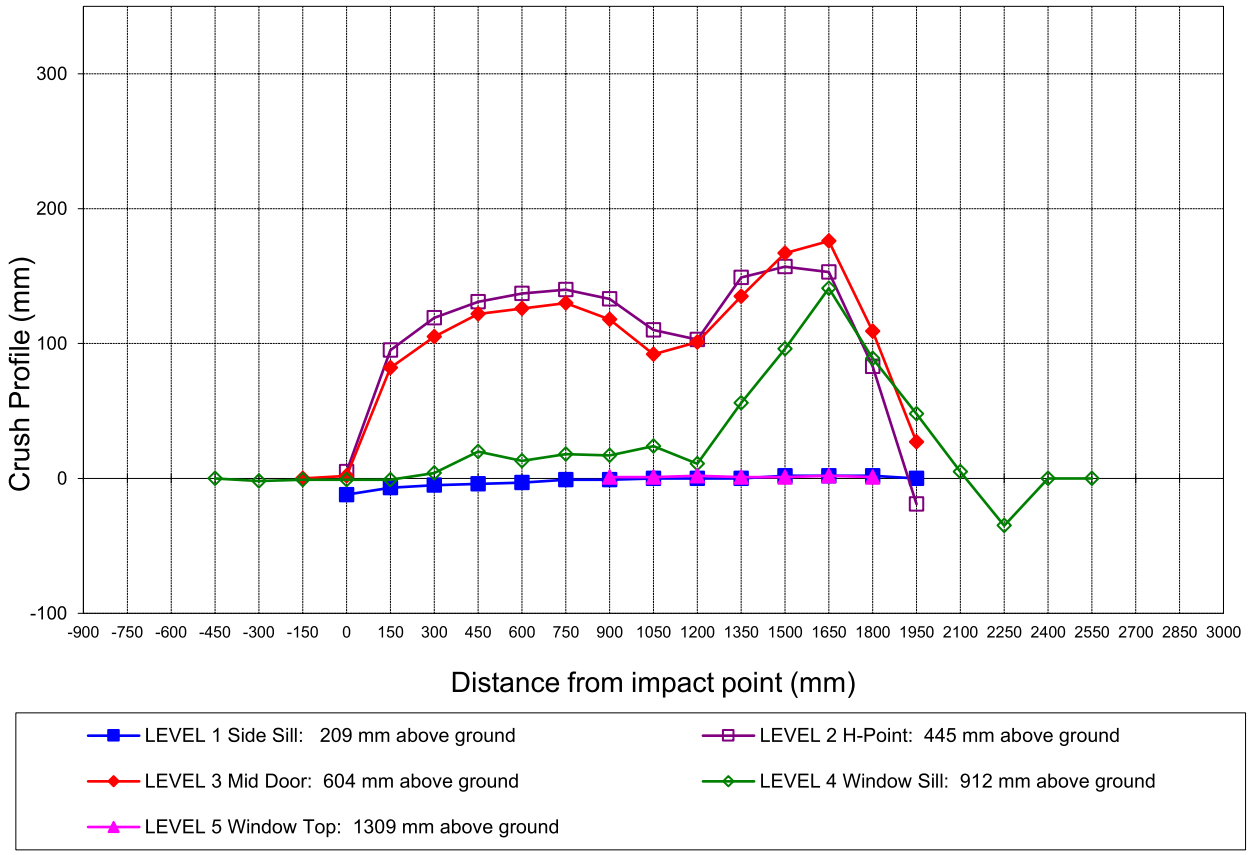
EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450				777					777					0	
-300				810					812					-2	
-150			981	829				981	830				0	-1	
0	923	972	972	832		935	967	969	833		-12	5	3	-1	
150	901	931	943	833		908	836	861	834		-7	95	82	-1	
300	896	936	947	839		901	817	842	835		-5	119	105	4	
450	896	940	950	888		900	809	828	868		-4	131	122	20	
600	897	943	952	862		900	806	826	849		-3	137	126	13	
750	899	945	952	867		900	805	822	849		-1	140	130	18	
900	898	946	952	869	646	899	813	834	852	645	-1	133	118	17	1
1050	898	946	951	871	649	898	836	859	847	648	0	110	92	24	1
1200	898	946	949	871	646	898	843	848	860	644	0	103	101	11	2
1350	897	947	946	868	640	897	798	811	812	639	0	149	135	56	1
1500	897	948	944	864	632	895	791	777	768	631	2	157	167	96	1
1650	896	950	944	867	619	894	797	768	726	617	2	153	176	141	2
1800	904	958	952	882	583	902	875	843	793	582	2	83	109	89	1
1950	947	975	969	897		947	994	942	849		0	-19	27	48	
2100				900					895					5	
2250				897					932					-35	
2400				888					888					0	
2550				872					872					0	
2700															
2850															
3000															

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

DATA SHEET NO.17
TEST VEHICLE EXTERIOR CRUSH PROFILES (CONTINUED)

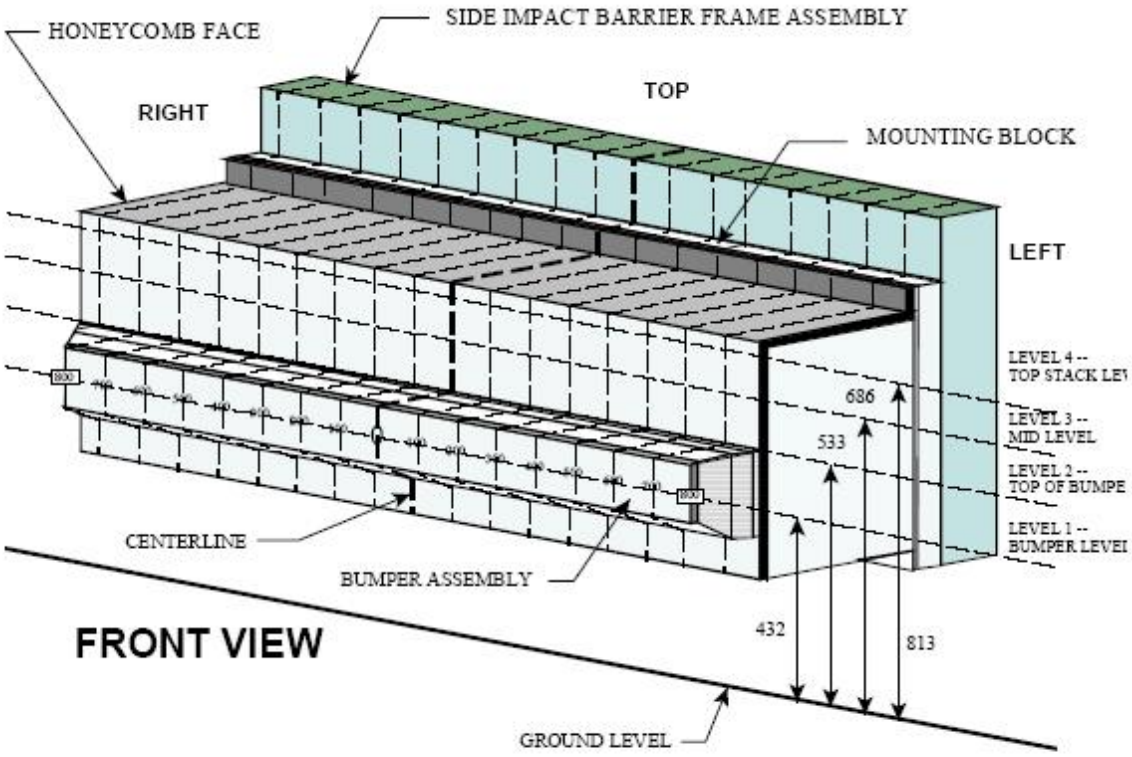
Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025



Vehicle Exterior Crush Measurements - Visual Representation

DATA SHEET NO.18
EXTERIOR STATIC CRUSH FOR IMPACT FACE

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025



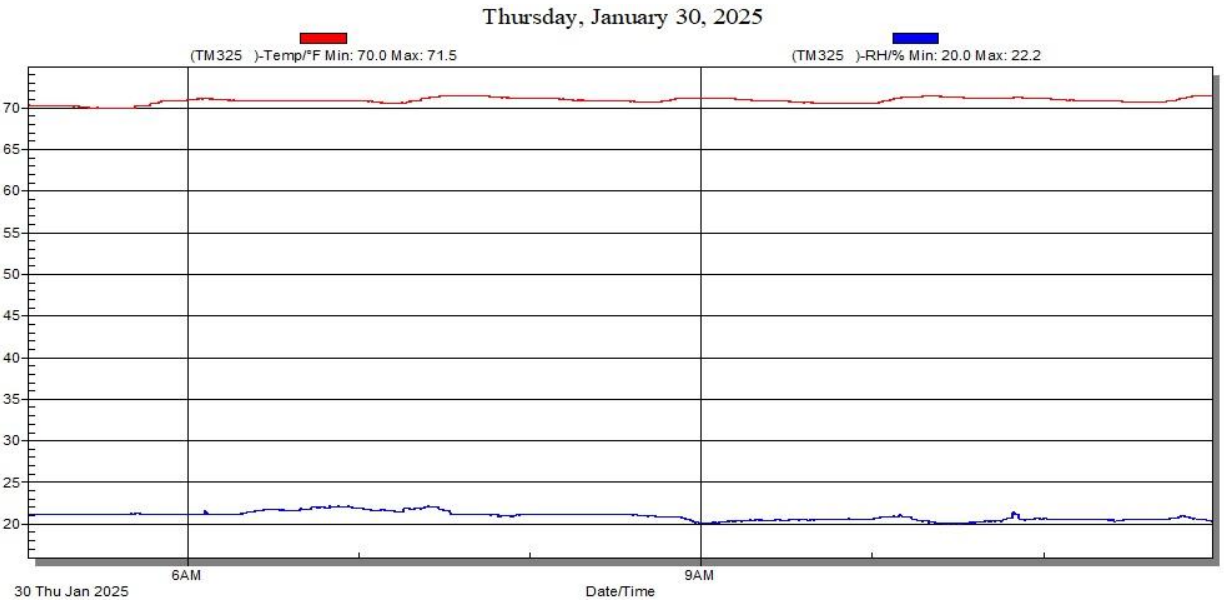
NOTE: Dimensions are shown in millimeters, mm

DEFORMABLE BARRIER STATIC CRUSH

Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100	0	100	200	300	400	500	600	700	800
1	193	190	194	204	214	237	214	206	187	206	214	237	214	204	194	190	193
2	123	124	125	134	143	152	147	126	115	126	147	152	143	134	125	124	123
3	40	30	38	50	76	121	126	92	67	92	126	121	76	50	38	30	40
4	10	0	18	34	75	144	130	110	87	110	130	144	75	34	18	0	10

DATA SHEET NO. 19
DUMMY / VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle:	2024 Audi e-tron GT quattro 4 Door Sedan	NHTSA No.:	C20245801
Test Facility:	Calspan	Test Date:	01/30/2025



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

APPENDIX I

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

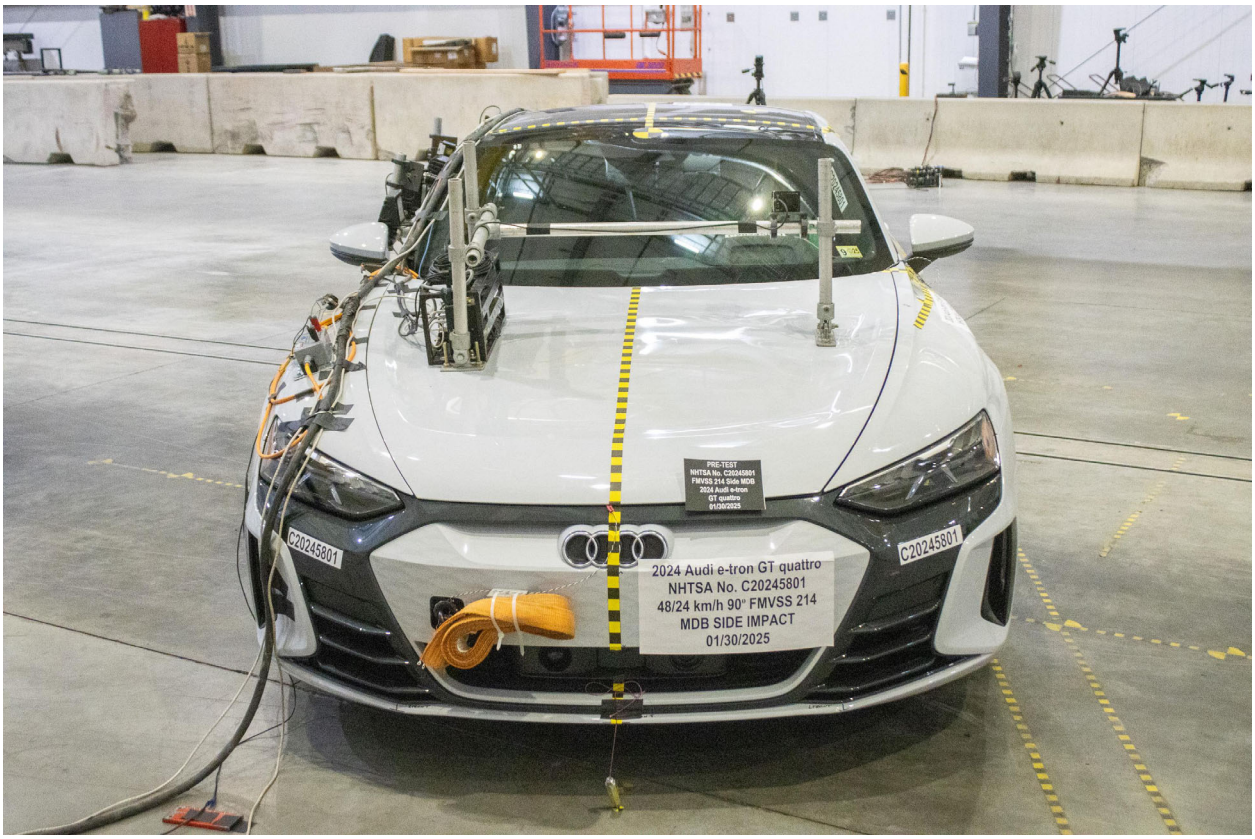


Figure A-1: Pre-Test Frontal View of Test Vehicle

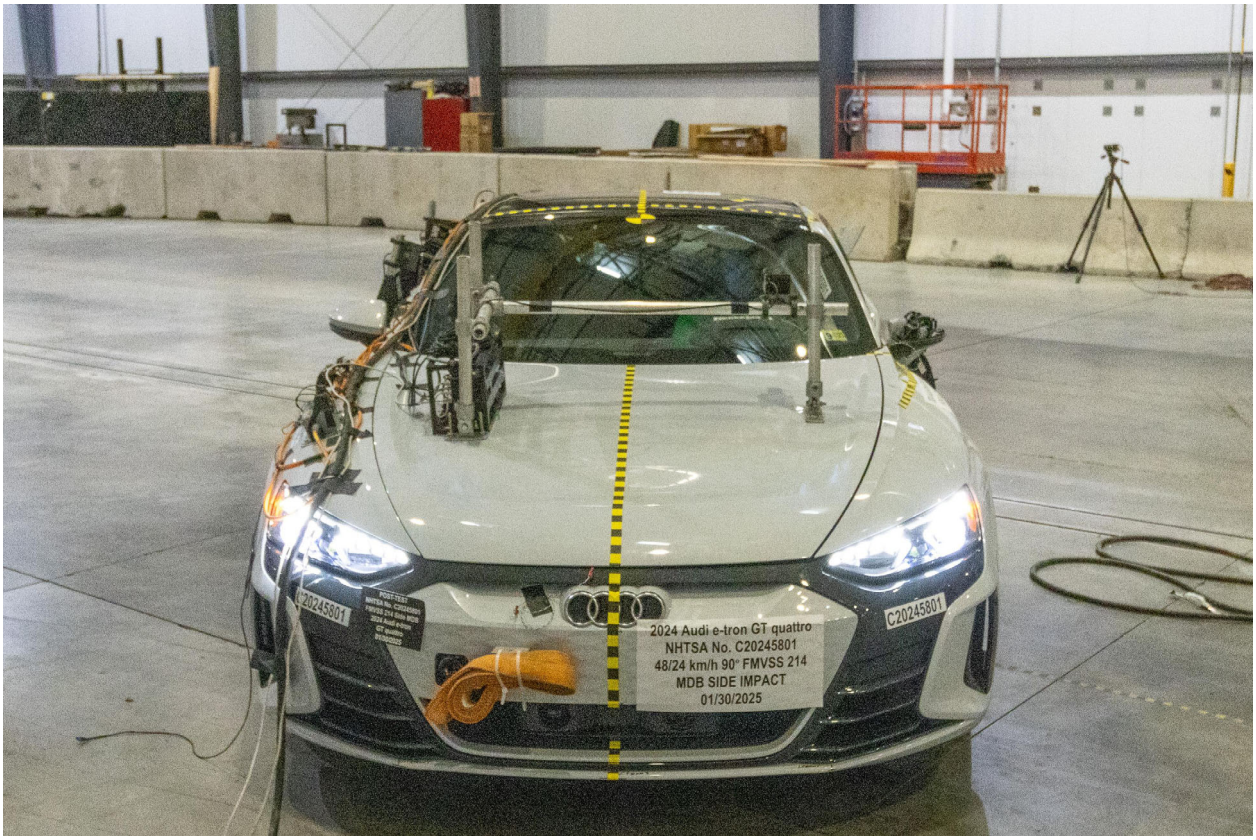


Figure A-2: Post-Test Frontal View of Test Vehicle

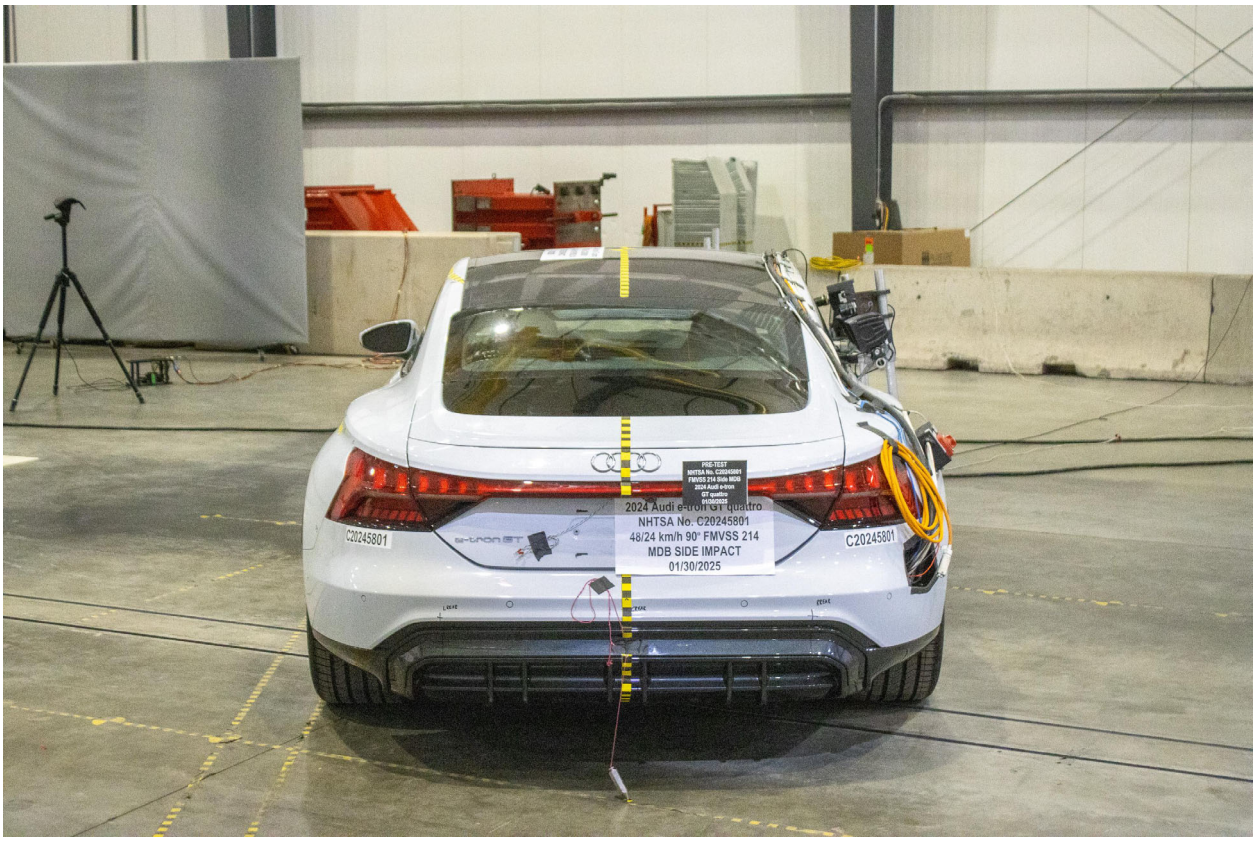


Figure A-3: Pre-Test Rear View of Test Vehicle

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

Figure A-5: Pre-Test Impacted Side View of Test Vehicle

Figure A-6: Post-Test Impacted Side View of Test Vehicle

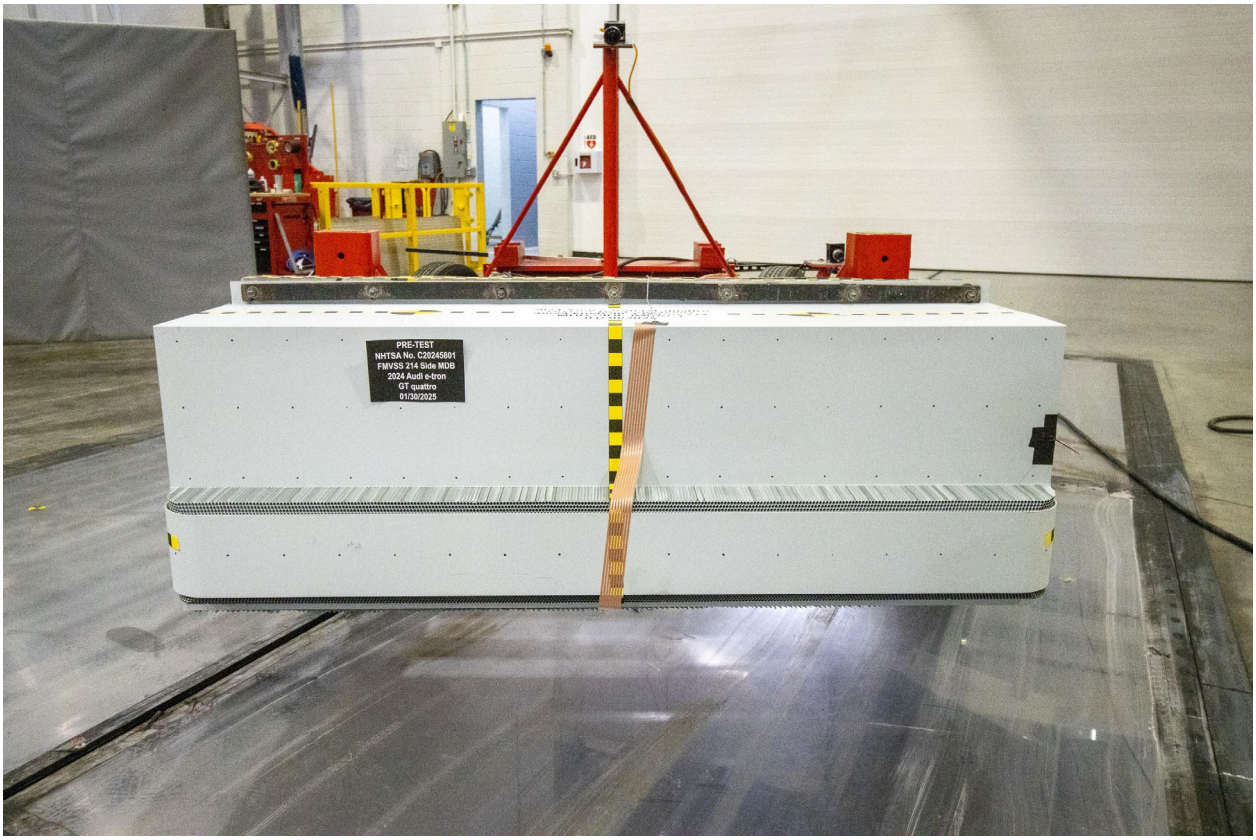


Figure A-7: Pre-Test Frontal View of Impactor Face

Figure A-8: Post-Test Frontal View of Impactor Face

Figure A-9: Pre-Test Left Side View of Impactor Face

Figure A-10: Post-Test Left Side View of Impactor Face

Figure A-11: Pre-Test Right Side View of Impactor Face

Figure A-12: Post-Test Right Side View of Impactor Face

Figure A-13: Pre-Test Top View of Impactor Face

Figure A-14: Post-Test Top View of Impactor Face

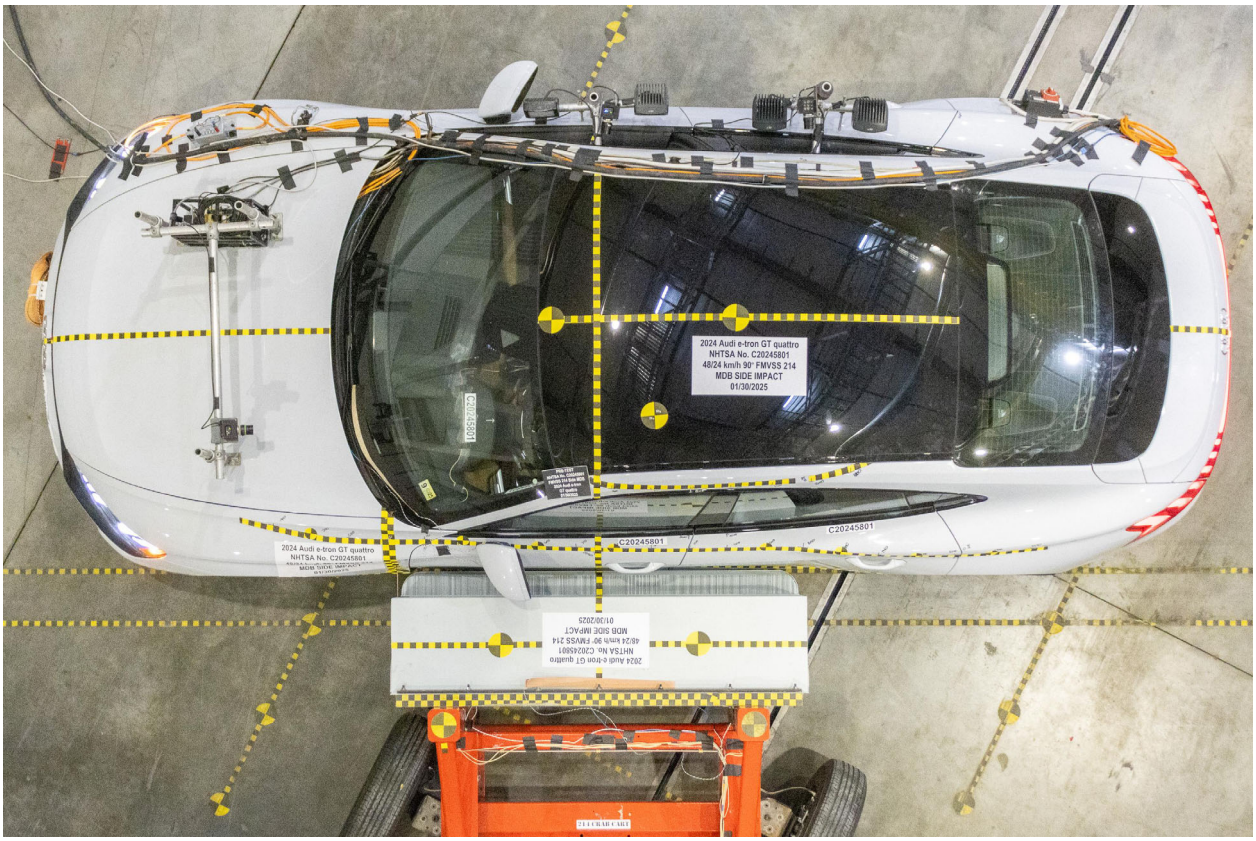


Figure A-15: Pre-Test Overhead View of MDB Positioned Against Impact Side of Test Vehicle at Impact Location

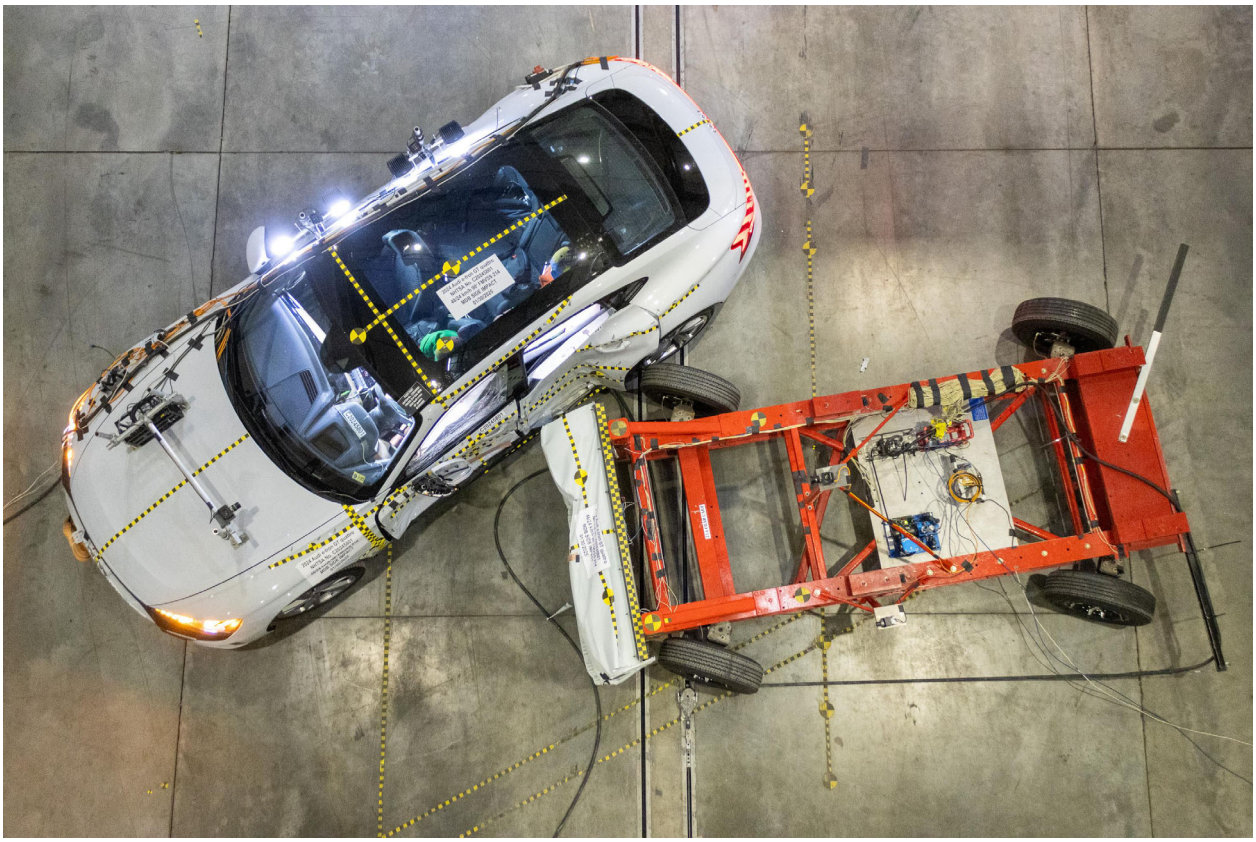


Figure A-16: Post-Test Overhead View of the MDB and Test Vehicle

Figure A-17: Pre-Test Front ES2-re in Final Seating Position (Door Open)

Figure A-18: Pre-Test Front ES2-re in Final Seating Position (Door Closed)

Figure A-19: Pre-Test Front ES2-re - Opposite Side View

Figure A-20: Post-Test Front ES2-re - Opposite Side View

Figure A-21: Pre-Test Rear SID in Final Seating Position (Door Open)

Figure A-22: Pre-Test Rear SID in Final Seating Position (Door Closed)

Figure A-23: Pre-Test Rear SID - Opposite Side View

Figure A-24: Post-Test Rear SID - Opposite Side View

Figure A-25: T (0) - Impact Event

Figure A-26: Post-Test Close-up View of Impact Point Target

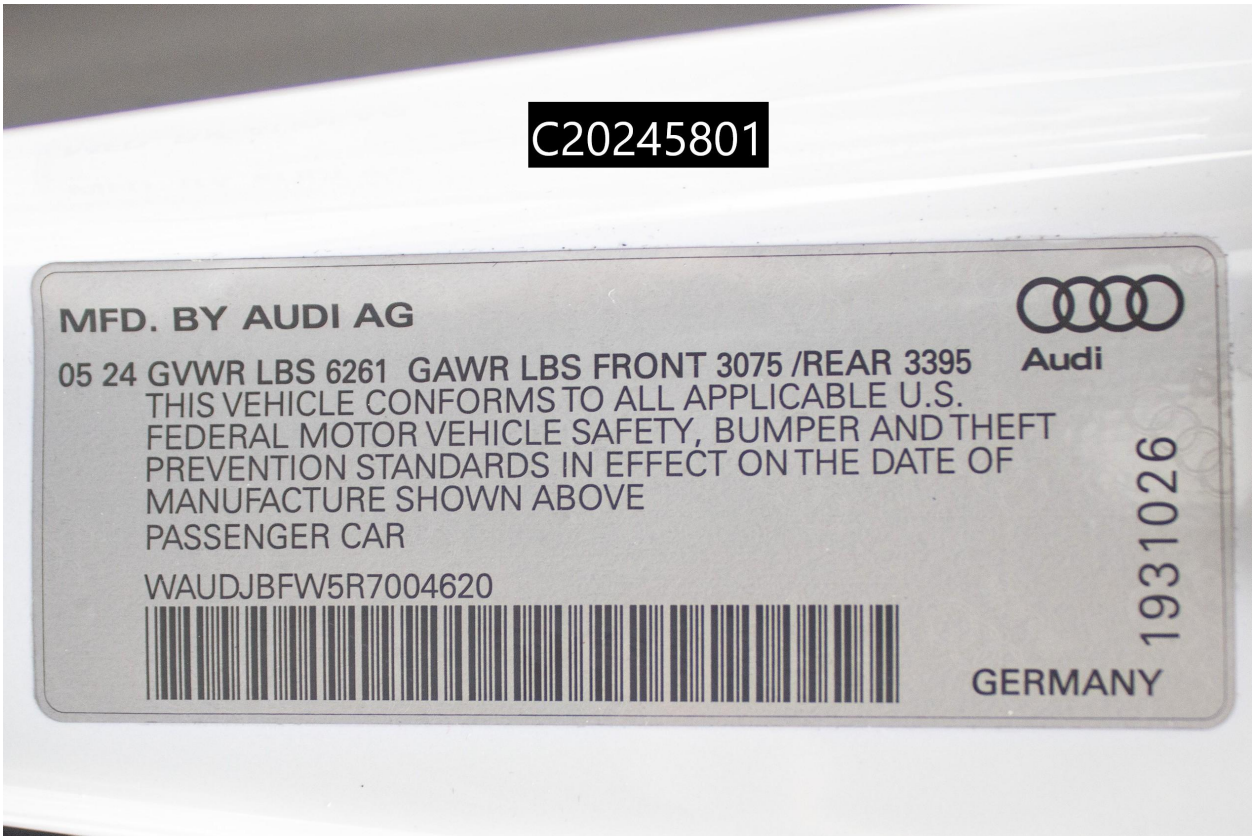


Figure A-27: Close-up View of Vehicle's Certification Label

Figure A-28: Post-Test Front Seat Occupant Area Showing Head & Torso Contact Regions

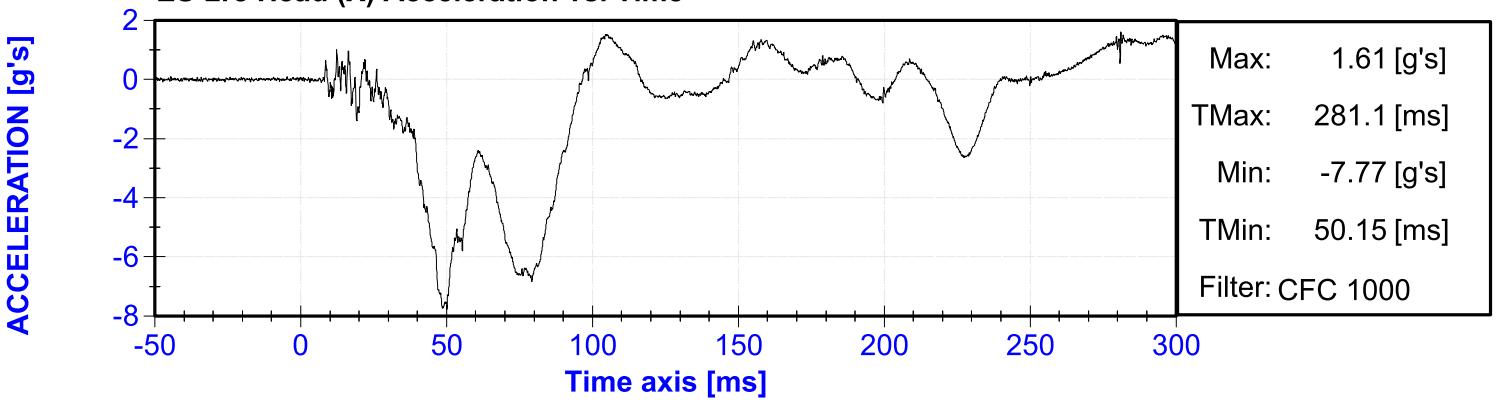
Figure A-29: Post-Test Rear Seat Occupant Area Showing Head & Torso Contact Regions

Figure A-30: Close-up View of Vehicle's Tire Placard

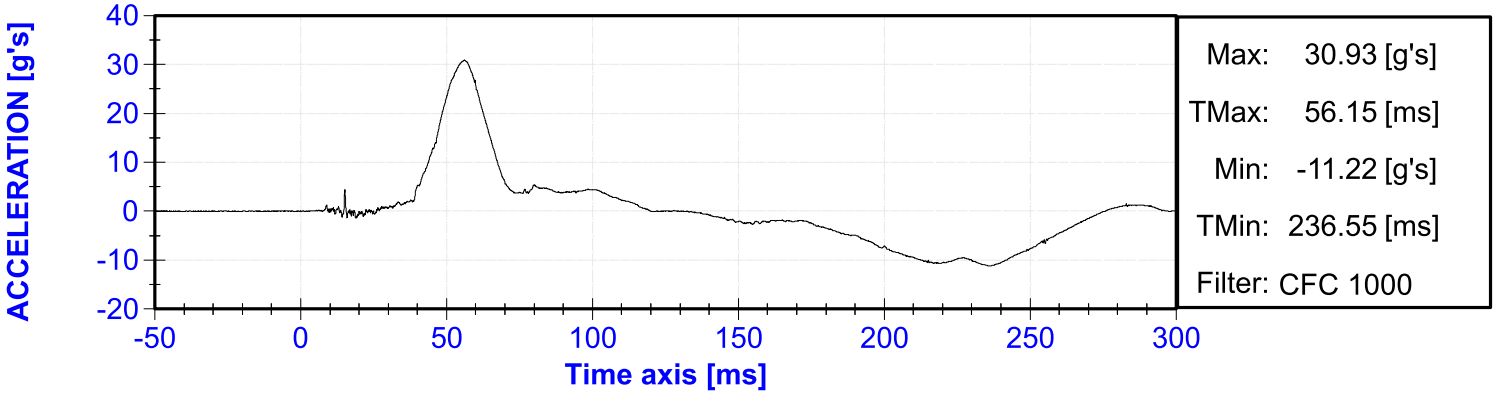
APPENDIX II
ES-2re DUMMY RESPONSE DATA TRACES

Table of Data Plots

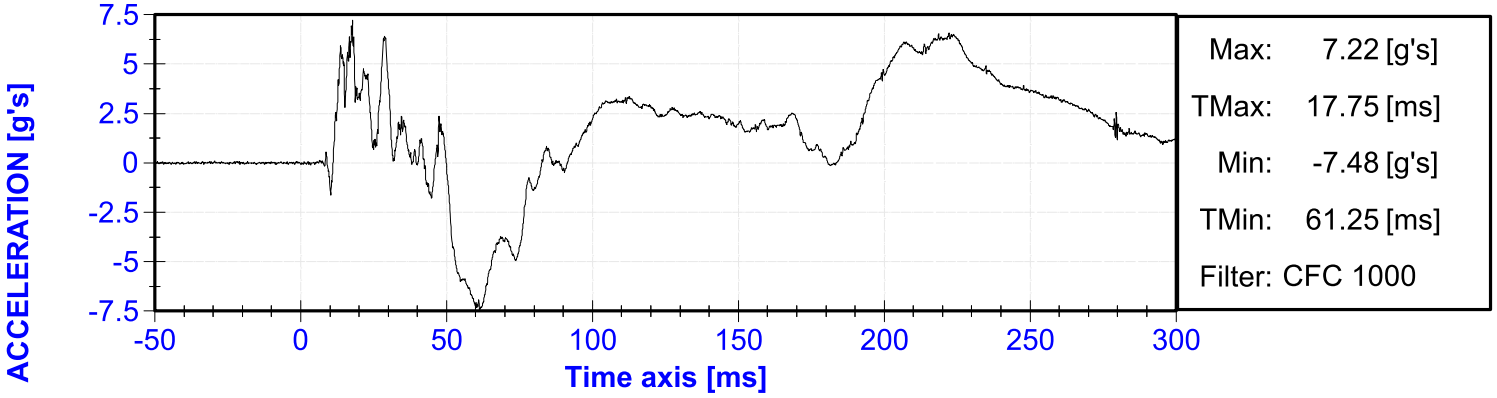
ES-2re Head (X) Acceleration vs. Time



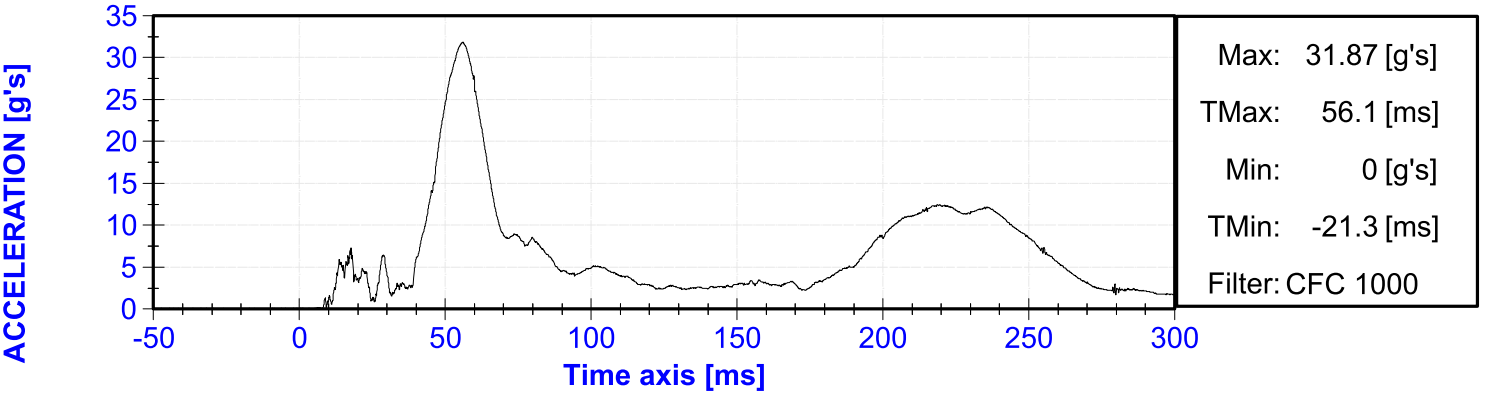
ES-2re Head (Y) Acceleration vs. Time

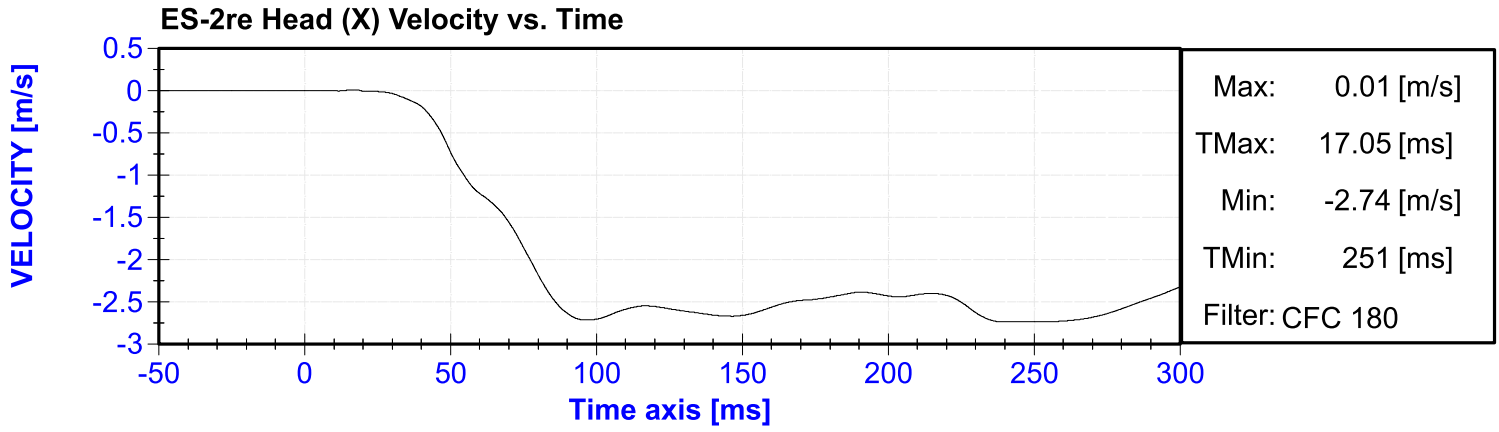


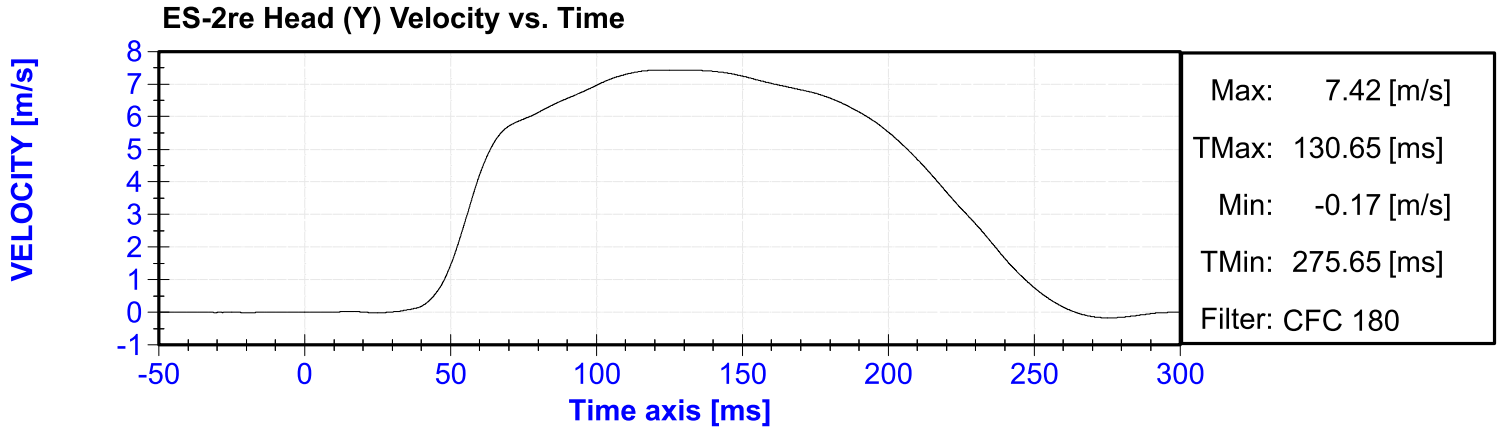
ES-2re Head (Z) Acceleration vs. Time

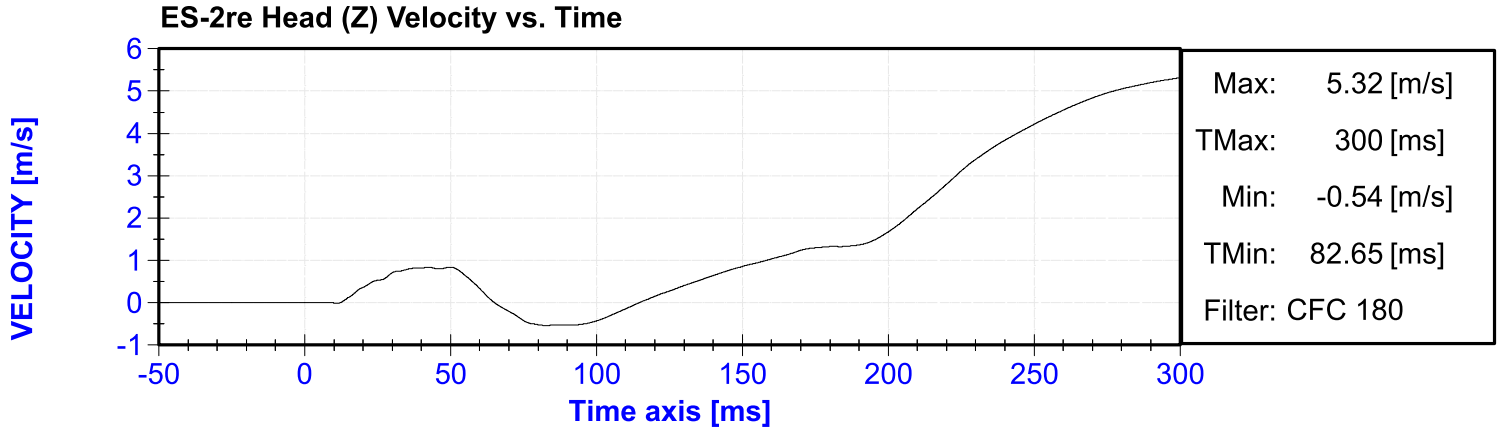


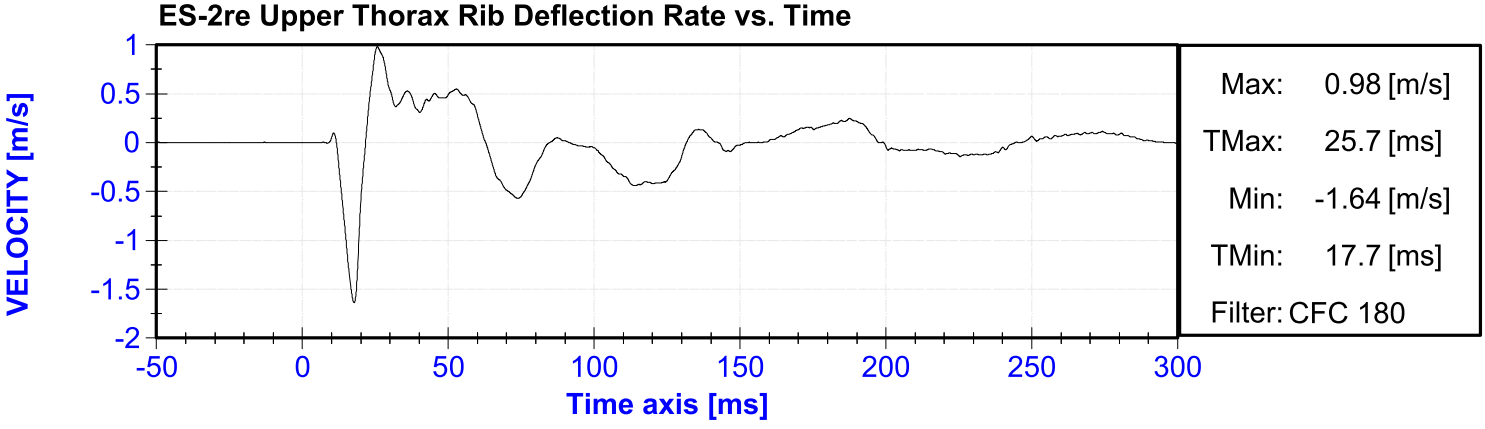
ES-2re Head Resultant Acceleration vs. Time

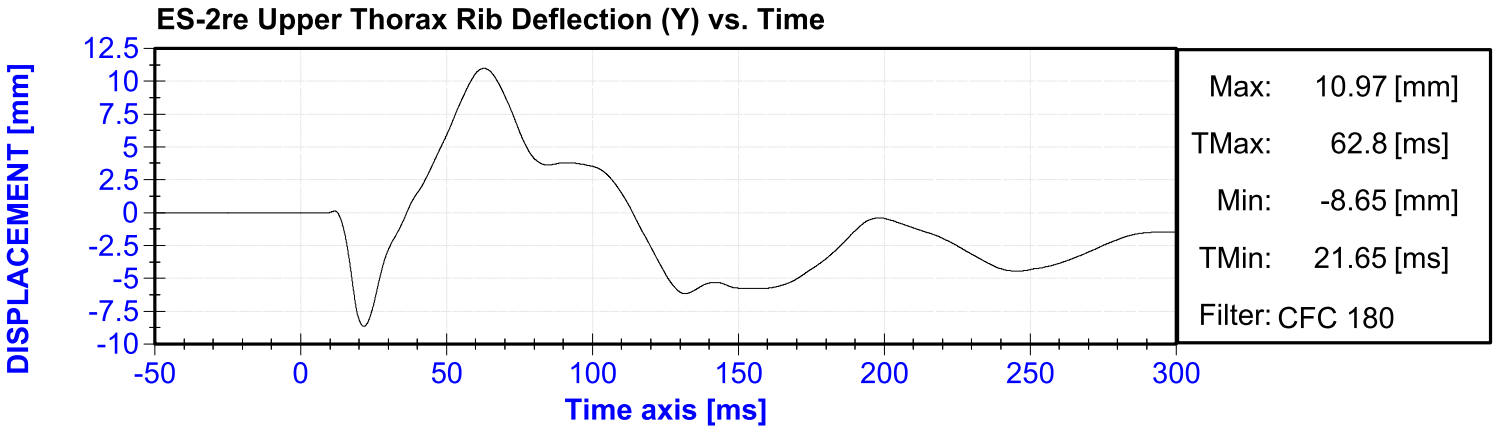


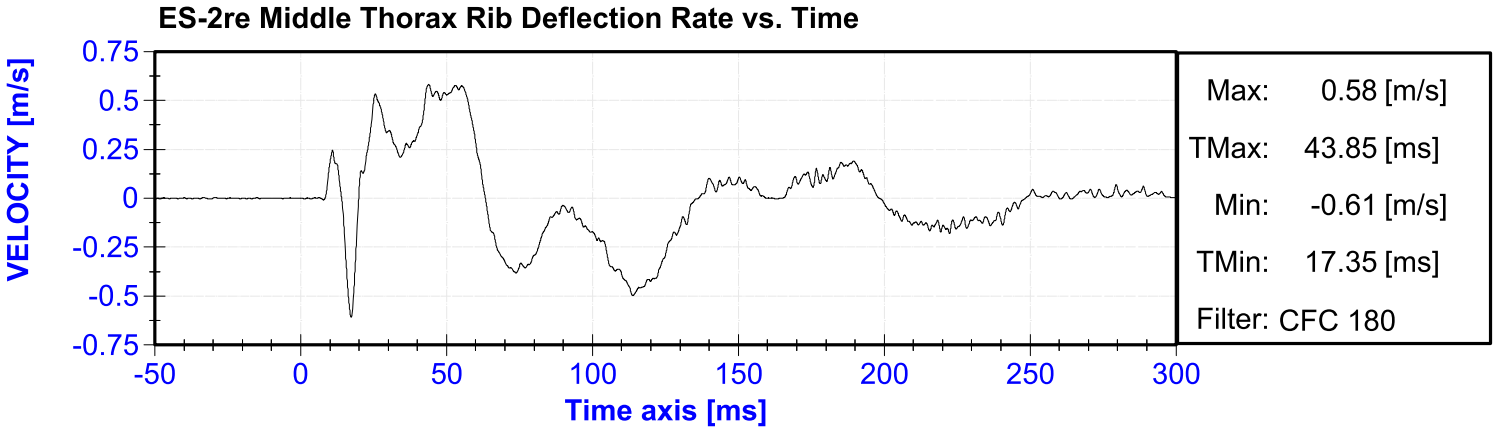

ES-2re Head (X) Velocity vs. Time
VELOCITY [m/s]
Time axis [ms]
Max: 0.01 [m/s]
TMax: 17.05 [ms]
Min: -2.74 [m/s]
TMin: 251 [ms]
Filter: CFC 180

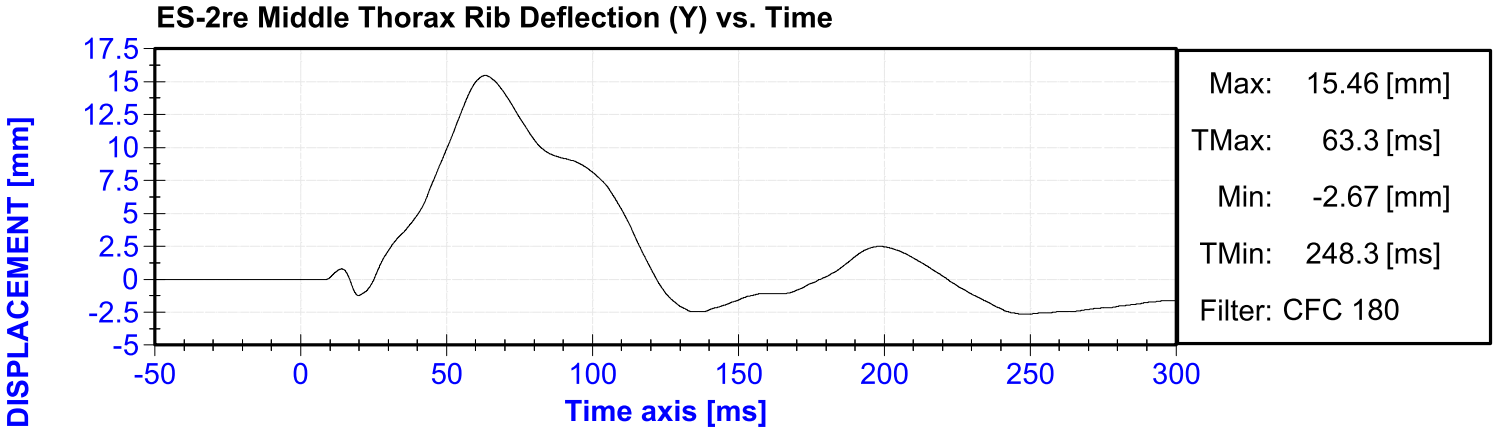

ES-2re Head (Y) Velocity vs. Time
VELOCITY [m/s]
Time axis [ms]
Max: 7.42 [m/s]
TMax: 130.65 [ms]
Min: -0.17 [m/s]
TMin: 275.65 [ms]
Filter: CFC 180

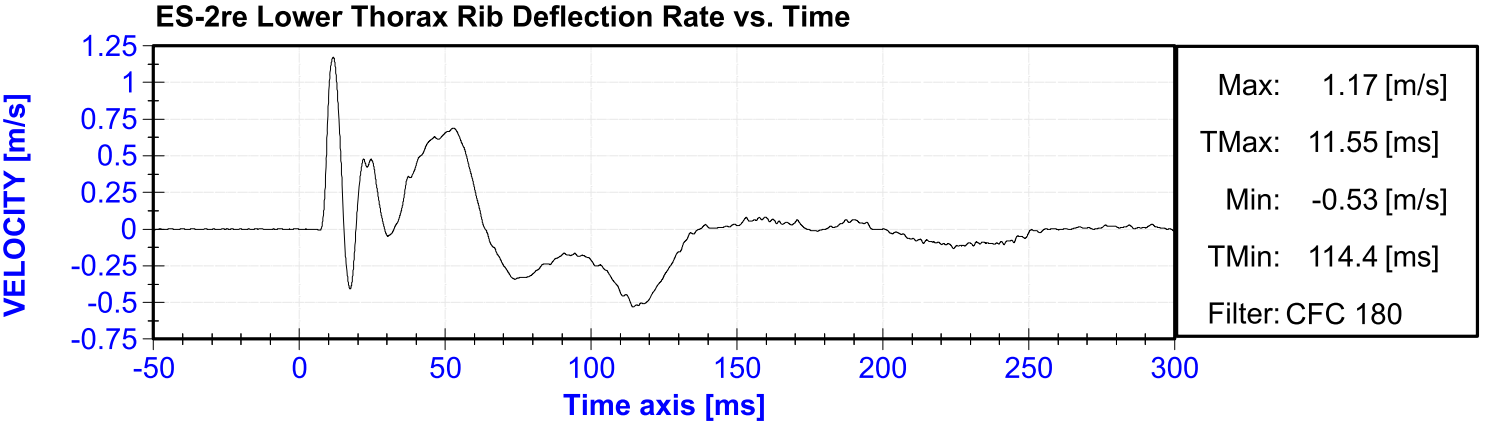

ES-2re Head (Z) Velocity vs. Time
VELOCITY [m/s]
Time axis [ms]
Max: 5.32 [m/s]
TMax: 300 [ms]
Min: -0.54 [m/s]
TMin: 82.65 [ms]
Filter: CFC 180


ES-2re Upper Thorax Rib Deflection Rate vs. Time
VELOCITY [m/s]
Time axis [ms]
Max: 0.98 [m/s]
TMax: 25.7 [ms]
Min: -1.64 [m/s]
TMin: 17.7 [ms]
Filter: CFC 180

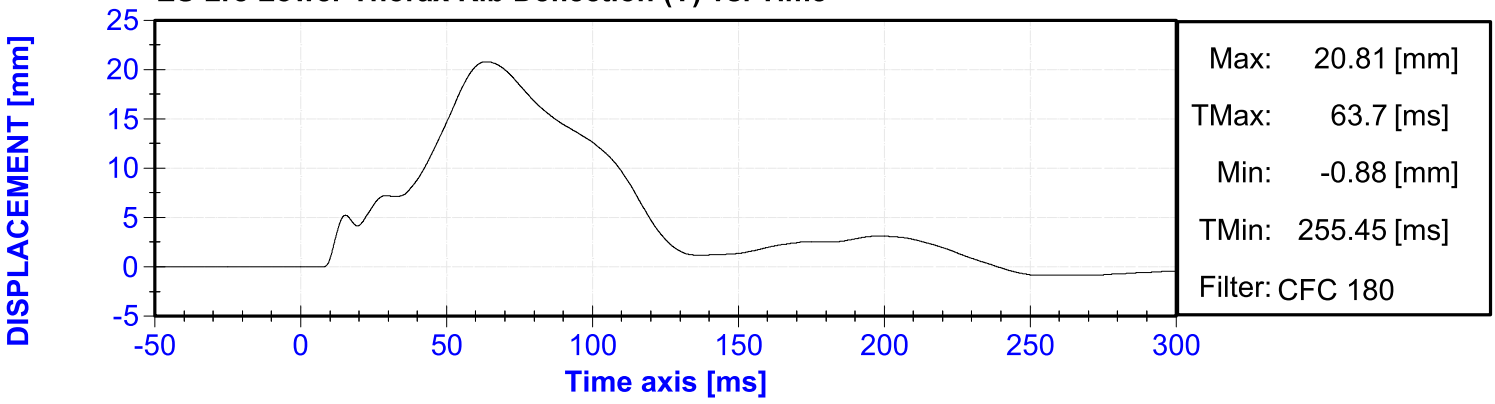

ES-2re Upper Thorax Rib Deflection (Y) vs. Time
DISPLACEMENT [mm]
12.5
10
7.5
5
2.5
0
-2.5
-5
-7.5
-10
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 10.97 [mm]
TMax: 62.8 [ms]
Min: -8.65 [mm]
TMin: 21.65 [ms]
Filter: CFC 180


ES-2re Middle Thorax Rib Deflection Rate vs. Time
VELOCITY [m/s]
0.75
0.5
0.25
0
-0.25
-0.5
-0.75
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 0.58 [m/s]
TMax: 43.85 [ms]
Min: -0.61 [m/s]
TMin: 17.35 [ms]
Filter: CFC 180

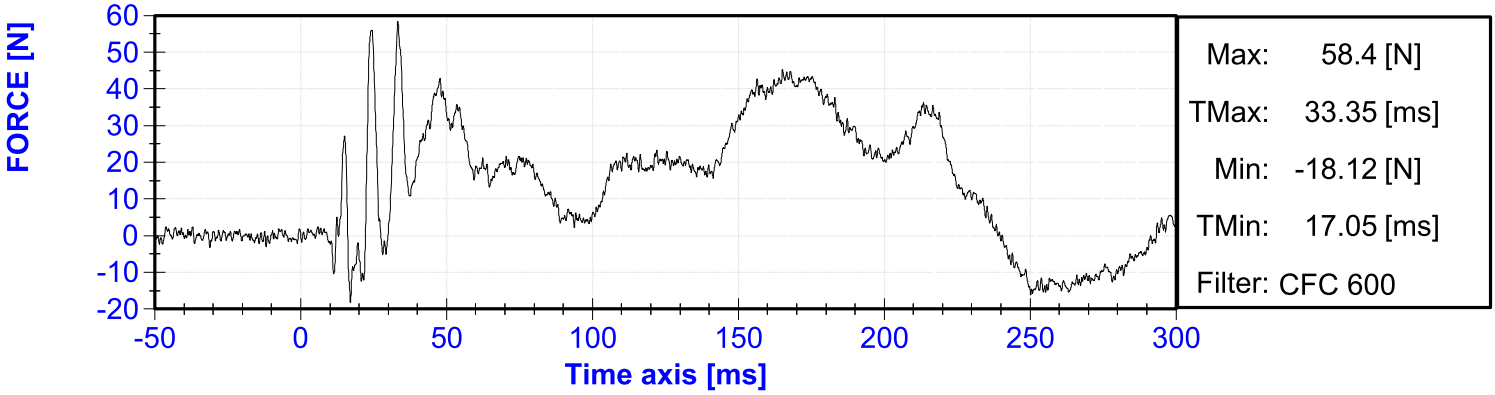

ES-2re Middle Thorax Rib Deflection (Y) vs. Time
DISPLACEMENT [mm]
17.5
15
12.5
10
7.5
5
2.5
0
-2.5
-5
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 15.46 [mm]
TMax: 63.3 [ms]
Min: -2.67 [mm]
TMin: 248.3 [ms]
Filter: CFC 180


ES-2re Lower Thorax Rib Deflection Rate vs. Time
VELOCITY [m/s]
1.25
1
0.75
0.5
0.25
0
-0.25
-0.5
-0.75
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 1.17 [m/s]
TMax: 11.55 [ms]
Min: -0.53 [m/s]
TMin: 114.4 [ms]
Filter: CFC 180

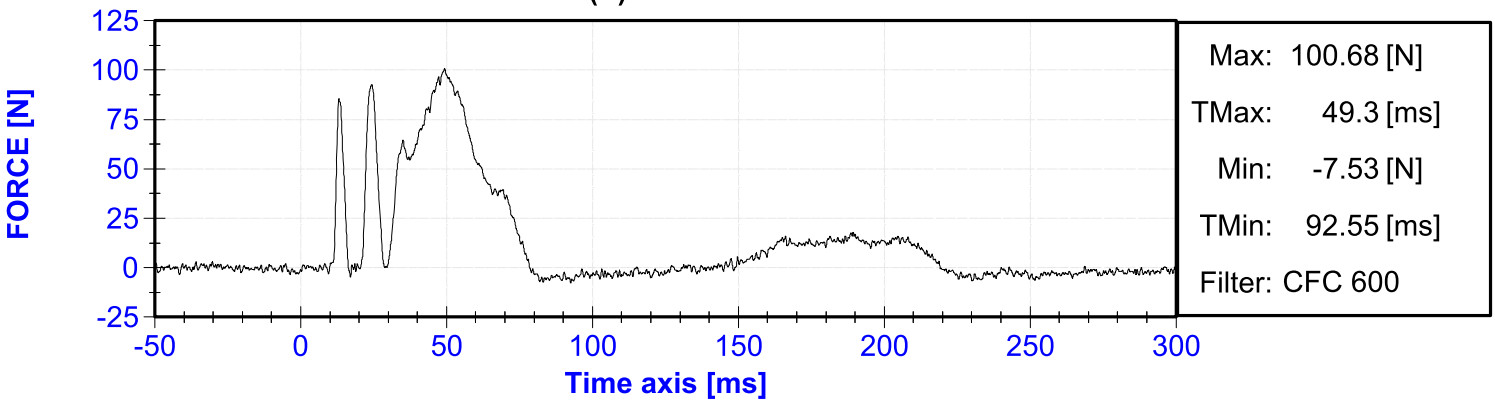
ES-2re Lower Thorax Rib Deflection (Y) vs. Time



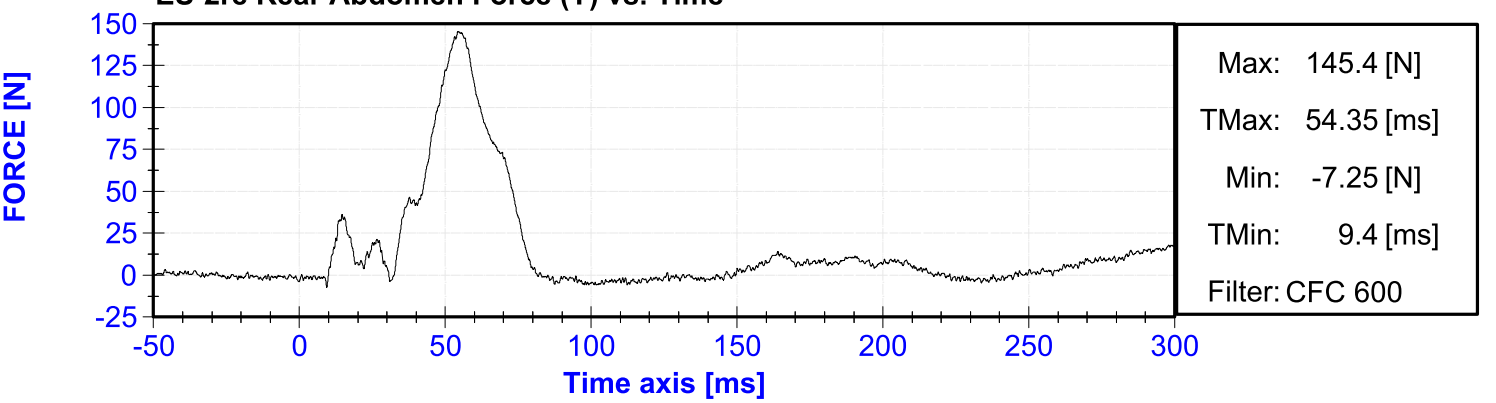
ES-2re Front Abdomen Force (Y) vs. Time

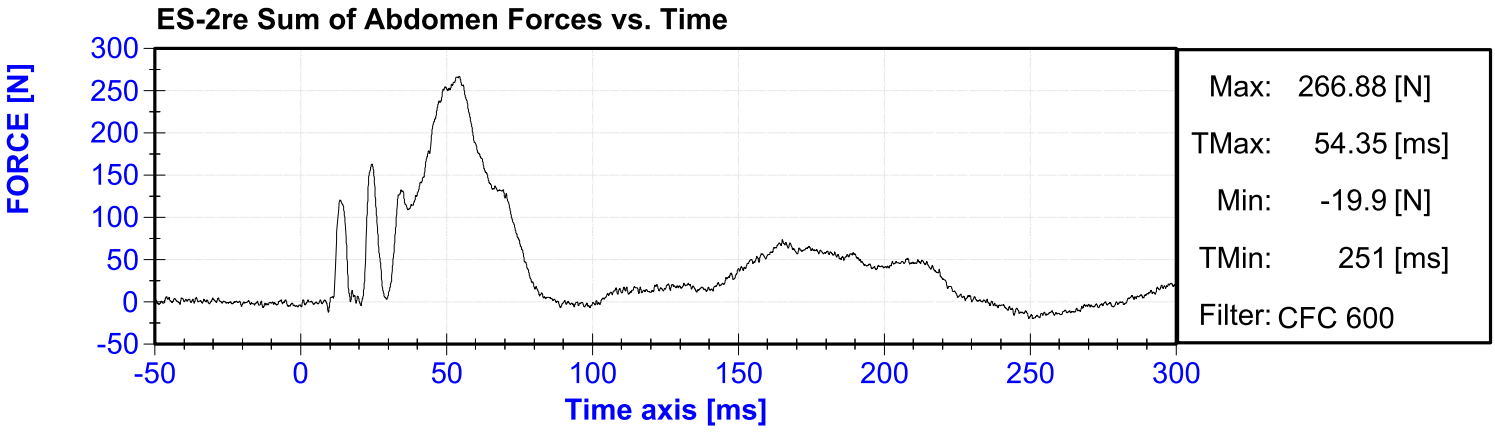


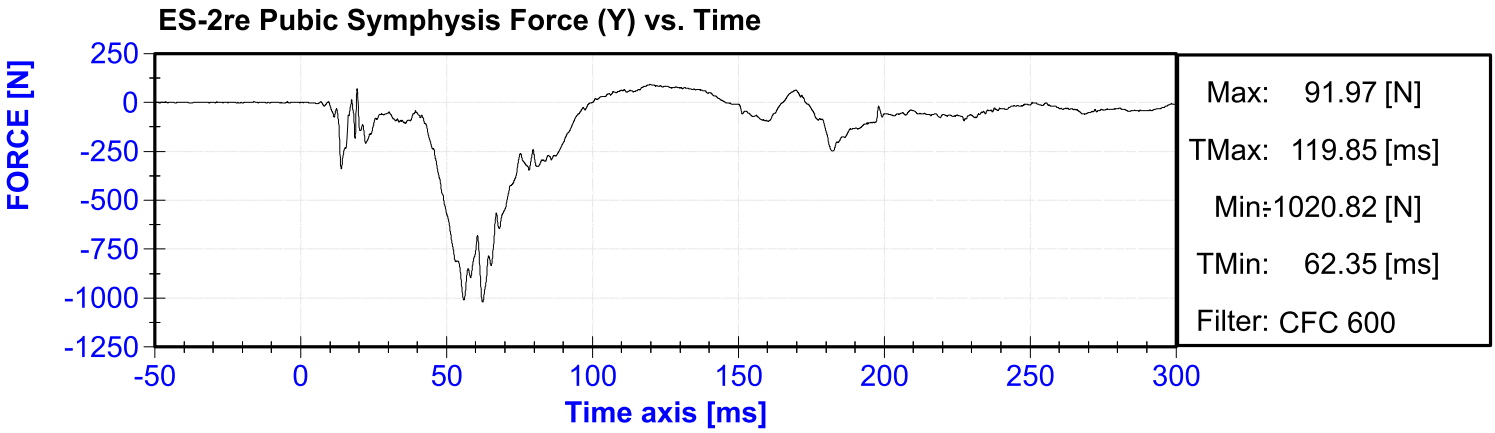
ES-2re Middle Abdomen Force (Y) vs. Time



ES-2re Rear Abdomen Force (Y) vs. Time



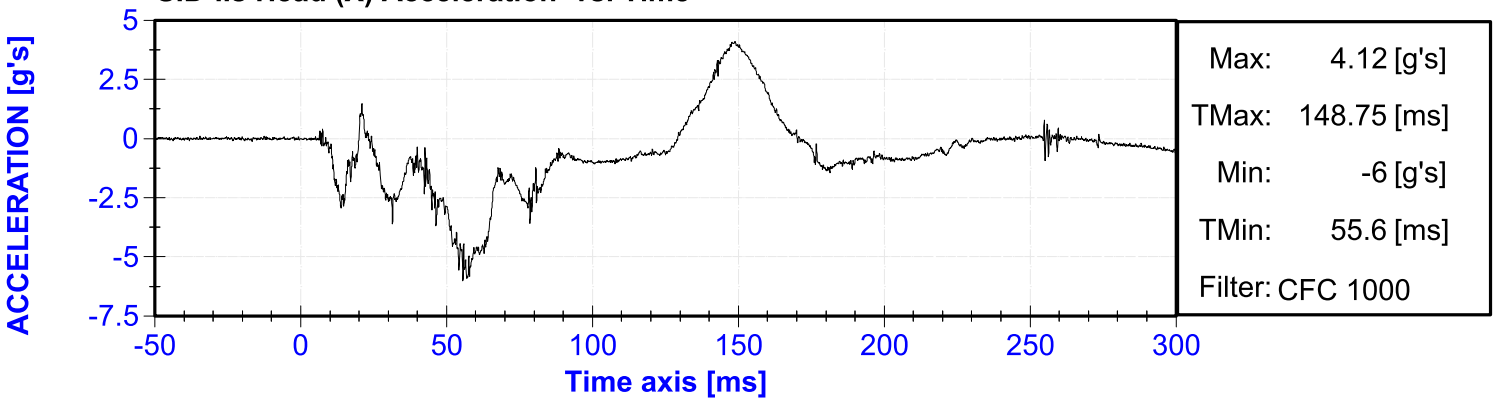

ES-2re Sum of Abdomen Forces vs. Time
FORCE [N]
300
250
200
150
100
50
0
-50
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 266.88 [N]
TMax: 54.35 [ms]
Min: -19.9 [N]
TMin: 251 [ms]
Filter: CFC 600


ES-2re Pubic Symphysis Force (Y) vs. Time
FORCE [N]
250
0
-250
-500
-750
-1000
-1250
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 91.97 [N]
TMax: 119.85 [ms]
Min: -1020.82 [N]
TMin: 62.35 [ms]
Filter: CFC 600

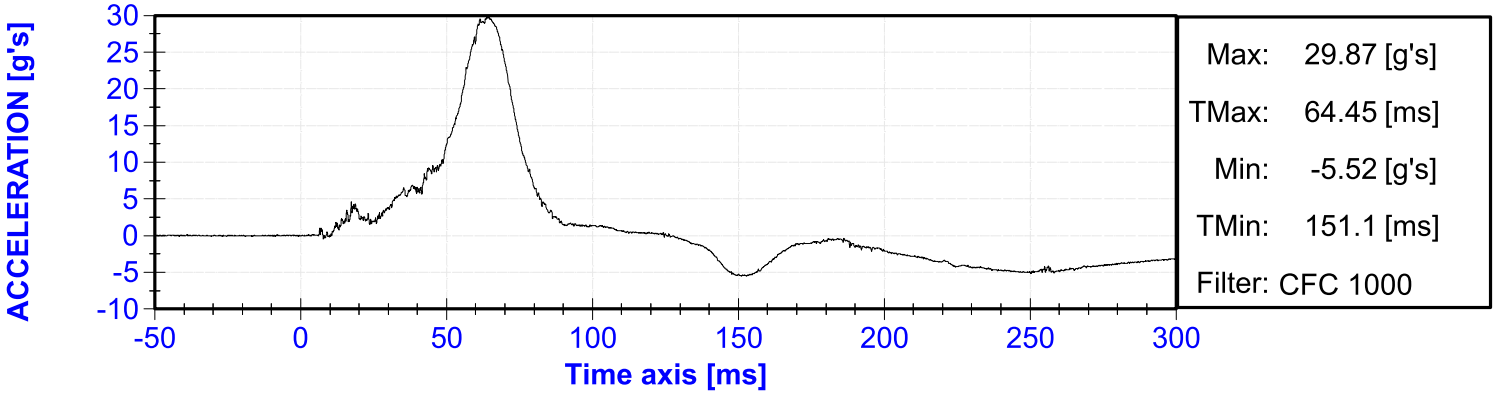
APPENDIX III
SID-IIs DUMMY RESPONSE DATA TRACES

Table of Data Plots

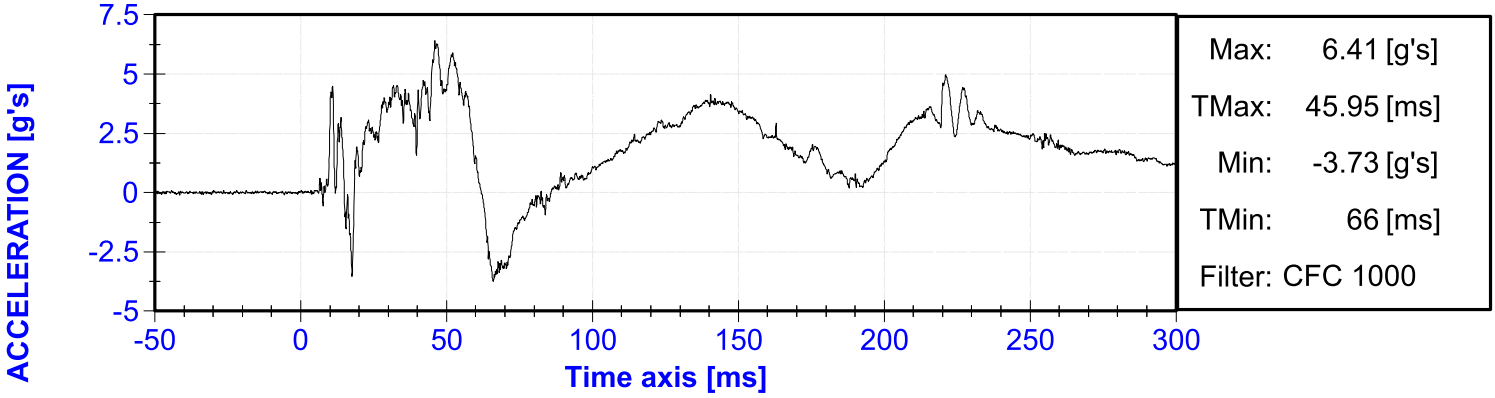
SID-IIs Head (X) Acceleration vs. Time



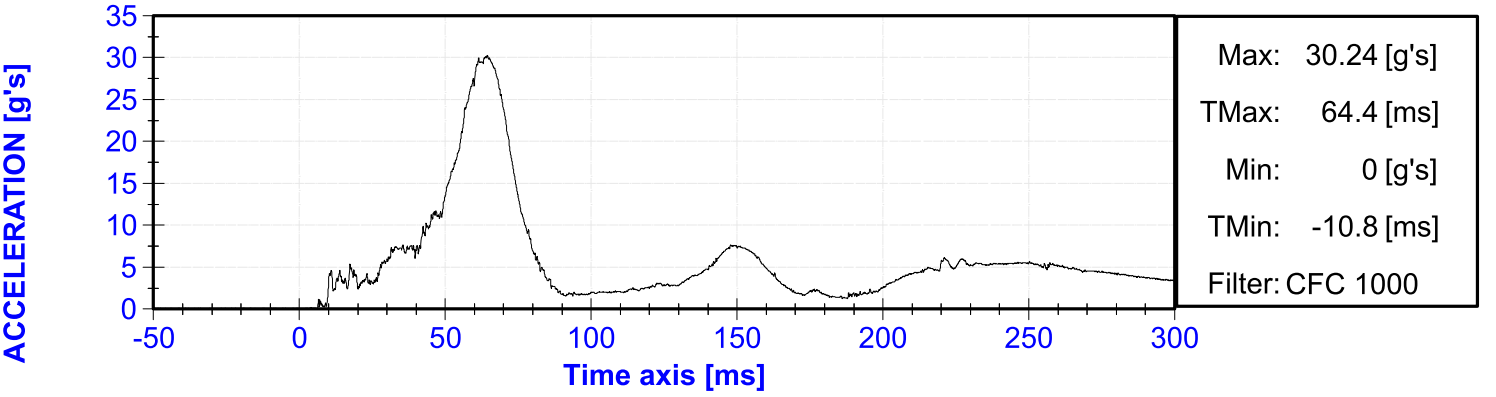
SID-IIs Head (Y) Acceleration vs. Time

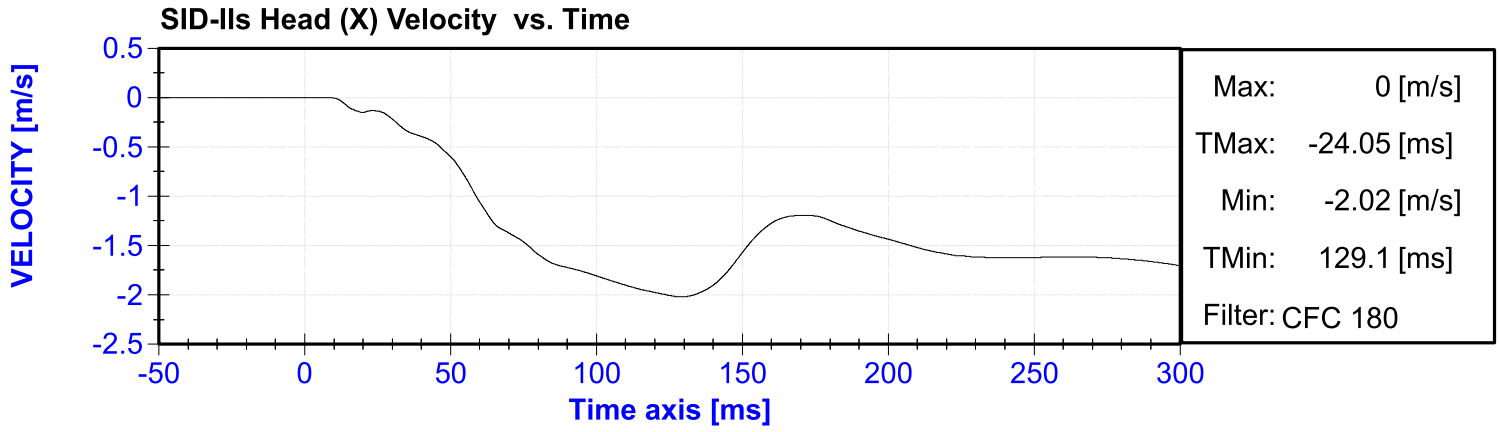


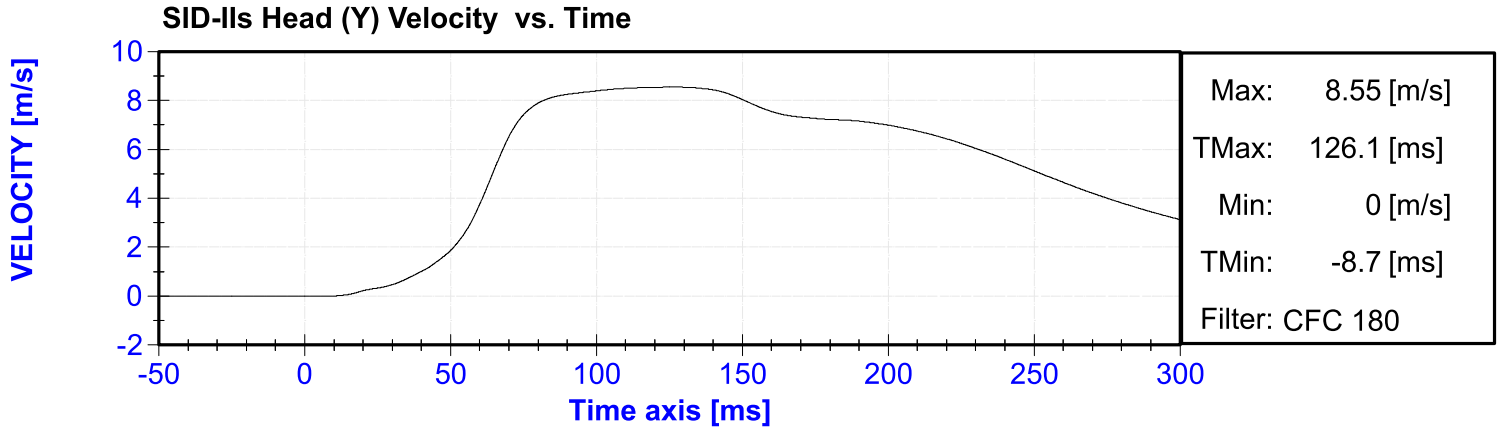
SID-IIs Head (Z) Acceleration vs. Time

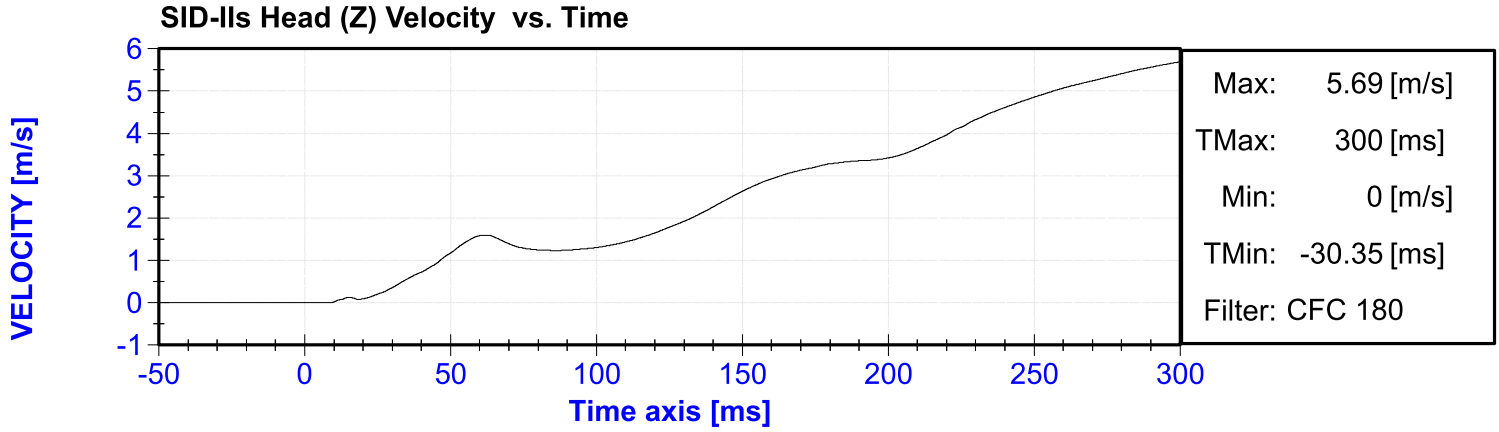


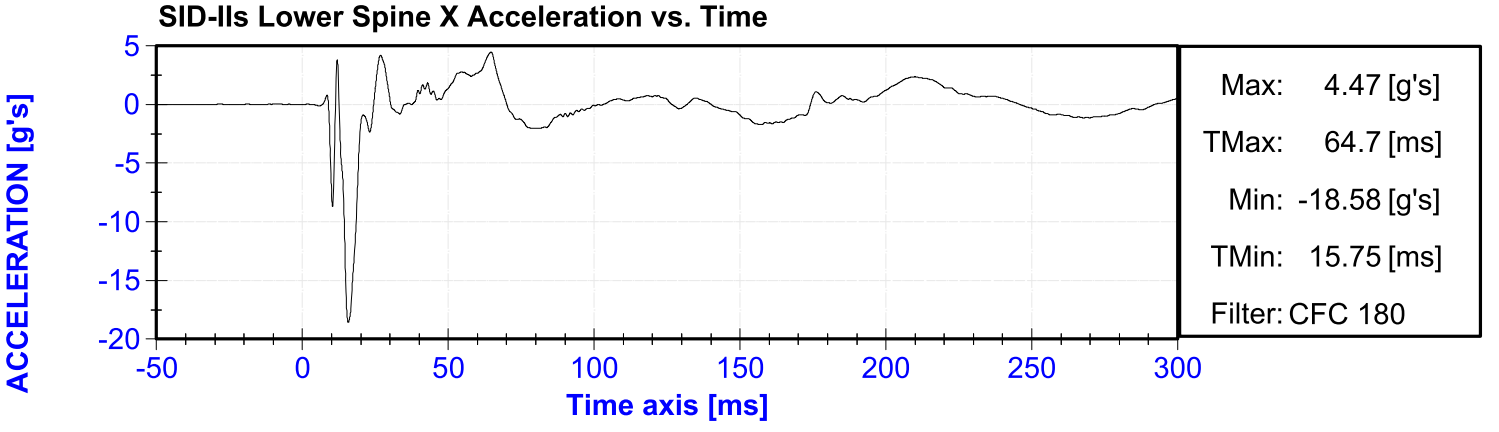
SID-IIs Head ResultantAcceleration vs. Time



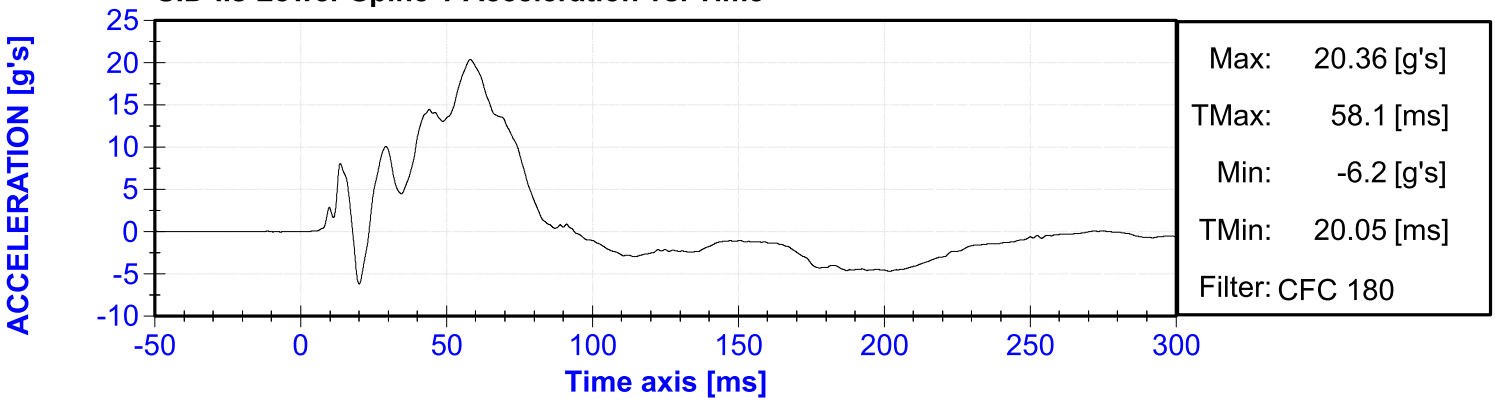

SID-IIs Head (X) Velocity vs. Time
VELOCITY [m/s]
0.5
0
-0.5
-1
-1.5
-2
-2.5
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 0 [m/s]
TMax: -24.05 [ms]
Min: -2.02 [m/s]
TMin: 129.1 [ms]
Filter: CFC 180


SID-IIs Head (Y) Velocity vs. Time
VELOCITY [m/s]
10
8
6
4
2
0
-2
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 8.55 [m/s]
TMax: 126.1 [ms]
Min: 0 [m/s]
TMin: -8.7 [ms]
Filter: CFC 180

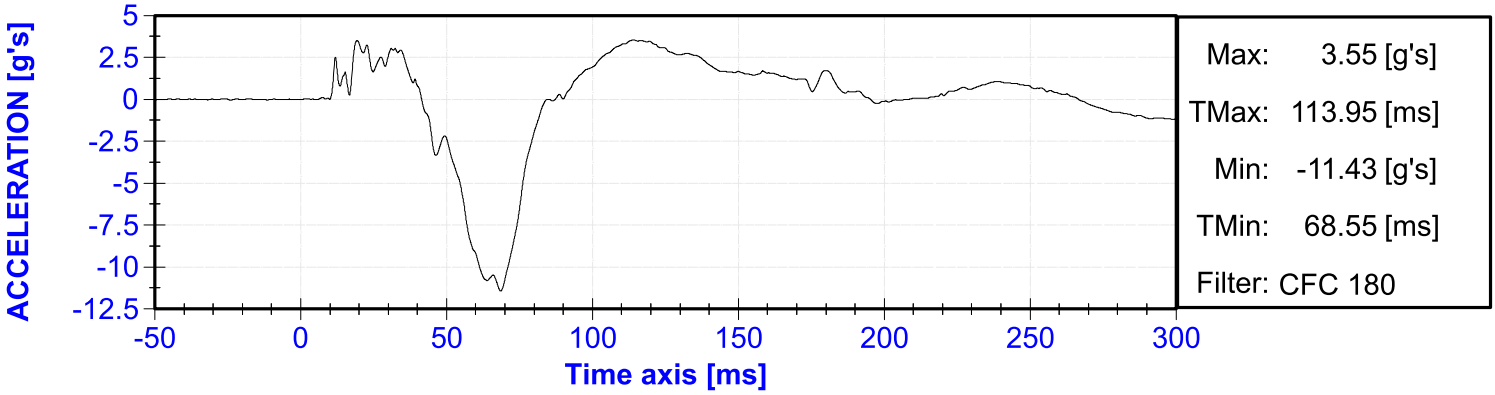

SID-IIs Head (Z) Velocity vs. Time
VELOCITY [m/s]
6
5
4
3
2
1
0
-1
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 5.69 [m/s]
TMax: 300 [ms]
Min: 0 [m/s]
TMin: -30.35 [ms]
Filter: CFC 180


SID-IIs Lower Spine X Acceleration vs. Time
ACCELERATION [g's]
5
0
-5
-10
-15
-20
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 4.47 [g's]
TMax: 64.7 [ms]
Min: -18.58 [g's]
TMin: 15.75 [ms]
Filter: CFC 180

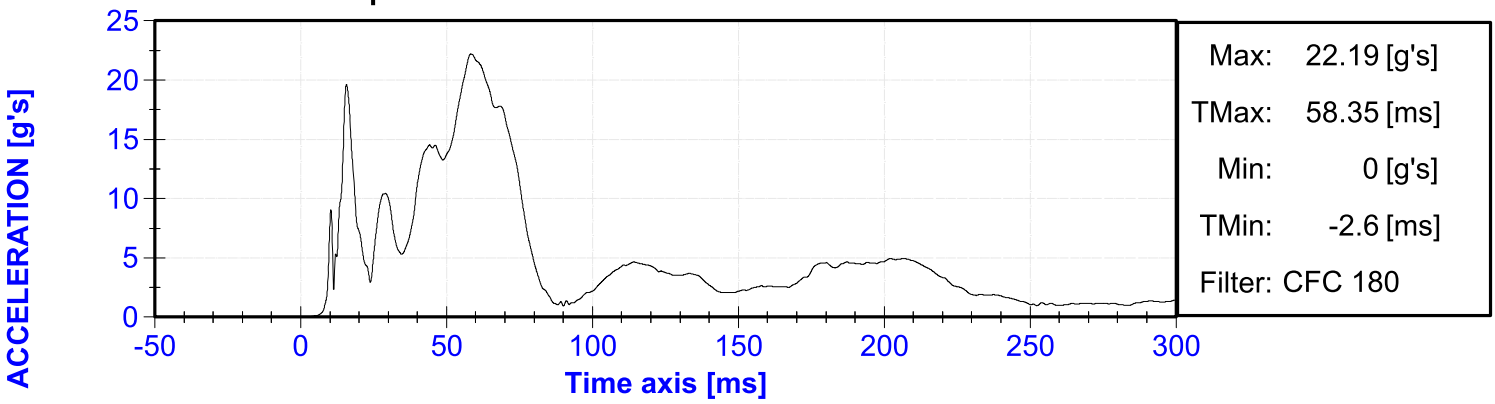
SID-IIs Lower Spine Y Acceleration vs. Time



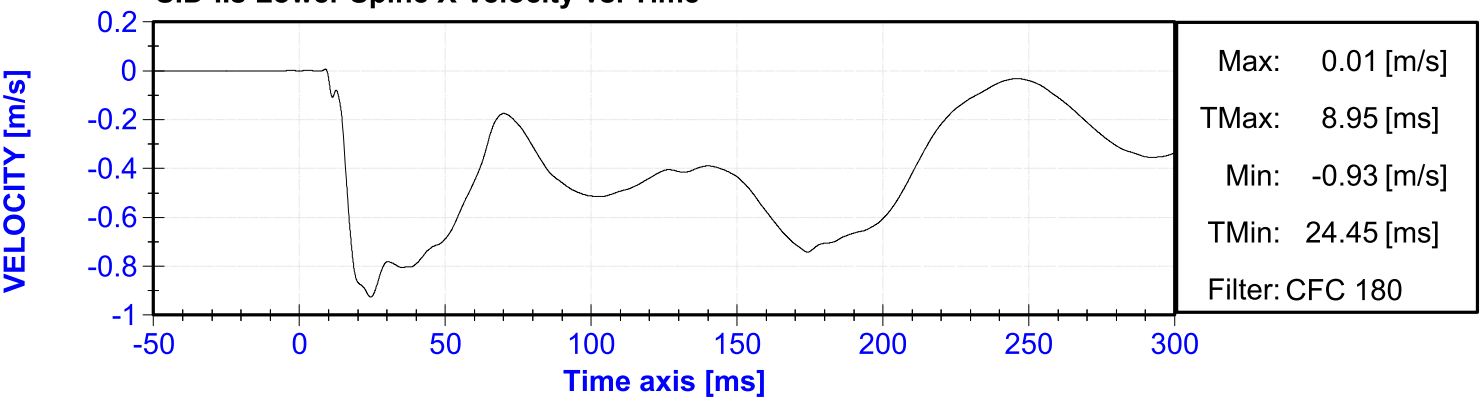
SID-IIs Lower Spine Z Acceleration vs. Time



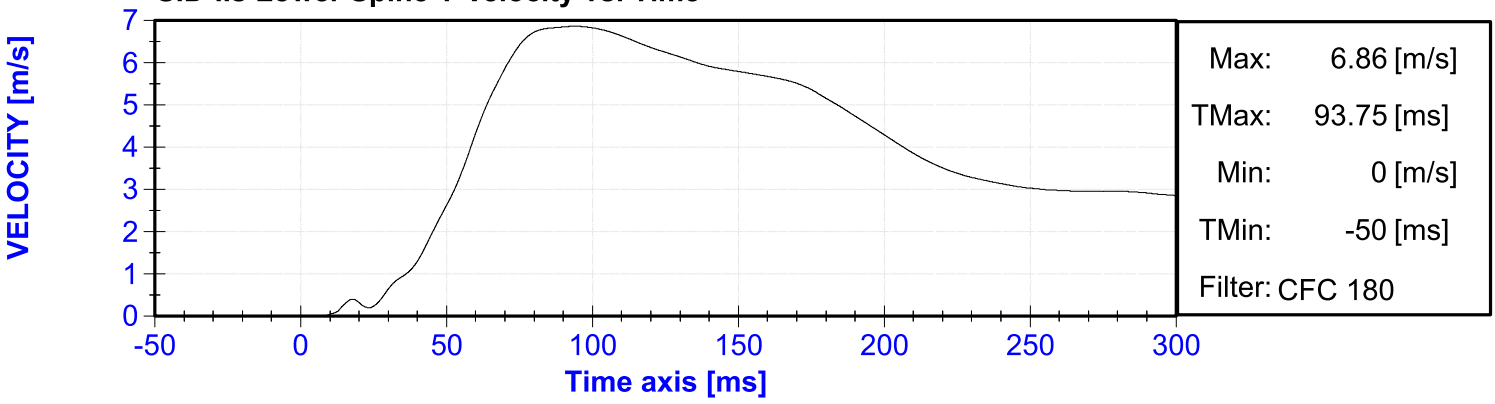
SID-IIs Lower Spine Resultant Acceleration vs. Time



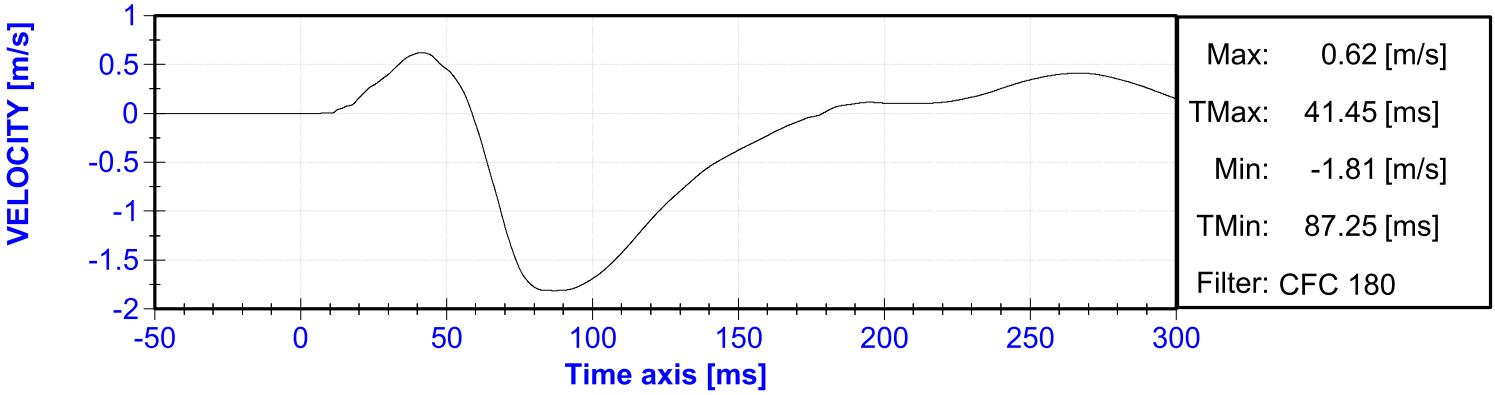
SID-IIs Lower Spine X Velocity vs. Time



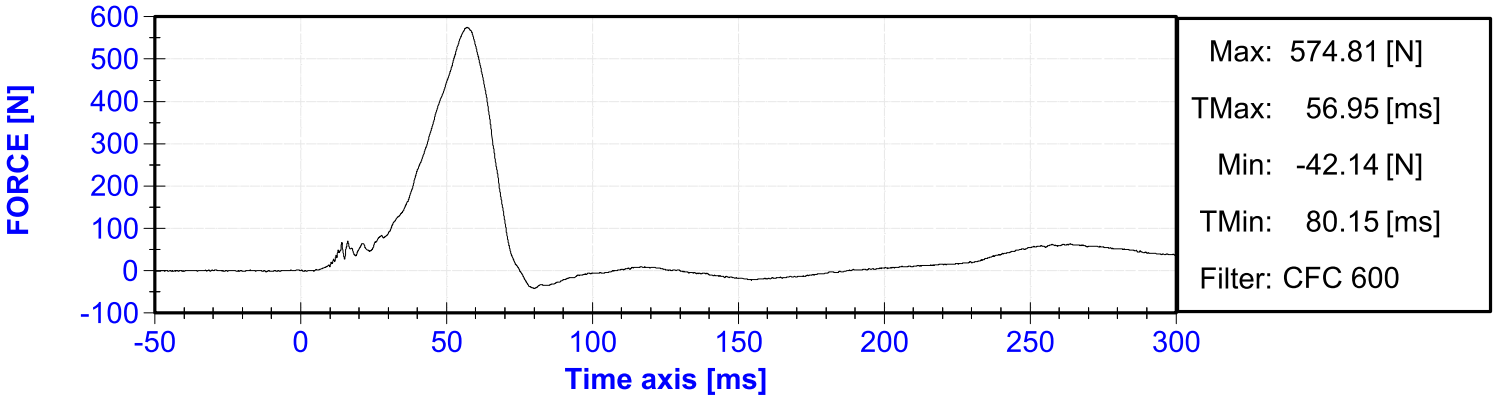
SID-IIs Lower Spine Y Velocity vs. Time



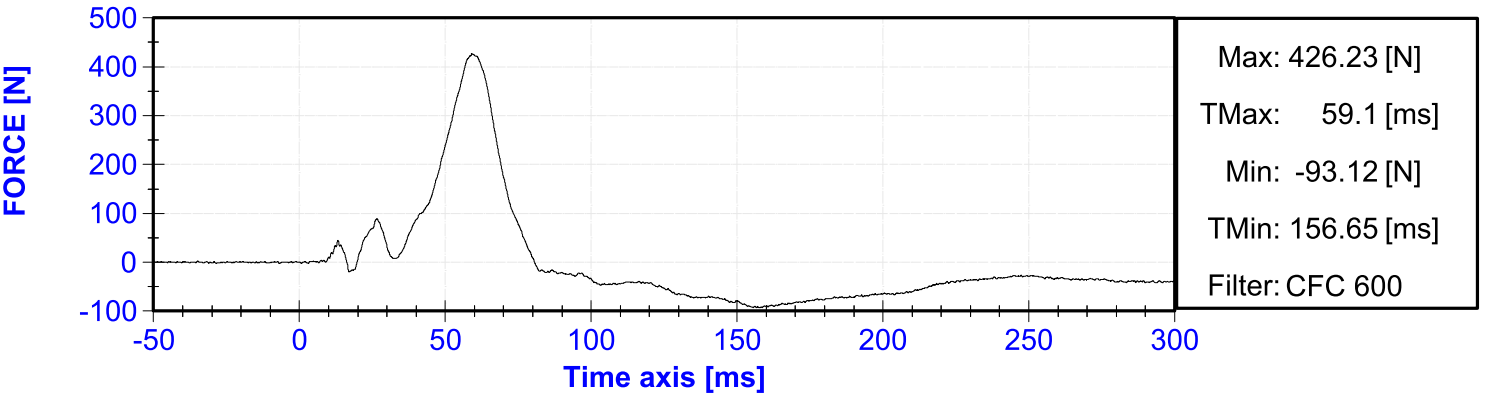
SID-IIs Lower Spine Z Velocity vs. Time

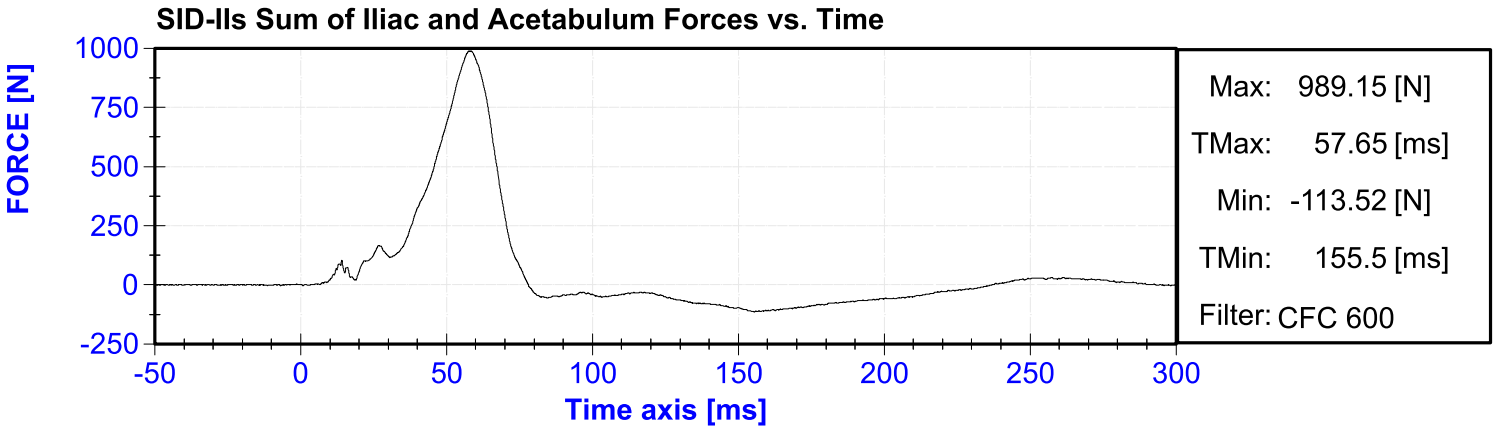


SID-IIs Acetabulum Force vs. Time



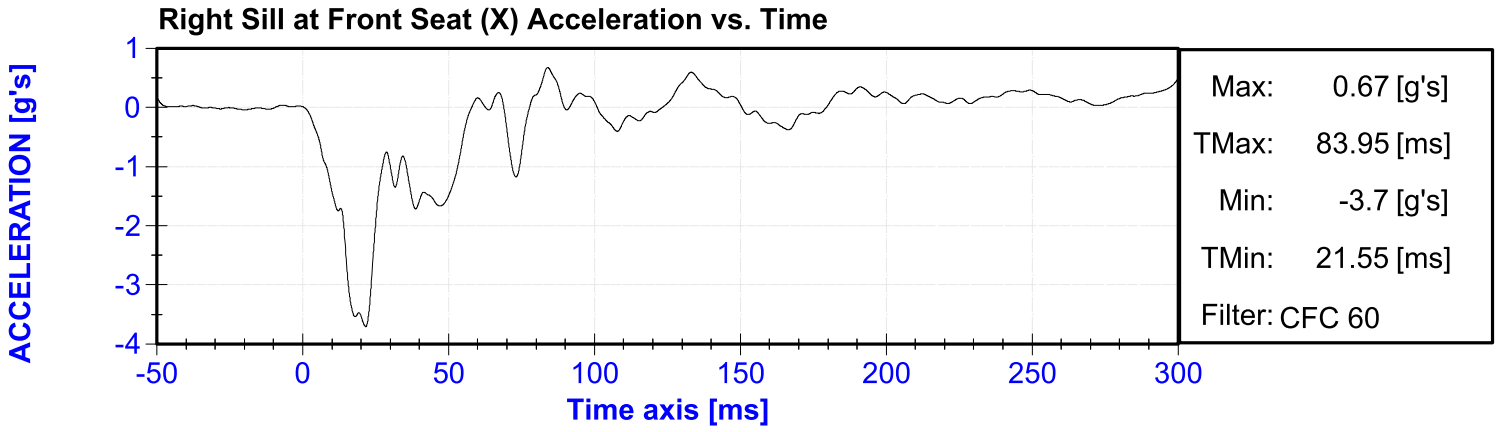
SID-IIs Iliac Force vs. Time

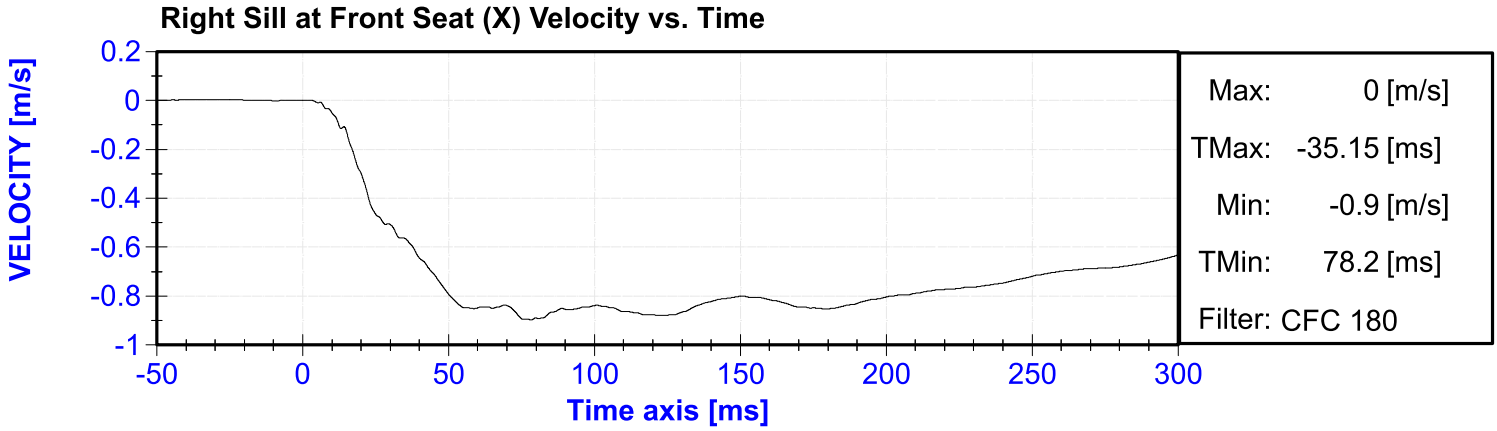


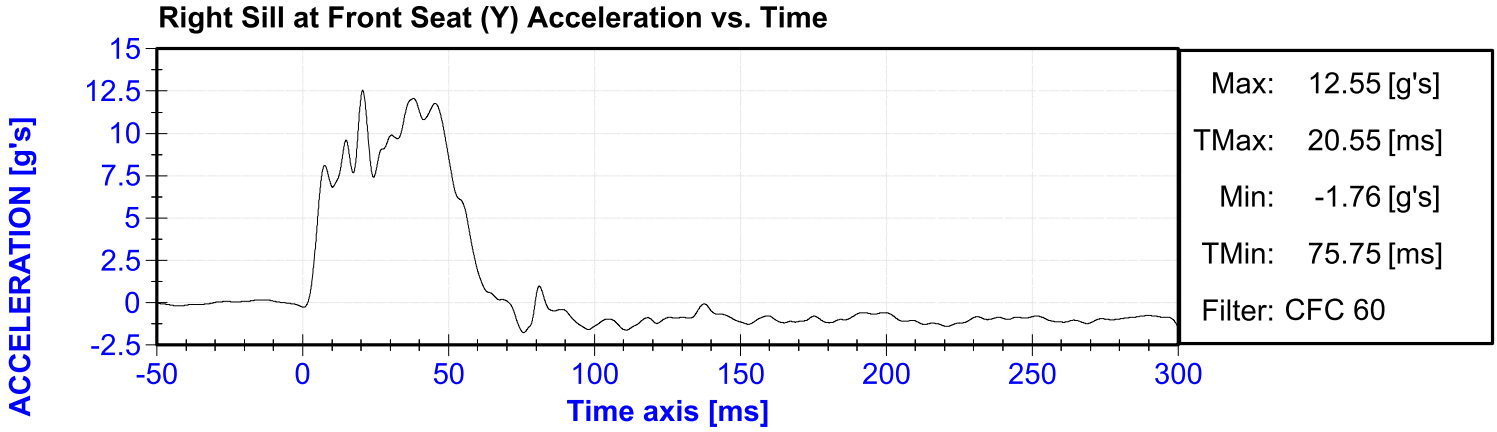

SID-IIs Sum of Iliac and Acetabulum Forces vs. Time
FORCE [N]
1000
750
500
250
0
-250
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 989.15 [N]
TMax: 57.65 [ms]
Min: -113.52 [N]
TMin: 155.5 [ms]
Filter: CFC 600

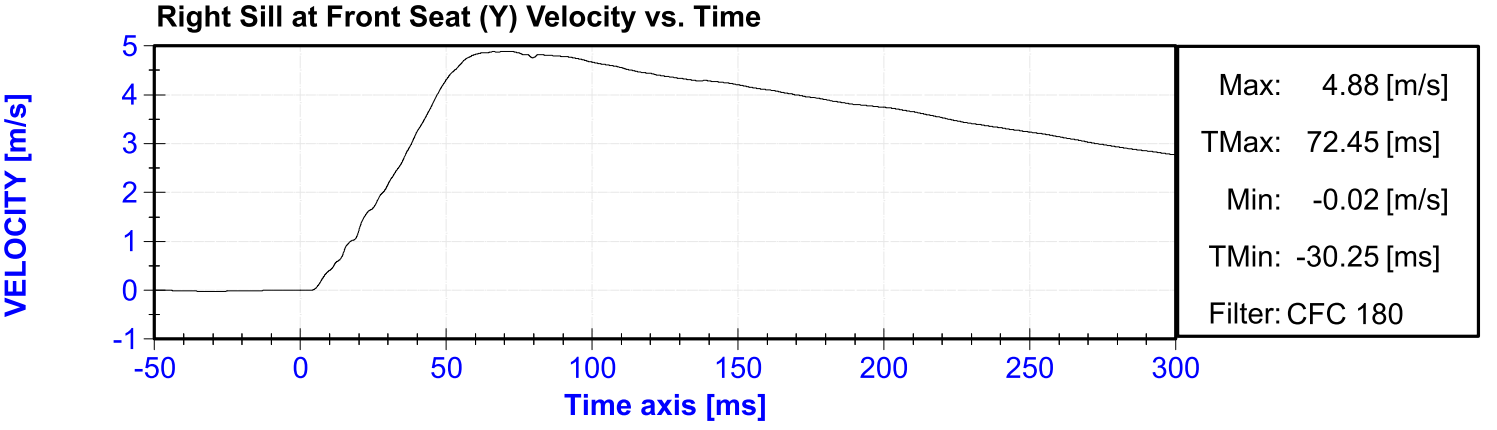
APPENDIX IV
VEHICLE AND MDB ACCELEROMETER RESPONSE DATA

Table of Data Plots

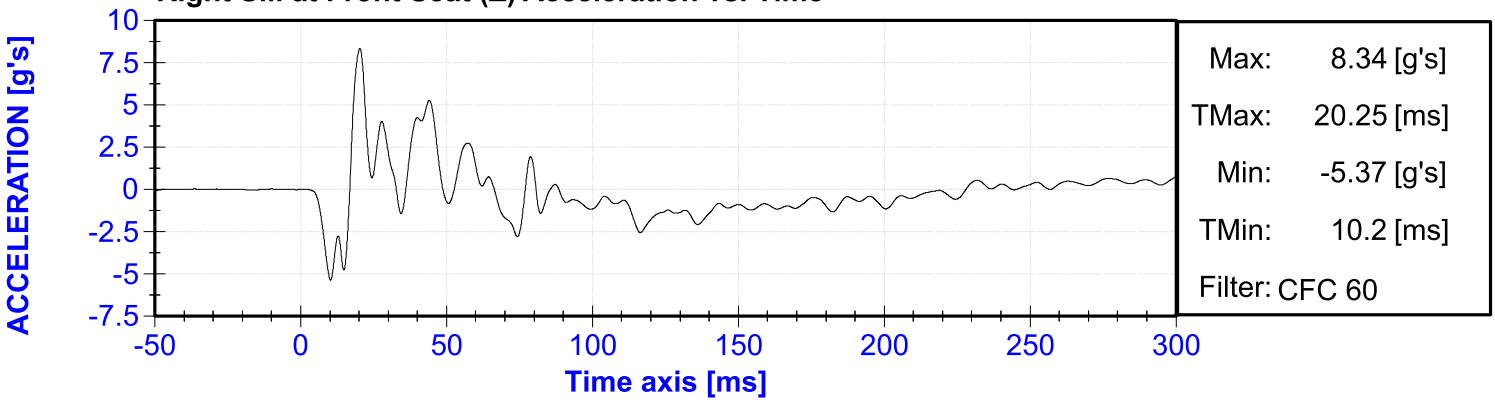

Right Sill at Front Seat (X) Acceleration vs. Time
ACCELERATION [g's]
1
0
-1
-2
-3
-4
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 0.67 [g's]
TMax: 83.95 [ms]
Min: -3.7 [g's]
TMin: 21.55 [ms]
Filter: CFC 60


Right Sill at Front Seat (X) Velocity vs. Time
VELOCITY [m/s]
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 0 [m/s]
TMax: -35.15 [ms]
Min: -0.9 [m/s]
TMin: 78.2 [ms]
Filter: CFC 180

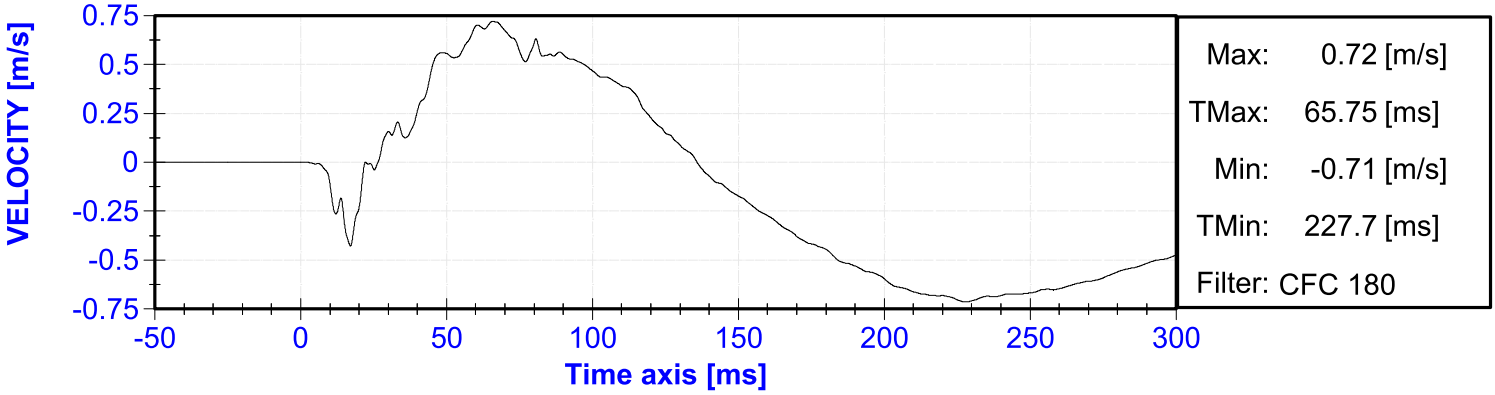

Right Sill at Front Seat (Y) Acceleration vs. Time
ACCELERATION [g's]
15
12.5
10
7.5
5
2.5
0
-2.5
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 12.55 [g's]
TMax: 20.55 [ms]
Min: -1.76 [g's]
TMin: 75.75 [ms]
Filter: CFC 60


Right Sill at Front Seat (Y) Velocity vs. Time
VELOCITY [m/s]
5
4
3
2
1
0
-1
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 4.88 [m/s]
TMax: 72.45 [ms]
Min: -0.02 [m/s]
TMin: -30.25 [ms]
Filter: CFC 180

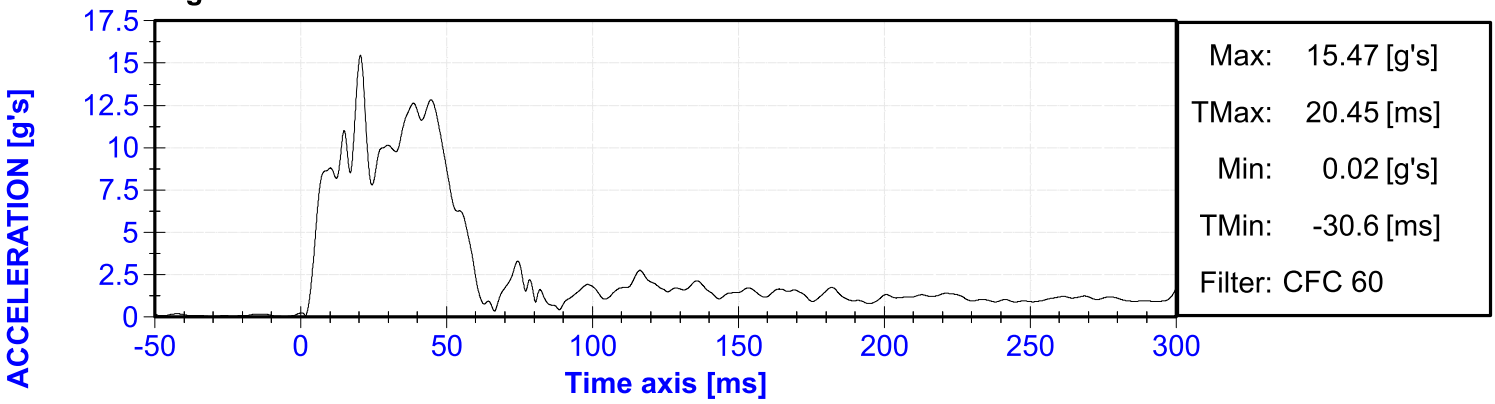
Right Sill at Front Seat (Z) Acceleration vs. Time



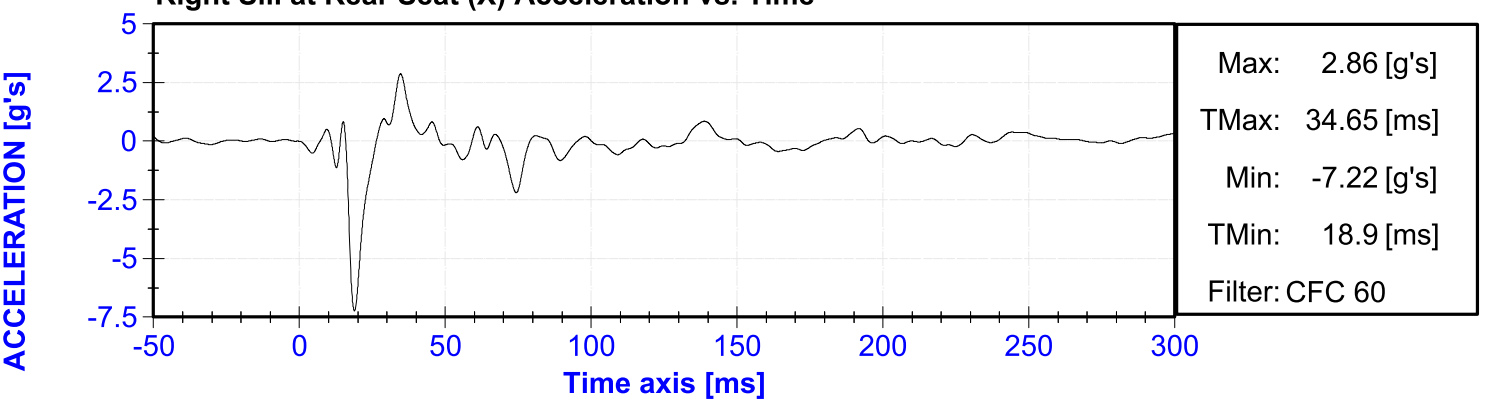
Right Sill at Front Seat (Z) Velocity vs. Time



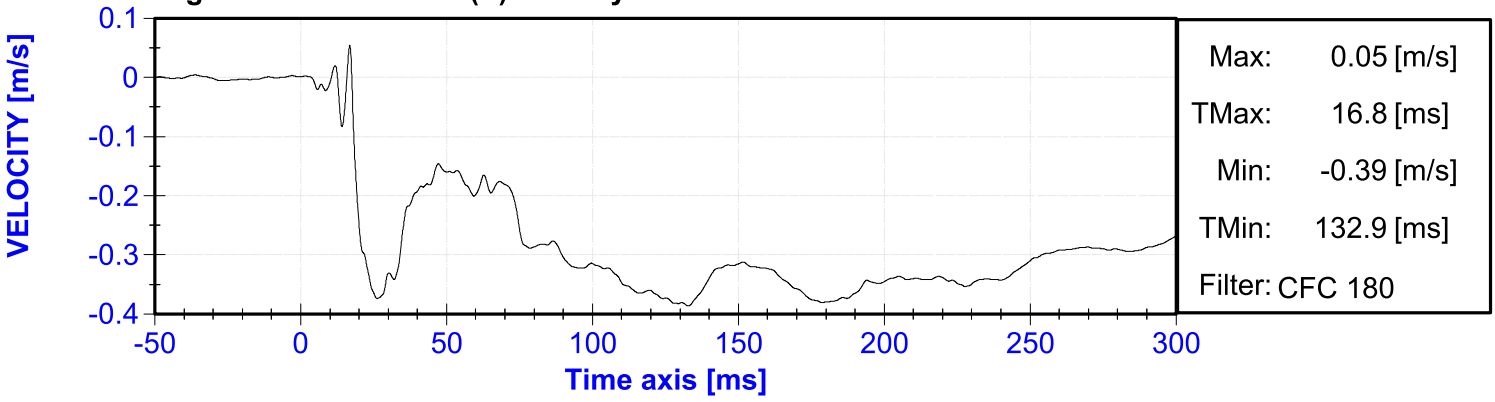
Right Sill at Front Seat Resultant vs. Time



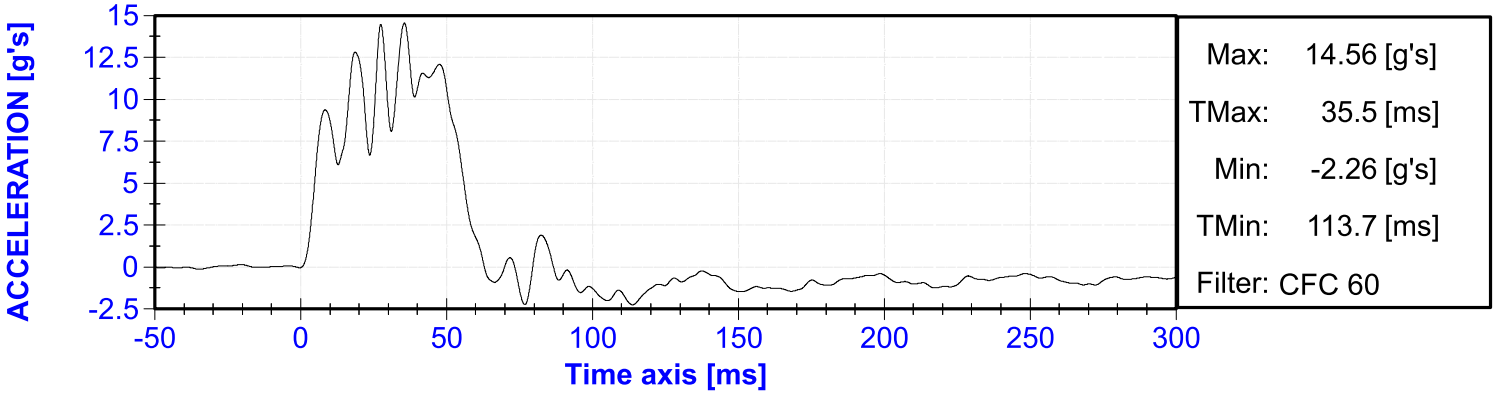
Right Sill at Rear Seat (X) Acceleration vs. Time



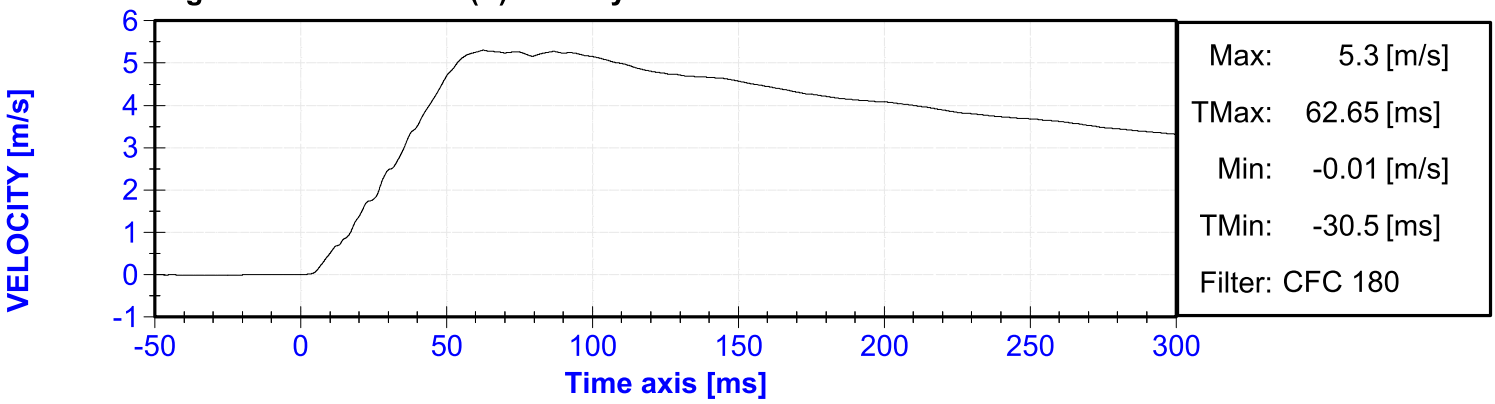
Right Sill at Rear Seat (X) Velocity vs. Time



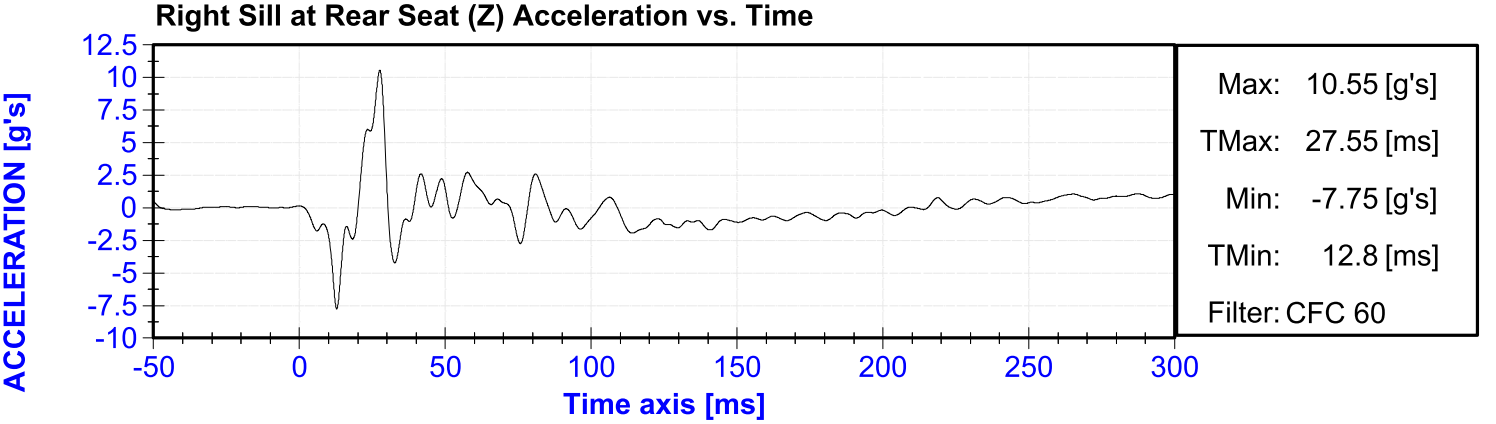
Right Sill at Rear Seat (Y) Acceleration vs. Time



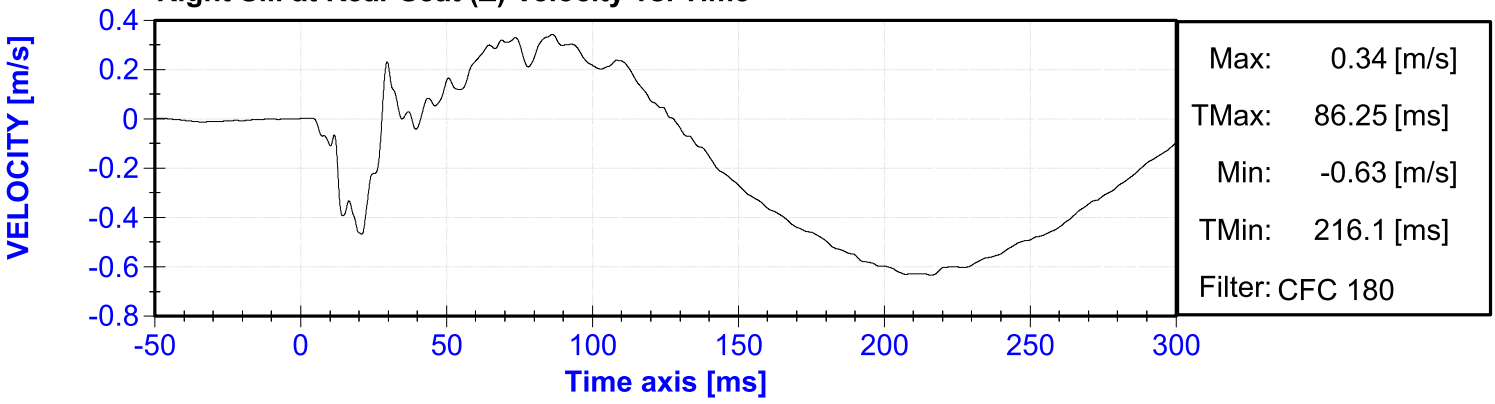
Right Sill at Rear Seat (Y) Velocity vs. Time



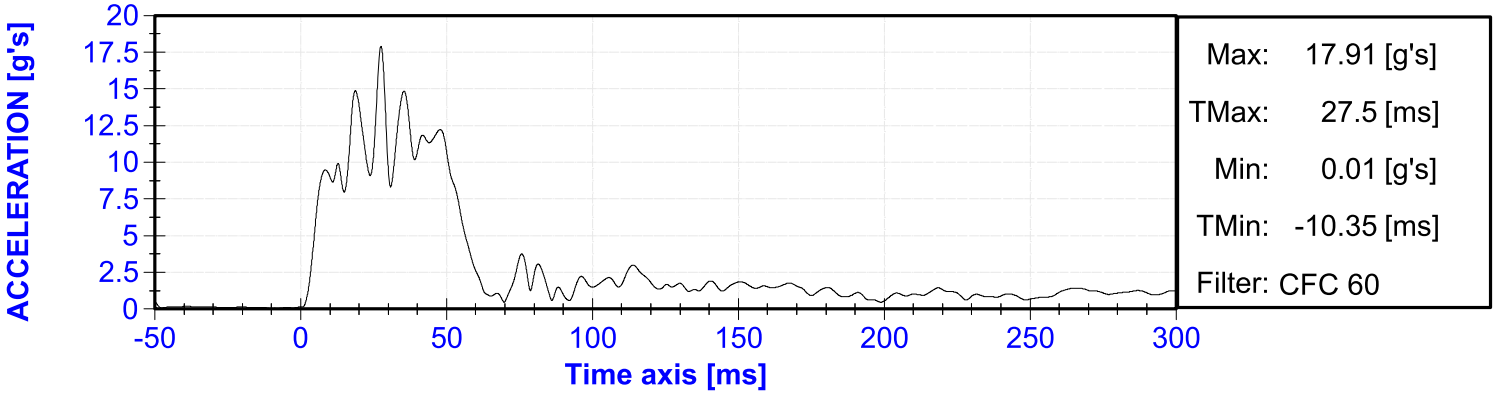
Right Sill at Rear Seat (Z) Acceleration vs. Time



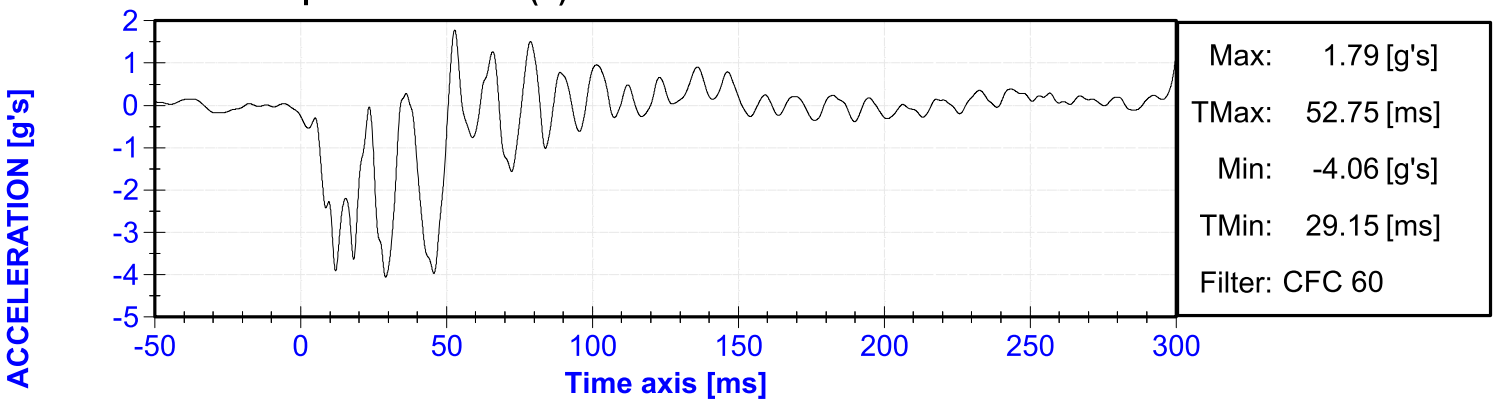
Right Sill at Rear Seat (Z) Velocity vs. Time



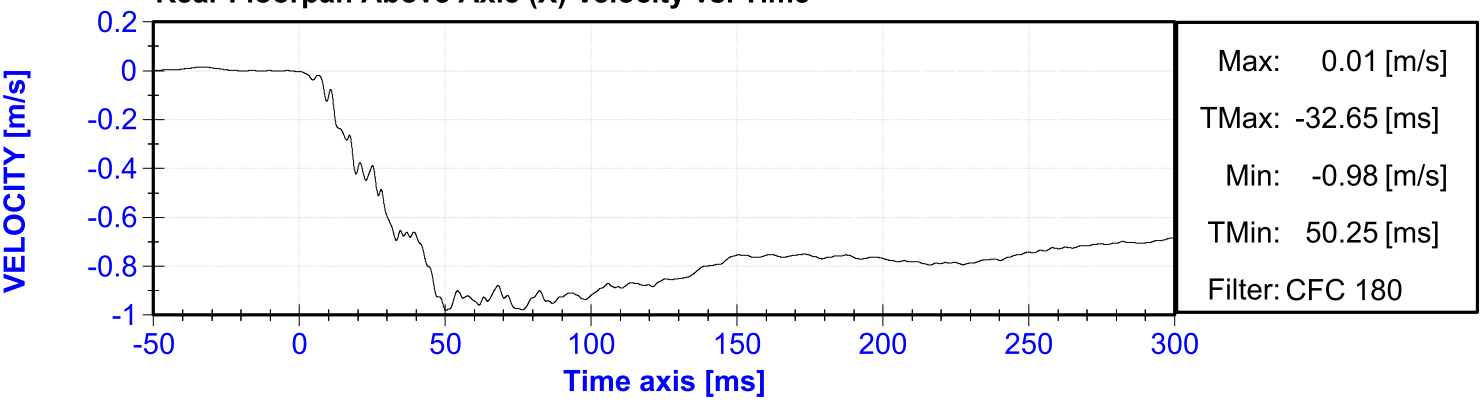
Right Sill at Rear Seat Resultant Acceleration vs. Time



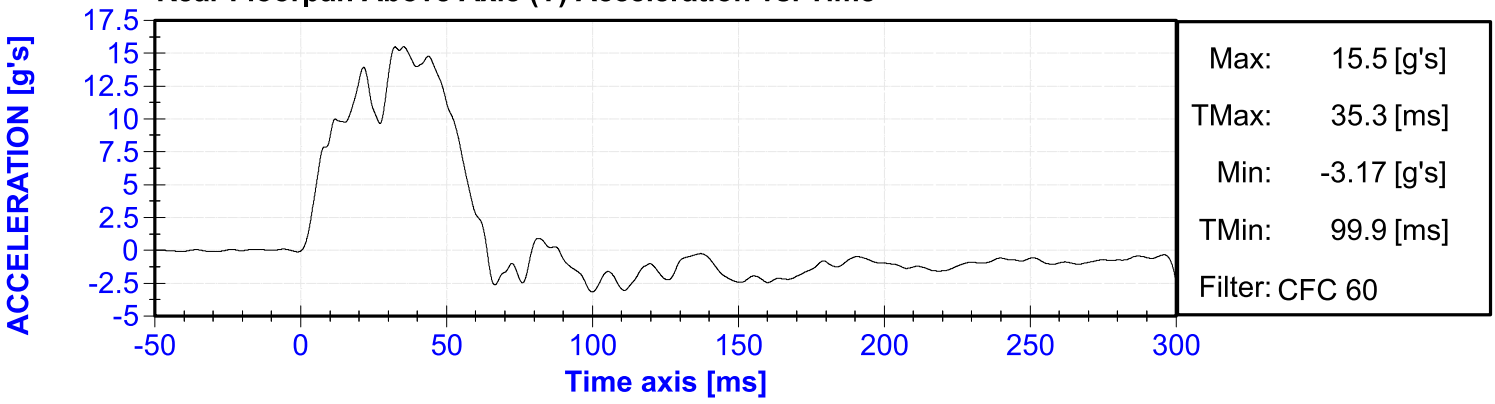
Rear Floorpan Above Axle (X) Acceleration vs. Time



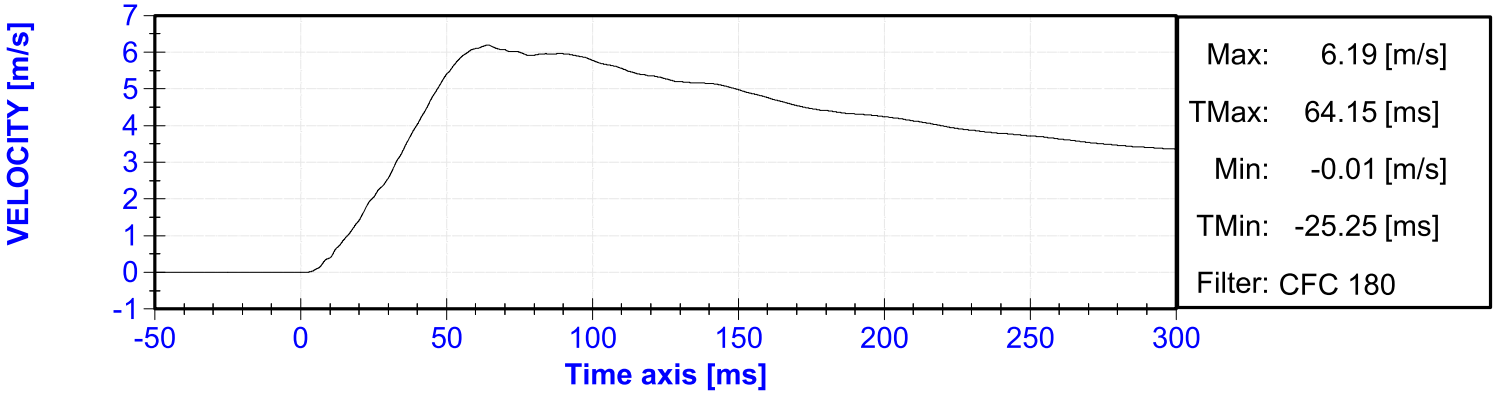
Rear Floorpan Above Axle (X) Velocity vs. Time



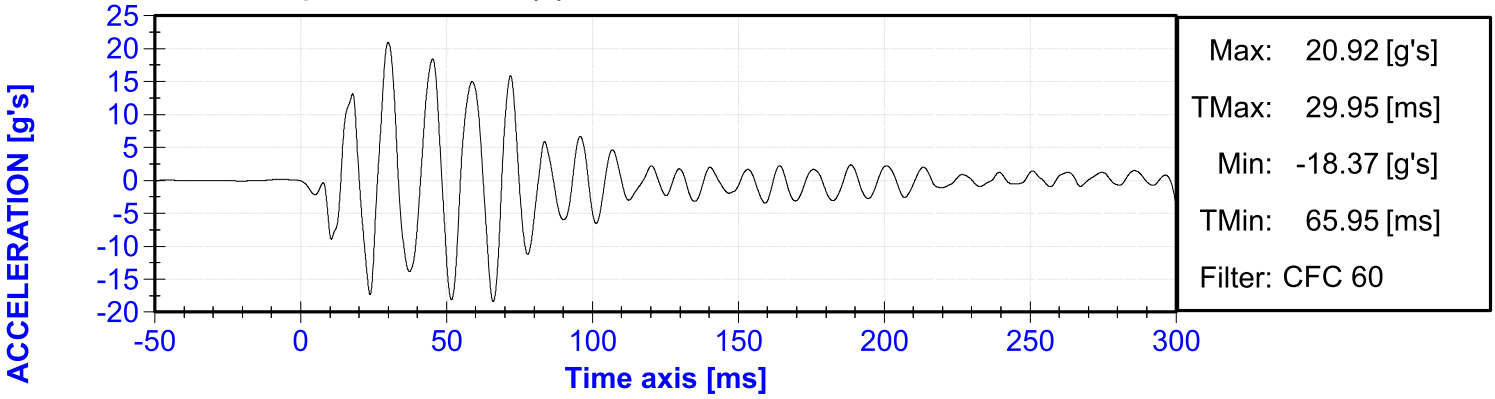
Rear Floorpan Above Axle (Y) Acceleration vs. Time



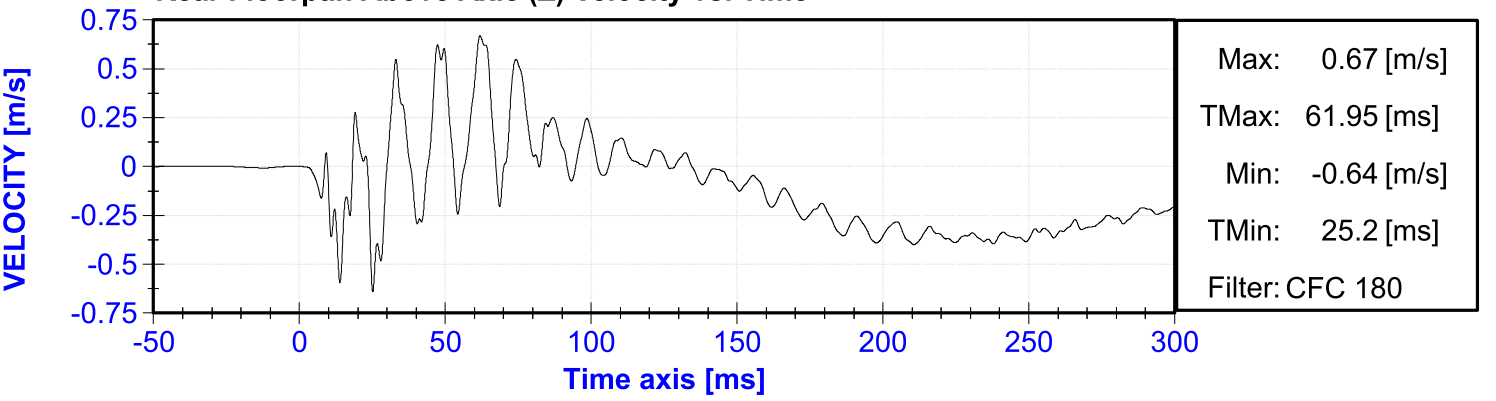
Rear Floorpan Above Axle (Y) Velocity vs. Time



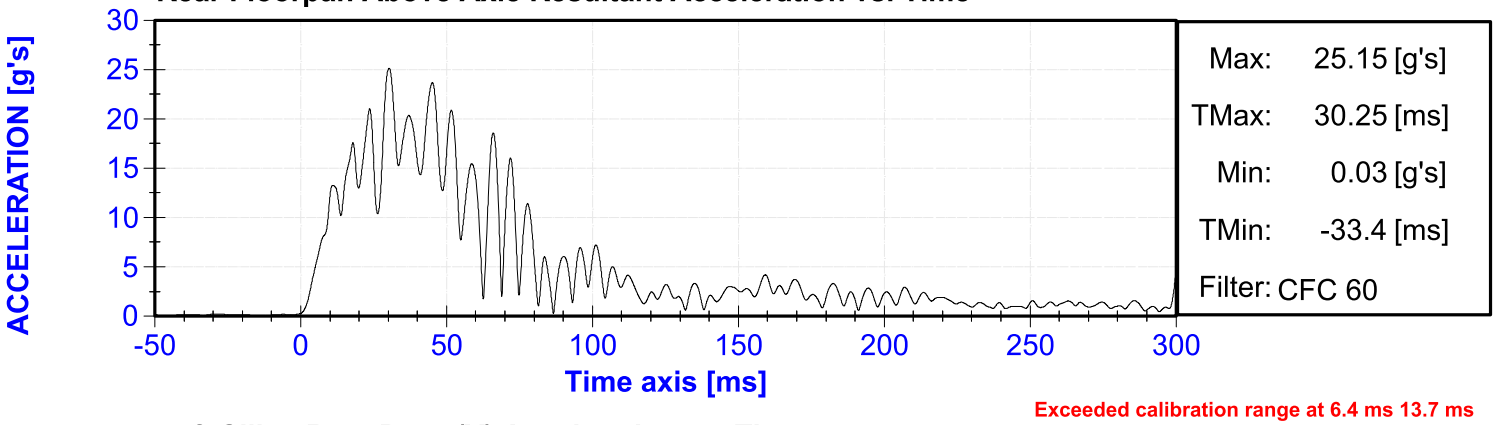
Rear Floorpan Above Axle (Z) Acceleration vs. Time



Rear Floorpan Above Axle (Z) Velocity vs. Time

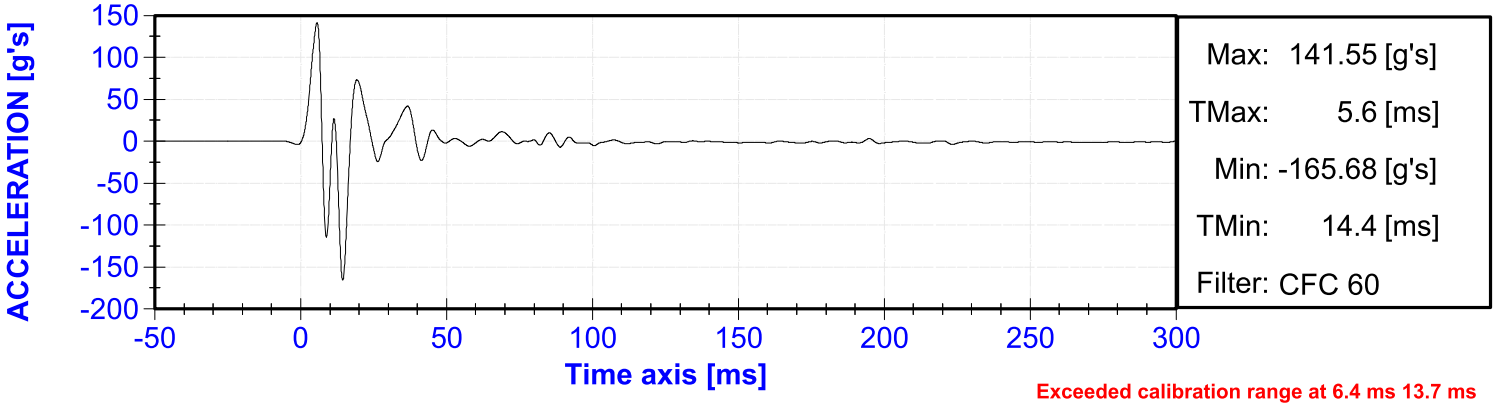


Rear Floorpan Above Axle Resultant Acceleration vs. Time



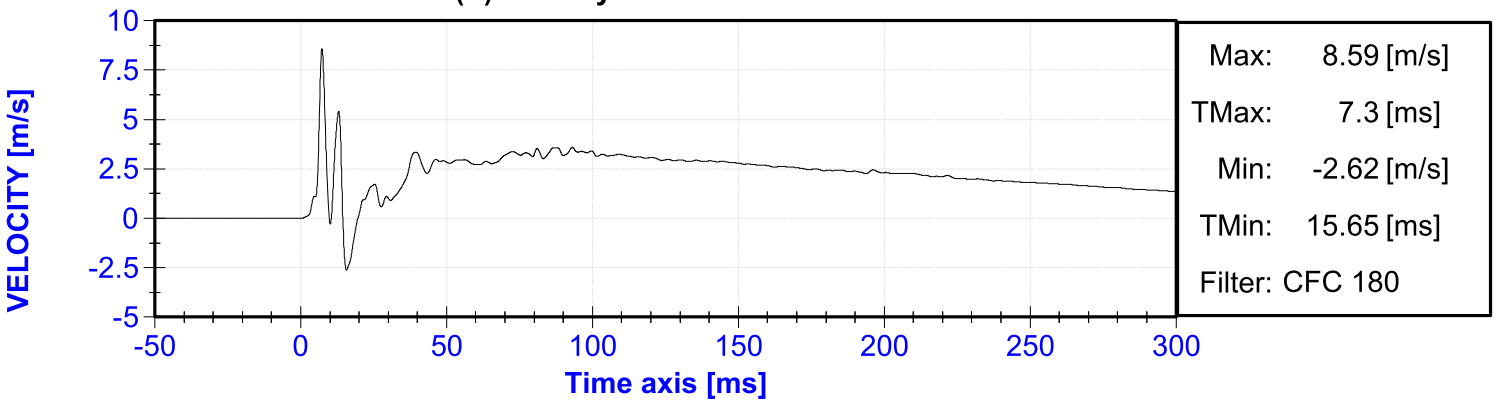
Exceeded calibration range at 6.4 ms 13.7 ms

Left Sill at Rear Door (Y) Acceleration vs. Time

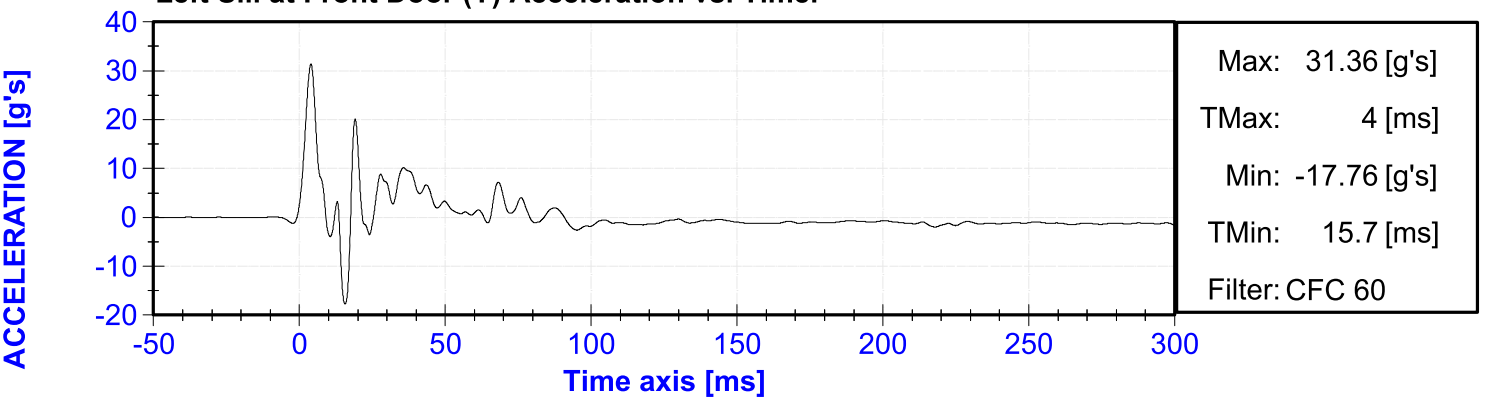


Exceeded calibration range at 6.4 ms 13.7 ms

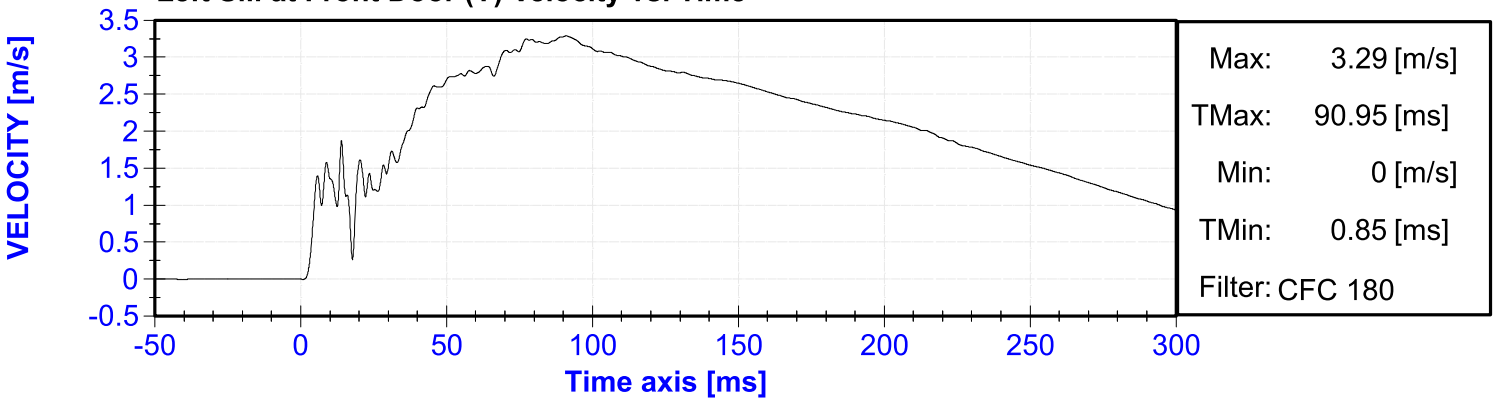
Left Sill at Rear Door (Y) Velocity vs. Time



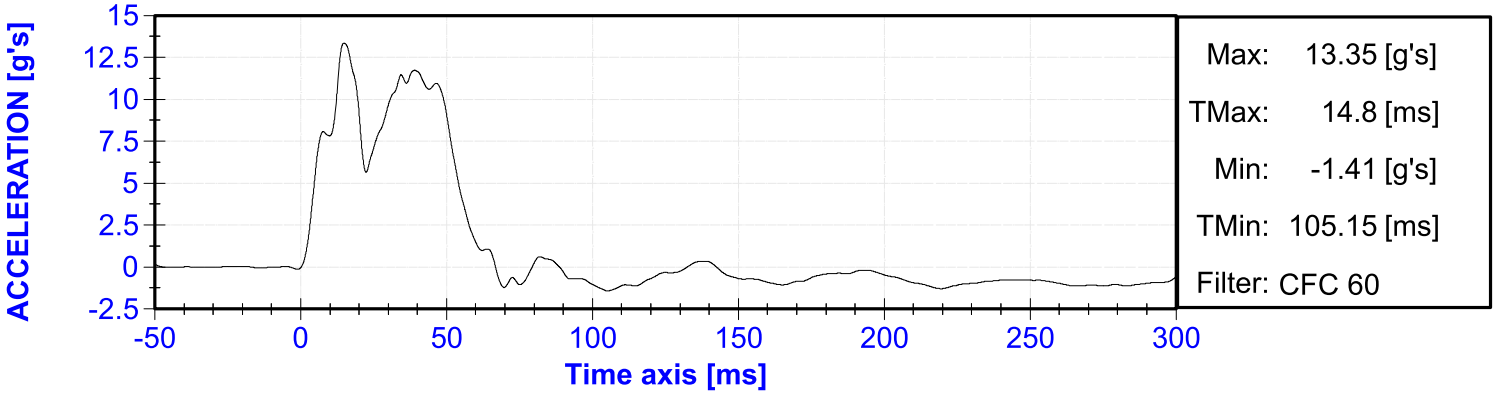
Left Sill at Front Door (Y) Acceleration vs. Time.



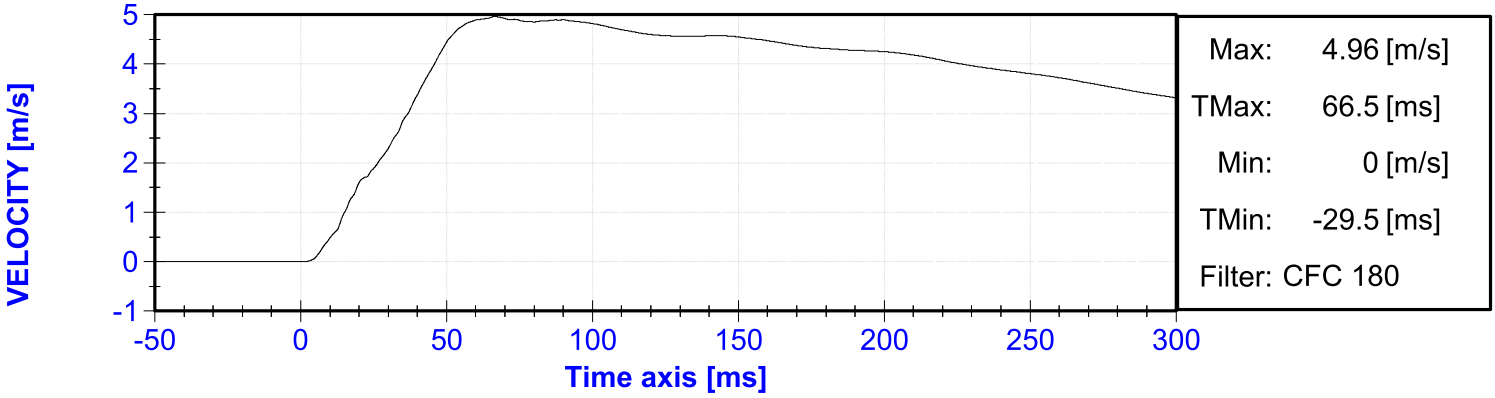
Left Sill at Front Door (Y) Velocity vs. Time



Right Rear Occ. Compartment(Y) Acceleration vs. Time

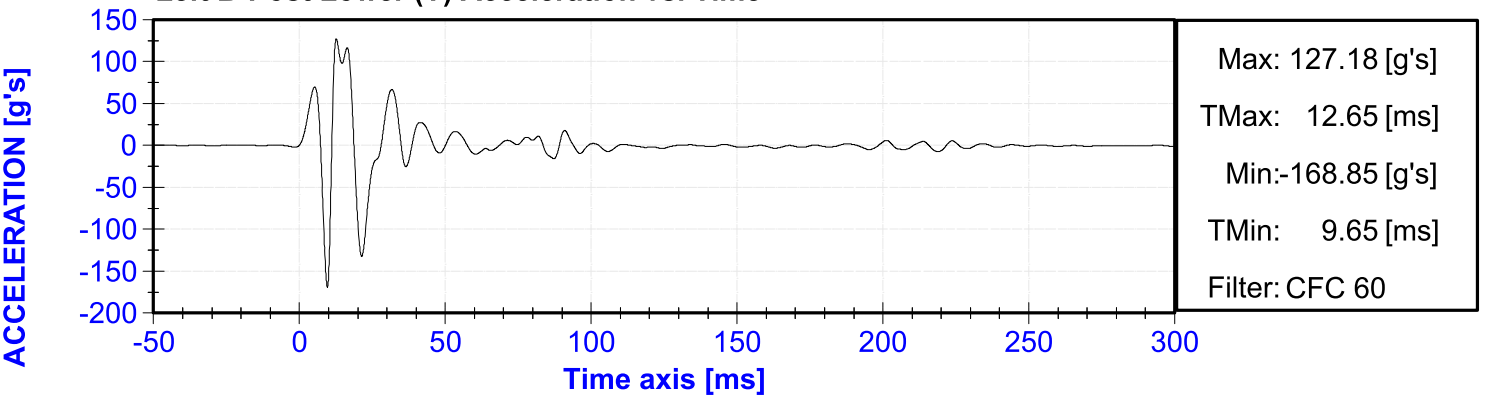


Right Rear Occ. Compartment(Y) Velocity vs. Time



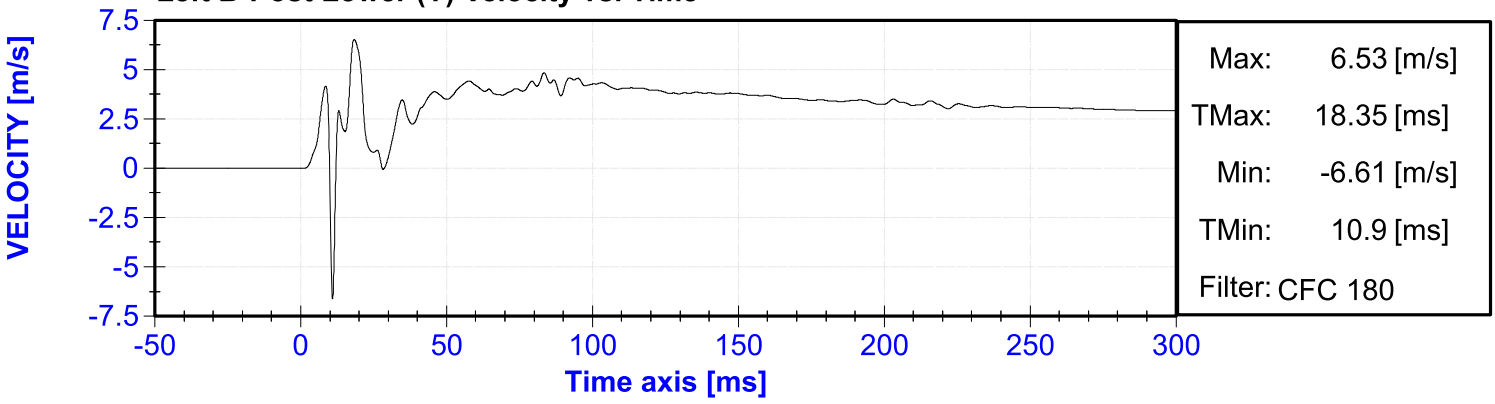
Exceeded calibration range and saturated at 9.6 ms

Left B-Post Lower (Y) Acceleration vs. Time

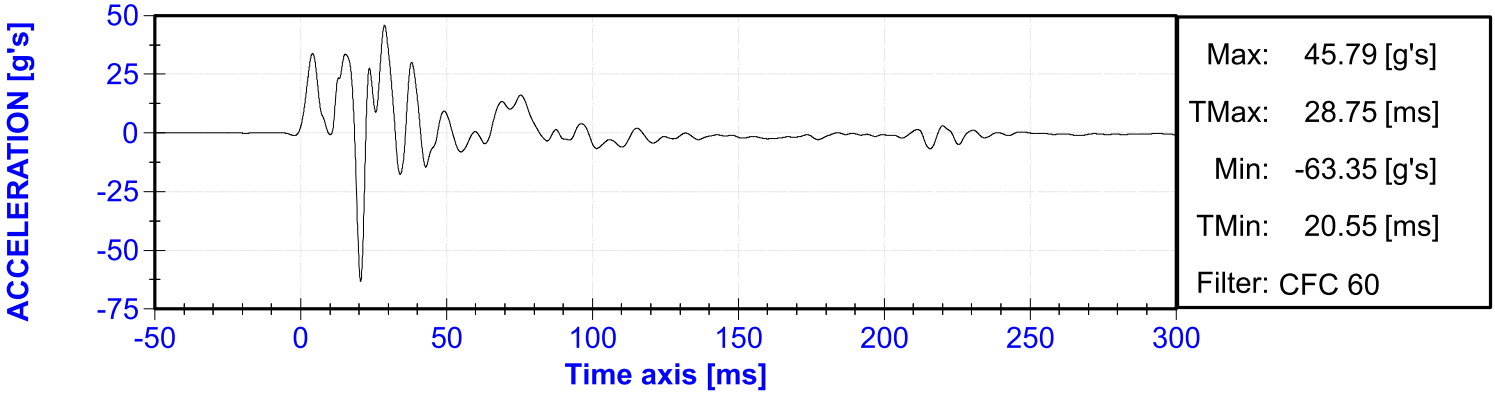


Exceeded calibration range and saturated at 9.6 ms

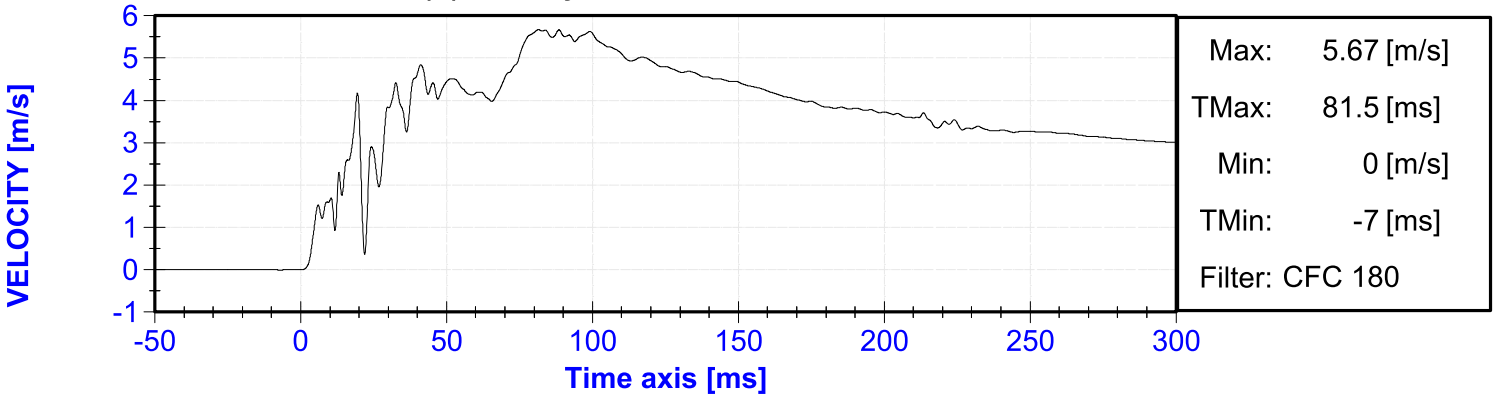
Left B-Post Lower (Y) Velocity vs. Time



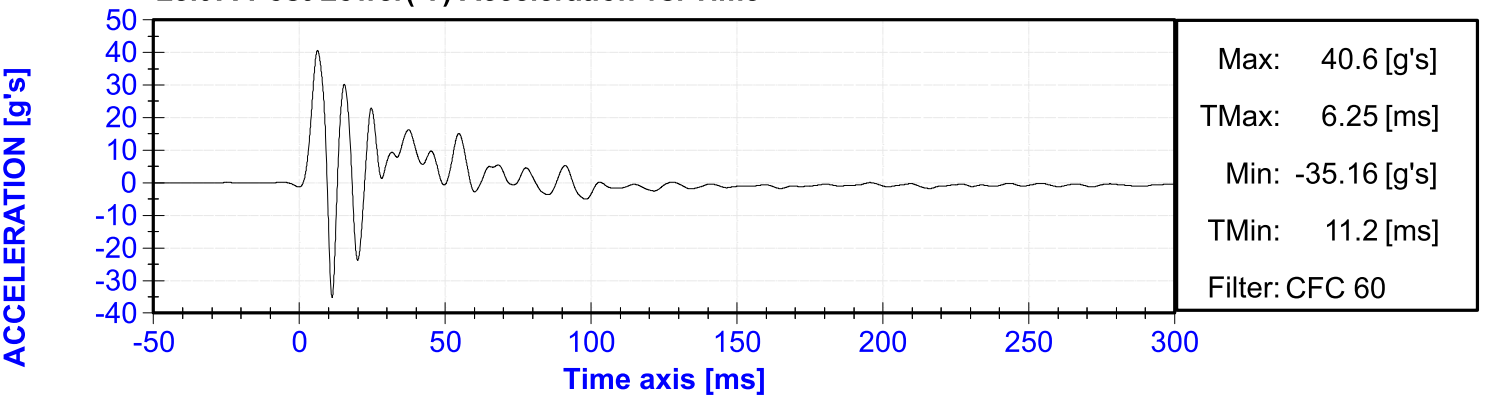
Left B-Post Middle (Y) Acceleration vs. Time



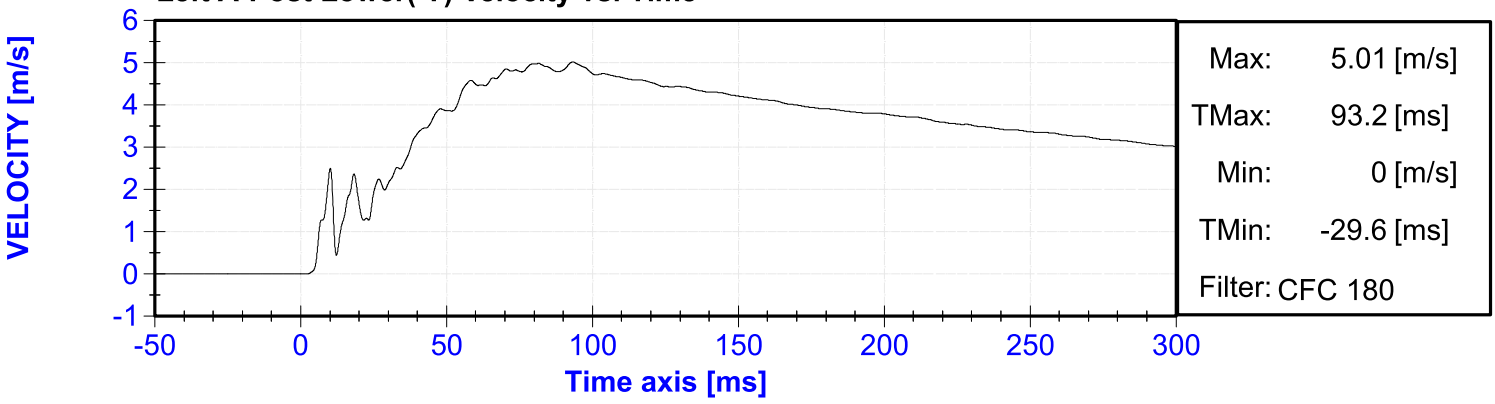
Left B-Post Middle (Y) Velocity vs. Time



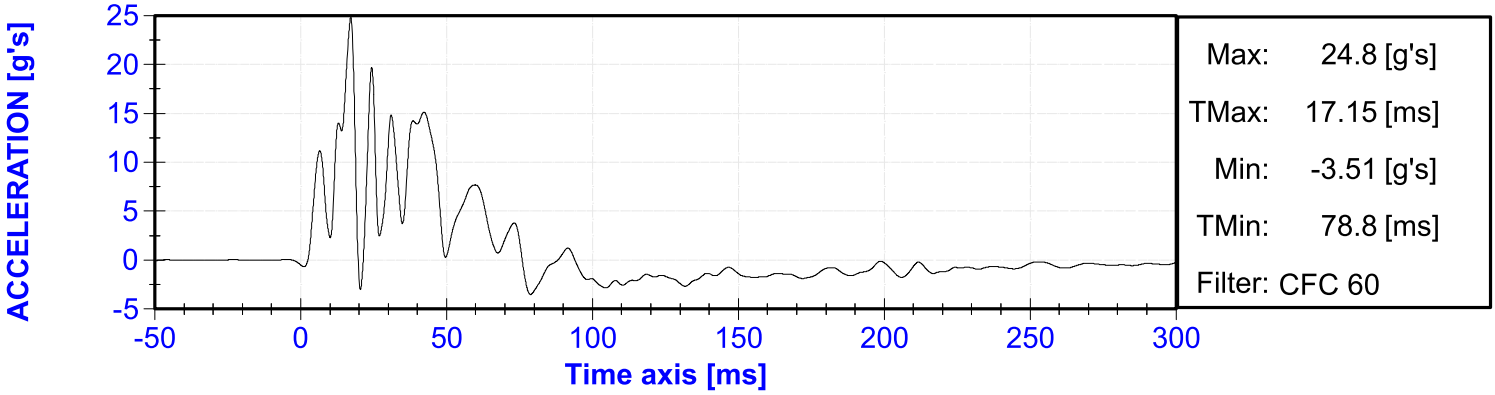
Left A-Post Lower(Y) Acceleration vs. Time



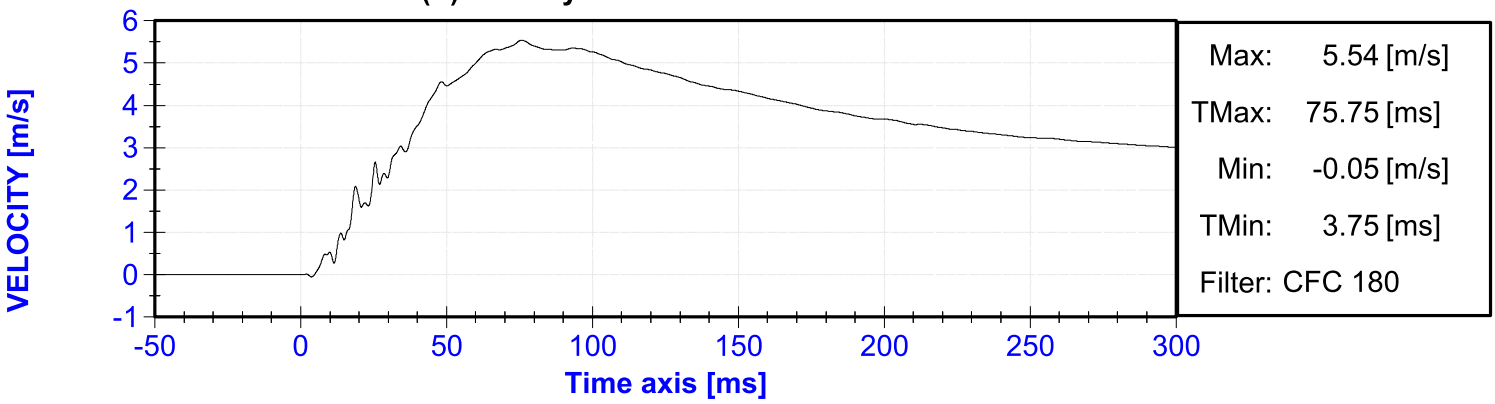
Left A-Post Lower(Y) Velocity vs. Time



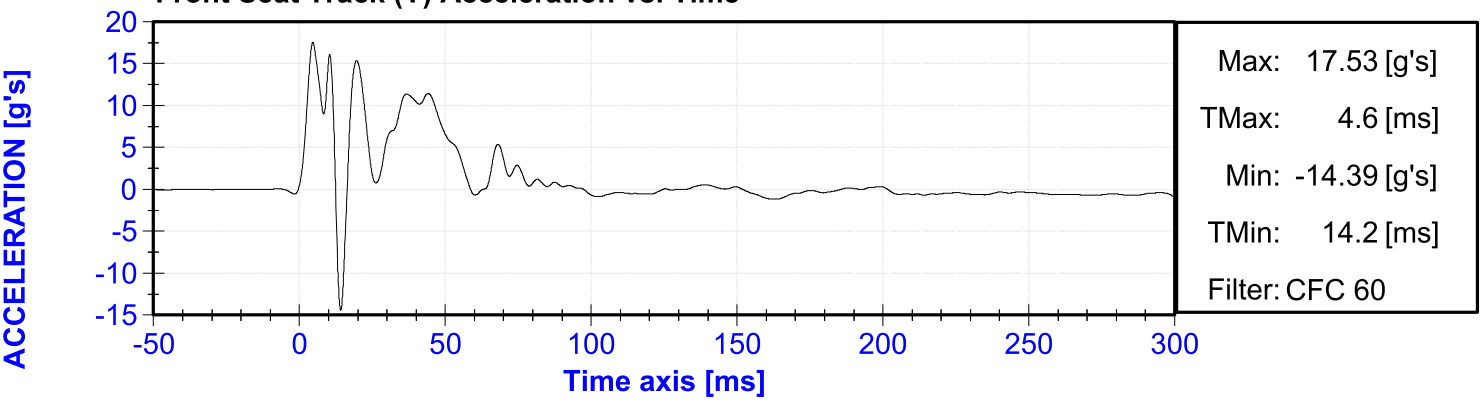
Left A-Post Middle (Y) Acceleration vs. Time



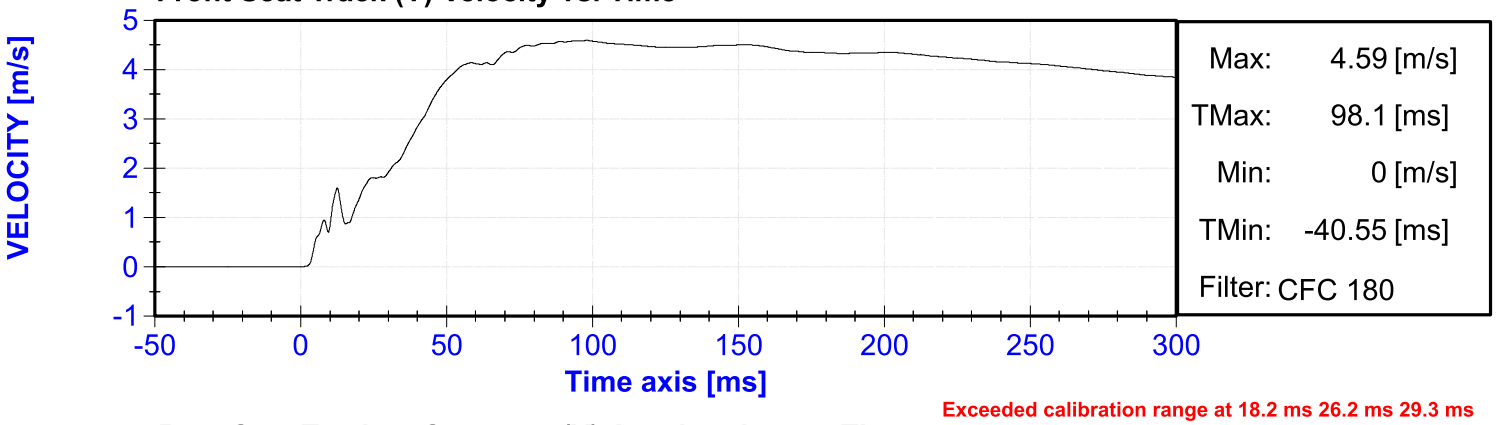
Left A-Post Middle (Y) Velocity vs. Time



Front Seat Track (Y) Acceleration vs. Time

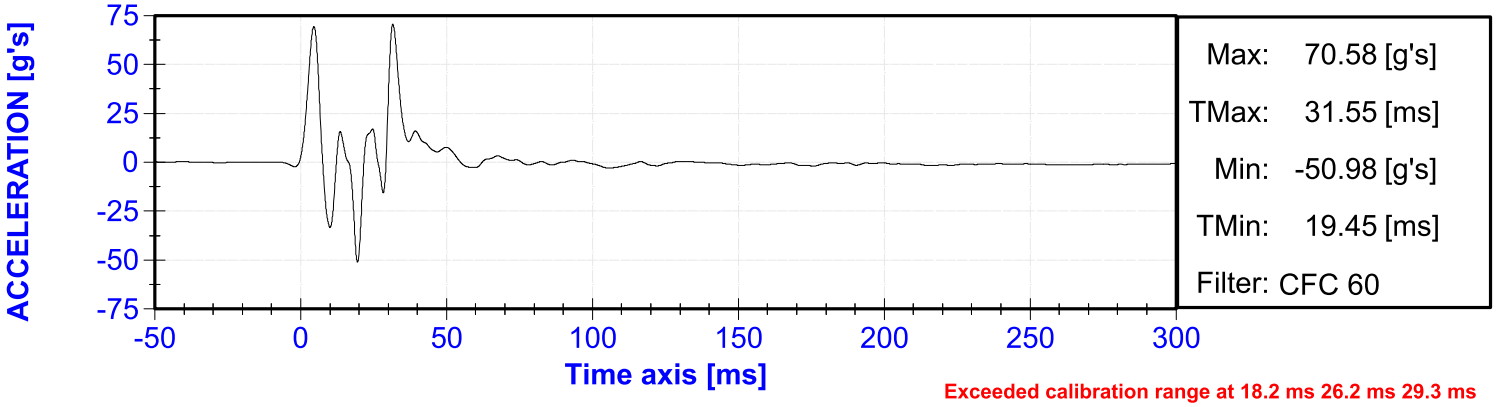


Front Seat Track (Y) Velocity vs. Time



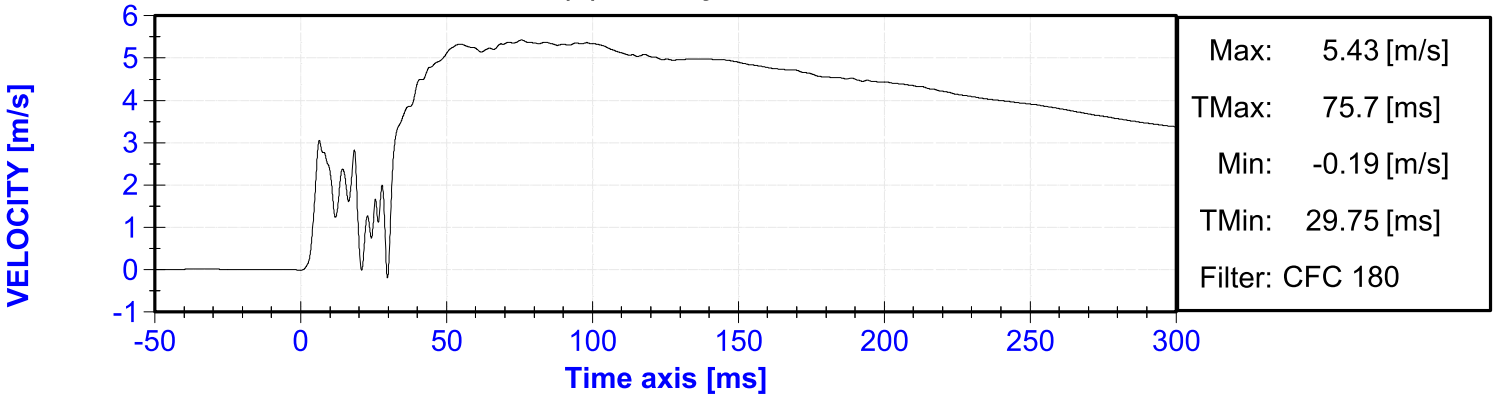
Exceeded calibration range at 18.2 ms 26.2 ms 29.3 ms

Rear Seat Track or Structure (Y) Acceleration vs. Time

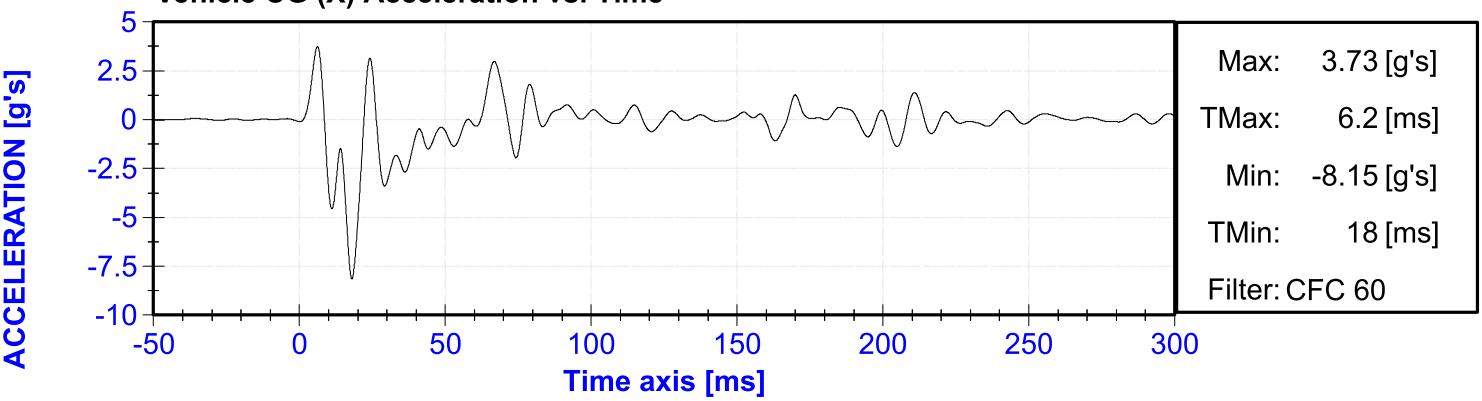


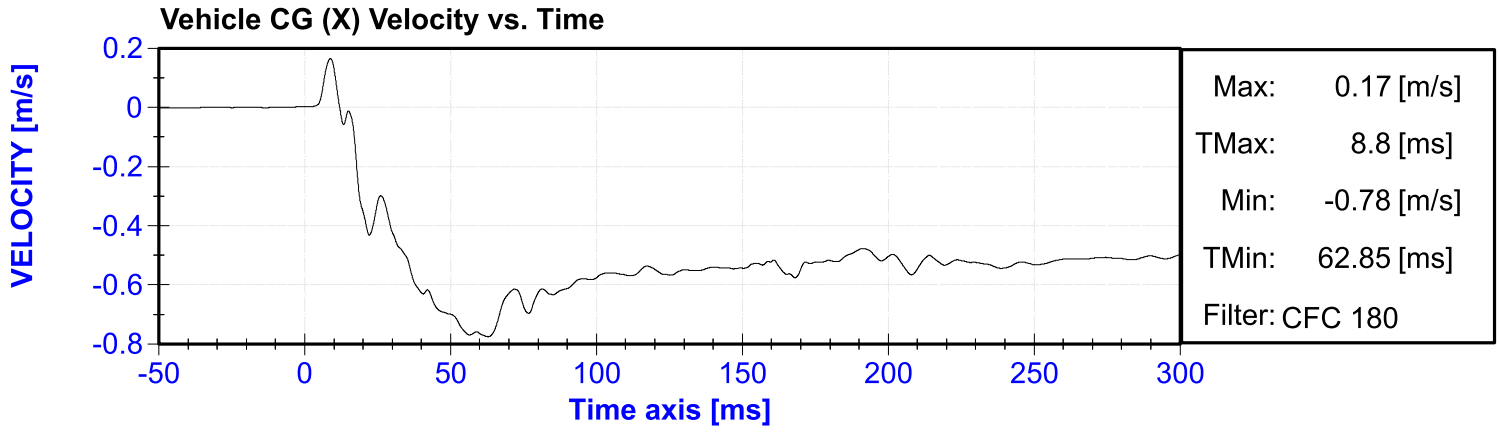
Exceeded calibration range at 18.2 ms 26.2 ms 29.3 ms

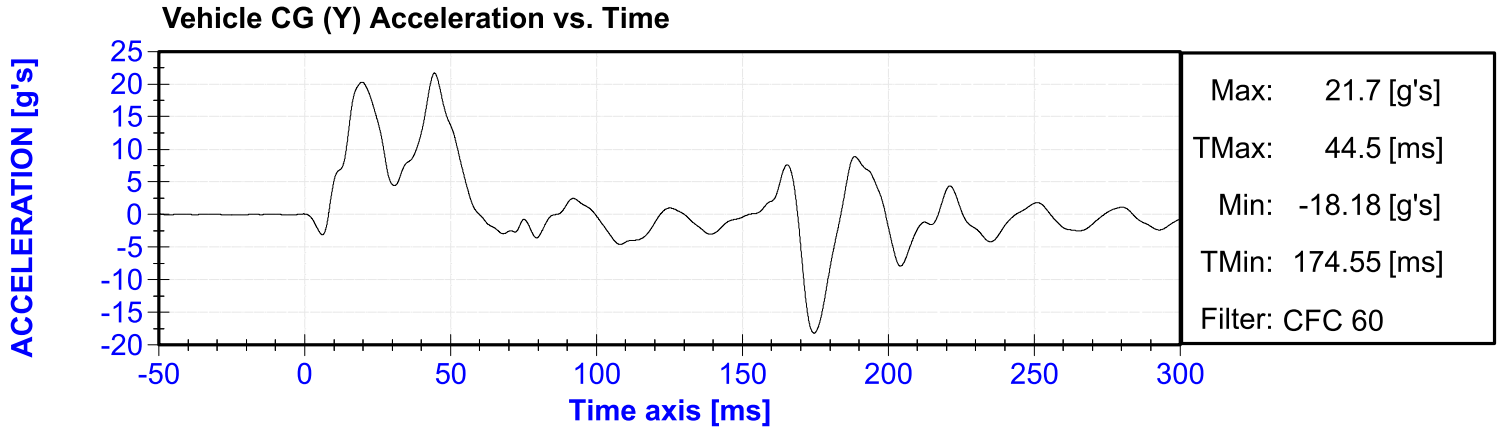
Rear Seat Track or Structure (Y) Velocity vs. Time

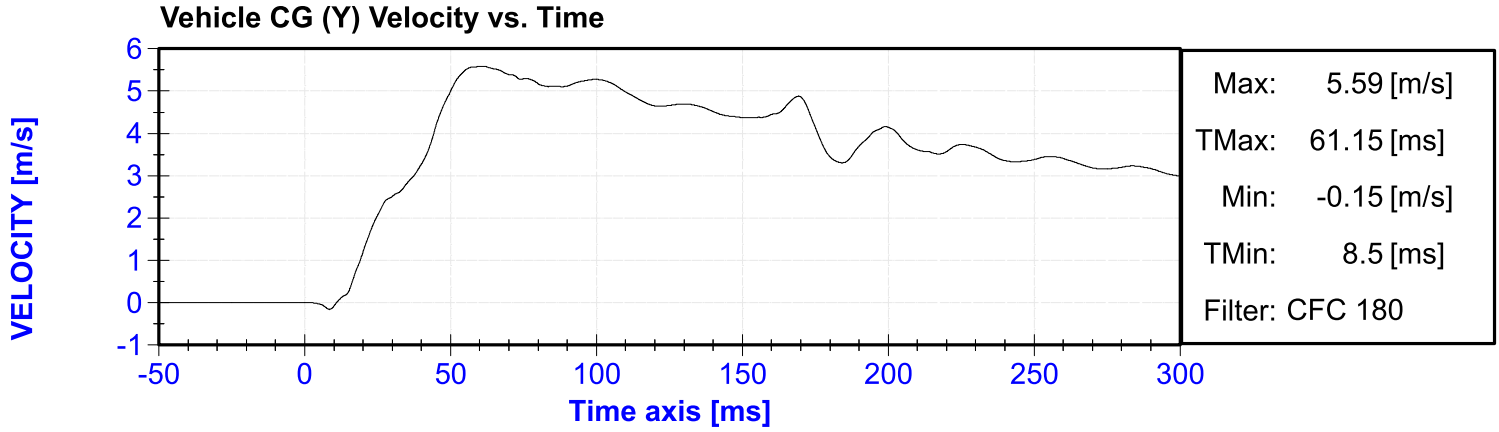


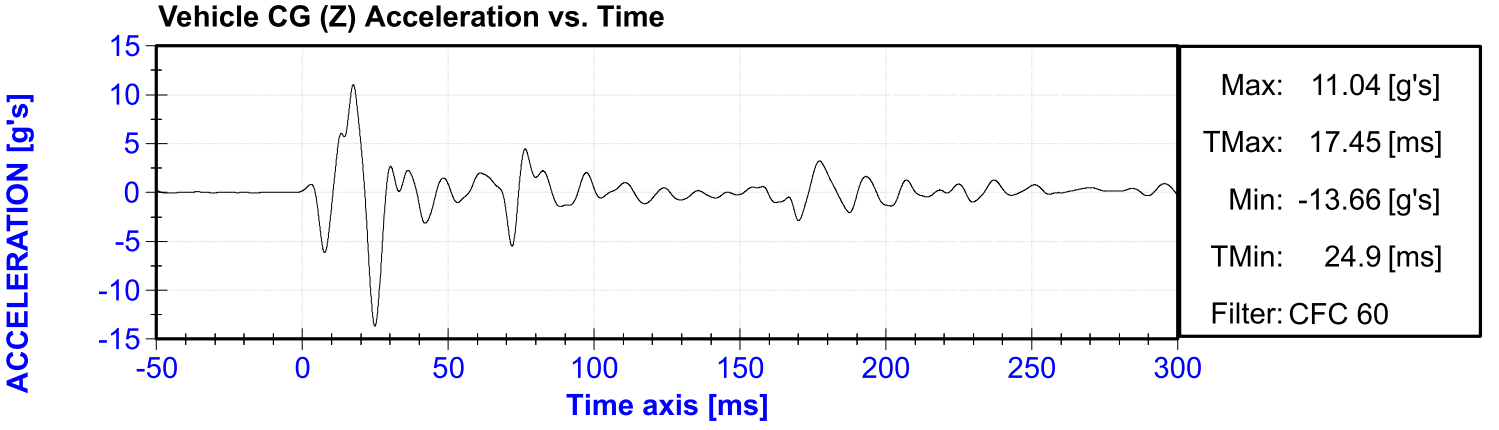
Vehicle CG (X) Acceleration vs. Time



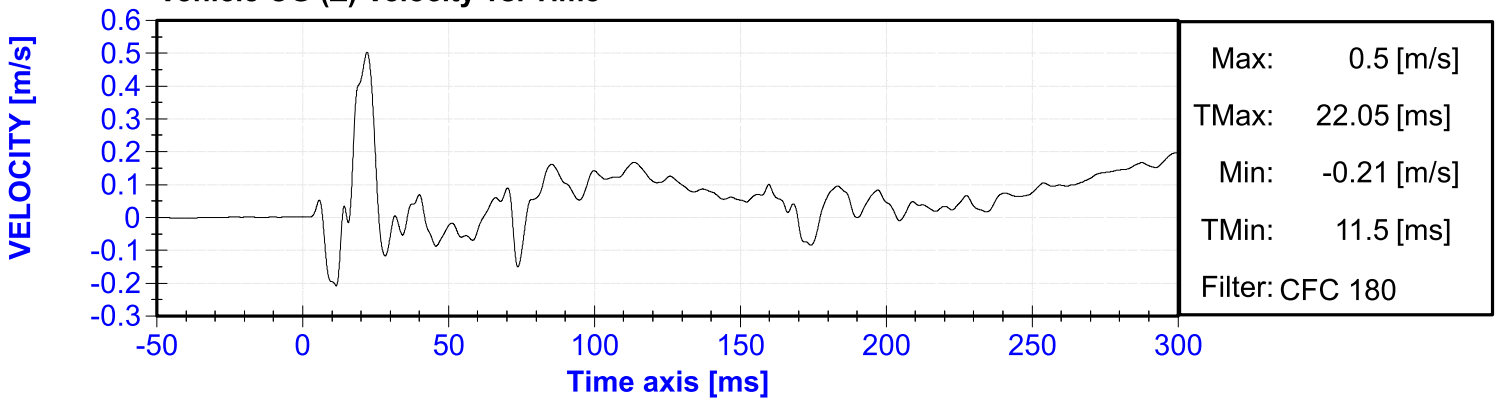

Vehicle CG (X) Velocity vs. Time
VELOCITY [m/s]
0.2
0
-0.2
-0.4
-0.6
-0.8
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 0.17 [m/s]
TMax: 8.8 [ms]
Min: -0.78 [m/s]
TMin: 62.85 [ms]
Filter: CFC 180


Vehicle CG (Y) Acceleration vs. Time
ACCELERATION [g's]
25
20
15
10
5
0
-5
-10
-15
-20
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 21.7 [g's]
TMax: 44.5 [ms]
Min: -18.18 [g's]
TMin: 174.55 [ms]
Filter: CFC 60

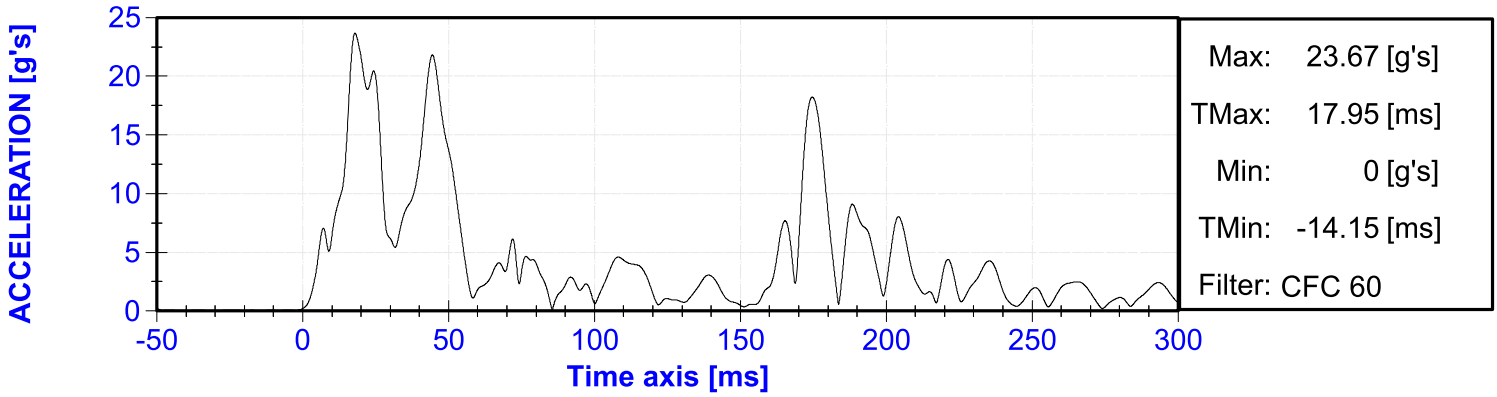

Vehicle CG (Y) Velocity vs. Time
VELOCITY [m/s]
6
5
4
3
2
1
0
-1
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 5.59 [m/s]
TMax: 61.15 [ms]
Min: -0.15 [m/s]
TMin: 8.5 [ms]
Filter: CFC 180


Vehicle CG (Z) Acceleration vs. Time
ACCELERATION [g's]
15
10
5
0
-5
-10
-15
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 11.04 [g's]
TMax: 17.45 [ms]
Min: -13.66 [g's]
TMin: 24.9 [ms]
Filter: CFC 60

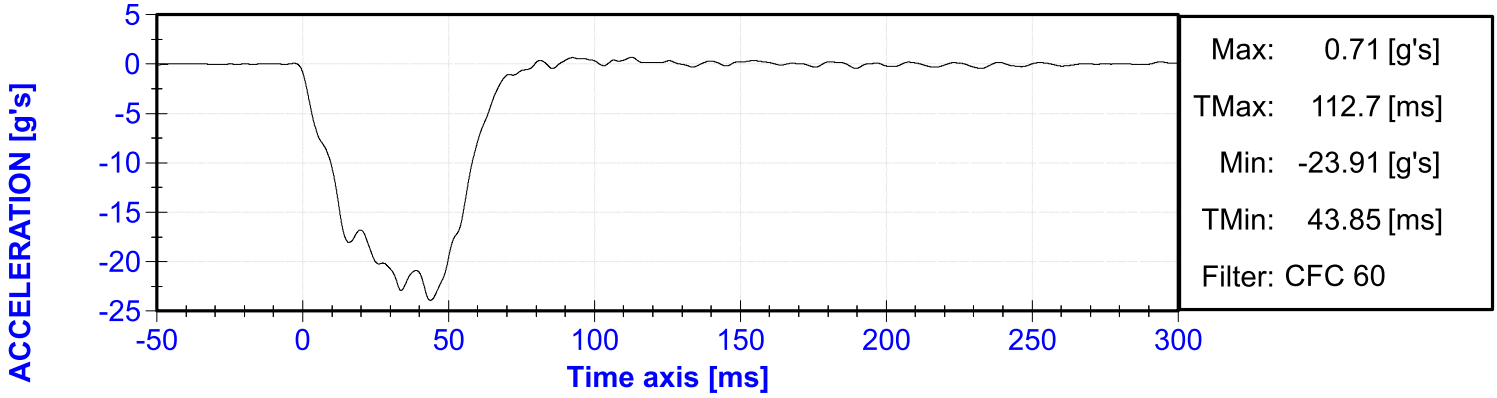
Vehicle CG (Z) Velocity vs. Time



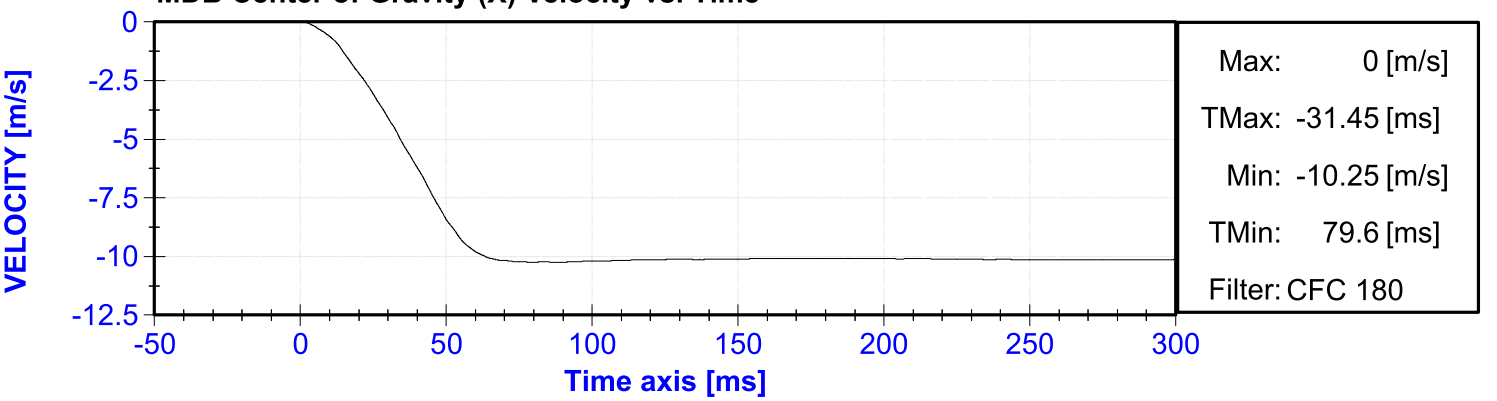
Vehicle CG Resultant Acceleration vs. Time

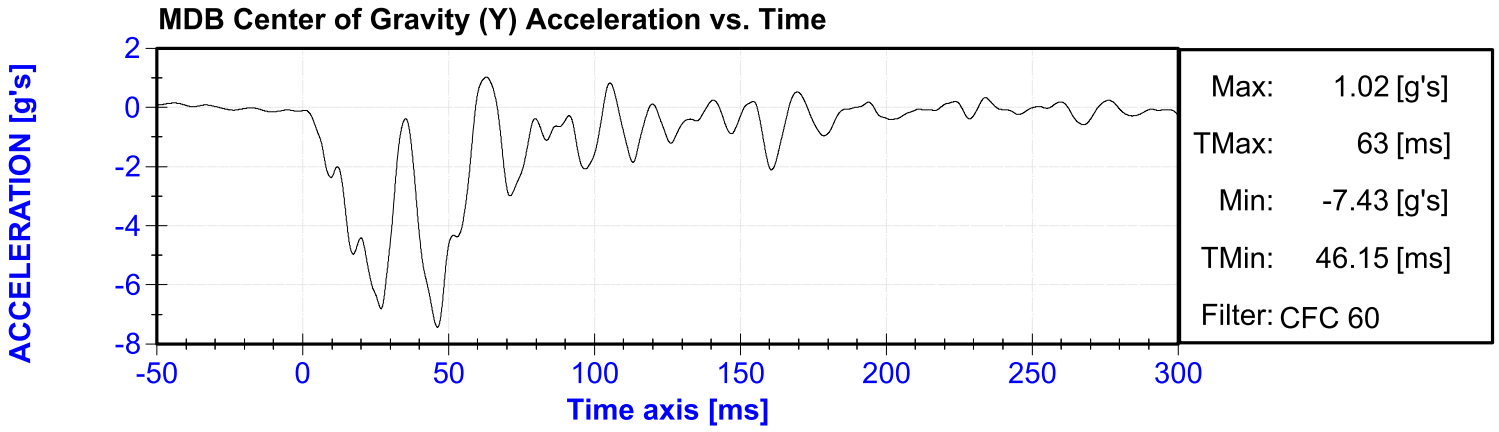


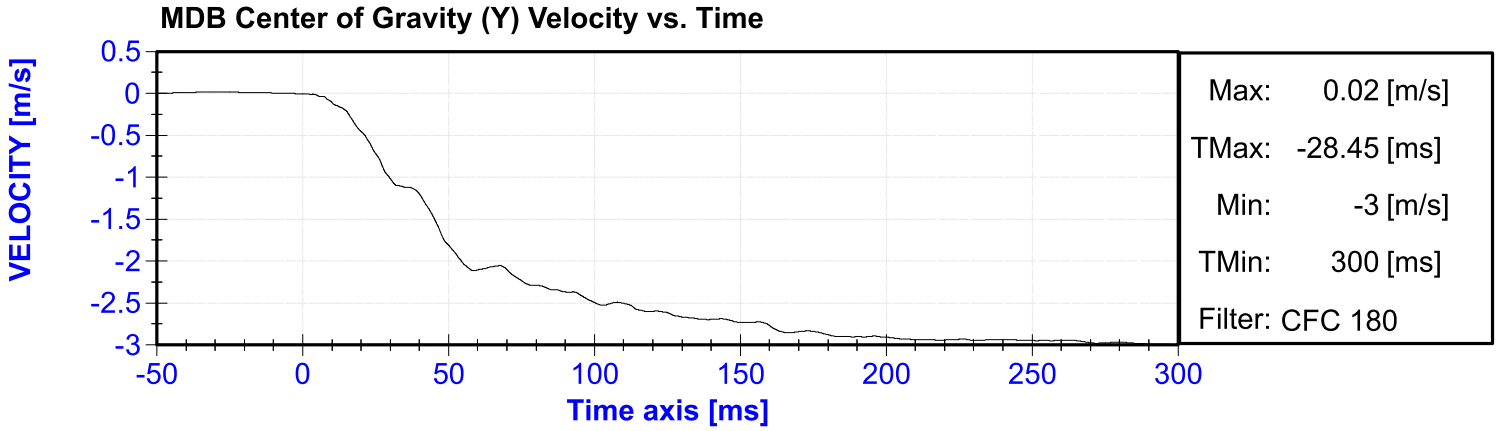
MDB Center of Gravity (X) Acceleration vs. Time

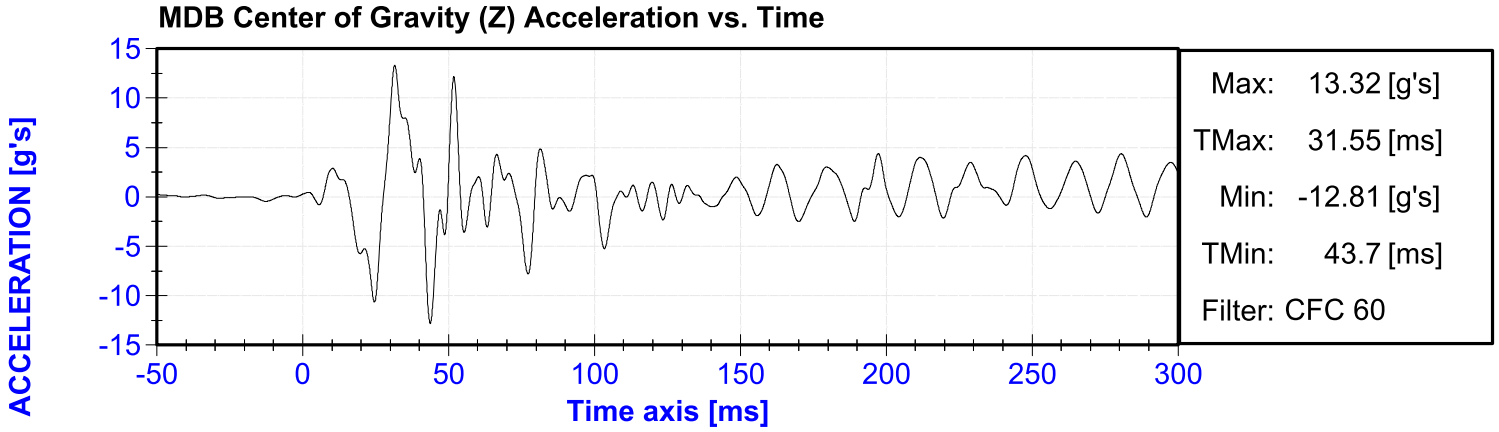


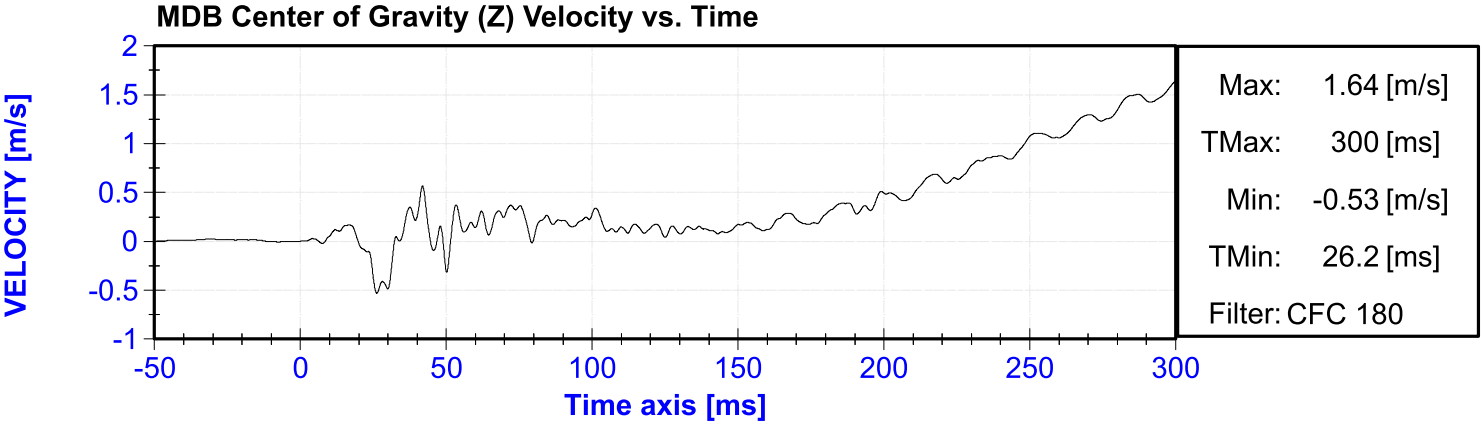
MDB Center of Gravity (X) Velocity vs. Time

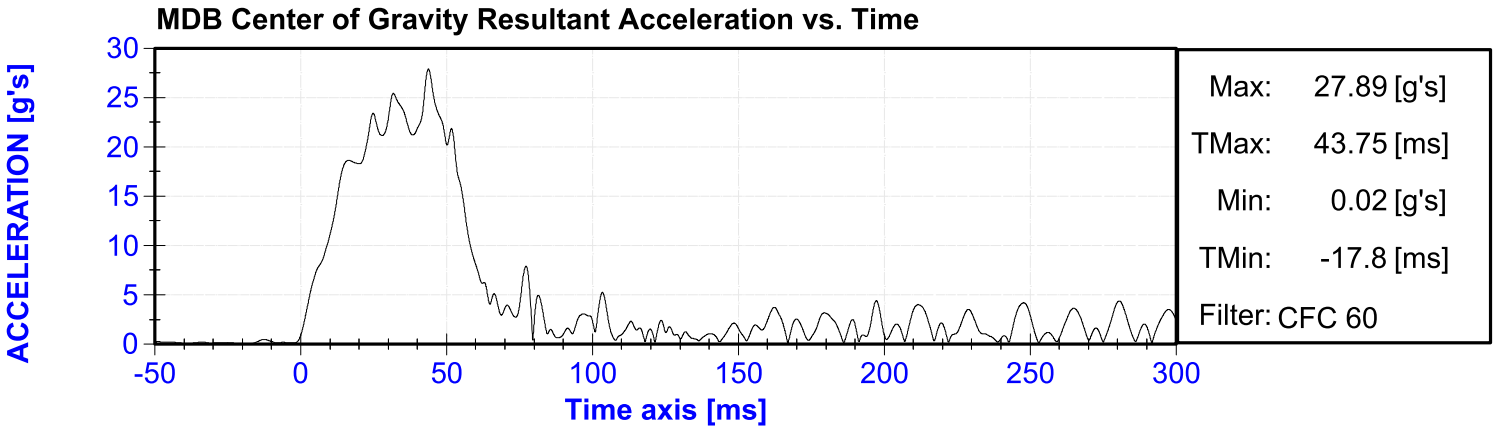


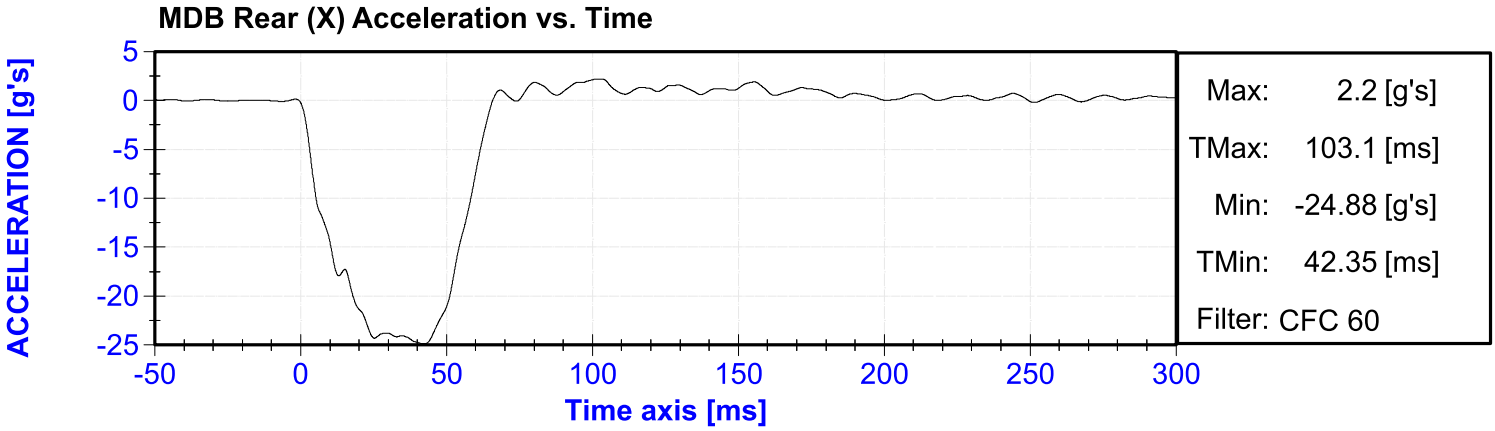

MDB Center of Gravity (Y) Acceleration vs. Time
ACCELERATION [g's]
Time axis [ms]
Max: 1.02 [g's]
TMax: 63 [ms]
Min: -7.43 [g's]
TMin: 46.15 [ms]
Filter: CFC 60

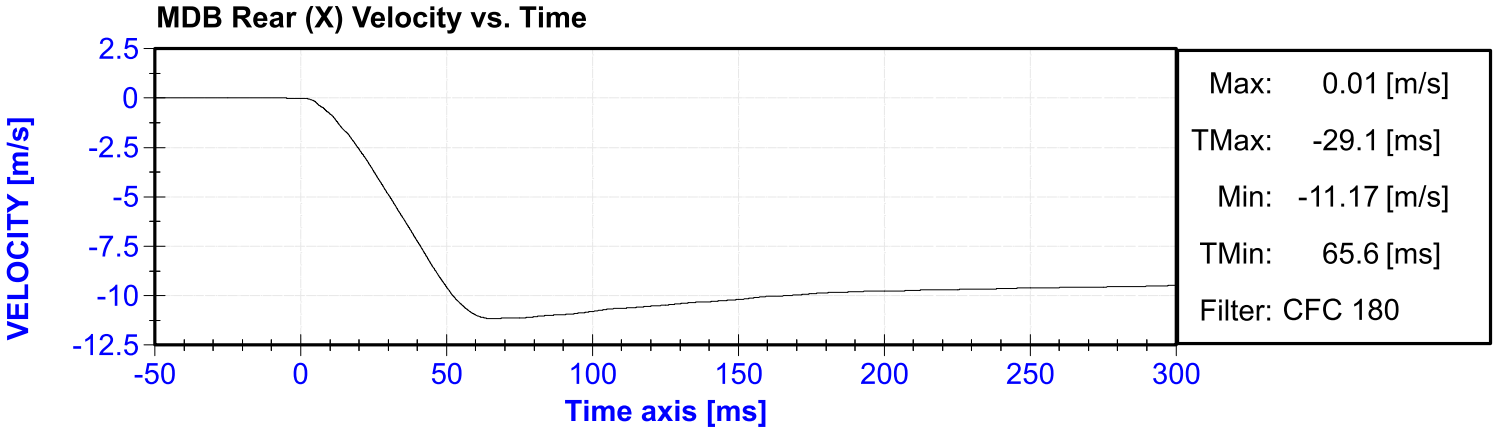

MDB Center of Gravity (Y) Velocity vs. Time
VELOCITY [m/s]
Time axis [ms]
Max: 0.02 [m/s]
TMax: -28.45 [ms]
Min: -3 [m/s]
TMin: 300 [ms]
Filter: CFC 180

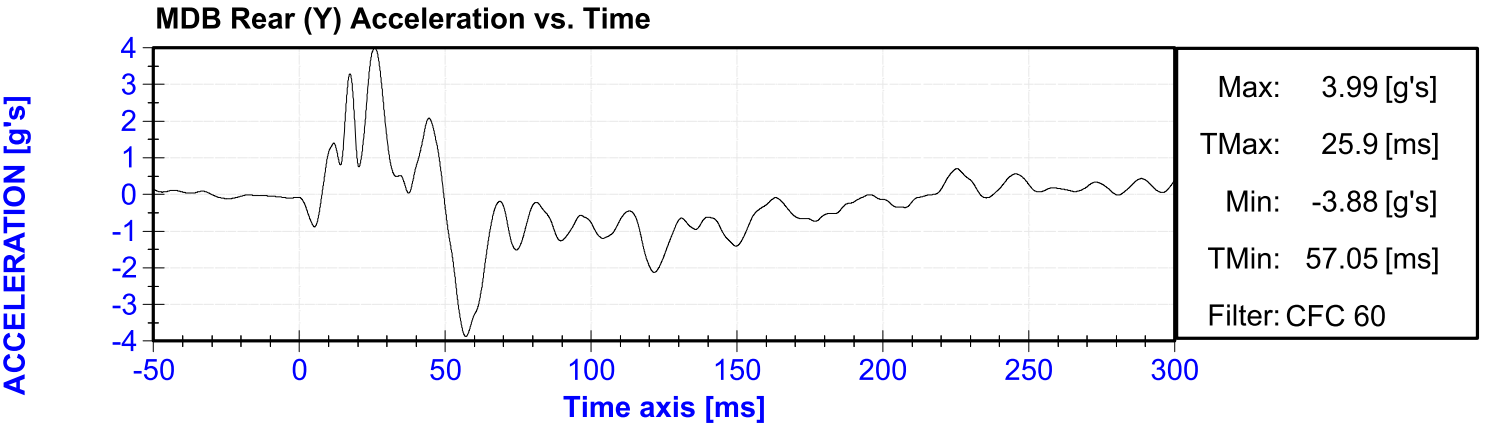

MDB Center of Gravity (Z) Acceleration vs. Time
ACCELERATION [g's]
Time axis [ms]
Max: 13.32 [g's]
TMax: 31.55 [ms]
Min: -12.81 [g's]
TMin: 43.7 [ms]
Filter: CFC 60

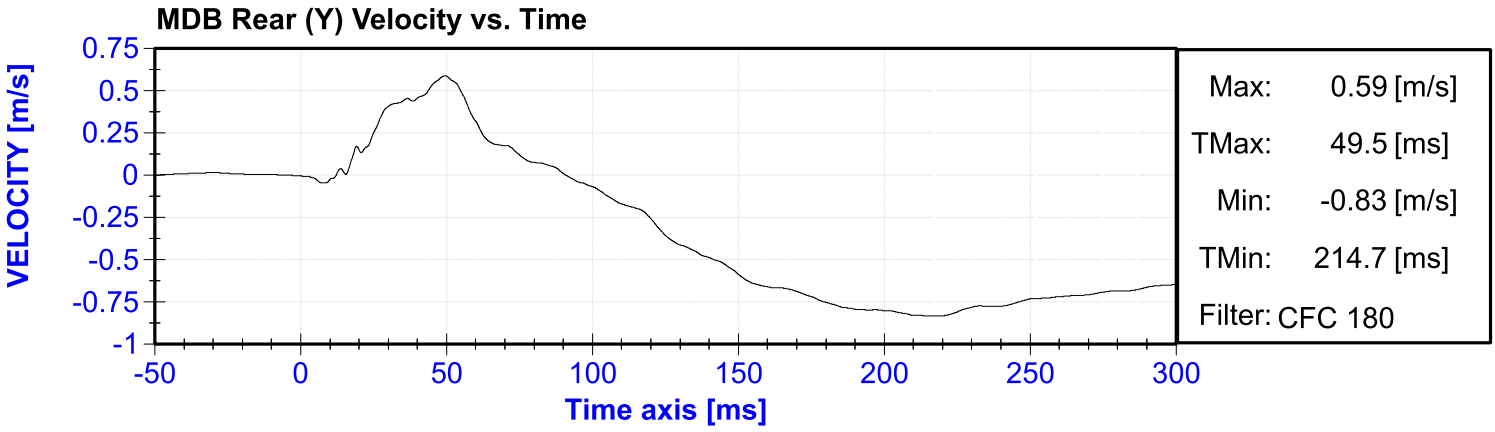

MDB Center of Gravity (Z) Velocity vs. Time
VELOCITY [m/s]
Time axis [ms]
Max: 1.64 [m/s]
TMax: 300 [ms]
Min: -0.53 [m/s]
TMin: 26.2 [ms]
Filter: CFC 180


MDB Center of Gravity Resultant Acceleration vs. Time
ACCELERATION [g's]
30
25
20
15
10
5
0
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 27.89 [g's]
TMax: 43.75 [ms]
Min: 0.02 [g's]
TMin: -17.8 [ms]
Filter: CFC 60


MDB Rear (X) Acceleration vs. Time
ACCELERATION [g's]
5
0
-5
-10
-15
-20
-25
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 2.2 [g's]
TMax: 103.1 [ms]
Min: -24.88 [g's]
TMin: 42.35 [ms]
Filter: CFC 60


MDB Rear (X) Velocity vs. Time
VELOCITY [m/s]
2.5
0
-2.5
-5
-7.5
-10
-12.5
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 0.01 [m/s]
TMax: -29.1 [ms]
Min: -11.17 [m/s]
TMin: 65.6 [ms]
Filter: CFC 180


MDB Rear (Y) Acceleration vs. Time
ACCELERATION [g's]
4
3
2
1
0
-1
-2
-3
-4
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 3.99 [g's]
TMax: 25.9 [ms]
Min: -3.88 [g's]
TMin: 57.05 [ms]
Filter: CFC 60


MDB Rear (Y) Velocity vs. Time
VELOCITY [m/s]
0.75
0.5
0.25
0
-0.25
-0.5
-0.75
-1
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 0.59 [m/s]
TMax: 49.5 [ms]
Min: -0.83 [m/s]
TMin: 214.7 [ms]
Filter: CFC 180

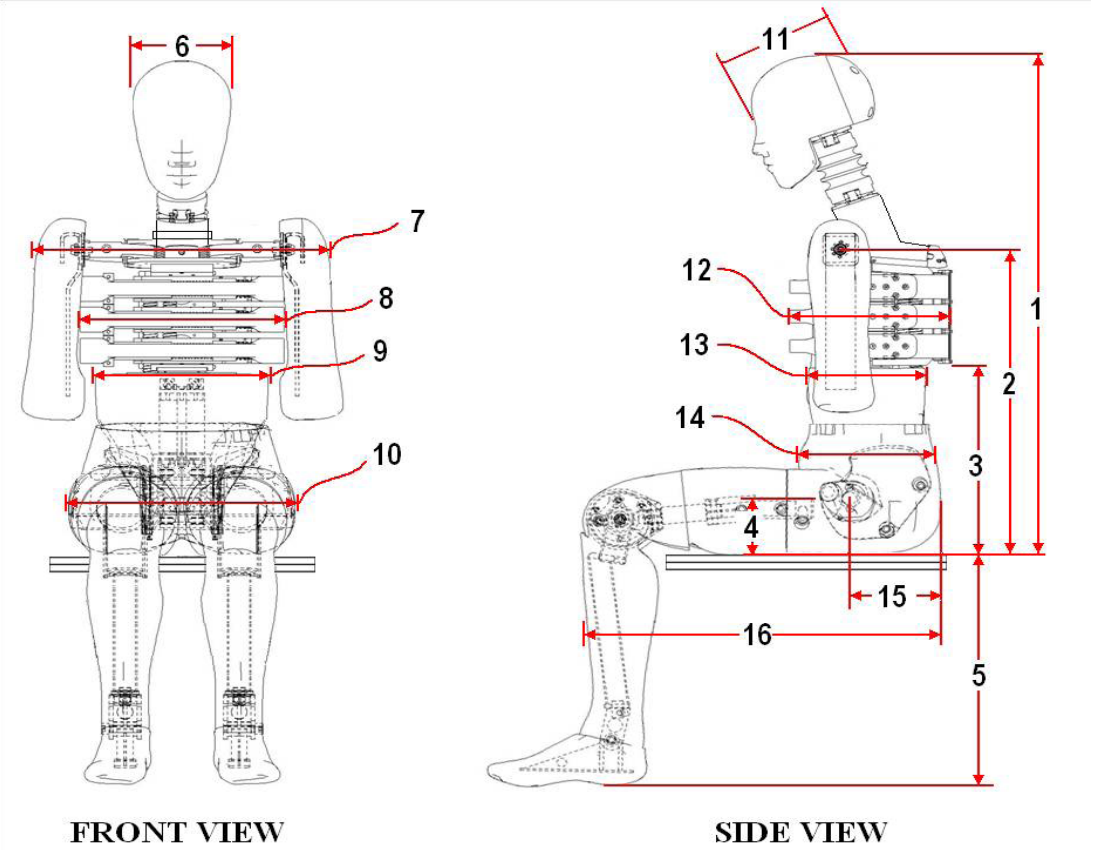
APPENDIX V

PRE-TEST
ES-2re PERFORMANCE CALIBRATION TEST DATA

External Measurements - EuroSID-2re

Technician: J. Rios Date: 1/29/2025

Dummy Serial Number: D037



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	911	Pass
2	Seat to Shoulder Joint	558	572	563	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	354	Pass
4	Seat to Hip Joint (center of bolt)	97	103	100	Pass
5	Sole to Seat, Sitting	333	451	424	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	470	Pass
8	Thorax Width	322	332	331	Pass
9	Abdomen Width	273	287	279	Pass
10	Pelvis Lap Width	359	373	362	Pass
11	Head Depth	196	206	201	Pass
12	Thorax Depth	262	272	267	Pass
13	Abdomen Depth	194	204	197	Pass
14	Pelvis Depth	235	245	240	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	155	Pass
16	Back of Buttocks to Front Knee	597	615	603	Pass

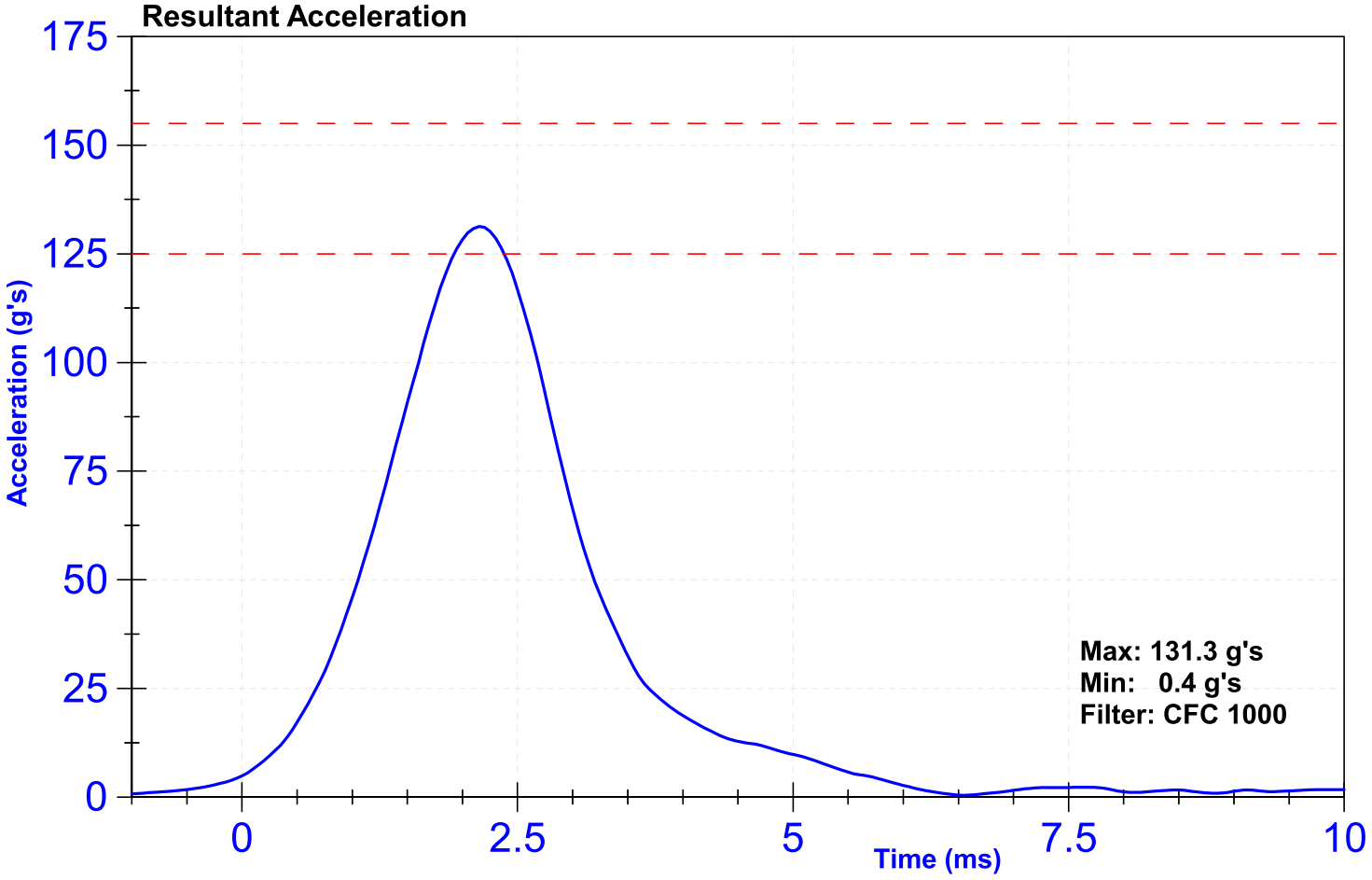
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

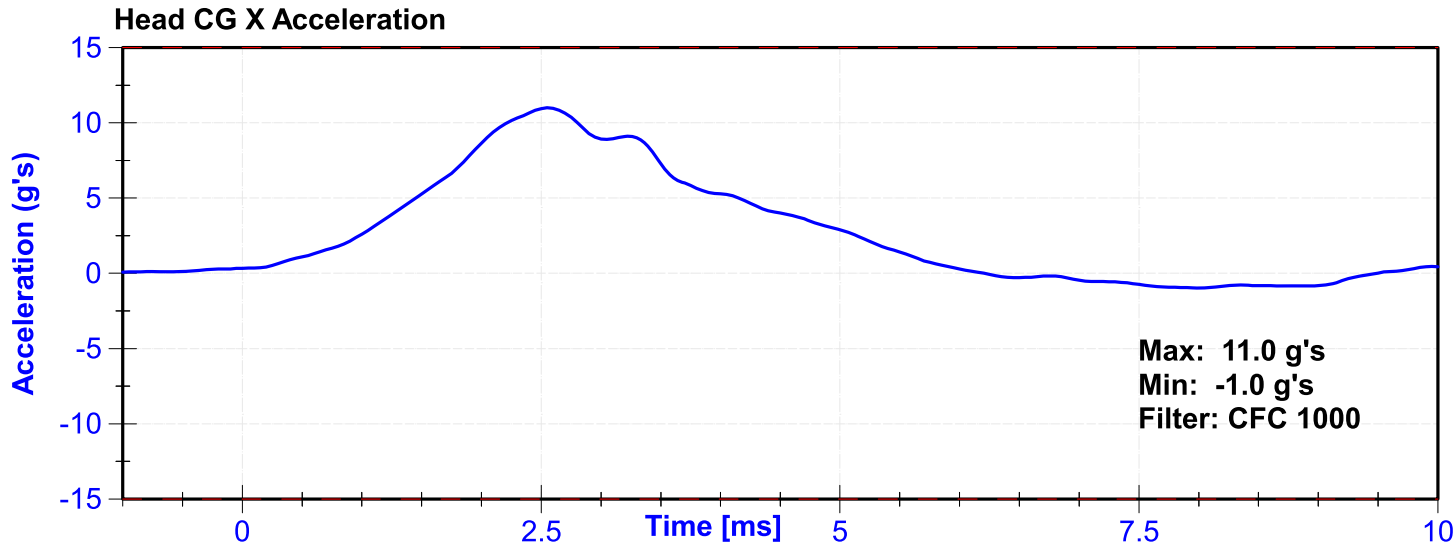
Results

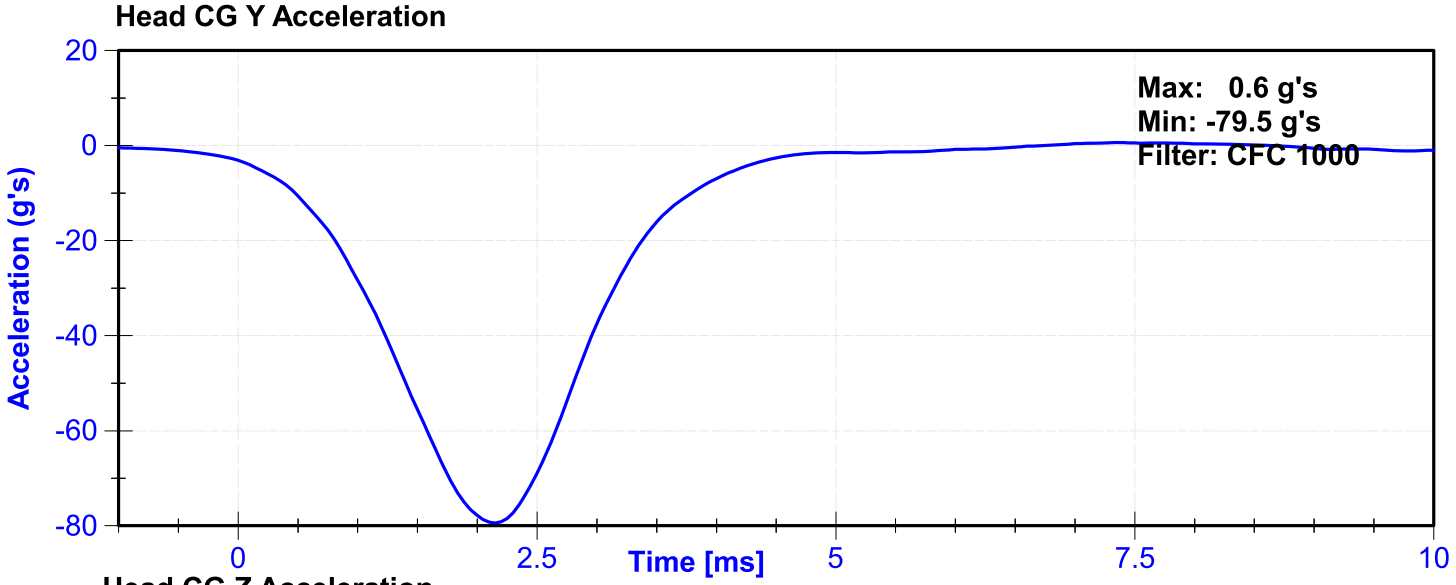
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Resultant Acceleration	125	155	g's	131.3	Pass
Oscillation	0	15	%	1.92	Pass
Fore-Aft Acceleration	-15	15	g's	11.0	Pass

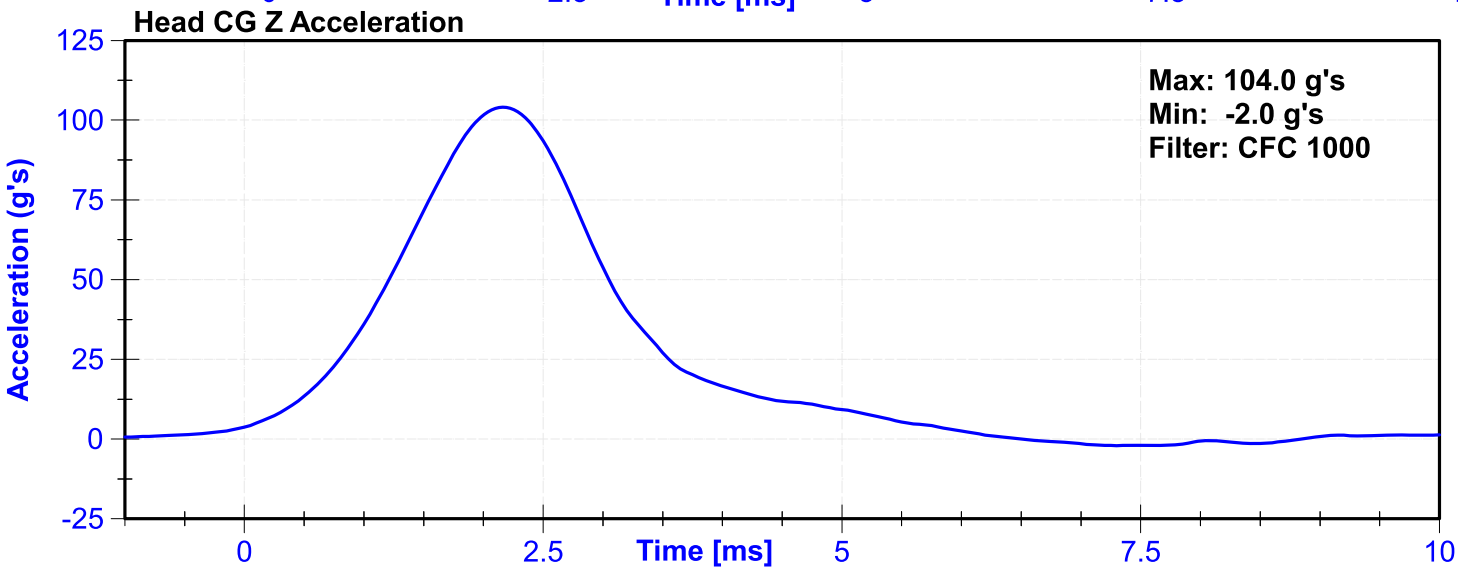
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	T21724	10/8/2024	4/6/2025
Y Accelerometer	Endevco	T22281	10/8/2024	4/6/2025
Z Accelerometer	Endevco	T26050	10/8/2024	4/6/2025




Head CG X Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
Time [ms]
5
7.5
10
Max: 11.0 g's
Min: -1.0 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
20
0
-20
-40
-60
-80
0
2.5
Time [ms]
5
7.5
10
Max: 0.6 g's
Min: -79.5 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: 104.0 g's
Min: -2.0 g's
Filter: CFC 1000

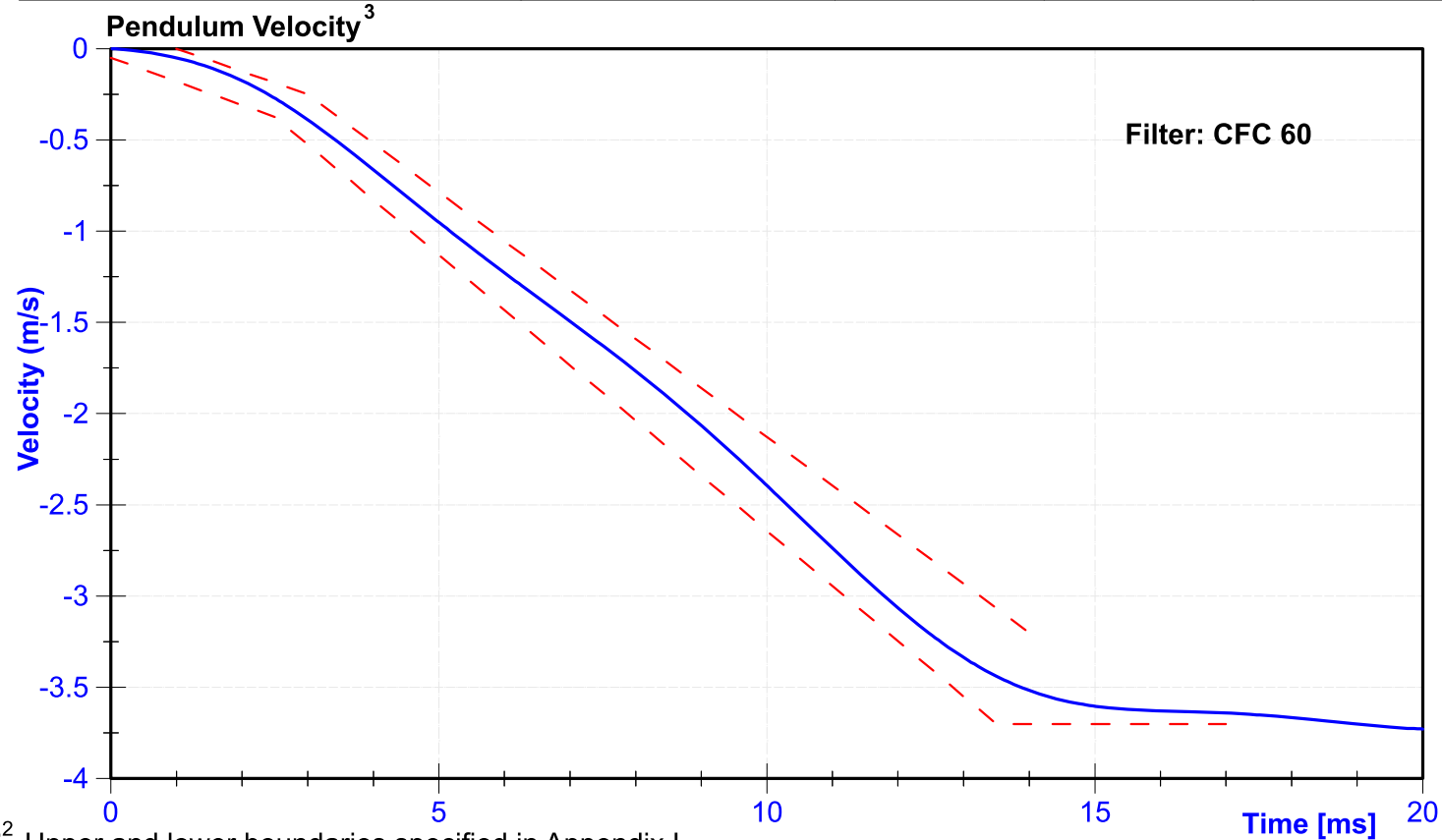
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

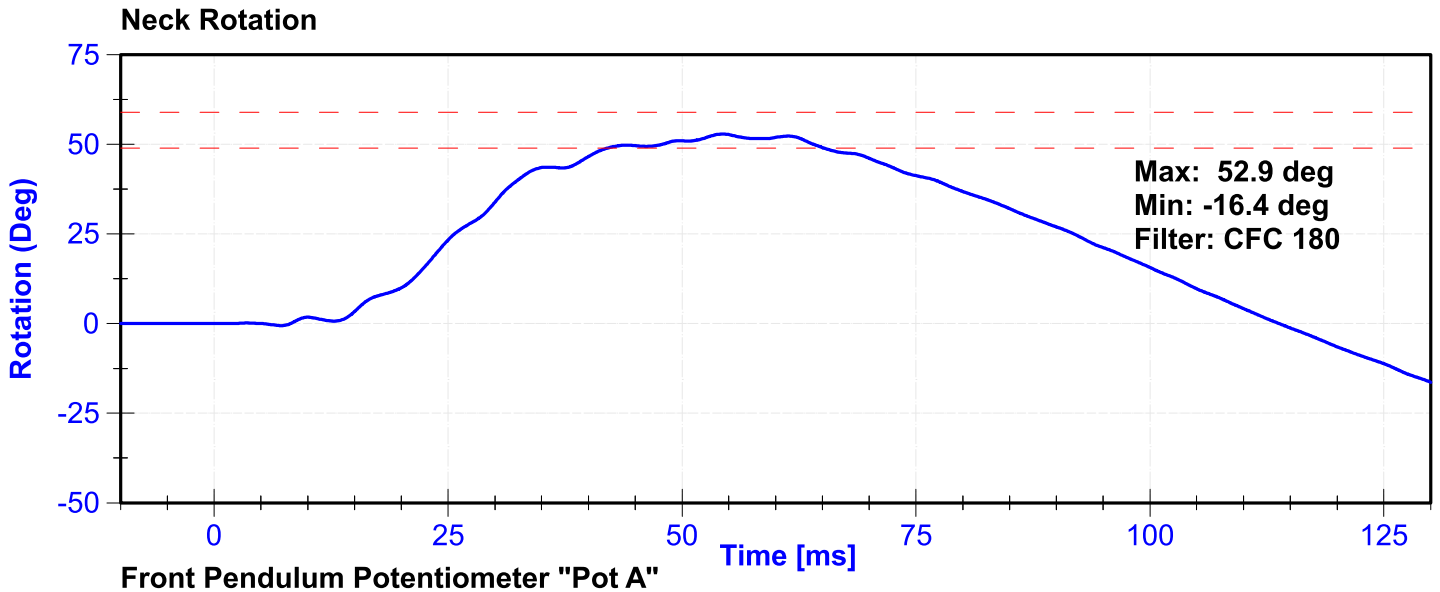
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	3.3	3.5	m/s	3.45	Pass
Lateral Neck Rotation	49	59	deg	52.9	Pass
Time at Maximum Rotation	54	66	ms	54.4	Pass
Time of Rotation Decay from Maximum	53	88	ms	59.4	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

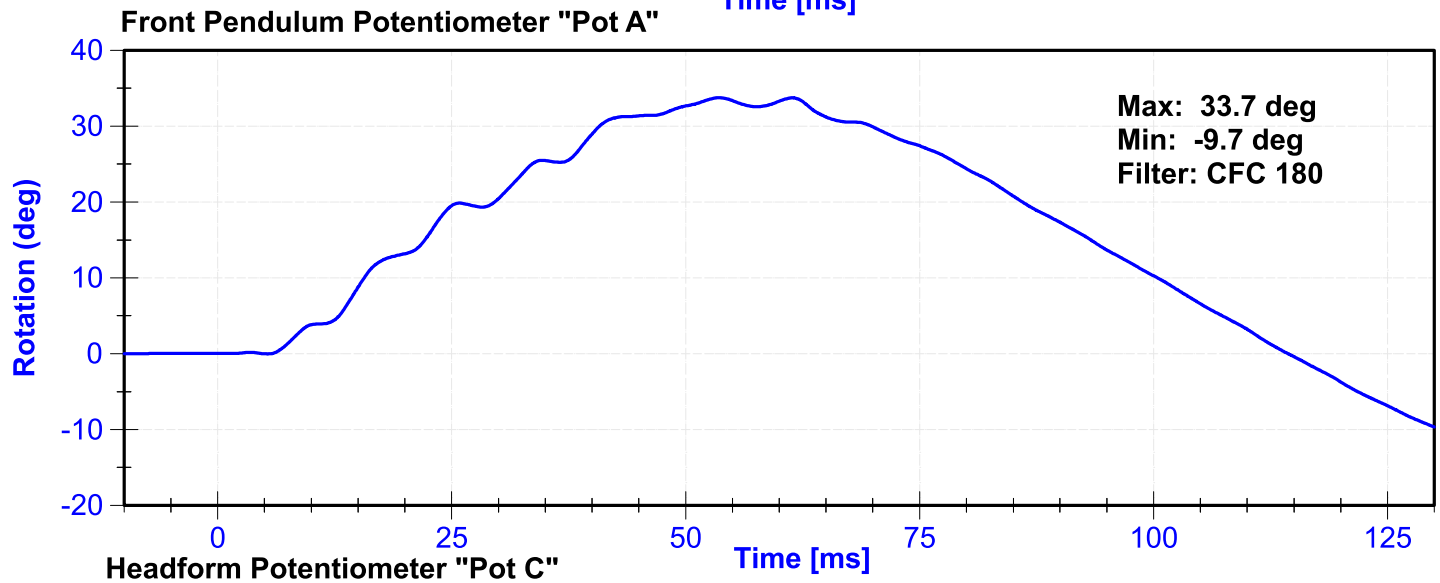
Transducer Calibrations

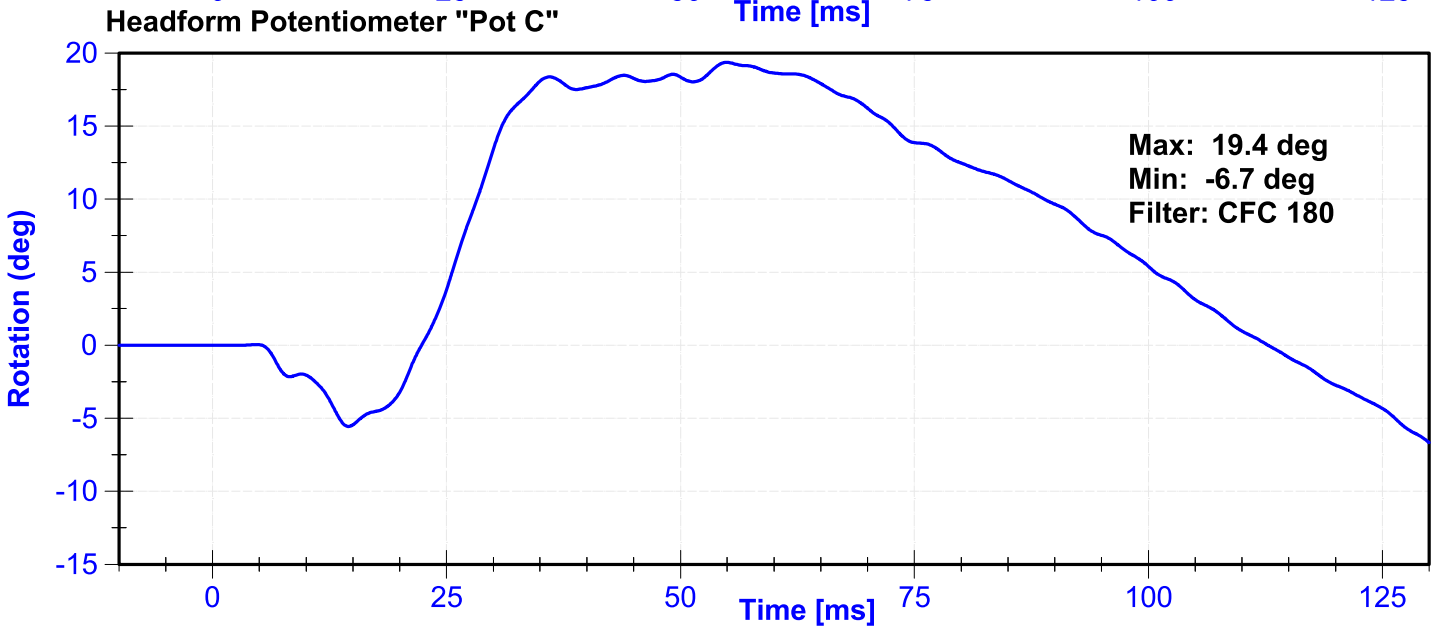
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Front Pendulum Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Headform Potentiometer	Sfernice	095	9/13/2024	9/13/2025



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


Neck Rotation
Rotation (Deg)
75
50
25
0
-25
-50
0
25
50
75
100
125
Time [ms]
Max: 52.9 deg
Min: -16.4 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: 33.7 deg
Min: -9.7 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
20
15
10
5
0
-5
-10
-15
0
25
50
75
100
125
Time [ms]
Max: 19.4 deg
Min: -6.7 deg
Filter: CFC 180

Appendix I

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

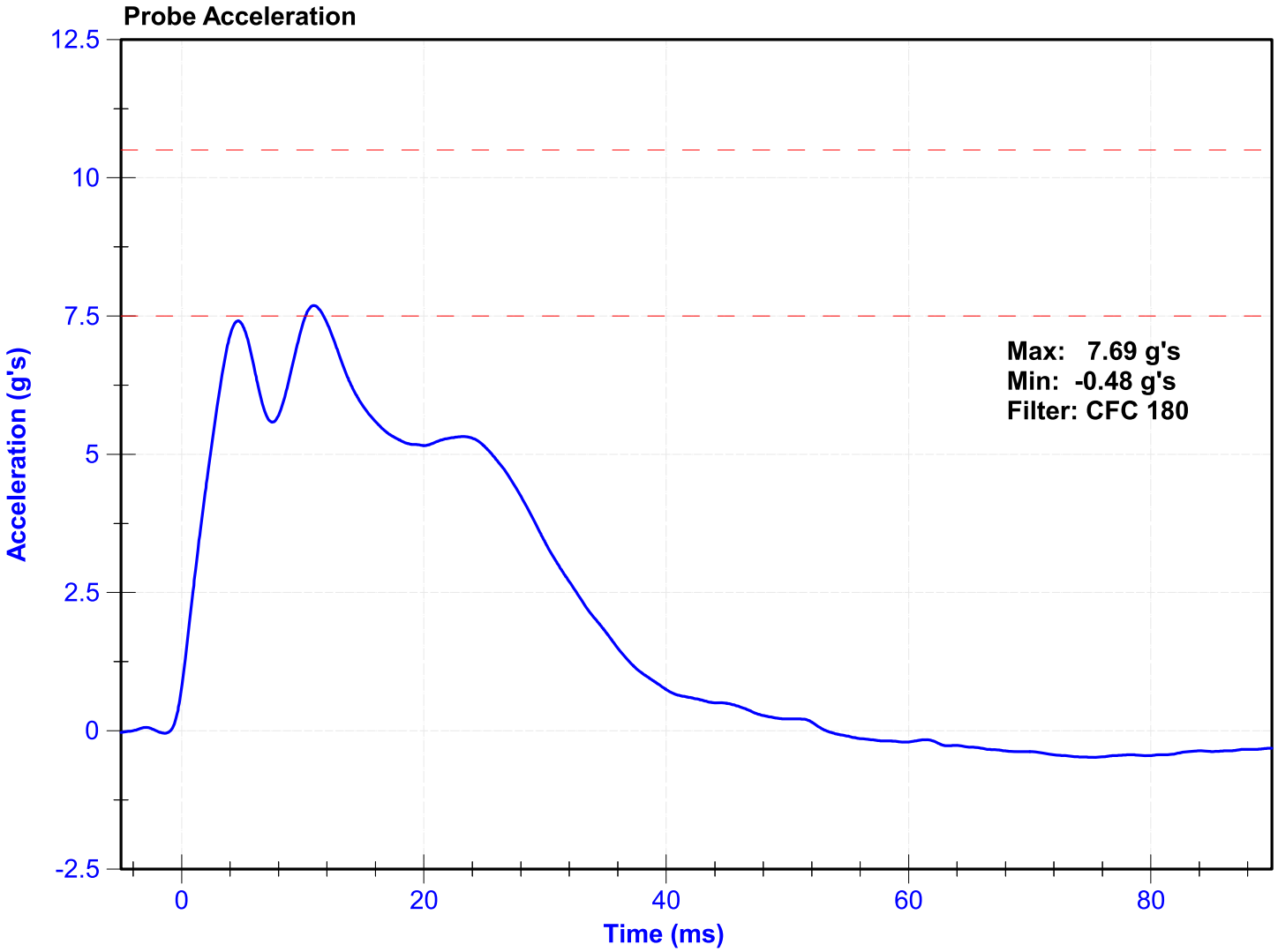
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	7.5	10.5	g's	7.69	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	T25863	1/17/2025	7/16/2025



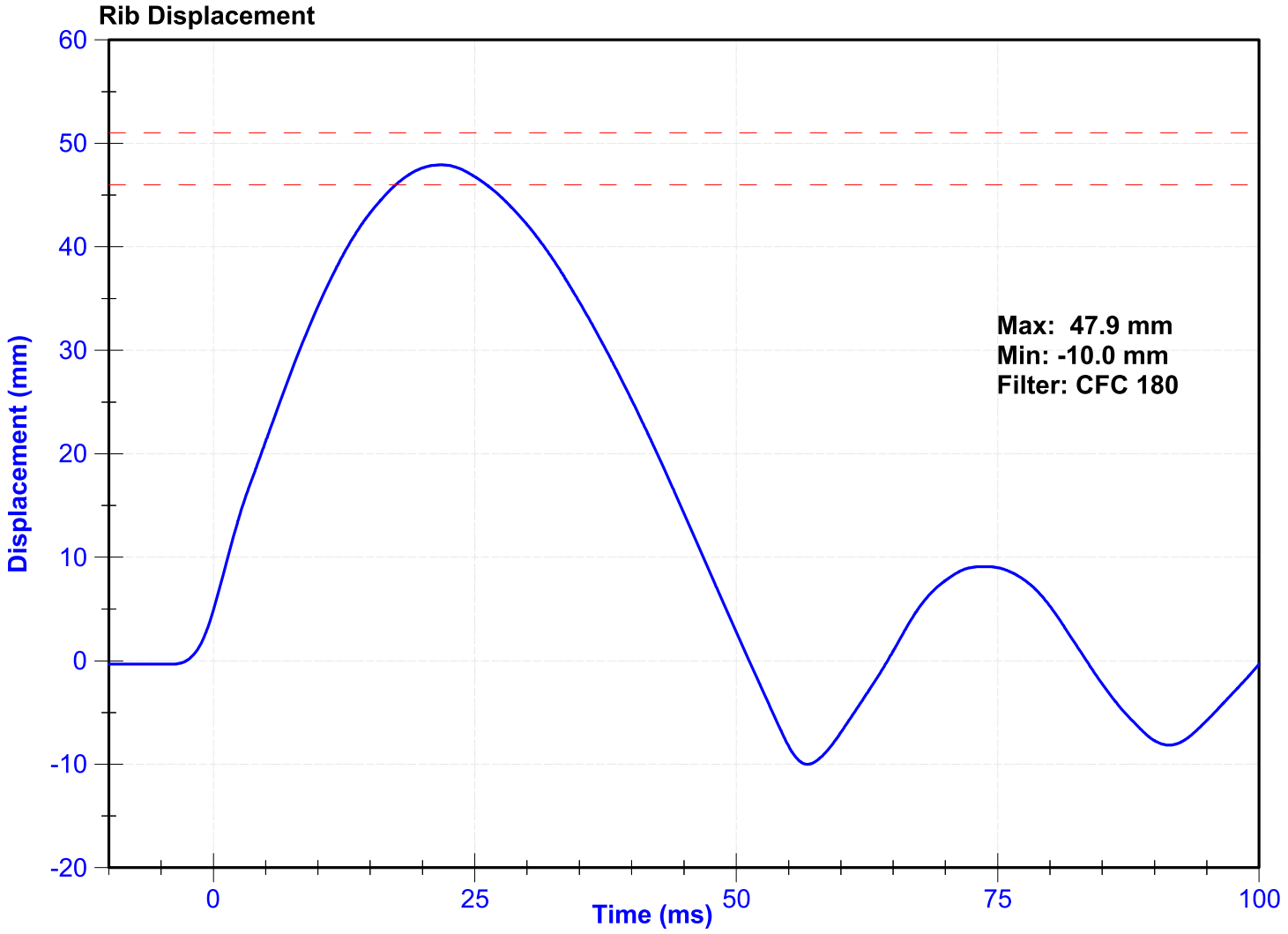
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J.Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	46	51	mm	47.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-01	10/8/2024	4/8/2025



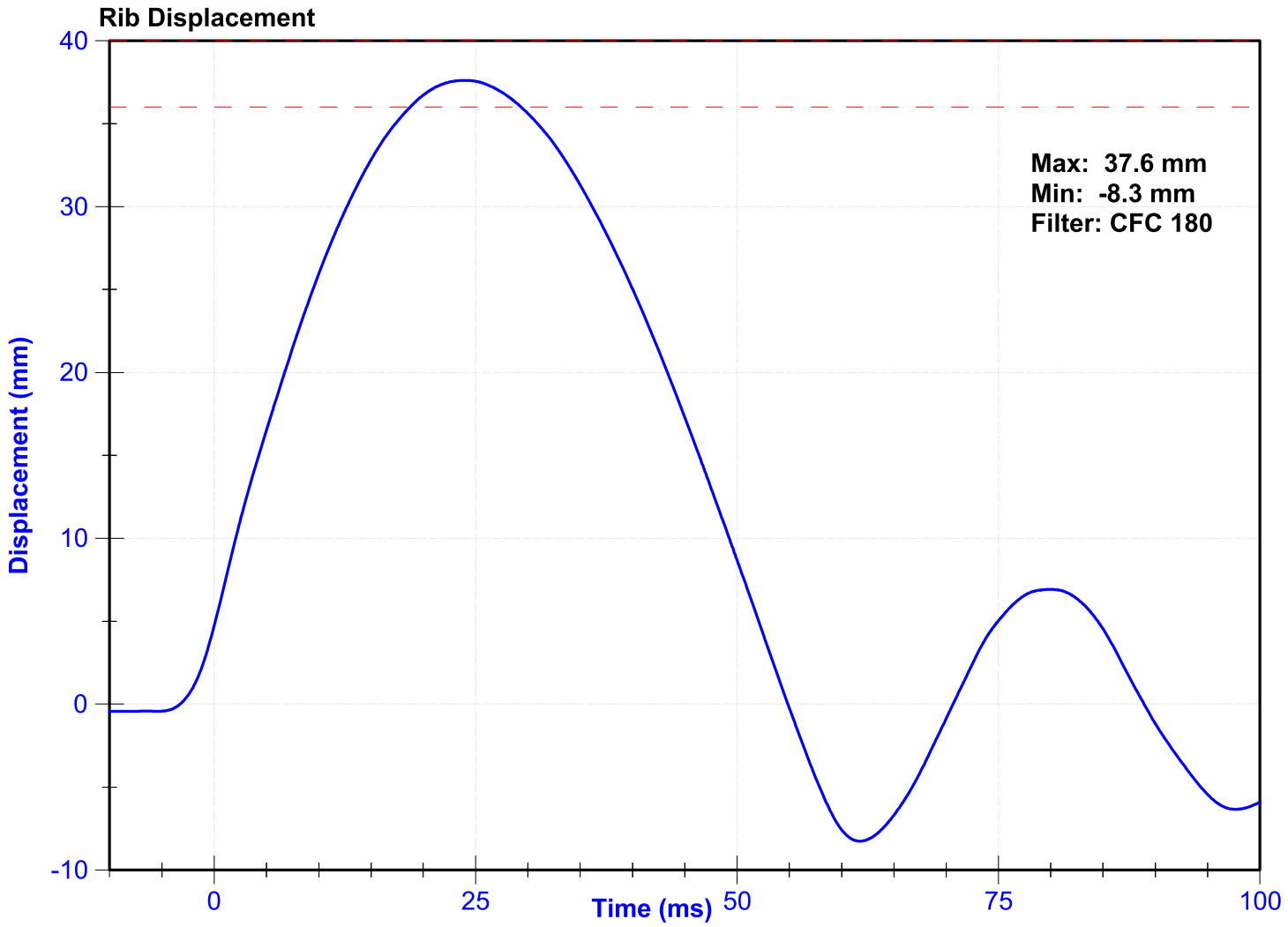
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J.Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	36	40	mm	37.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-01	10/8/2024	4/8/2025



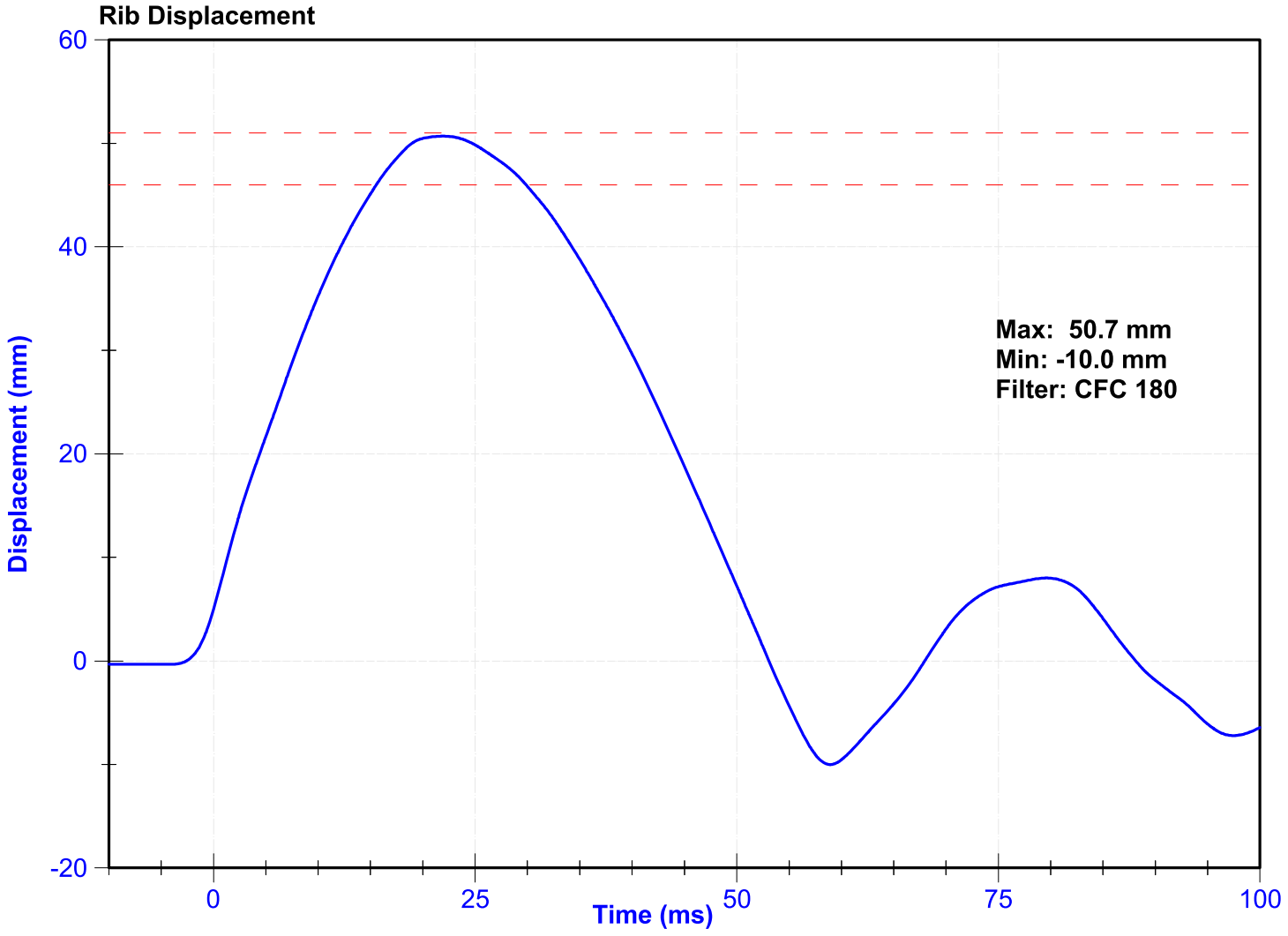
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J.Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	46	51	mm	50.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	807	10/8/2024	4/8/2025



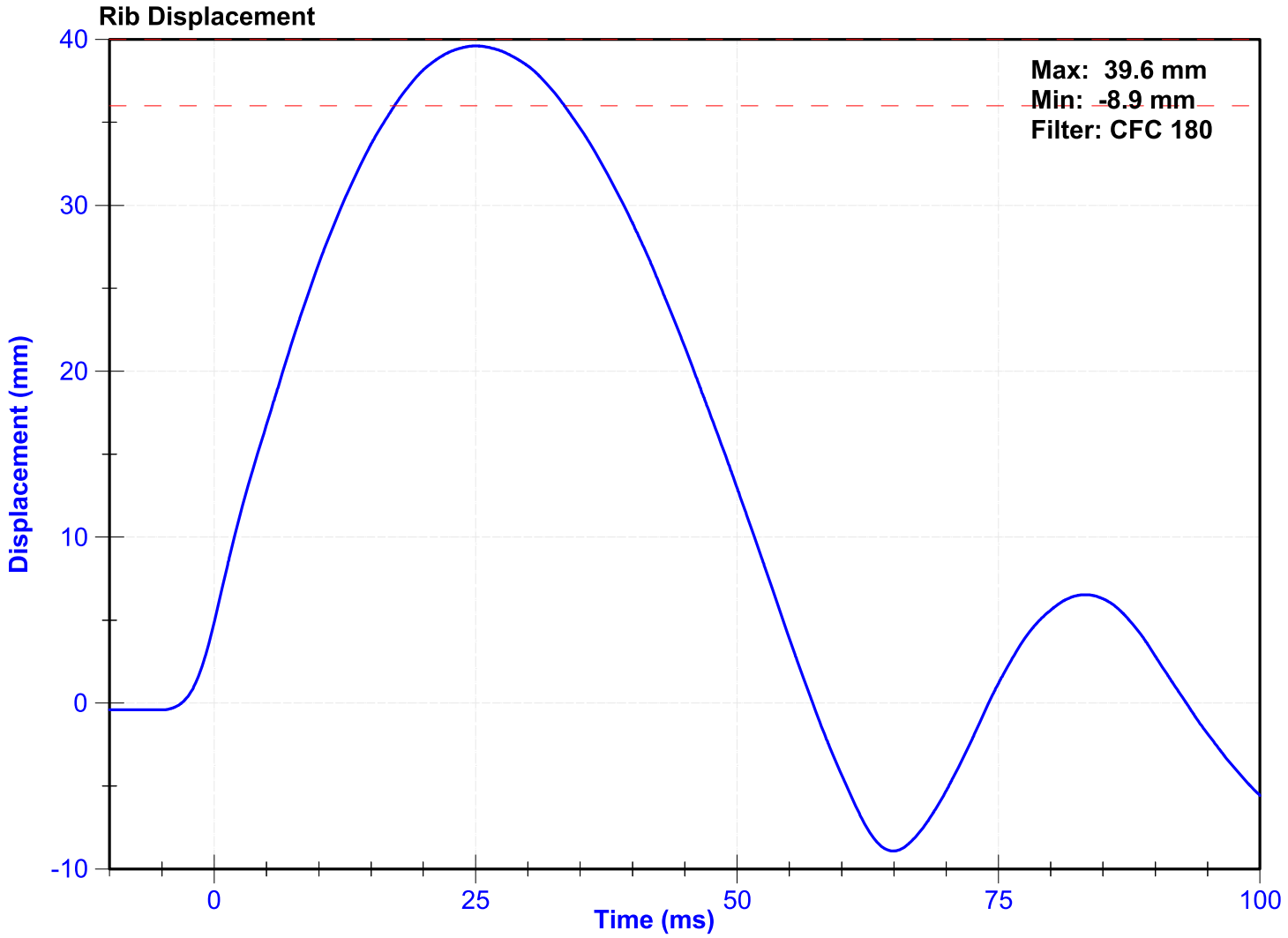
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J.Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	36	40	mm	39.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	807	10/8/2024	4/8/2025



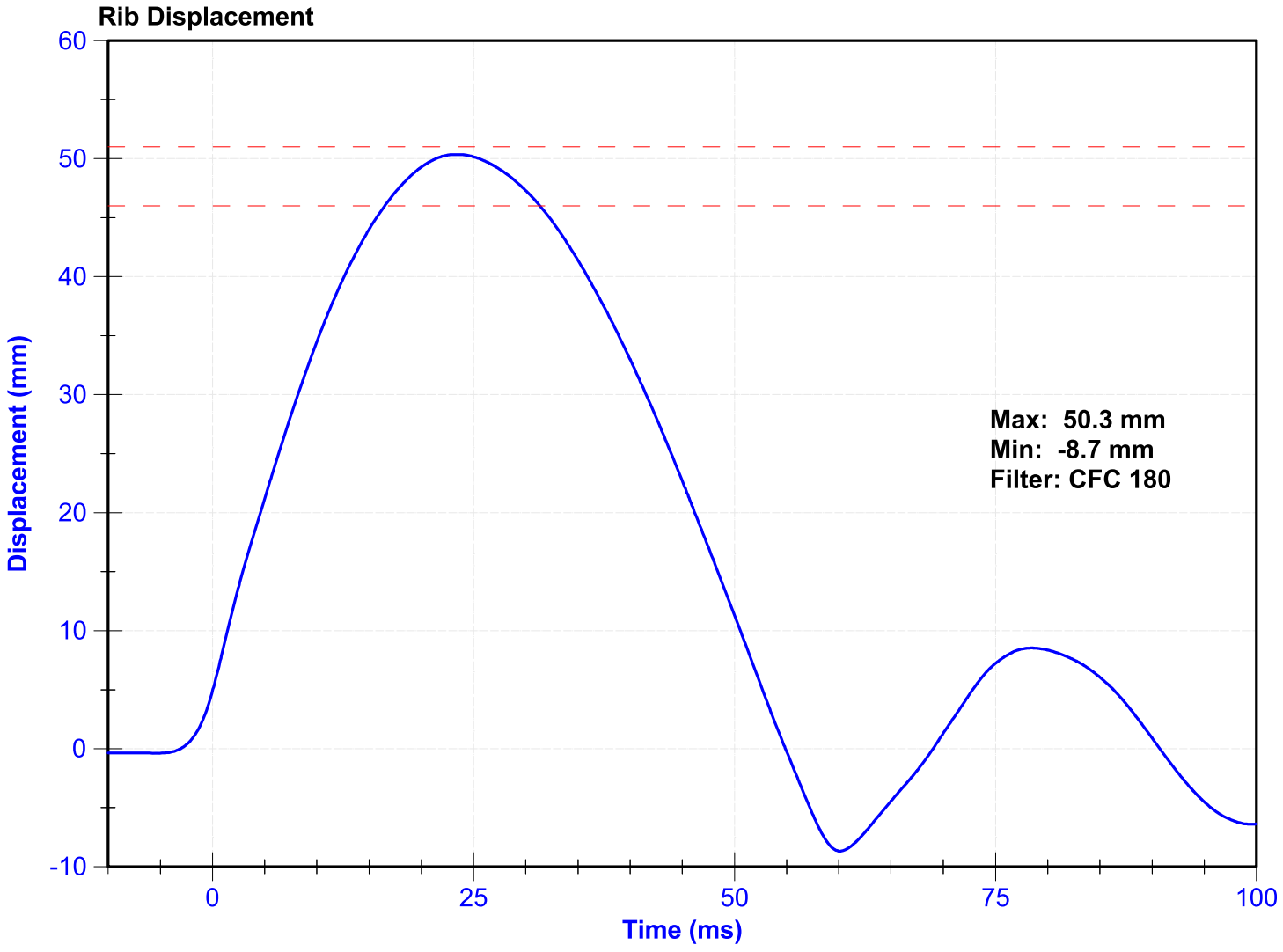
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	46	51	mm	50.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-03	10/8/2024	4/8/2025



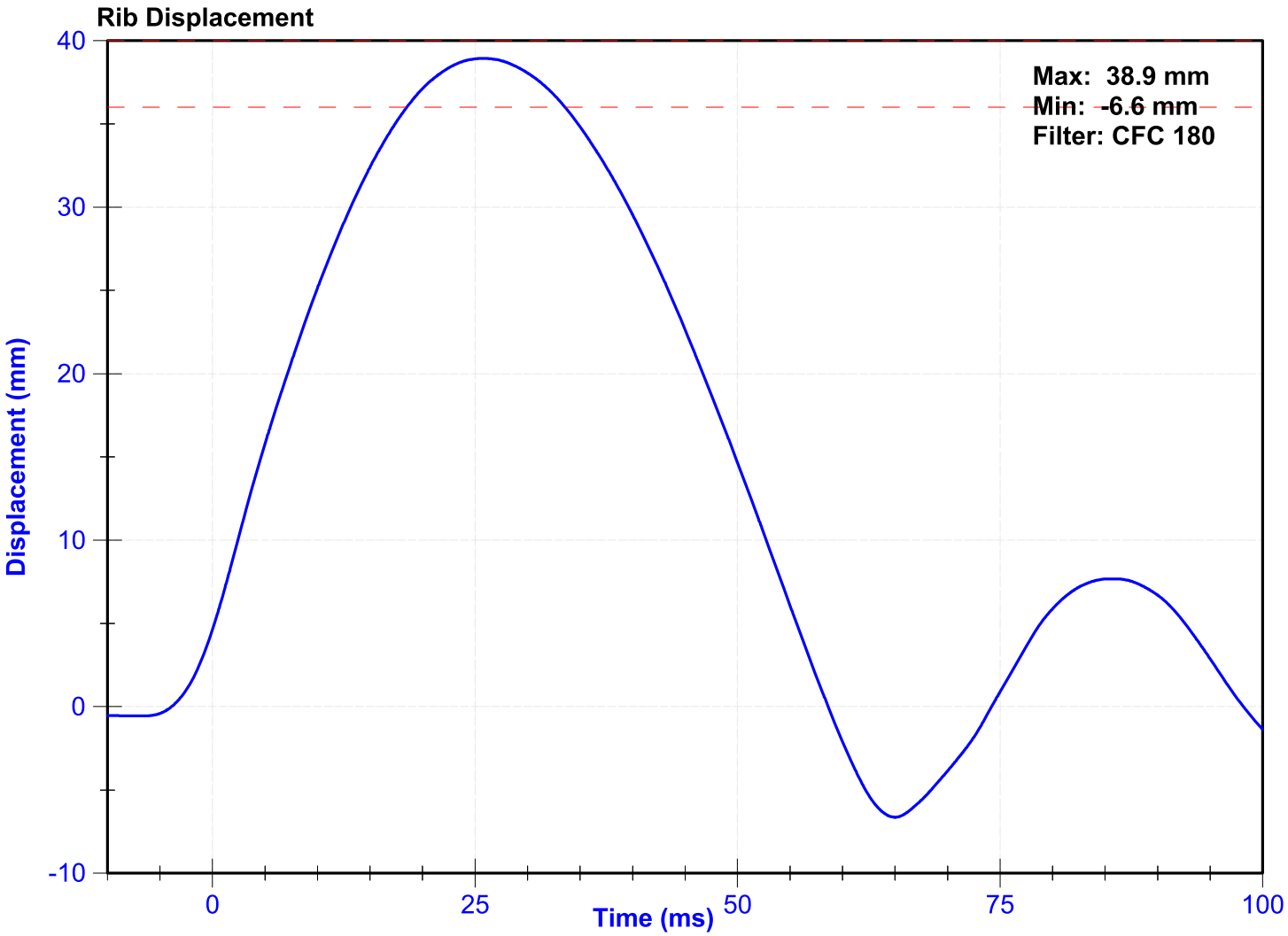
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J.Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	36	40	mm	38.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-03	10/8/2024	4/8/2025



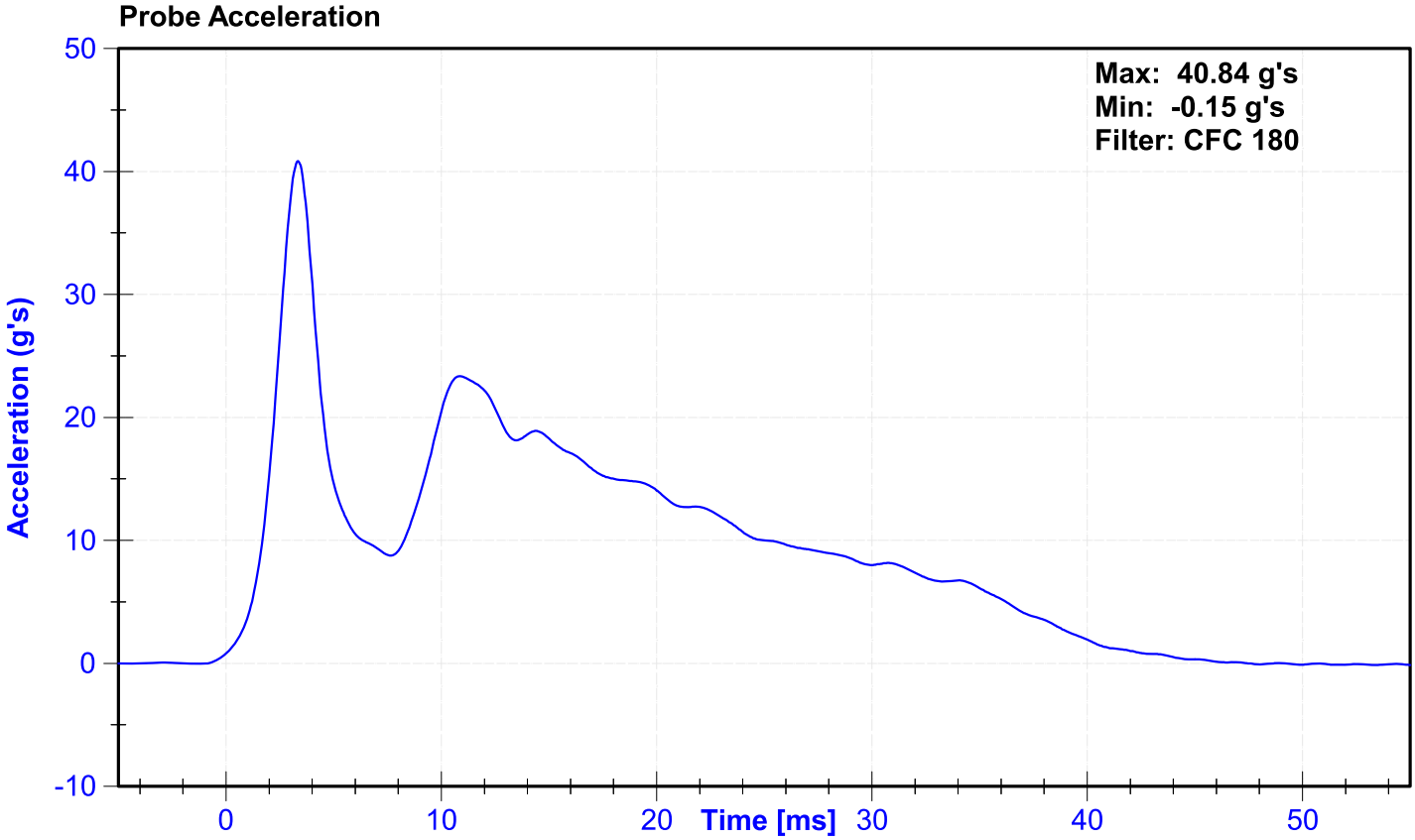
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

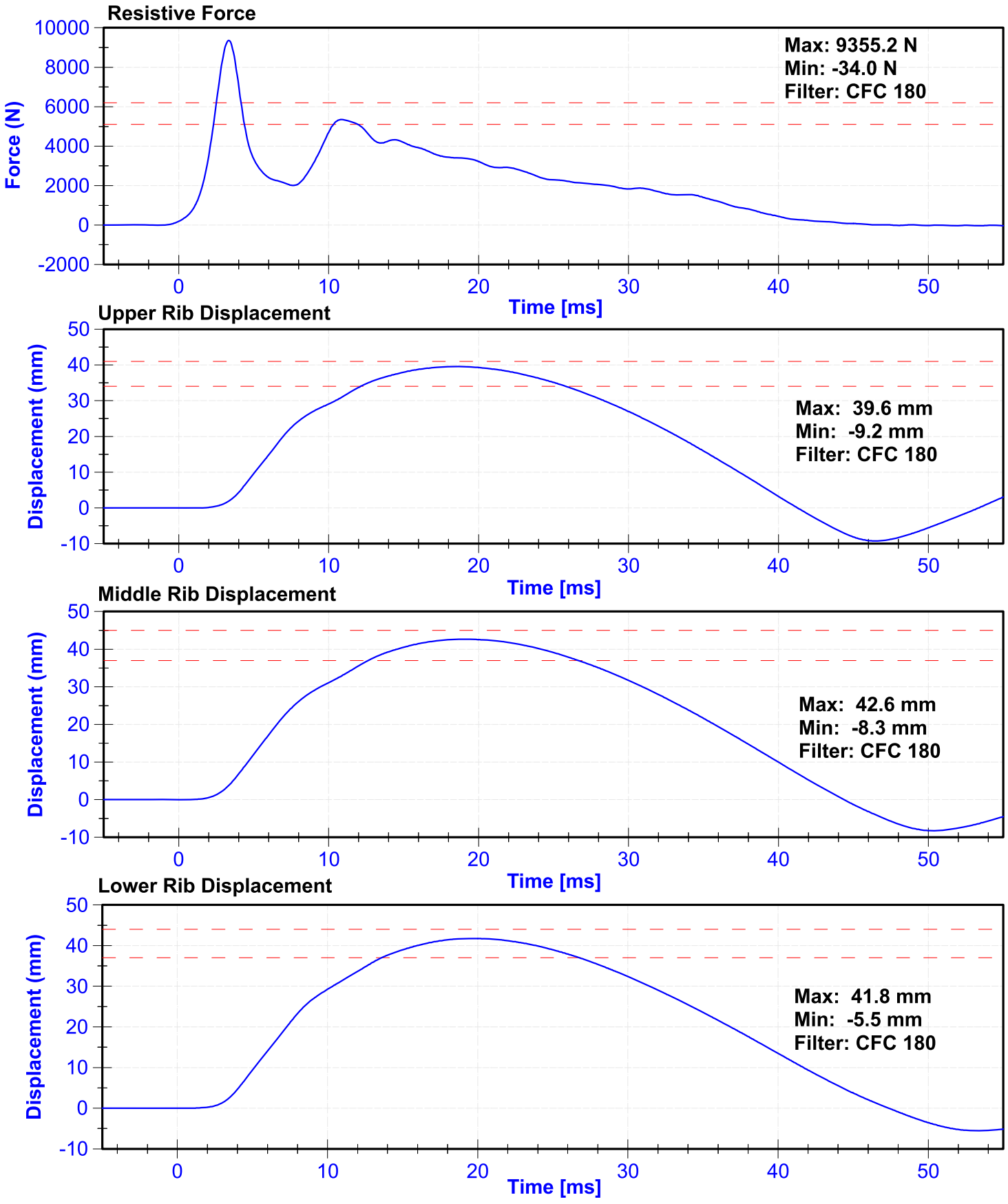
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	5.4	5.6	m/s	5.42	Pass
Resistive Force after 6ms	5100	6200	N	5348.7	Pass
Upper Thorax Rib Deflection	34	41	mm	39.6	Pass
Mid Thorax Rib Deflection	37	45	mm	42.6	Pass
Lower Thorax Rib Deflection	37	44	mm	41.8	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	T25863	1/17/2025	7/16/2025
Upper Thorax Rib Potentiometer	Honeywell	0552-01	10/8/2024	4/8/2025
Middle Thorax Rib Potentiometer	Honeywell	807	10/8/2024	4/8/2025
Lower Thorax Rib Potentiometer	Honeywell	0552-03	10/8/2024	4/8/2025




Resistive Force
Force (N)
Max: 9355.2 N
Min: -34.0 N
Filter: CFC 180
Time [ms]
Upper Rib Displacement
Displacement (mm)
Max: 39.6 mm
Min: -9.2 mm
Filter: CFC 180
Time [ms]
Middle Rib Displacement
Displacement (mm)
Max: 42.6 mm
Min: -8.3 mm
Filter: CFC 180
Time [ms]
Lower Rib Displacement
Displacement (mm)
Max: 41.8 mm
Min: -5.5 mm
Filter: CFC 180
Time [ms]

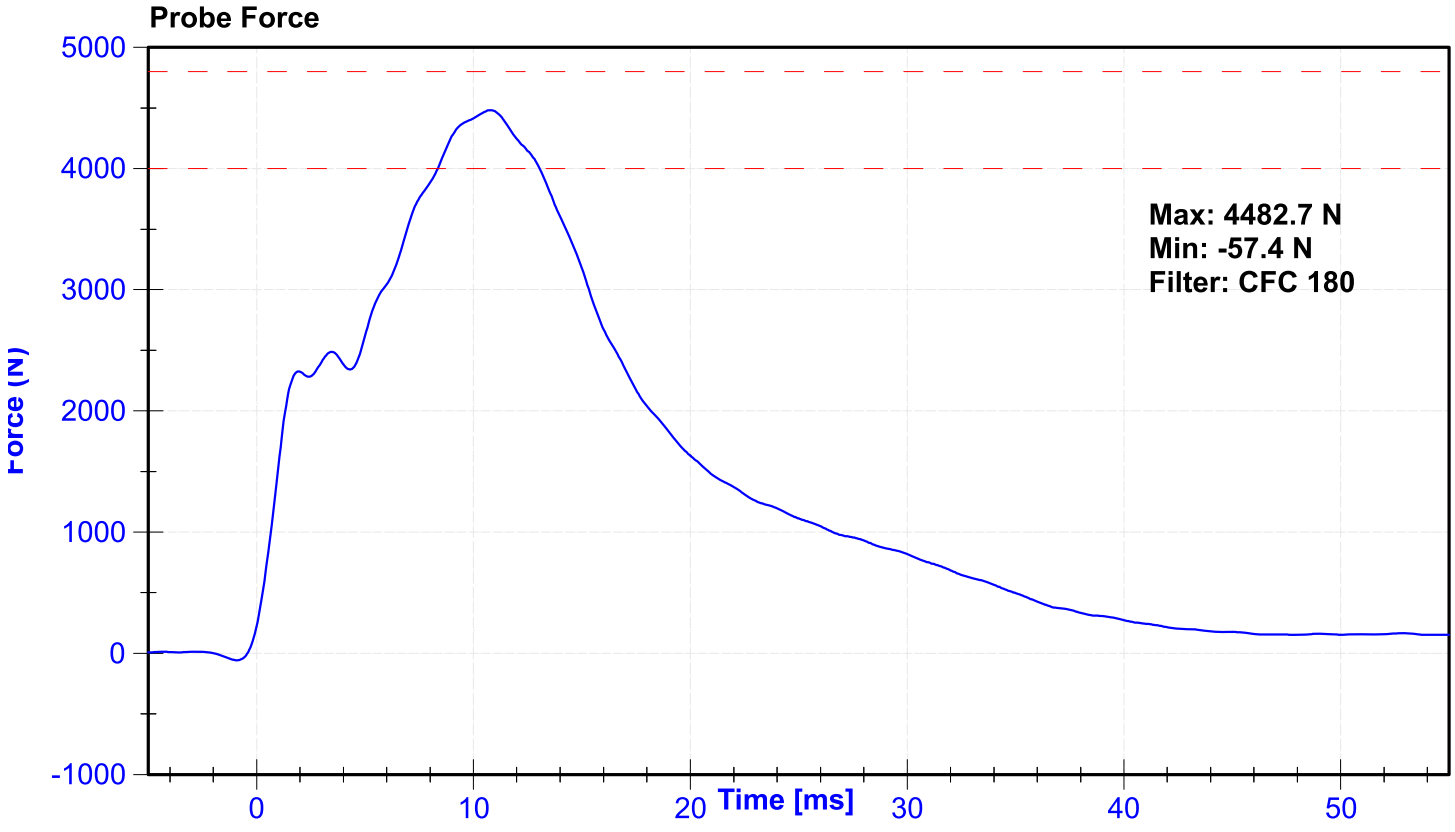
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

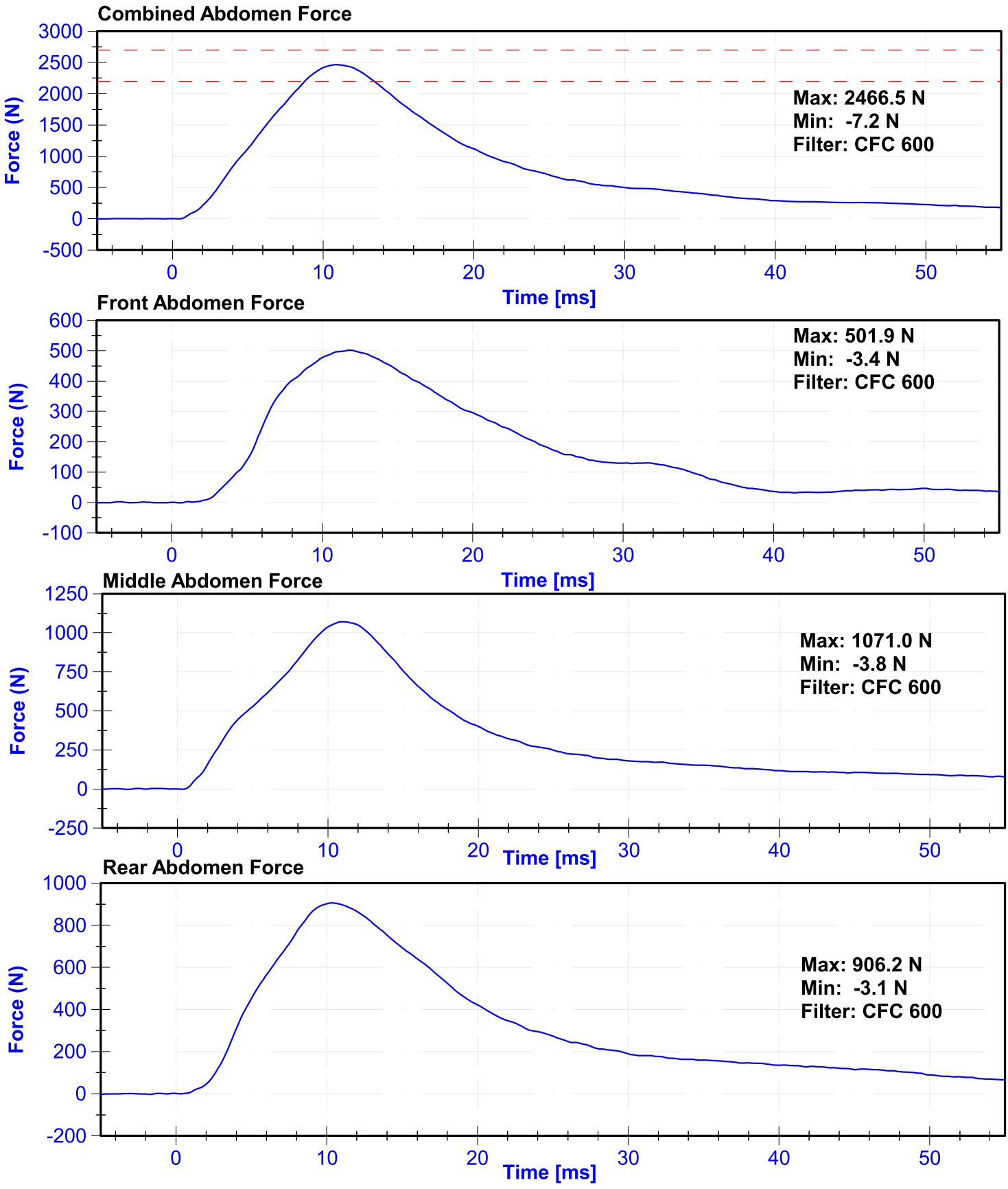
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	3.9	4.1	m/s	4.03	Pass
Combined Abdomen Force	2200	2700	N	2466.5	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	10.90	Pass
Resistive Probe Force	4000	4800	N	4482.7	Pass
Time at Peak Resistive Force	10.6	13.0	ms	10.80	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25863	1/17/2025	7/16/2025
Front Abdomen Load Cell	Denton	1512	9/16/2024	9/16/2025
Middle Abdomen Load Cell	Denton	1526	9/16/2024	9/16/2025
Rear Abdomen Load Cell	Denton	1516	9/16/2024	9/16/2025




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2466.5 N
Min: -7.2 N
Filter: CFC 600
Front Abdomen Force
Force (N)
Time [ms]
Max: 501.9 N
Min: -3.4 N
Filter: CFC 600
Middle Abdomen Force
Force (N)
Time [ms]
Max: 1071.0 N
Min: -3.8 N
Filter: CFC 600
Rear Abdomen Force
Force (N)
Time [ms]
Max: 906.2 N
Min: -3.1 N
Filter: CFC 600

ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

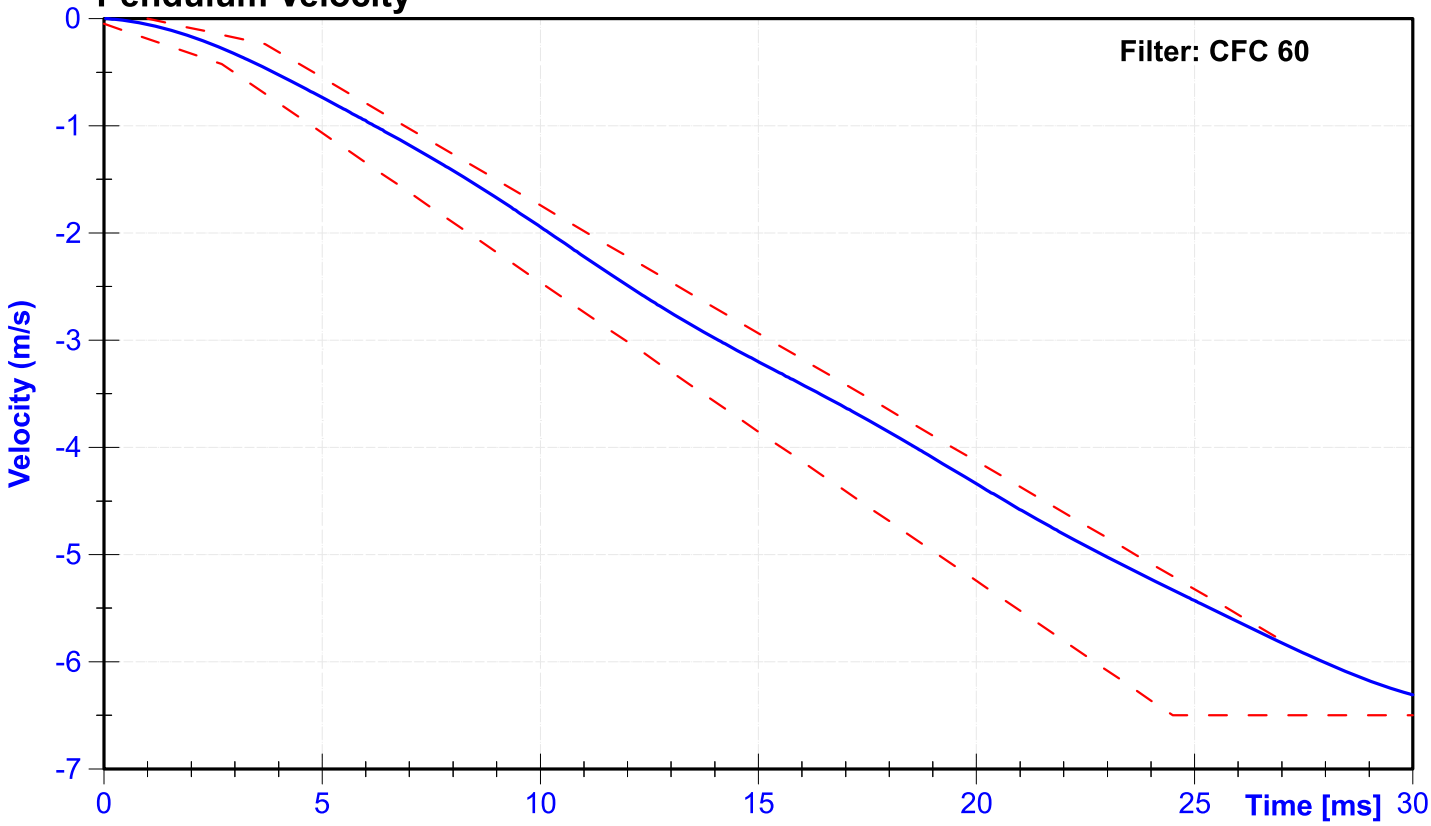
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	5.95	6.15	m/s	6.148	Pass
Lateral Spine Rotation	45	55	deg	50.0	Pass
Time at Maximum Rotation	39	53	ms	47.5	Pass
Time of Decay to Zero Degrees	37	57	ms	40.8	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

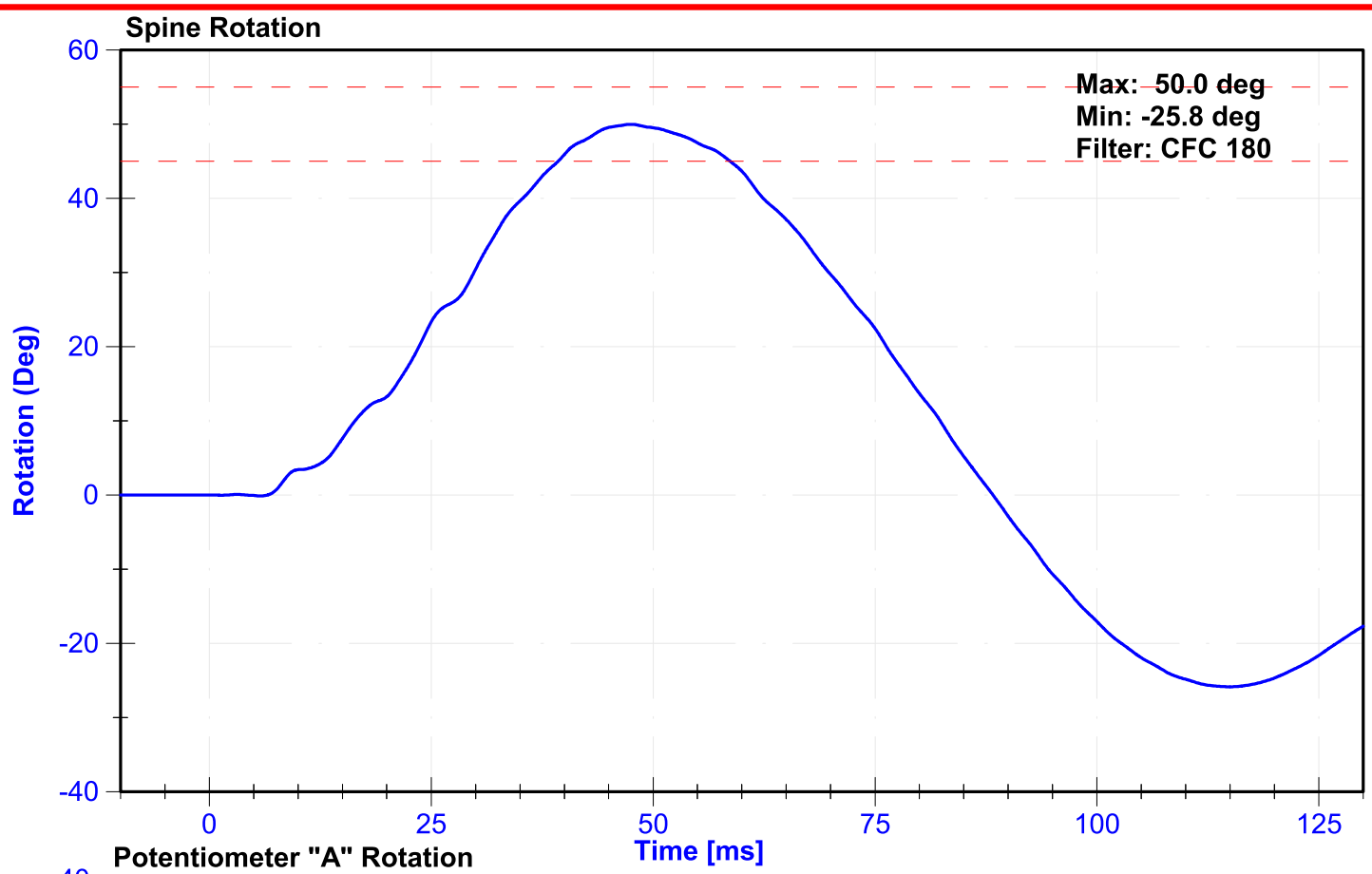
Transducer Calibrations

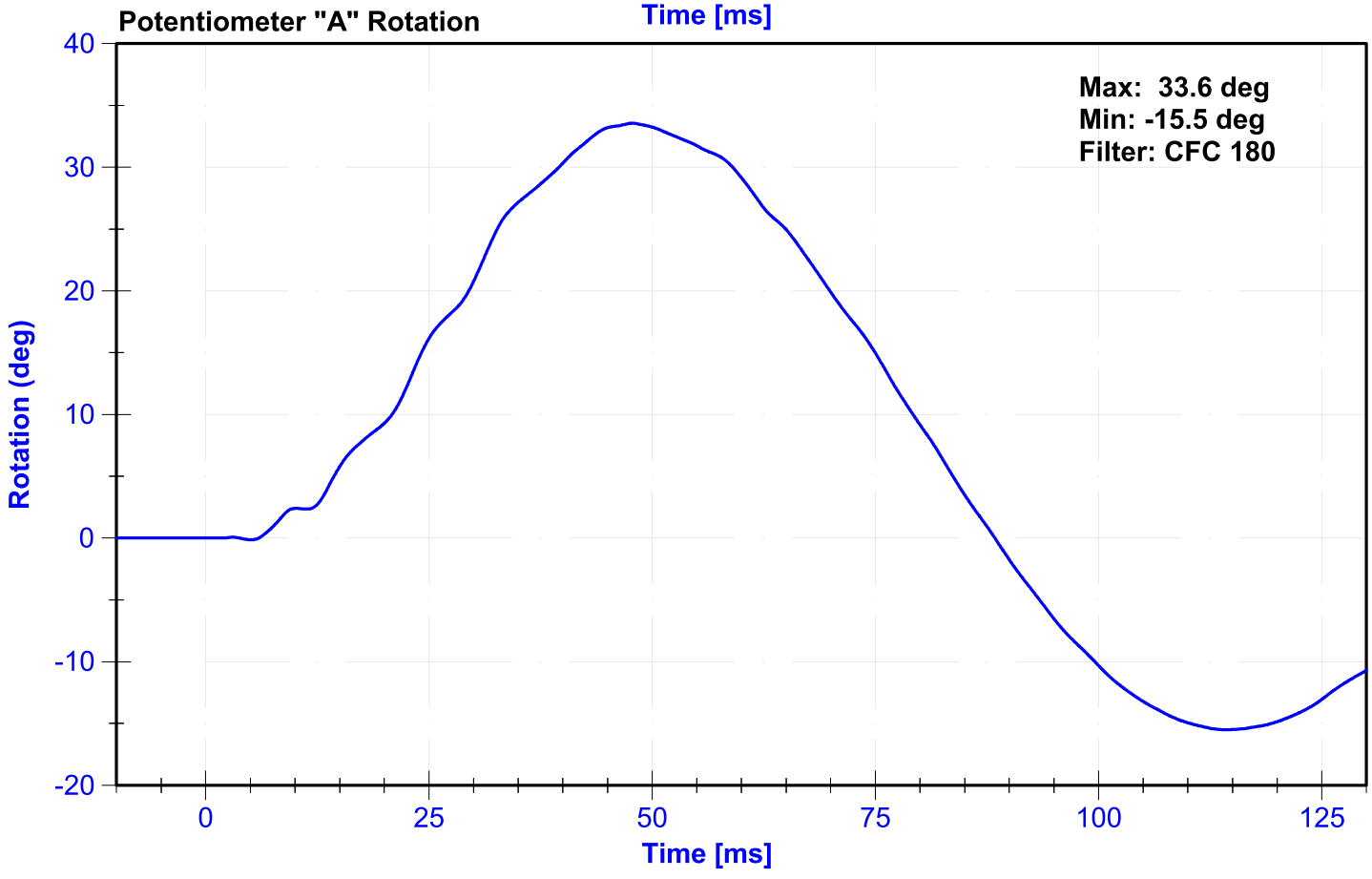
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Pendulum "A" Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Condyle "B" Potentiometer	Sfernice	095	9/13/2024	9/13/2025

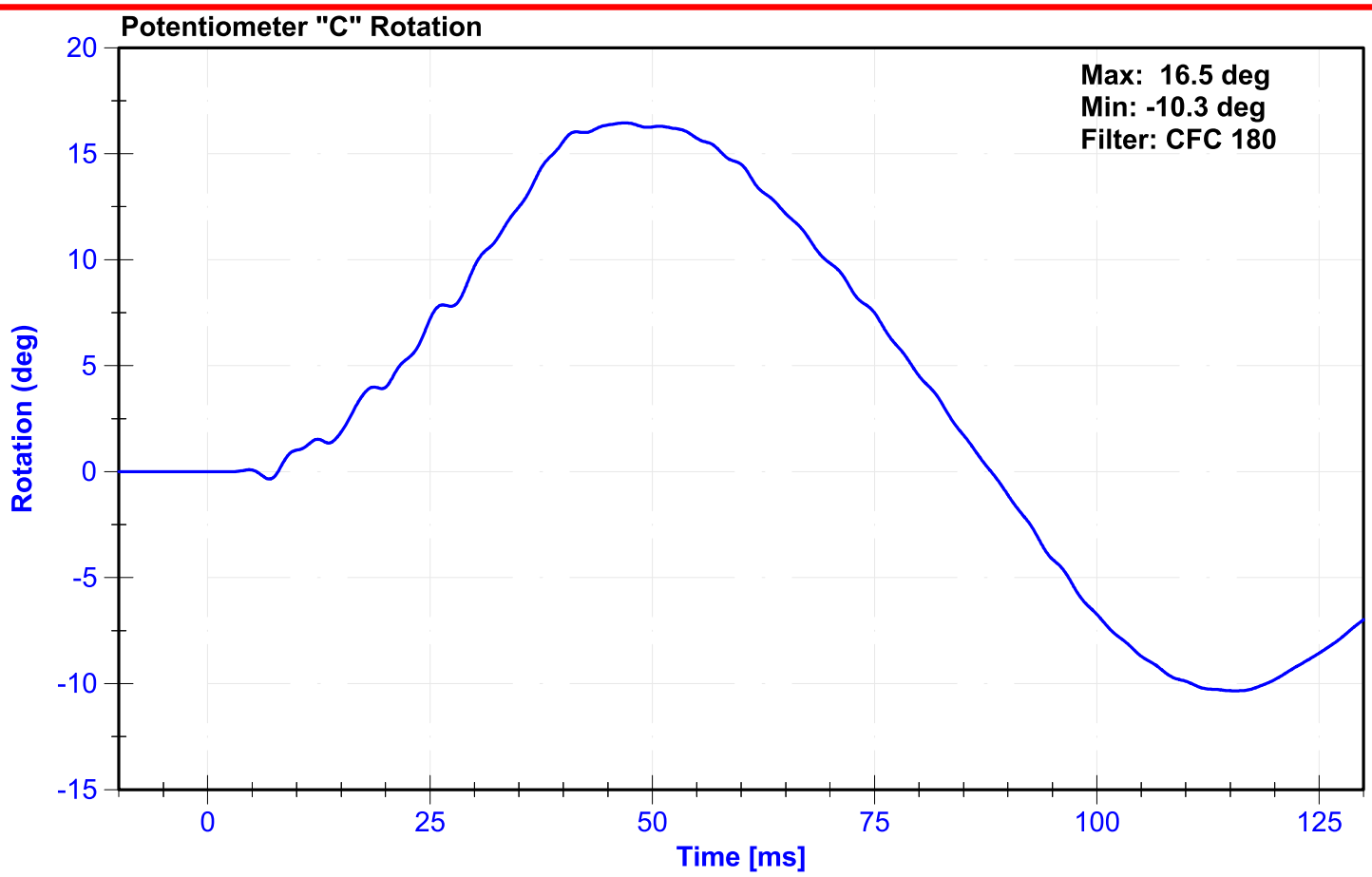
Pendulum Velocity[3]



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


Spine Rotation
Max: 50.0 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: 33.6 deg
Min: -15.5 deg
Filter: CFC 180
Rotation (deg)
40
30
20
10
0
-10
-20
0
25
50
75
100
125
Time [ms]



Appendix I

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

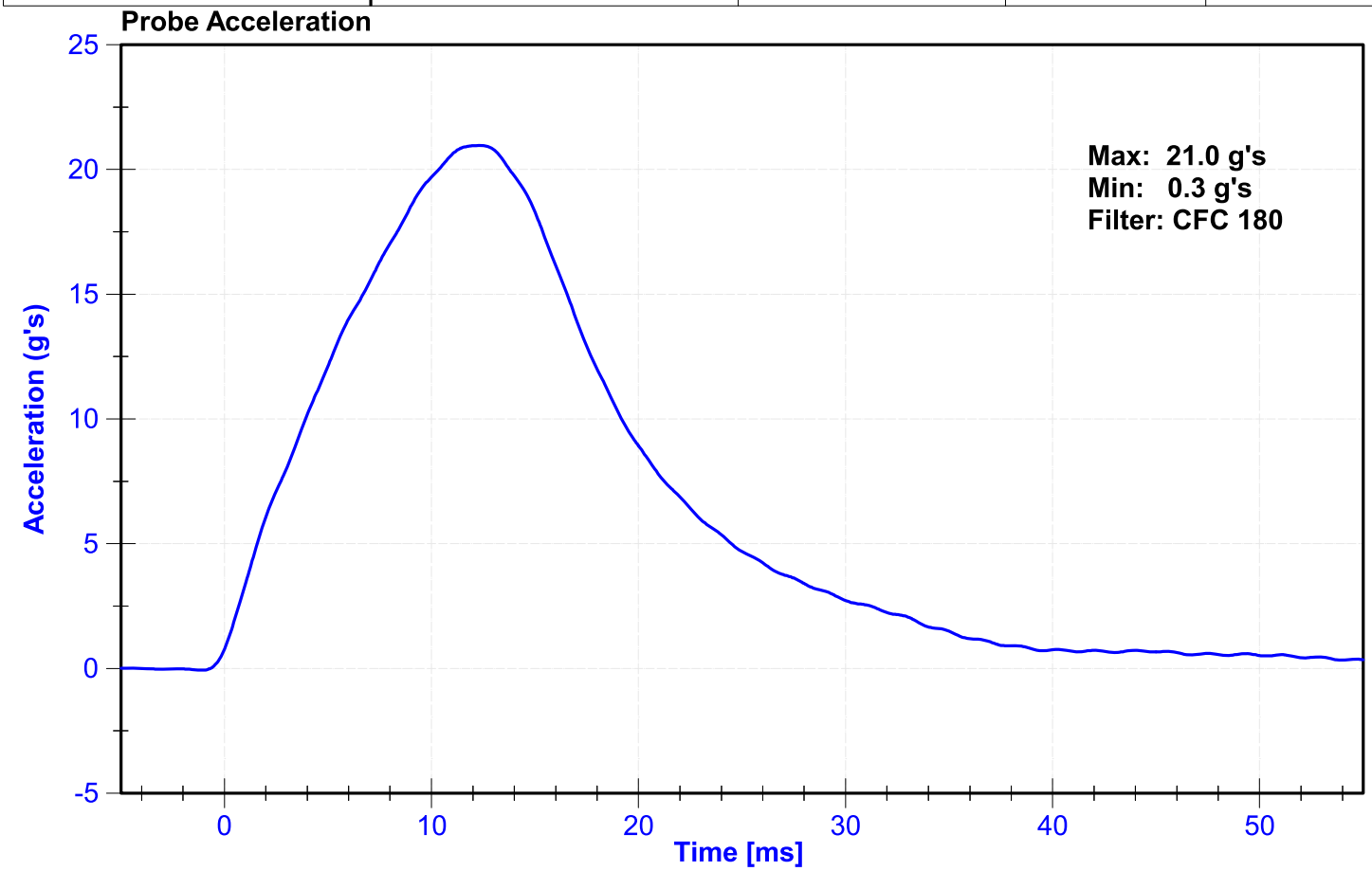
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

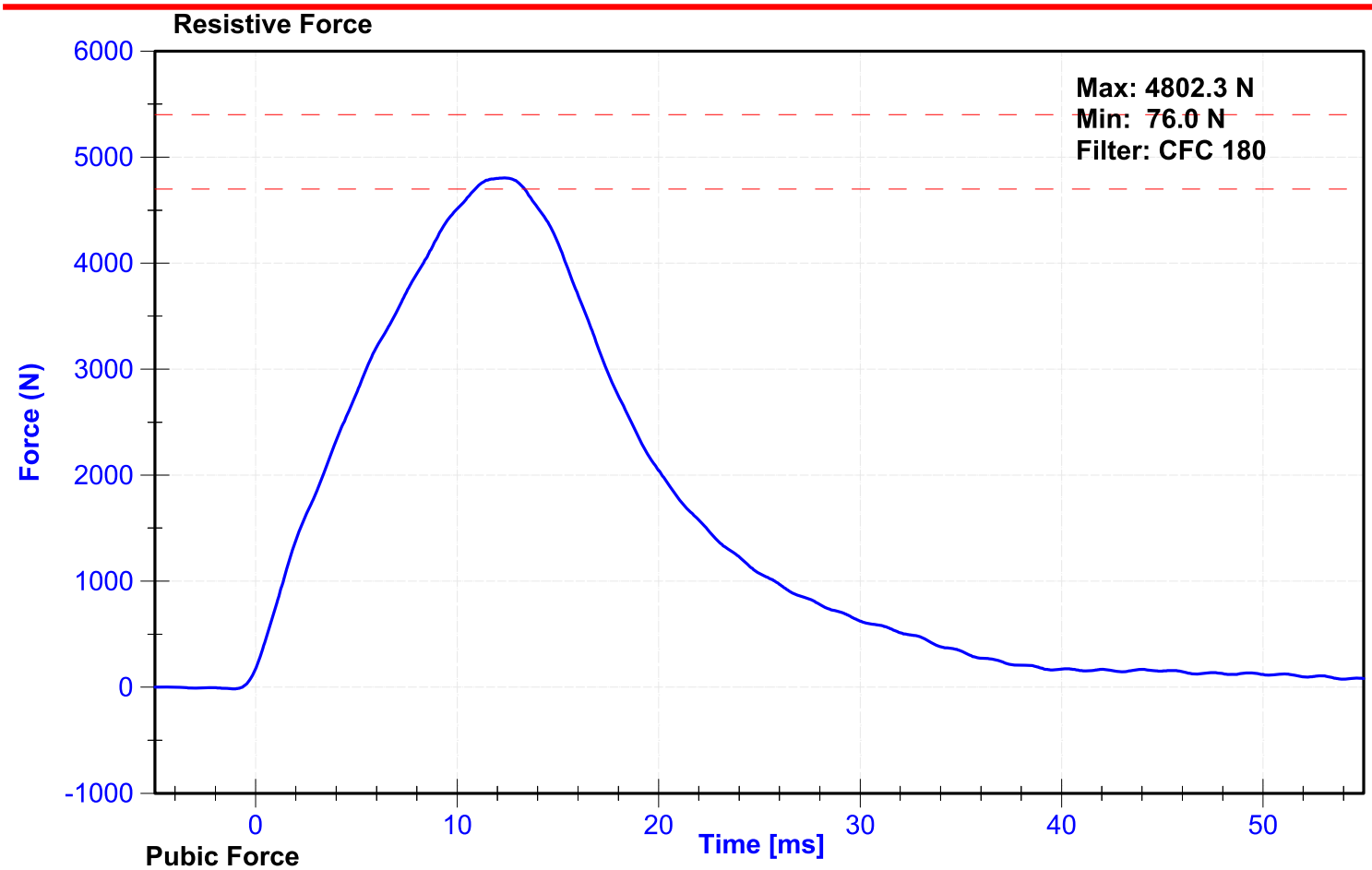
Results

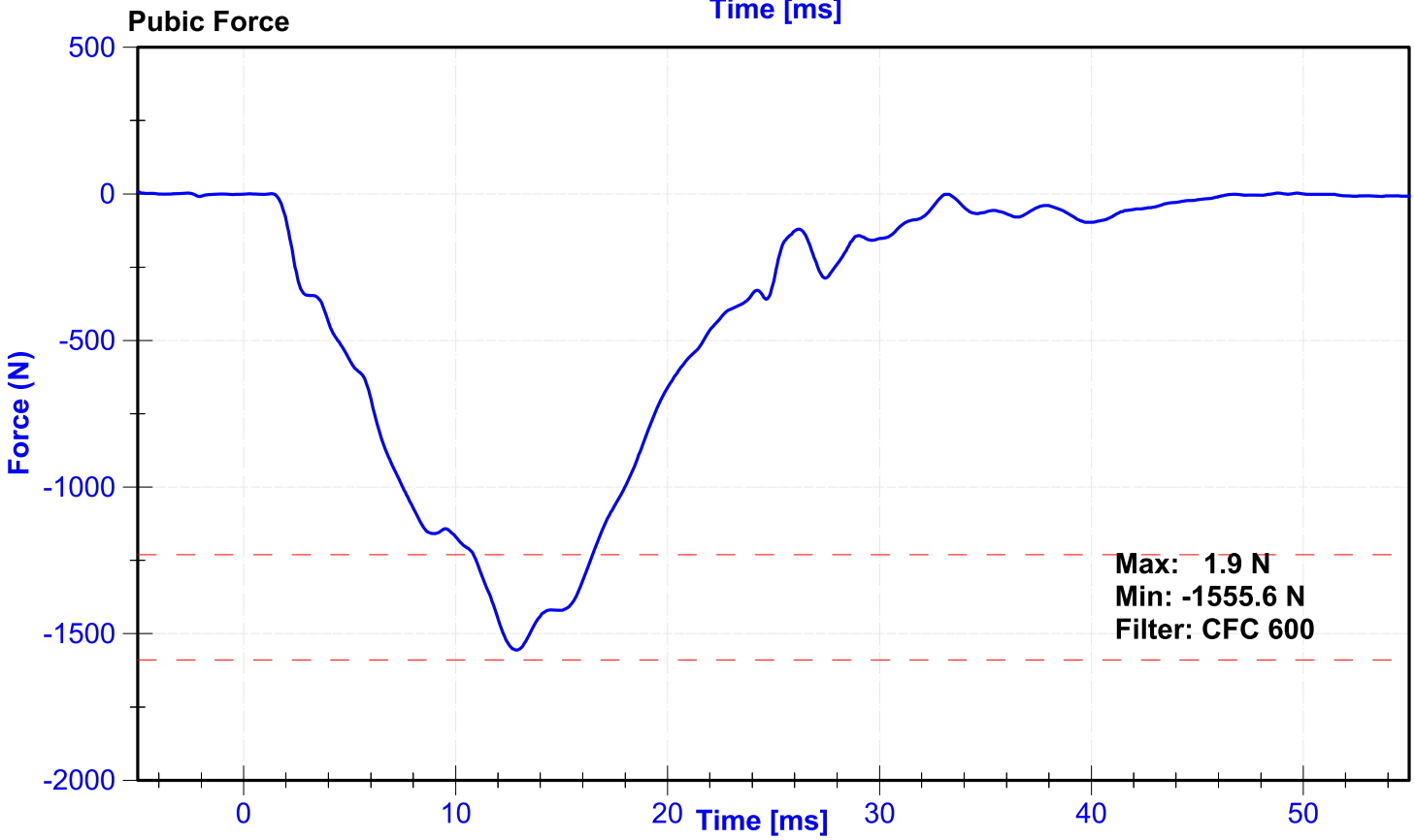
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Resistive Force	4700	5400	N	4802.3	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.40	Pass
Pubic Force	-1590	-1230	N	-1555.6	Pass
Time at Peak Pubic Force	12.2	17.0	ms	12.88	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25863	1/17/2025	7/16/2025
Pubic Load Cell	Denton	464-FY	9/16/2024	9/16/2025




Resistive Force
Max: 4802.3 N
Min: 76.0 N
Filter: CFC 180
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

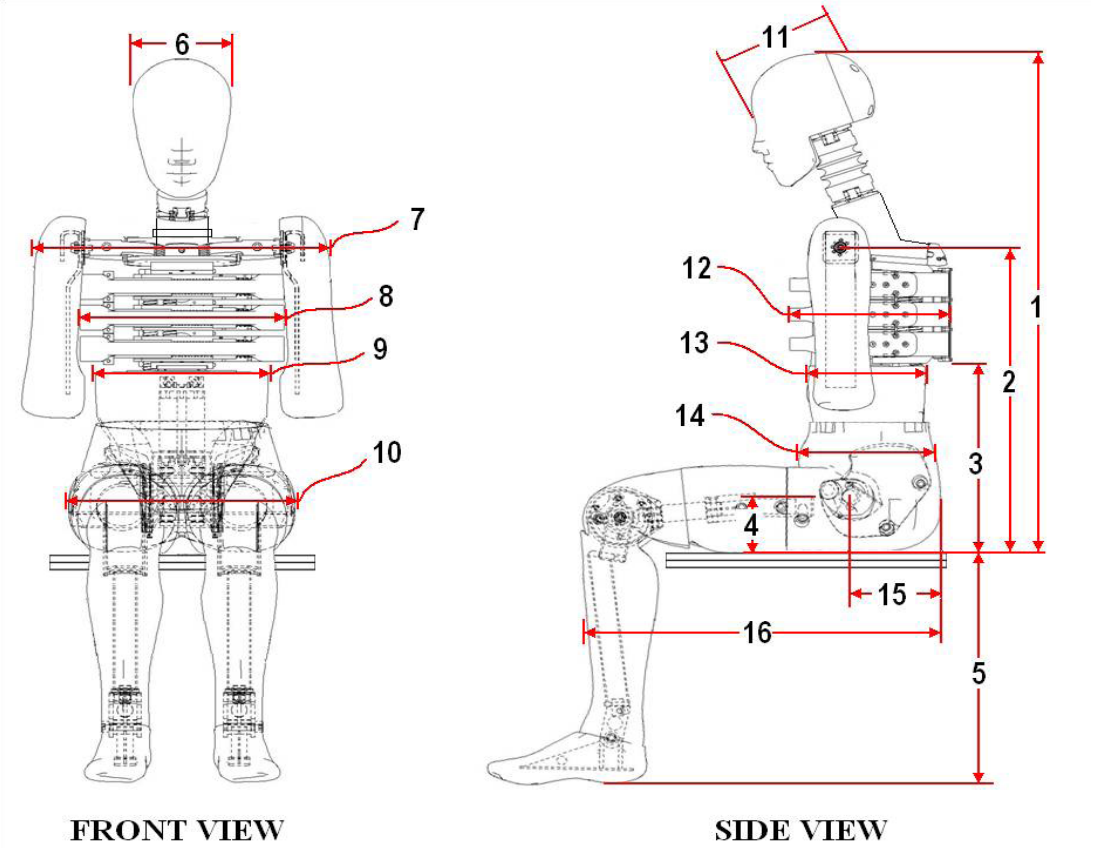

Pubic Force
Max: 1.9 N
Min: -1555.6 N
Filter: CFC 600
Force (N)
500
0
-500
-1000
-1500
-2000
0
10
20
30
40
50
Time [ms]

POST-TEST
ES-2re PERFORMANCE CALIBRATION TEST DATA

External Measurements - EuroSID-2re

Technician: J. Rios Date: 2/11/2025

Dummy Serial Number: D037



FRONT VIEW SIDE VIEW

Dim. No.	Description	Specification (mm)		Result (mm)	Pass/Fail
1	Sitting Height	900	918	910	Pass
2	Seat to Shoulder Joint	558	572	564	Pass
3	Seat to Lower Face of Thoracic Spine Box	346	356	350	Pass
4	Seat to Hip Joint (center of bolt)	97	103	102	Pass
5	Sole to Seat, Sitting	333	451	424	Pass
6	Head Width	152	158	155	Pass
7	Shoulder/Arm Width	461	479	468	Pass
8	Thorax Width	322	332	328	Pass
9	Abdomen Width	273	287	279	Pass
10	Pelvis Lap Width	359	373	365	Pass
11	Head Depth	196	206	201	Pass
12	Thorax Depth	262	272	268	Pass
13	Abdomen Depth	194	204	197	Pass
14	Pelvis Depth	235	245	238	Pass
15	Back of Buttocks to Hip Joint (center of bolt)	150	160	155	Pass
16	Back of Buttocks to Front Knee	597	615	605	Pass

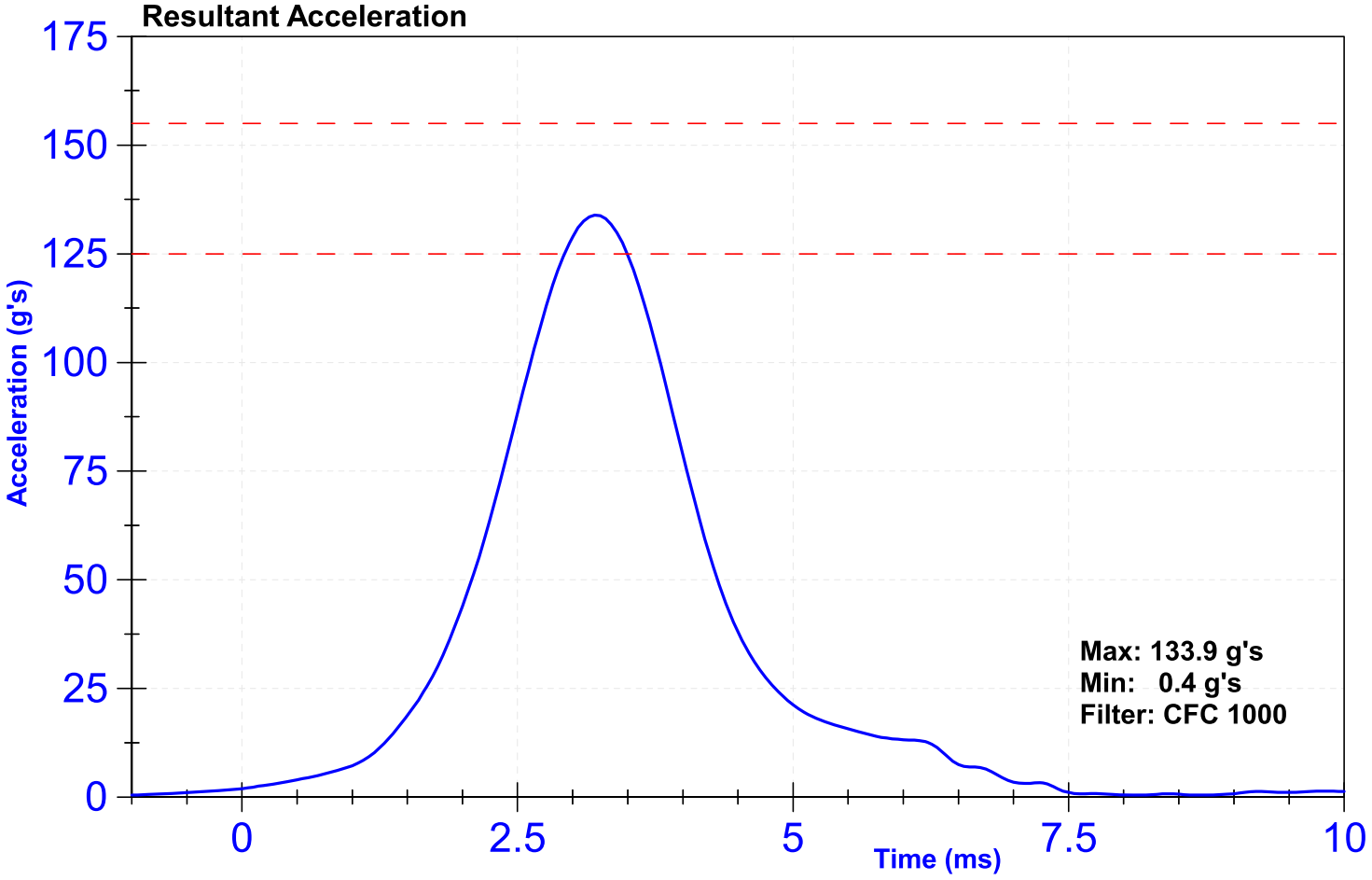
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

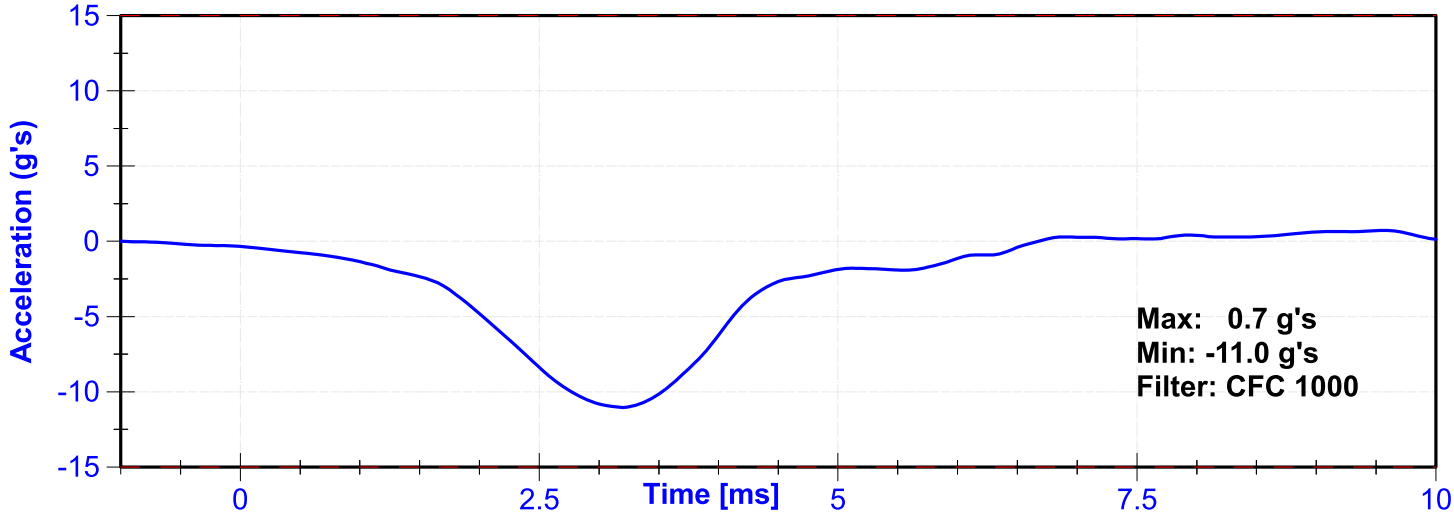
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Resultant Acceleration	125	155	g's	133.9	Pass
Oscillation	0	15	%	2.45	Pass
Fore-Aft Acceleration	-15	15	g's	-11.0	Pass

Transducer Calibrations

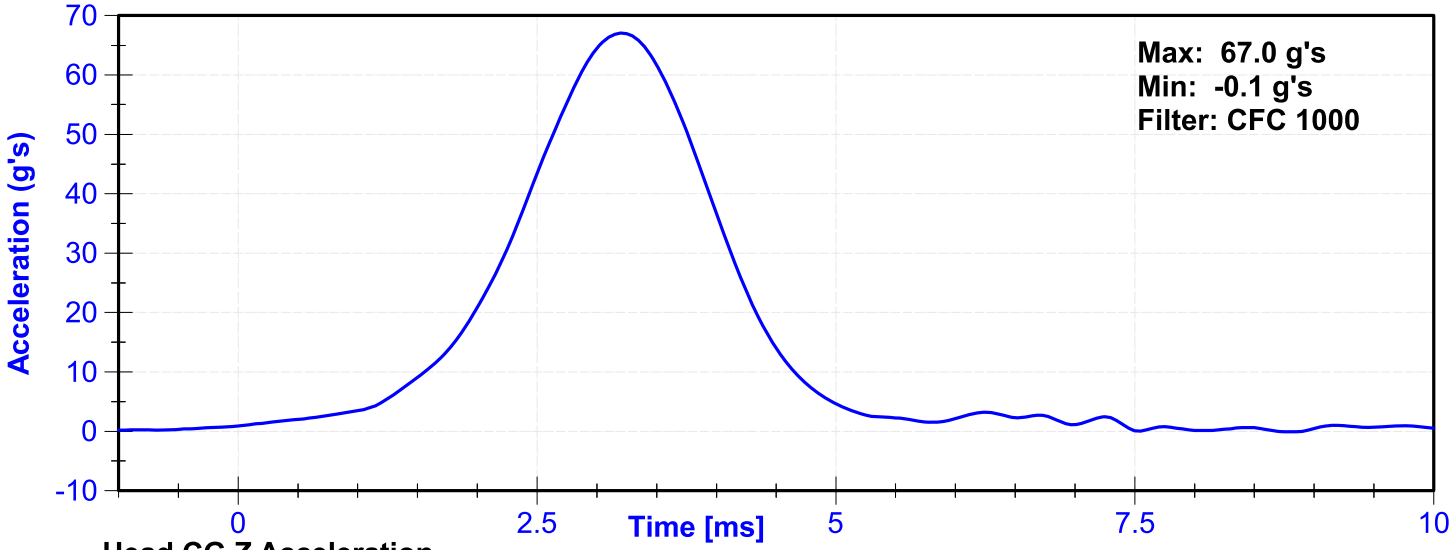
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	T21724	10/8/2024	4/6/2025
Y Accelerometer	Endevco	T22281	10/8/2024	4/6/2025
Z Accelerometer	Endevco	T26050	10/8/2024	4/6/2025



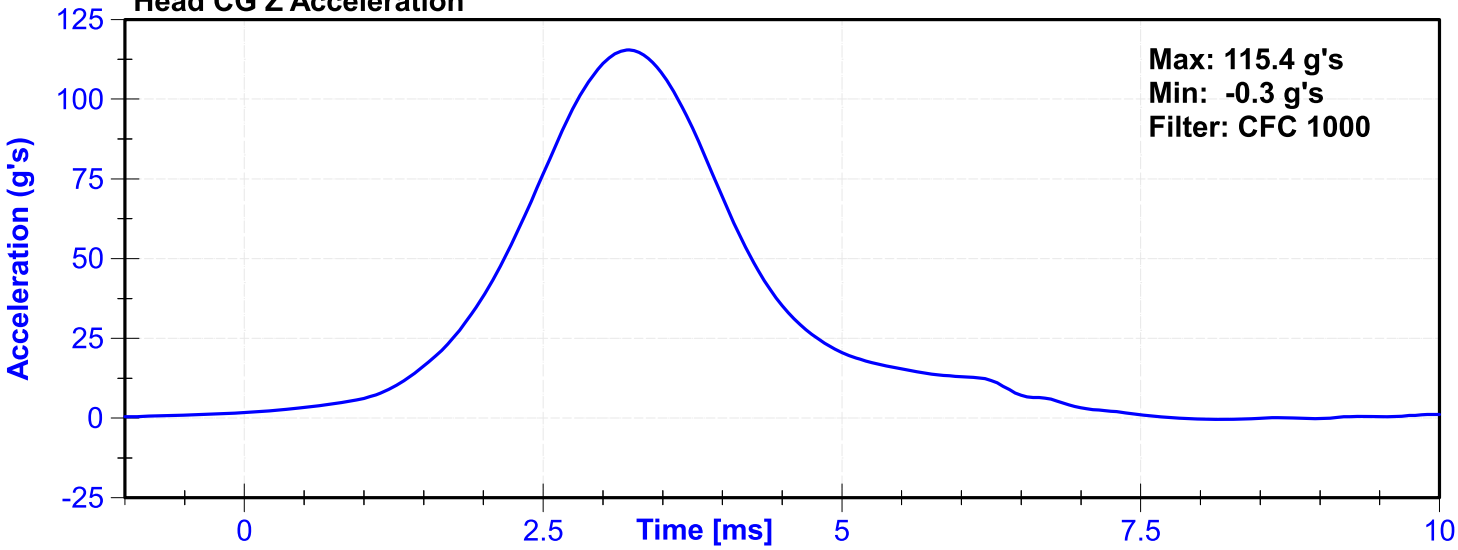
Head CG X Acceleration



Head CG Y Acceleration



Head CG Z Acceleration



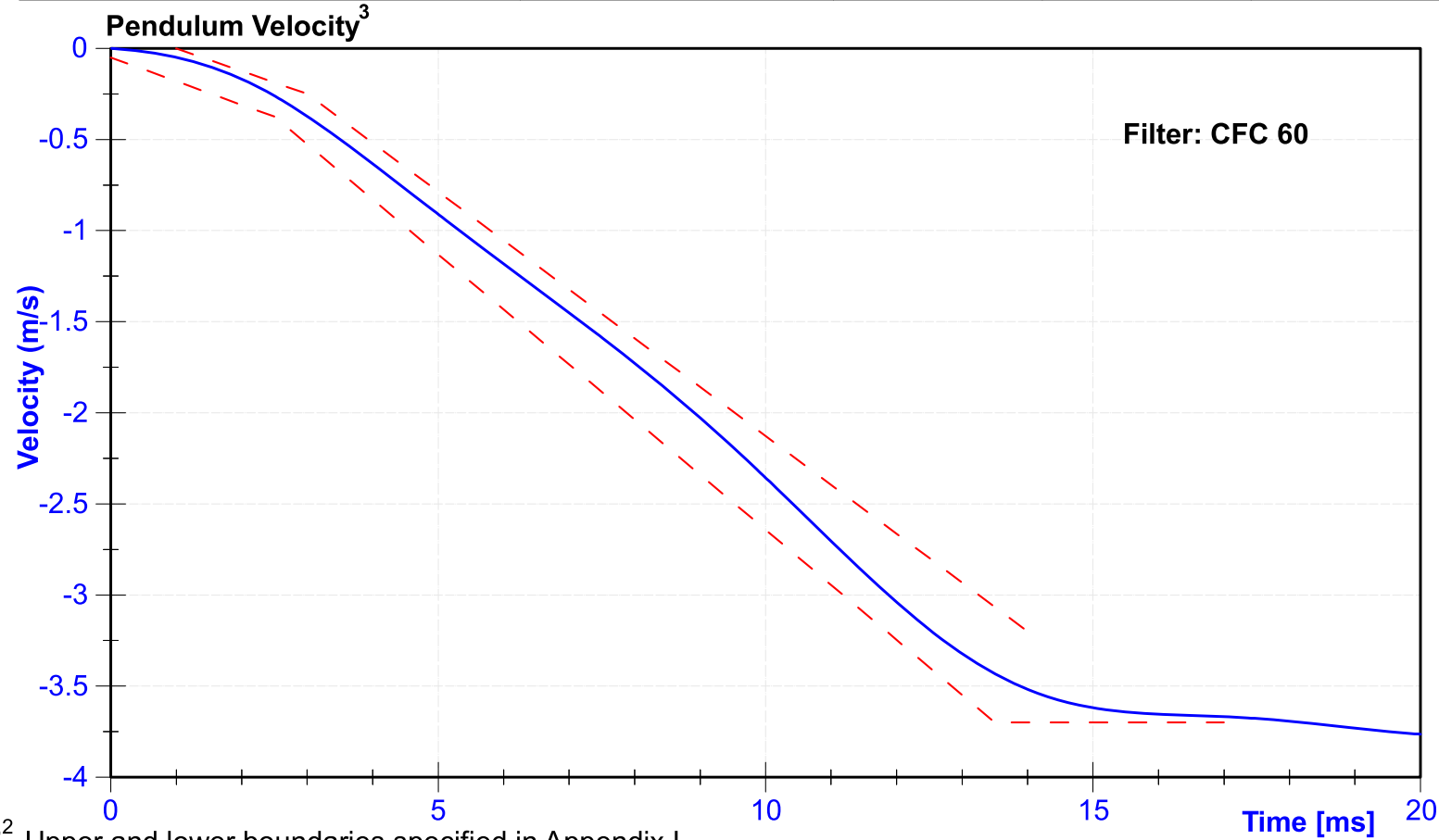
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

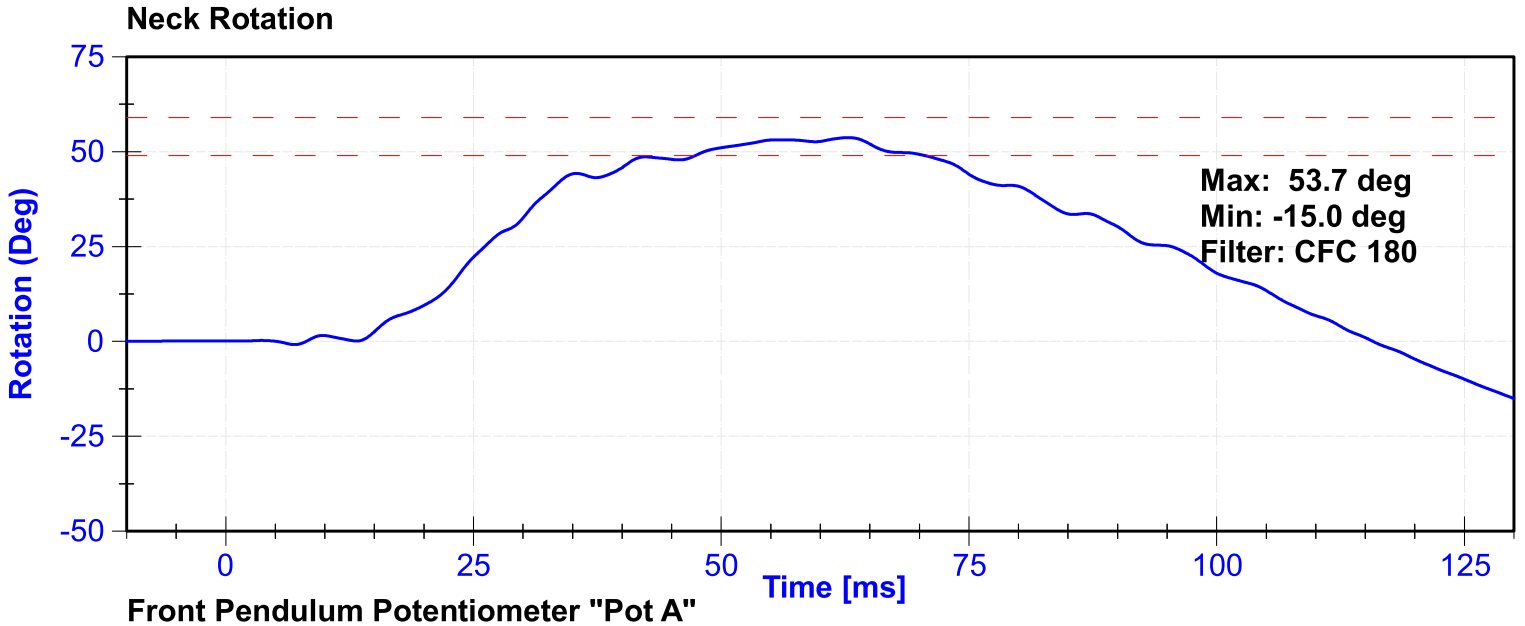
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	3.3	3.5	m/s	3.47	Pass
Lateral Neck Rotation	49	59	deg	53.7	Pass
Time at Maximum Rotation	54	66	ms	62.8	Pass
Time of Rotation Decay from Maximum	53	88	ms	53.0	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

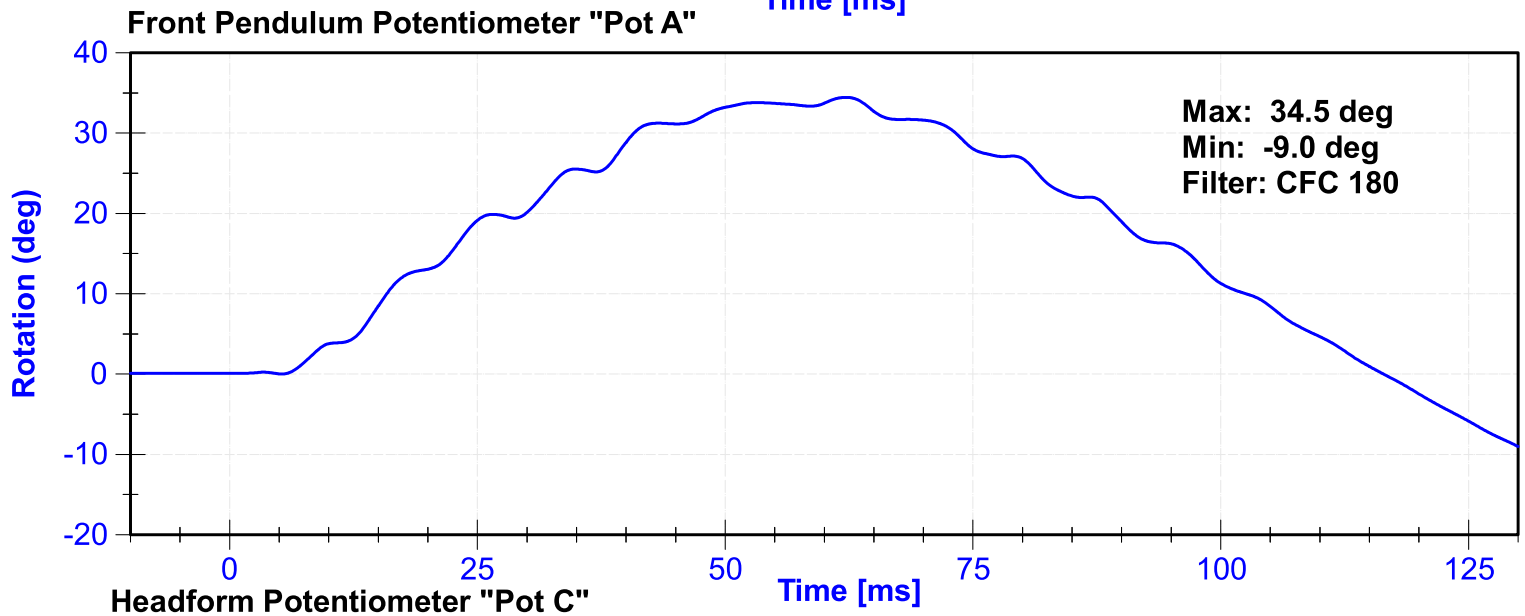
Transducer Calibrations

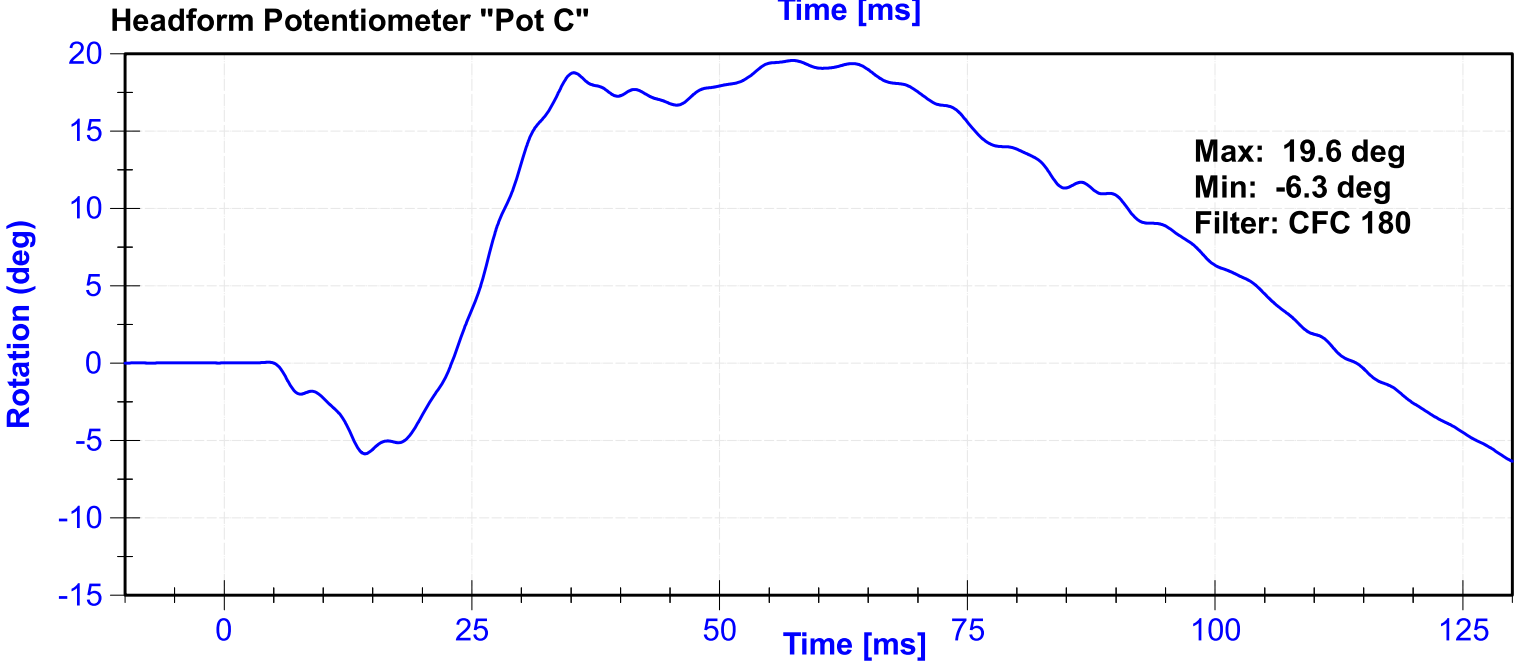
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Front Pendulum Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Headform Potentiometer	Sfernice	095	9/13/2024	9/13/2025



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


Neck Rotation
Rotation (Deg)
Time [ms]
Max: 53.7 deg
Min: -15.0 deg
Filter: CFC 180


Front Pendulum Potentiometer "Pot A"
Rotation (deg)
Time [ms]
Max: 34.5 deg
Min: -9.0 deg
Filter: CFC 180


Headform Potentiometer "Pot C"
Rotation (deg)
Time [ms]
Max: 19.6 deg
Min: -6.3 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

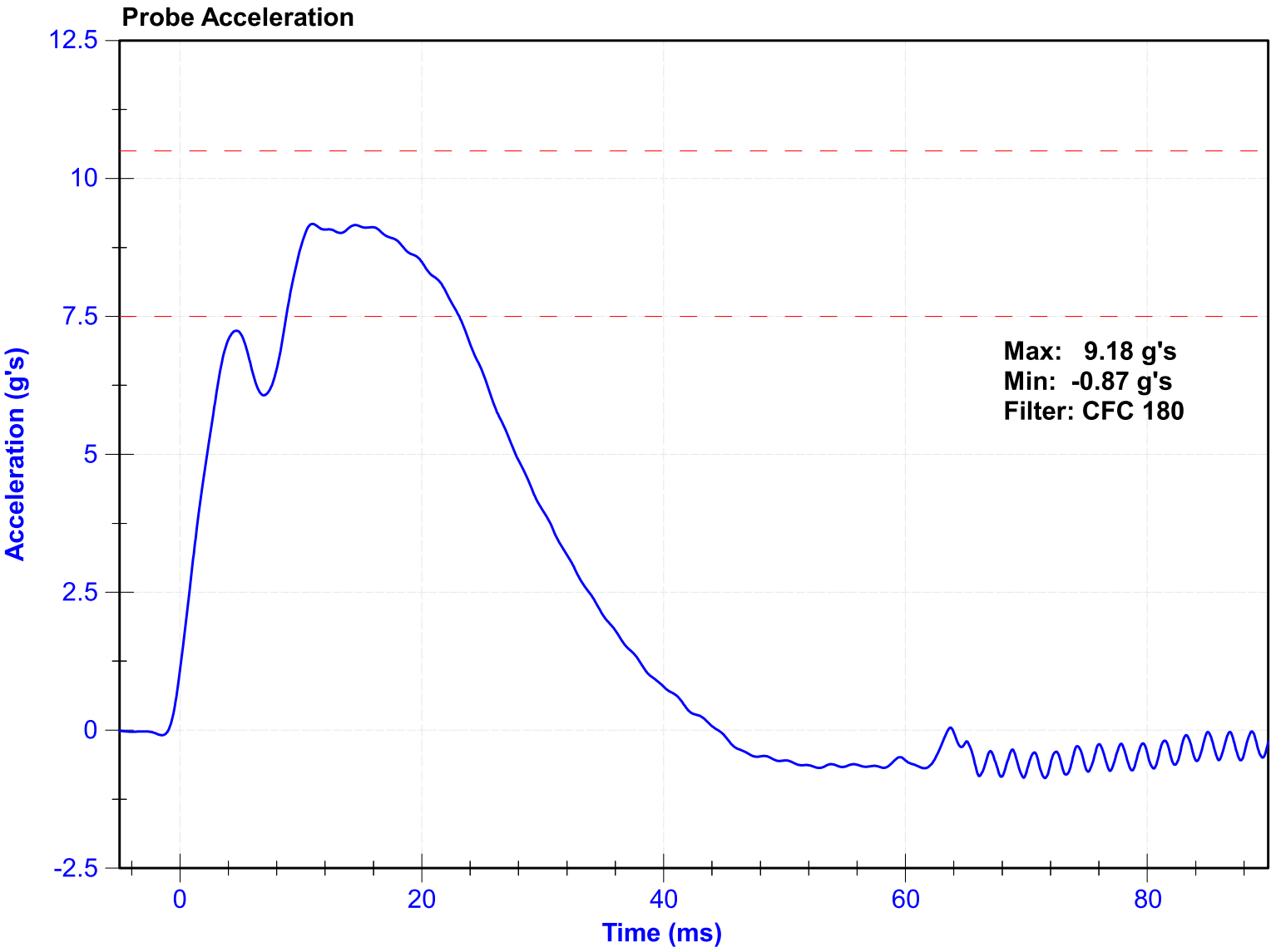
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	7.5	10.5	g's	9.18	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18566	11/26/2024	5/25/2025



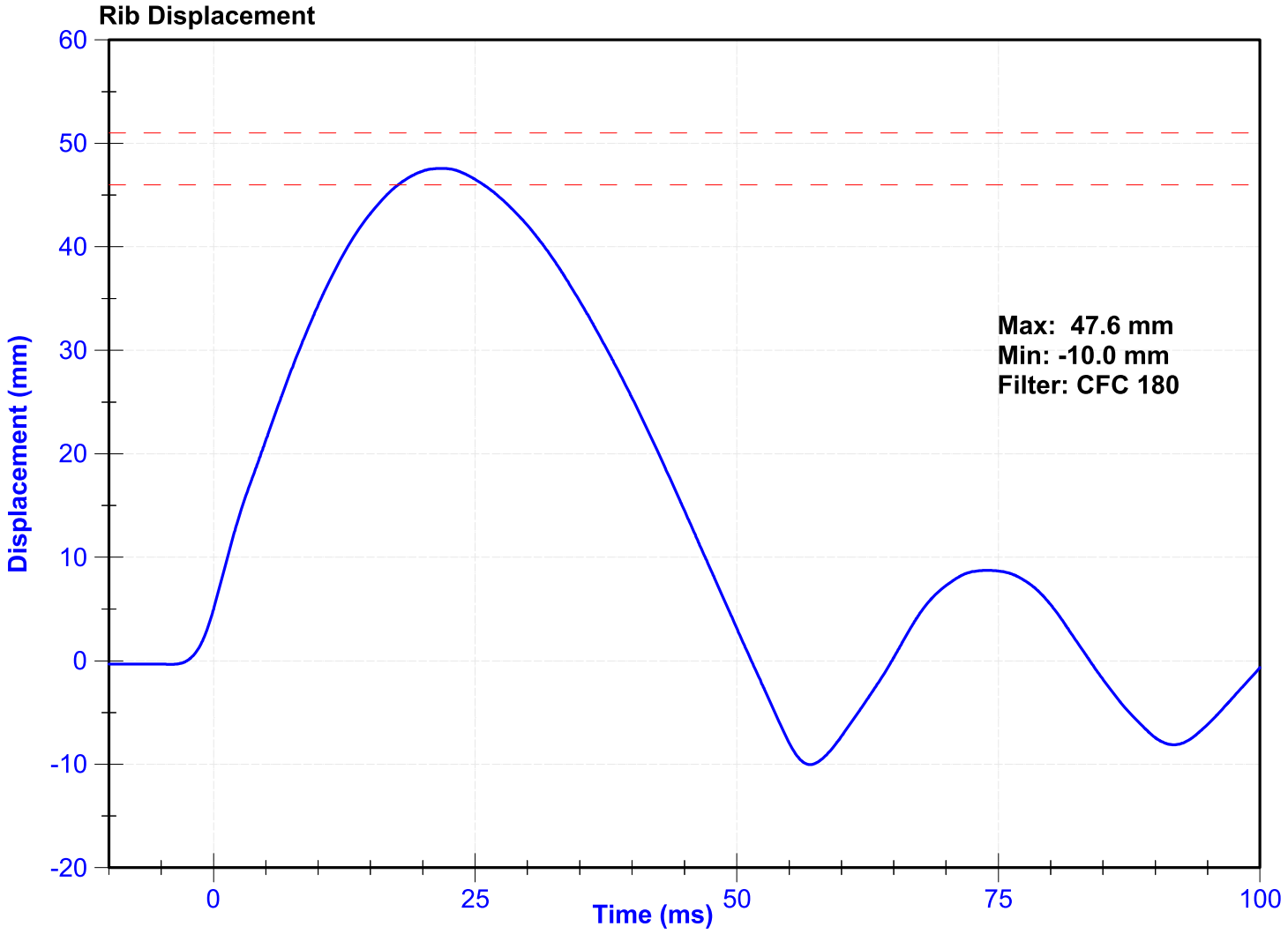
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	46	51	mm	47.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-01	10/8/2024	4/8/2025



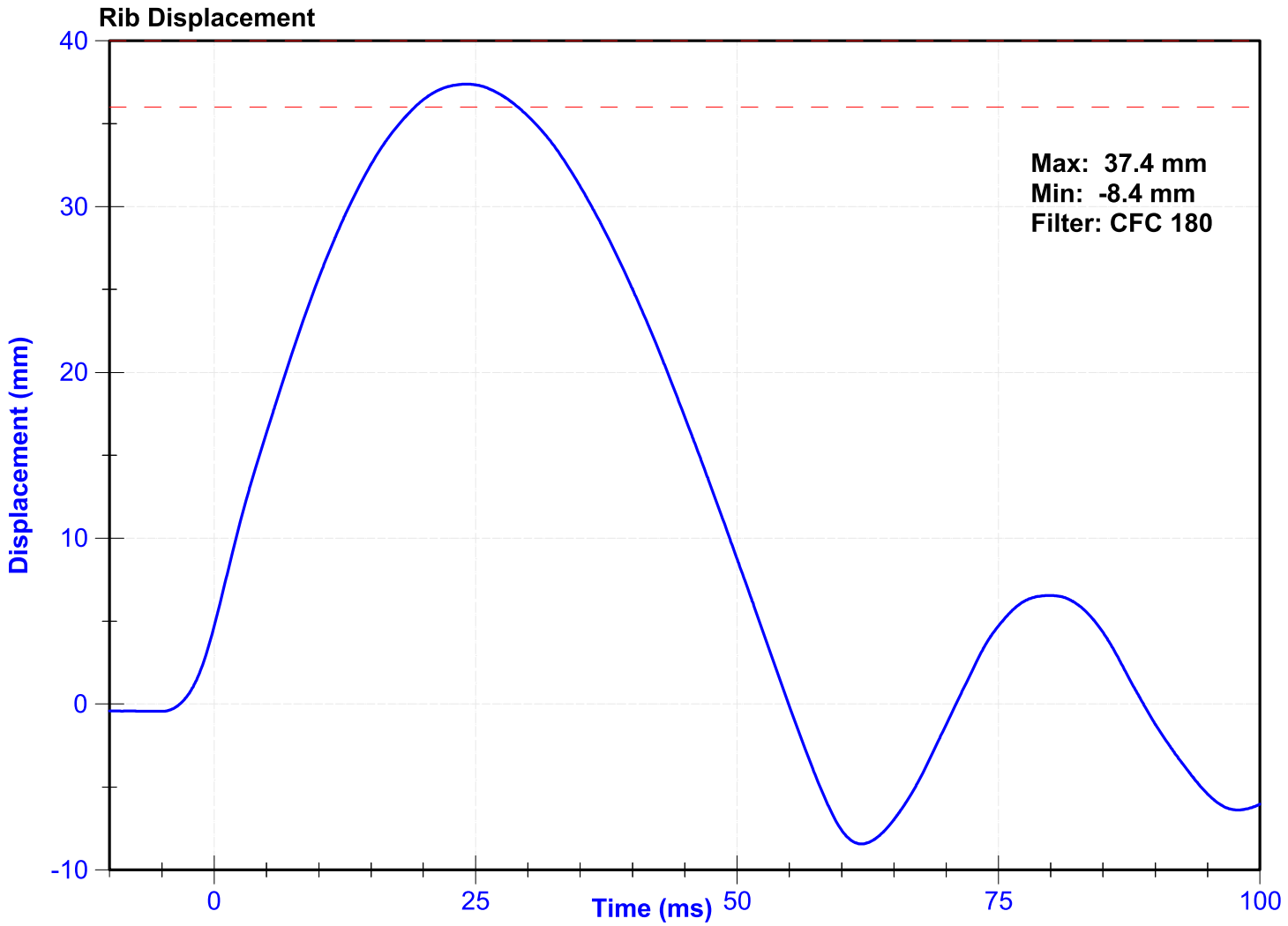
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	36	40	mm	37.4	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-01	10/8/2024	4/8/2025



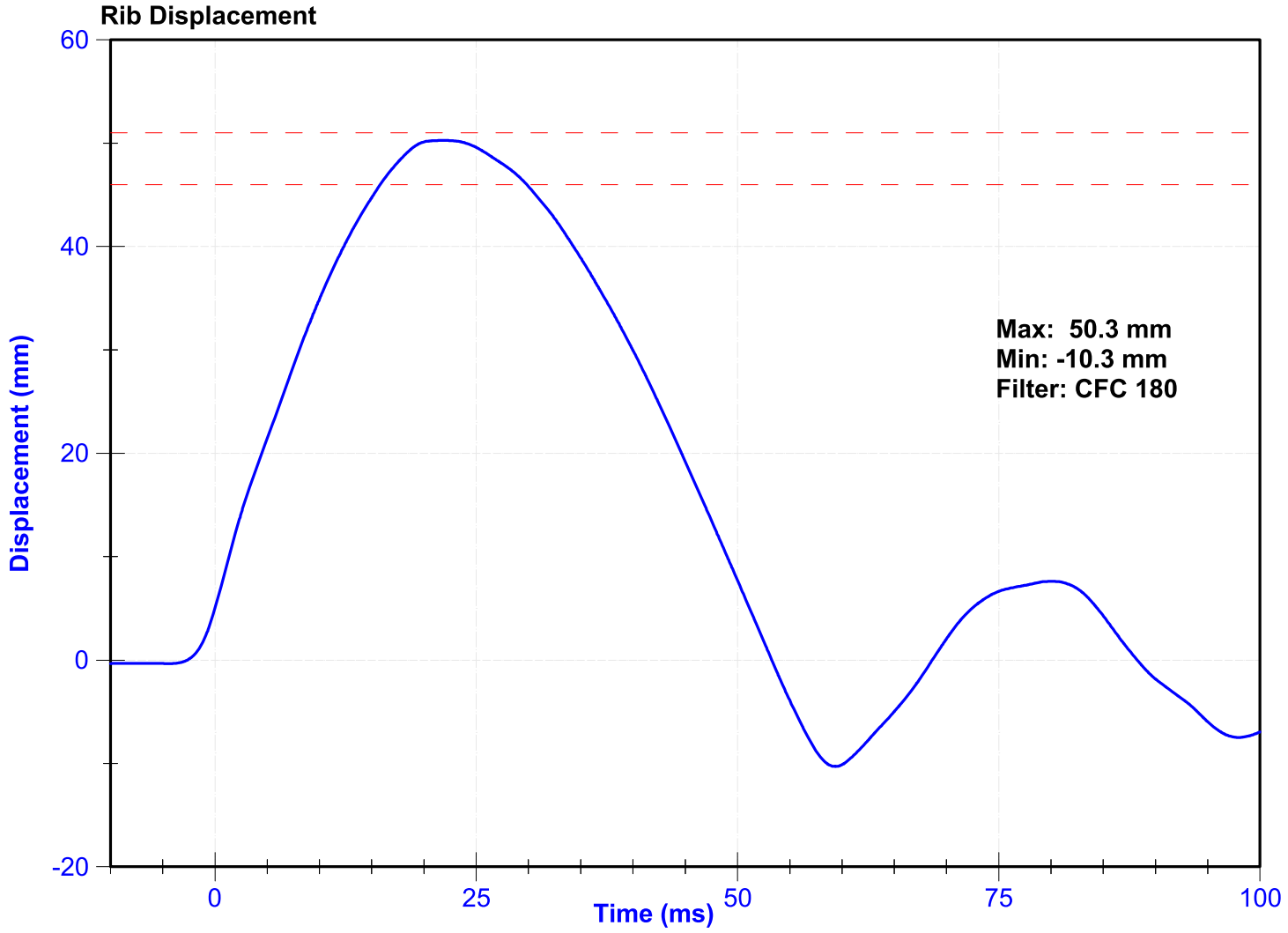
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	46	51	mm	50.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	807	10/8/2024	4/8/2025



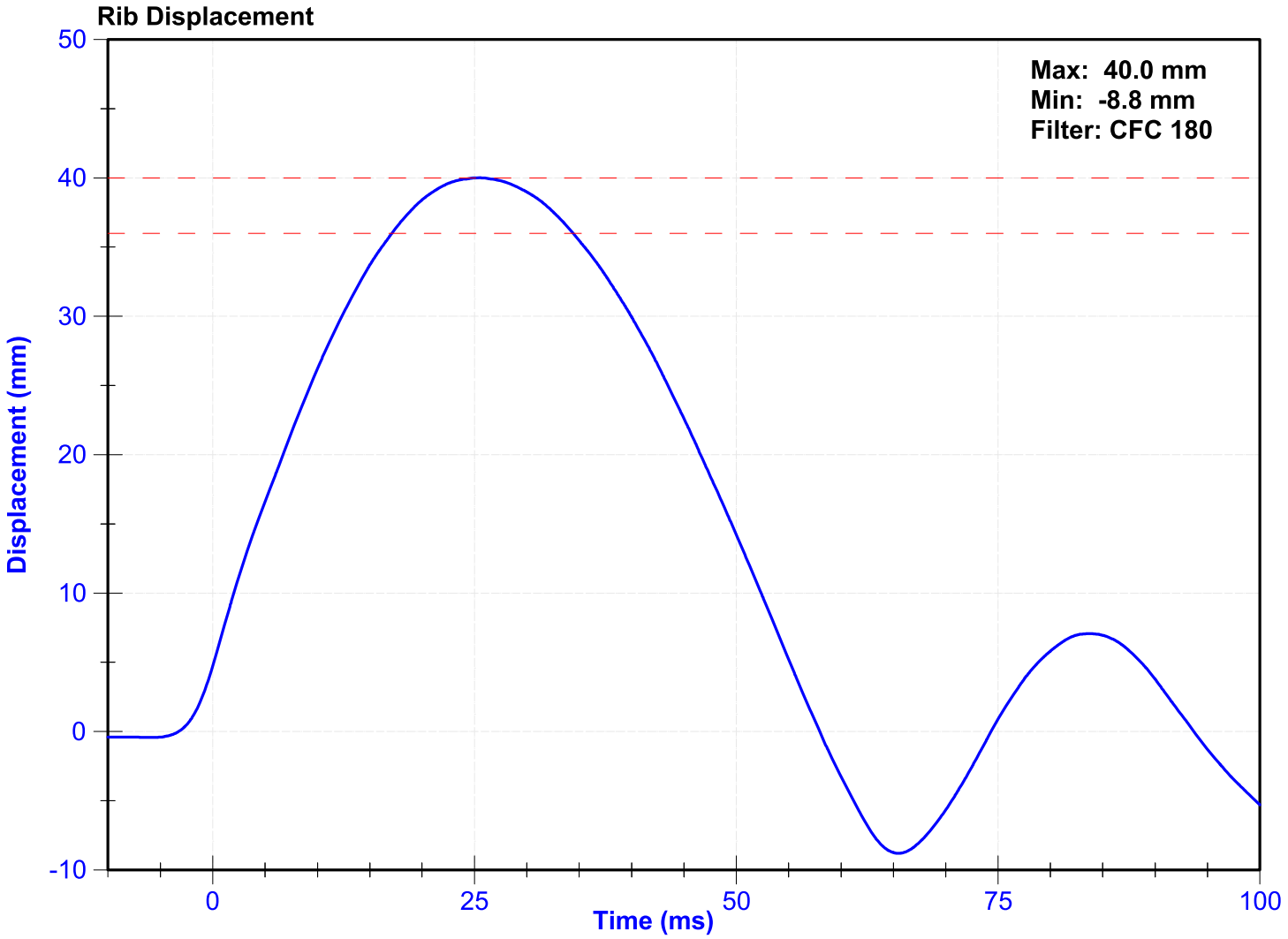
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	36	40	mm	40.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	807	10/8/2024	4/8/2025



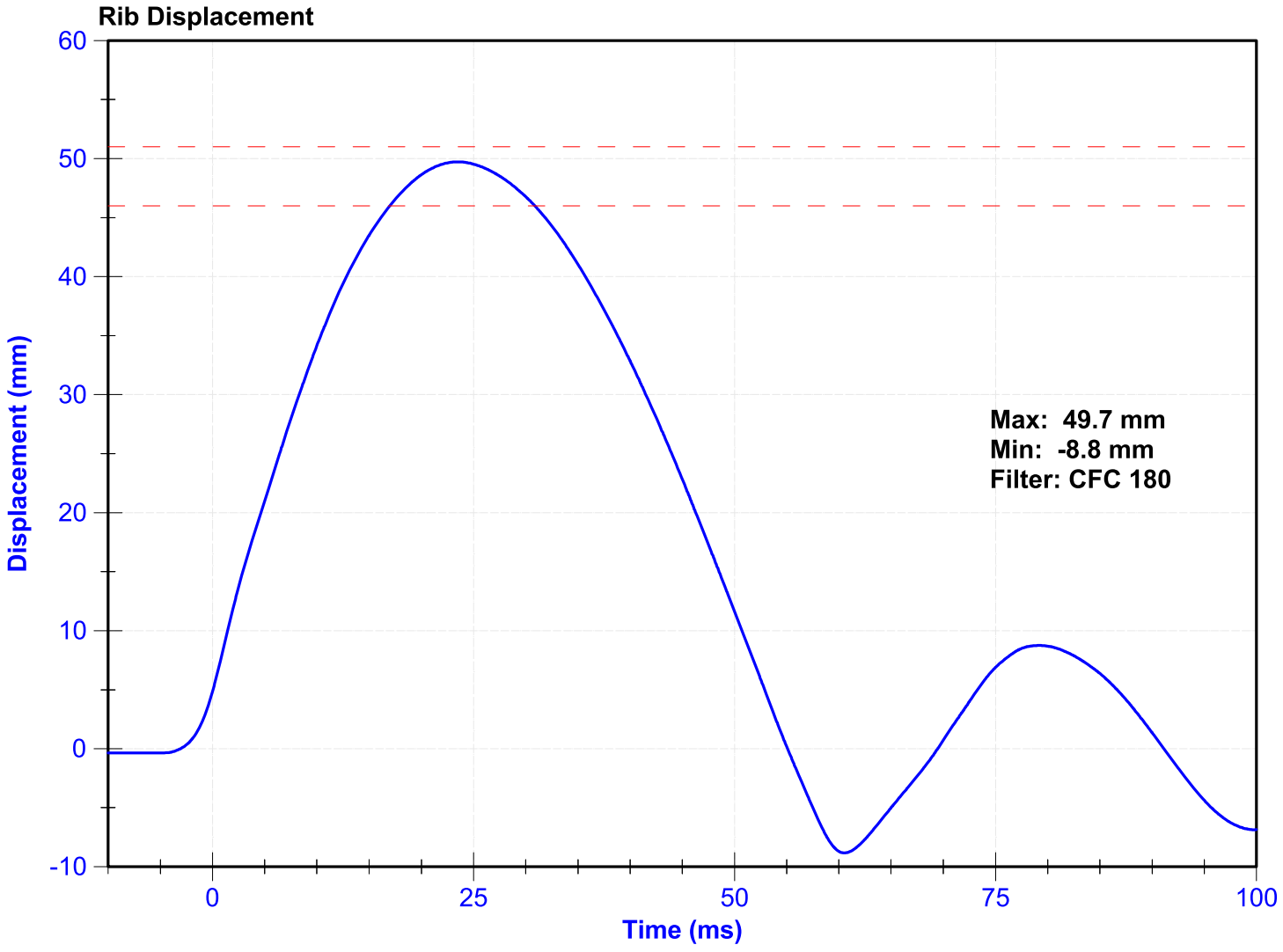
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	46	51	mm	49.7	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-03	10/8/2024	4/8/2025



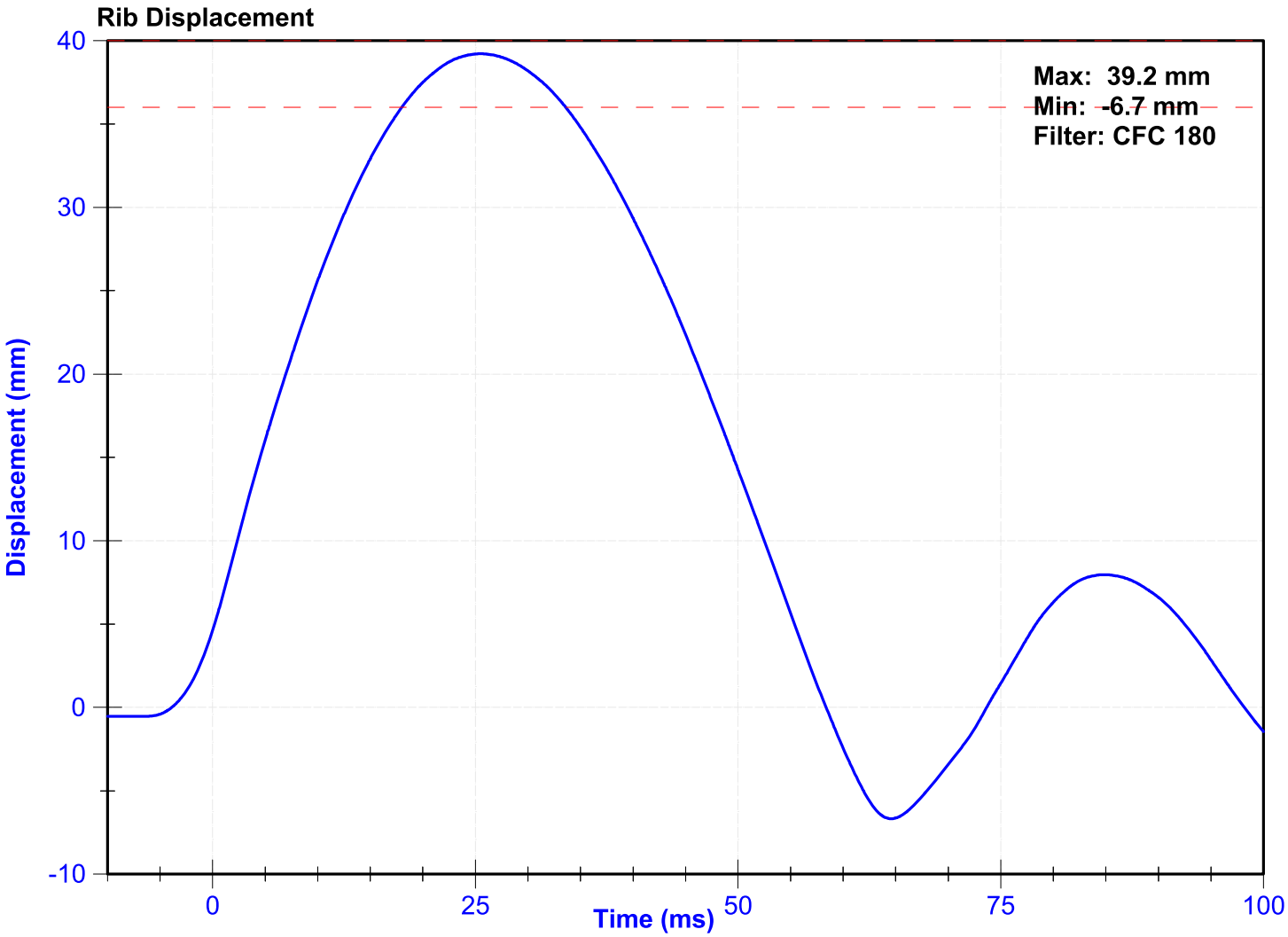
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Rib Displacement	36	40	mm	39.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Rib Potentiometer	Honeywell	0552-03	10/8/2024	4/8/2025



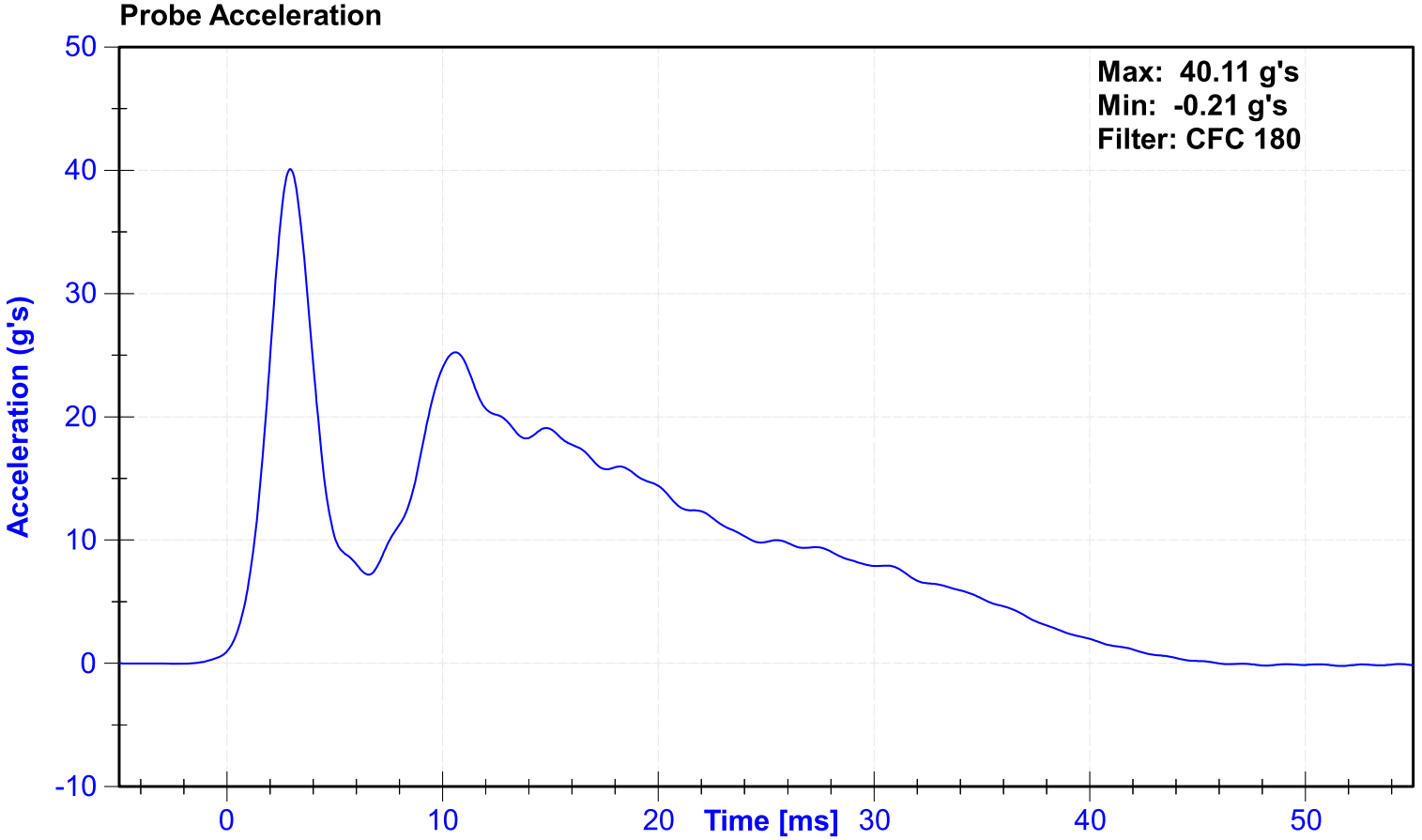
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

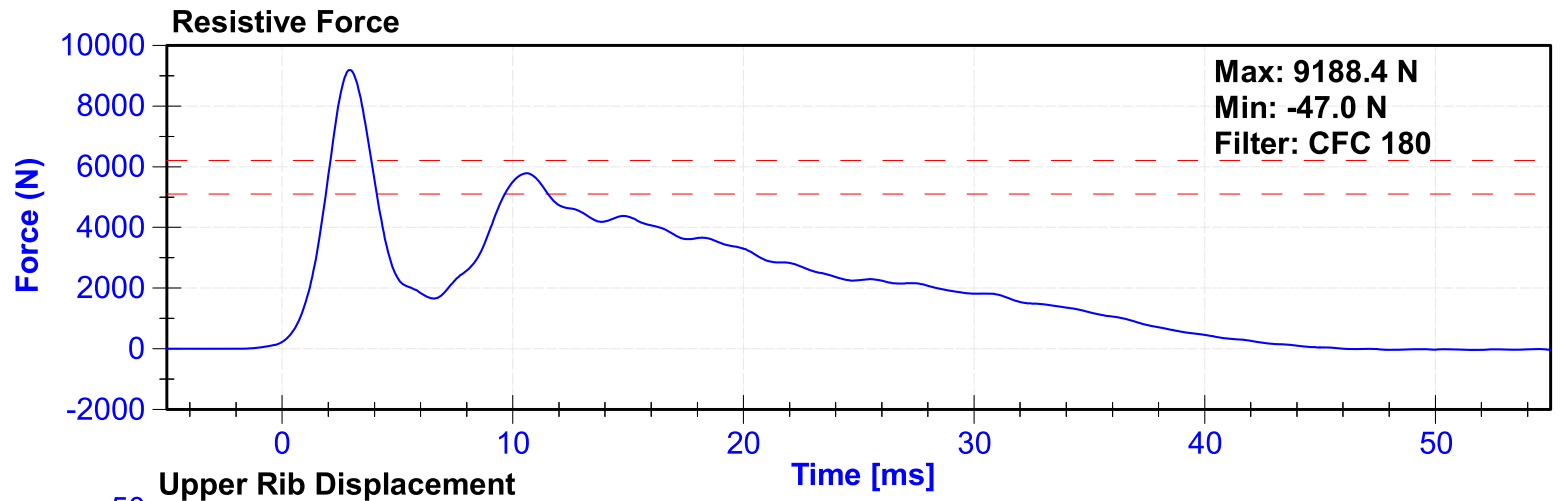
Results

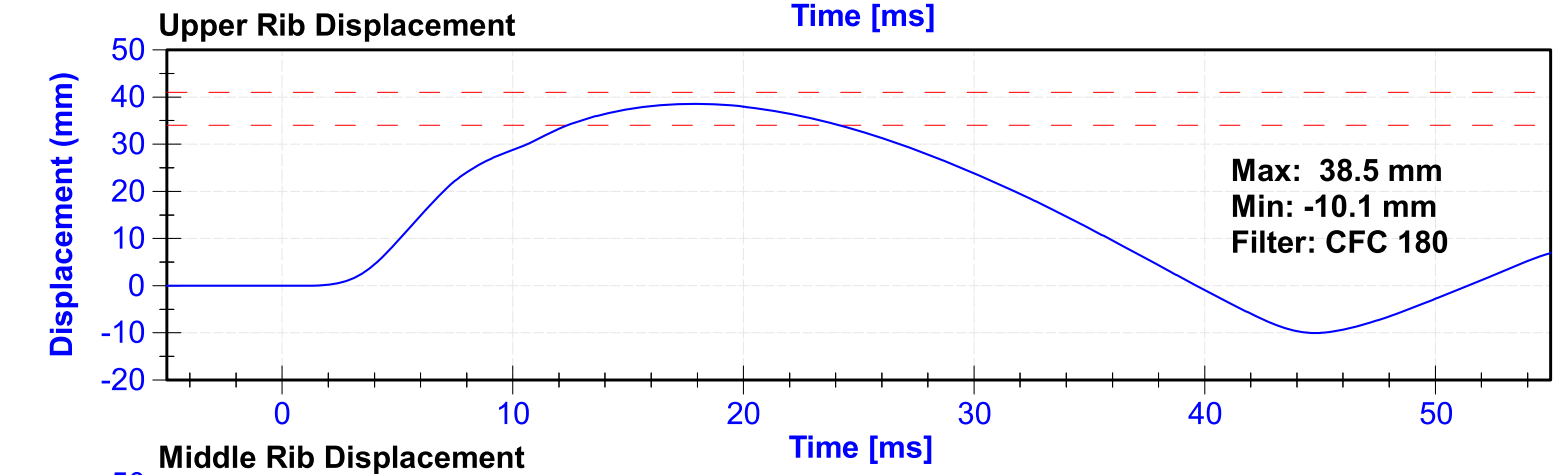
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	5.4	5.6	m/s	5.46	Pass
Resistive Force after 6ms	5100	6200	N	5783.6	Pass
Upper Thorax Rib Deflection	34	41	mm	38.5	Pass
Mid Thorax Rib Deflection	37	45	mm	43.1	Pass
Lower Thorax Rib Deflection	37	44	mm	43.9	Pass

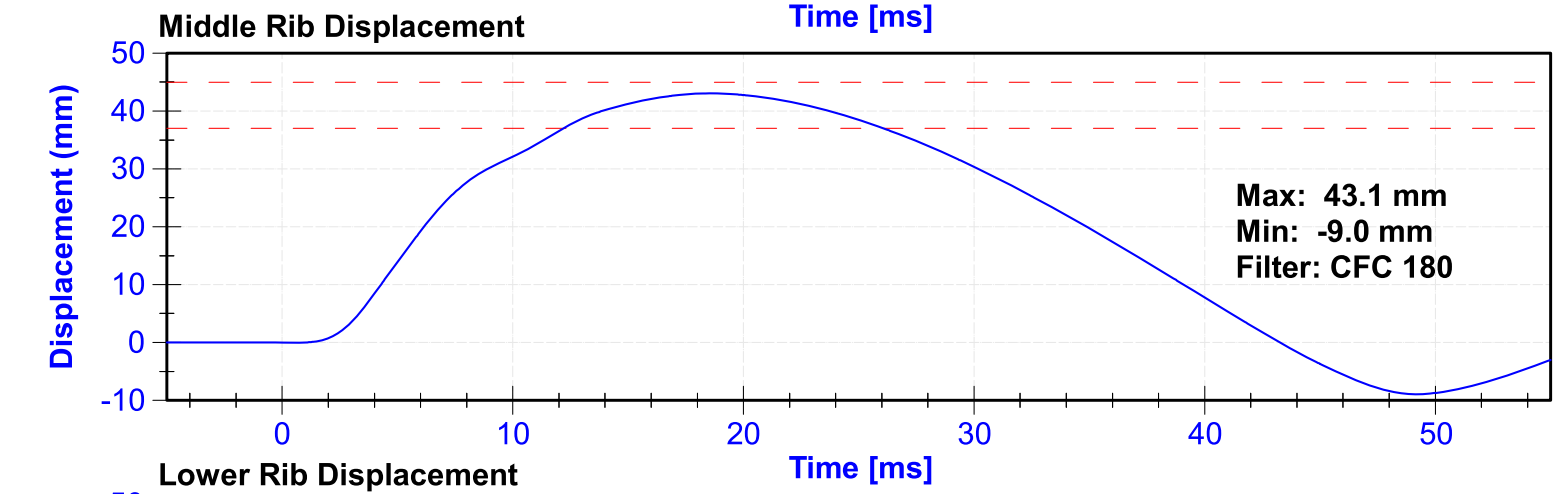
Transducer Calibrations

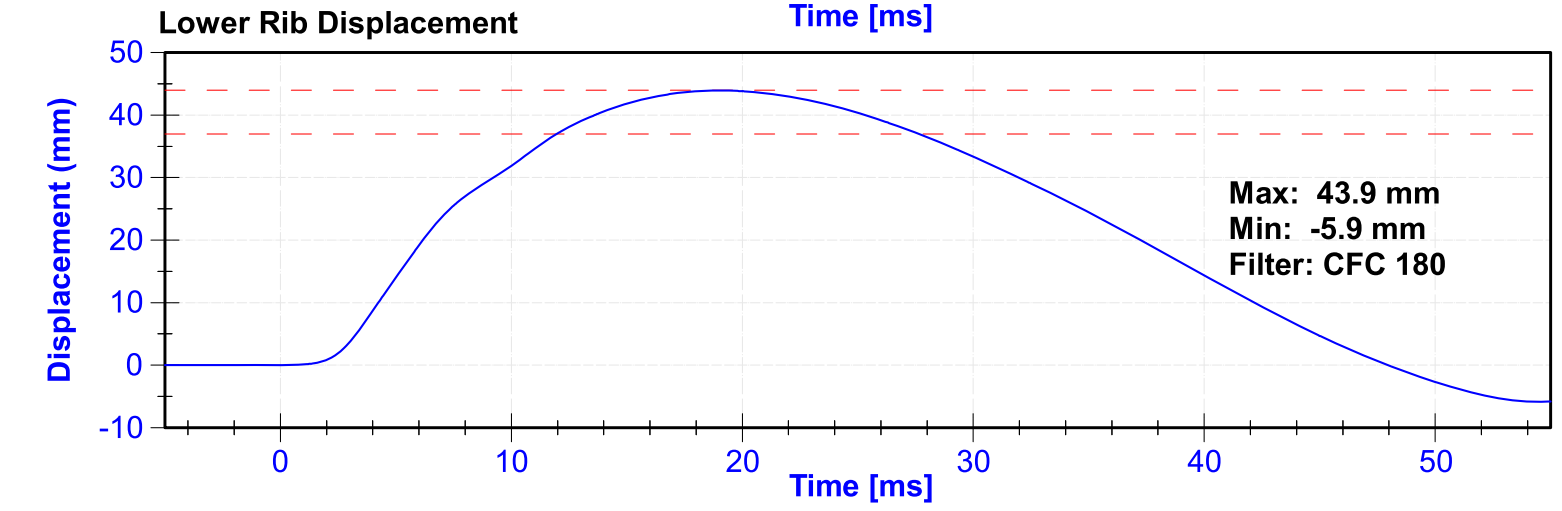
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Upper Thorax Rib Potentiometer	Honeywell	0552-01	10/8/2024	4/8/2025
Middle Thorax Rib Potentiometer	Honeywell	807	10/8/2024	4/8/2025
Lower Thorax Rib Potentiometer	Honeywell	0552-03	10/8/2024	4/8/2025




Resistive Force
Max: 9188.4 N
Min: -47.0 N
Filter: CFC 180
Force (N)
Time [ms]


Upper Rib Displacement
Max: 38.5 mm
Min: -10.1 mm
Filter: CFC 180
Displacement (mm)
Time [ms]


Middle Rib Displacement
Max: 43.1 mm
Min: -9.0 mm
Filter: CFC 180
Displacement (mm)
Time [ms]


Lower Rib Displacement
Max: 43.9 mm
Min: -5.9 mm
Filter: CFC 180
Displacement (mm)
Time [ms]

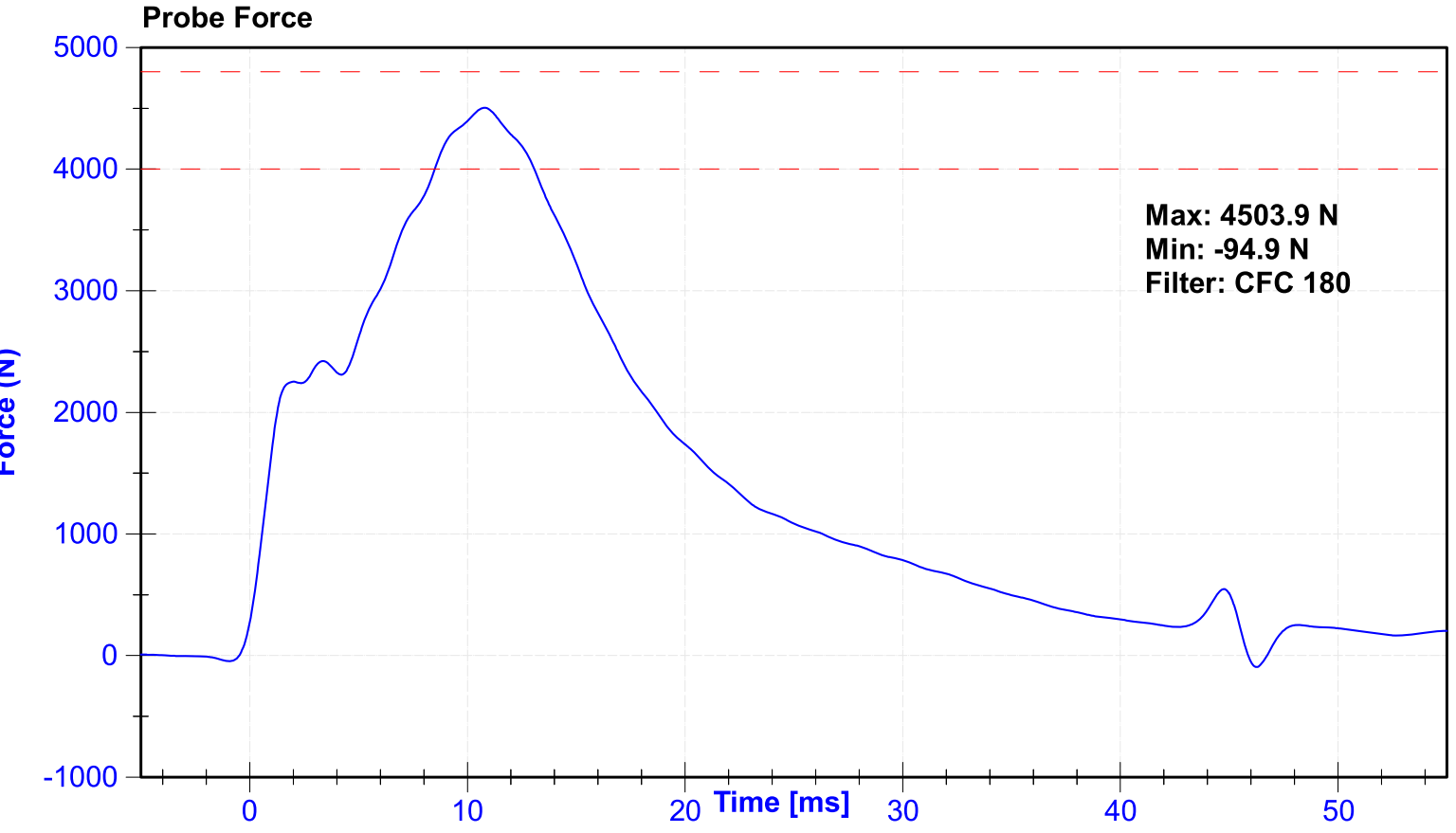
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

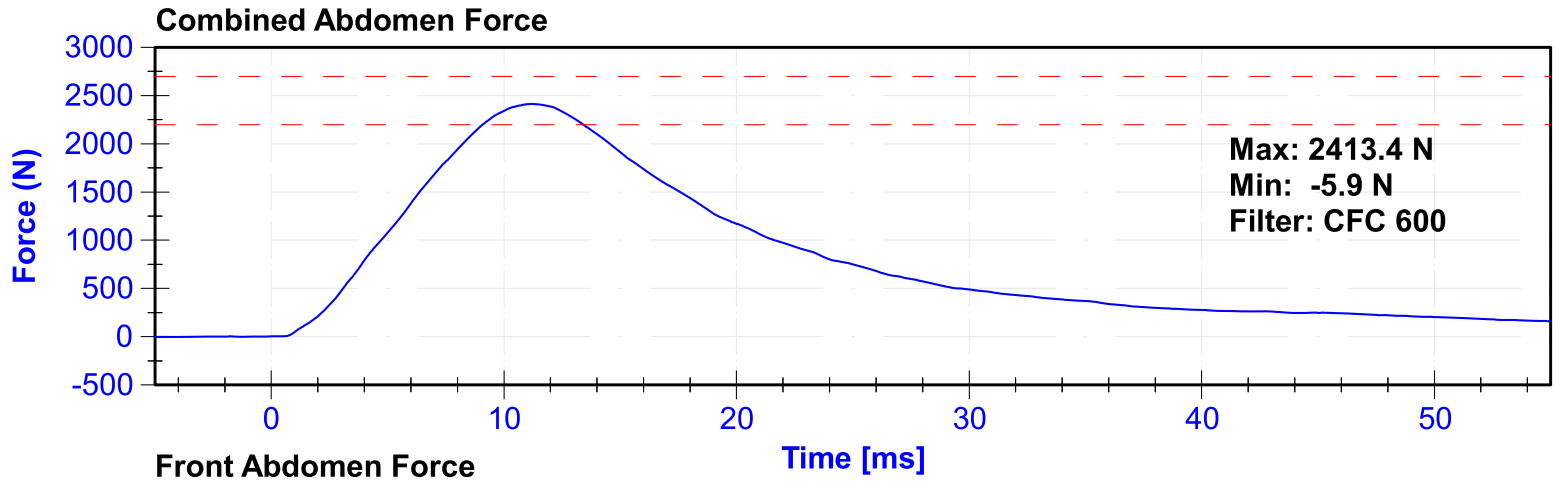
Results

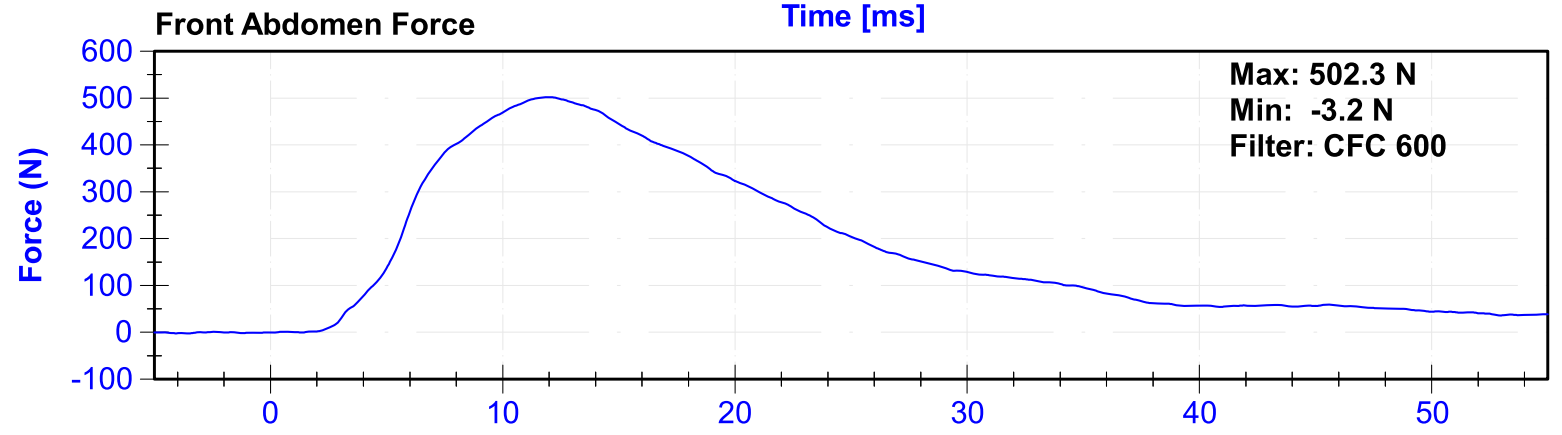
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	3.9	4.1	m/s	4.02	Pass
Combined Abdomen Force	2200	2700	N	2413.4	Pass
Time at Peak Abdomen Force	10.0	12.3	ms	11.20	Pass
Resistive Probe Force	4000	4800	N	4503.9	Pass
Time at Peak Resistive Force	10.6	13.0	ms	10.80	Pass

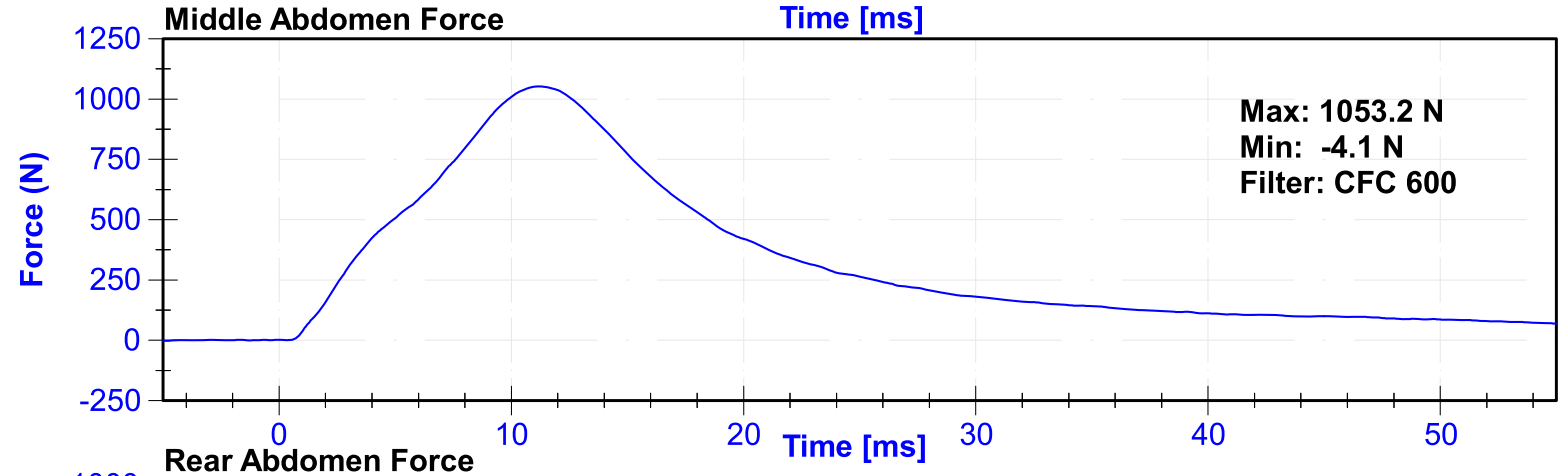
Transducer Calibrations

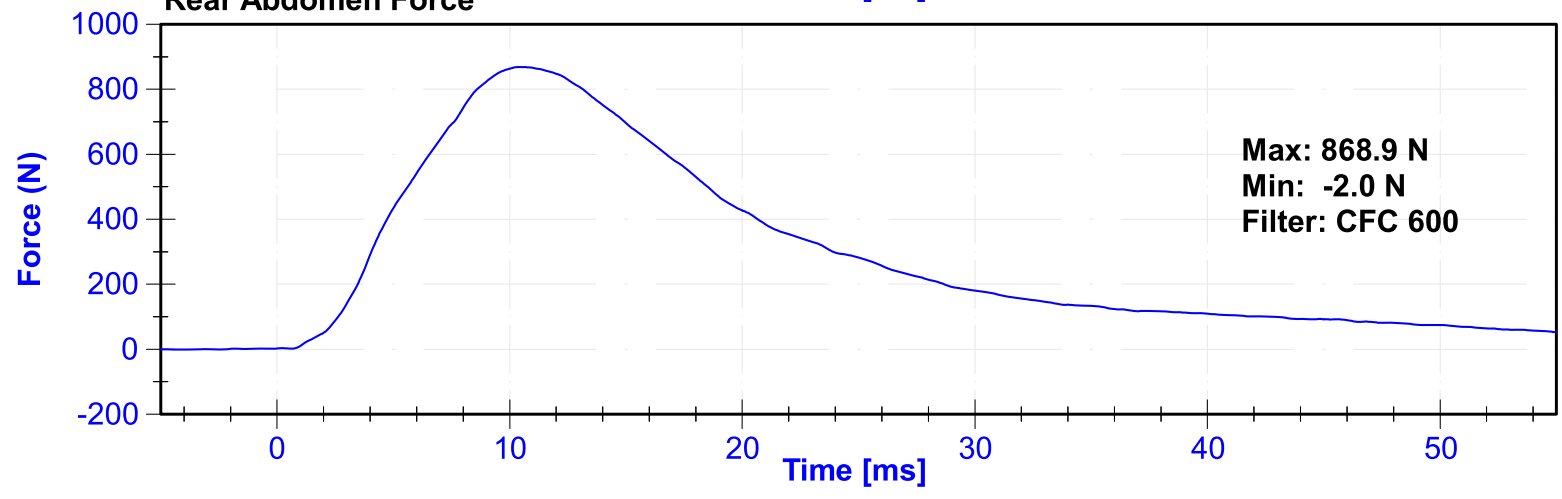
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Front Abdomen Load Cell	Denton	1512	9/16/2024	9/16/2025
Middle Abdomen Load Cell	Denton	1526	9/16/2024	9/16/2025
Rear Abdomen Load Cell	Denton	1516	9/16/2024	9/16/2025




Combined Abdomen Force
Force (N)
Time [ms]
Max: 2413.4 N
Min: -5.9 N
Filter: CFC 600


Front Abdomen Force
Force (N)
Time [ms]
Max: 502.3 N
Min: -3.2 N
Filter: CFC 600


Middle Abdomen Force
Force (N)
Time [ms]
Max: 1053.2 N
Min: -4.1 N
Filter: CFC 600


Rear Abdomen Force
Force (N)
Time [ms]
Max: 868.9 N
Min: -2.0 N
Filter: CFC 600

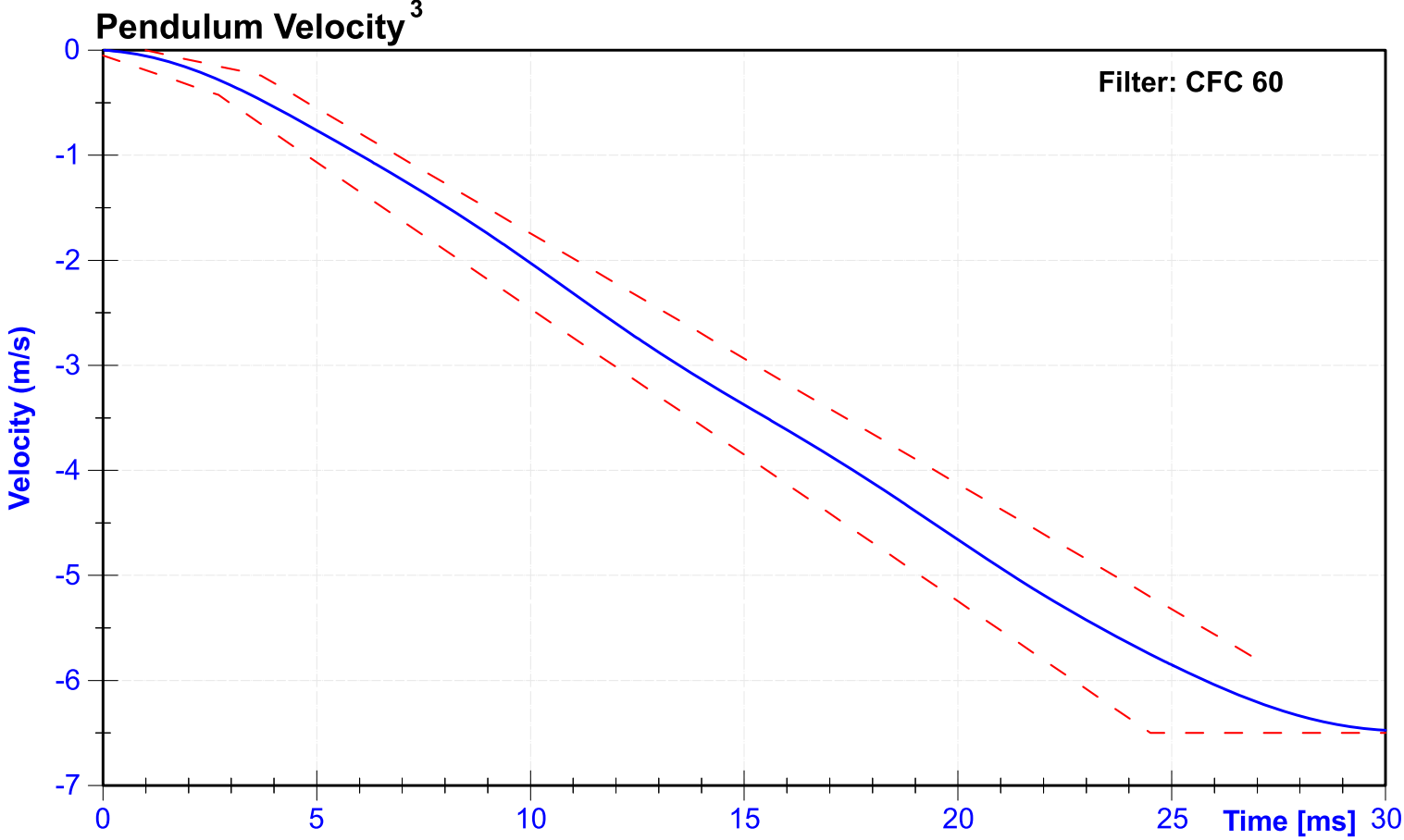
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

Results

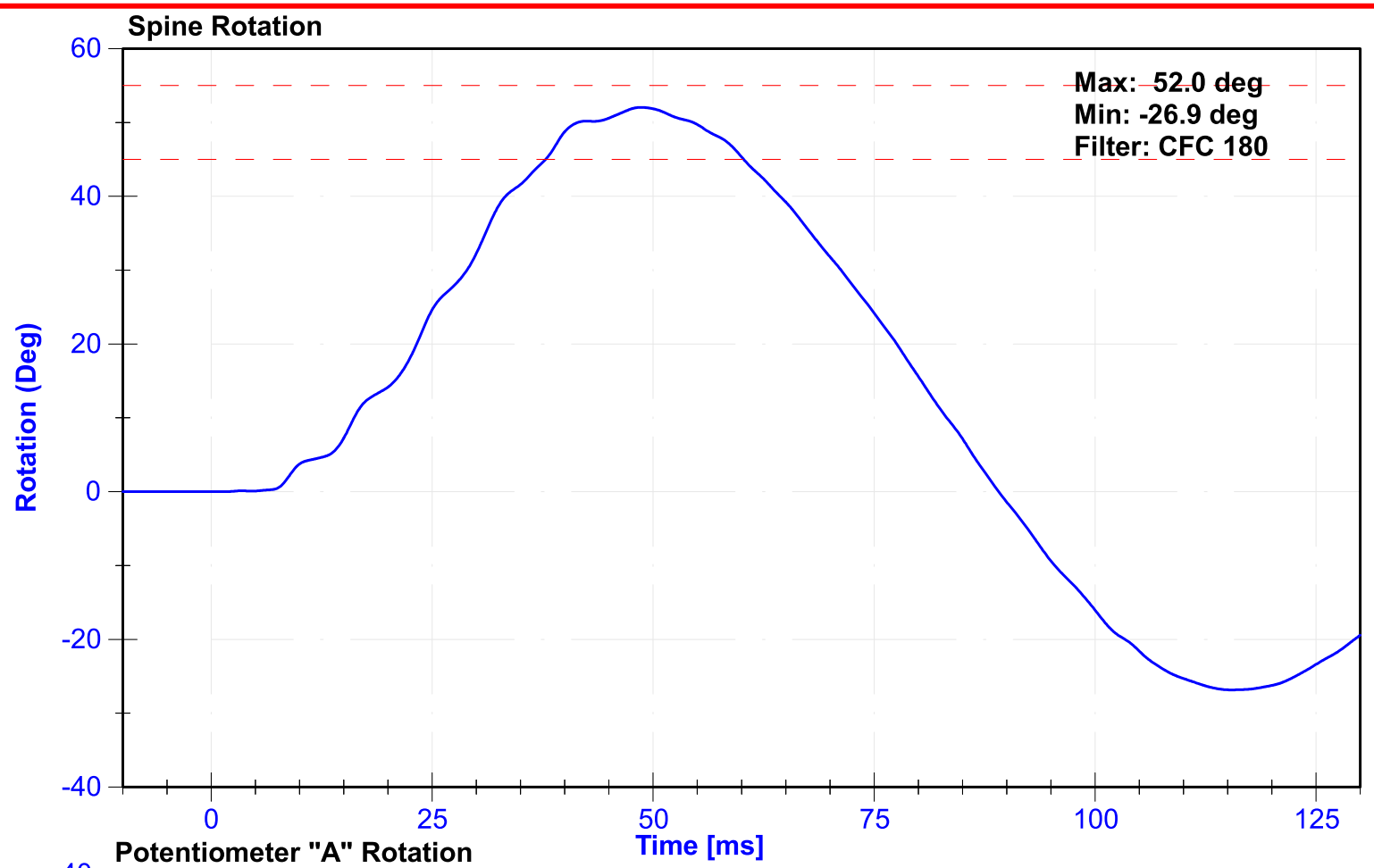
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	5.95	6.15	m/s	6.141	Pass
Lateral Spine Rotation	45	55	deg	52.0	Pass
Time at Maximum Rotation	39	53	ms	48.6	Pass
Time of Decay to Zero Degrees	37	57	ms	40.5	Pass
Pendulum Velocity Overall Corridor	Lower Boundary[1]	Upper Boundary[2]	m/s	See Plot[3]	Pass

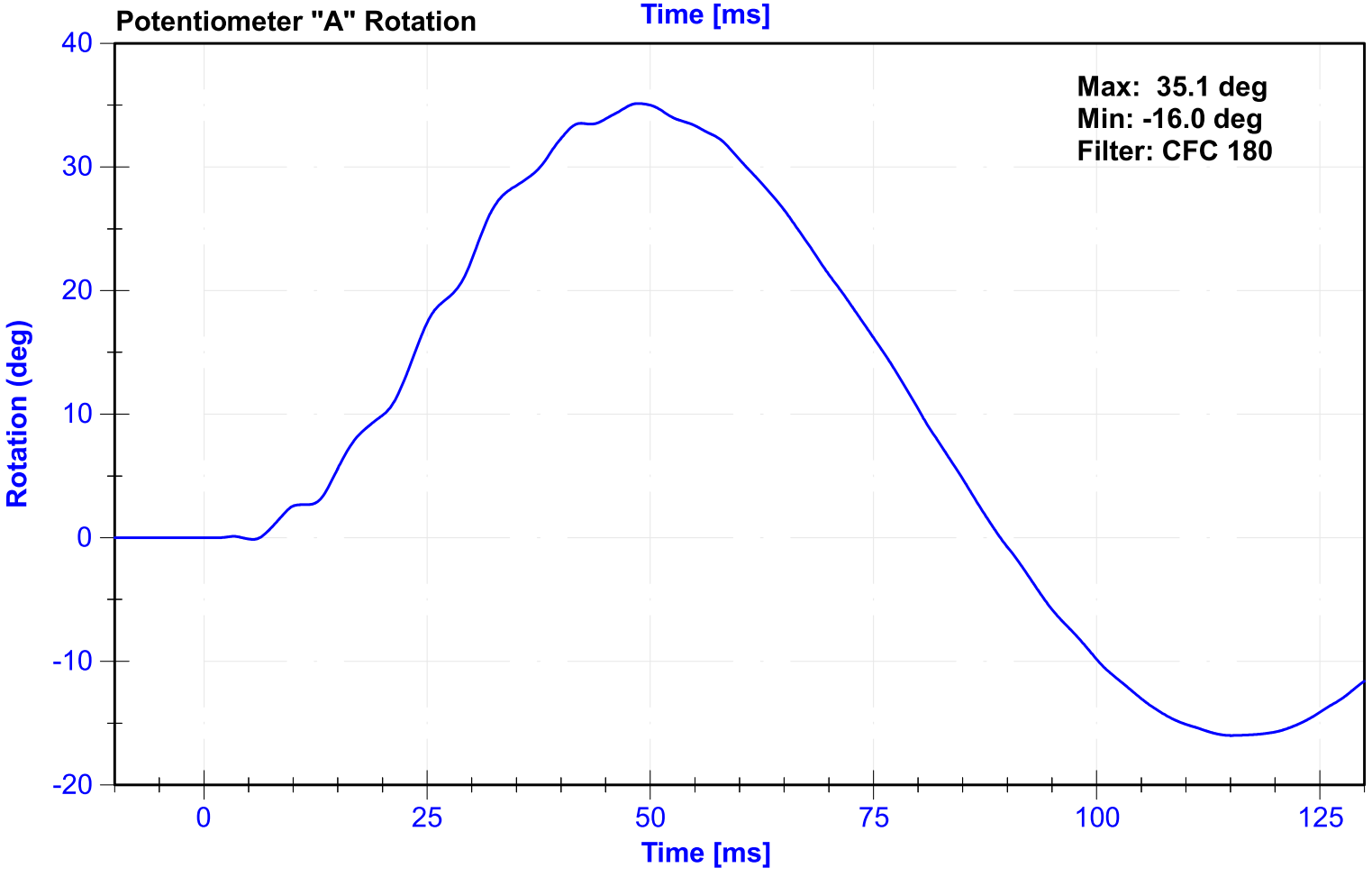
Transducer Calibrations

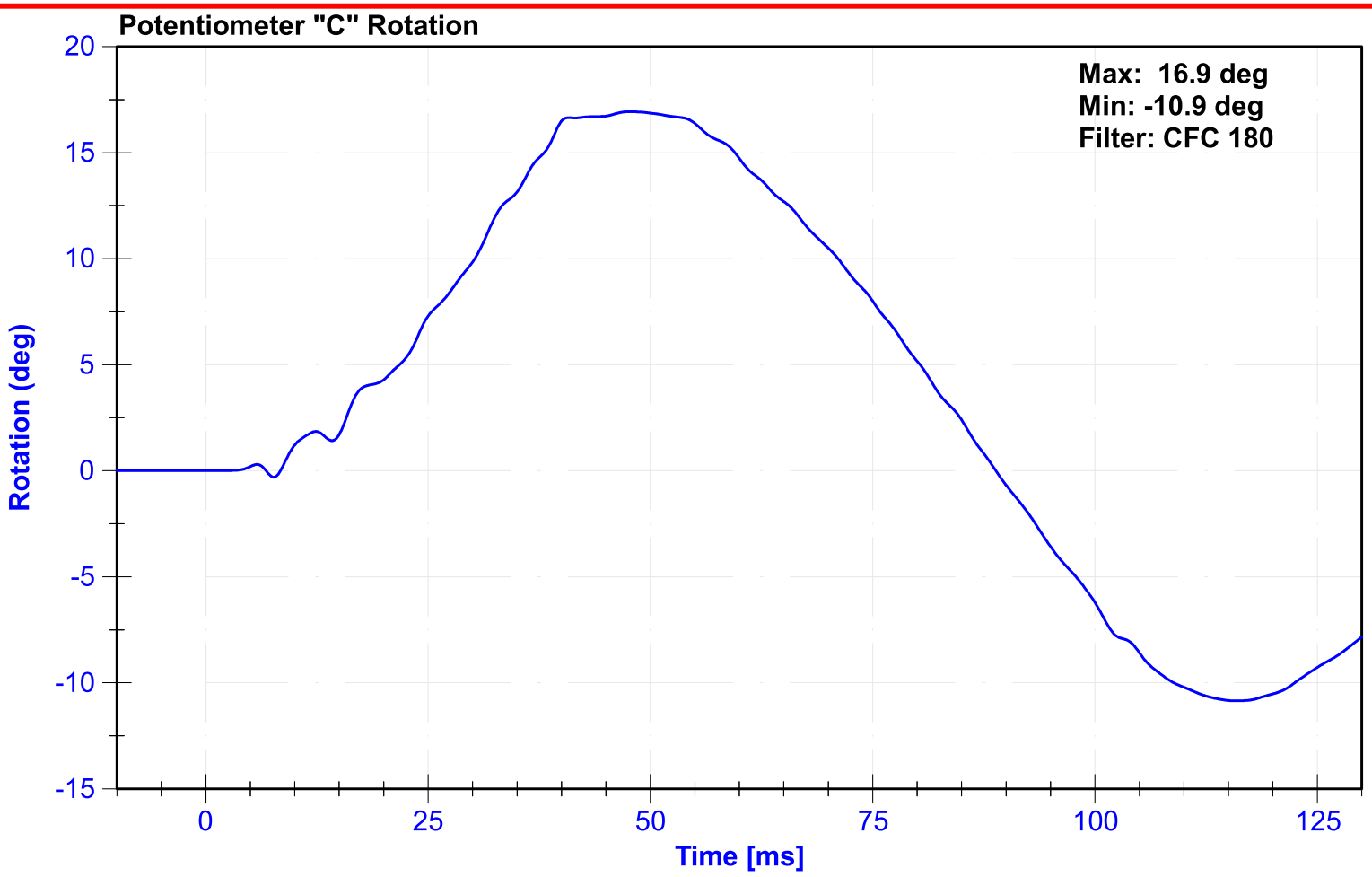
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Pendulum "A" Potentiometer	Sfernice	2247	9/13/2024	9/13/2025
Condyle "B" Potentiometer	Sfernice	095	9/13/2024	9/13/2025



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


Spine Rotation
Max: 52.0 deg
Min: -26.9 deg
Filter: CFC 180
Rotation (Deg)
60
40
20
0
-20
-40
0
25
50
75
100
125
Time [ms]


Potentiometer "A" Rotation
Max: 35.1 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

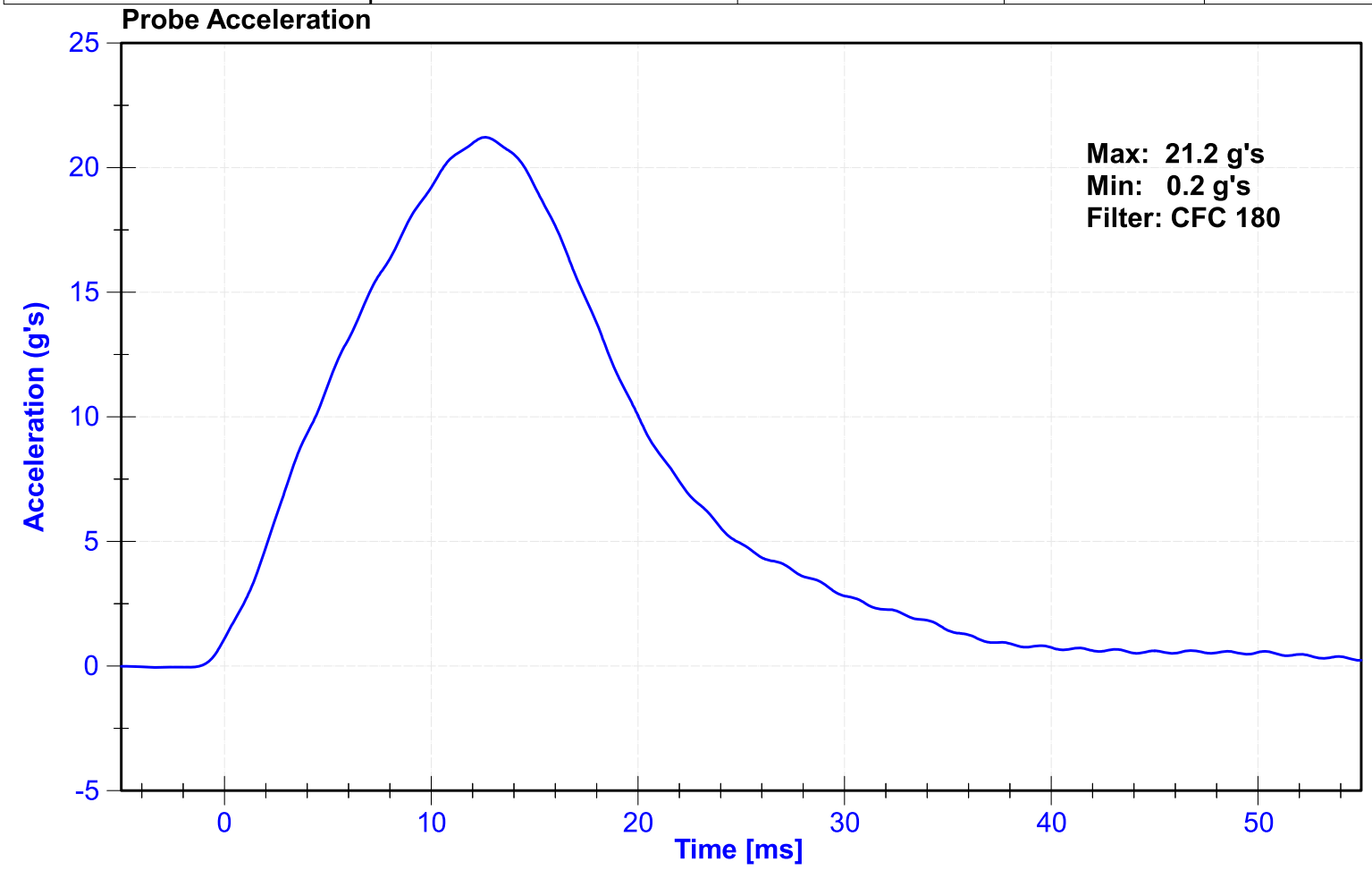
ATD Manufacturer	Denton	Test Technician	E. Andruczyk
ATD Serial Number	D037	Laboratory Supervisor	J. Kinderman

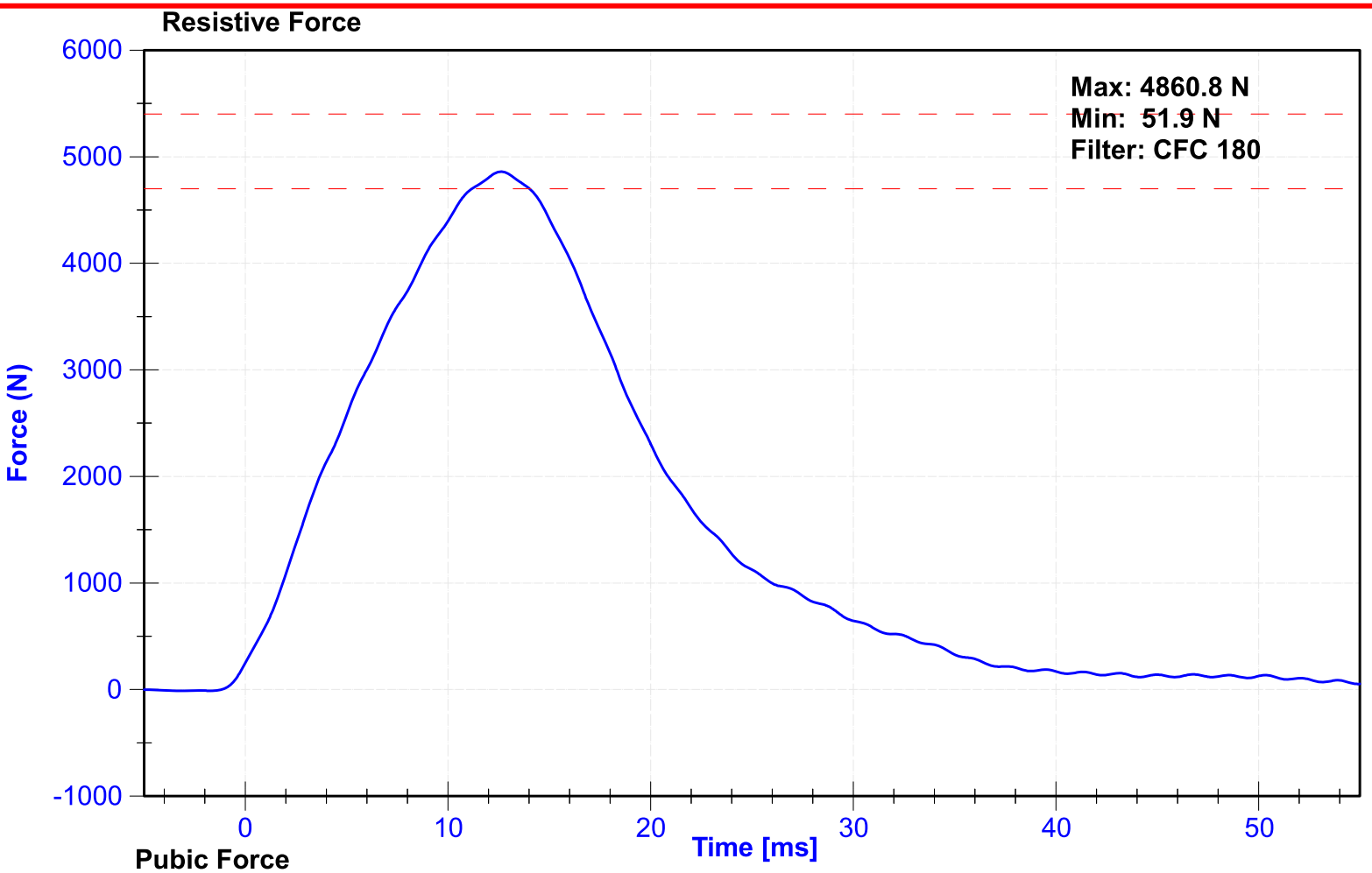
Results

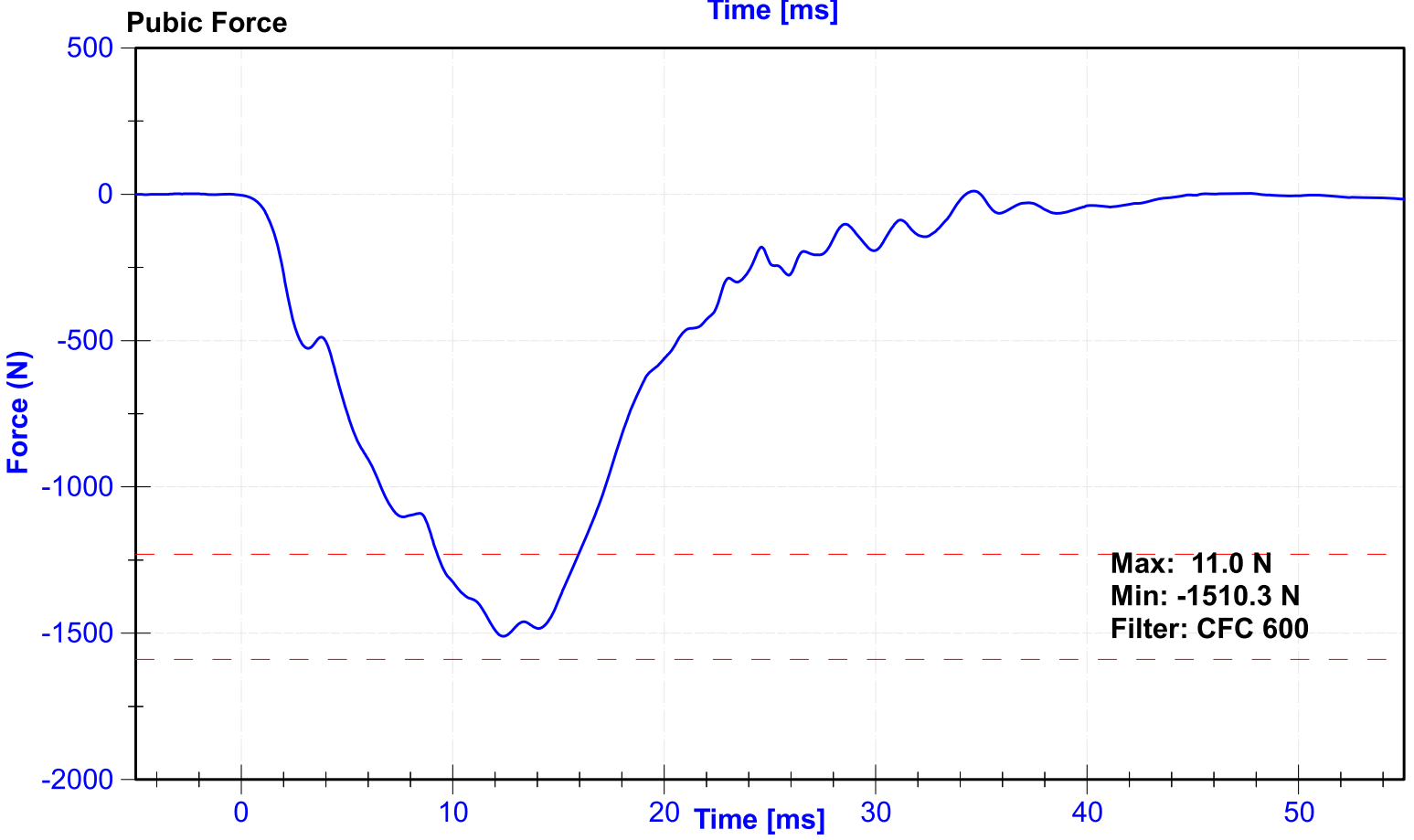
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	4.2	4.4	m/s	4.30	Pass
Resistive Force	4700	5400	N	4860.8	Pass
Time at Peak Resistive Force	11.8	16.1	ms	12.60	Pass
Pubic Force	-1590	-1230	N	-1510.3	Pass
Time at Peak Pubic Force	12.2	17.0	ms	12.40	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Pubic Load Cell	Denton	464-FY	9/16/2024	9/16/2025




Resistive Force
Max: 4860.8 N
Min: 51.9 N
Filter: CFC 180
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

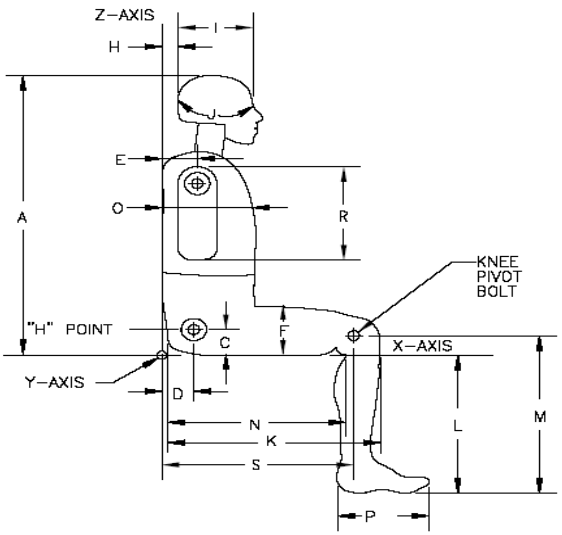

Pubic Force
Max: 11.0 N
Min: -1510.3 N
Filter: CFC 600
Force (N)
500
0
-500
-1000
-1500
-2000
0
10
20
30
40
50
Time [ms]

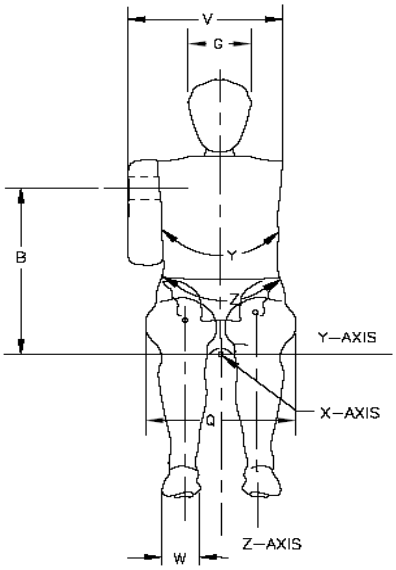
APPENDIX VI
SID-IIs PERFOMANCE CALIBRATION TEST DATA

External Measurements - SID-IIs

Technician: J. Rios Date: 12/16/2024

Dummy Serial Number: 224





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	782	Pass
B	Shoulder Pivot Height	437	453	446	Pass
C	H-point Height	79	89	83	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	101	Pass
F	Thigh Clearance	119	135	125	Pass
G	Head Breadth	140	148	141	Pass
H	Head Back from Backline	40	46	45	Pass
I	Head Depth	178	188	184	Pass
J	Head Circumference	541	551	550	Pass
K	Buttock to Knee Length	514	540	525	Pass
L	Popliteal Height	343	369	352	Pass
M	Knee Pivot to floor height	392	409	407	Pass
N	Buttock Popliteal Length	416	442	430	Pass
O	Chest Depth w/o jacket	195	211	207	Pass
P	Foot Length	216	232	222	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	318	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	347	Pass
W	Foot Width	78	94	84	Pass
Y	Chest Circumference w/jacket	851	881	875	Pass
Z	Waist Circumference	761	791	775	Pass

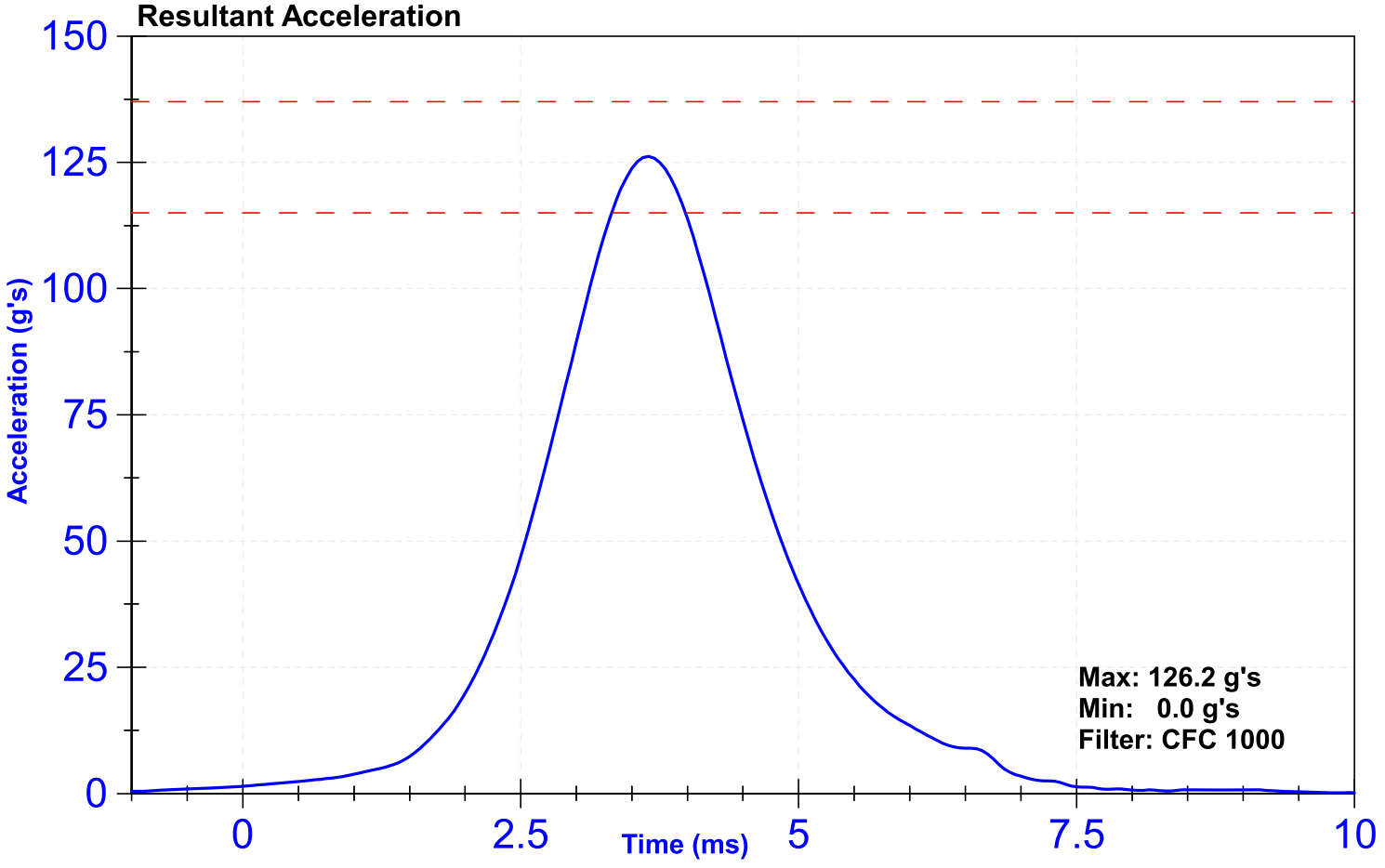
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

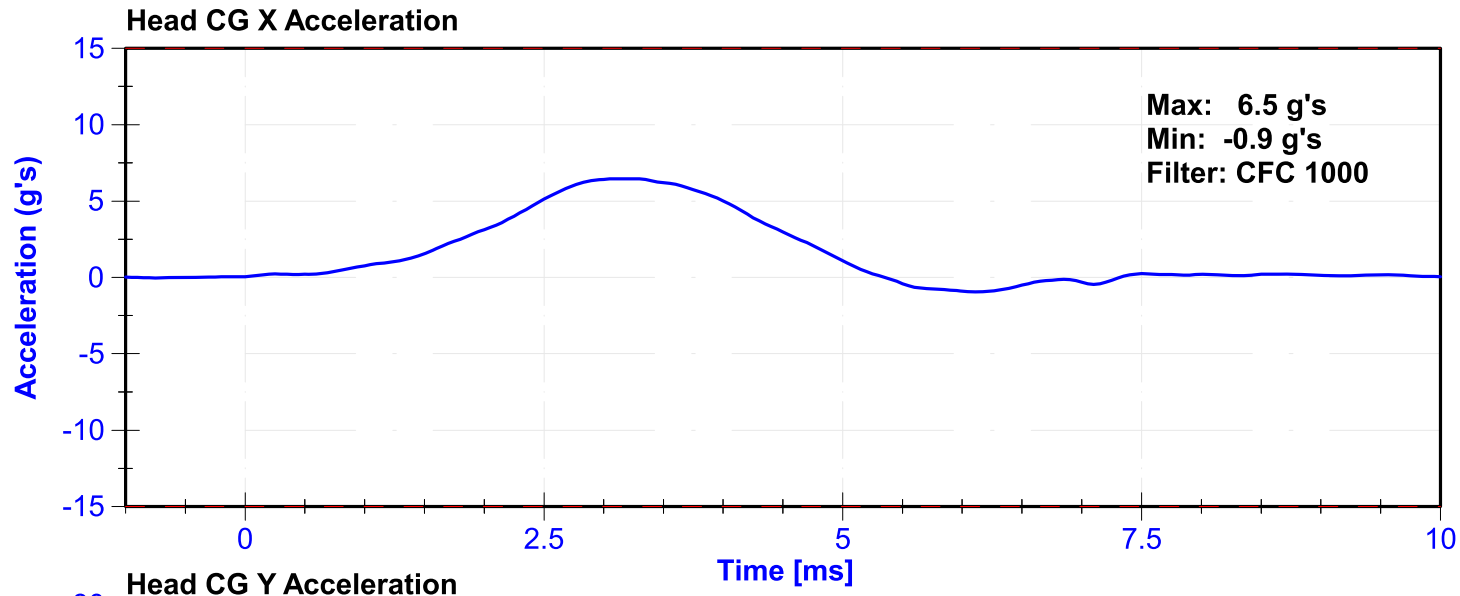
Results

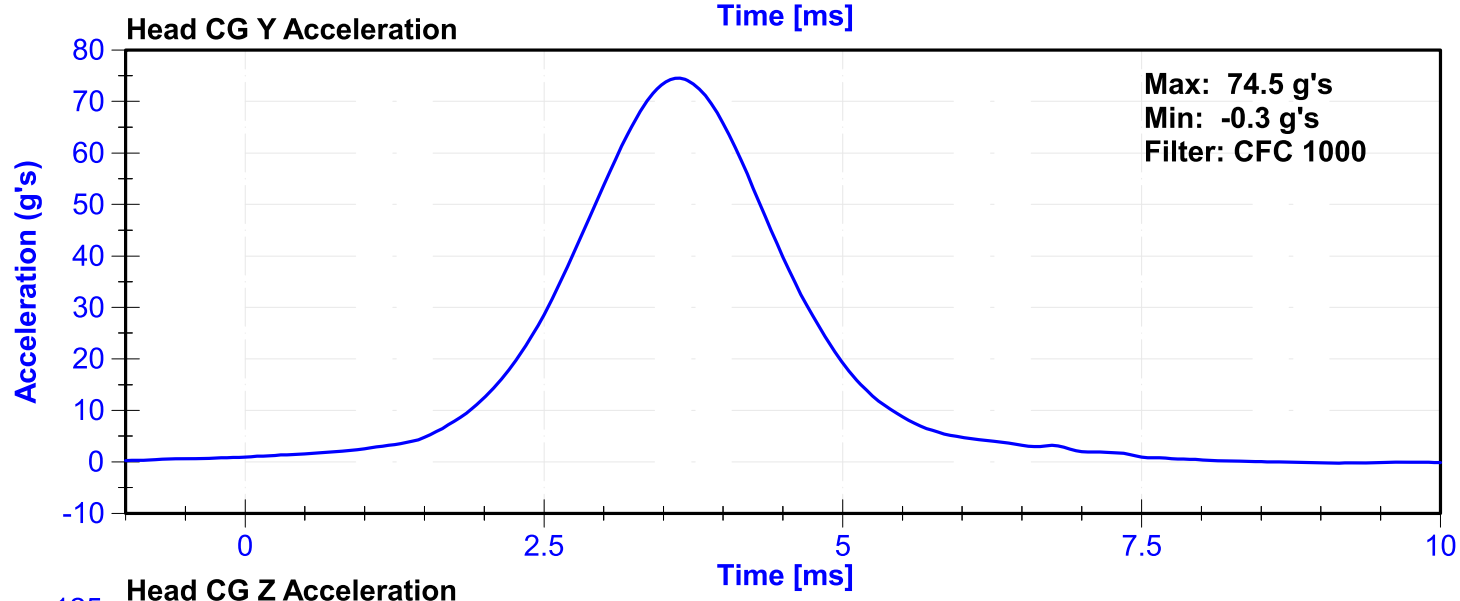
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	17	Pass
Resultant Acceleration	115	137	g's	126.2	Pass
Oscillation	0	15	%	0.7	Pass
Fore-Aft Acceleration	-15	15	g's	6.5	Pass

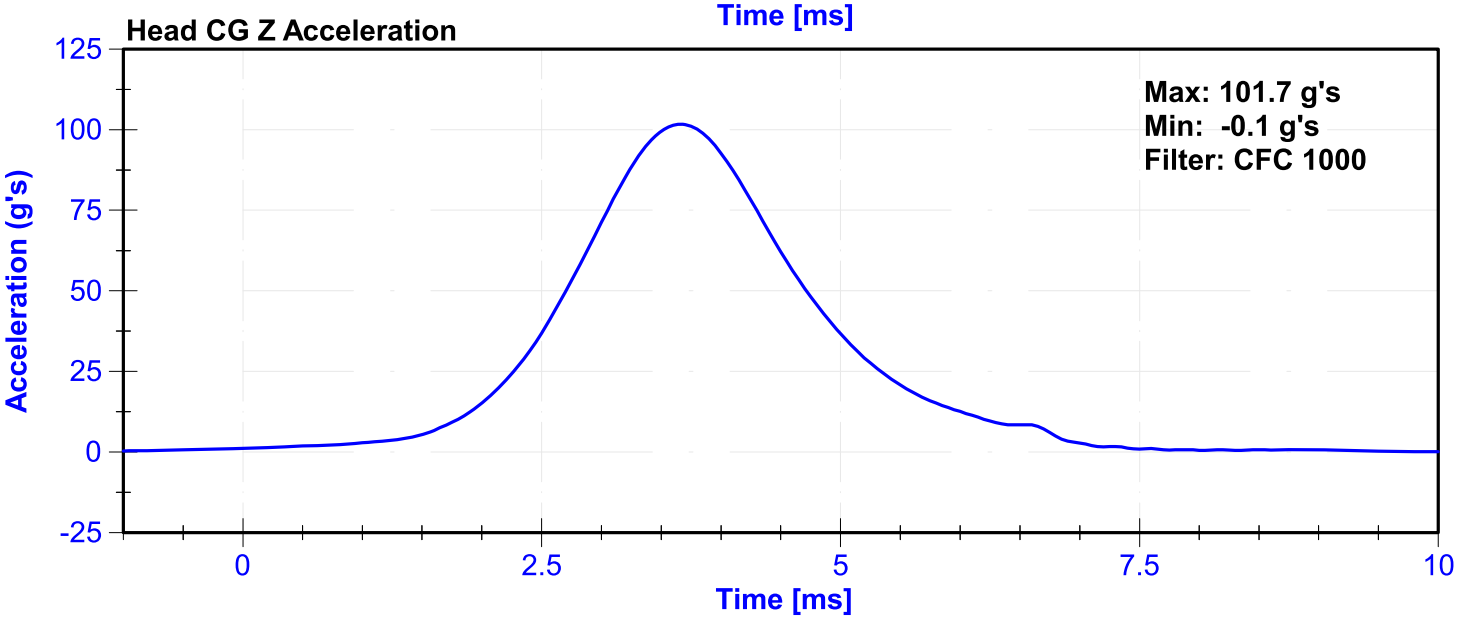
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P51884	10/8/2024	4/6/2025
Y Accelerometer	Endevco	P73161	10/8/2024	4/6/2025
Z Accelerometer	Endevco	P79588	10/8/2024	4/6/2025




Head CG X Acceleration
Max: 6.5 g's
Min: -0.9 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 74.5 g's
Min: -0.3 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 101.7 g's
Min: -0.1 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

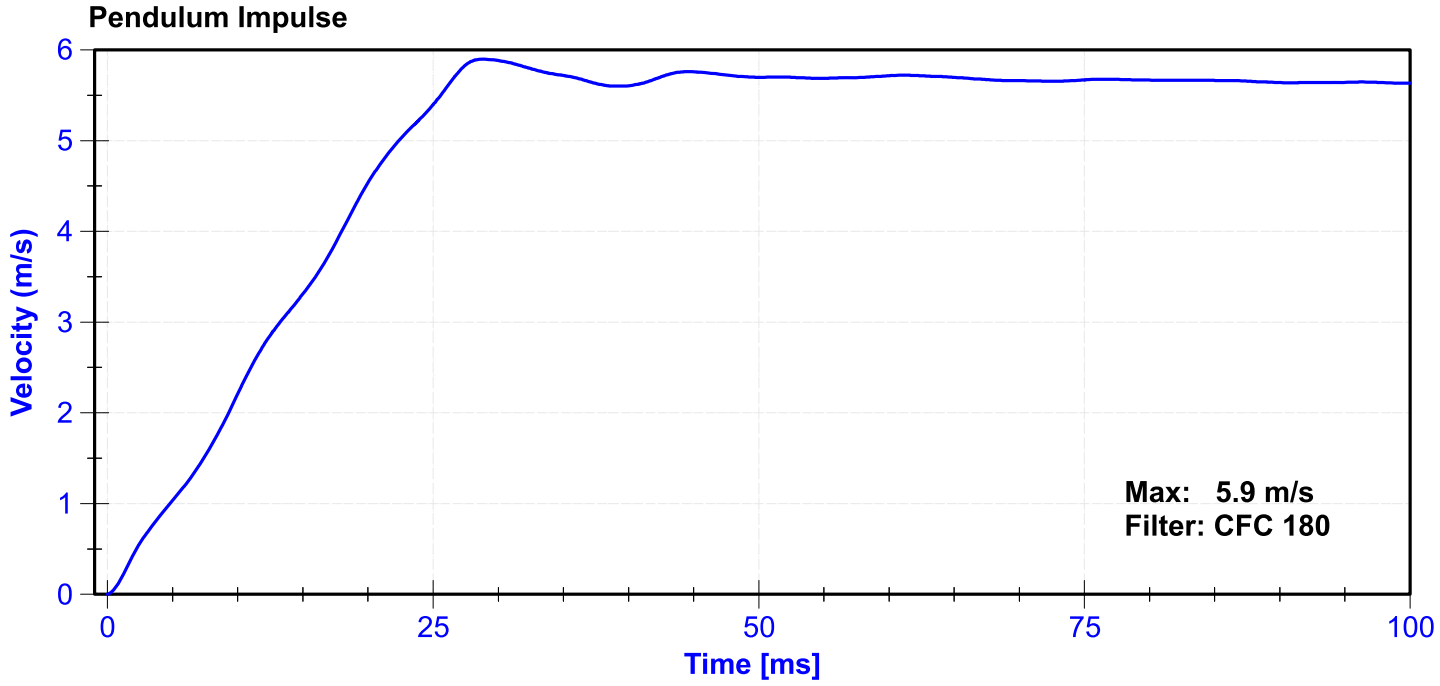
ATD Manufacturer	FTSS	Test Technician	E. Andruczyk
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

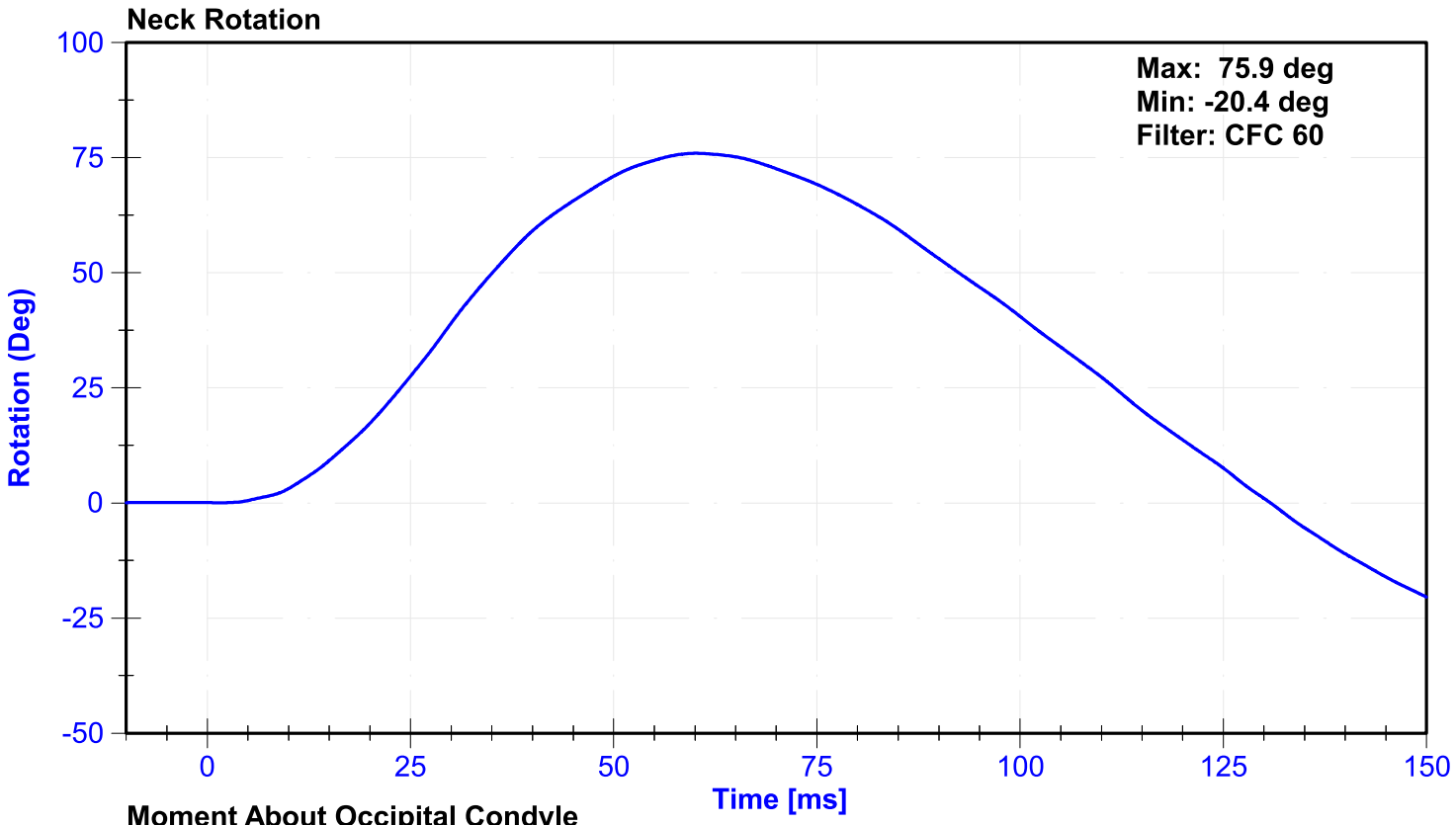
Results

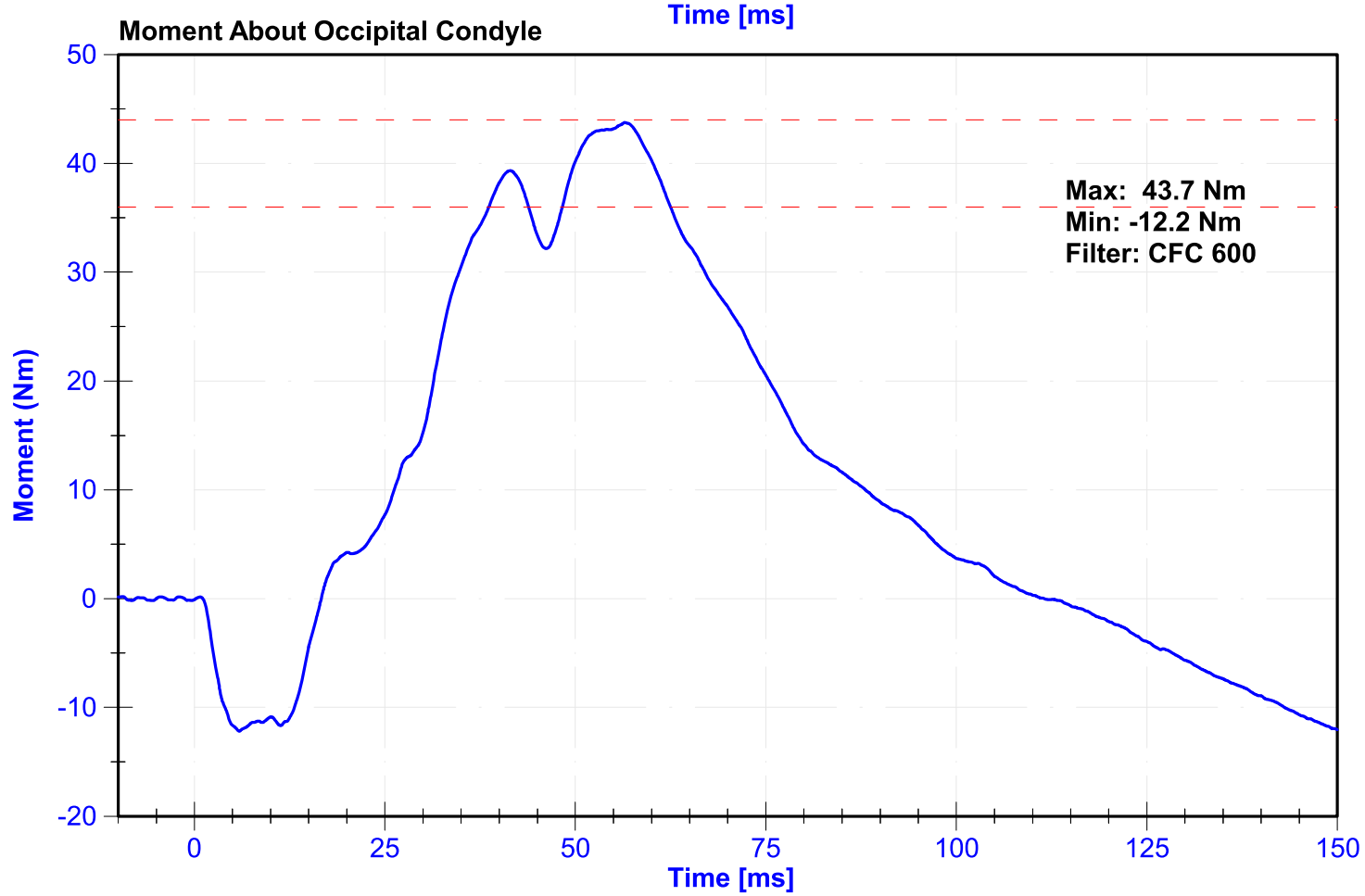
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	17	Pass
Velocity	5.51	5.63	m/s	5.597	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.21	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.31	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.54	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.40	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.90	Pass
Neck Rotation	71	81	deg	75.9	Pass
Time at Maximum Rotation	50	70	ms	60.1	Pass
Moment about the OC	36	44	Nm	43.7	Pass
Moment Decay to 0 Nm	102	126	ms	111.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	11/1/2024	11/1/2025
Pendulum Potentiometer	Servo	4961	9/23/2024	9/23/2025
Condyle Potentiometer	Servo	DS185	9/23/2024	9/23/2025
Upper Neck Load Cell	Humanetics	1716_130-FY	9/26/2024	9/26/2025




Neck Rotation
Max: 75.9 deg
Min: -20.4 deg
Filter: CFC 60
Rotation (Deg)
Time [ms]
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150


Moment About Occipital Condyle
Max: 43.7 Nm
Min: -12.2 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150

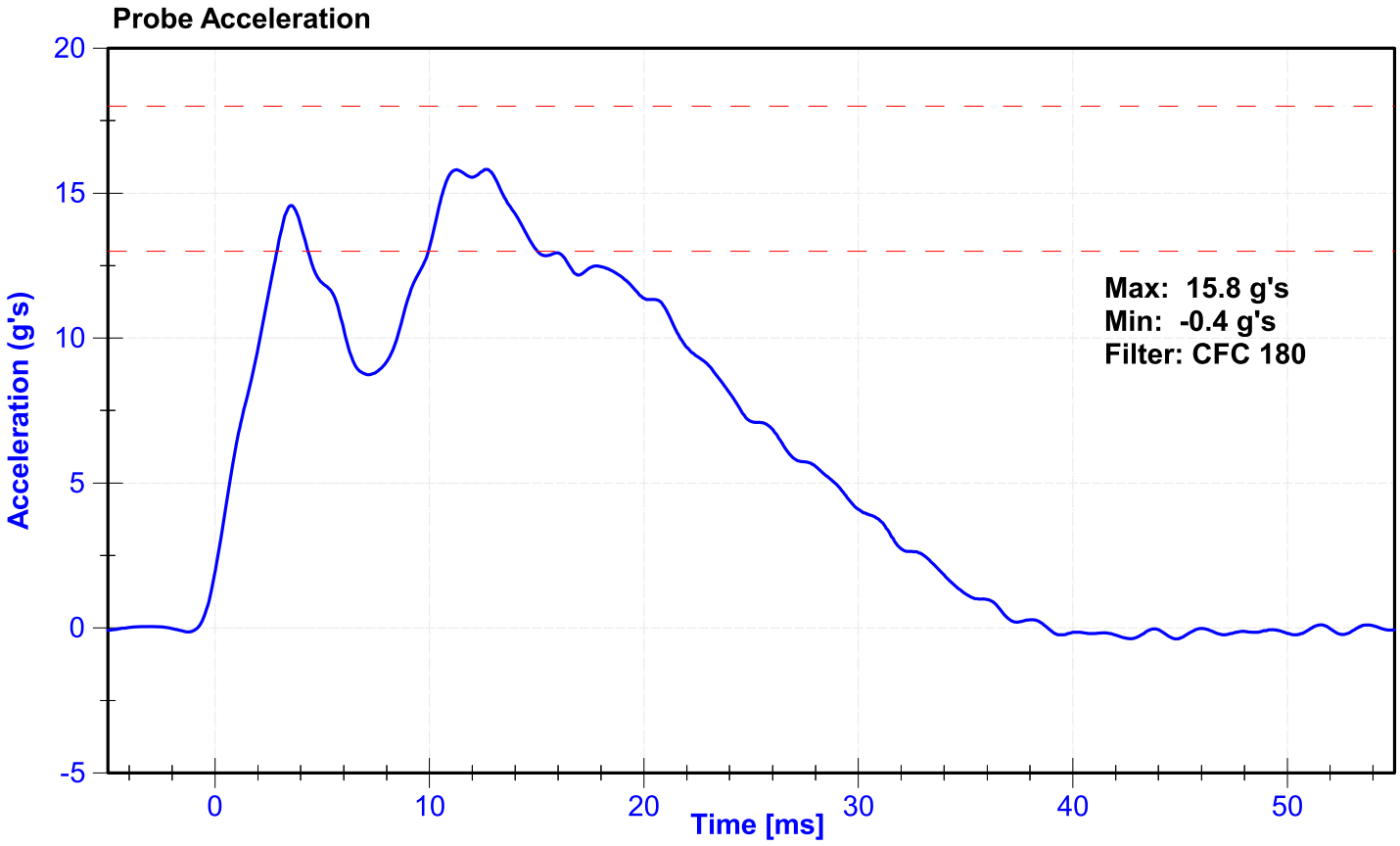
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

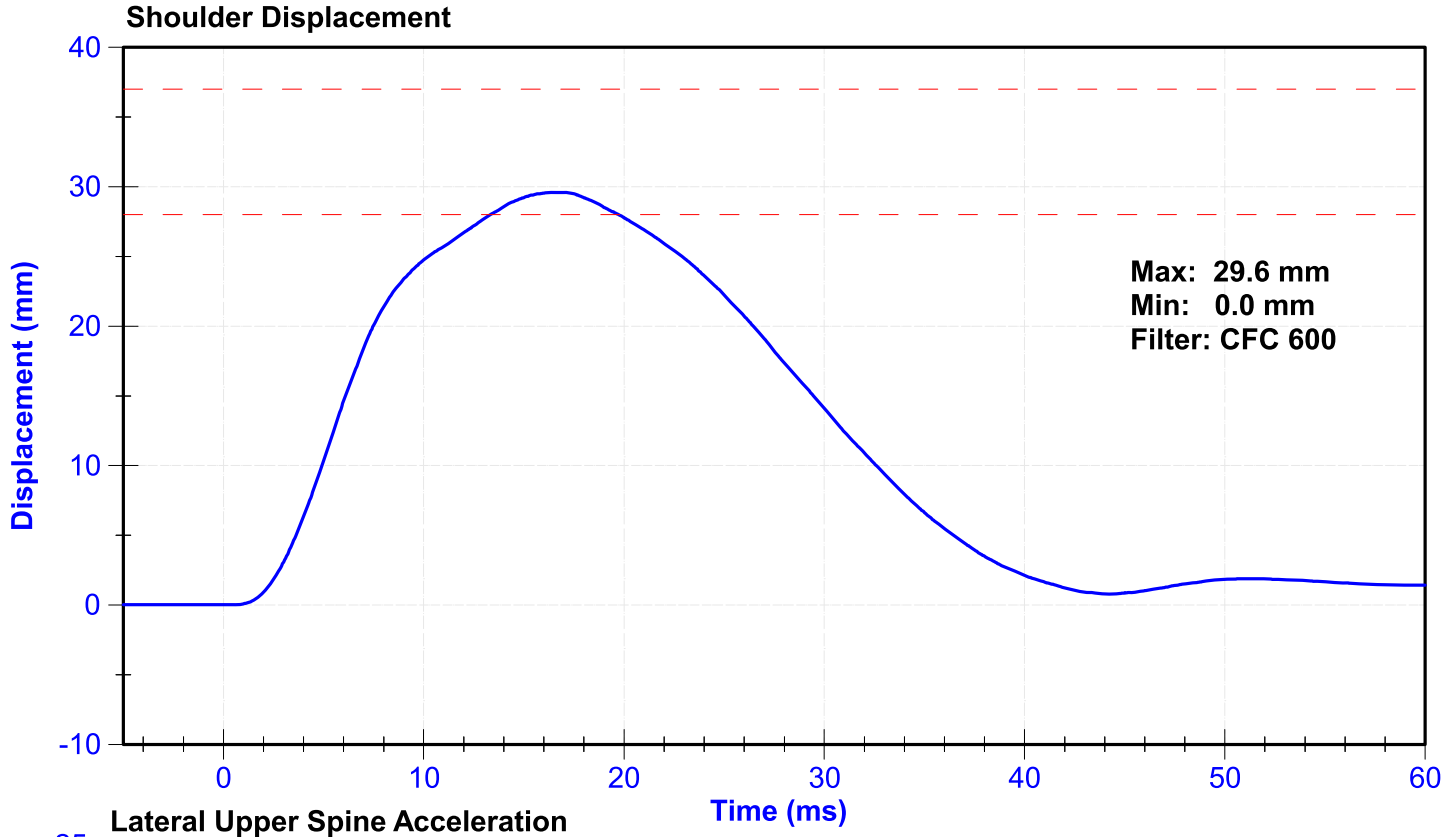
Results

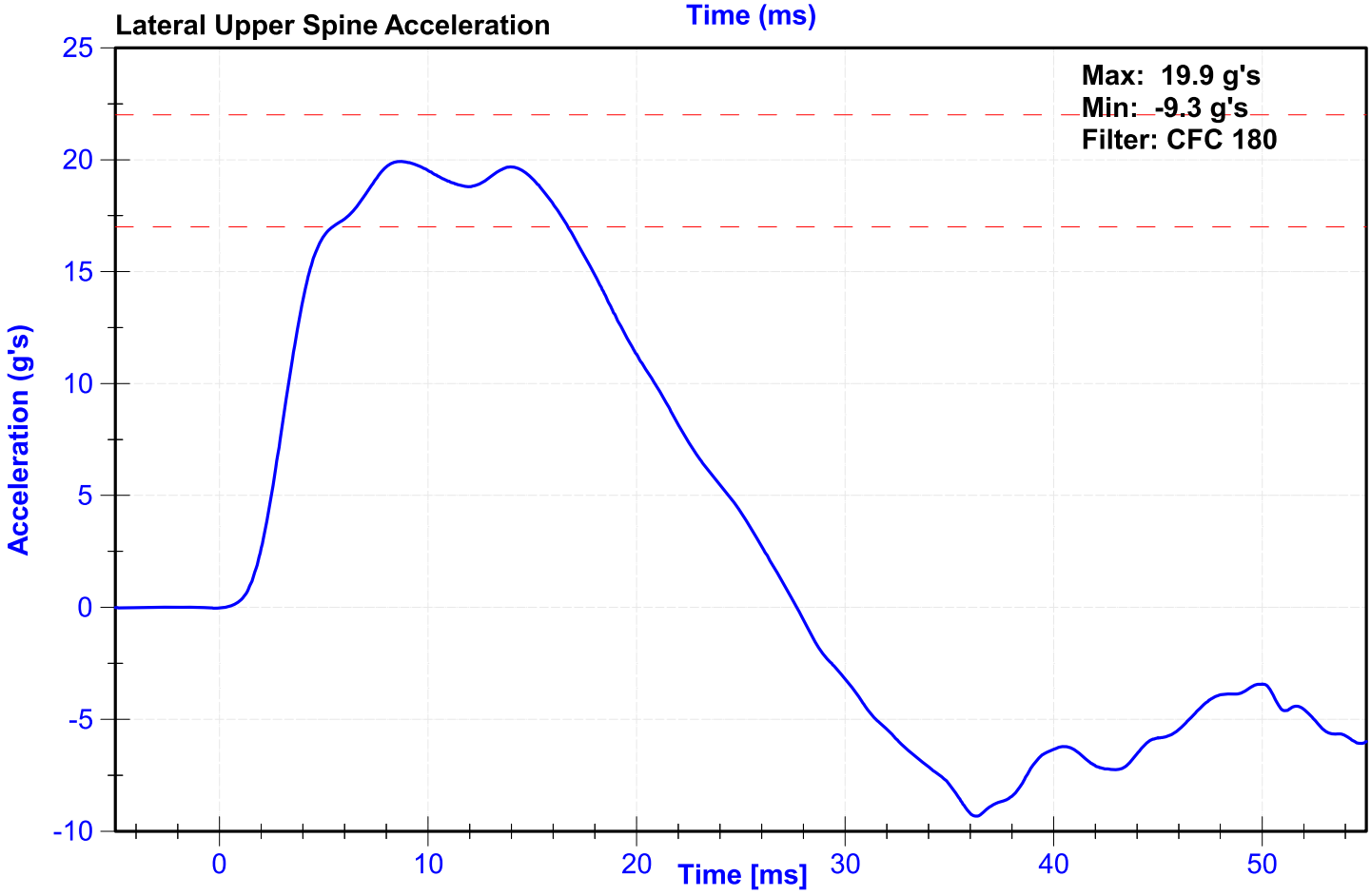
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	17	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	13	18	g's	15.8	Pass
Shoulder Deflection	28	37	mm	29.6	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Shoulder Potentiometer	Servo	829GFE	10/8/2024	4/8/2025
Upper Spine Y Accelerometer	Endevco	P58883	10/8/2024	4/6/2025




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 29.6 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 19.9 g's
Min: -9.3 g's
Filter: CFC 180

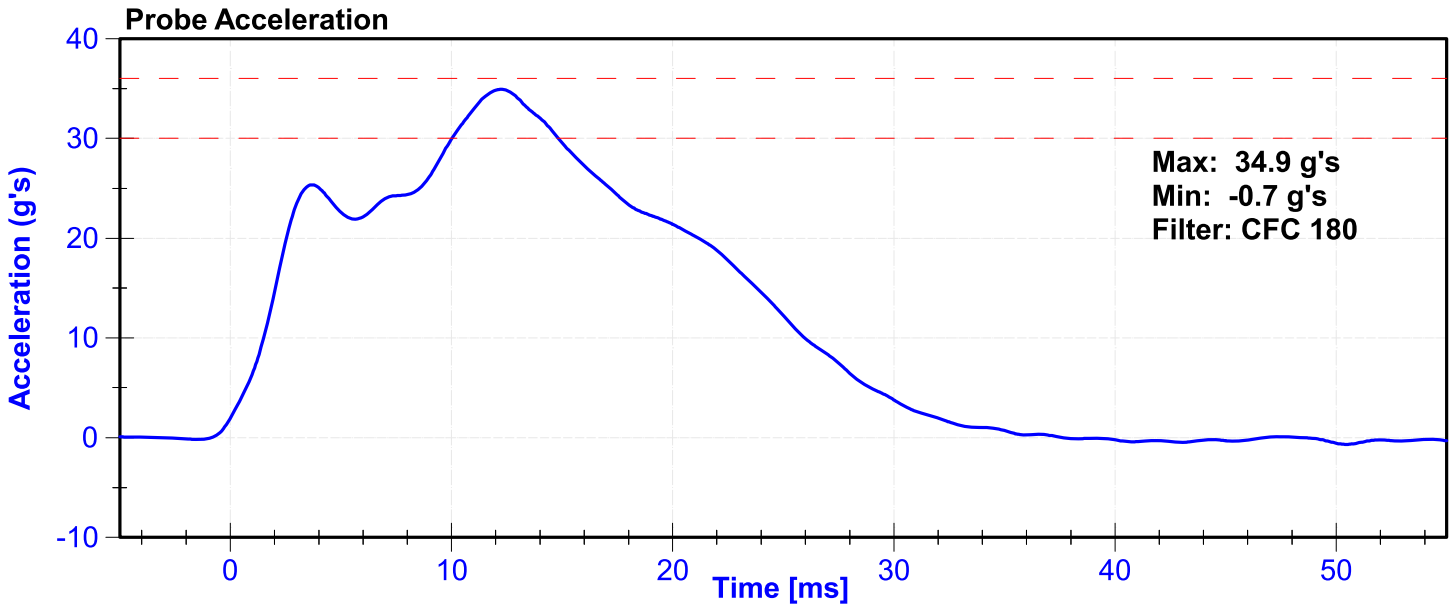
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

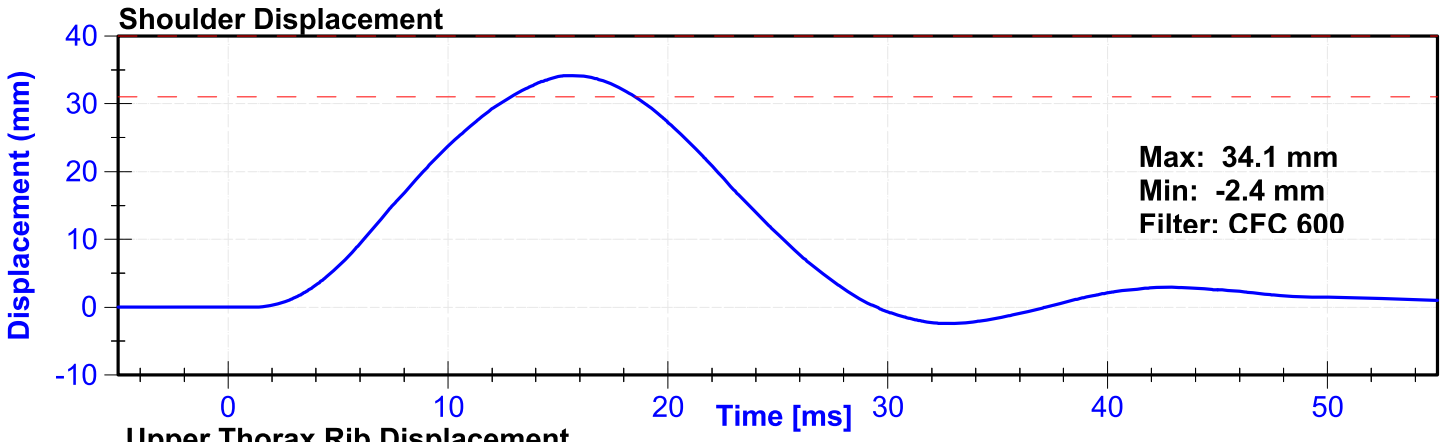
Results

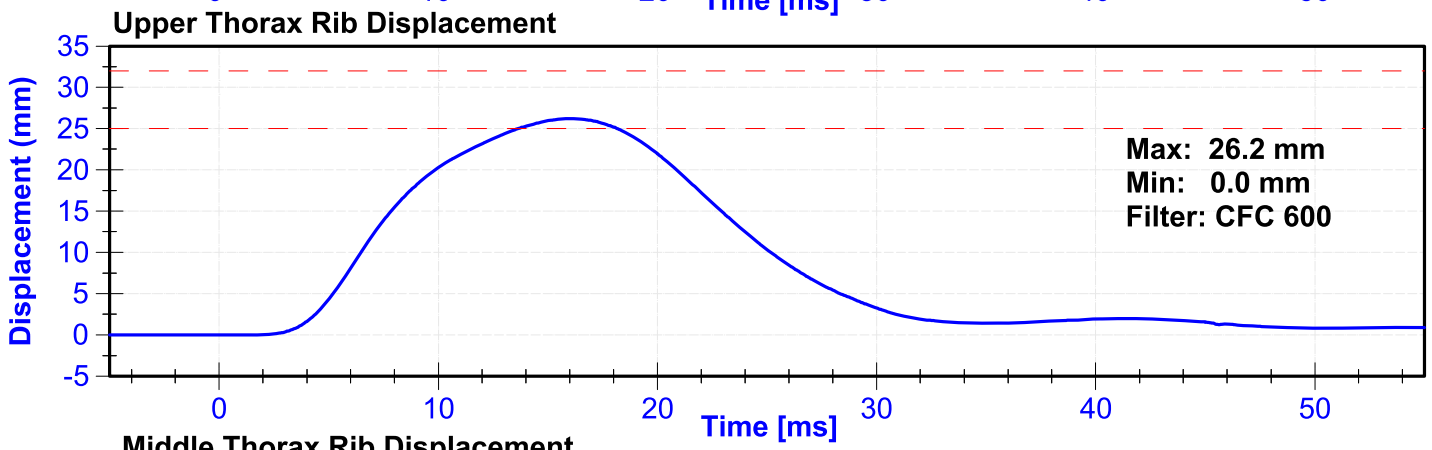
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	17	Pass
Velocity	6.6	6.8	m/s	6.65	Pass
Probe Acceleration after 5 ms	30	36	g's	34.9	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.5	Pass
Lateral Lower Spine Acceleration	29	37	g's	33.2	Pass
Shoulder Deflection	31	40	mm	34.1	Pass
Upper Thorax Rib Deflection	25	32	mm	26.2	Pass
Mid Thorax Rib Deflection	30	36	mm	30.1	Pass
Lower Thorax Rib Deflection	32	38	mm	32.0	Pass

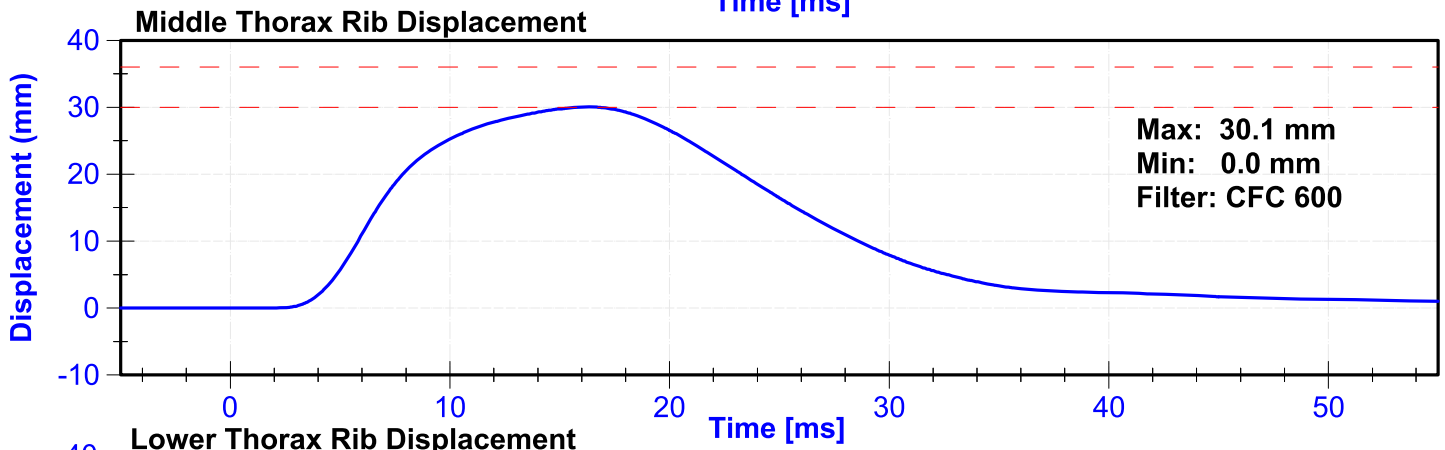
Transducer Calibrations

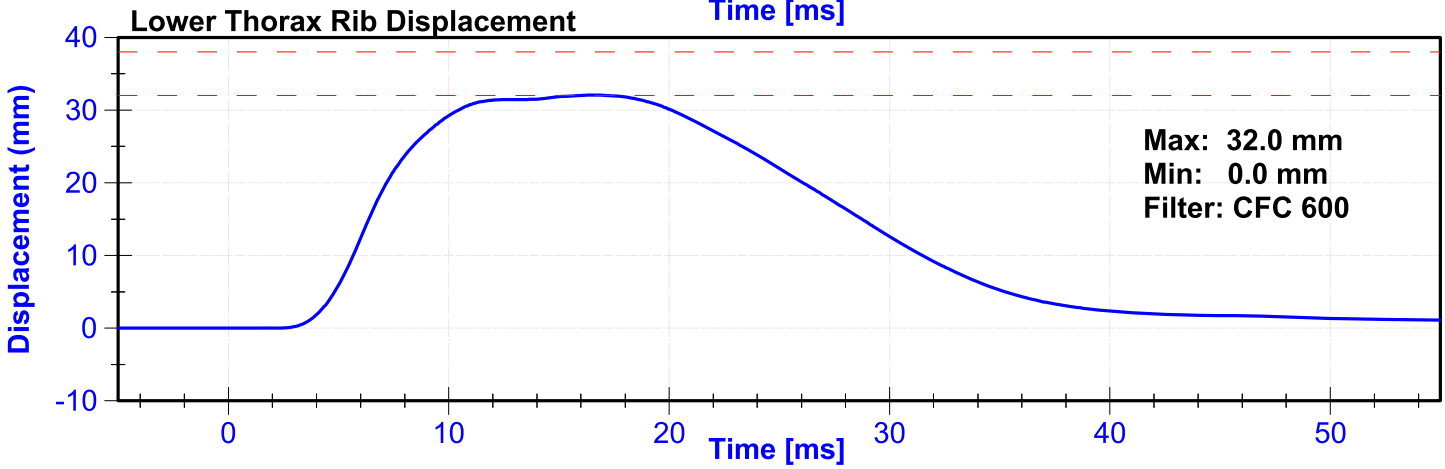
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Upper Spine T1 Y Accelerometer	Endevco	P58883	10/8/2024	4/6/2025
Upper Spine T12 Y Accelerometer	Endevco	T20906	10/8/2024	4/6/2025
Shoulder Potentiometer	Servo	829GFE	10/8/2024	4/8/2025
Upper Thorax Rib Potentiometer	Servo	DS-049GFE	10/8/2024	4/8/2025
Middle Thorax Rib Potentiometer	Servo	080GFE	10/9/2024	4/9/2025
Lower Thorax Rib Potentiometer	Servo	087GFE	12/5/2024	6/5/2025

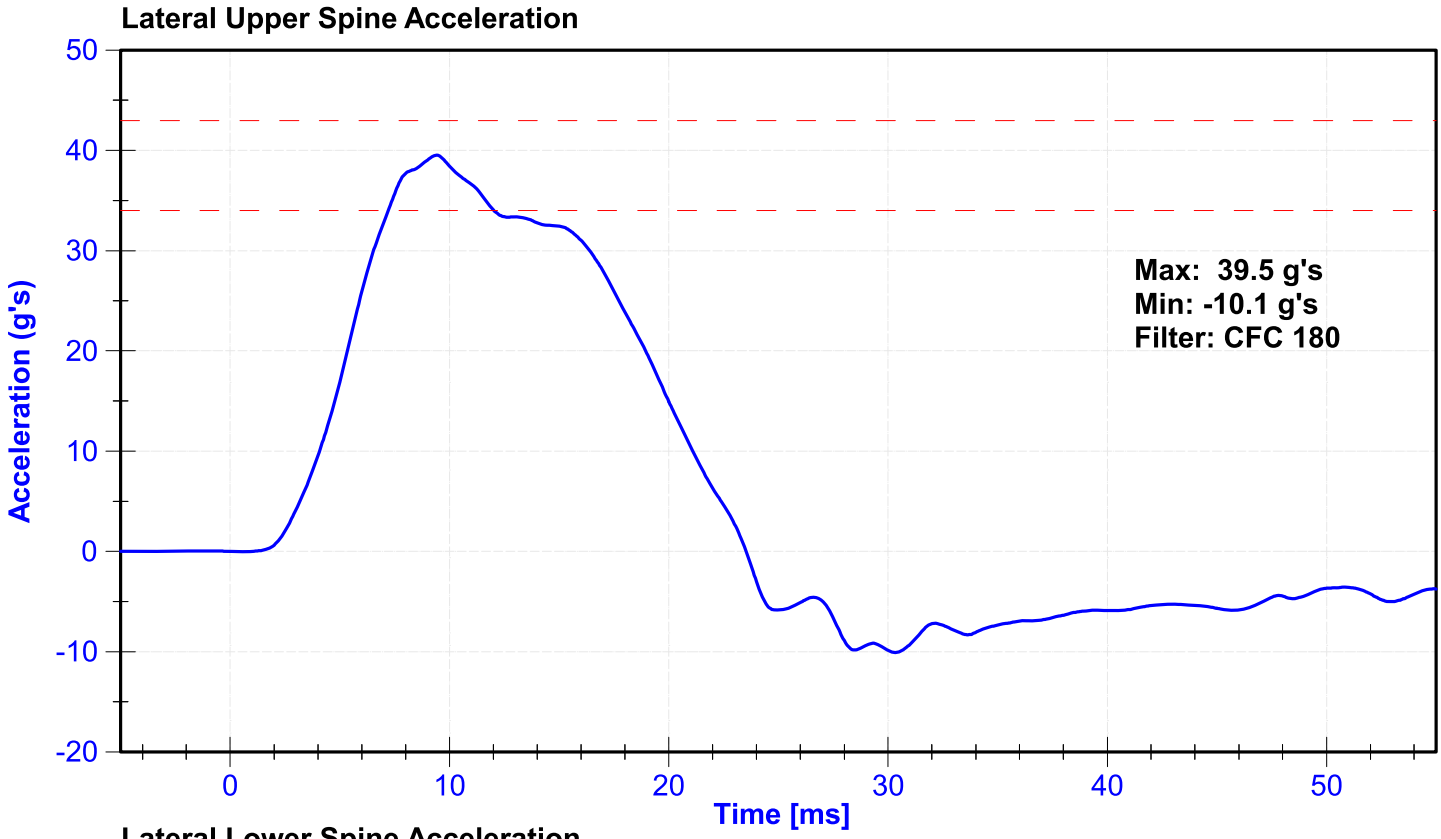


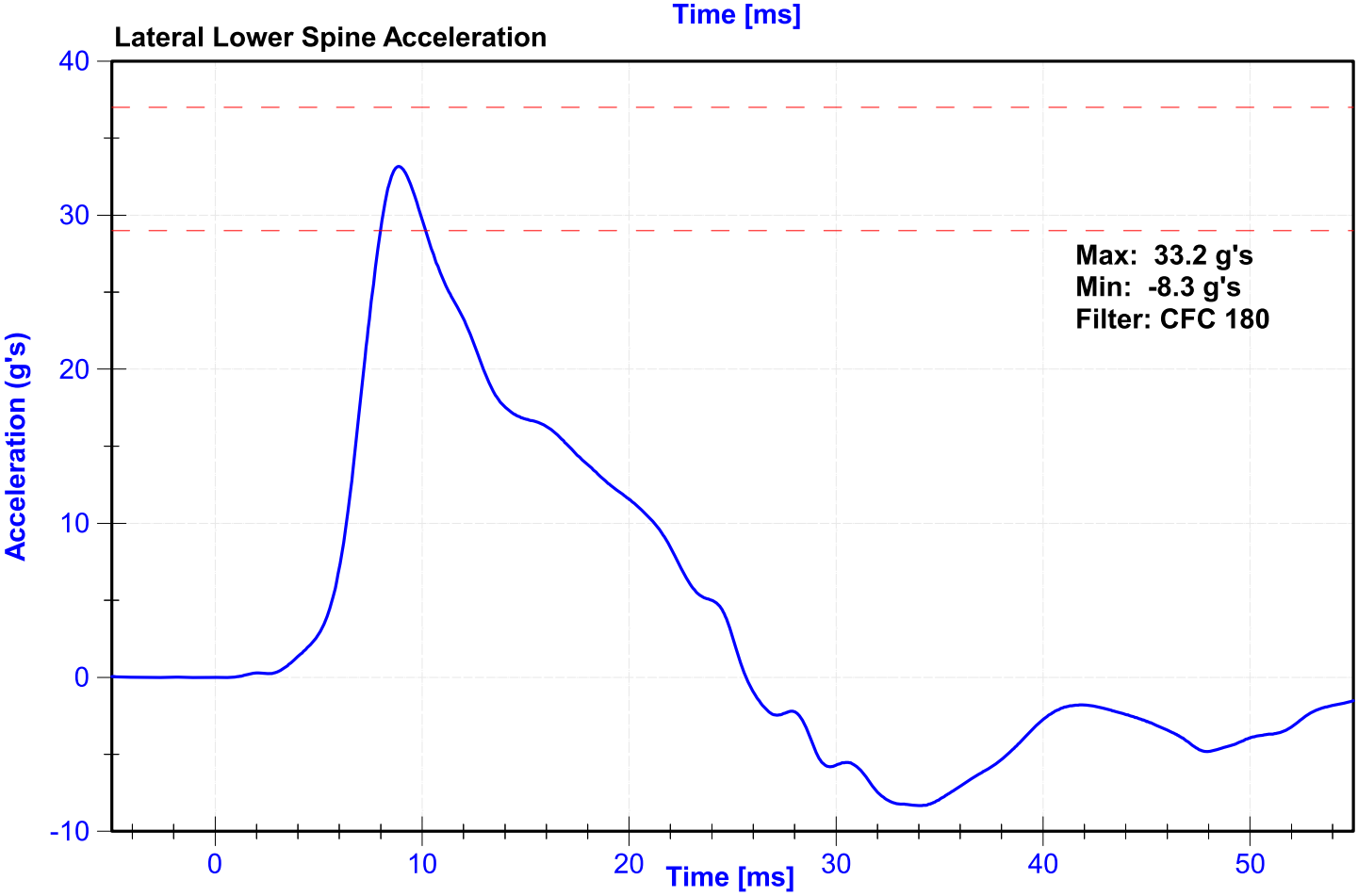

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 34.1 mm
Min: -2.4 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.2 mm
Min: 0.0 mm
Filter: CFC 600


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


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.0 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]
Max: 39.5 g's
Min: -10.1 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 33.2 g's
Min: -8.3 g's
Filter: CFC 180

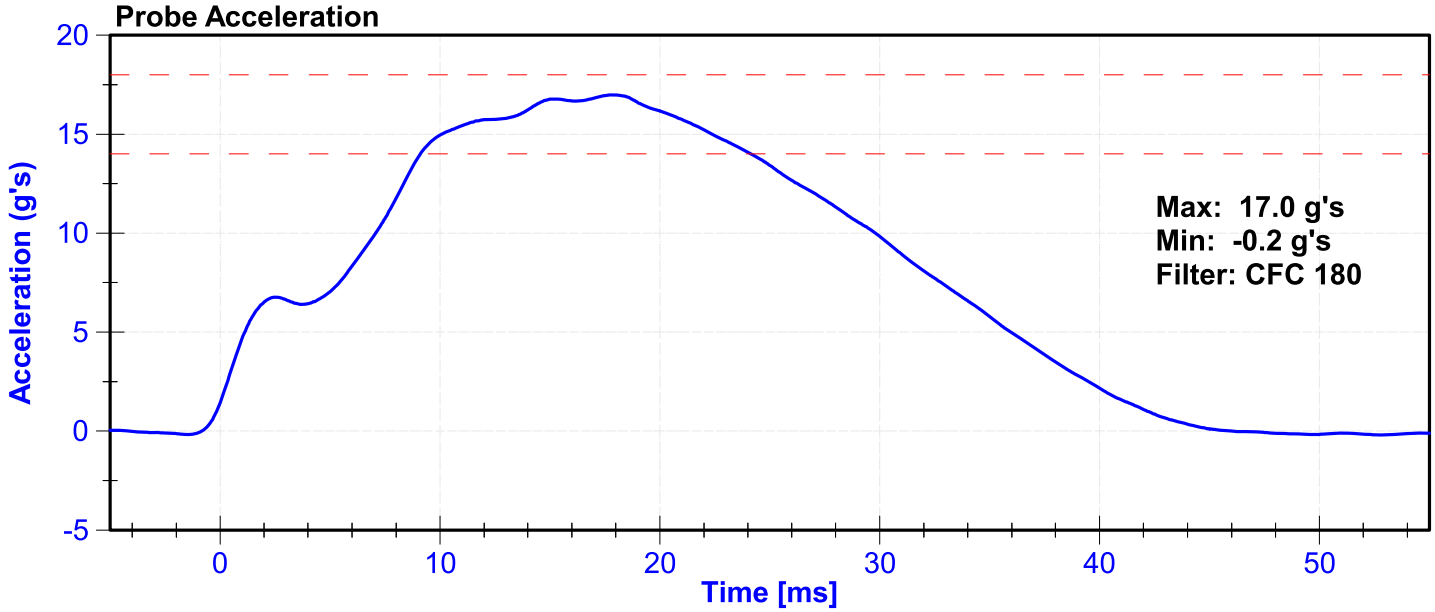
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

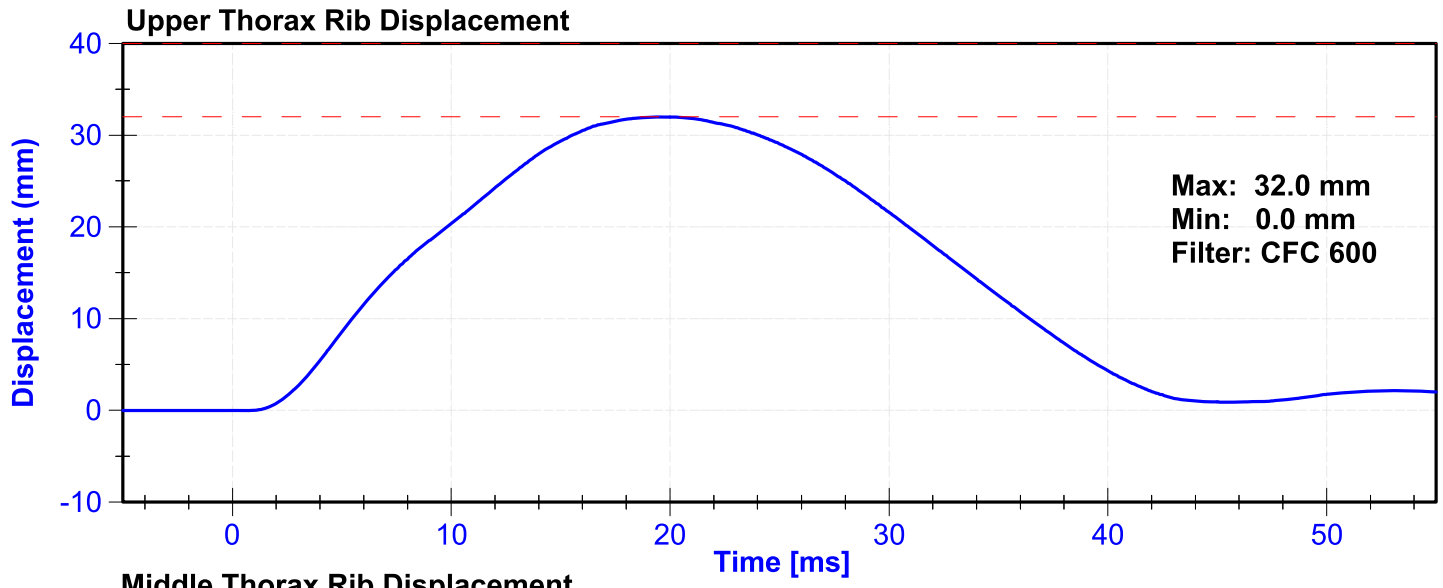
Results

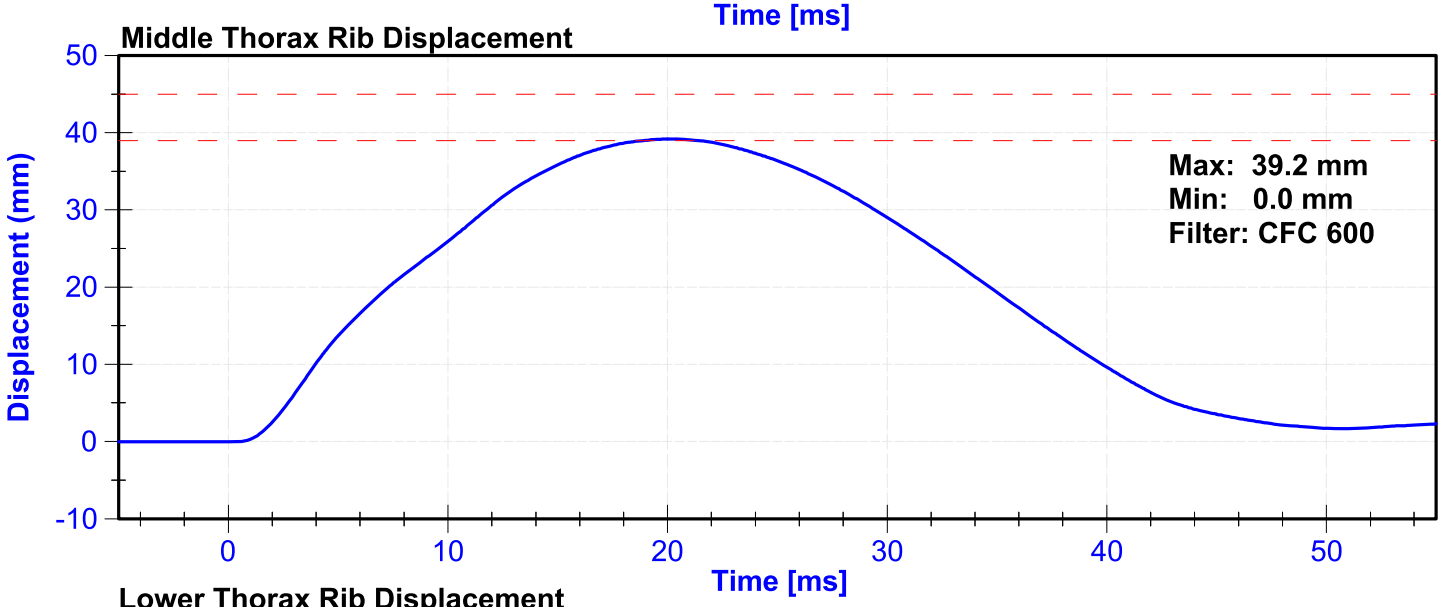
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	17	Pass
Velocity	4.2	4.4	m/s	4.28	Pass
Probe Acceleration	14	18	g's	17.0	Pass
Lateral Upper Spine Acceleration	13	17	g's	15.1	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.1	Pass
Upper Thorax Rib Deflection	32	40	mm	32.0	Pass
Middle Thorax Rib Deflection	39	45	mm	39.2	Pass
Lower Thorax Rib Deflection	35	43	mm	39.0	Pass

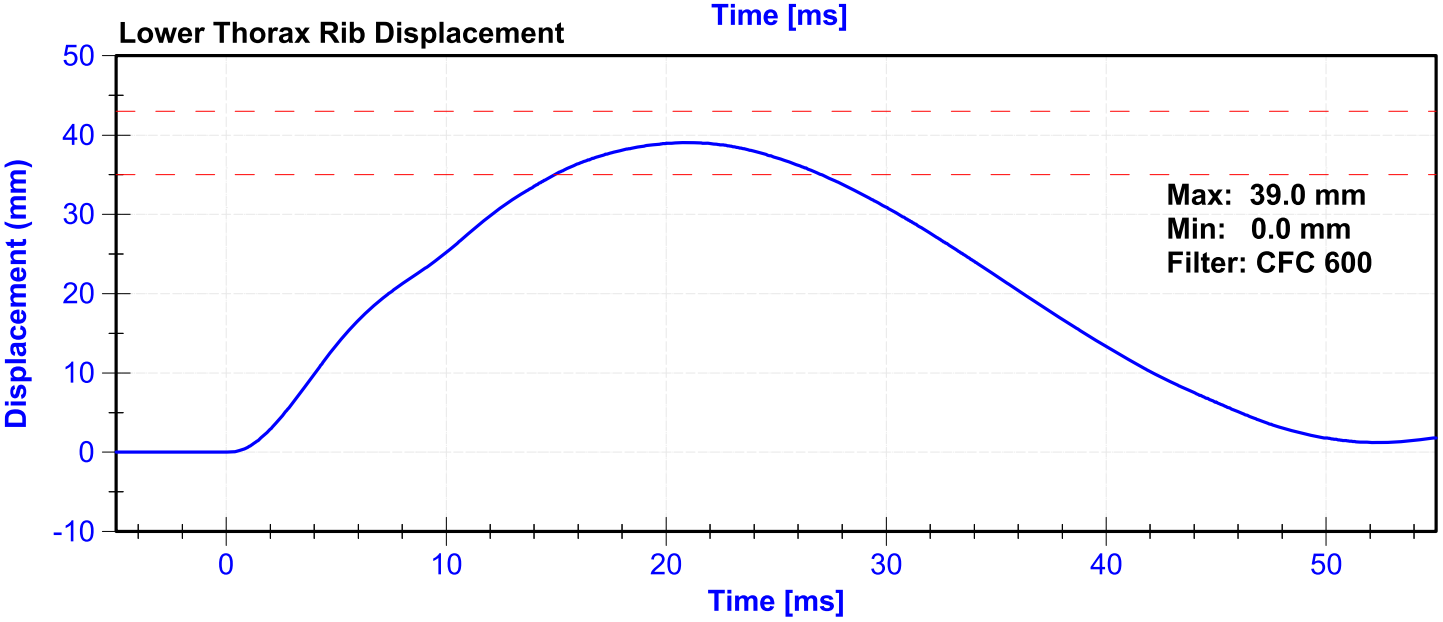
Transducer Calibrations

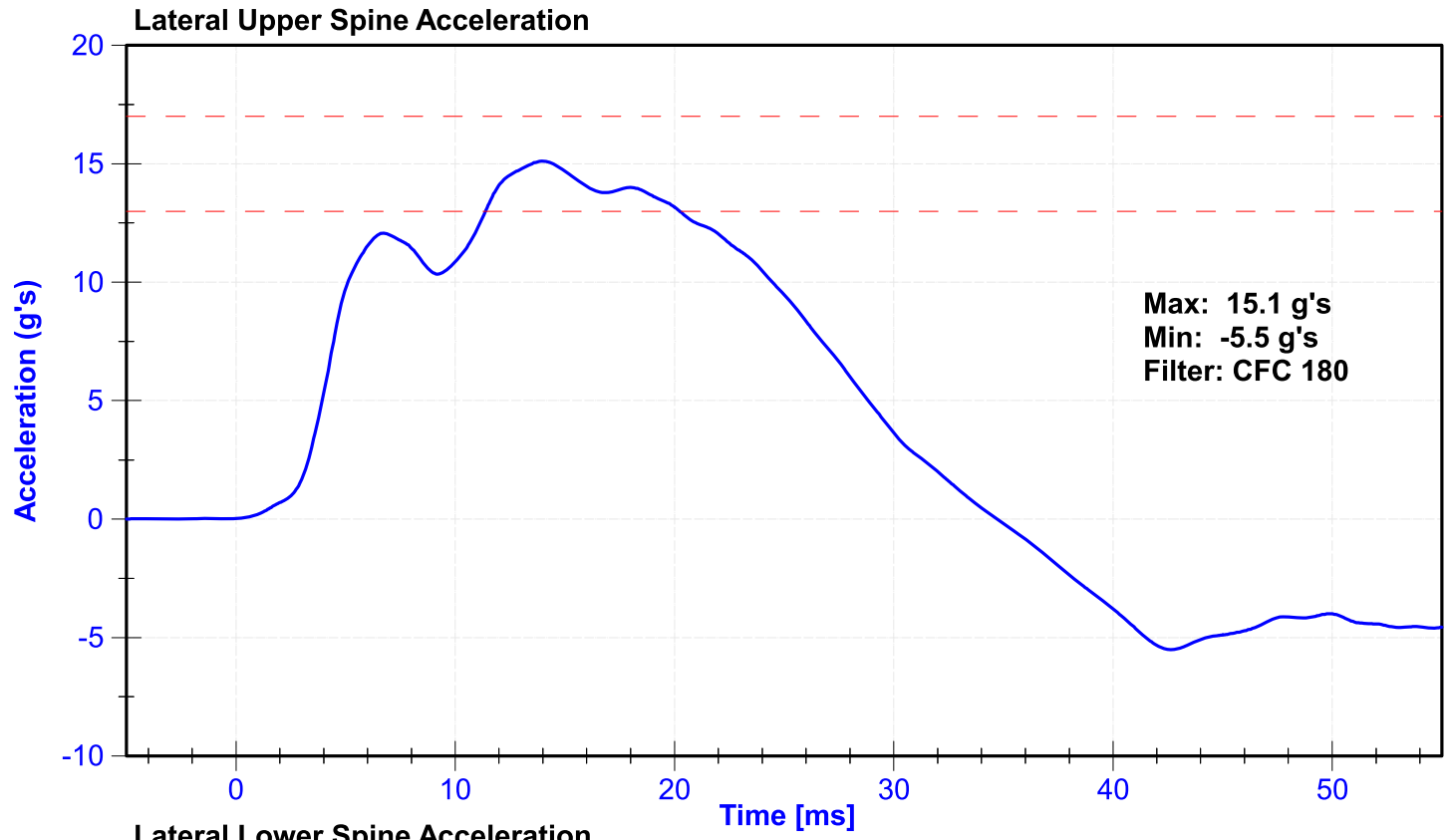
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Upper Spine Y Accelerometer	Endevco	P58883	10/8/2024	4/6/2025
Lower Spine Y Accelerometer	Endevco	T20906	10/8/2024	4/6/2025
Upper Thorax Rib Potentiometer	Servo	DS-049GFE	10/8/2024	4/8/2025
Middle Thorax Rib Potentiometer	Servo	080GFE	10/9/2024	4/9/2025
Lower Thorax Rib Potentiometer	Servo	087GFE	12/5/2024	6/5/2025

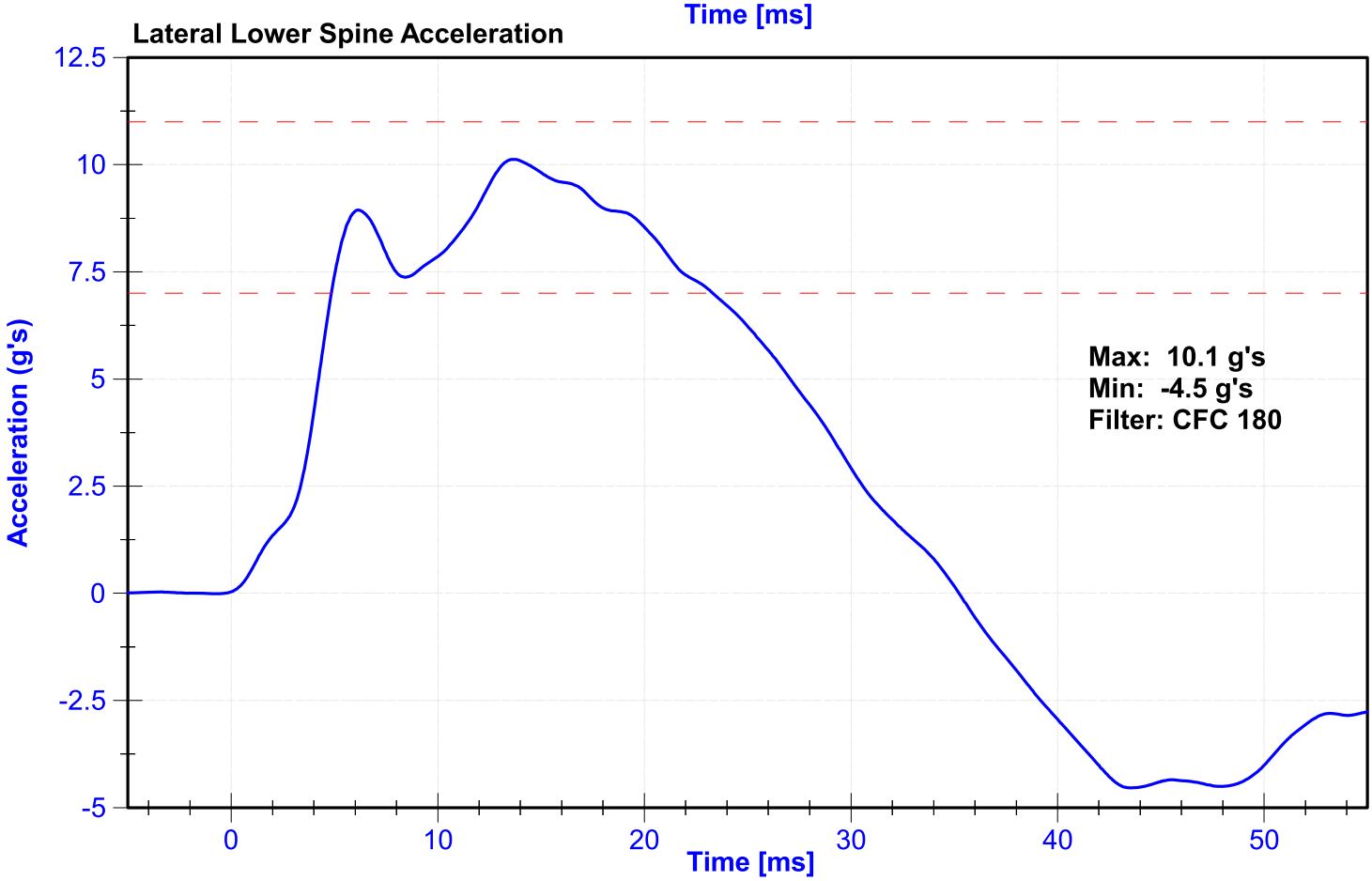



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.0 mm
Min: 0.0 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.2 mm
Min: 0.0 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.0 mm
Min: 0.0 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 15.1 g's
Min: -5.5 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 10.1 g's
Min: -4.5 g's
Filter: CFC 180

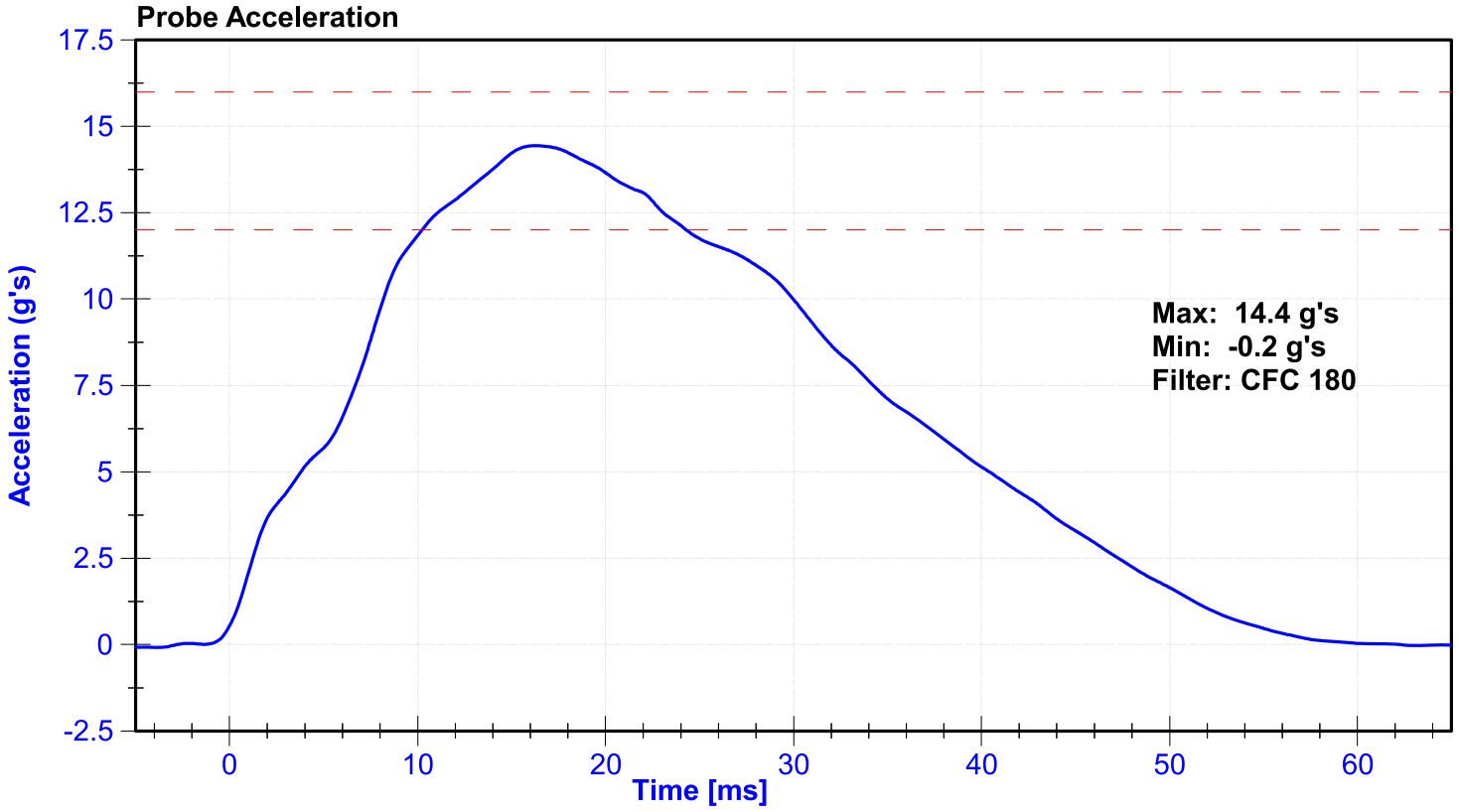
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

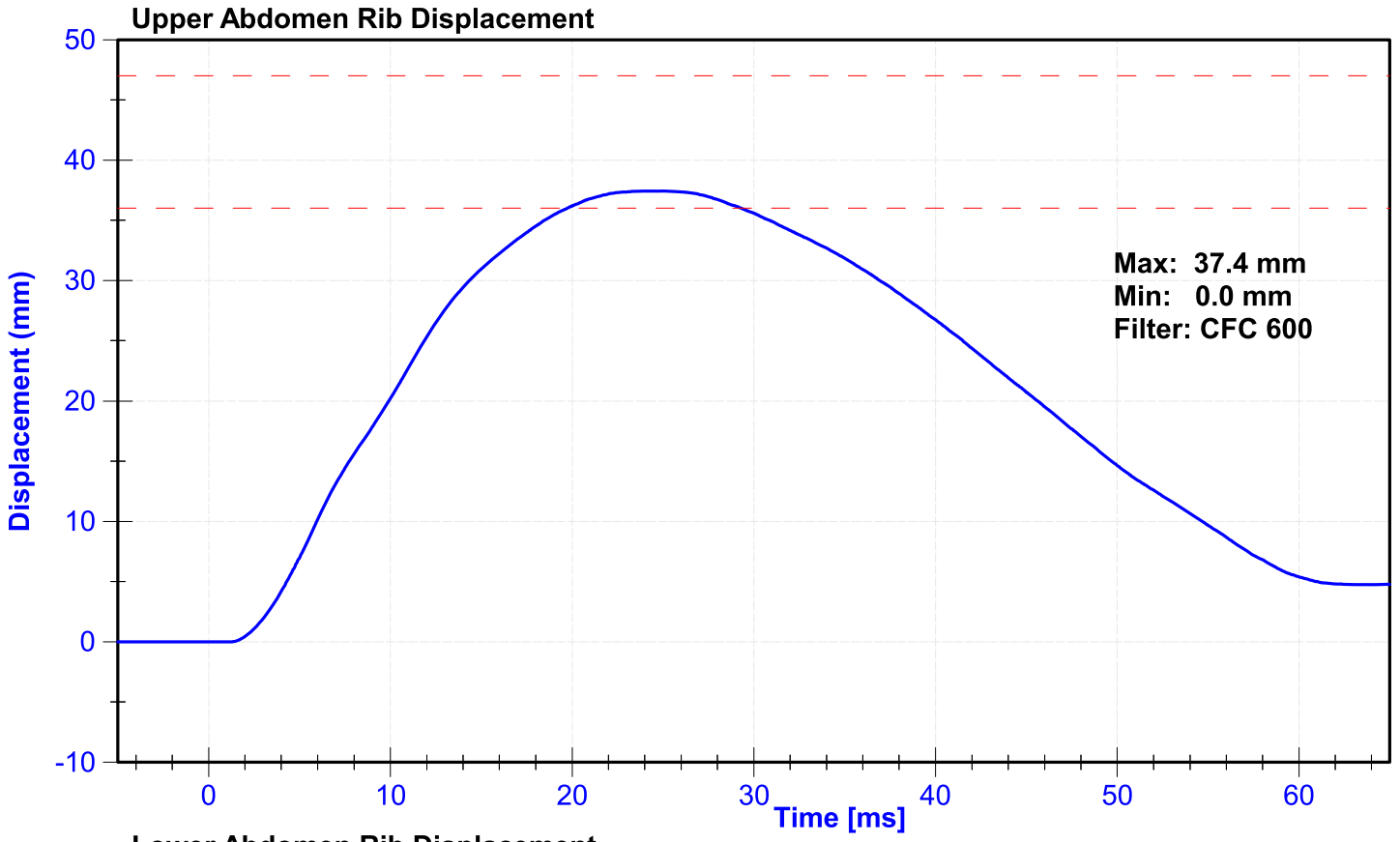
Results

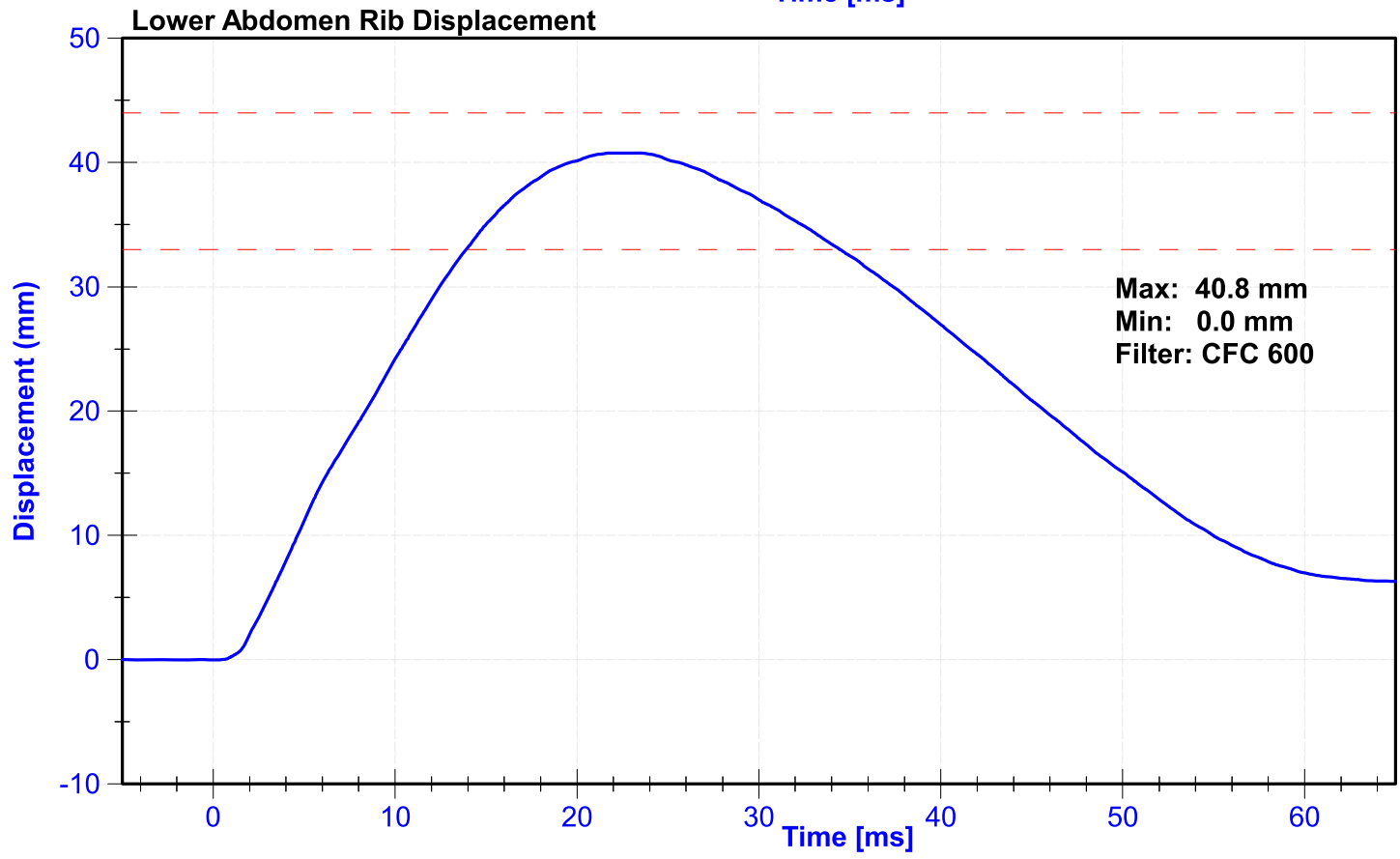
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	17	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	12	16	g's	14.4	Pass
Lateral Lower Spine Acceleration	9	14	g's	11.7	Pass
Upper Abdomen Rib Deflection	36	47	mm	37.4	Pass
Lower Abdomen Rib Deflection	33	44	mm	40.8	Pass

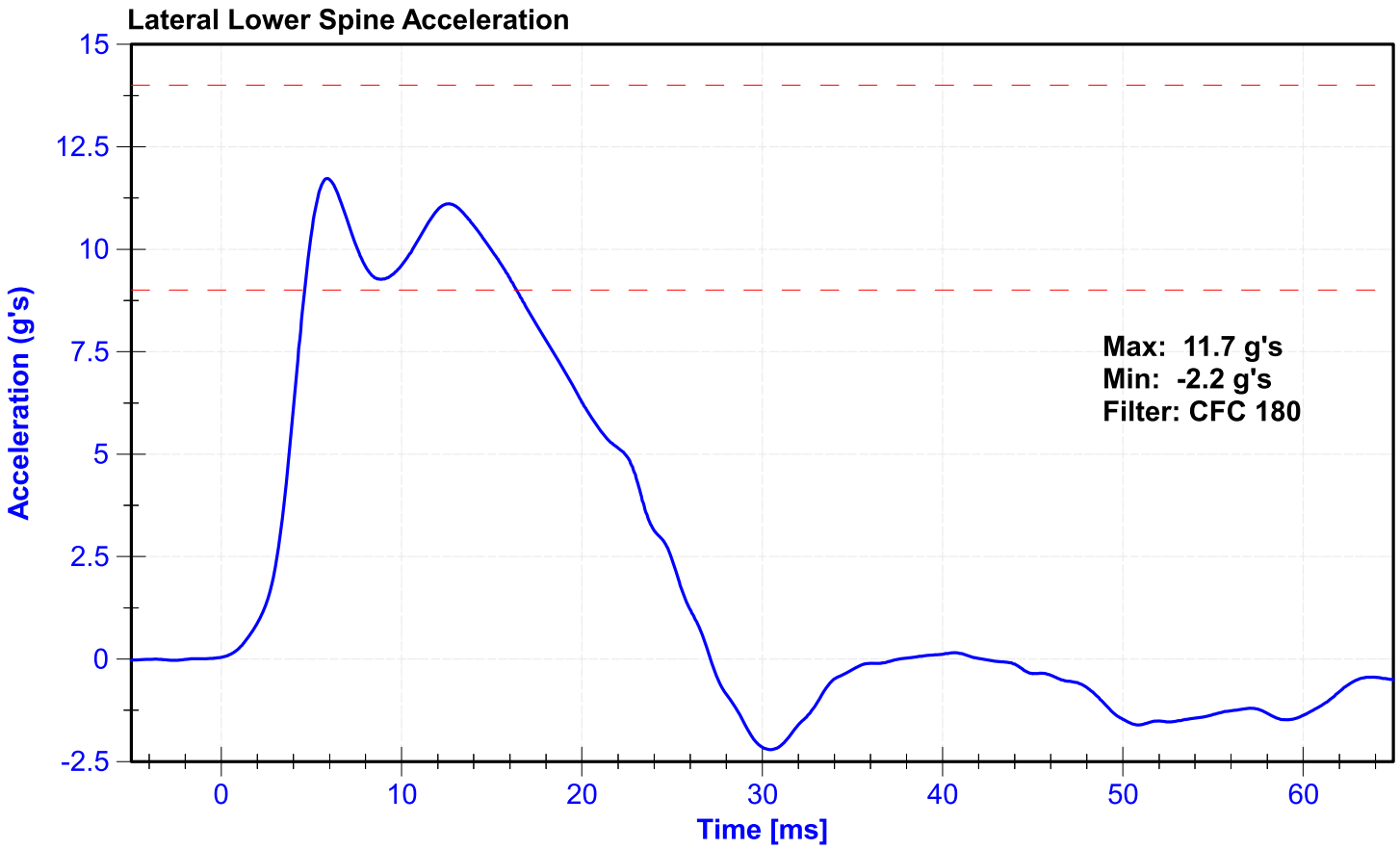
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Lower Spine Y Accelerometer	Endevco	T20906	10/8/2024	4/6/2025
Upper Abdomen Rib Potentiometer	Servo	DS-058GFE	10/8/2024	4/8/2025
Lower Abdomen Rib Potentiometer	Servo	1256GFE	10/8/2024	4/8/2025




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.4 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
0
10
20
30
40
50
60
Time [ms]
Max: 11.7 g's
Min: -2.2 g's
Filter: CFC 180

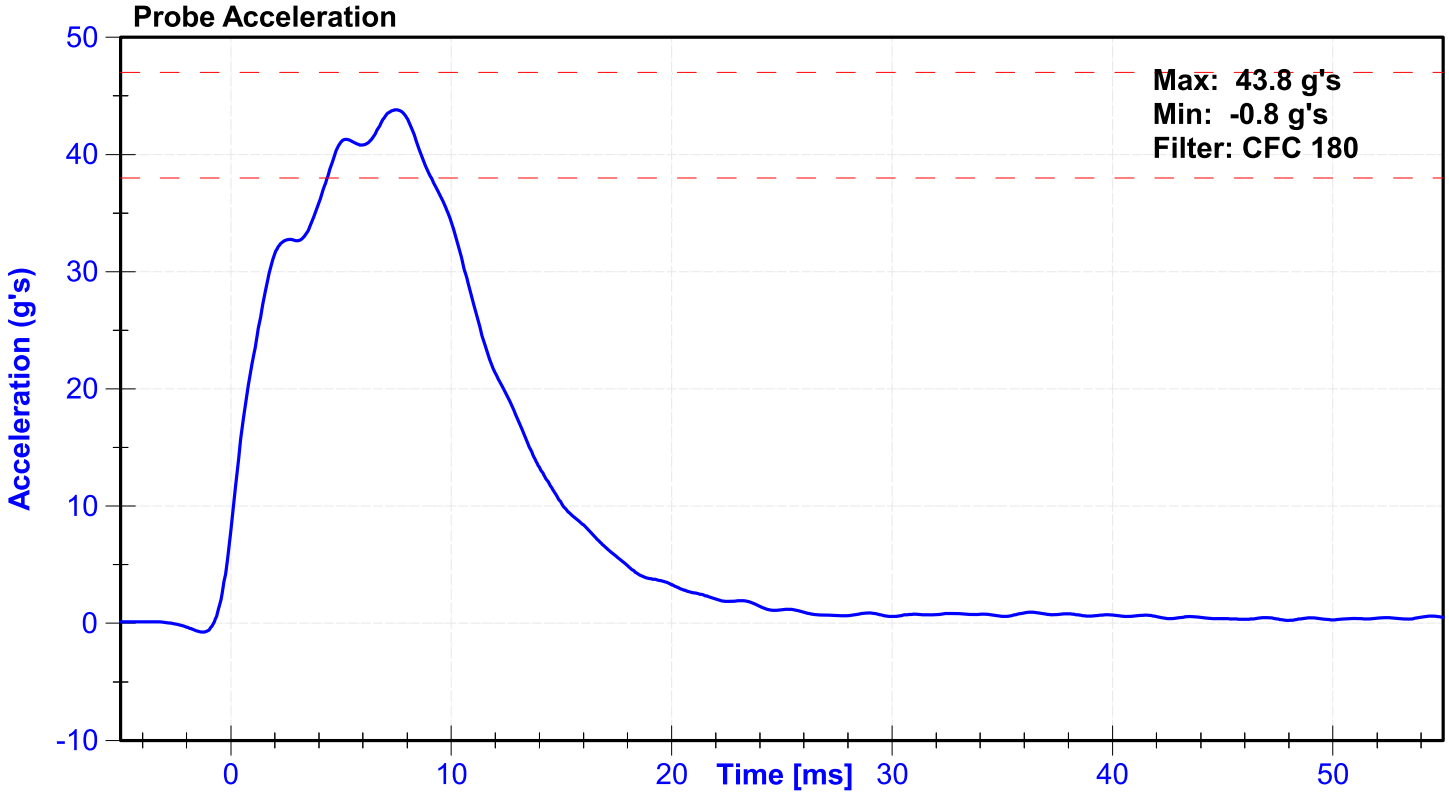
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

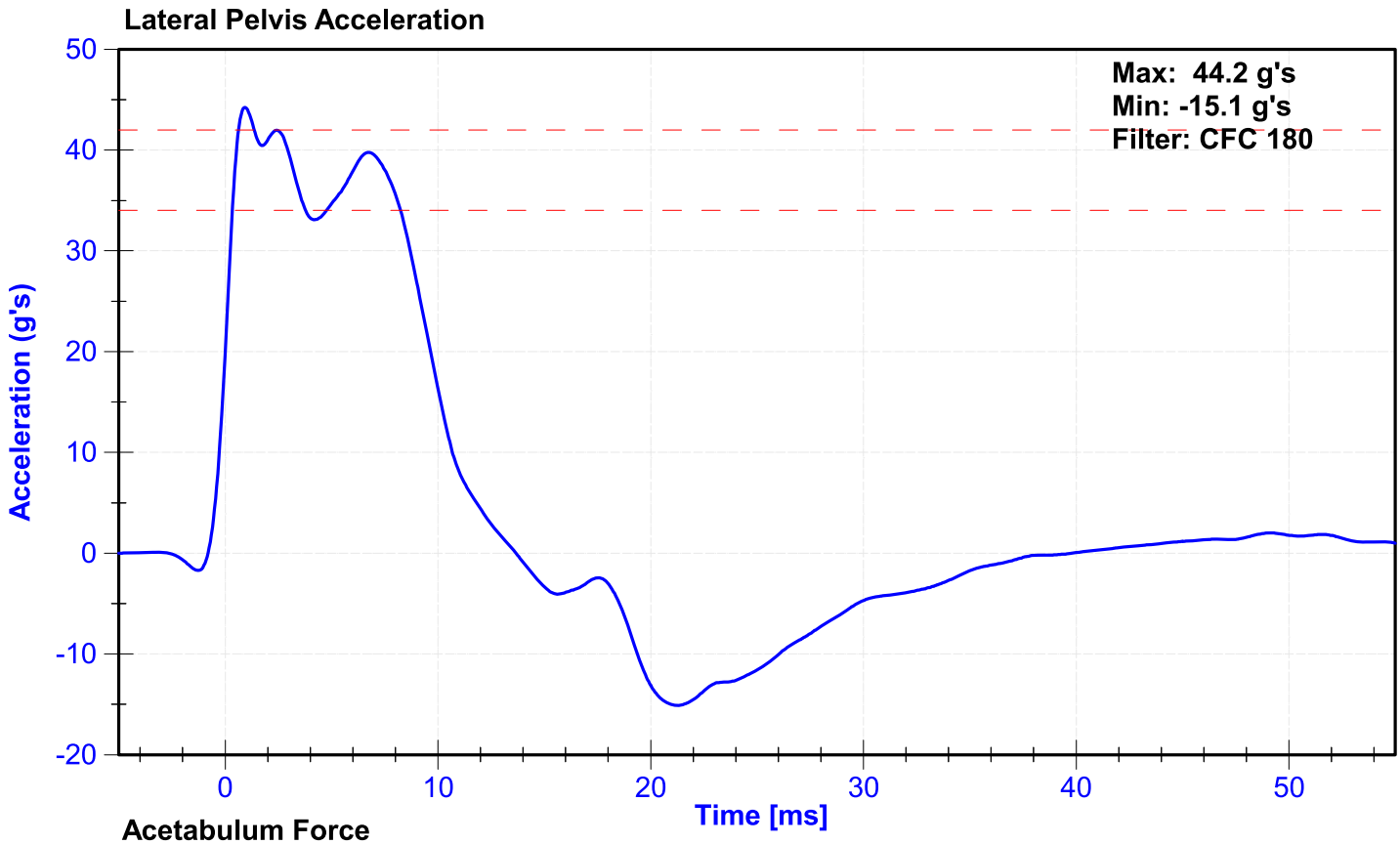
Results

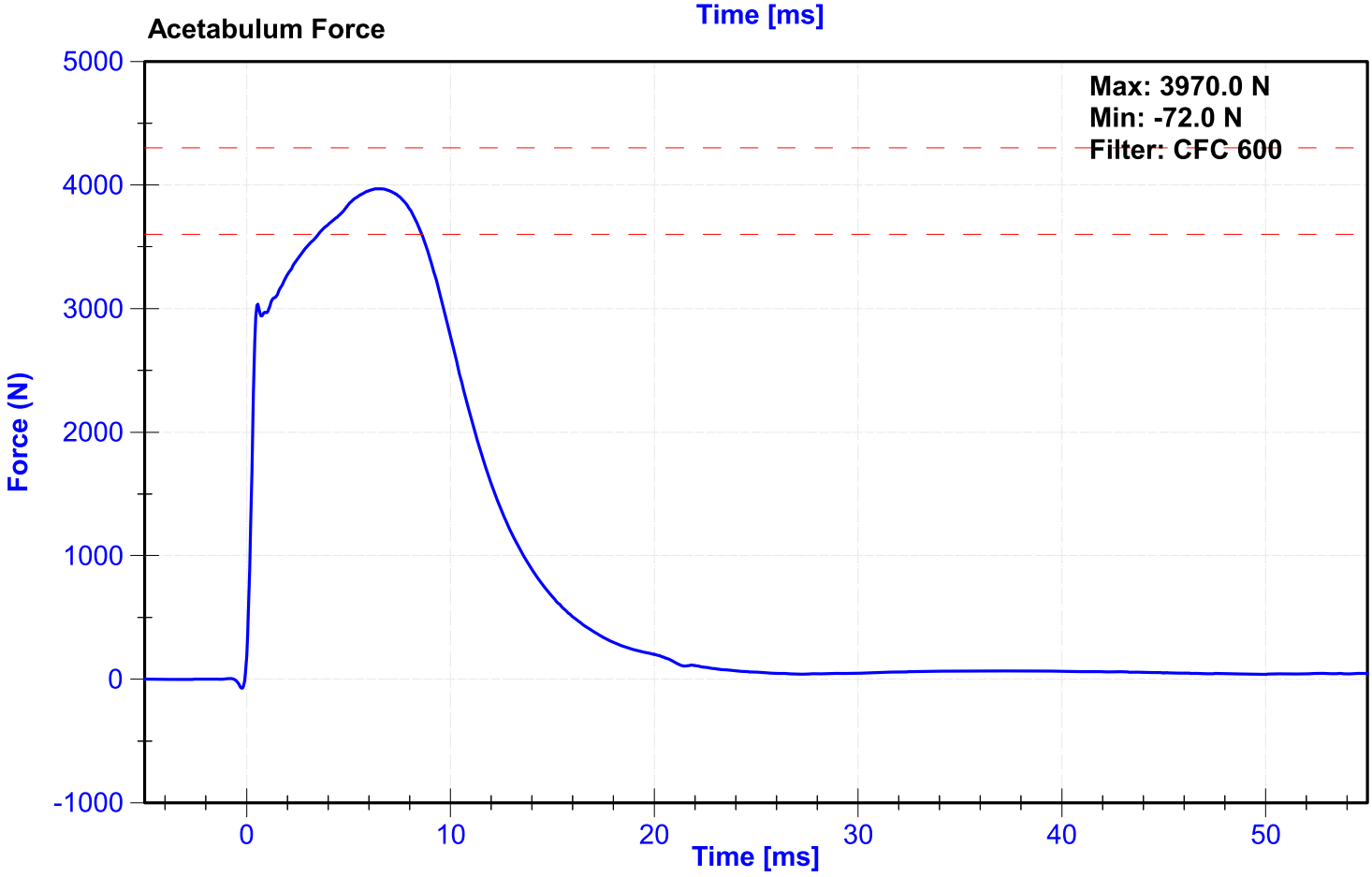
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	17	Pass
Velocity	6.6	6.8	m/s	6.63	Pass
Probe Acceleration	38	47	g's	43.8	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	39.8	Pass
Acetabulum Force	3600	4300	N	3970.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Pelvis Y Accelerometer	Endevco	P63987	10/8/2024	4/6/2025
Acetabulum Load Cell	Denton	267-FY	9/16/2024	9/16/2025
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 44.2 g's
Min: -15.1 g's
Filter: CFC 180
Acceleration (g's)
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 3970.0 N
Min: -72.0 N
Filter: CFC 600
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]

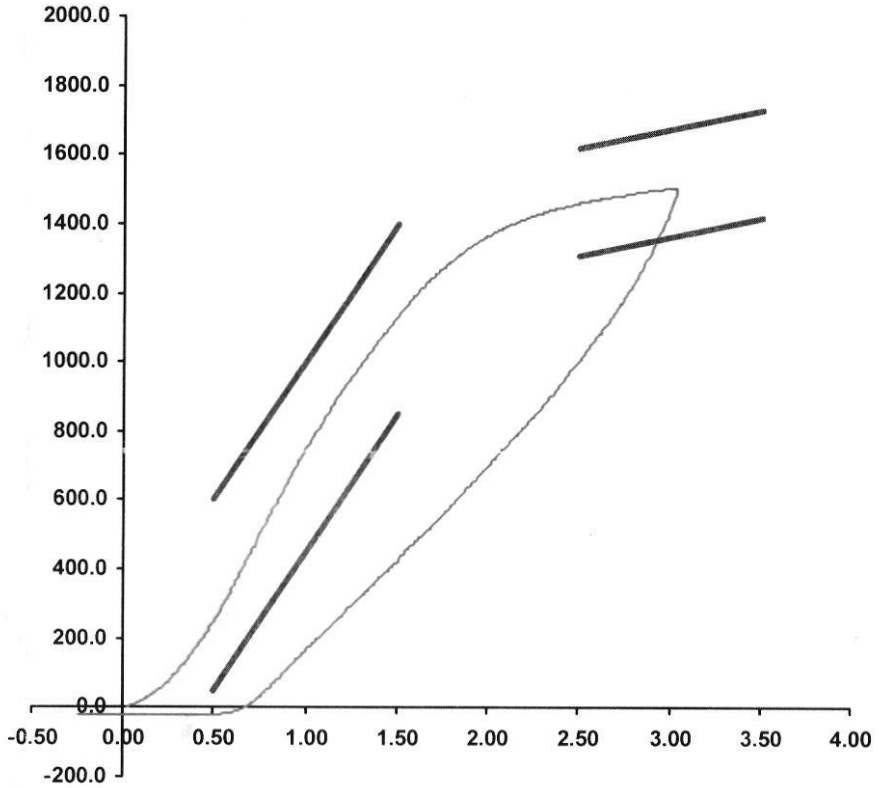
Cert
12-13-21
2c4

SID-IIs Pelvis Plug Certification Test

Plug S/N 16727
Test Number 23527
Report Number 23584
Test Date 7/22/2022 12:38:53 PM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	252	50	600
Force @ 1.5 mm (N)	1,135	850	1,400
Force @ 2.5 mm (N)	1,460	1,306	1,618
Force @ 3.0 mm (N)	1,503	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 22-Jul-22
SACO Research

By : DC Date : 7/22/22

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

VI-21

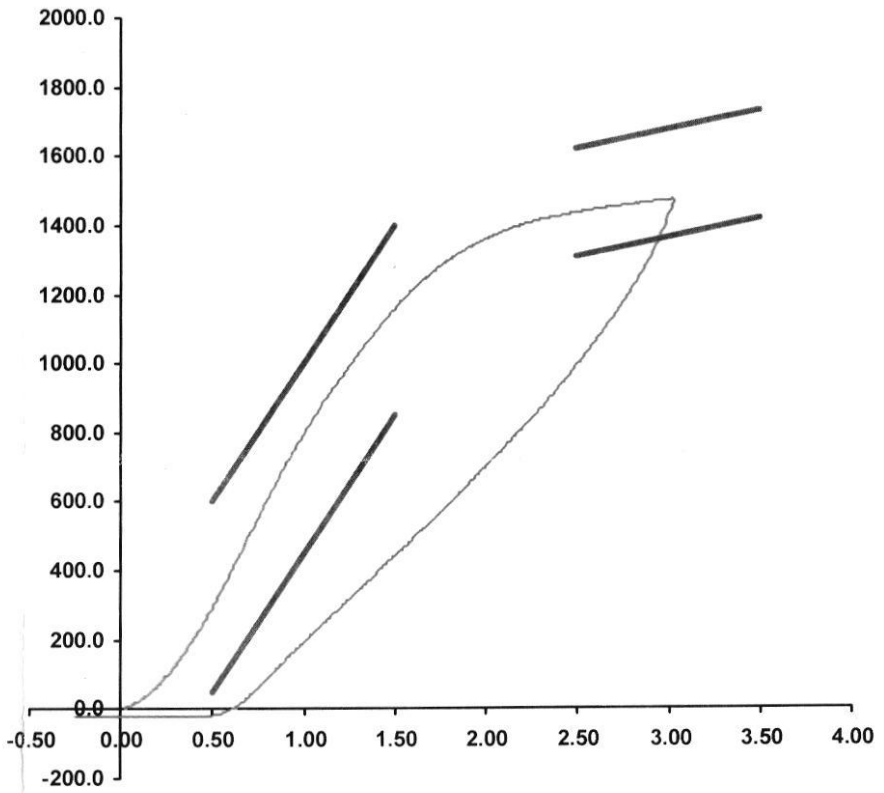
Impact
224
1-24-2025

SID-IIs Pelvis Plug Certification Test

Plug S/N 16717
Test Number 23517
Report Number 23574
Test Date 7/22/2022 11:59:12 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	293	50	600
Force @ 1.5 mm (N)	1,159	850	1,400
Force @ 2.5 mm (N)	1,435	1,306	1,618
Force @ 3.0 mm (N)	1,471	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:

Operator

Part Number 180-4450

Template No 107 22-Jul-22
SACO Research

By : DC Date : 7/22/22

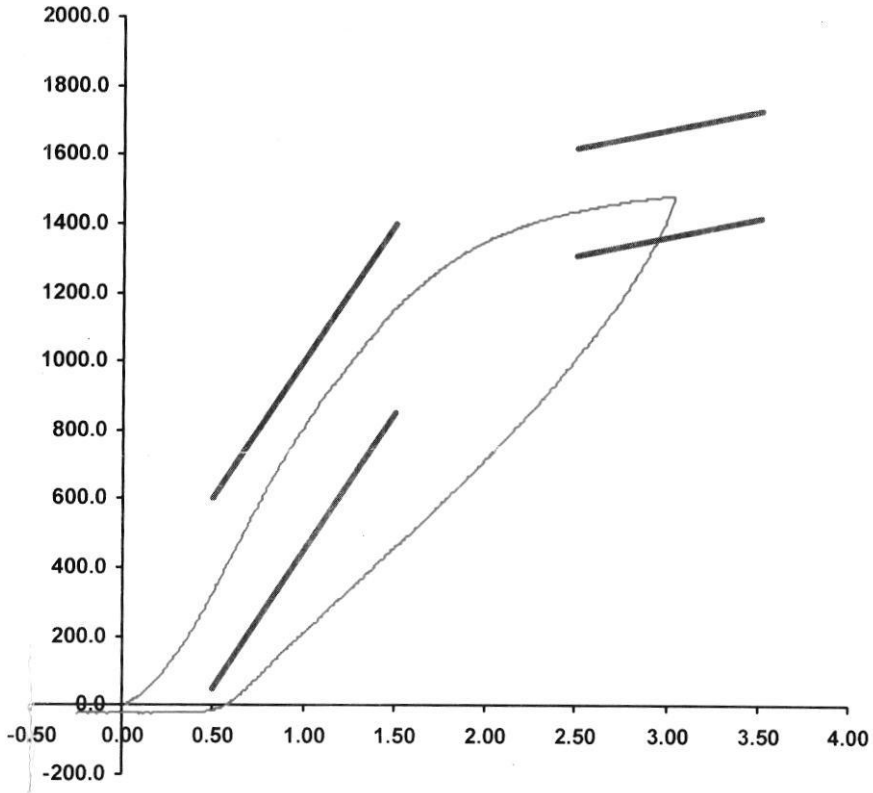
Non Impact
224
1-29-2025

SID-IIs Pelvis Plug Certification Test

Plug S/N 16707
Test Number 23507
Report Number 23564
Test Date 7/22/2022 11:32:18 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	337	50	600
Force @ 1.5 mm (N)	1,152	850	1,400
Force @ 2.5 mm (N)	1,437	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:

Operator

Part Number 180-4450

Template No 107 22-Jul-22
SACO Research

By : DC Date : 7/22/22

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

VI-23

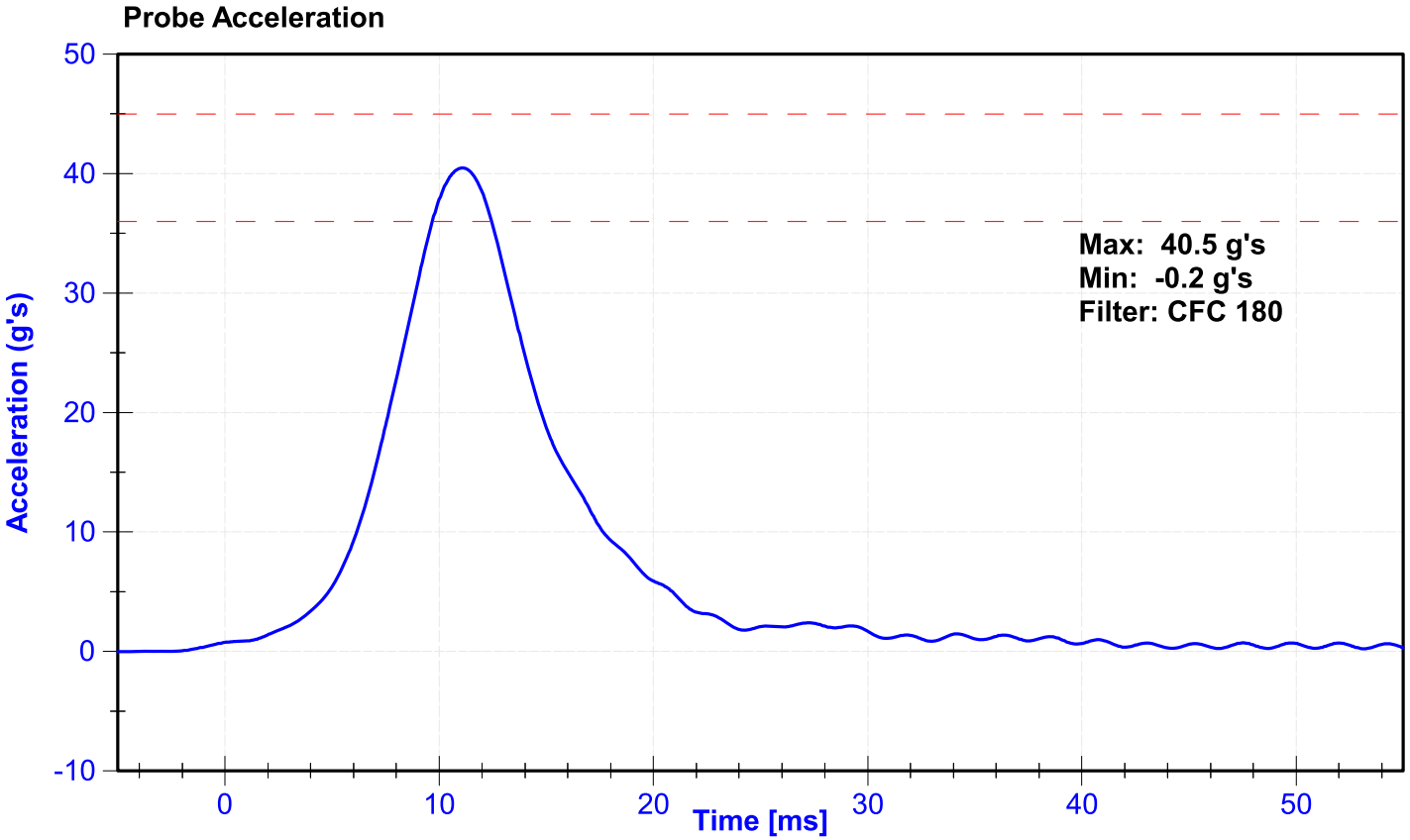
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

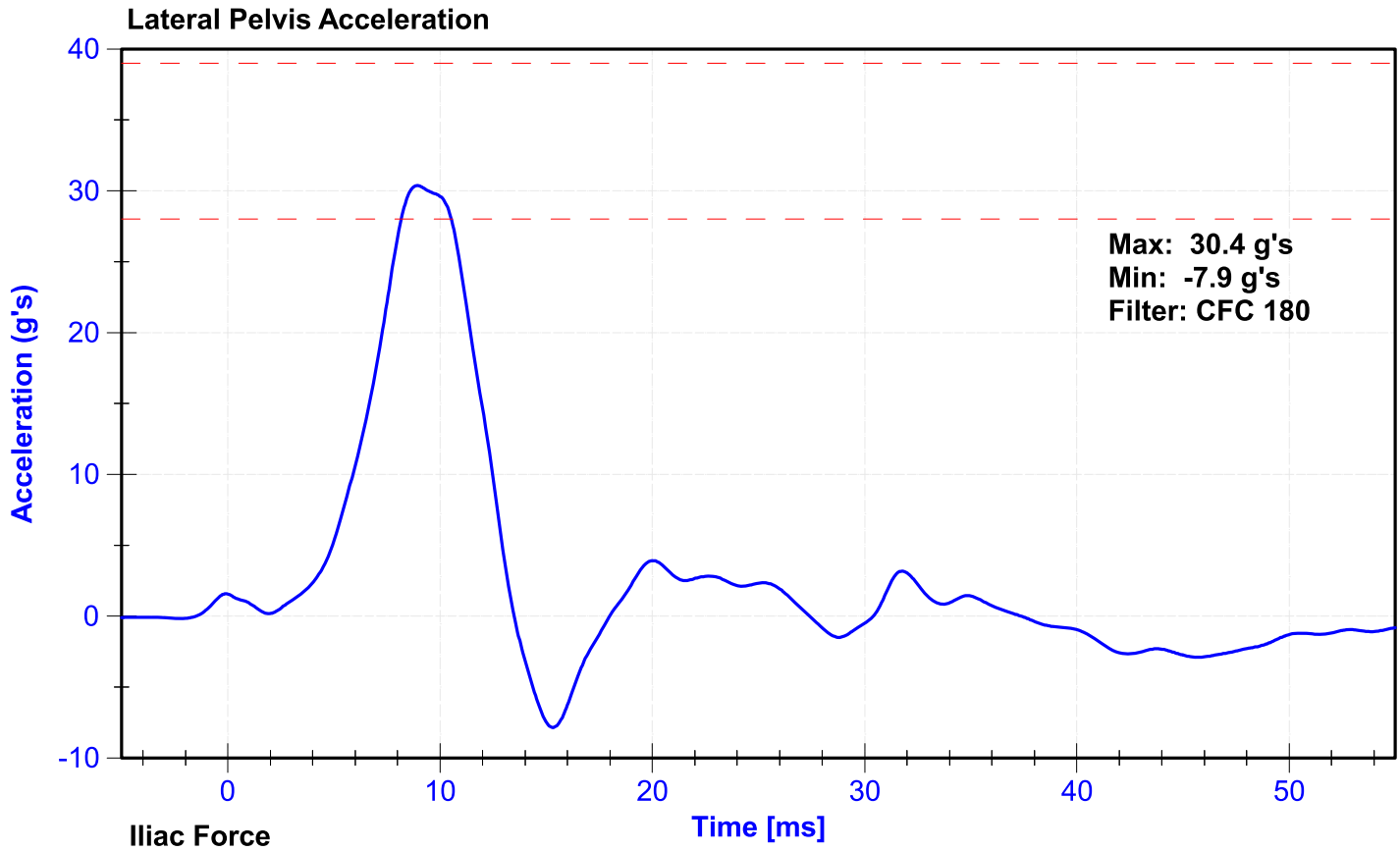
Results

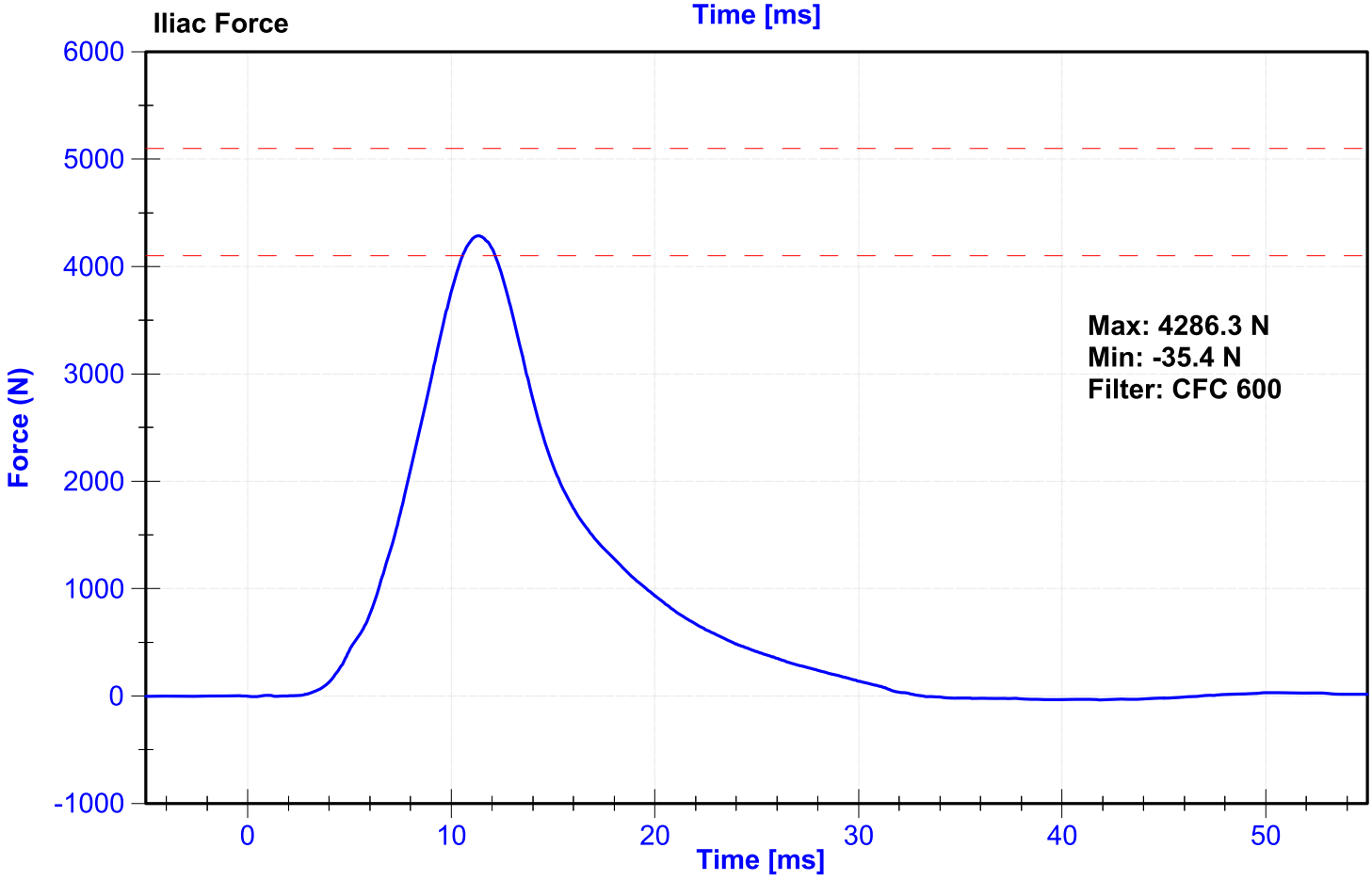
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	17	Pass
Velocity	4.2	4.4	m/s	4.23	Pass
Probe Acceleration	36	45	g's	40.5	Pass
Lateral Pelvis Acceleration	28	39	g's	30.4	Pass
Iliac Force	4100	5100	N	4286.3	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Pelvis Y Accelerometer	Endevco	P63987	10/8/2024	4/6/2025
Iliac Load Cell	Denton	280-FY	9/16/2024	9/16/2025




Lateral Pelvis Acceleration
Acceleration (g's)
Time [ms]
Max: 30.4 g's
Min: -7.9 g's
Filter: CFC 180

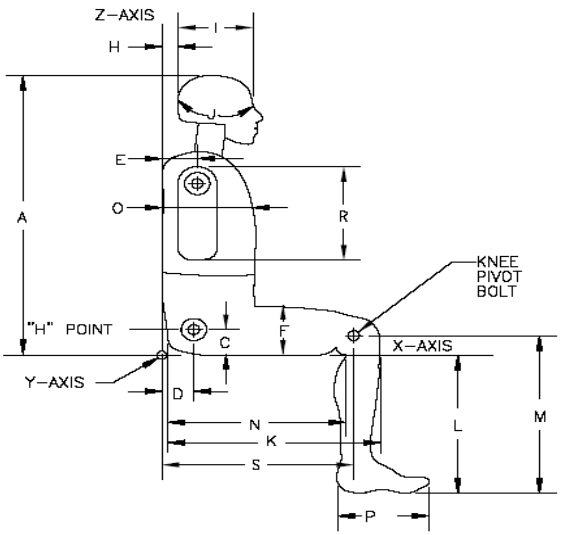

Iliac Force
Force (N)
Time [ms]
Max: 4286.3 N
Min: -35.4 N
Filter: CFC 600

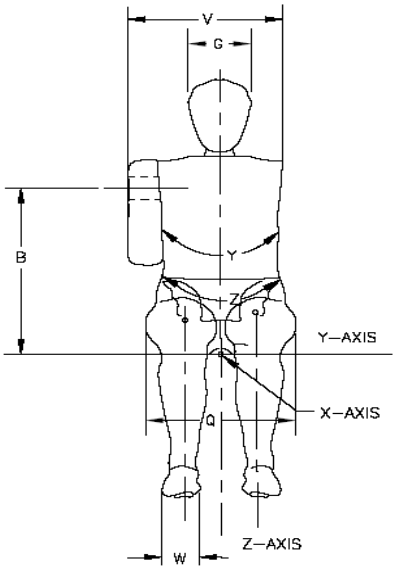
POST-TEST
SID-IIs PERFORMANCE CALIBRATION TEST DATA

External Measurements - SID-IIs

Technician: J. Rios Date: 2/8/2025

Dummy Serial Number: 224





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	779	Pass
B	Shoulder Pivot Height	437	453	444	Pass
C	H-point Height	79	89	82	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	101	Pass
F	Thigh Clearance	119	135	127	Pass
G	Head Breadth	140	148	145	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	184	Pass
J	Head Circumference	541	551	547	Pass
K	Buttock to Knee Length	514	540	527	Pass
L	Popliteal Height	343	369	354	Pass
M	Knee Pivot to floor height	392	409	404	Pass
N	Buttock Popliteal Length	416	442	428	Pass
O	Chest Depth w/o jacket	195	211	208	Pass
P	Foot Length	216	232	224	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	317	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	482	Pass
V	Shoulder Width	341	357	348	Pass
W	Foot Width	78	94	84	Pass
Y	Chest Circumference w/jacket	851	881	870	Pass
Z	Waist Circumference	761	791	778	Pass

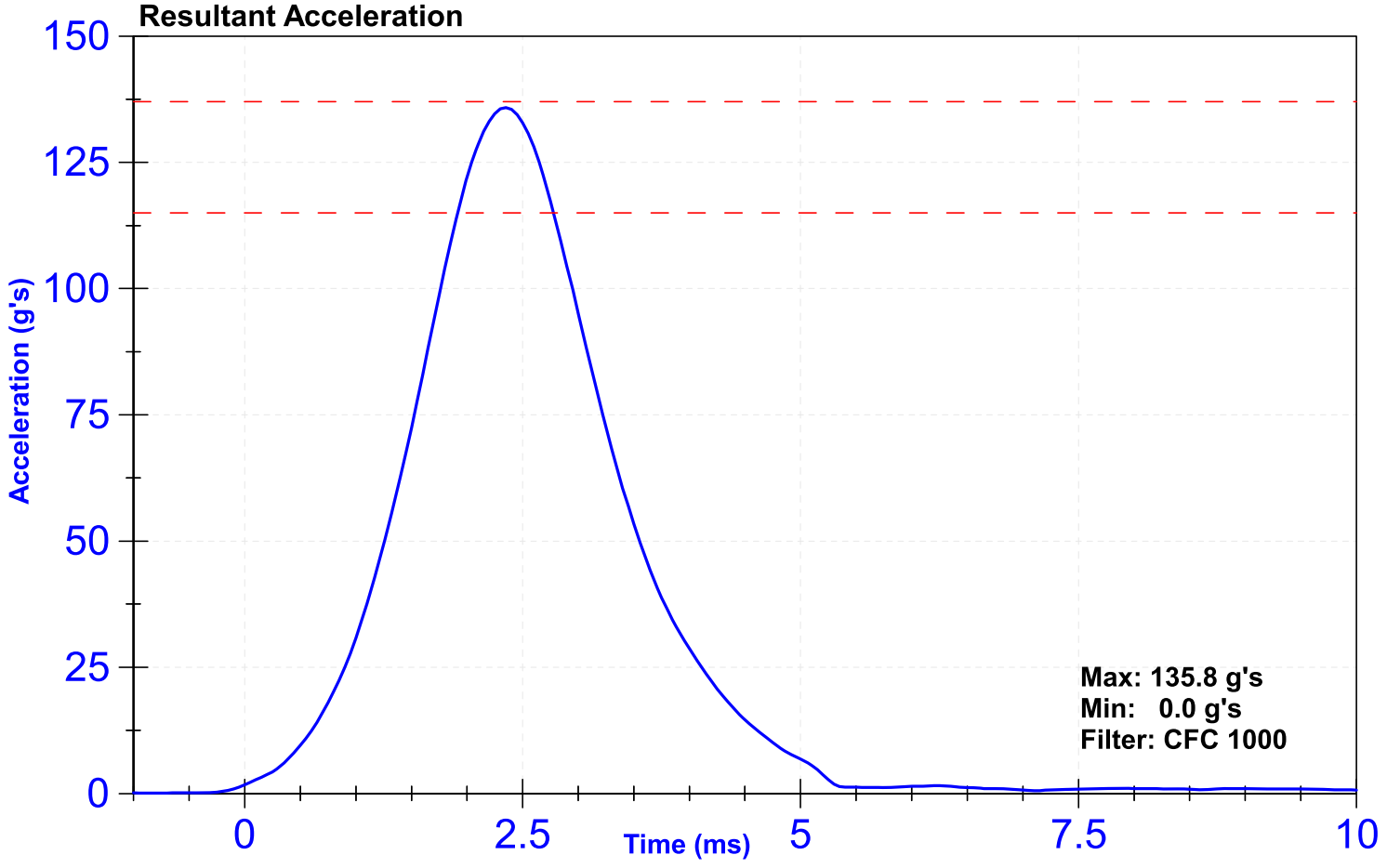
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

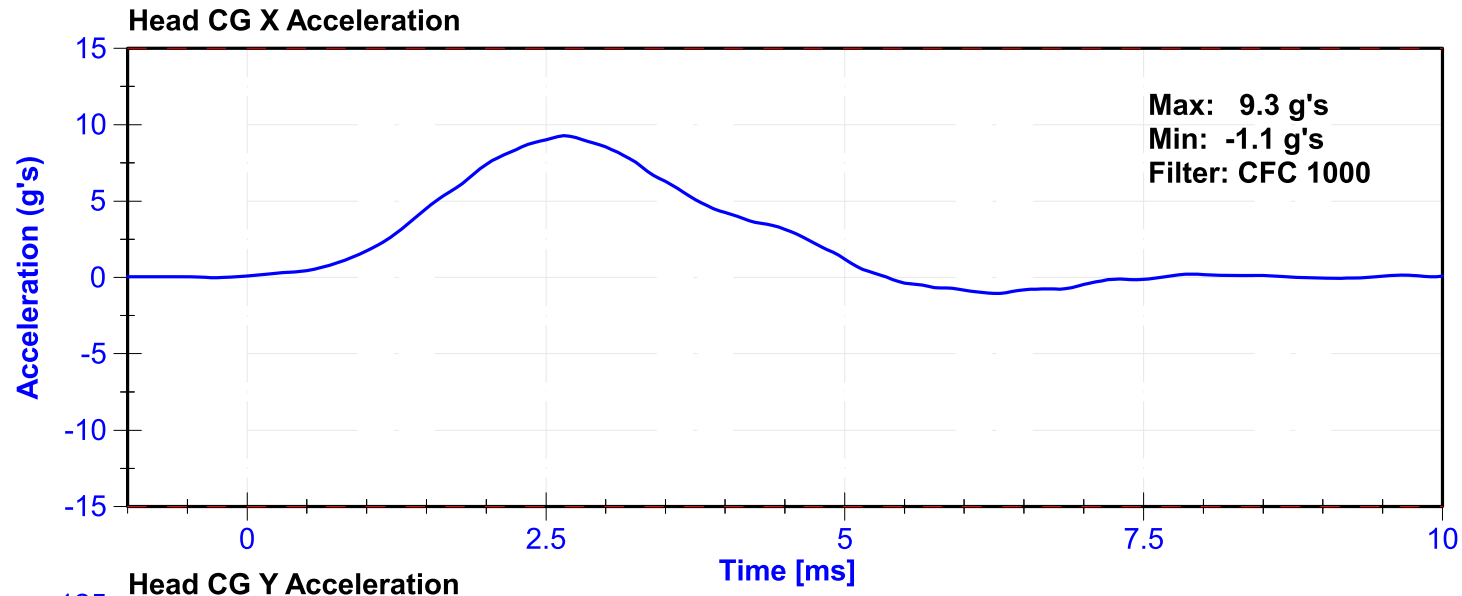
Results

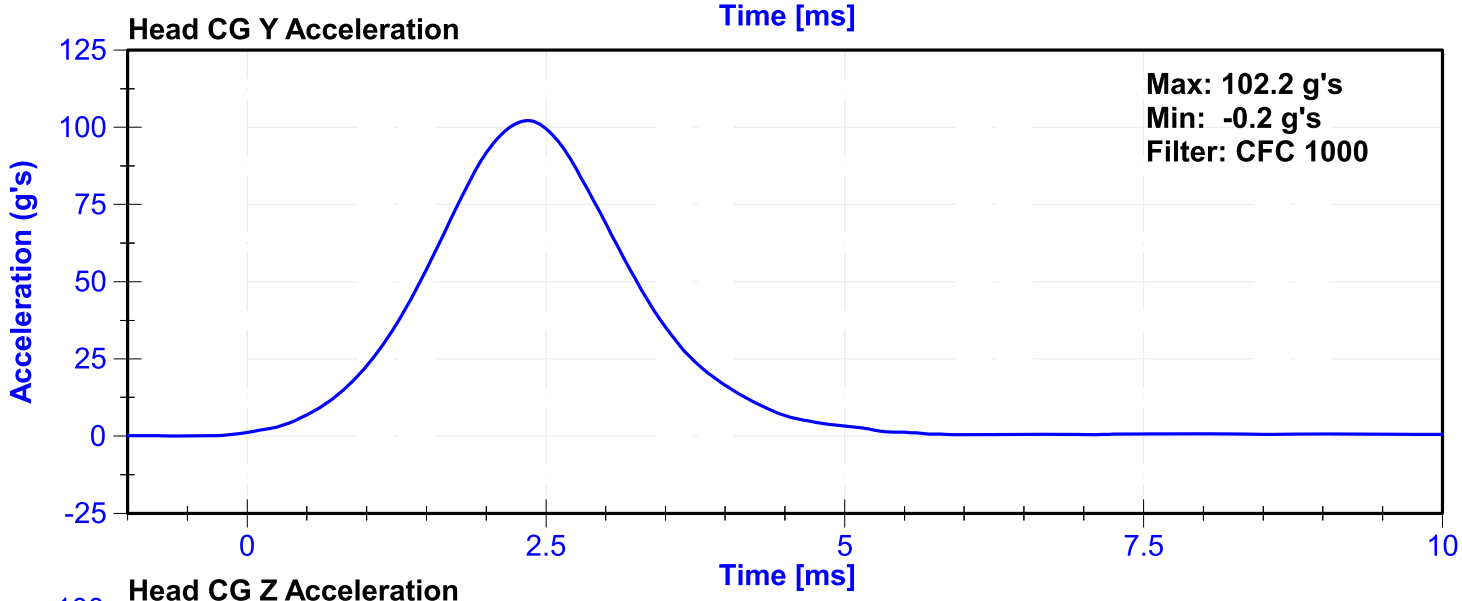
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.3	Pass
Humidity	10	70	%	21	Pass
Resultant Acceleration	115	137	g's	135.8	Pass
Oscillation	0	15	%	1.1	Pass
Fore-Aft Acceleration	-15	15	g's	9.3	Pass

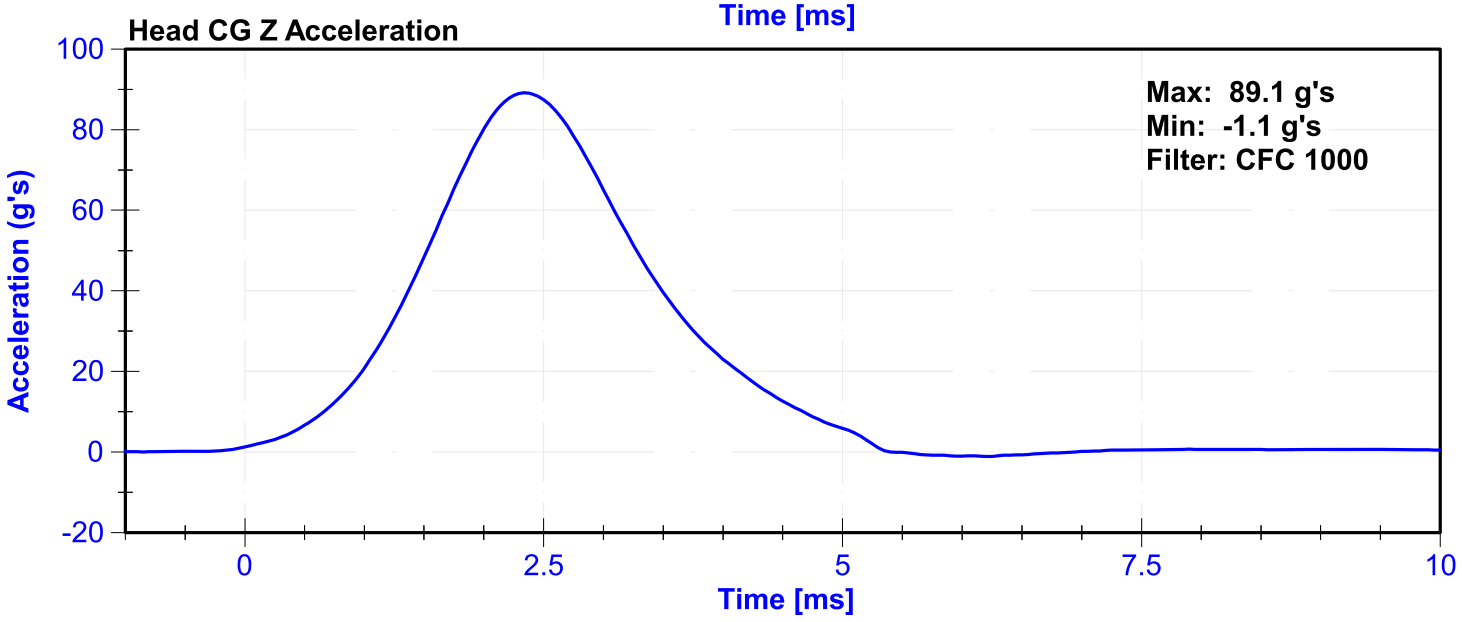
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibratio Date	Calibratio Due Date
X Accelerometer	Endevco	P51884	10/8/2024	4/6/2025
Y Accelerometer	Endevco	P73161	10/8/2024	4/6/2025
Z Accelerometer	Endevco	P79588	10/8/2024	4/6/2025




Head CG X Acceleration
Max: 9.3 g's
Min: -1.1 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Y Acceleration
Max: 102.2 g's
Min: -0.2 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]


Head CG Z Acceleration
Max: 89.1 g's
Min: -1.1 g's
Filter: CFC 1000
Acceleration (g's)
Time [ms]

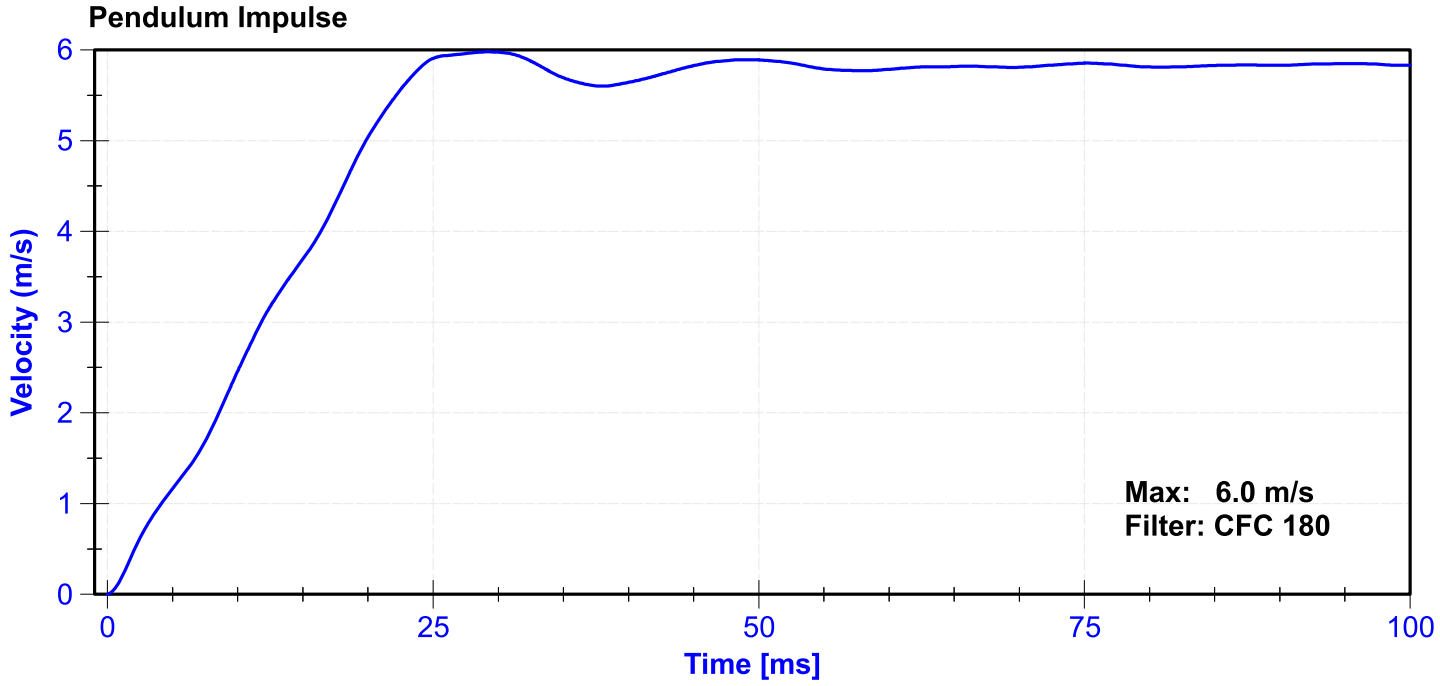
ATD Manufacturer	FTSS	Test Technician	J. Rios
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

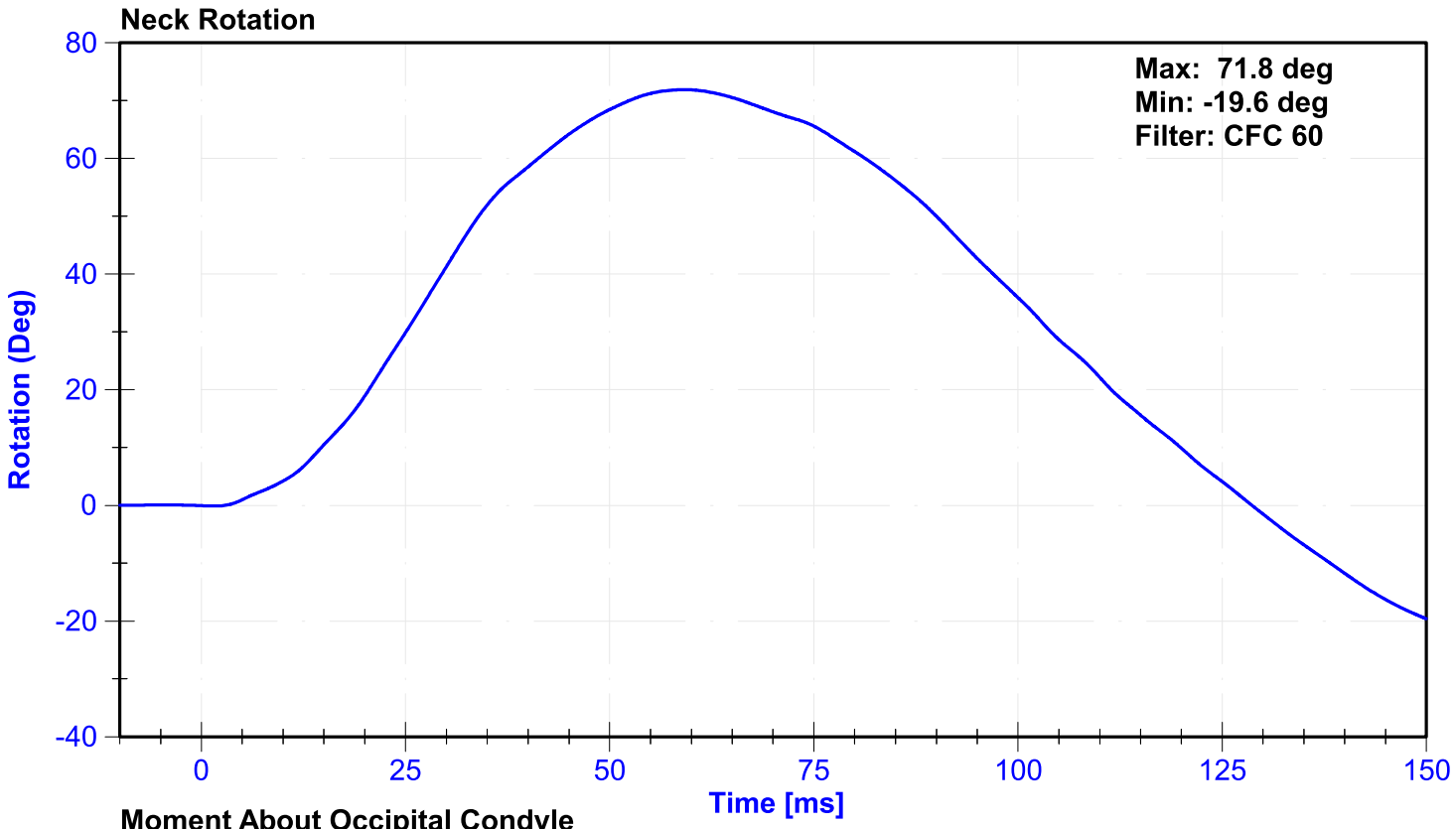
Results

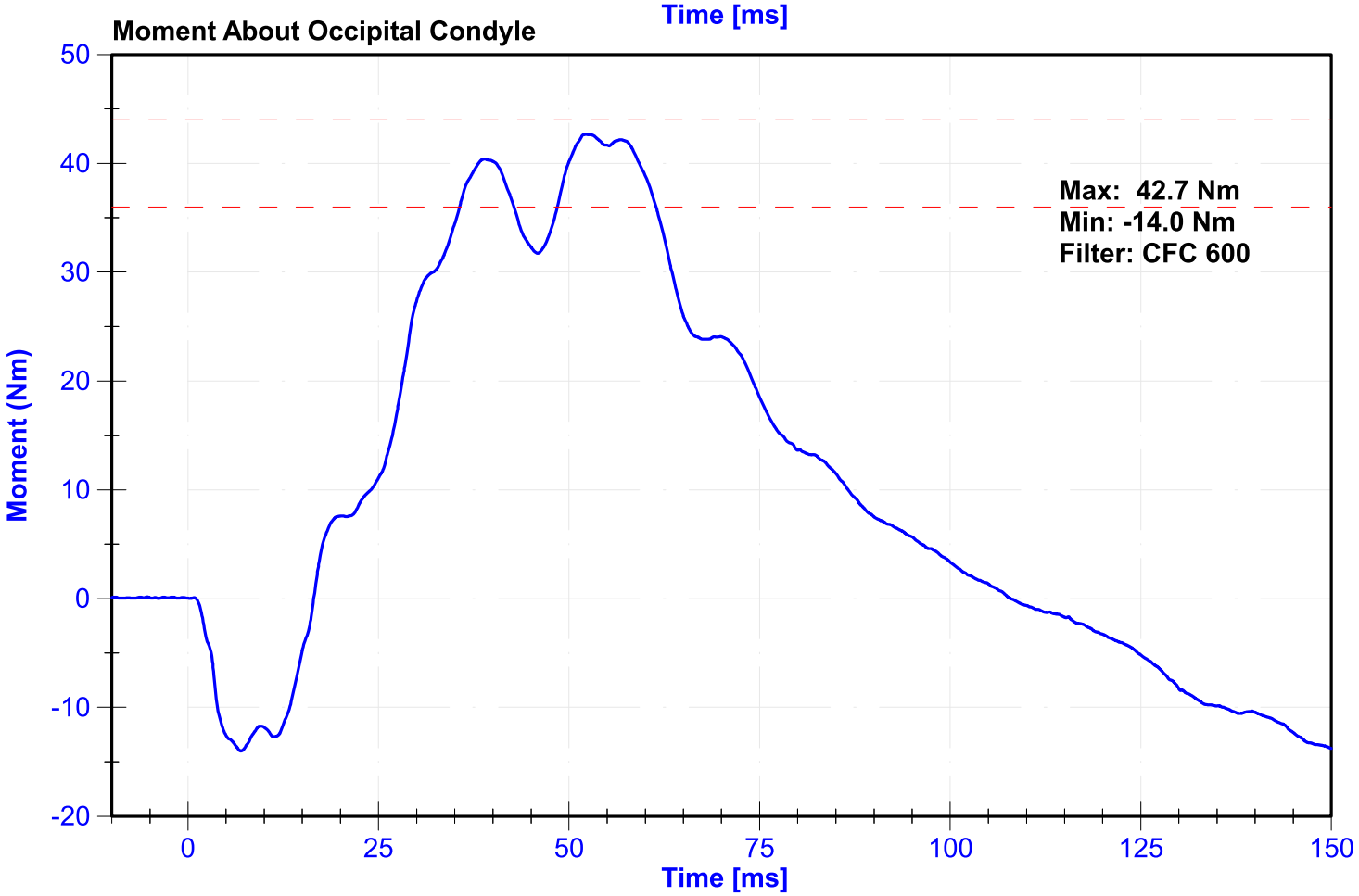
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	19	Pass
Velocity	5.51	5.63	m/s	5.609	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.46	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.70	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	5.04	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.91	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.98	Pass
Neck Rotation	71	81	deg	71.8	Pass
Time at Maximum Rotation	50	70	ms	59.2	Pass
Moment about the OC	36	44	Nm	42.7	Pass
Moment Decay to 0 Nm	102	126	ms	107.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	7231C-750	11/1/2024	11/1/2025
Pendulum Potentiometer	Servo	4961	9/23/2024	9/23/2025
Condyle Potentiometer	Servo	DS185	9/23/2024	9/23/2025
Upper Neck Load Cell	Kistler	M555A6CFM_1935H01700-F2Y	2/13/2024	2/12/2025




Neck Rotation
Max: 71.8 deg
Min: -19.6 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: 42.7 Nm
Min: -14.0 Nm
Filter: CFC 600
Moment (Nm)
50
40
30
20
10
0
-10
-20
0
25
50
75
100
125
150
Time [ms]

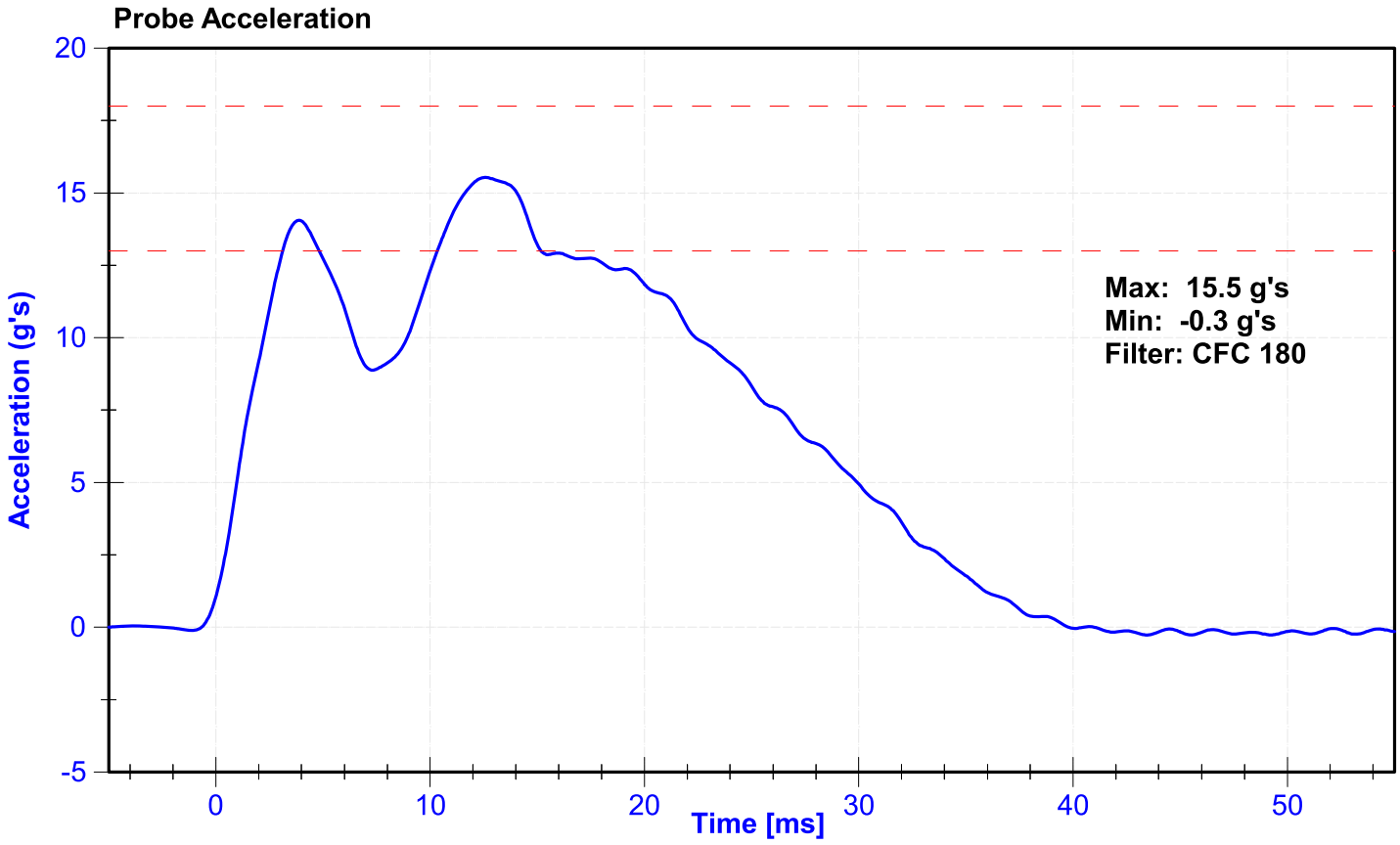
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

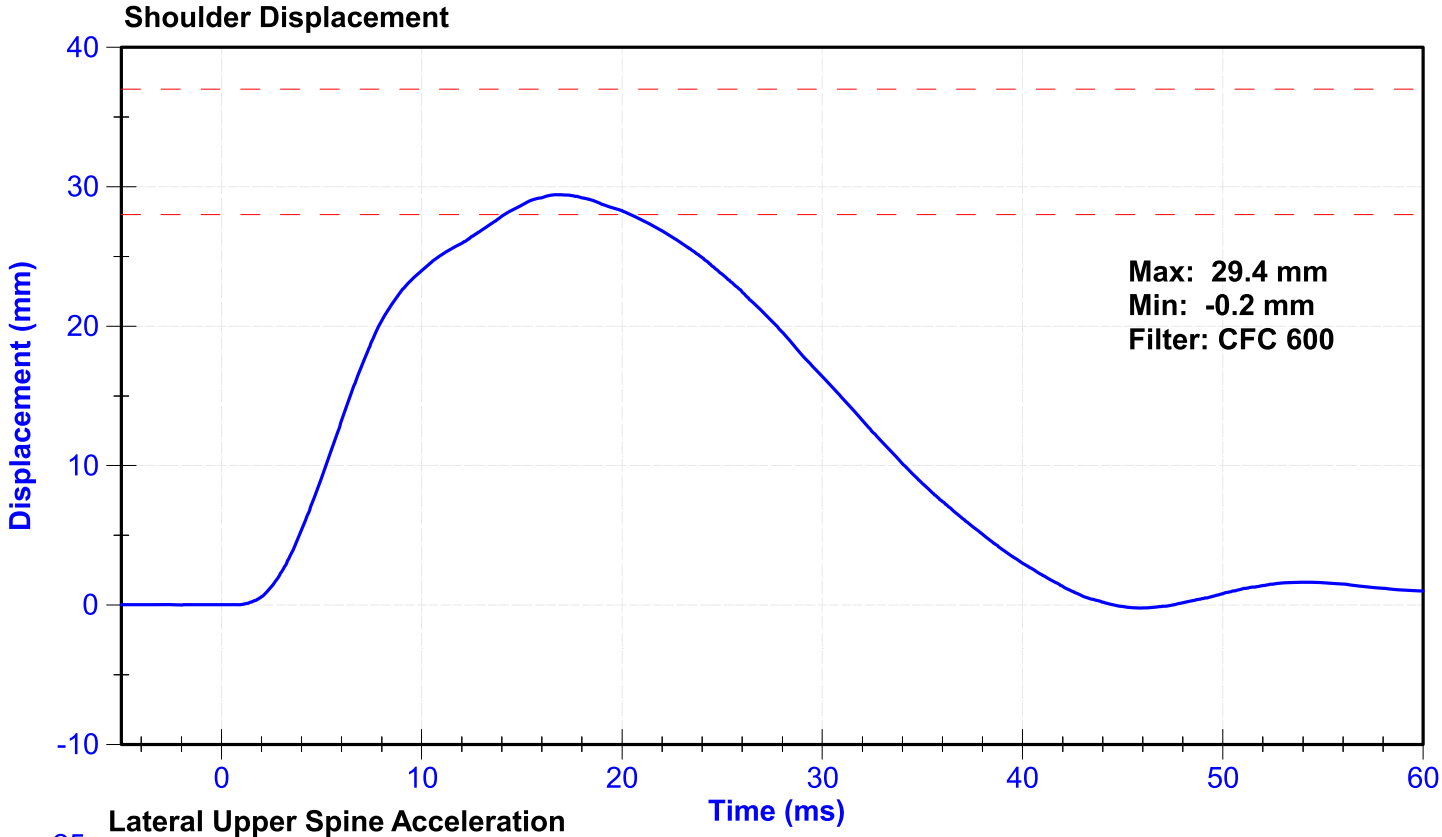
Results

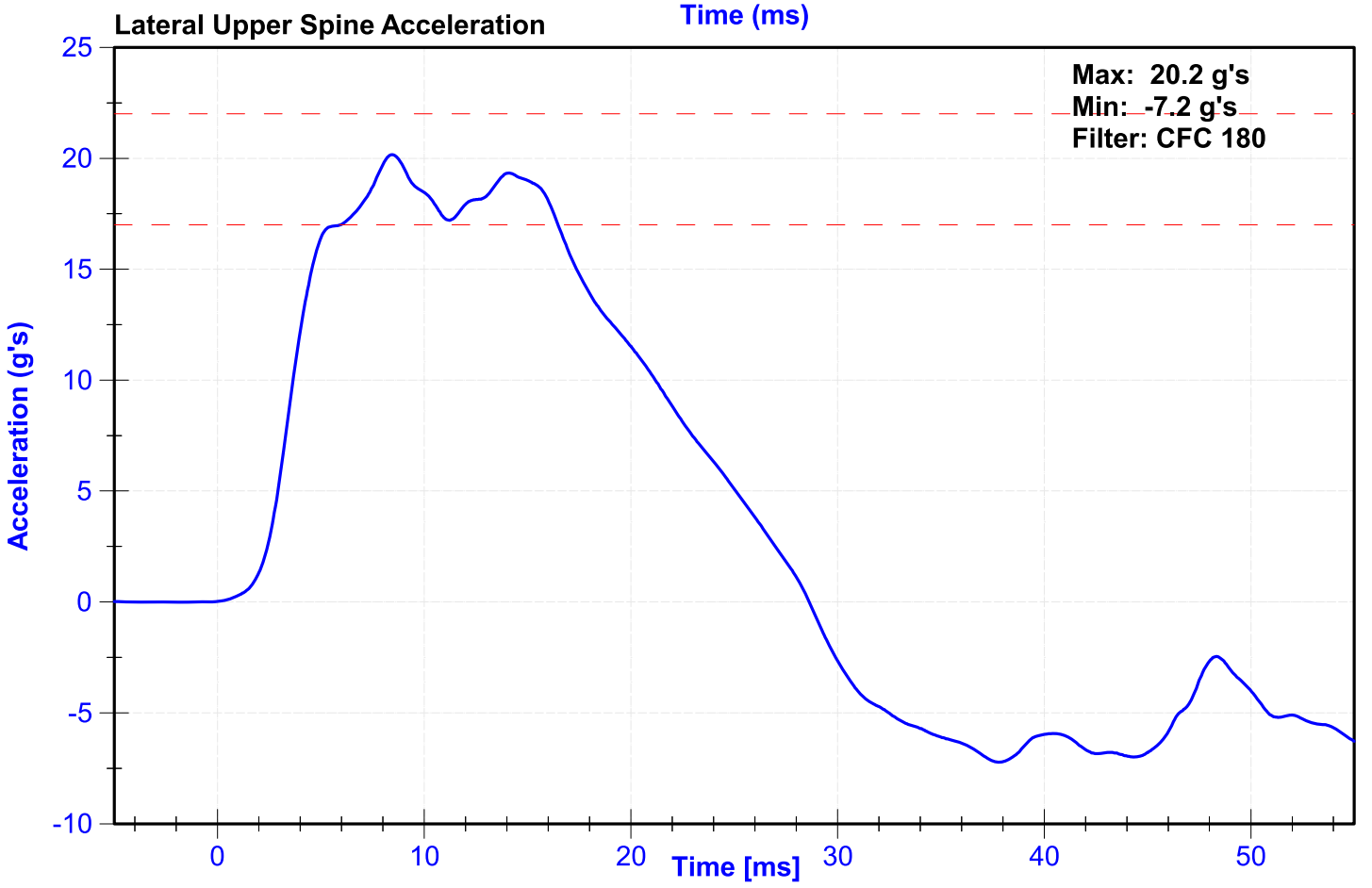
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	17	Pass
Velocity	4.2	4.4	m/s	4.25	Pass
Probe Acceleration	13	18	g's	15.5	Pass
Shoulder Deflection	28	37	mm	29.4	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25863	1/17/2025	7/16/2025
Shoulder Potentiometer	Servo	829GFE	10/8/2024	4/8/2025
Upper Spine Y Accelerometer	Endevco	P58883	10/8/2024	4/6/2025




Shoulder Displacement
Displacement (mm)
Time (ms)
Max: 29.4 mm
Min: -0.2 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 20.2 g's
Min: -7.2 g's
Filter: CFC 180

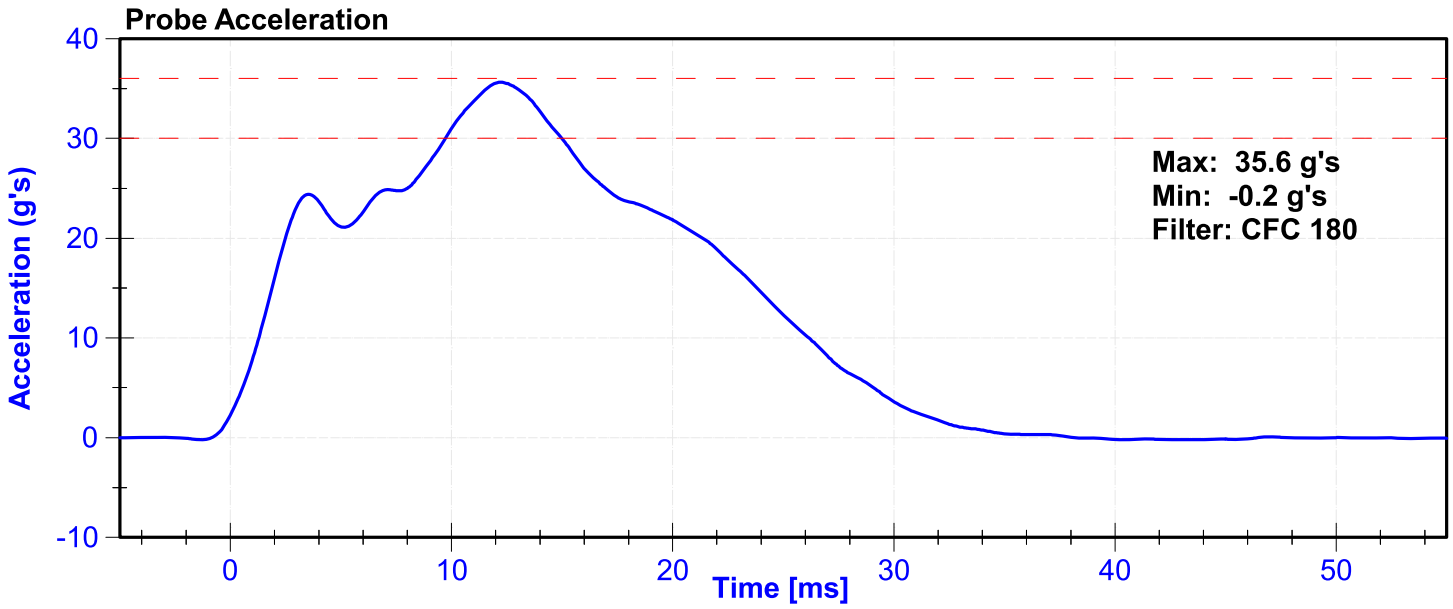
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

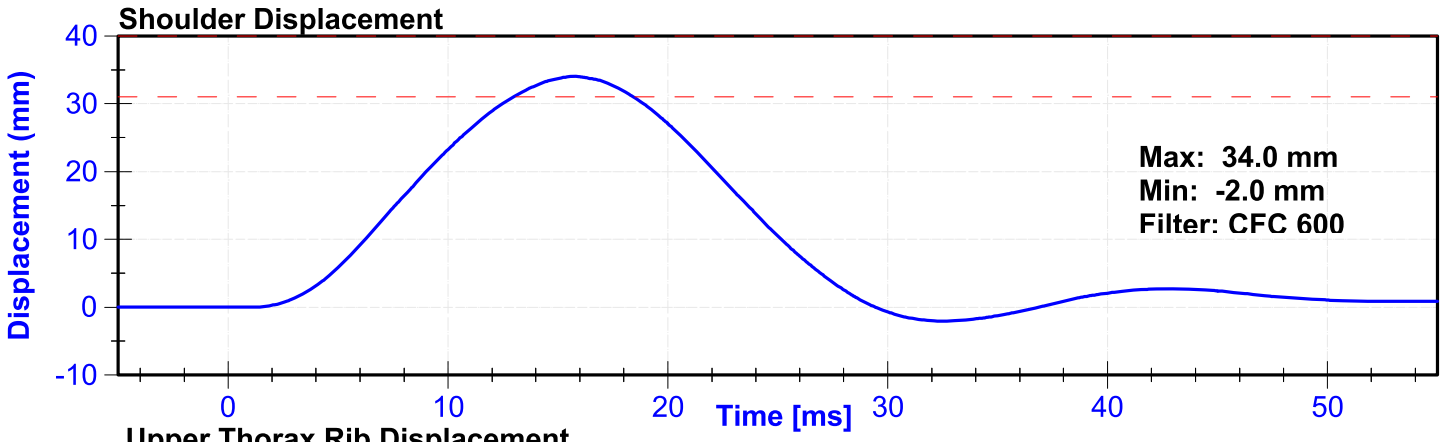
Results

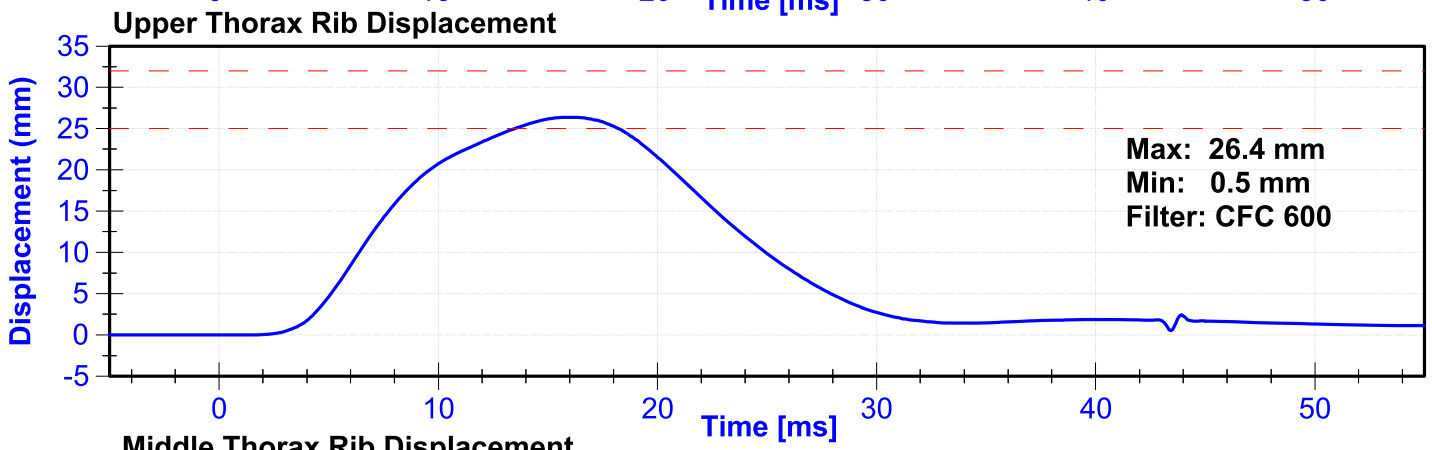
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	17	Pass
Velocity	6.6	6.8	m/s	6.66	Pass
Probe Acceleration after 5 ms	30	36	g's	35.6	Pass
Lateral Upper Spine Acceleration	34	43	g's	39.5	Pass
Lateral Lower Spine Acceleration	29	37	g's	34.7	Pass
Shoulder Deflection	31	40	mm	34.0	Pass
Upper Thorax Rib Deflection	25	32	mm	26.4	Pass
Mid Thorax Rib Deflection	30	36	mm	30.0	Pass
Lower Thorax Rib Deflection	32	38	mm	32.7	Pass

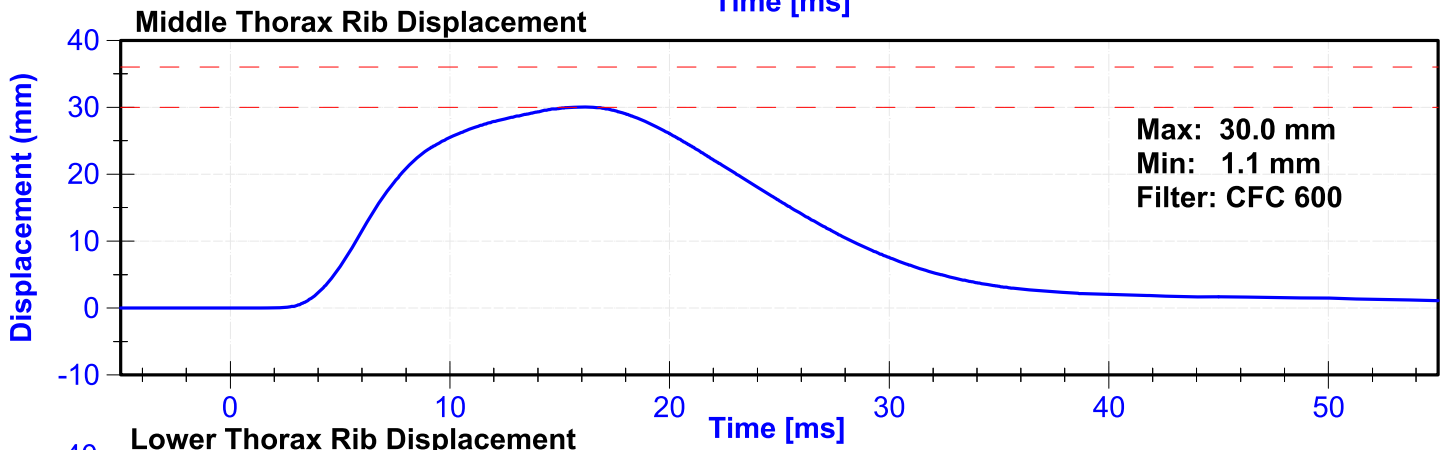
Transducer Calibrations

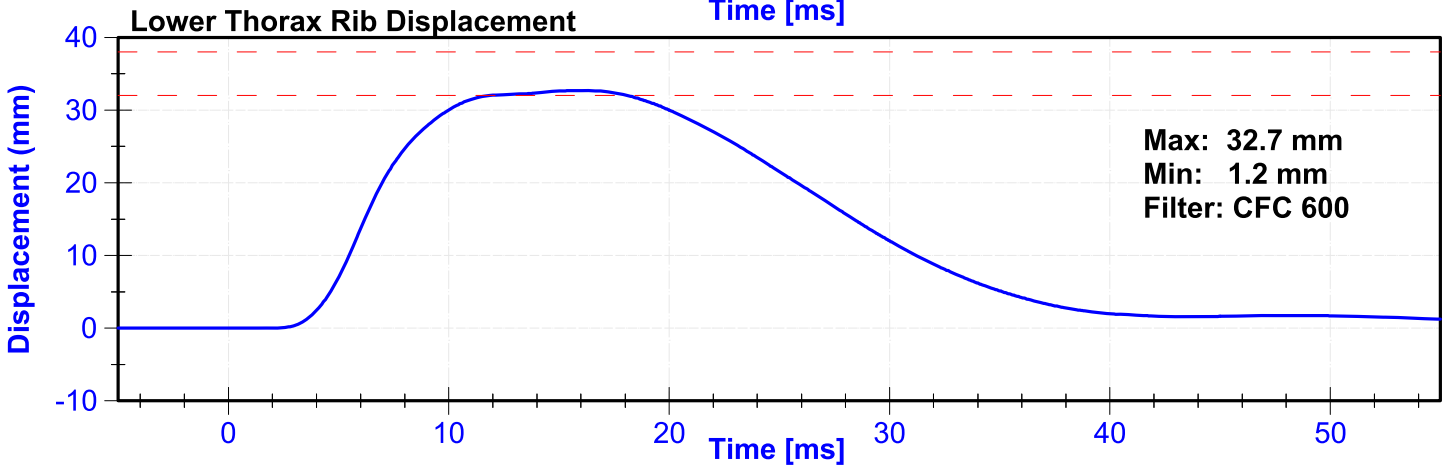
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25863	1/17/2025	7/16/2025
Upper Spine T1 Y Accelerometer	Endevco	P58883	10/8/2024	4/6/2025
Upper Spine T12 Y Accelerometer	Endevco	T20906	10/8/2024	4/6/2025
Shoulder Potentiometer	Servo	829GFE	10/8/2024	4/8/2025
Upper Thorax Rib Potentiometer	Servo	DS-049GFE	10/8/2024	4/8/2025
Middle Thorax Rib Potentiometer	Servo	080GFE	10/9/2024	4/9/2025
Lower Thorax Rib Potentiometer	Servo	087GFE	12/5/2024	6/5/2025

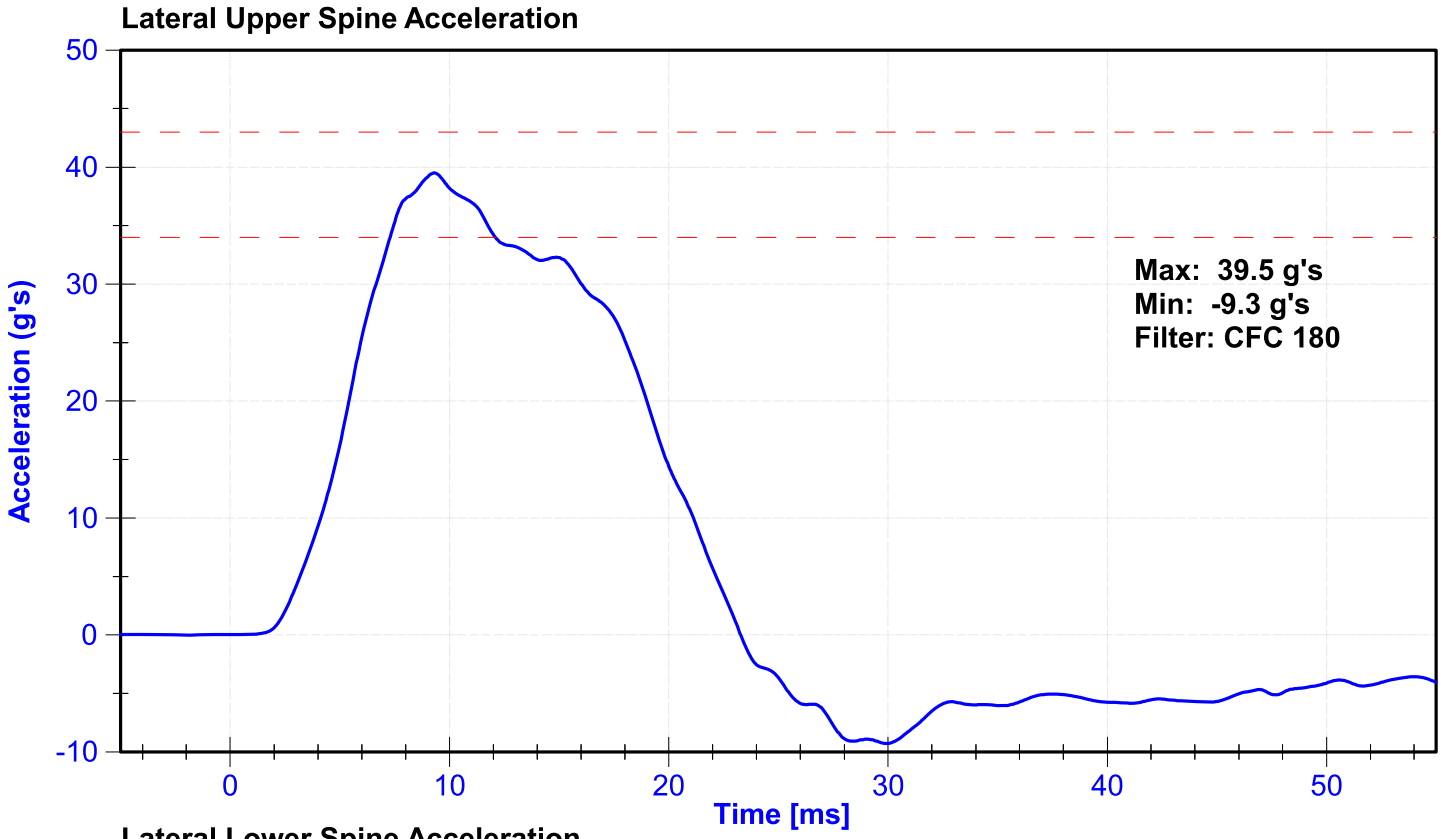


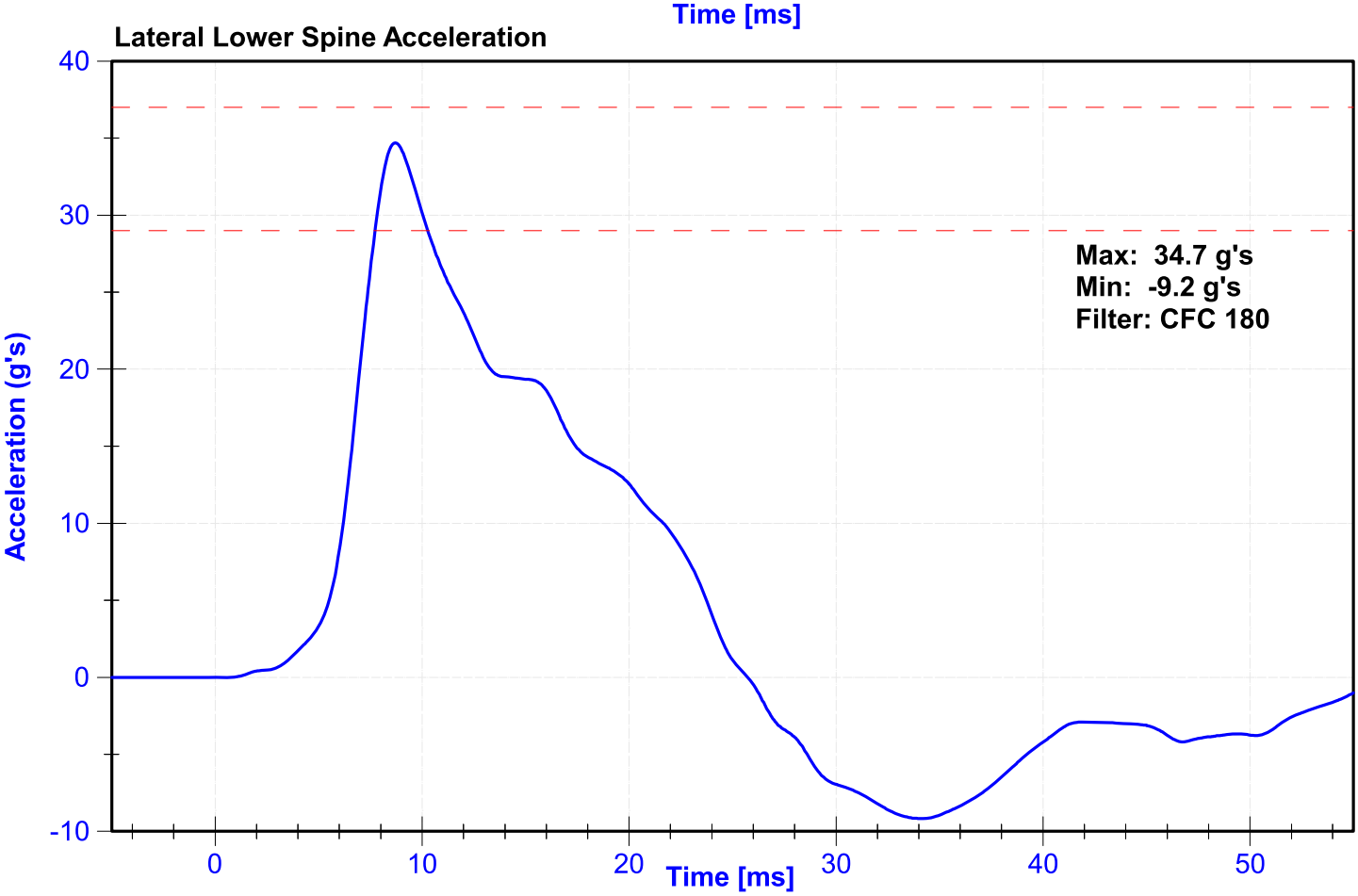

Shoulder Displacement
Displacement (mm)
Time [ms]
Max: 34.0 mm
Min: -2.0 mm
Filter: CFC 600


Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 26.4 mm
Min: 0.5 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 30.0 mm
Min: 1.1 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 32.7 mm
Min: 1.2 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 39.5 g's
Min: -9.3 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]
Max: 34.7 g's
Min: -9.2 g's
Filter: CFC 180

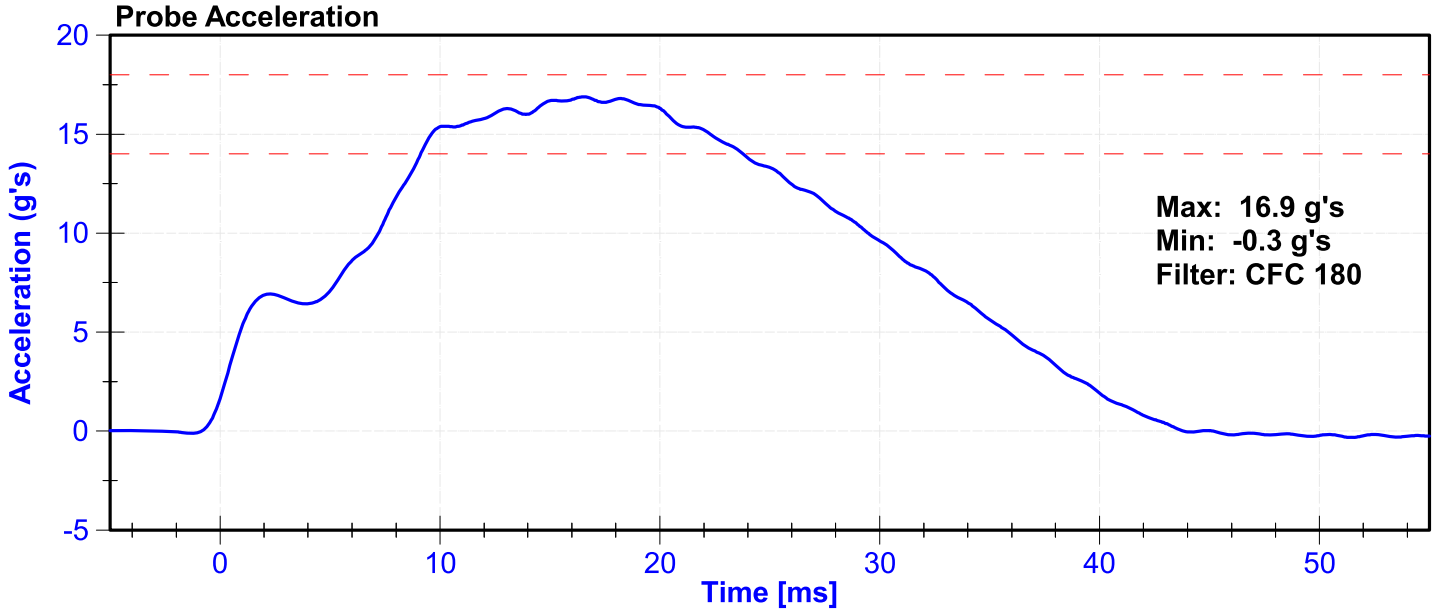
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

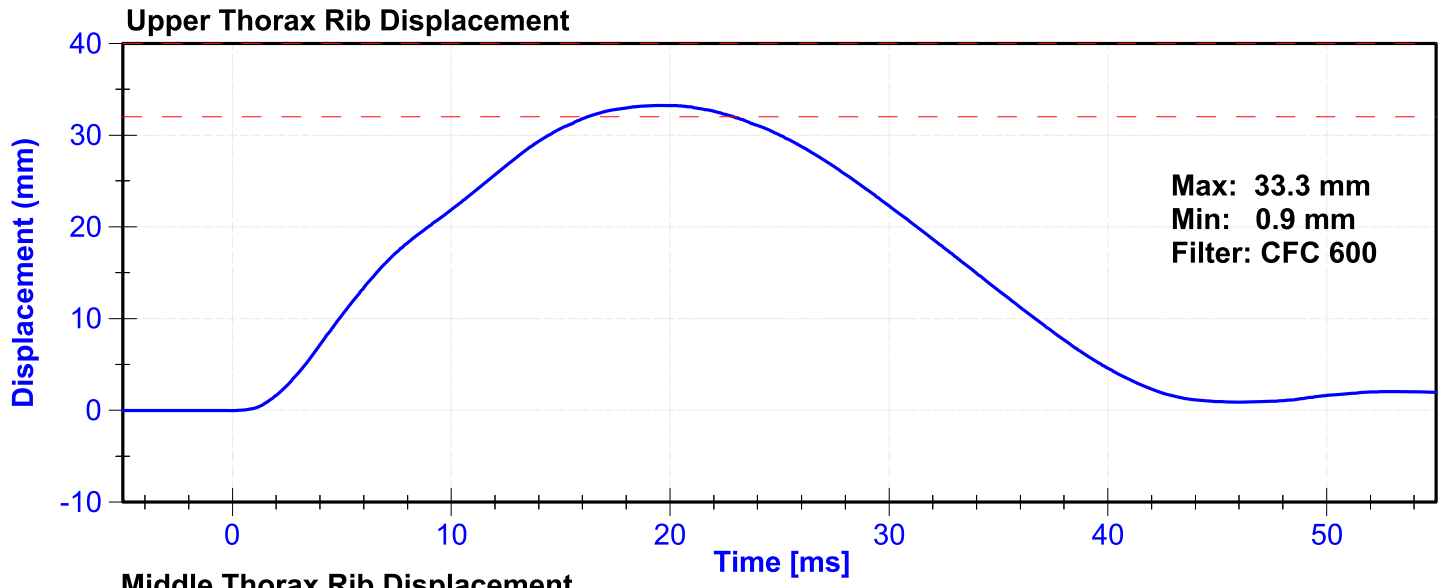
Results

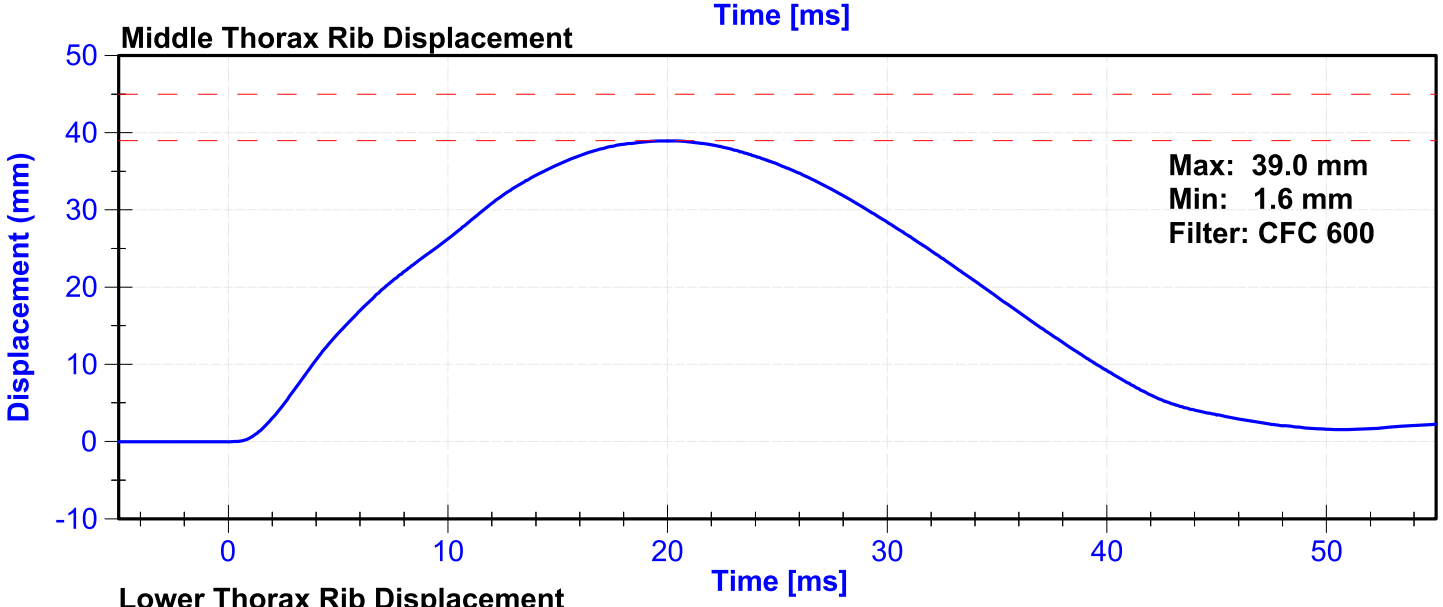
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	17	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	14	18	g's	16.9	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.8	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.5	Pass
Upper Thorax Rib Deflection	32	40	mm	33.3	Pass
Middle Thorax Rib Deflection	39	45	mm	39.0	Pass
Lower Thorax Rib Deflection	35	43	mm	37.5	Pass

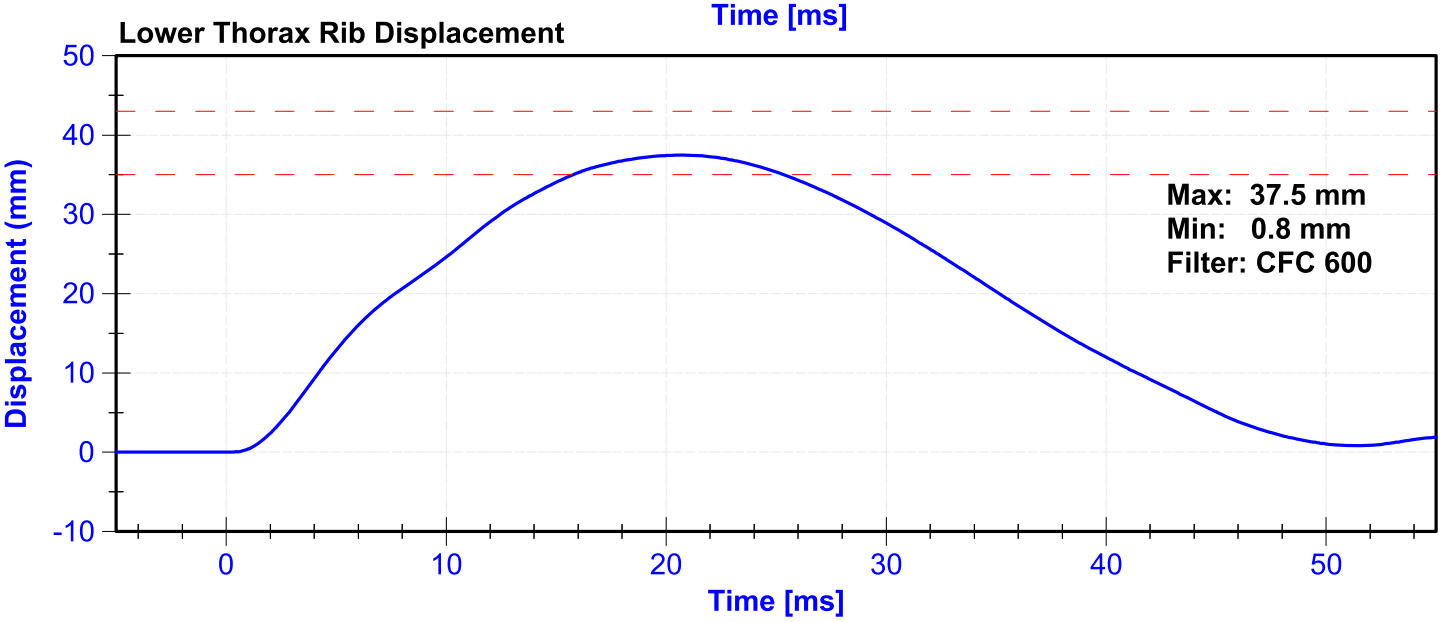
Transducer Calibrations

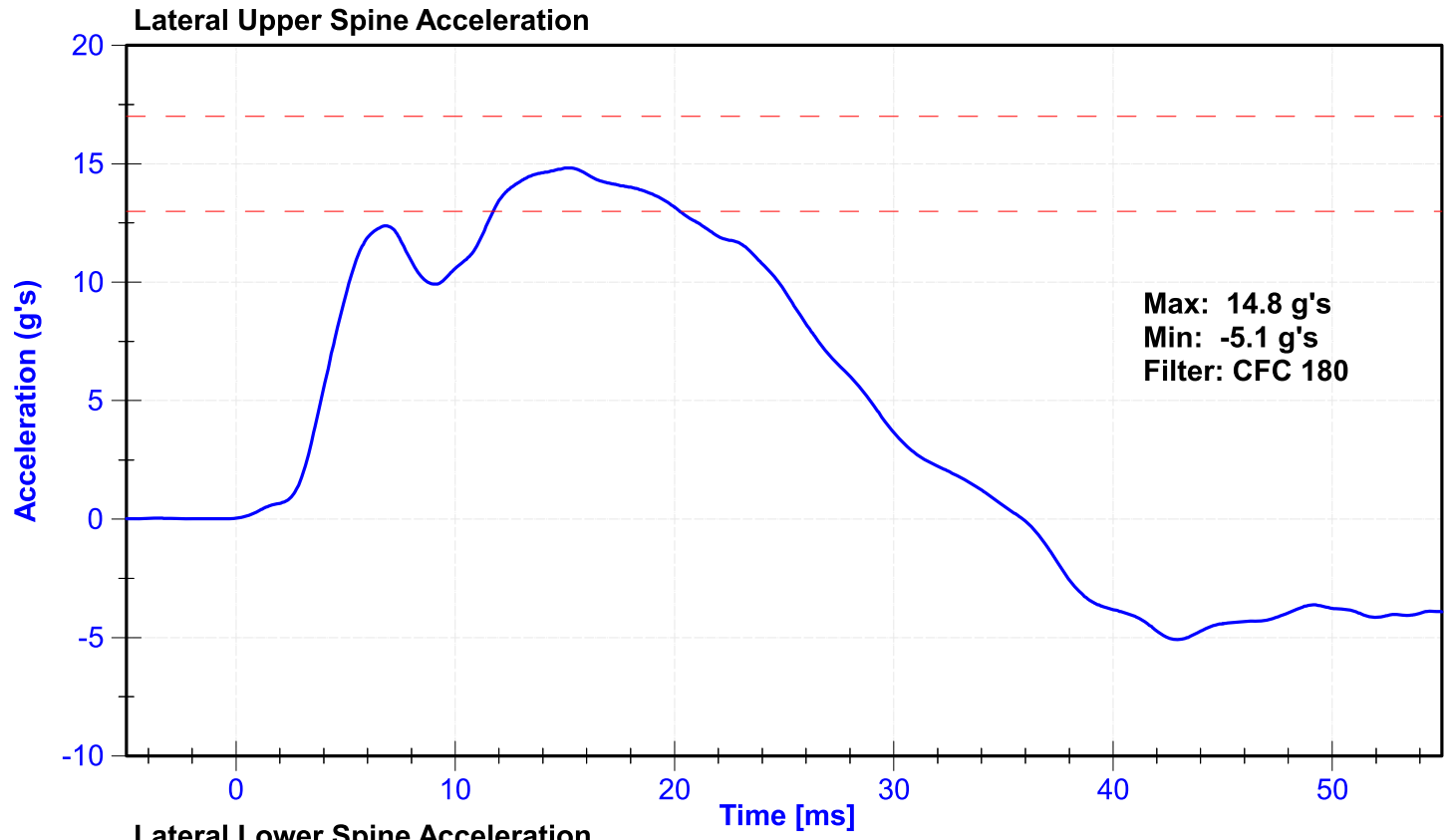
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25863	1/17/2025	7/16/2025
Upper Spine Y Accelerometer	Endevco	P58883	10/8/2024	4/6/2025
Lower Spine Y Accelerometer	Endevco	T20906	10/8/2024	4/6/2025
Upper Thorax Rib Potentiometer	Servo	DS-049GFE	10/8/2024	4/8/2025
Middle Thorax Rib Potentiometer	Servo	080GFE	10/9/2024	4/9/2025
Lower Thorax Rib Potentiometer	Servo	087GFE	12/5/2024	6/5/2025

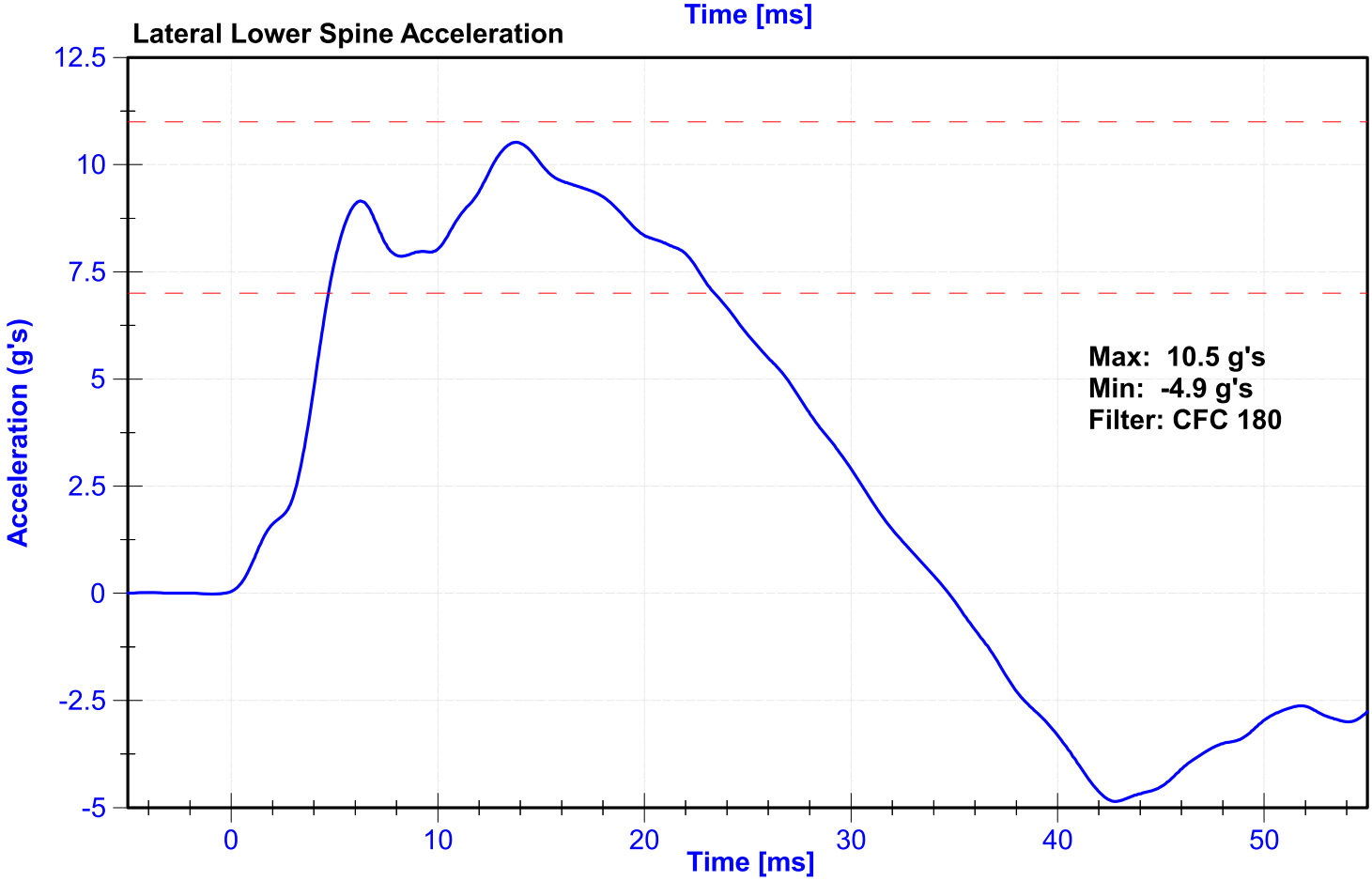



Upper Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 33.3 mm
Min: 0.9 mm
Filter: CFC 600


Middle Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.0 mm
Min: 1.6 mm
Filter: CFC 600


Lower Thorax Rib Displacement
Displacement (mm)
Time [ms]
Max: 37.5 mm
Min: 0.8 mm
Filter: CFC 600


Lateral Upper Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 14.8 g's
Min: -5.1 g's
Filter: CFC 180


Lateral Lower Spine Acceleration
Acceleration (g's)
Time [ms]
Max: 10.5 g's
Min: -4.9 g's
Filter: CFC 180

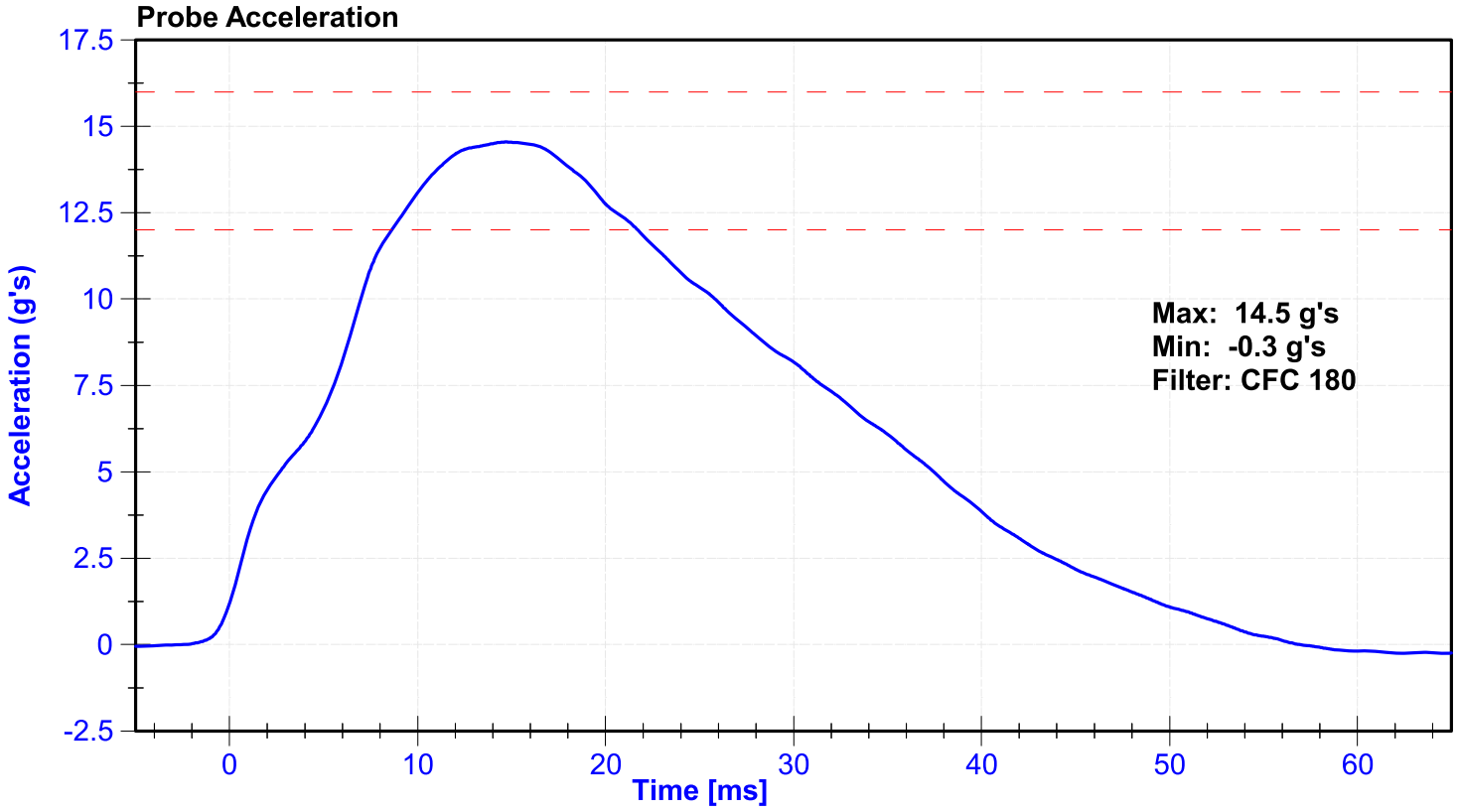
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

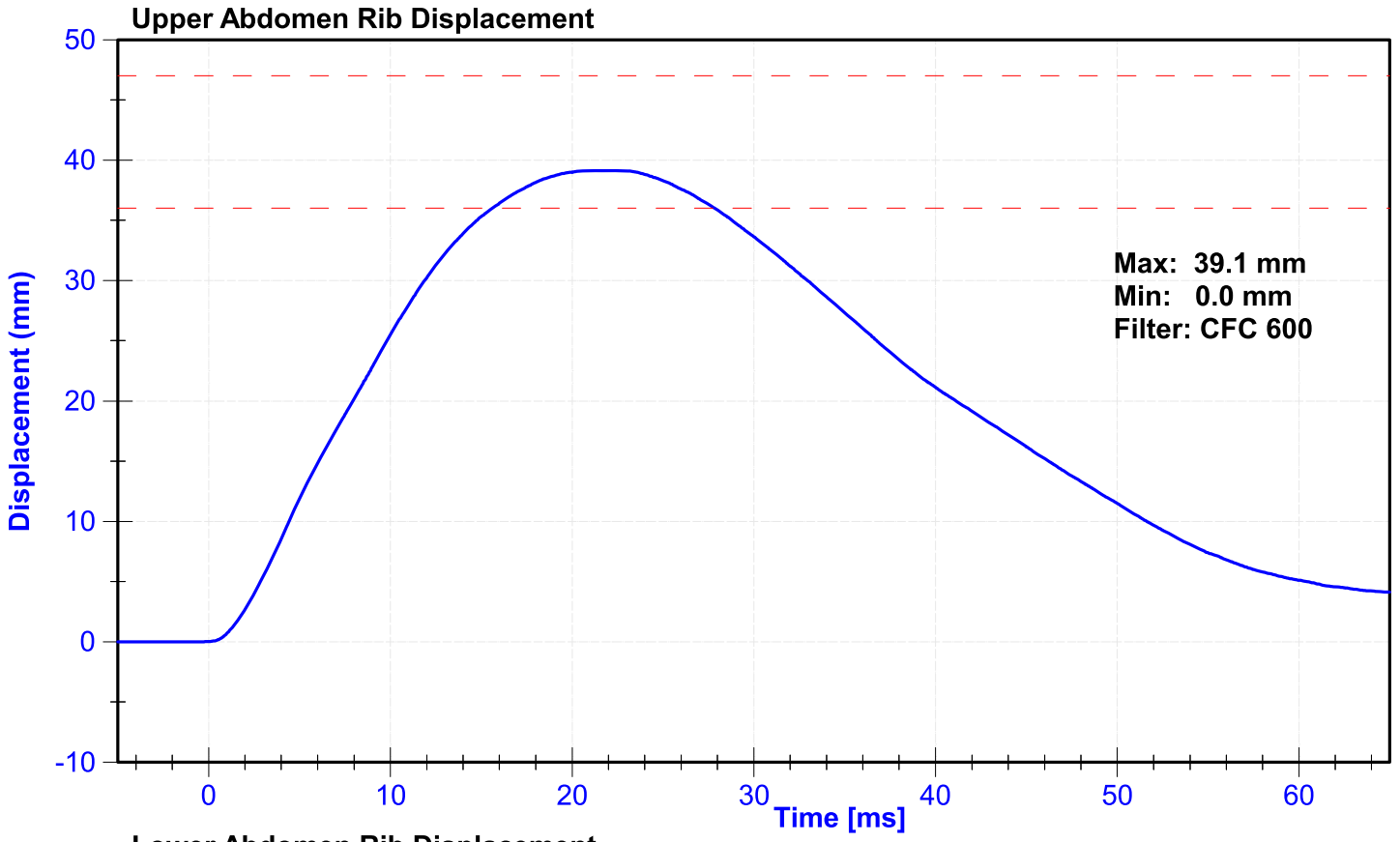
Results

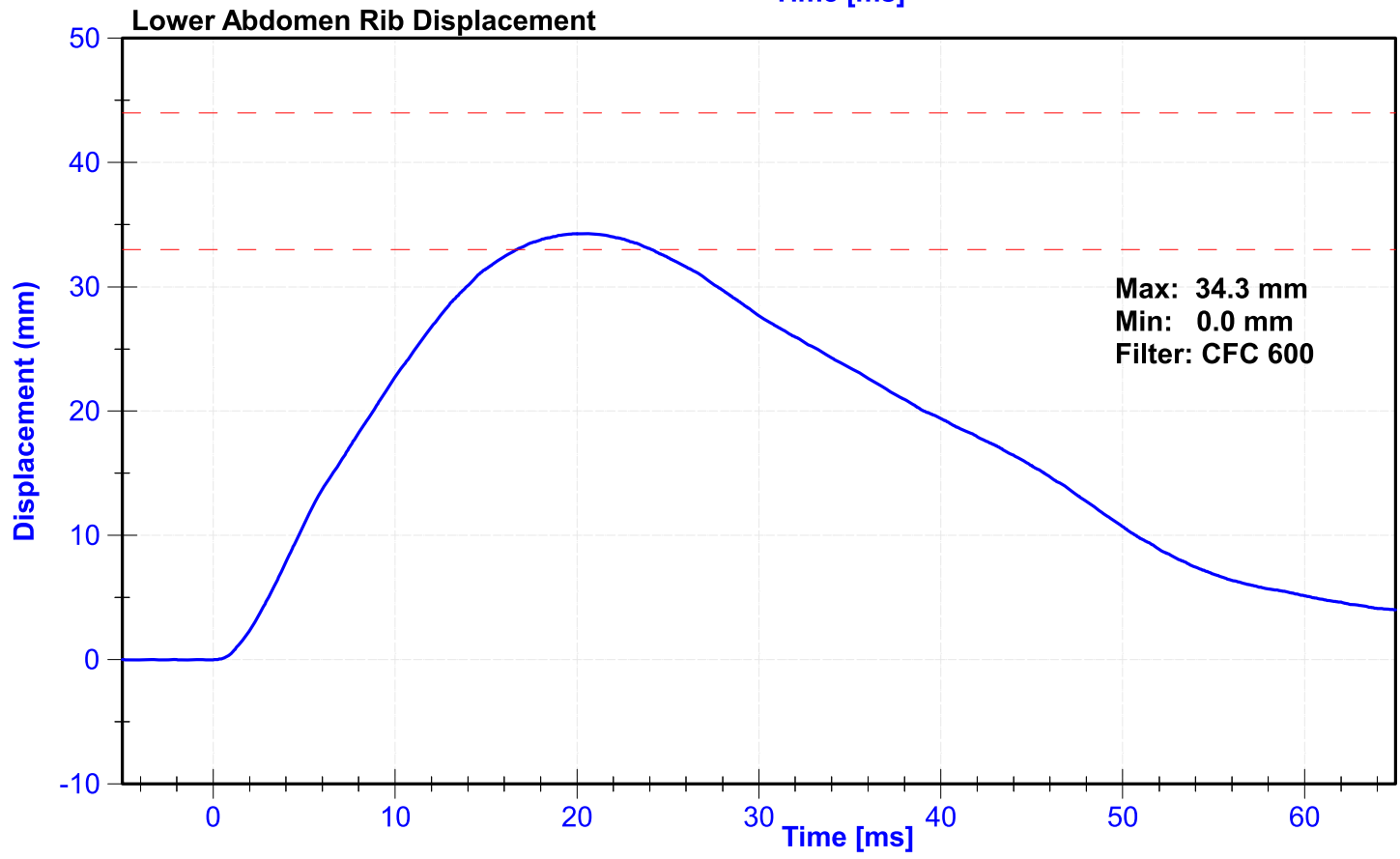
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	17	Pass
Velocity	4.2	4.4	m/s	4.29	Pass
Probe Acceleration	12	16	g's	14.5	Pass
Lateral Lower Spine Acceleration	9	14	g's	12.0	Pass
Upper Abdomen Rib Deflection	36	47	mm	39.1	Pass
Lower Abdomen Rib Deflection	33	44	mm	34.3	Pass

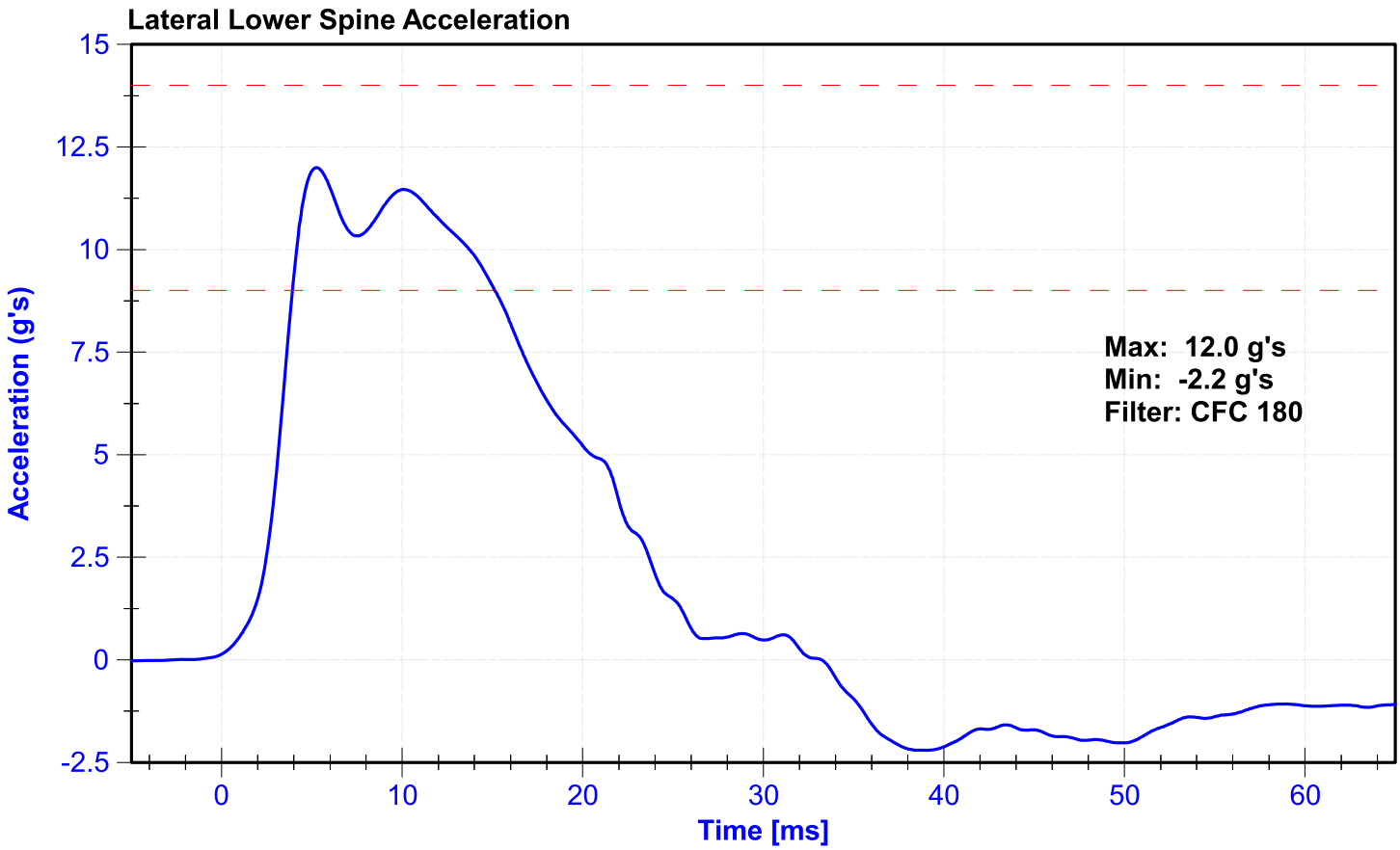
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	Endevco	T25863	1/17/2025	7/16/2025
Lower Spine Y Accelerometer	Endevco	T20906	10/8/2024	4/6/2025
Upper Abdomen Rib Potentiometer	Servo	DS-058GFE	10/8/2024	4/8/2025
Lower Abdomen Rib Potentiometer	Servo	1256GFE	10/8/2024	4/8/2025




Upper Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 39.1 mm
Min: 0.0 mm
Filter: CFC 600


Lower Abdomen Rib Displacement
Displacement (mm)
Time [ms]
Max: 34.3 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: 12.0 g's
Min: -2.2 g's
Filter: CFC 180

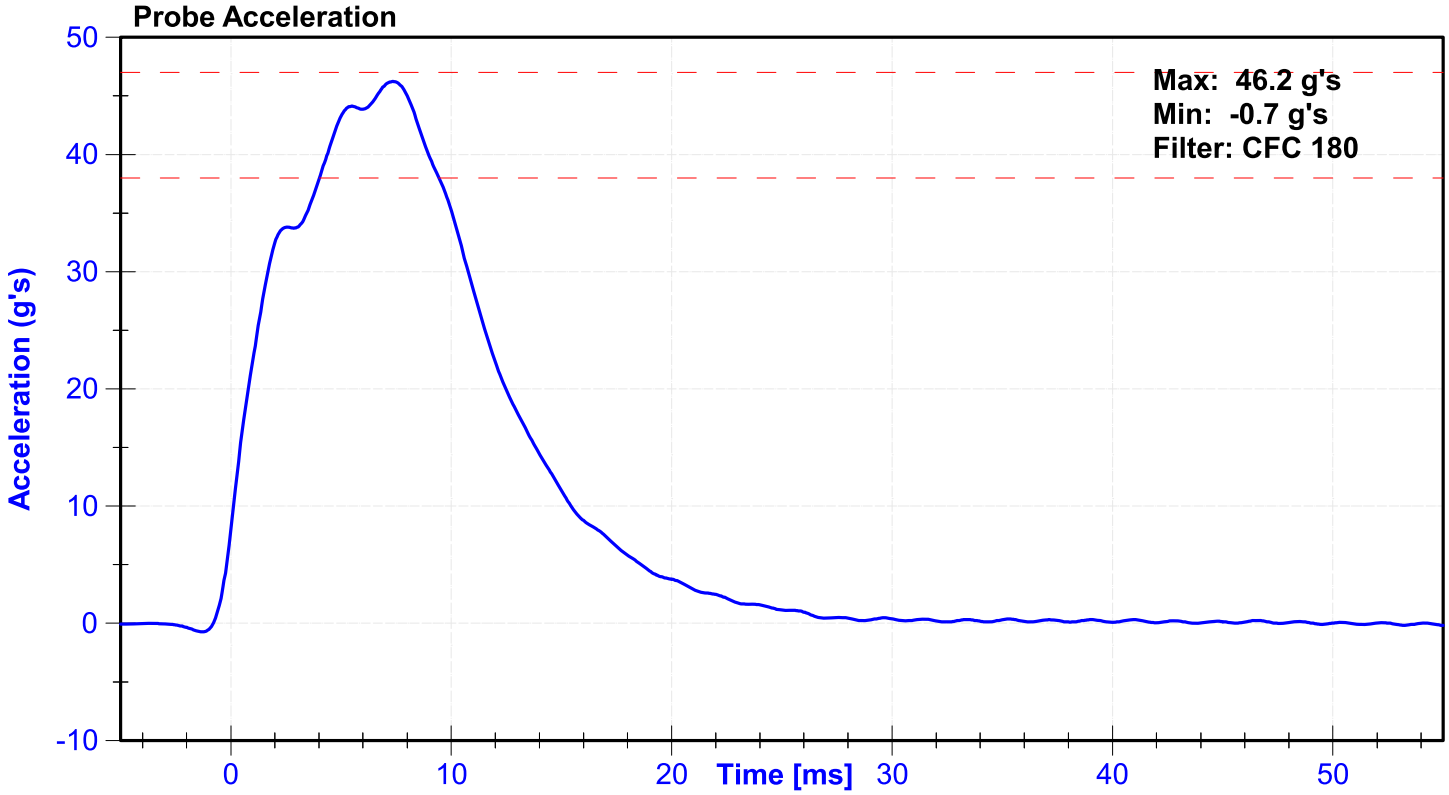
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

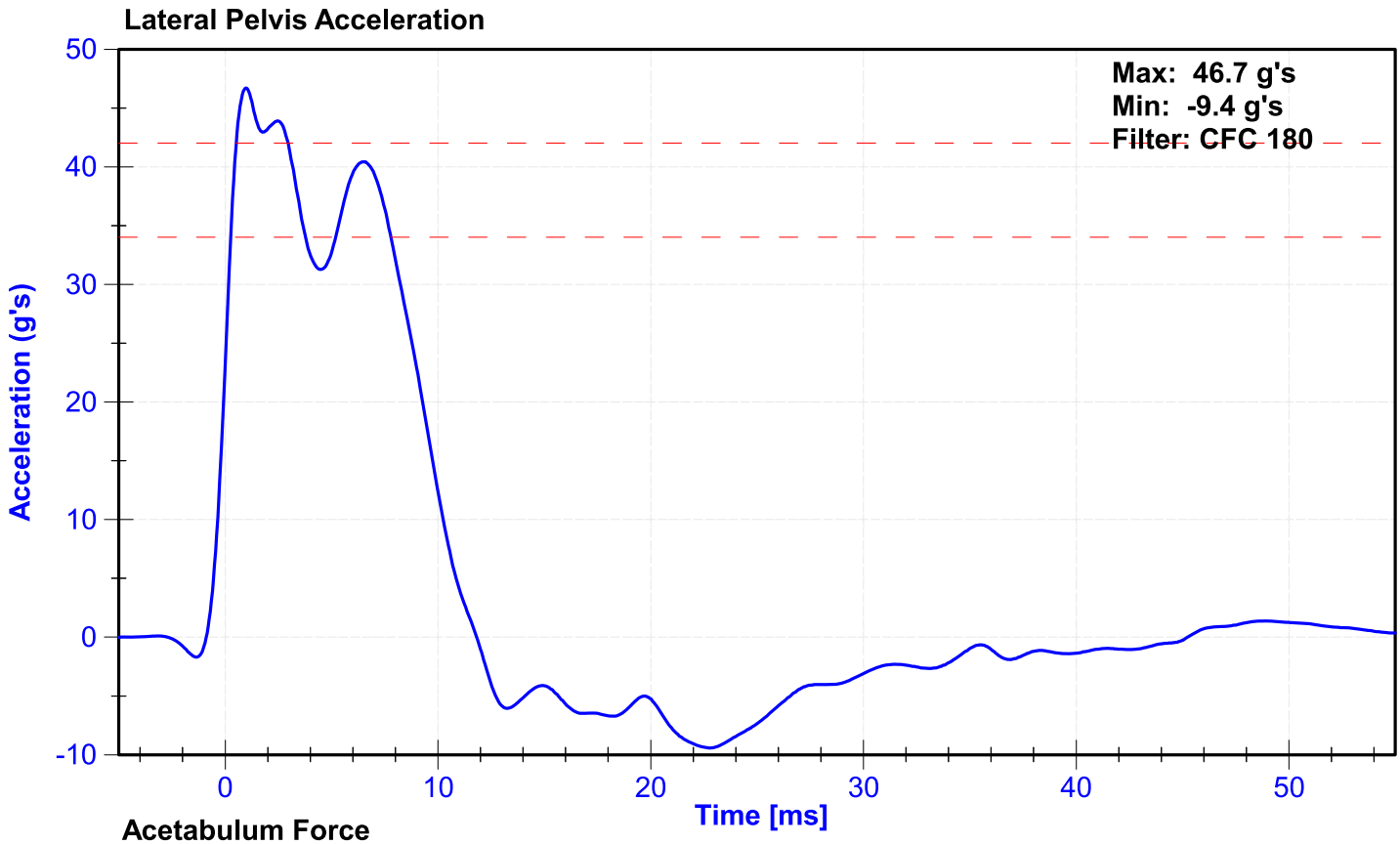
Results

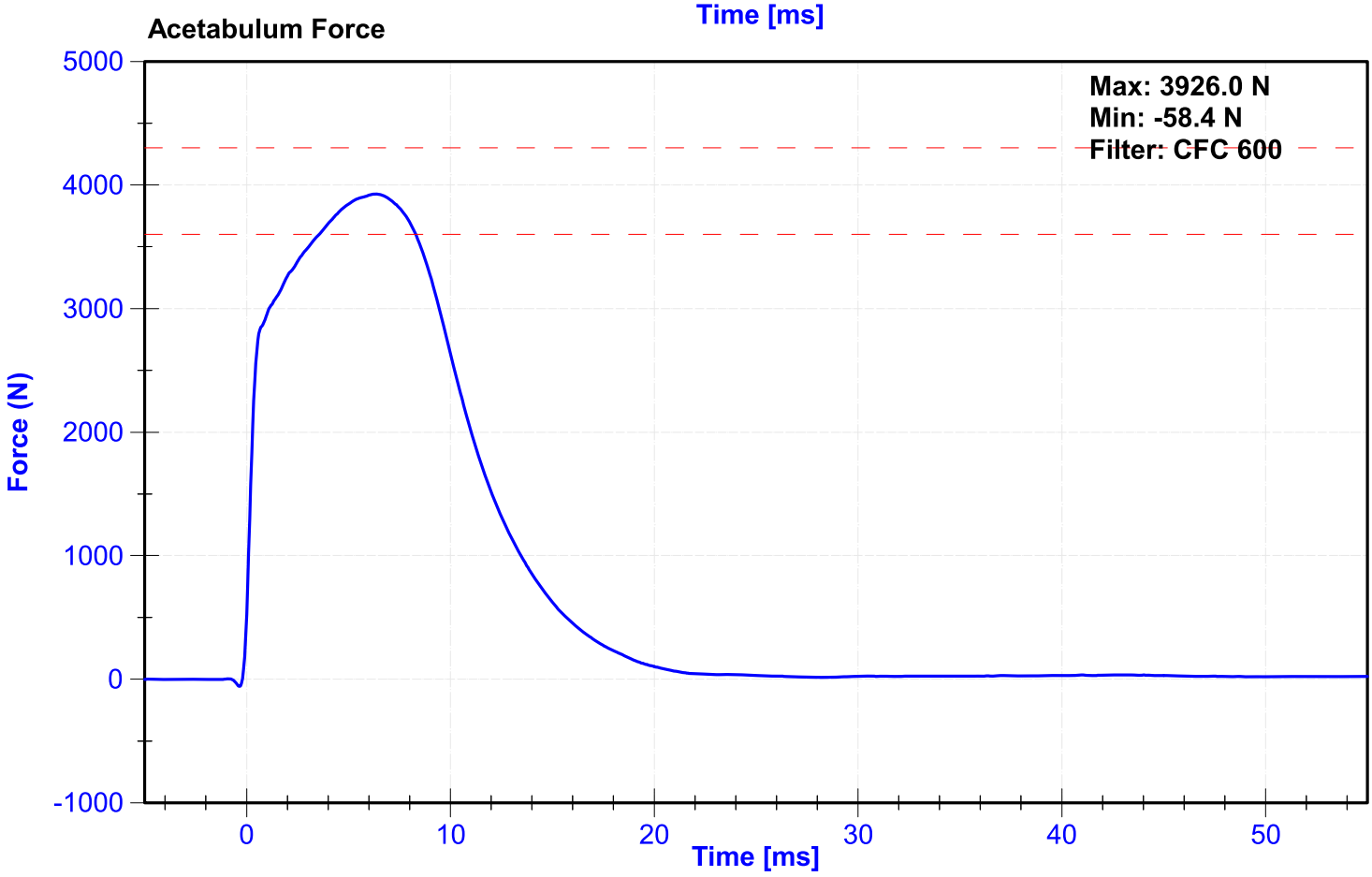
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	17	Pass
Velocity	6.6	6.8	m/s	6.67	Pass
Probe Acceleration	38	47	g's	46.2	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	40.4	Pass
Acetabulum Force	3600	4300	N	3926.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25863	1/17/2025	7/16/2025
Pelvis Y Accelerometer	Endevco	P63987	10/8/2024	4/6/2025
Acetabulum Load Cell	Denton	267-FY	9/16/2024	9/16/2025
Certification Plug	SACO			N/A
Crash Test Plug	SACO			N/A




Lateral Pelvis Acceleration
Max: 46.7 g's
Min: -9.4 g's
Filter: CFC 180
Acceleration (g's)
50
40
30
20
10
0
-10
0
10
20
30
40
50
Time [ms]


Acetabulum Force
Max: 3926.0 N
Min: -58.4 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 16749
Test Number 23550
Report Number 23607
Test Date 7/22/2022 1:27:54 PM

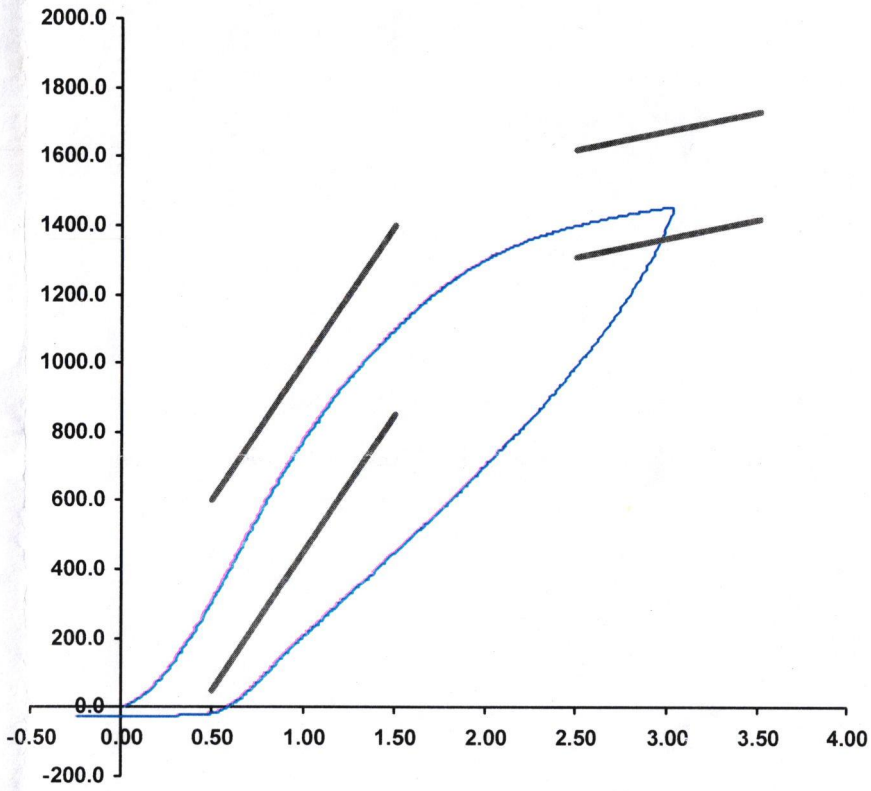
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	317	50	600
Force @ 1.5 mm (N)	1,098	850	1,400
Force @ 2.5 mm (N)	1,399	1,306	1,618
Force @ 3.0 mm (N)	1,451	1,361	1,673

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:
Cert Plug 2-4-25 224

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 22-Jul-22
SACO Research

By DC Date : 7/22/22

SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16719
Test Number 23519
Report Number 23576
Test Date 7/22/2022 12:22:16 PM

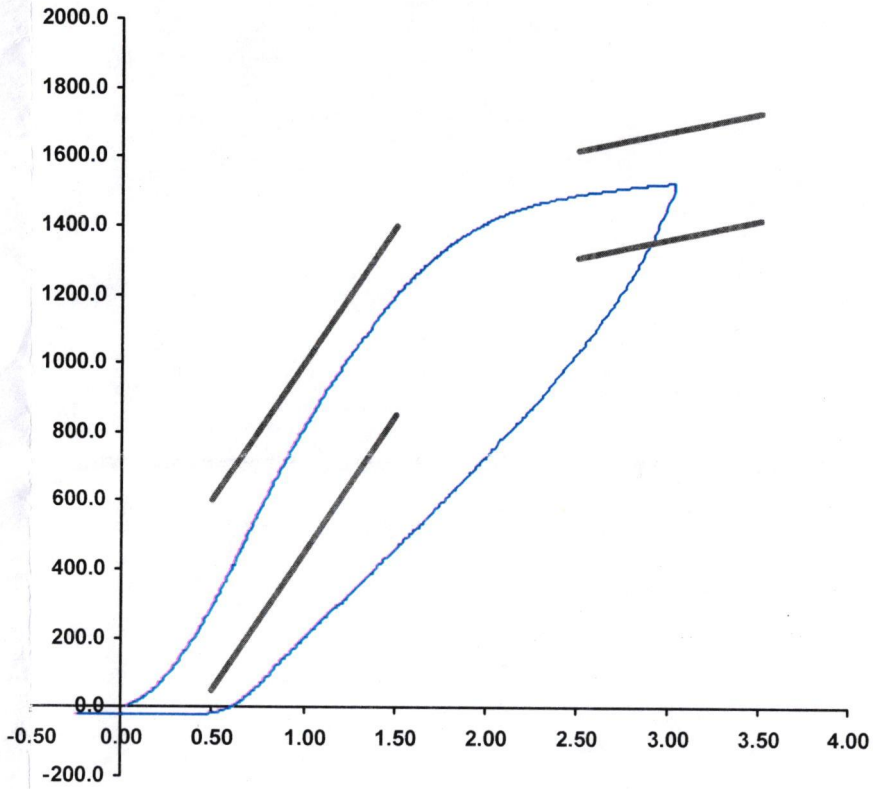
	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	301	50	600
Force @ 1.5 mm (N)	1,197	850	1,400
Force @ 2.5 mm (N)	1,491	1,306	1,618
Force @ 3.0 mm (N)	1,525	1,361	1,673

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

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

Notes:
Impact Plug 2-4-25 224

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 22-Jul-22
SACO Research

By : DC Date : 7/22/22

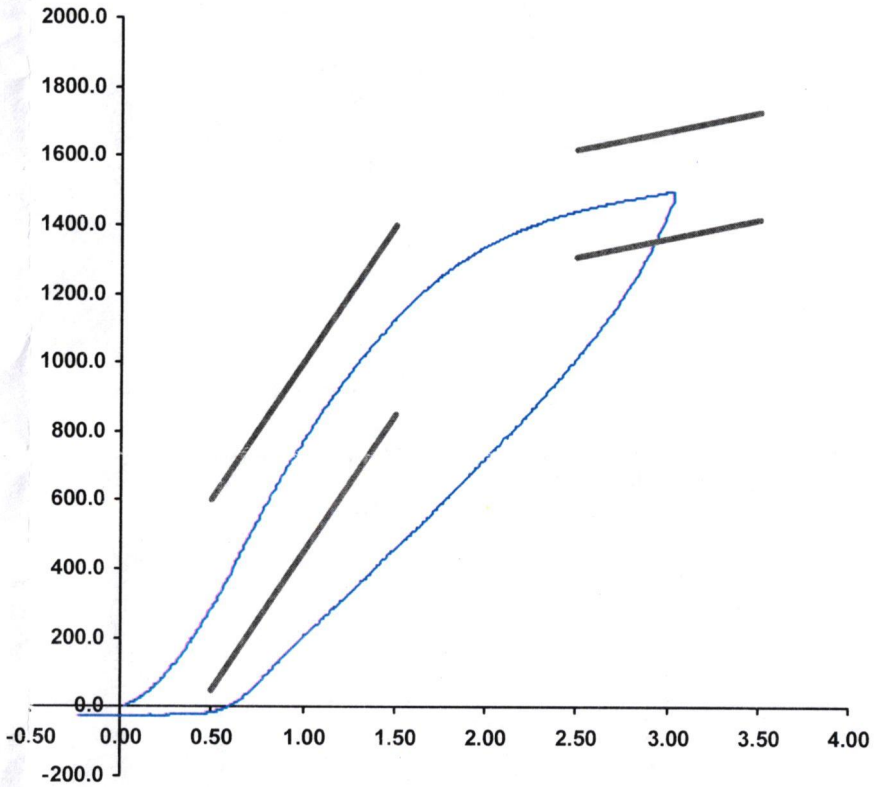
SACO RESEARCH

SID-IIs Pelvis Plug Certification Test

Plug S/N 16661
Test Number 23437
Report Number 23494
Test Date 7/21/2022 11:47:50 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	290	50	600
Force @ 1.5 mm (N)	1,128	850	1,400
Force @ 2.5 mm (N)	1,442	1,306	1,618
Force @ 3.0 mm (N)	1,496	1,361	1,673

Force (-N) vs Extension (-mm)



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

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

Notes:
NON IMPACT 2-4-25 284

Operator

Part Number 180-4450

Template No 107 21-Jul-22
SACO Research

By : DC Date : 7/21/22

SACO Research 41735 Elm St, #401 Murrieta, C[illegible]92562 Tel 310-694-2082 FAX

VI-46

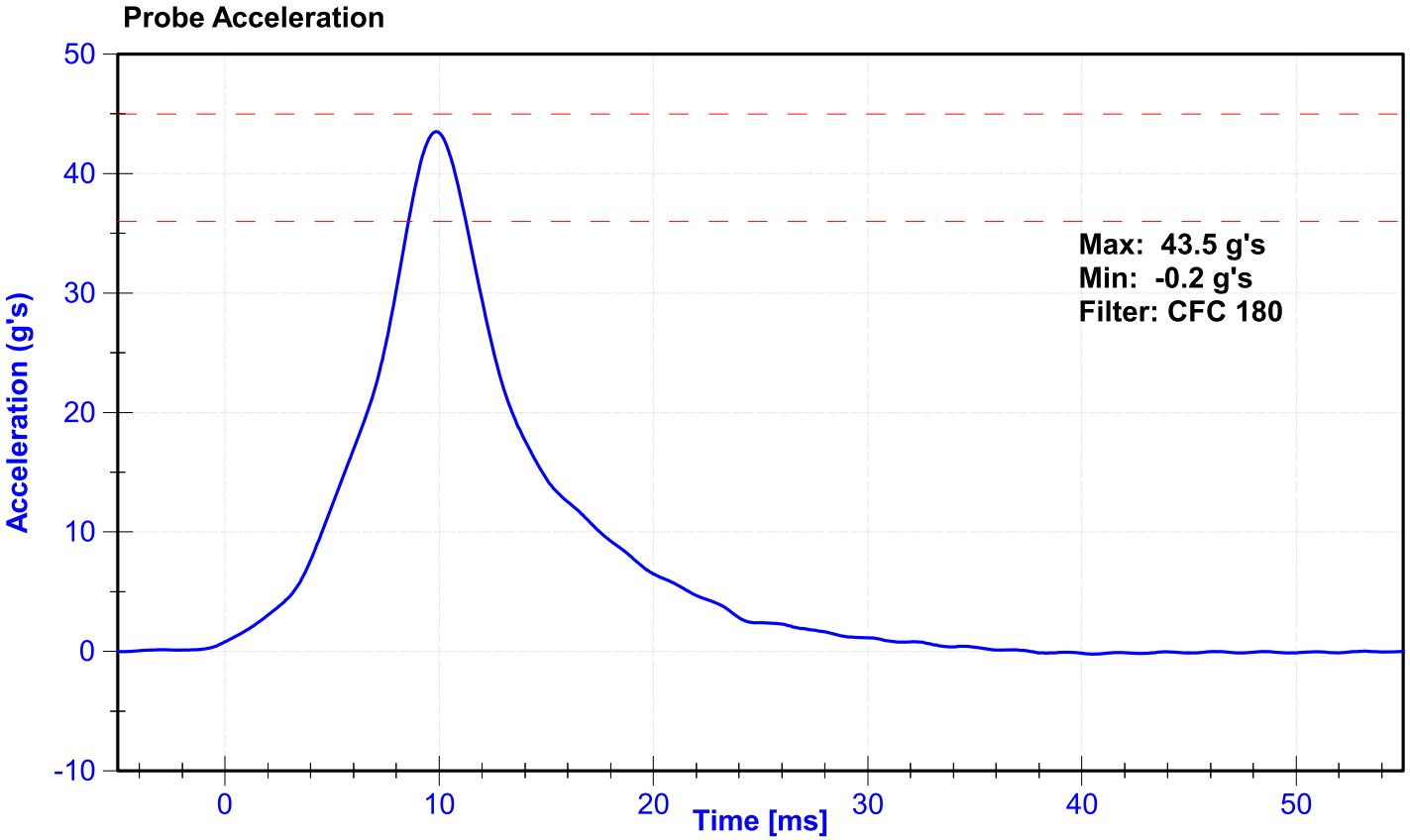
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	224	Laboratory Supervisor	J. Kinderman

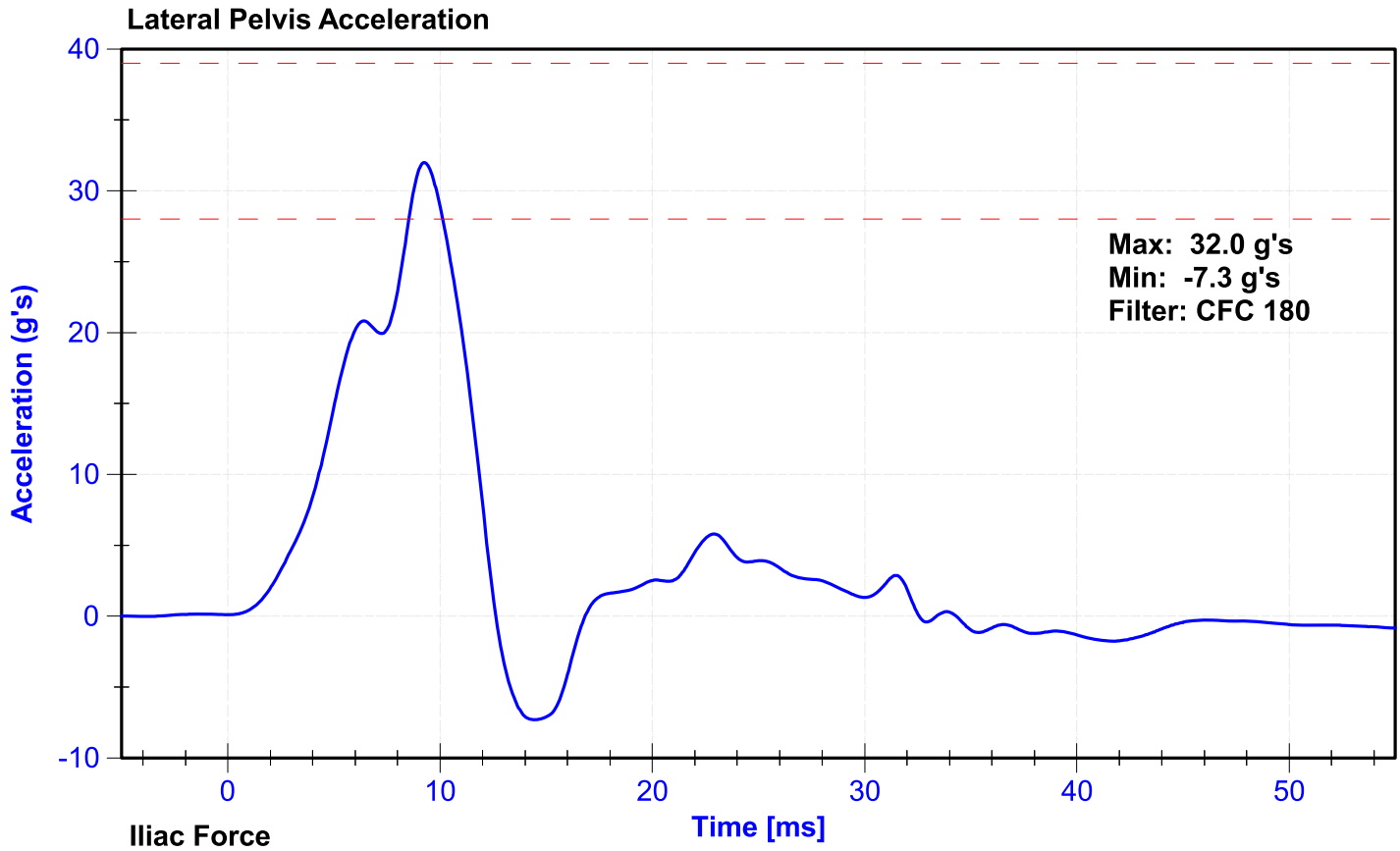
Results

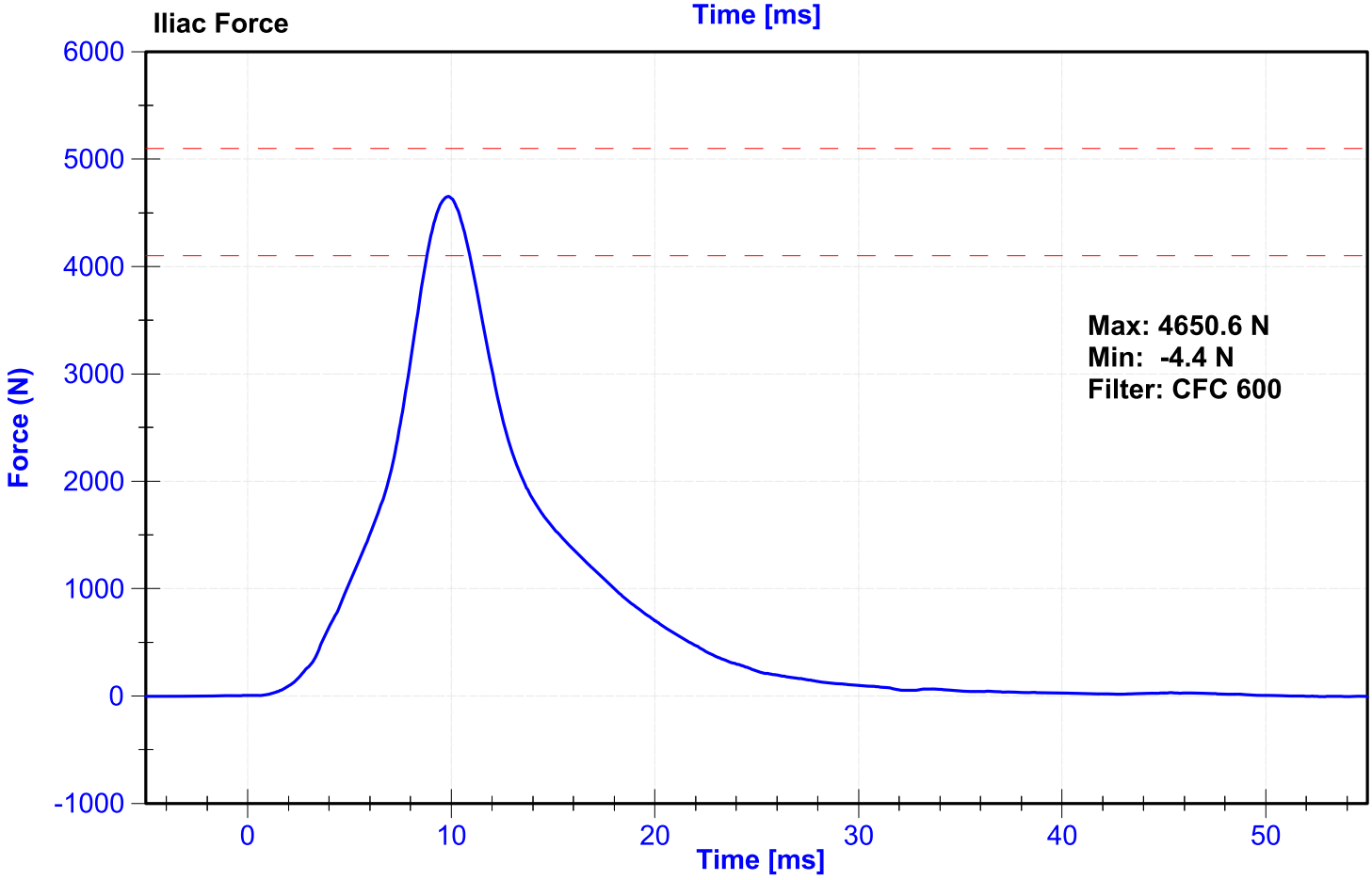
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.8	Pass
Humidity	10	70	%	17	Pass
Velocity	4.2	4.4	m/s	4.27	Pass
Probe Acceleration	36	45	g's	43.5	Pass
Lateral Pelvis Acceleration	28	39	g's	32.0	Pass
Iliac Force	4100	5100	N	4650.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T25863	1/17/2025	7/16/2025
Pelvis Y Accelerometer	Endevco	P63987	10/8/2024	4/6/2025
Iliac Load Cell	Denton	280-FY	9/16/2024	9/16/2025




Lateral Pelvis Acceleration
Max: 32.0 g's
Min: -7.3 g's
Filter: CFC 180
Acceleration (g's)
Time [ms]
40
30
20
10
0
-10
0
10
20
30
40
50


Iliac Force
Max: 4650.6 N
Min: -4.4 N
Filter: CFC 600
Force (N)
Time [ms]
6000
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50

APPENDIX VII

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

TABLE 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N _D037__		
			Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers	Primary	X	T21724	Endevco	10/08/2024
		Y	T22281	Endevco	10/08/2024
		Z	T26050	Endevco	10/08/2024
	Redundant	X	T21682	Endevco	10/08/2024
		Y	T25989	Endevco	10/08/2024
		Z	T25864	Endevco	10/08/2024
Thorax Rib Displacement Potentiometers	Upper	Y	0552-01	Honeywell	10/08/2024
	Middle	Y	807	Honeywell	10/08/2024
	Lower	Y	0552-03	Honeywell	10/08/2024
Abdomen Load Cells	Forward	Y	1512	Denton	09/16/2024
	Middle	Y	1526	Denton	09/16/2024
	Rear	Y	1516	Denton	09/16/2024
Lower Spine Accelerometers (T12)		X	P71278	Endevco	10/08/2024
		Y	18595	Endevco	10/08/2024
		Z	18509	Endevco	10/08/2024
Pubic Symphysis Load Cell		Y	464-FY	Denton	09/16/2024

TABLE 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N __224 __		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers		Primary	X	P51884	Endevco	10/08/2024
			Y	P73161	Endevco	10/08/2024
			Z	P79588	Endevco	10/08/2024
		Redundant	X	P74963	Endevco	10/08/2024
			Y	P58864	Endevco	10/08/2024
			Z	P52030	Endevco	10/08/2024
Displacement Potentiometers	Thoracic Rib	Upper	Y	DS-049GFE	Servo	10/08/2024
		Middle	Y	080GFE	Servo	10/09/2024
		Lower	Y	087GFE	Servo	12/05/2024
	Abdominal Rib	Upper	Y	DS-058GFE	Servo	10/08/2024
		Lower	Y	1256GFE	Servo	10/08/2024
Lower Spine Accelerometers (T12)			X	P82326	Endevco	10/08/2024
			Y	T20906	Endevco	10/08/2024
			Z	T21176	Endevco	10/08/2024
Acetabulum Load Cell			Y	267-FY	Denton	09/16/2024
Iliac Wing Load Cell			Y	280-FY	Denton	09/16/2024
Pelvis Plug (struck side)				16697	SACO	07/22/2022
Pelvis Plug (non-struck side)				16703	SACO	07/22/2022

TABLE 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	G24582	Endevco	10/08/2024
	Vehicle Center of Gravity	Y	G24606	Endevco	10/08/2024
	Vehicle Center of Gravity	Z	G24610	Endevco	10/08/2024
2	Right Sill at Front Seat	X	G22718	Endevco	10/07/2024
	Right Sill at Front Seat	Y	A352423	Measurement Specialties	09/18/2024
	Right Sill at Front Seat	Z	G22746	Endevco	10/07/2024
3	Right Sill at Rear Seat	X	A315714	Measurement Specialties	10/03/2024
	Right Sill at Rear Seat	Y	A373201	Measurement Specialties	10/03/2024
	Right Sill at Rear Seat	Z	A405591	Measurement Specialties	10/03/2024
4	Left Sill at Front Door	Y	G25851	Endevco	11/26/2024
5	Left Sill at Rear Door	Y	G23464	Endevco	11/01/2024
6	Left A-Post Lower	Y	G22832	Endevco	01/07/2025
7	Left A-Post Middle	Y	G22413	Endevco	01/06/2025
8	Left B-Post Lower	Y	A413612	Measurement Specialties	09/18/2024
9	Left B-Post Middle	Y	A405559	Measurement Specialties	01/07/2025
10	Front Seat Track	Y	G23833	Endevco	12/03/2024
11	Rear Seat Track or Structure	Y	A372833	Measurement Specialties	10/11/2024
12	Right Rear Occ. Compartment	Y	G24587	Endevco	11/01/2024
13	Rear Floorpan Above Axle	X	A335455	Measurement Specialties	09/27/2024
	Rear Floorpan Above Axle	Y	A372849	Measurement Specialties	09/27/2024
	Rear Floorpan Above Axle	Z	A274256	Measurement Specialties	10/10/2024

TABLE 4 – MDB Instrumentation

MDB Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle CG Acceleration vs. Time	X	G22621	Endevco	12/17/2024
Vehicle CG Acceleration vs. Time	Y	A374224	Measurement Specialties	12/17/2024
Vehicle CG Velocity vs. Time	Y	Calculated	Measurement Specialties	12/17/2024
Vehicle CG Acceleration vs. Time	Z	A431195	Measurement Specialties	12/17/2024
Vehicle CG Velocity vs. Time	Z	Calculated	Measurement Specialties	12/17/2024
Vehicle CG Resultant Acceleration vs. Time	R	A431195	Measurement Specialties	12/17/2024