REPORT NUMBER: NCAP-CAL-25-003

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

General Motors LLC
2025 Cadillac XT4
5 Door SUV

NHTSA No: M20250102

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

March 15, 2025

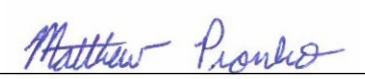
FINAL REPORT

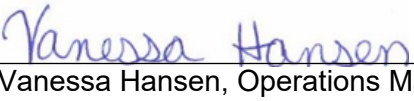
PREPARED FOR:
U. S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
1200 NEW JERSEY AVE SE
WASHINGTON, D.C. 20590

This final test report was prepared for the U.S. Department of Transportation, National Highway Safety Traffic Administration, in response to Contract Number 693JJ919D000005.

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

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

Prepared by:  Date: March 15, 2025
Matthew Pronko, Test Engineer

Approved by:  Date: March 15, 2025
Vanessa Hansen, Operations Manager

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

TECHNICAL REPORT DOCUMENTATION PAGE

1. *Report No.* NCAP-CAL-25-003	***2. Government Accession No.***	***3. Recipient's Catalog No.***
4. Title and Subtitle Final Report of New Car Assessment Program Frontal Impact Testing of a 2025 Cadillac XT4 5 Door SUV NHTSA No.: M20250102		***5. Report Date*** March 15, 2025 ***6. Performing Organization Code*** CAL
7. Author(s) Matthew Pronko, Test Engineer Vanessa Hansen, Operations Manager		***8. Performing Organization Report No.*** CAL-DOT-2025-003
9. Performing Organization Name and Address Calspan Corporation Transportation Test Operations P.O. Box 400 Buffalo, New York 14225		***10. Work Unit No.*** ***11. Contract or Grant No.*** 693JJ919D000005
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave., SE Washington, D.C. 20590		***13. Type of Report and Period Covered:*** Final Test Report February 5, 2025 - March 15, 2025 ***14. Sponsoring Agency Code*** NRM-110
15. Supplementary Notes		

16. Abstract

A 56.30 km/h (35 mph), NCAP frontal rigid barrier impact test was conducted on a 2025 Cadillac XT4 5 Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. The test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 5, 2025.

The impact velocity of the vehicle was 56.44 km/h, and the ambient temperature at the barrier face at the time of impact was 21°C. The target vehicle post-test maximum crush was 461 mm at the vehicle centerline. The test vehicle's occupant performance data is as follows:

Measurement Description	Units	Driver ATD (Serial No. 065)		Passenger ATD (Serial No. 137)	
		Threshold	Result	Threshold	Result
Head Injury Criteria (HIC15)		700	192.803	700	340.824
Maximum Chest Compression	mm	63	26.206	52	13.551
Nij		1	0.283	1	0.319
Neck Tension	N	4170	913.915	2620	630.229
Neck Compression	N	4000	27.925	2520	189.449
Left Femur Force	N	10008	724.982	6805	985.115
Right Femur Force	N	10008	1240.712	6805	1576.914

17. Key Words 56.3 km/h (35 mph) Full Frontal Rigid Barrier Impact Test New Car Assessment Program (NCAP)	***18. Distribution Statement*** Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave, SE Washington, DC 20590

19. Security Class. (of this report) UNCLASSIFIED	***20. Security Class. (of this page)*** UNCLASSIFIED	***21. No. of Pages*** 169	***22. Price***

Form DOT F1700.7 (8-69)

TABLE OF CONTENTS

Section		Page
1	Purpose and Summary of the Test	1-1
2	Occupant and Vehicle Information / Data Sheets	2-1

Data Sheet		Page
1	General Test and Vehicle Parameter Data	2-2
2	Seat Adjustment, Fuel System, and Steering Wheel Data	2-6
3	Dummy Longitudinal Clearance Dimensions	2-8
4	Dummy Lateral Clearance Dimensions	2-9
5	Seat Belt Positioning Data	2-10
6	High-Speed Camera Locations and Data	2-11
7	Vehicle Accelerometer Locations	2-13
8	Photographic Reference Target Locations	2-14
9	Load Cell Locations on Fixed Barrier	2-15
10	Test Vehicle Summary of Results	2-16
11	Post-Test Observations	2-17
12	Vehicle Profile Measurements	2-18
13	Accident Investigation Division Data	2-21
14	Vehicle Intrusion Measurements	2-22
15	Summary of FMVSS 212, 219 (Partial) and 301 Data	2-24
16	FMVSS 301 Static Rollover Results	2-26
17	Dummy/Vehicle Temperature Stabilization Chart	2-27

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

SECTION 1

PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under Contract No. 693JJ919D000005. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

The 56.3 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

SUMMARY

A load cell barrier consisting of 128 load cells was impacted by a 2025 Cadillac XT4 5 Door SUV at a velocity of 56.44 km/h. The test was performed at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on February 5, 2025. Pre- and post-test photographs of the vehicle and dummies to document the test can be found in Appendix A. One real-time camera and 16 high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in Data Sheet 6 of this report.

One Part 572E, 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female ATD was placed in the right-front passenger seating position according to dummy placement instructions specified in the Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, femur load cells, and lower leg instrumentation. Seat belt load cells were installed on the driver's and passenger's lap and shoulder belts to measure dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 065) and the right-front passenger (position 2) ATD (Serial No. 137) were qualified prior to this test. Certification details, along with instrumentation calibration data, can be found in Appendix C of this report.

The 230 channels of data were recorded on an on-board data acquisition system. Appendix B contains the vehicle, load cell barrier and dummy response data traces.

There was 99.1 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was a total of 0.0 grams of Stoddard solvent leakage after the event or during any phase of the static rollover. The maximum static crush of the vehicle was 461 mm and both driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver's head contacted the frontal airbag, curtain airbag, and the head restraint. The upper torso contacted the frontal airbag. Both knees contacted the knee airbag.

The passenger's visible contact points were as follows: The passenger's head contacted the frontal airbag and the head restraint. The upper torso contacted the frontal airbag. Both knees contacted the knee airbag.

The occupant data is summarized below.

ATD Position	HIC_{15}	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50th)	192.803	0.283	913.915	27.925	39.226	26.206	724.982	1240.712
Passenger (5th)	340.824	0.319	630.229	189.449	42.636	13.551	985.115	1576.914

GENERAL COMMENTS:

1. P1 (Driver) serial number - 065
2. P2 (Passenger) serial number - 137

Data Anomalies:

- Engine Bottom X Acceleration, Questionable data after 23.6 ms

SECTION 2

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

This section contains information reporting for the following Data Sheets:

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

Data Sheet No. 2 – Seat Adjustment, Fuel System, and Steering Wheel Data

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Seat Belt Positioning Data

Data Sheet No. 6 – High-Speed Camera Locations and Data

Data Sheet No. 7 – Vehicle Accelerometer Locations

Data Sheet No. 8 – Photographic Reference Target Locations

Data Sheet No. 9 – Load Cell Locations on Fixed Barrier

Data Sheet No. 10 – Test Vehicle Summary of Results

Data Sheet No. 11 – Post-Test Observations

Data Sheet No. 12 – Vehicle Profile Measurements

Data Sheet No. 13 – Accident Investigation Division Data

Data Sheet No. 14 – Vehicle Intrusion Measurements

Data Sheet No. 15 – Summary of FMVSS 212, 219 (Partial) and 301 Data

Data Sheet No. 16 – FMVSS 301 Static Rollover Results

Data Sheet No. 17 – Dummy/Vehicle Temperature Stabilization Chart

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2025 Cadillac XT4 5 Door SUV
NHTSA No.: M20250102
Test Program: NCAP Frontal Barrier Impact Test
Test Date: 02/05/2025

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20250102	Traction Control System (TCS)	Yes
Model Year	2025	Power Steering	Yes
Make	Cadillac	Power Window Auto-Reverse	Yes
Model	XT4	Driver Frontal Airbag	Yes
Body Style	SUV	Driver Curtain Airbag	Yes
VIN	1GYFZDR44SF112842	Driver Head/Torso Airbag	No
Body Color	Argent Silver Metallic	Driver Torso Airbag	No
Odometer Reading (km /mi)	190 mi	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	2.0	Driver Pelvis Airbag	No
Type / No. Cylinders	I4 Turbo	Driver Knee Airbag	Yes
Engine Placement	Transverse	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	9 - Speed	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	All Wheel Drive	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof / T-Top	No	Front Pass. Knee Airbag	Yes
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	Yes	Front Pass. Pretensioner	Yes
Anti-Lock Brakes (ABS)	Yes	Front Pass. Load Limiter	Yes
Automatic Door Locks (ADLs)	Yes	Other –	N/A

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

DATA FROM CERTIFICATION LABEL

Manufactured By	General Motors LLC	GVWR (KG)	2350
Date of Manufacture	08/2024	GAWR Front (KG)	1220
		GAWR Rear (KG)	1220

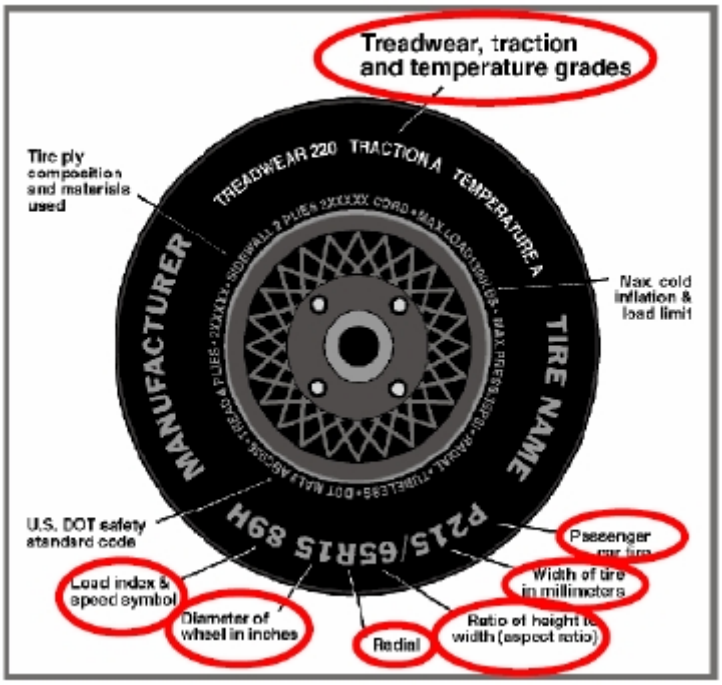
VEHICLE SEATING AND WEIGHT CAPACITY DATA

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench	N/A	
Number of Occupants	2	3	N/A	5
Capacity Wt. (VCW) (kg)				591
Cargo Wt. (RCLW) (kg)				136

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

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

Collect items circled in red, tire manufacturer, and tire name.



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	240
Recommended Tire Size	235/60R18	235/60R18
Tire Size on Vehicle	235/60R18	235/60R18
Tire Manufacturer	Continental	Continental
Tire Model	Pro Contact TX	Pro Contact TX
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Polyamide	2 Polyester, 2 Steel, 1 Polyamide
Load Index / Speed Symbol	103H	103H
Tire Material	Rubber	Rubber
DOT Safety Code Left	1A3 0FBBYB 3024	1A3 0FBBYB 3024
DOT Safety Code Right	1A3 0FBBYB 3024	1A3 0FBBYB 3024

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

Test Vehicle: 2025 Cadillac XT4 5 Door SUV
NHTSA No.: M20250102
Test Program: NCAP Frontal Barrier Impact Test
Test Date: 02/05/2025

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	545	347		574	448	
Right	kg	498	359		557	442	
Ratio	%	59.6	40.4		56.0	44.0	
Total	kg	1043	706	1749	1131	890	2021

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1749	(A)
Weight of 1 P572E ATD & 1 P572O ATD	kg	142	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	136	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2027	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

Condition	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	872	878	926	925	1120
As Tested	mm	850	851	869	871	1222
Post-Test	mm	896	871	886	851	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2774
Total Vehicle Length at Left Side	mm	4440
Total Vehicle Length at Centerline	mm	4597
Total Vehicle Length at Right Side	mm	4440
Weight of Ballast in Cargo Area	kg	70.3
Weight of Vehicle Components Removed	kg	18
Amount of Stoddard Solvent in Fuel Tank	L	57.7

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Trunk carpeting and trunk panels

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

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

TARGET VEHICLE STRUCTURAL MEASUREMENT

No.	Description	Pre-Test
1	Total Length	4597
2	Total Width	1870
3*	Bumper Top Height	608
4*	Bumper Bottom Height	513
5*	Longitudinal Member Top Height	611
6	Distance Between Longitudinal Members	1050
7	Longitudinal Member Width	76
8*	Engine Top Height	841
9*	Engine Bottom Height	251
10	Engine and Gearbox Width	547
11	Front Bumper-Engine Distance	512
12*	Front Shock Absorber Fixing Height	943
13*	Bonnet Leading Edge Height	925
14	Front Shock Absorber Fixing Width	1201
15	Front Bumper – Front Axle Distance	955
16	Front Axle – A Pillar Distance	503
17	A-Pillar – B-Pillar Distance	1117
18	B-Pillar – Rear Axle Distance	1153
19	B-Pillar – C-Pillar Distance	1061
20*	Roof Sill Bottom Height	1550
21*	Roof Sill Top Height	1599
22*	Floor Sill Bottom Height	334
23*	Floor Sill Top Height	434

*Height Measurements are taken from the ground
Note: All measurements are in millimeters

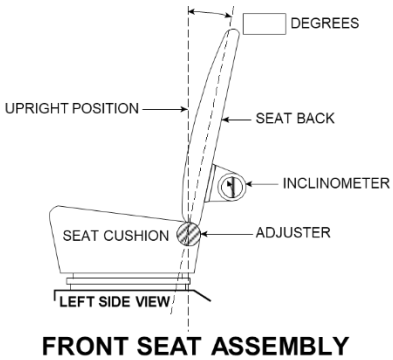
DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

NOMINAL DESIGN RIDING POSITION

The driver's seat back was set to the manufacturer's designated angle. The passenger's seat back was positioned in a similar manner as the driver's seat back. Seat back angles are measured at the headrest post bezel using a digital inclinometer.

Seating Position	Degrees
Driver Seat Back Angle	-8.7
Passenger Seat Back Angle	-17.6



FRONT SEAT ASSEMBLY

SEAT FORE / AFT POSITIONS

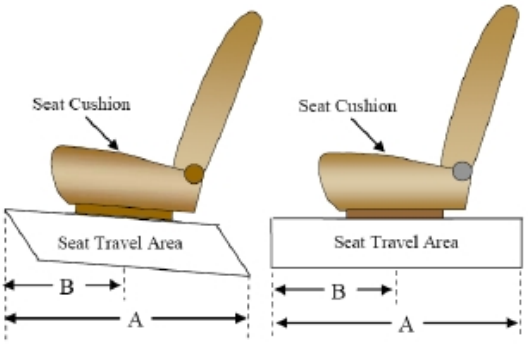
The driver's seat was positioned at the mid-point of fore/aft travel at its lowest position. The passenger's seat was positioned at the most forward position of fore/aft travel. Zero is defined as the forward most position.

Seating Position	Total Fore / Aft Travel	Placed in Position #
Driver Seat	317	158.5
Passenger Seat	309	0

SEAT BELT UPPER ANCHORAGE

The driver's seat belt anchorage was positioned according to the manufacturer's designated positioning for a 50th percentile adult male ATD. The passenger's seat belt anchorage was positioned according to the manufacturer's designated positioning for a 5th percentile adult female ATD. For this test zero is defined as the uppermost position.

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



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

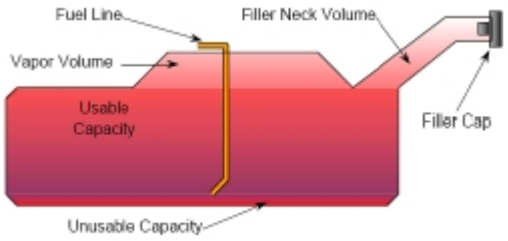
Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of “Standard Tank”	61.7
Usable Capacity of “Optional Tank”	N/A
92%-94% of Usable Capacity	56.8 - 57.9
Actual Amount of Solvent Used	57.7
1/3 of Usable Capacity	20.6

FUEL PUMP

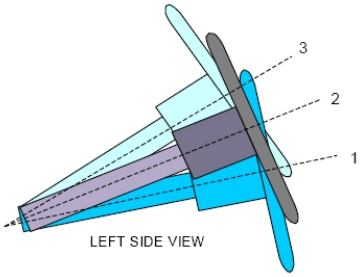
The vehicle is equipped with an electric fuel pump. The fuel filler neck is on the left side of the vehicle. The pump creates positive pressure in the fuel lines, pushing the gasoline to the engine. See form 1 for more information.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. For angular measurements, a digital inclinometer was used to measure a plate which was placed across the steering wheel rim. A tape measure was used to measure the telescoping steering wheel travel.



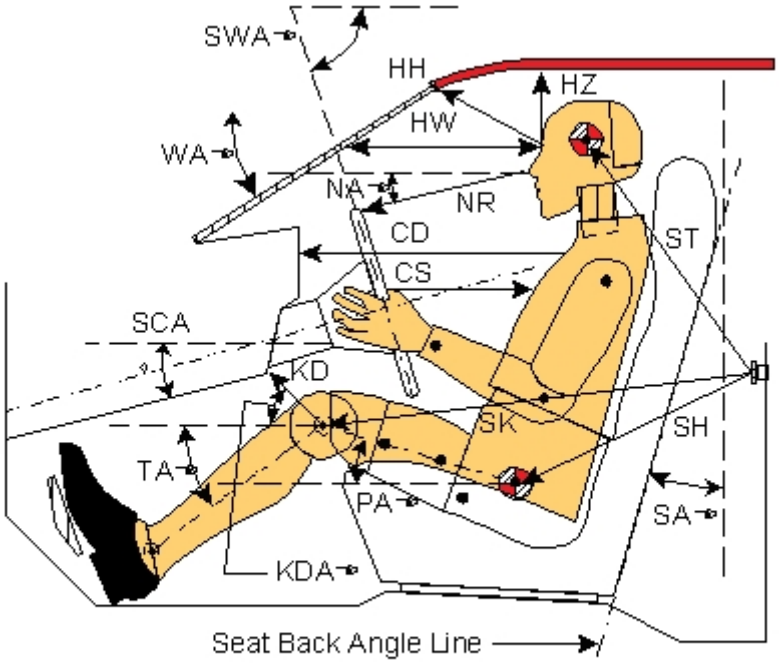
STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

Description	Degrees	Fore / Aft Position (mm)
Lowermost position No. 1	23.4	
Geometric center position No. 2	25.4	
Uppermost position No. 3	27.4	
Telescoping Steering Wheel Travel		64
Test Position	25.4	32

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2025 Cadillac XT4 5 Door SUV
NHTSA No.: M20250102
Test Program: NCAP Frontal Barrier Impact Test
Test Date: 02/05/2025

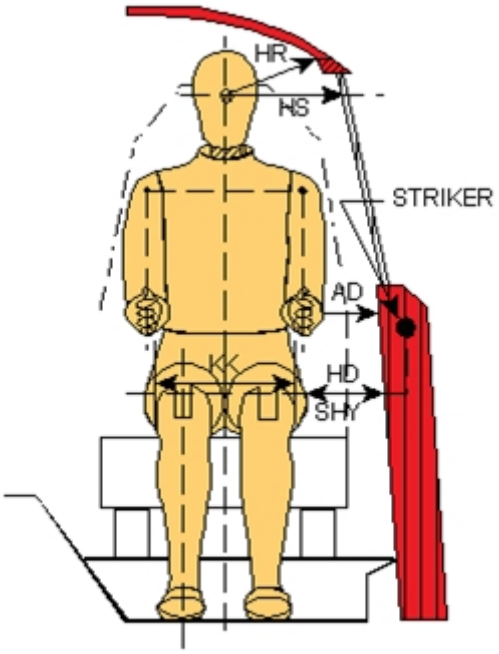


Left Side View

Code	Measurement Description	Driver (SN: 065)		Passenger (SN: 137)	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		31.2		
SWA°	Steering Wheel Angle		25.4		
SCA°	Steering Column Angle		64.6		
SA°	Seat Back Angle (on headrest post)		-8.7		-17.6
HZ	Head to Roof (Z)	233	90.0	262	90.0
HH	Head to Header	459	20.6	367	38.0
HW	Head to Windshield	758	0.1	687	0.0
NR	Nose to Rim / Dash	476	6.5	445	28.0
CD	Chest to Dash	632		380	
CS	Chest to Steering Hub	385	3.0		
RA	Rim to Abdomen	249	0.2		
KDL	Left Knee to Dash	236	29.1	139	24.0
KDR	Right Knee to Dash	221	37.3	141	28.0
PA°	Pelvic Angle		23.8		21.75
TA°	Tibia Angle		34.2		49.9
SK	Striker to Knee	497	8.6	665	11.2
ST	Striker to Head	502	88.8	457	69.7
SH	Striker to H-Point	204	60.0	336	27.8

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

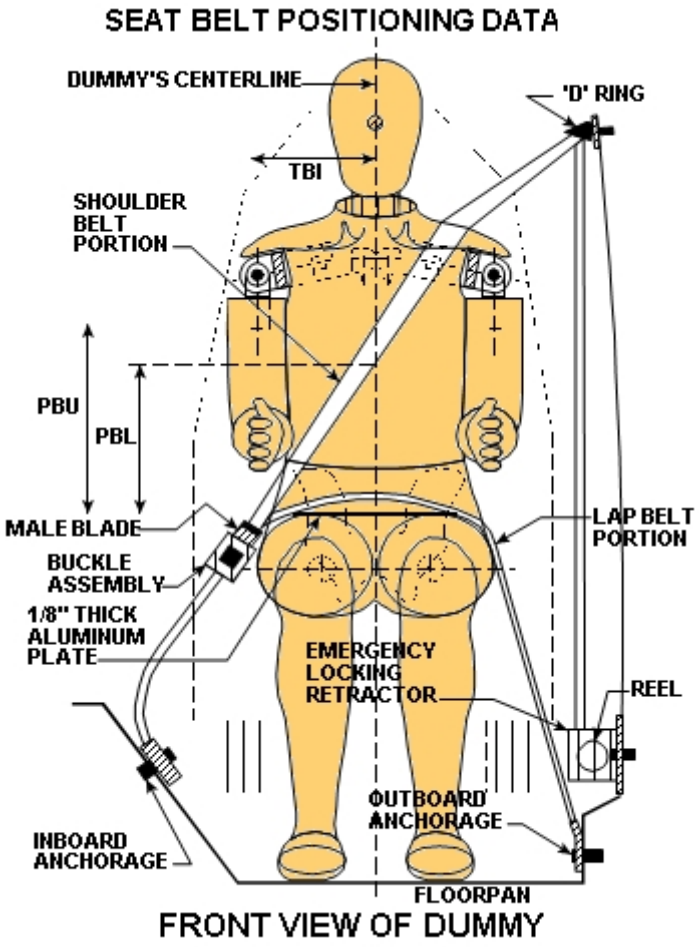


Front View

Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	56	83
HD	H-Point to Door	151	190
HR	Head to Side Header	223	265
HS	Head to Side Window	340	374
KK	Knee to Knee	321	216
SHY	Striker to H-Point (Y Direction)	255	282
AA	Ankle to Ankle	330	167

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	351	295
PBL — Top surface of reference to belt lower edge	mm	265	203

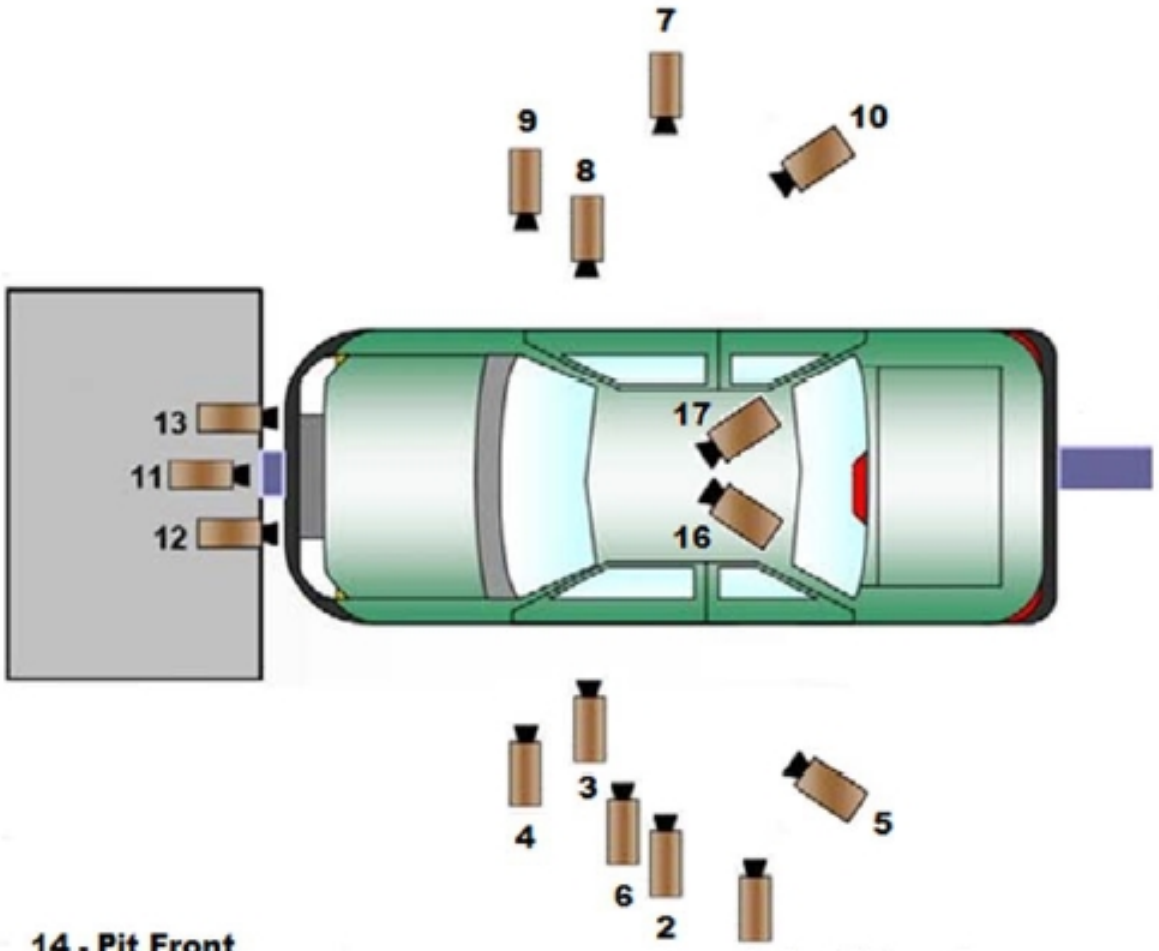
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	820	900
Lap Belt Length as measured on ATD	mm	537	630
Remainder of belt on reel	mm	983	780
Total belt length for continuous webbing systems	mm	2340	2310

DATA SHEET NO. 6
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

CAMERA POSITIONS FOR FRONTAL IMPACTS



DATA SHEET NO. 6 … (CONTINUED)
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

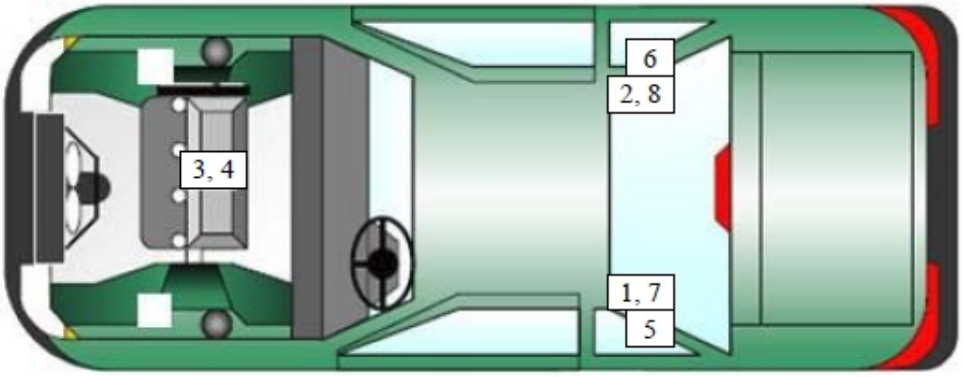
CAMERA LOCATIONS

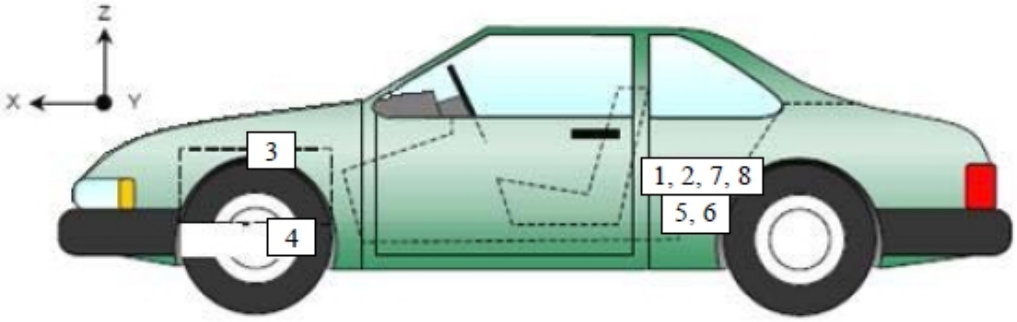
No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall				Zoom	60
2	Left Overall	-1256	-7341	-1500	24	1000
3	Driver Close-Up	-1382	-6341	-1493	50	1000
4	Left Front Half	-902	-6243	-1483	28	1000
5	Left Angle	-3924	-4762	-2456	50	1000
6	Steering Column	-1403	-7243	-2345	75	1000
7	Right Overall	-1303	7031	-1521	24	1000
8	Passenger Close-Up	-1392	5956	-1492	50	1000
9	Right Front Half	-1003	6052	-1463	28	1000
10	Right Angle	-3942	4572	-2456	50	1000
11	Windshield	1168	0	-3471	12.5	1000
12	Driver Windshield	958	-458	-2204	25	1000
13	Passenger Windshield	958	458	-2204	25	1000
14	Pit Front	-833	0	2228	12.5	1000
15	Pit Rear	-3021	0	2234	12.5	1000
16	Onboard Driver Airbag (Optional)				8	1000
17	Onboard Passenger Airbag (Optional)				8	1000

** COORDINATES:* *+X = forward of impact plane*
+Y = right of monorail center
+Z = into ground

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025





VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1727	-389	281
2	Right Rear Accelerometer – X Direction	1723	344	282
3	Engine Top X	3820	189	-263
4	Engine Bottom X	3835	-179	347
5	Left Rear Accelerometer – Z Direction	1727	-389	281
6	Right Rear Accelerometer – Z Direction	1723	344	282
7	Left Rear Accelerometer – X Direction Redundant	1719	-395	282
8	Right Rear Accelerometer – X Direction Redundant	1723	344	282

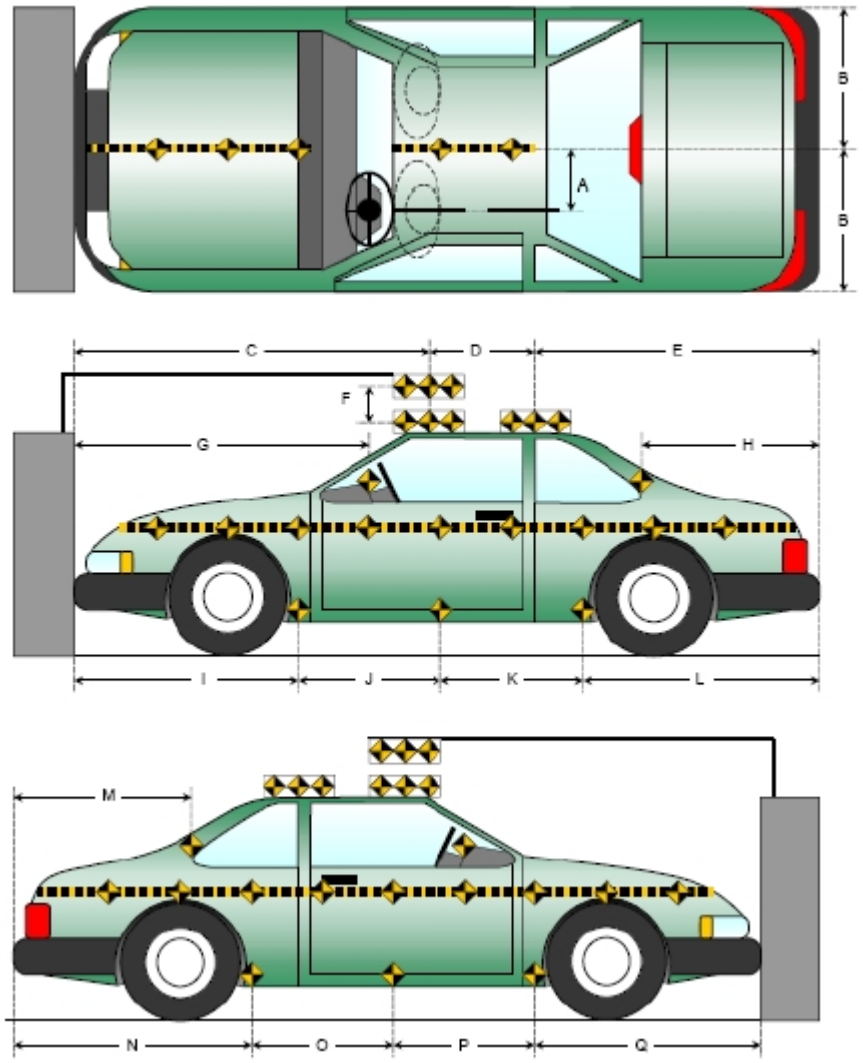
Reference Points: *X – Rear Surface of Vehicle (+ forward)*
Y – Vehicle Centerline (+ to right)
Z – Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2025 Cadillac XT4 5 Door SUV
Test Program: NCAP Frontal Barrier Impact Test
NHTSA No.: M20250102
Test Date: 02/05/2025

Item	Value
A	376
B	935
C	2146
D	606
E	1845
F	412
G	1792
H	946
I	1442
J	906
K	900
L	1349
M	949
N	1344
O	903
P	902
Q	1448

All units in millimeters



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

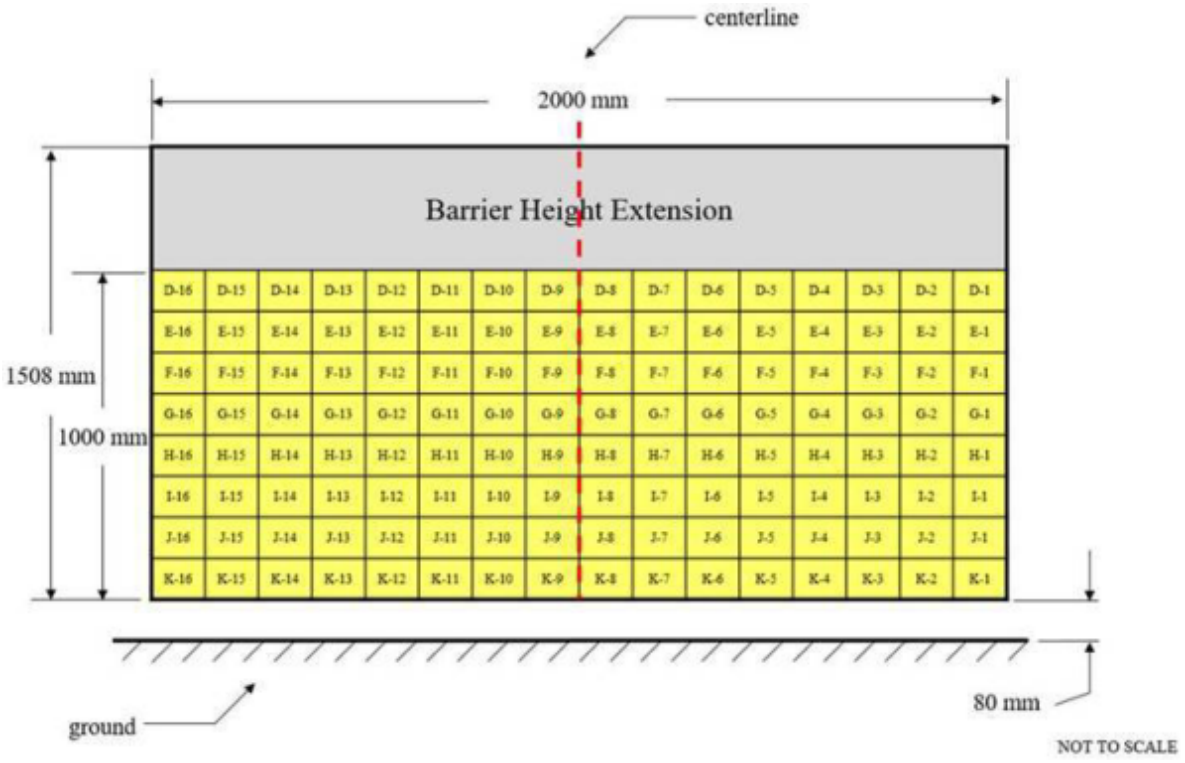


Figure 1 - Load Cell Locations on a 128-Load Cell Barrier with Plywood Height Extension*
Please note above diagram is not actual representation of load cell barrier used.

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

INSTRUMENTATION

Instrumentation	Number of Channels Collected
Driver Dummy Accelerometers	47
Passenger Dummy Accelerometers	47
Vehicle Structure Accelerometers	8
Load Cell Barrier	128
Total	230

CAMERA COVERAGE

Type of Camera	Number Used in this Test
High-Speed Vehicle Onboard	2
High-Speed Offboard	14
Real-Time Panning	1
Total	17

DATA SHEET NO. 11
POST-TEST OBSERVATIONS

Test Vehicle: 2025 Cadillac XT4 5 Door SUV
NHTSA No.: M20250102
Test Program: NCAP Frontal Barrier Impact Test
Test Date: 02/05/2025

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	HIII-50th Male / 065	HIII-5th Female / 137
Head Contact	Frontal Airbag, Curtain Airbag, and Head Restraint	Frontal Airbag & Head Restraint
Upper Torso Contact	Frontal Airbag	Frontal Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag	Knee Airbag
Right Knee Contact	Knee Airbag	Knee Airbag

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger	Other
Locked / Unlocked Doors	Unlocked	Unlocked	
Front Door Opening	Closed & Operational	Closed & Operational	
Rear Door Opening	Closed & Operational	Closed & Operational	
Trunk/Hatch/Tailgate Opening			Closed & Operational
Seat Track Shift (mm)	0	0	
Seat Back Movement from Initial Position	None	None	

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	Cracked Throughout
Window Damage	None
Other	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	914
Center	mm	891
Right Side	mm	909
Average	mm	905

DATA SHEET NO. 11 … (CONTINUED)
POST-TEST OBSERVATIONS

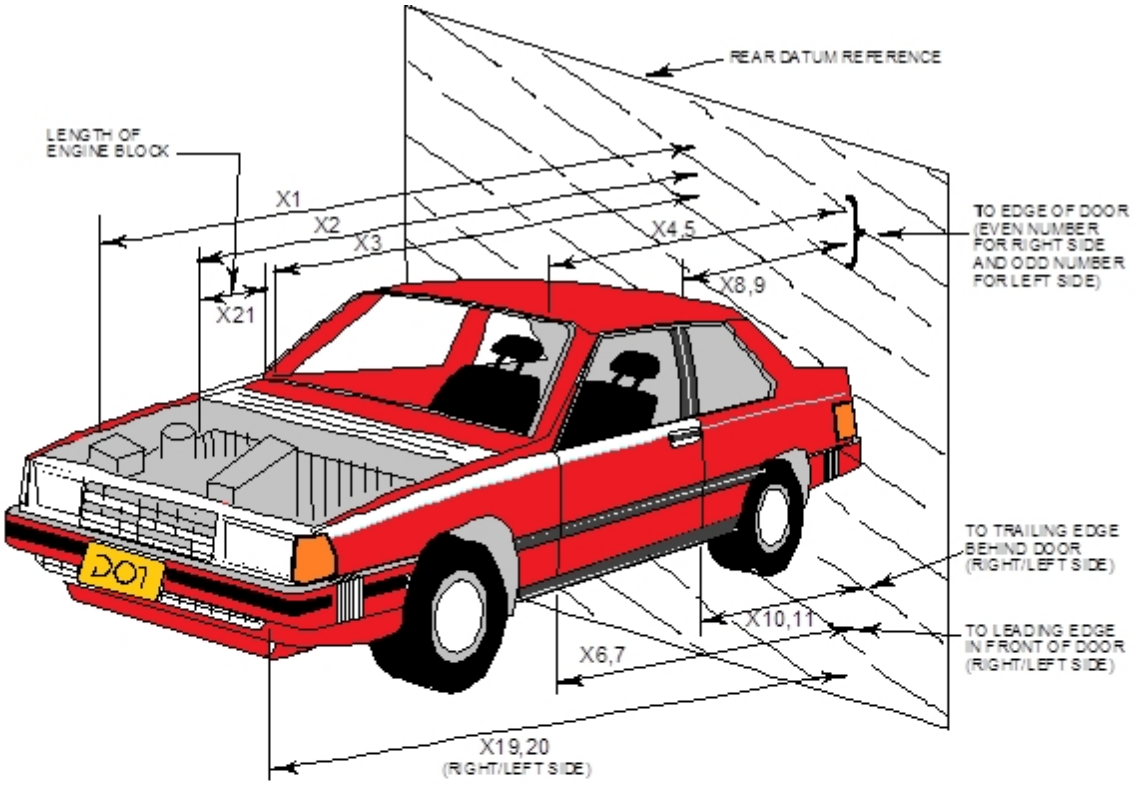
Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

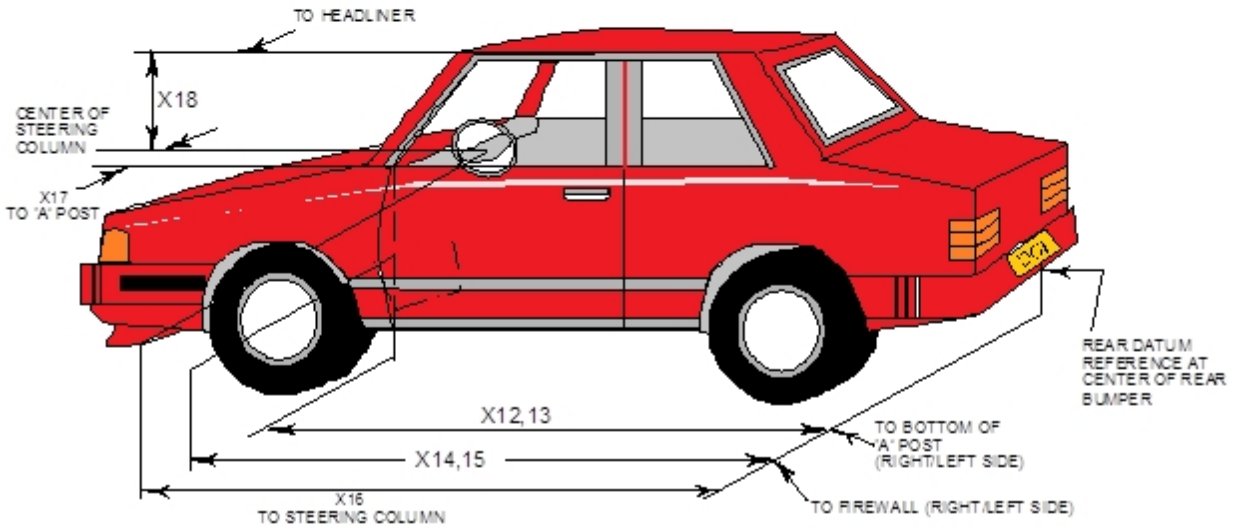
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 12
VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025





DATA SHEET NO. 12 … (CONTINUED)
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2025 Cadillac XT4 5 Door SUV NHTSA No.: M20250102
Test Program: NCAP Frontal Barrier Impact Test Test Date: 02/05/2025

No.	Measurement Description	Pre-Test	Post-Test	Change
1	Total Length of Vehicle at Centerline	4597	4136	-461
2	Rear Surface of Vehicle (RSOV) to Front of Engine	4085	3821	-264
3	RSOV to Firewall	3517	3490	-27
4	RSOV to Upper Leading Edge of Right Door	3140	3139	-1
5	RSOV to Upper Leading Edge of Left Door	3139	3141	2
6	RSOV to Lower Leading Edge of Right Door	3074	3070	-4
7	RSOV to Lower Leading Edge of Left Door	3074	3075	1
8	RSOV to Upper Trailing Edge of Right Door	2022	2020	-2
9	RSOV to Upper Trailing Edge of Left Door	2021	2023	2
10	RSOV to Lower Trailing Edge of Right Door	2037	2031	-6
11	RSOV to Lower Trailing Edge of Left Door	2038	2036	-2
12	RSOV to Bottom of “A” Post of Right Side	3103	3098	-5
13	RSOV to Bottom of “A” Post of Left Side	3102	3103	1
14	RSOV to Firewall, Right Side	3590	3579	-11
15	RSOV to Firewall, Left Side	3569	3545	-24
16	RSOV to Steering Column	2641	2728	87
17	Center of Steering Column to “A” Post	297	292	-5
18	Center of Steering Column to Headliner	425	460	35
19	RSOV to Right Side of Front Bumper	4509	4101	-408
20	RSOV to Left Side of Front Bumper	4510	4132	-378
21	Length of Engine Block	517	517	0
RD	RSOV to Right Side of Dash Panel	2833	2825	-8
CD	RSOV to Center of Dash Panel	2770	2766	-4
LD	RSOV to Left Side of Dash Panel	2826	2825	-1

All Dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

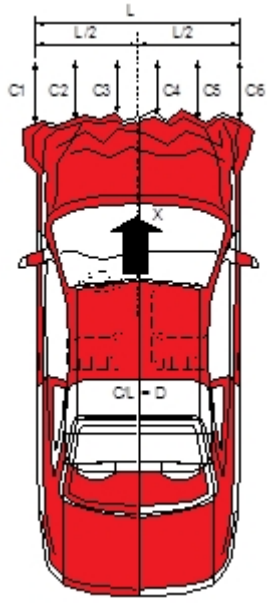
Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

VEHICLE INFORMATION

VIN:	1GYFZDR44SF112842	Wheelbase (mm):	2774
Vehicle Size Category:	MPV	Test Weight (kg):	2021

ACCELEROMETER DATA

Accelerometer Locations:	Please See Data Sheet No. 7
Cal. Procedure / Interval:	Calspan Procedure / 6 month
Integration Algorithm:	Trapezoidal
Linearity:	> 99%
Impact Velocity (km/h):	56.44
Velocity Change (km/h):	70.09
Time of Separation (ms):	102



CRUSH PROFILE

Collision Deformation Classification:	12FDEW2
Midpoint of Damage:	C4
Damage Region Length (mm):	1448
Impact Mode:	Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Crush
C1	Crush Zone 1 at Left Side	mm	4355	4073	282
C2	Crush Zone 2 at Left Side	mm	4551	4134	417
C3	Crush Zone 3 at Left Side	mm	4584	4129	455
C4	Crush Zone 4 at Right Side	mm	4584	4127	457
C5	Crush Zone 5 at Right Side	mm	4550	4118	432
C6	Crush Zone 6 at Right Side	mm	4356	4063	293
L	C1 to C6	mm	1329	1448	-119

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

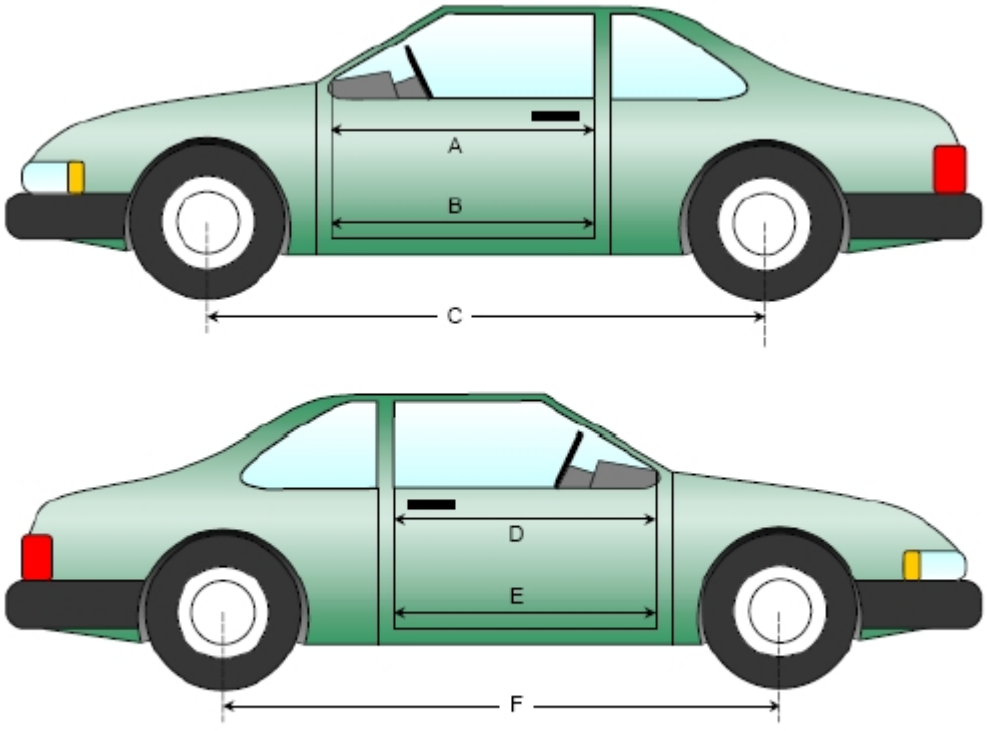
Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Change
A	Left Side Upper	mm	982	982	0
B	Left Side Lower	mm	860	860	0
D	Right Side Upper	mm	985	984	-1
E	Right Side Lower	mm	869	869	0

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Change
C	Left Side Wheelbase	mm	2774	2693	-81
F	Right Side Wheelbase	mm	2774	2730	-44



Left & Right Side Views

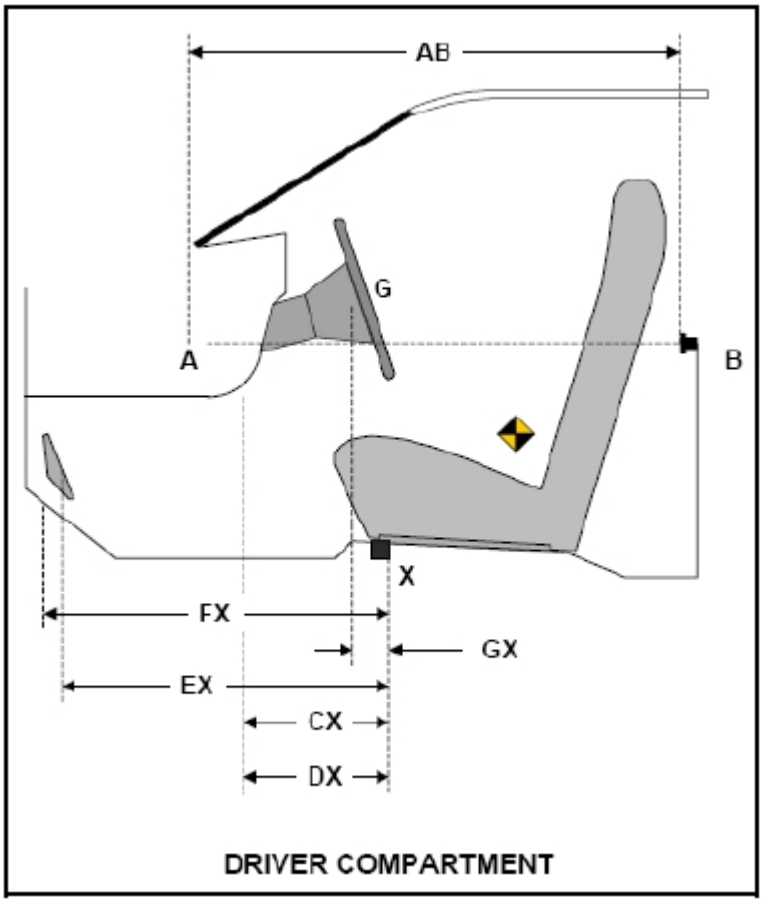
DATA SHEET NO.14 … (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Change
AB	Door Opening (Inside Window Jam)	mm	724	727	3
CX	Left Knee Bolster to X	mm	370	371	1
DX	Right Knee Bolster to X	mm	357	357	0
EX	Brake Pedal to X	mm	546	521	-25
FX	Foot Rest to X	mm	567	561	-6
GX	Center of Steering Column Wheel Hub to X	mm	108	197	89

X = Front of Seat Track (Stationary)



DATA SHEET NO. 15
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

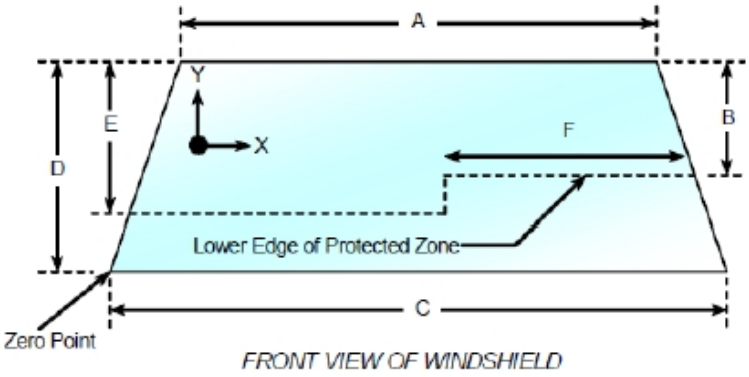
Windshield Mounting Details: A trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicles not equipped with occupant passive restraints and 50% for each side of the windshield for vehicles which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21 °C

WINDSHIELD PERIPHERY MEASUREMENTS

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2180	2162	99.2%
Right Side	2180	2160	99.1%
Total	4360	4322	99.1%



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1238
B	mm	536
C	mm	1462
D	mm	830
E	mm	550
F	mm	378

AREAS OF PROTECTED ZONE FAILURES

A. *Provide coordinates of the area that the protected zone was penetrated more than .25 inches by a vehicle component other than one that is normally in contact with the windshield.*
   - No Penetration

B. *Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component.*
   - No Penetration

X	Y

X	Y

DATA SHEET NO. 15 … (CONTINUED)
SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

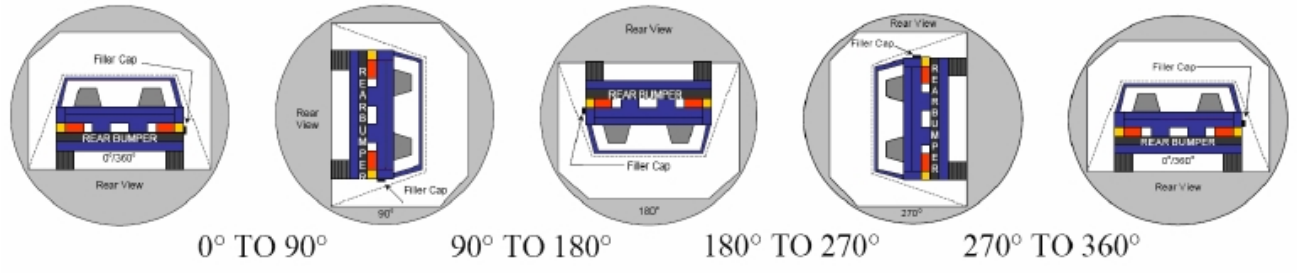
Temperature at Time of Impact: 21°C Test Time: 10:45 AM

STODDARD SOLVENT SPILLAGE MEASUREMENTS

A. From impact until vehicle motion ceases (Maximum allowable is 1 oz.)	0	oz
B. For the 5-minute period after motion ceases (Maximum allowable is 5 oz.)	0	oz
C. For the following 25 minutes: (Maximum allowable is 1 oz.)	0	oz
D. Spillage:	No Spillage	

DATA SHEET NO. 16
FMVSS 301 STATIC ROLLOVER RESULTS

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025



0° TO 90° 90° TO 180° 180° TO 270° 270° TO 360°

1. The specified fixture rollover rate for each 90°of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent Spillage: No Spillage

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	66	300	366
90° to 180°	65	300	365
180° to 270°	64	300	364
270° to 360°	66	300	366

FMVSS 301 SPILLAGE TABLE

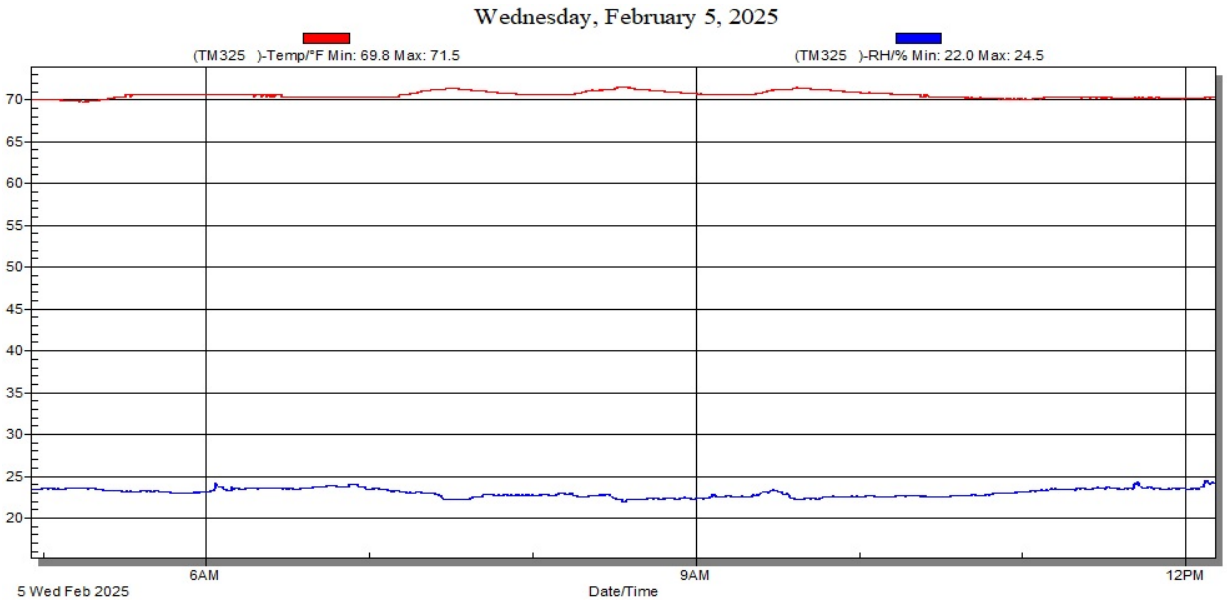
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° to 90°	No Spillage
90° to 180°	No Spillage
180° to 270°	No Spillage
270° to 360°	No Spillage

DATA SHEET NO. 17
DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle:	2025 Cadillac XT4 5 Door SUV	NHTSA No.:	M20250102
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	02/05/2025



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

APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Fig.	Description	Page
1	Load Cell Location	A-5
2	Pre-Test Load Cell Wall	A-5
3	Post-Test Load Cell Wall	A-6
4	Manufacturer's Label	A-6
5	Tire Placard	A-7
6	2025 Cadillac XT4 Frontal As Delivered	A-7
7	Left Rear 3-4 View, as Received	A-8
8	Pre-Test Front View of Test Vehicle	A-8
9	Post-Test Front View of Test Vehicle	A-9
10	Pre-Test Left View of Test Vehicle	A-9
11	Post-Test Left View of Test Vehicle	A-10
12	Pre-Test Right View of Test Vehicle	A-10
13	Post-Test Right View of Test Vehicle	A-11
14	Pre-Test Right Front 3-4 View	A-11
15	Post-Test Right Front 3-4 View	A-12
16	Pre-Test Left Rear 3-4 View	A-12
17	Post-Test Left Rear 3-4 View	A-13
18	Pre-Test Windshield View	A-13
19	Post-Test Windshield View	A-14
20	Pre-Test Engine Compartment View	A-14
21	Post-Test Engine Compartment View	A-15
22	Pre-Test Fuel Filler Cap View	A-15
23	Post-Test Fuel Filler Cap View	A-16
24	Pre-Test Front Underbody View[1]	A-16
25	Post-Test Front Underbody View[1]	A-17
26	Pre-Test Rear Underbody View[1]	A-17
27	Post-Test Rear Underbody View[1]	A-18
28	Pre-Test Dummy Cable Routing	A-18
29	Post-Test Dummy Cable Routing	A-19
30	Pre-Test Driver Dummy Front View	A-19
31	Post-Test Driver Dummy Front View	A-20
32	Pre-Test Driver Dummy Window View	A-20
33	Post-Test Driver Dummy Window View	A-21
34	Pre-Test Driver Dummy and Vehicle Interior View	A-21
35	Post-Test Driver Dummy and Vehicle Interior View	A-22

Fig.	Description	Page
36	Pre-Test Driver's Seat Fore-Aft Markings	A-22
37	Post-Test Driver's Seat Fore-Aft Markings	A-23
38	Pre-Test View of Belt Anchorage for Driver Dummy	A-23
39	Post-Test View of Belt Anchorage for Driver Dummy	A-24
40	Pre-Test View of Belt Buckle and Latch Plate for Driver Dummy	A-24
41	Post-Test View of Belt Buckle and Latch Plate for Driver Dummy	A-25
42	Pre-Test Driver Dummy Feet	A-25
43	Post-Test Driver Dummy Feet	A-26
44	Pre-Test Driver's Side Knee Bolster	A-26
45	Post-Test Driver's Side Knee Bolster	A-27
46	Pre-Test Driver's Side Floorpan	A-27
47	Post-Test Driver's Side Floorpan	A-28
48	Post-Test Driver Dummy Face	A-28
49	Post-Test Driver Dummy Contact With Airbag	A-29
50	Post-Test Driver Dummy Contact With Headrest	A-29
51	Pre-Test View of the Steering Wheel	A-30
52	Post-Test View of the Steering Wheel	A-30
53	Pre-Test Passenger Dummy Front View	A-31
54	Post-Test Passenger Dummy Front View	A-31
55	Pre-Test Passenger Dummy Window View	A-32
56	Post-Test Passenger Dummy Window View	A-32
57	Pre-Test Passenger Dummy and Vehicle Interior View	A-33
58	Post-Test Passenger Dummy and Vehicle Interior View	A-33
59	Pre-Test Passenger's Seat Fore-Aft Markings	A-34
60	Post-Test Passenger's Seat Fore-Aft Markings	A-34
61	Pre-Test View of Belt Anchorage for Passenger Dummy	A-35
62	Post-Test View of Belt Anchorage for Passenger Dummy	A-35
63	Pre-Test View of Belt Buckle and Latch Plate for Passenger Dummy	A-36
64	Post-Test View of Belt Buckle and Latch Plate for Passenger Dummy	A-36
65	Pre-Test Passenger Dummy Feet	A-37
66	Post-Test Passenger Dummy Feet	A-37
67	Pre-Test Passenger's Side Knee Bolster	A-38
68	Post-Test Passenger's Side Knee Bolster	A-38
69	Pre-Test Passenger's Side Floorpan	A-39
70	Post-Test Passenger's Side Floorpan	A-39
71	Post-Test Passenger Dummy Face	A-40

Fig.	Description	Page
72	Post-Test Passenger Dummy Contact With Airbag	A-40
73	Post-Test Passenger Dummy Contact With Headrest	A-41
74	Photograph of Ballast Installed in Vehicle	A-41
75	Post-Test Stoddard Solvent Spillage Location View, if Required	A-42
76	Post-Test Speed Trap Read-Out	A-42
77	Vehicle at 0º on Static Rollover Device	A-43
78	Vehicle at 90º on Static Rollover Device	A-43
79	Vehicle at 180º on Static Rollover Device	A-44
80	Vehicle at 270º on Static Rollover Device	A-44
81	Vehicle at 360º on Static Rollover Device	A-45
82	2025 Cadillac XT4 Frontal Impact Event	A-45
83	Monroney Label Photograph	A-46

[1]**NOTE**: *The underbody views should include the following vehicle components: fuel pump, fuel lines, sender unit, fuel tank filler pipe and any other visible system components.*

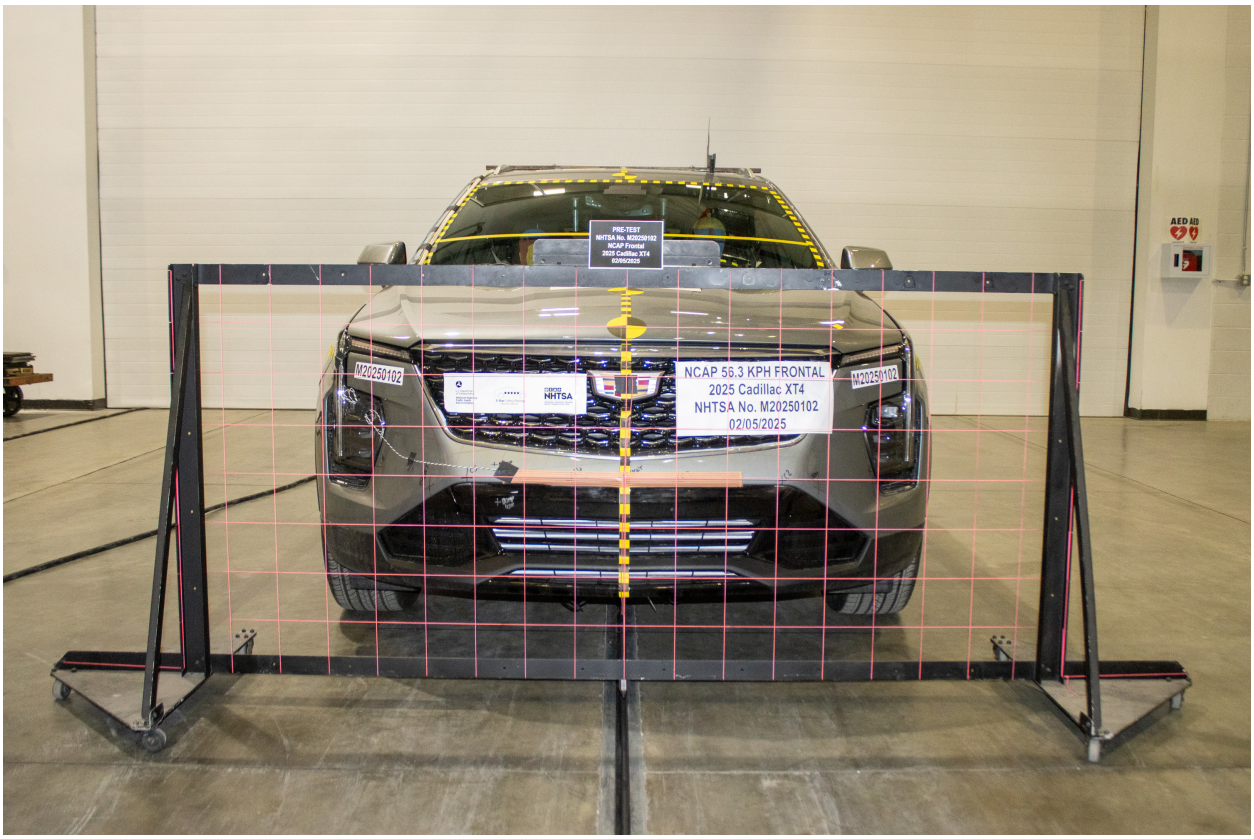


Figure A-1: Load Cell Location

Figure A-2: Pre-Test Load Cell Wall

Figure A-3: Post-Test Load Cell Wall

Figure A-4: Manufacturer's Label

Figure A-5: Tire Placard

Figure A-6: 2025 Cadillac XT4 Frontal As Delivered

Figure A-7: Left Rear 3-4 View, As Received

Figure A-8: Pre-Test Front View of Test Vehicle

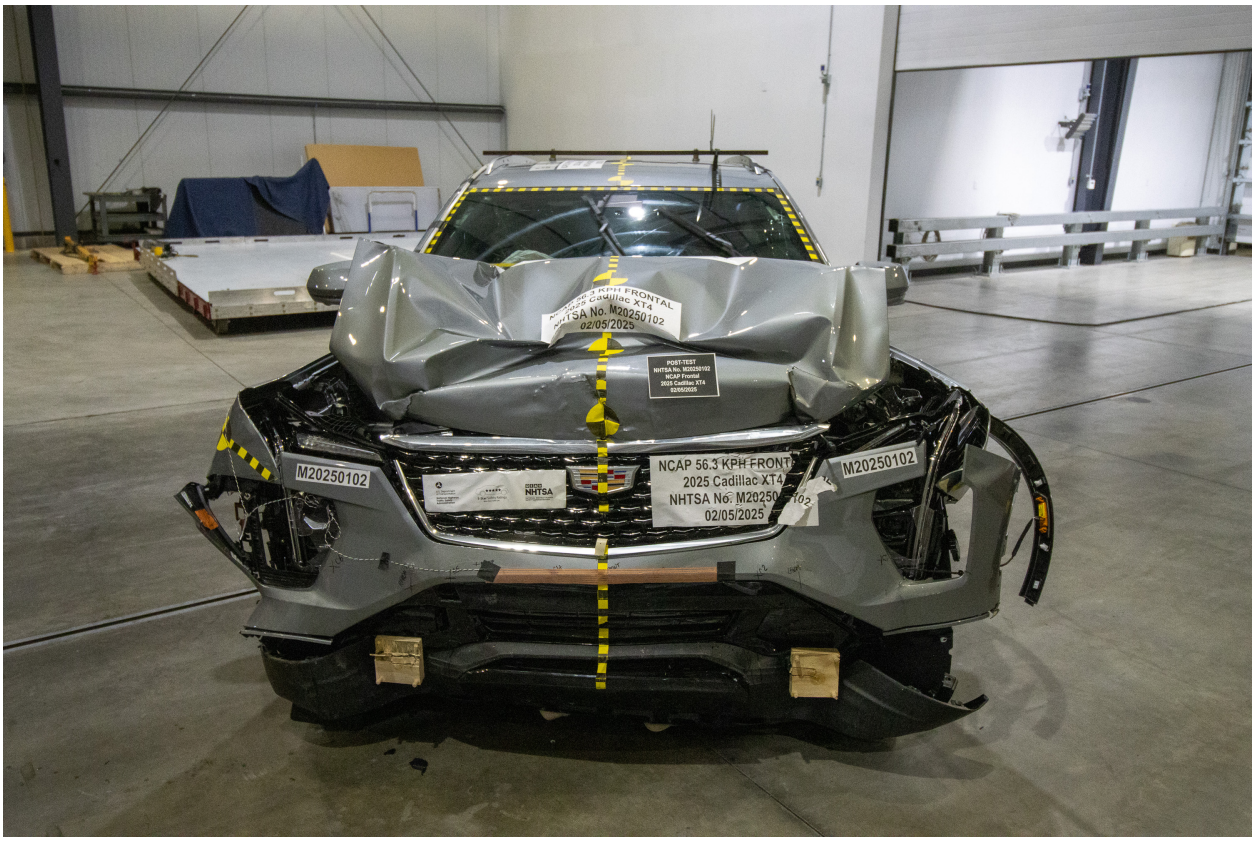


Figure A-9: Post-Test Front View of Test Vehicle

Figure A-10: Pre-Test Left View of Test Vehicle

Figure A-11: Post-Test Left View of Test Vehicle

Figure A-12: Pre-Test Right View of Test Vehicle

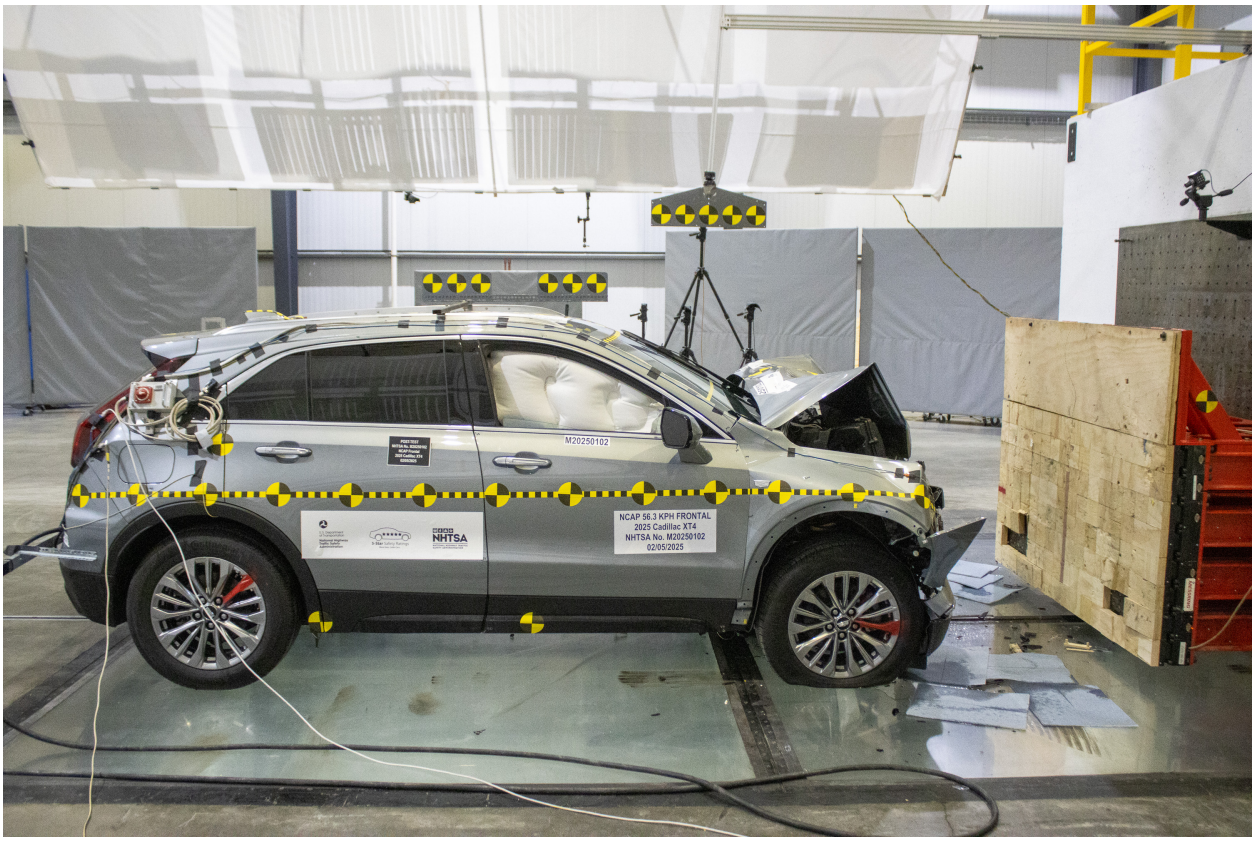


Figure A-13: Post-Test Right View of Test Vehicle

Figure A-14: Pre-Test Right Front 3-4 View

Figure A-15: Post-Test Right Front 3-4 View

Figure A-16: Pre-Test Left Rear 3-4 View

Figure A-17: Post-Test Left Rear 3-4 View

Figure A-18: Pre-Test Windshield View

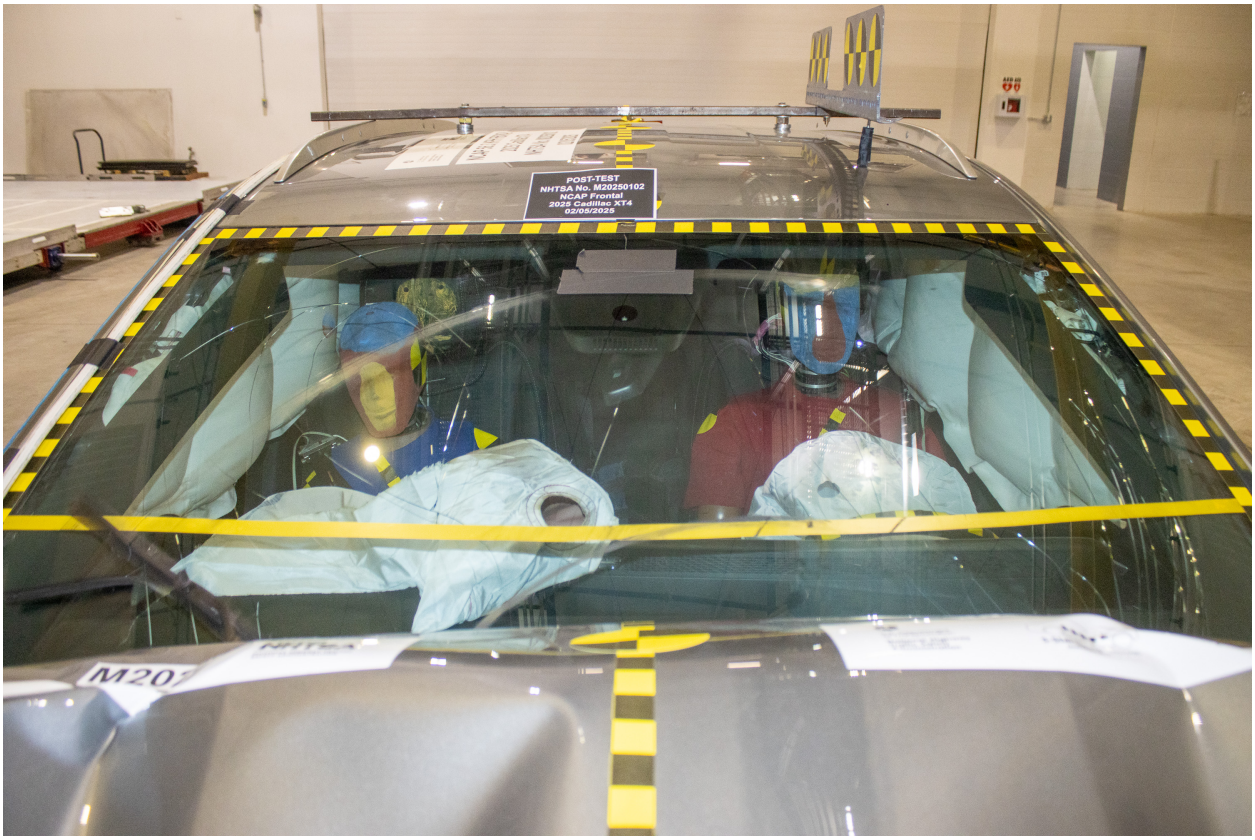


Figure A-19: Post-Test Windshield View

Figure A-20: Pre-Test Engine Compartment View

Figure A-21: Post-Test Engine Compartment View

Figure A-22: Pre-Test Fuel Filler Cap View

Figure A-23: Post-Test Fuel Filler Cap View

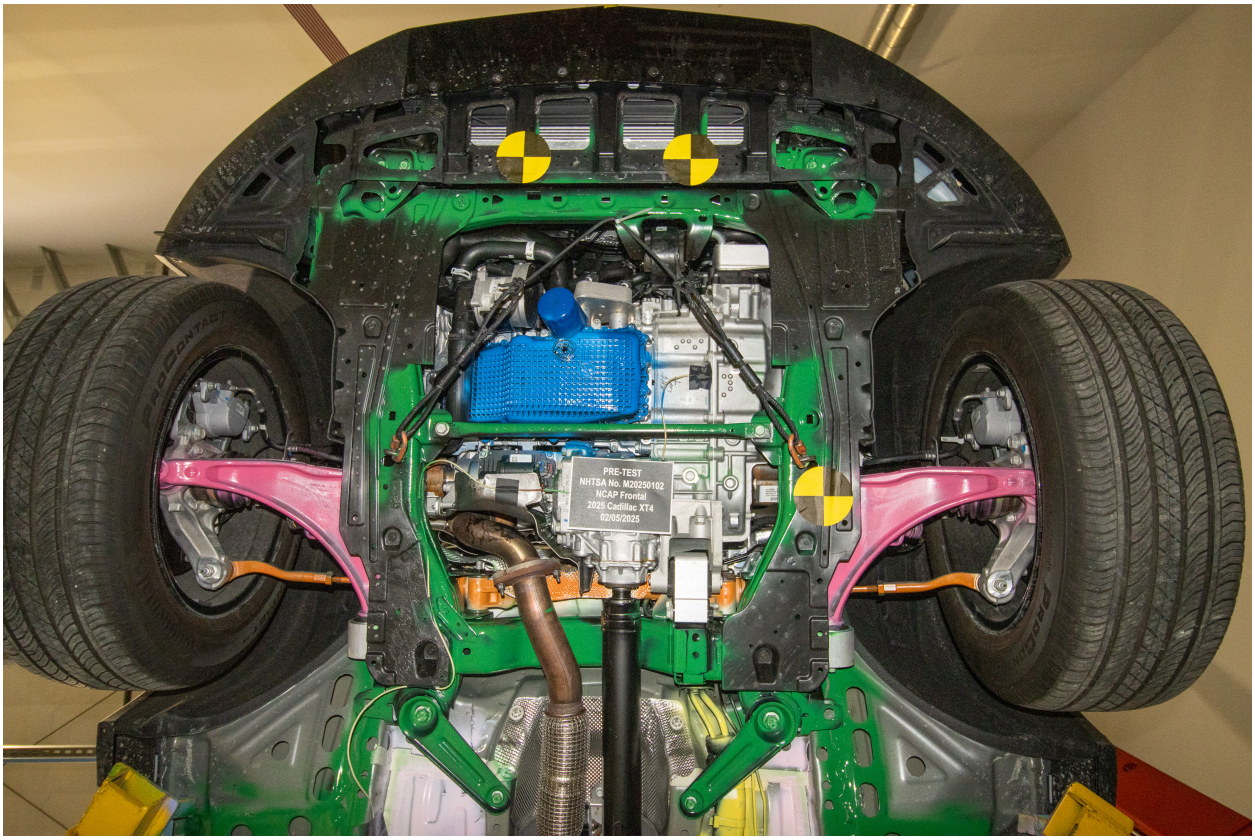


Figure A-24: Pre-Test Front Underbody View

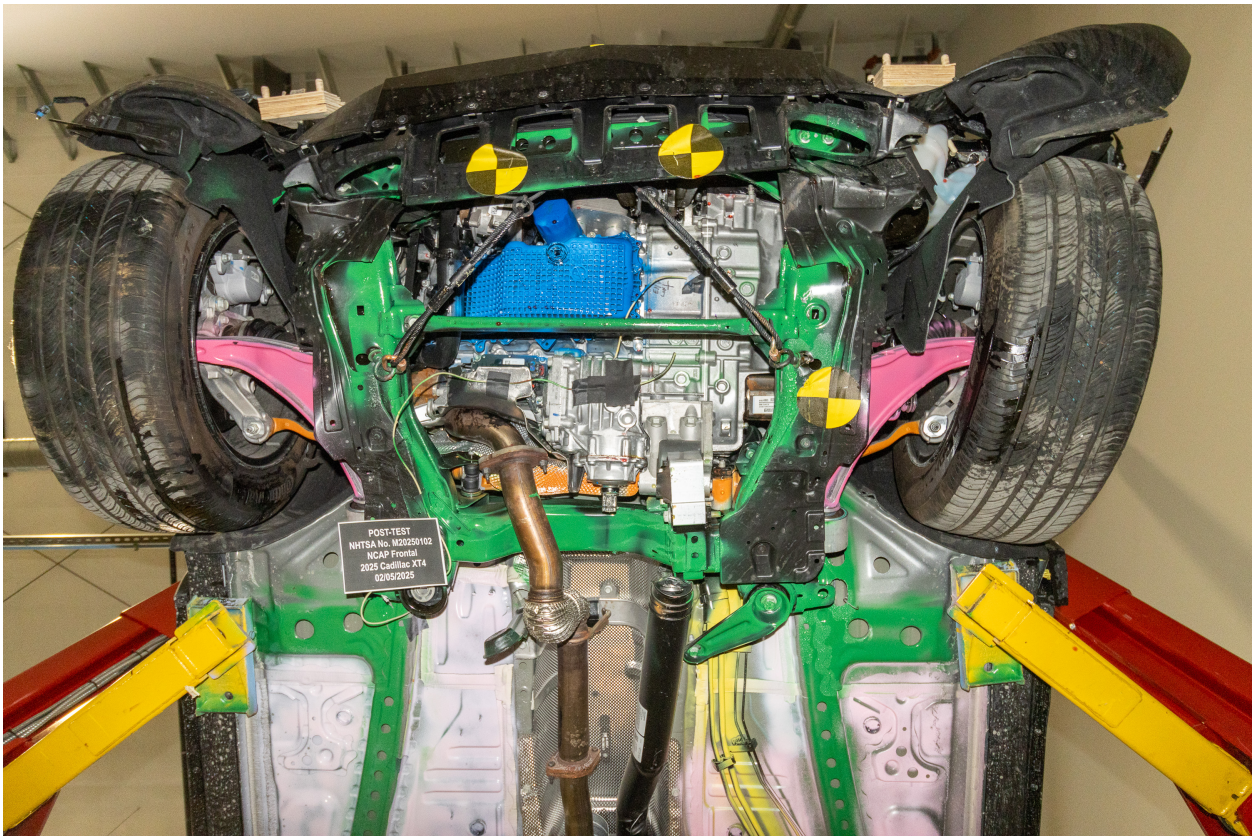


Figure A-25: Post-Test Front Underbody View

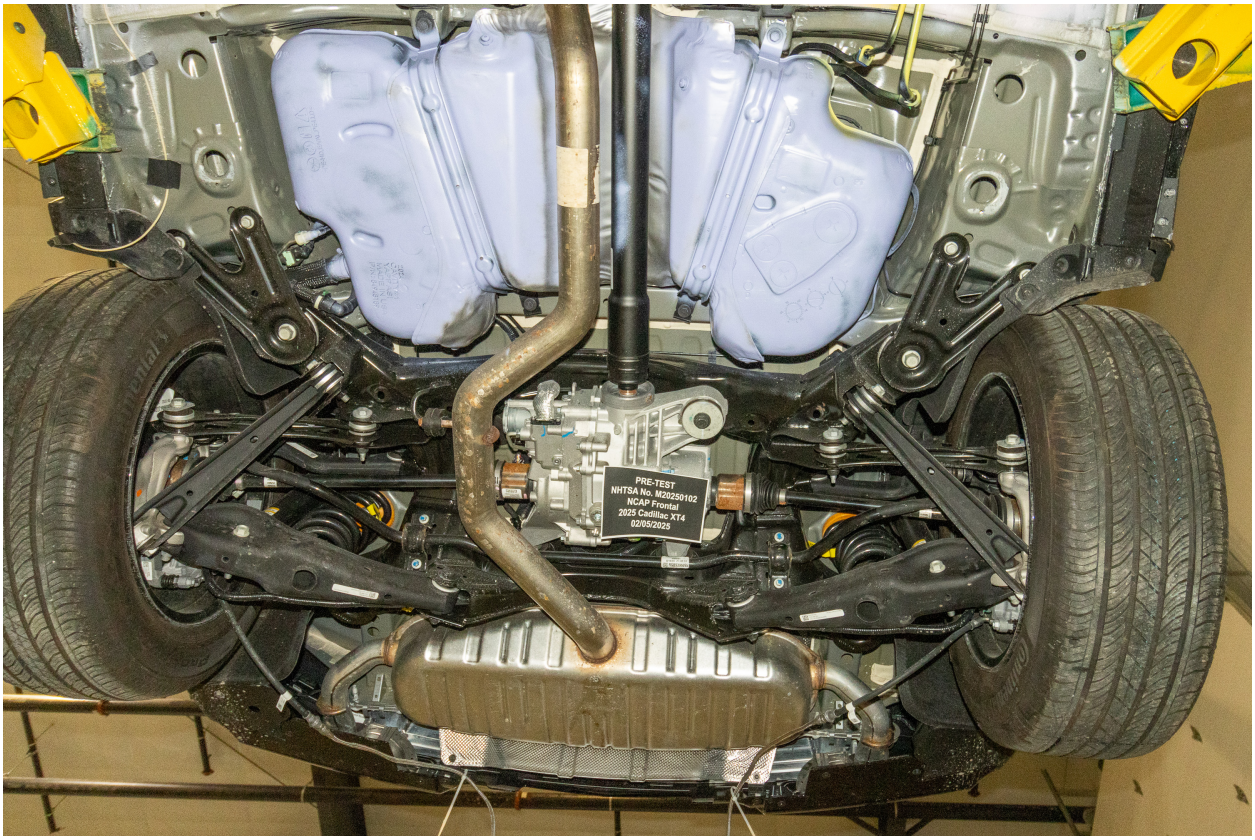


Figure A-26: Pre-Test Rear Underbody View

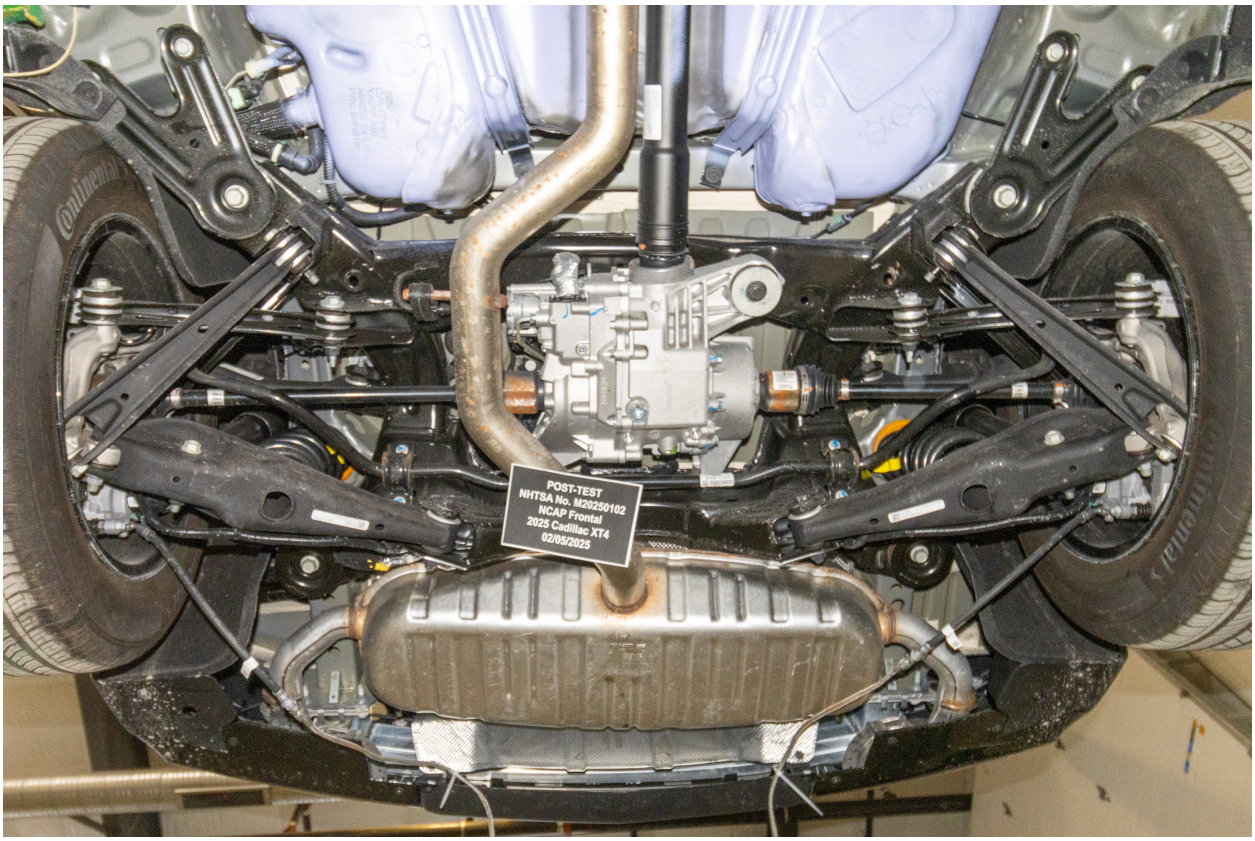


Figure A-27: Post-Test Rear Underbody View

Figure A-28: Pre-Test Dummy Cable Routing

Figure A-29: Post-Test Dummy Cable Routing

Figure A-30: Pre-Test Driver Dummy Front View

Figure A-31: Post-Test Driver Dummy Front View

Figure A-32: Pre-Test Driver Dummy Window View

Figure A-33: Post-Test Driver Dummy Window View

Figure A-34: Pre-Test Driver Dummy and Vehicle Interior View

Figure A-35: Post-Test Driver Dummy and Vehicle Interior View

Figure A-36: Pre-Test Driver's Seat Fore-Aft Markings

Figure A-37: Post-Test Driver's Seat Fore-Aft Markings

Figure A-38: Pre-Test View of Belt Anchorage for Driver Dummy

Figure A-39: Post-Test View of Belt Anchorage for Driver Dummy

Figure A-40: Pre-Test View of Belt Buckle and Latch Plate for Driver Dummy

Figure A-41: Post-Test View of Belt Buckle and Latch Plate for Driver Dummy

Figure A-42: Pre-Test Driver Dummy Feet

Figure A-43: Post-Test Driver Dummy Feet

Figure A-44: Pre-Test Driver's Side Knee Bolster

Figure A-45: Post-Test Driver's Side Knee Bolster

Figure A-46: Pre-Test Driver's Side Floorpan

Figure A-47: Post-Test Driver's Side Floorpan

Figure A-48: Post-Test Driver Dummy Face

Figure A-49: Post-Test Driver Dummy Contact With Airbag

Figure A-50: Post-Test Driver Dummy Contact With Headrest

Figure A-51: Pre-Test View of the Steering Wheel

Figure A-52: Post-Test View of the Steering Wheel

Figure A-53: Pre-Test Passenger Dummy Front View

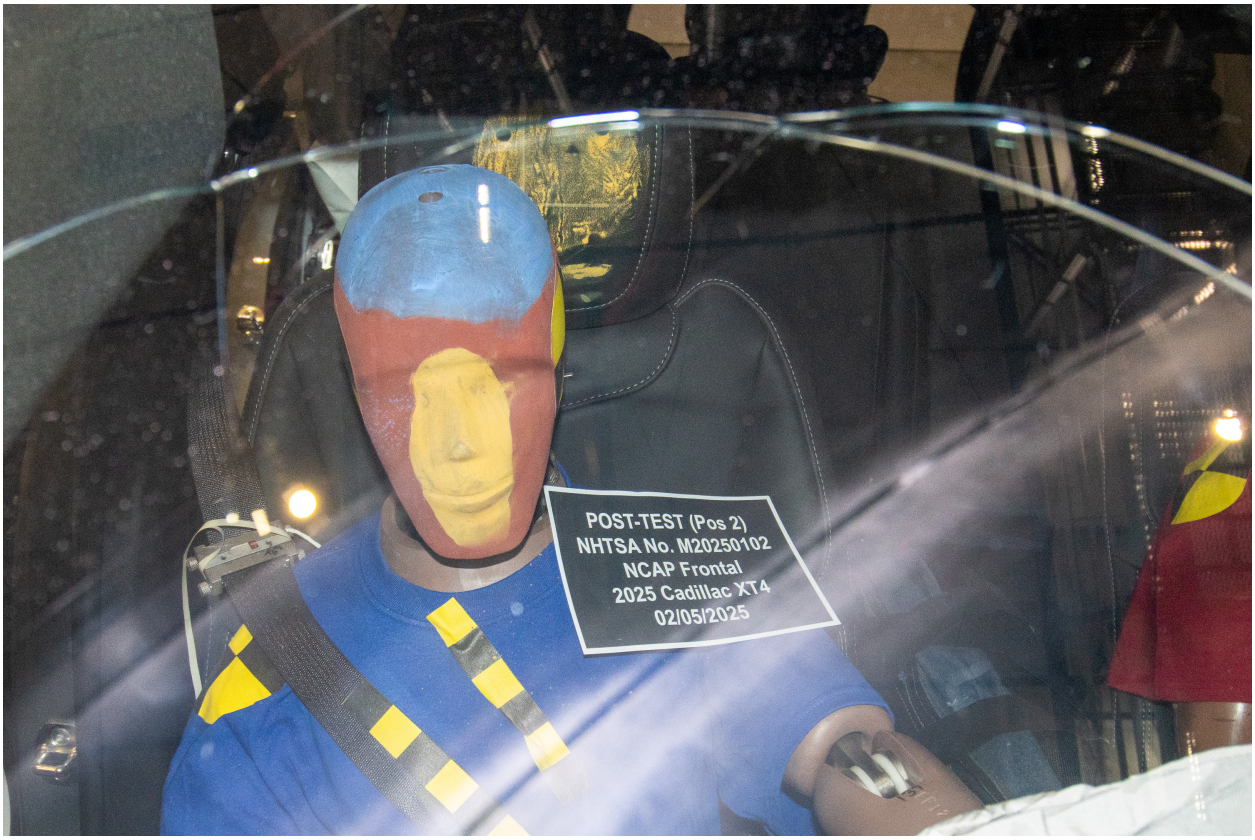


Figure A-54: Post-Test Passenger Dummy Front View

Figure A-55: Pre-Test Passenger Dummy Window View

Figure A-56: Post-Test Passenger Dummy Window View

Figure A-57: Pre-Test Passenger Dummy and Vehicle Interior View

Figure A-58: Post-Test Passenger Dummy and Vehicle Interior View

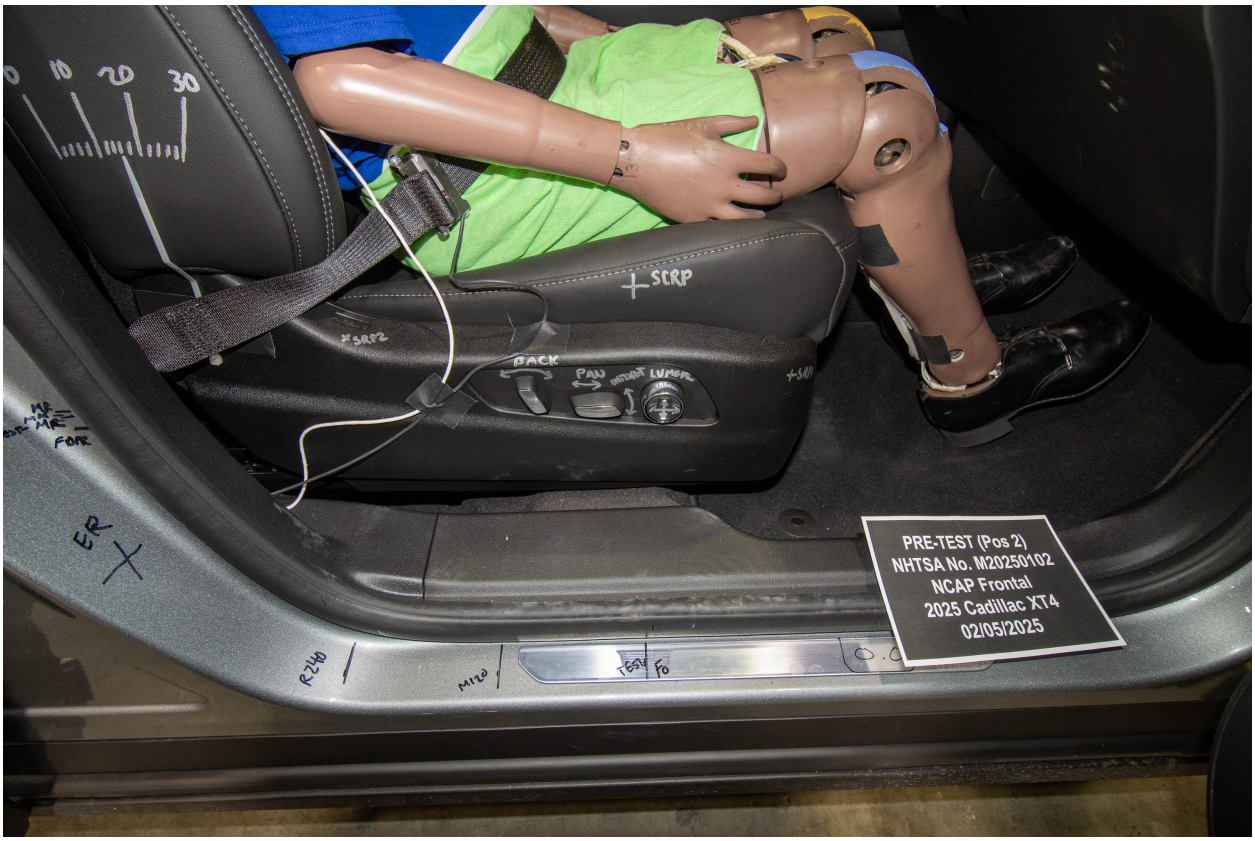


Figure A-59: Pre-Test Passenger's Seat Fore-Aft Markings

Figure A-60: Post-Test Passenger's Seat Fore-Aft Markings

Figure A-61: Pre-Test View of Belt Anchorage for Passenger Dummy

Figure A-62: Post-Test View of Belt Anchorage for Passenger Dummy

Figure A-63: Pre-Test View of Belt Buckle and Latch Plate for Passenger Dummy

Figure A-64: Post-Test View of Belt Buckle and Latch Plate for Passenger Dummy

Figure A-65: Pre-Test Passenger Dummy Feet

Figure A-66: Post-Test Passenger Dummy Feet

Figure A-67: Pre-Test Passenger's Side Knee Bolster

Figure A-68: Post-Test Passenger's Side Knee Bolster

Figure A-69: Pre-Test Passenger's Side Floorpan

Figure A-70: Post-Test Passenger's Side Floorpan

Figure A-71: Post-Test Passenger Dummy Face

Figure A-72: Post-Test Passenger Dummy Contact With Airbag

Figure A-73: Post-Test Passenger Dummy Contact With Headrest

Figure A-74: Photograph of Ballast Installed in Vehicle

Photo Not Applicable

Figure A-75: Post-Test Stoddard Solvent Spillage Location View, If Required

Figure A-76: Post-Test Speed Trap Read-Out

Figure A-77: Vehicle at 0º on Static Rollover Device

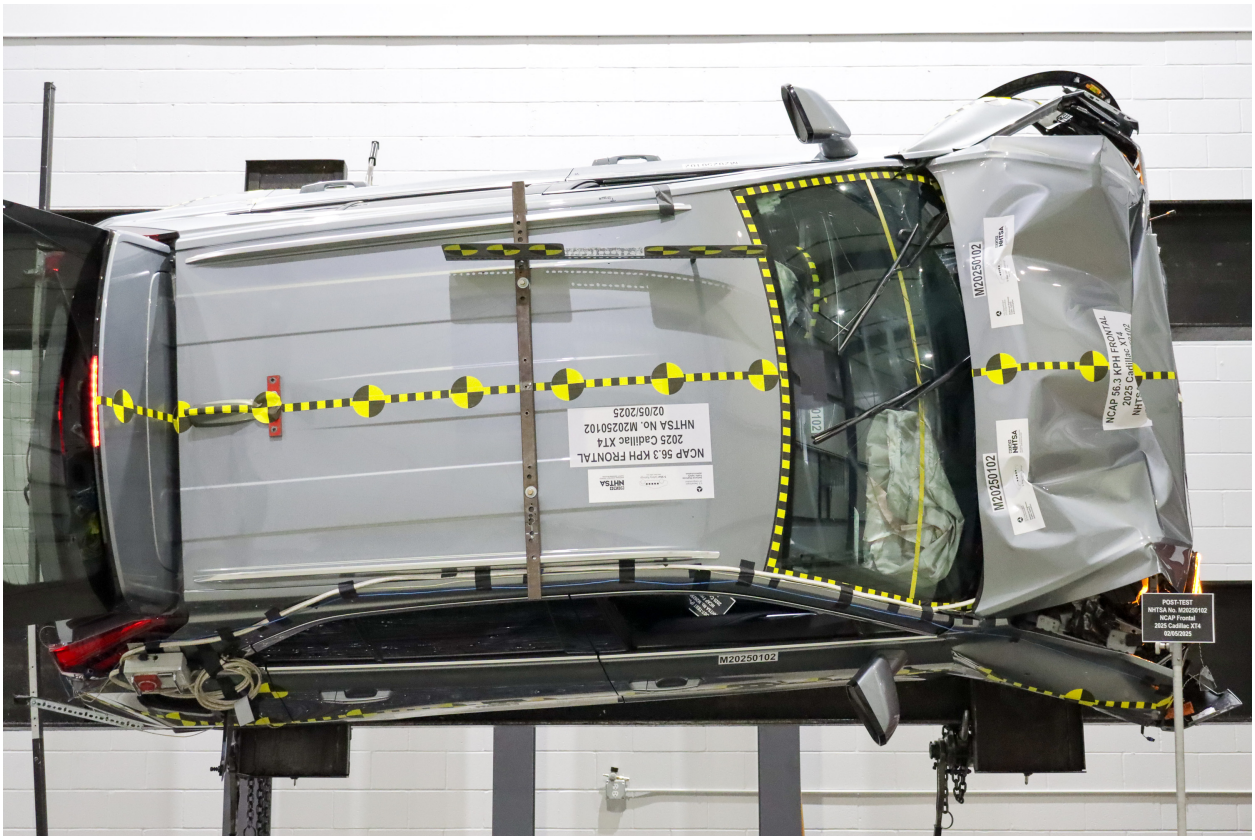


Figure A-78: Vehicle at 90º on Static Rollover Device

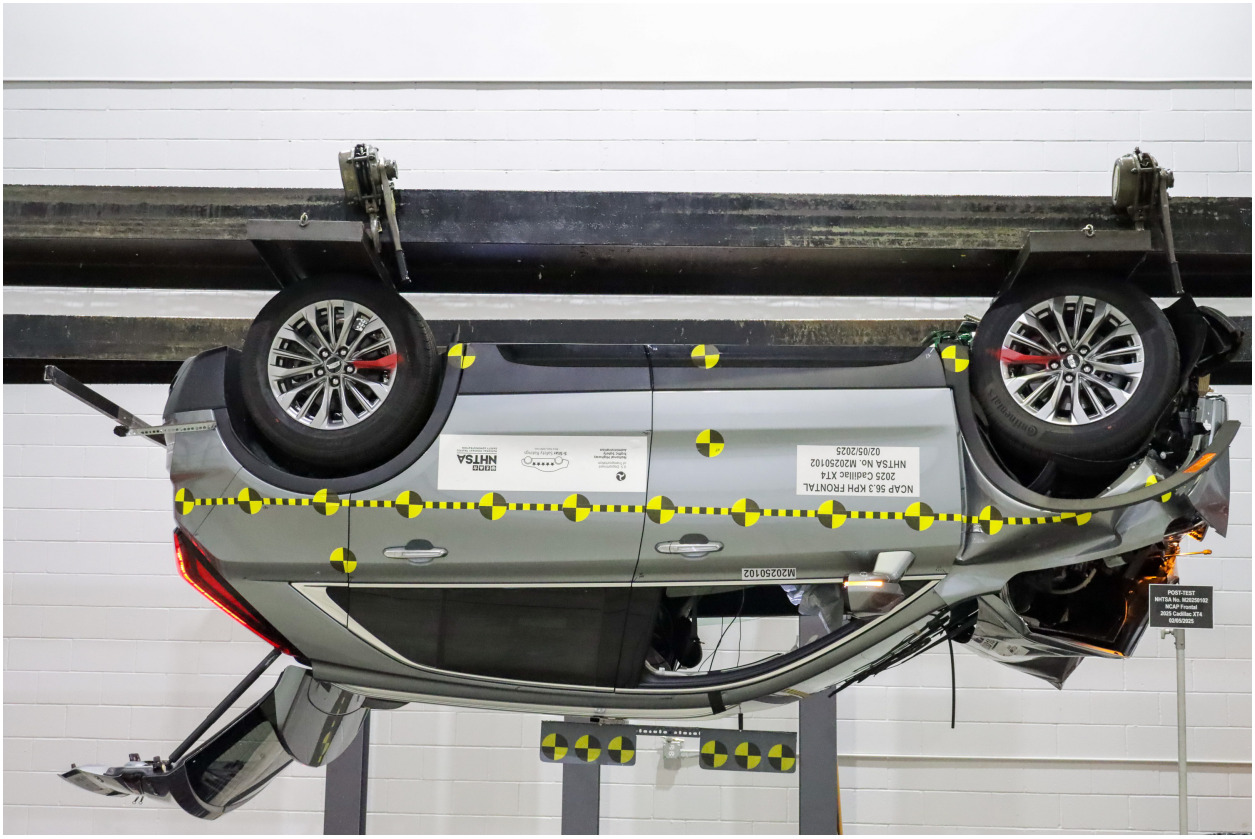


Figure A-79: Vehicle at 180º on Static Rollover Device

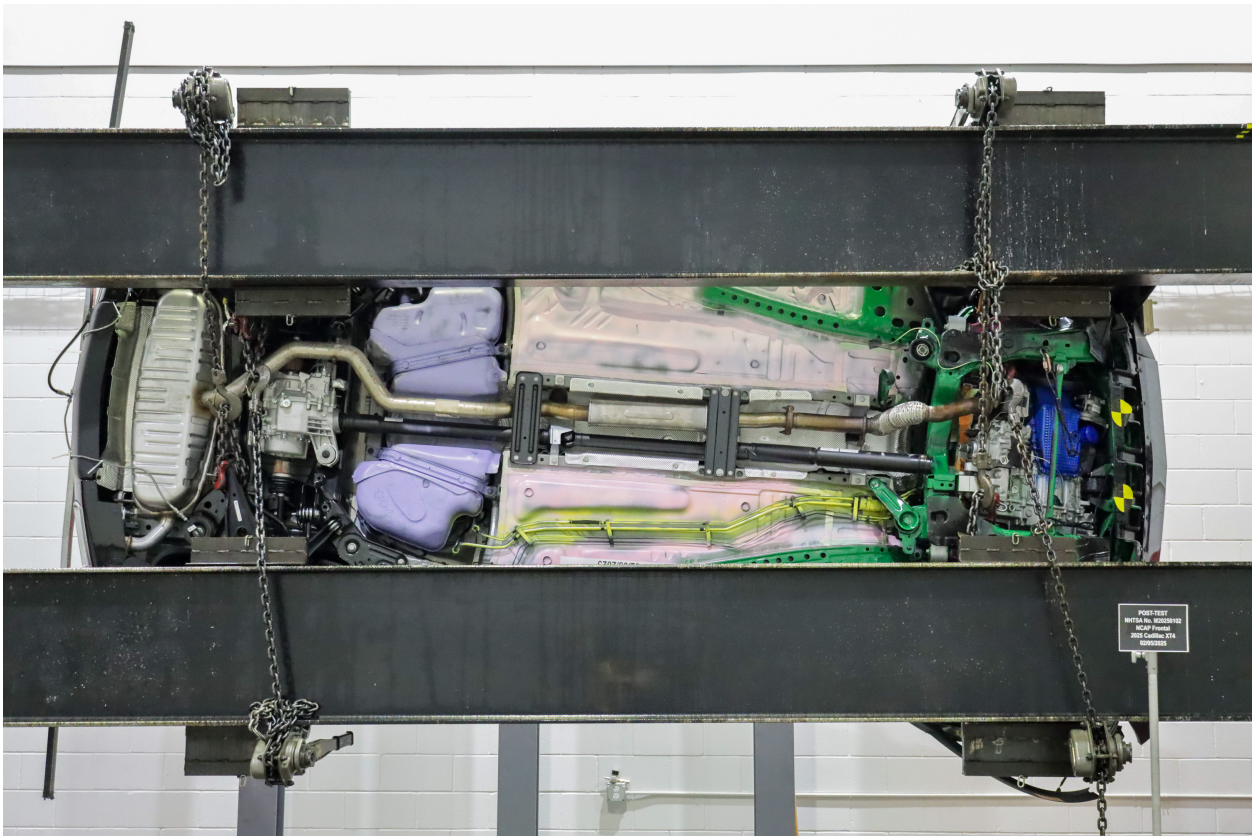


Figure A-80: Vehicle at 270º on Static Rollover Device

Figure A-81: Vehicle at 360º on Static Rollover Device

Figure A-82: 2025 Cadillac XT4 Frontal Impact Event

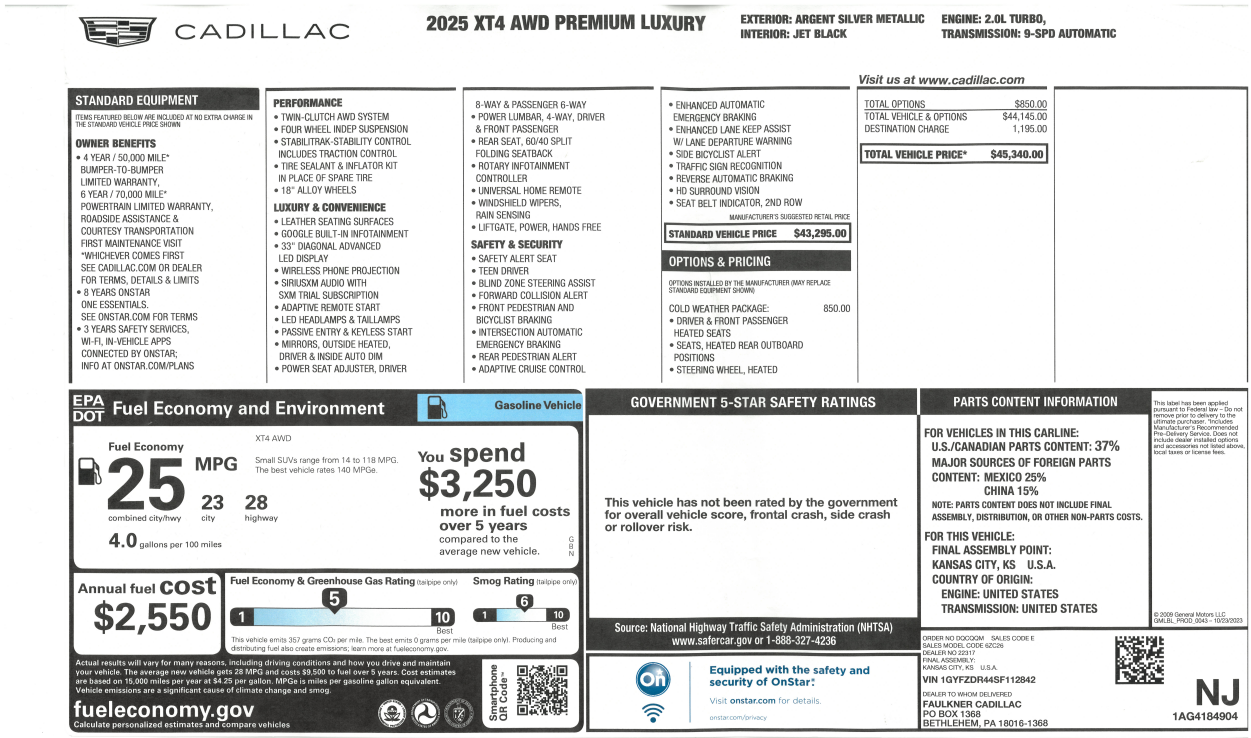


Figure A-83: Monroney Label Photograph

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA TRACES

Table of Data Plots

Fig.	Description	Page
Plot 1	Driver Head X Acceleration vs. Time Primary	B-5
Plot 2	Driver Head Y Acceleration vs. Time Primary	B-5
Plot 3	Driver Head Z Acceleration vs. Time Primary	B-5
Plot 4	Driver Head Resultant Acceleration vs. Time Primary	B-5
Plot 5	Driver Chest X Deflection vs. Time	B-6
Plot 6	Driver Chest X Acceleration vs. Time Primary	B-6
Plot 7	Driver Chest Y Acceleration vs. Time Primary	B-6
Plot 8	Driver Chest Z Acceleration vs. Time Primary	B-6
Plot 9	Driver Chest Resultant Acceleration vs. Time Primary	B-7
Plot 10	Driver Upper Neck Force X vs. Time Primary	B-7
Plot 11	Driver Upper Neck Force Z vs. Time Primary	B-7
Plot 12	Driver Upper Neck Moment Y vs. Time Primary	B-7
Plot 13	Driver Nij vs. Time Primary	B-8
Plot 14	Driver Left Femur Force vs. Time	B-8
Plot 15	Driver Right Femur Force vs. Time	B-8
Plot 16	Passenger Head X Acceleration vs. Time Primary	B-8
Plot 17	Passenger Head Y Acceleration vs. Time Primary	B-9
Plot 18	Passenger Head Z Acceleration vs. Time Primary	B-9
Plot 19	Passenger Head Resultant Acceleration vs. Time Primary	B-9
Plot 20	Passenger Chest X Deflection vs. Time	B-9
Plot 21	Passenger Chest X Acceleration vs. Time Primary	B-10
Plot 22	Passenger Chest Y Acceleration vs. Time Primary	B-10
Plot 23	Passenger Chest Z Acceleration vs. Time Primary	B-10
Plot 24	Passenger Chest Resultant Acceleration vs. Time Primary	B-10
Plot 25	Passenger Upper Neck Force X vs. Time Primary	B-11
Plot 26	Passenger Upper Neck Force Z vs. Time Primary	B-11
Plot 27	Passenger Upper Neck Moment Y vs. Time Primary	B-11
Plot 28	Passenger Nij vs. Time Primary	B-11
Plot 29	Passenger Left Femur Force vs. Time	B-12
Plot 30	Passenger Right Femur Force vs. Time	B-12

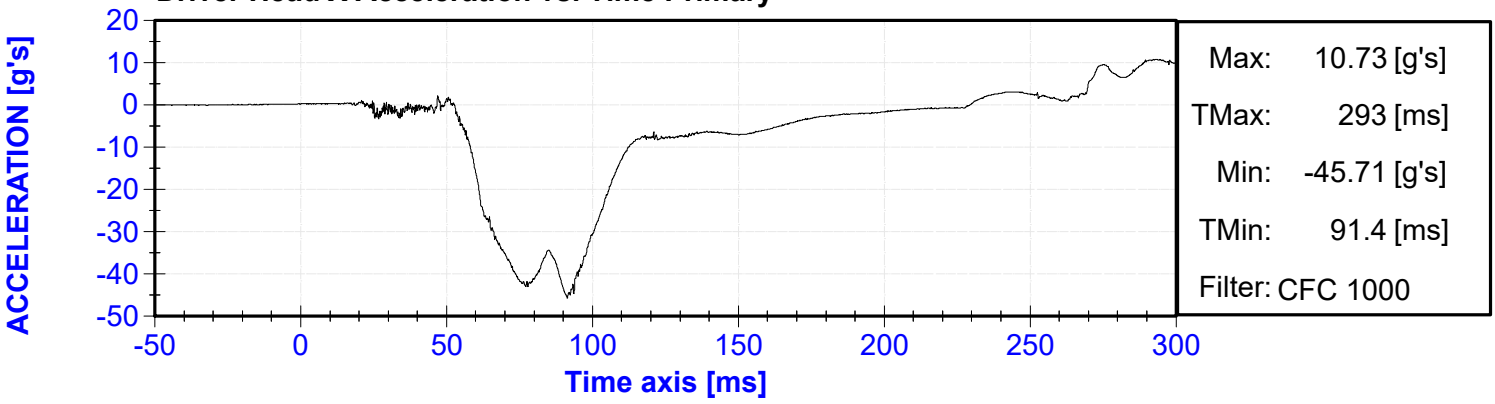
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.NHTSA.gov

Driver Head X Acceleration Redundant
Driver Head Y Acceleration Redundant
Driver Head Z Acceleration Redundant
Driver Upper Neck Force Y
Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Acceleration Redundant
Driver Chest Y Acceleration Redundant
Driver Chest Z Acceleration Redundant
Driver Pelvis X
Driver Pelvis Y
Driver Pelvis Z
Driver Left Femur Redundant
Driver Right Femur Redundant
Driver Left Upper Tibia Moment X
Driver Left Upper Tibia Moment Y

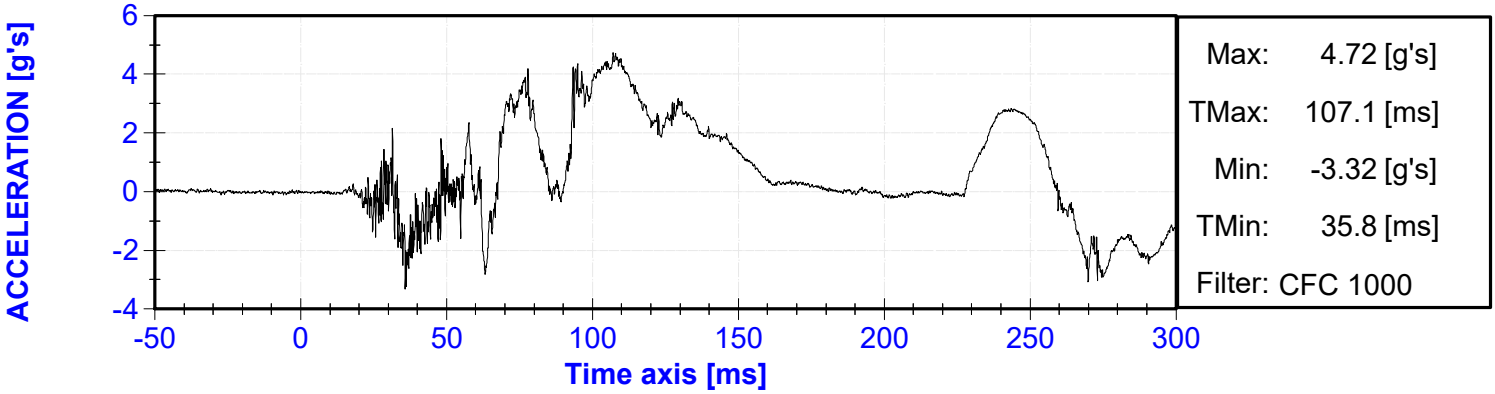
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Driver Shoulder Belt Force
Driver Lap Belt Force
Driver Head Angular Velocity X
Driver Head Angular Velocity Y
Driver Head Angular Velocity Z
Passenger Head X Acceleration Redundant
Passenger Head Y Acceleration Redundant
Passenger Head Z Acceleration Redundant
Passenger Upper Neck Force X
Passenger Upper Neck Force Z
Passenger Upper Neck Moment Y
Passenger Chest X Acceleration Redundant
Passenger Chest Y Acceleration Redundant
Passenger Chest Z Acceleration Redundant
Passenger Pelvis X
Passenger Pelvis Y
Passenger Pelvis Z
Passenger Left Femur Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z

Passenger Right Food Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Passenger Shoulder Belt Force
Passenger Lap Belt Force
Passenger Head Angular Velocity X
Passenger Head Angular Velocity Y
Passenger Head Angular Velocity Z
Left Rear Seat Crossmember X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember X
Right Rear Seat Crossmember Z
Left Rear Seat Crossmember X Redundant
Right Rear Seat Crossmember X Redundant
Vehicle Engine Top X
Vehicle Engine Bottom X
Load Cell Barrier Forces and Moments

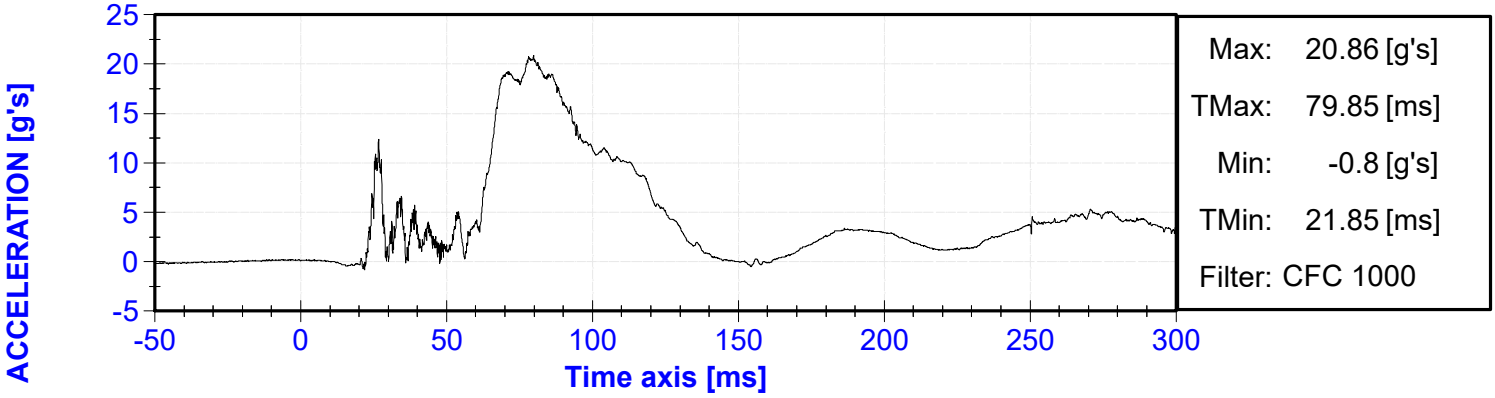
Driver Head X Acceleration vs. Time Primary



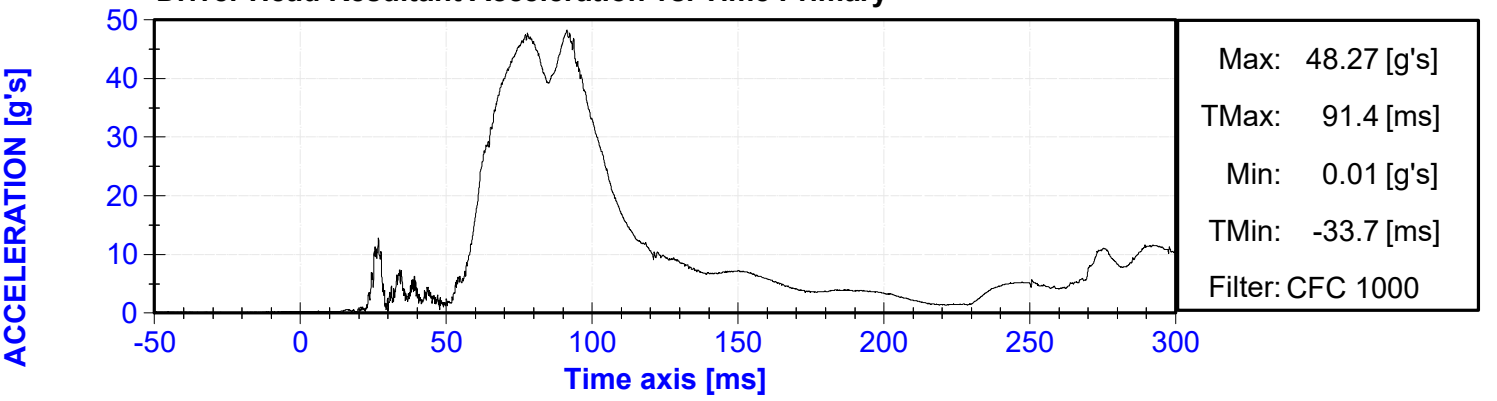
Driver Head Y Acceleration vs. Time Primary



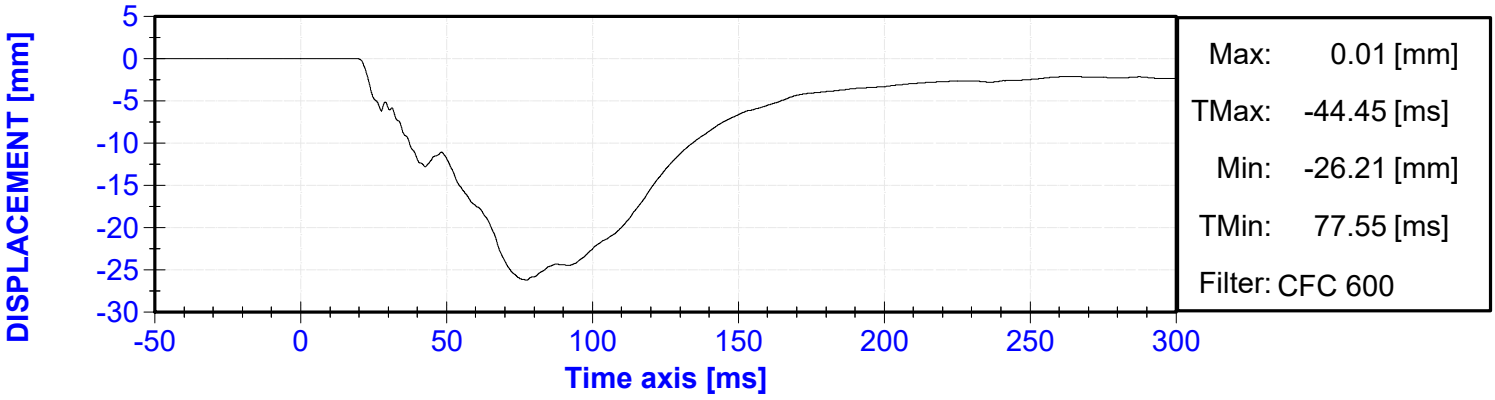
Driver Head Z Acceleration vs. Time Primary



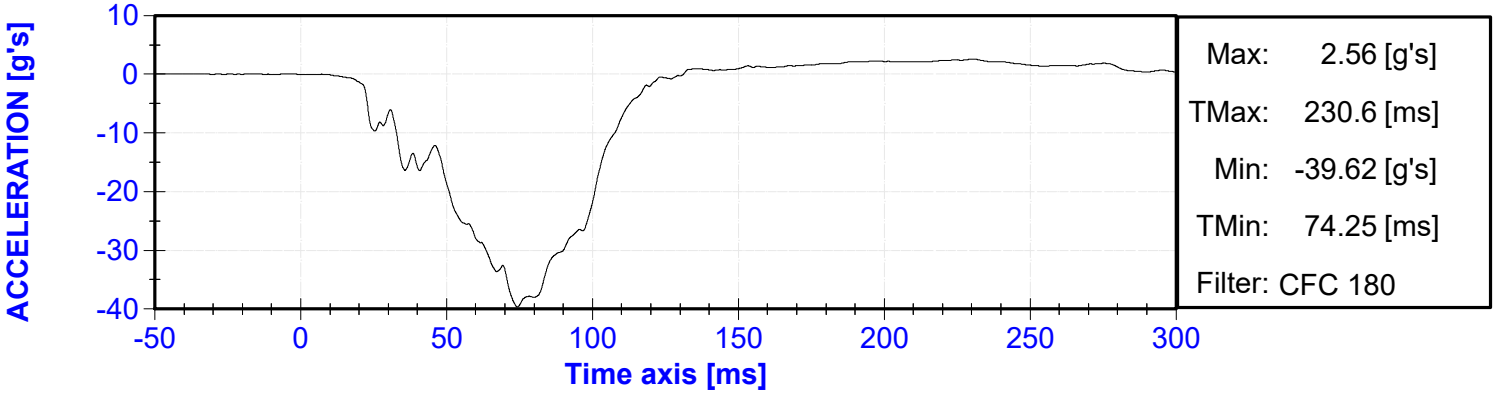
Driver Head Resultant Acceleration vs. Time Primary



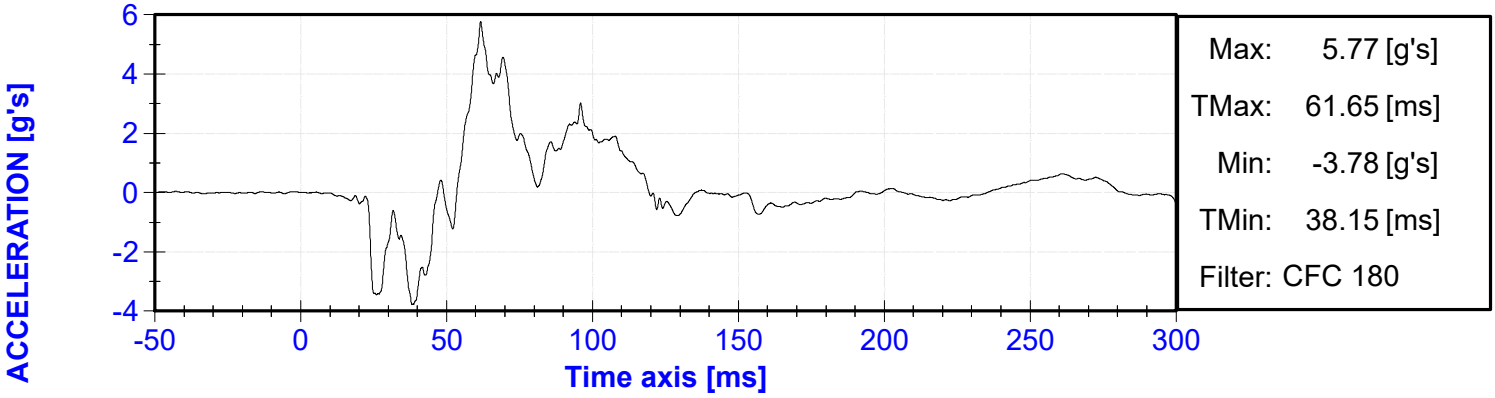
Driver Chest X Deflection vs. Time



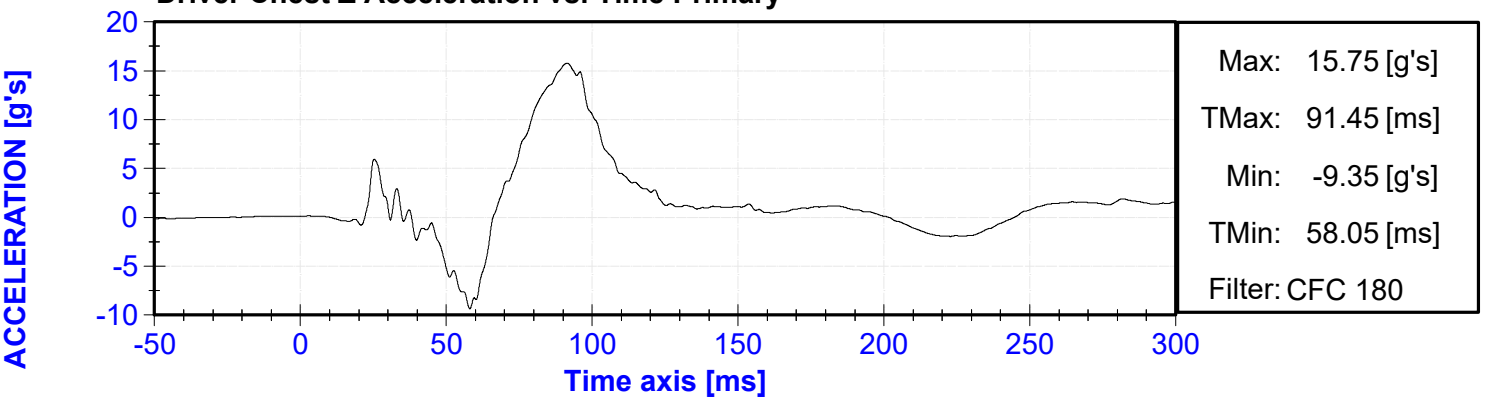
Driver Chest X Acceleration vs. Time Primary



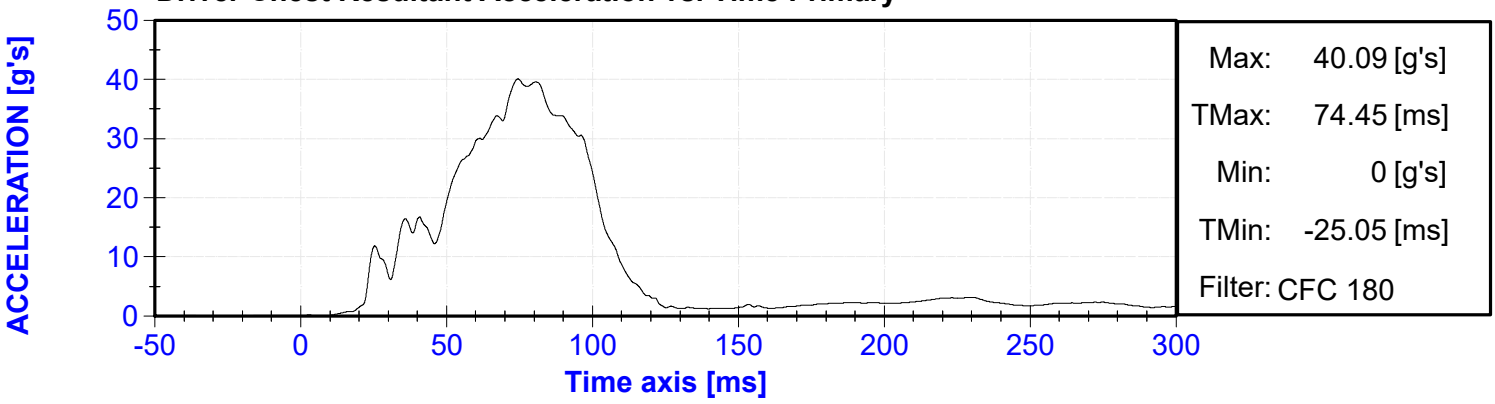
Driver Chest Y Acceleration vs. Time Primary



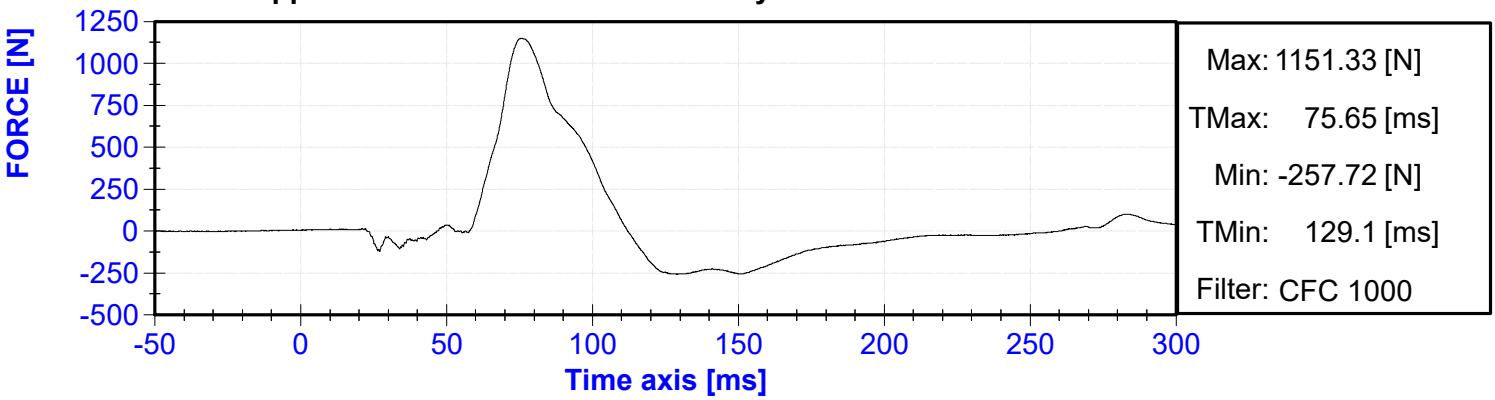
Driver Chest Z Acceleration vs. Time Primary



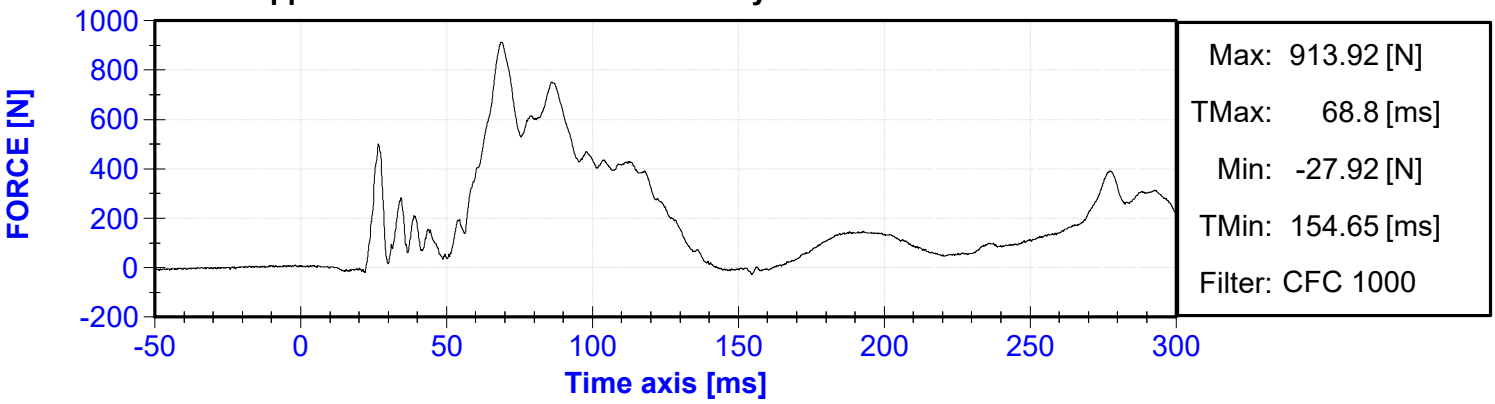
Driver Chest Resultant Acceleration vs. Time Primary



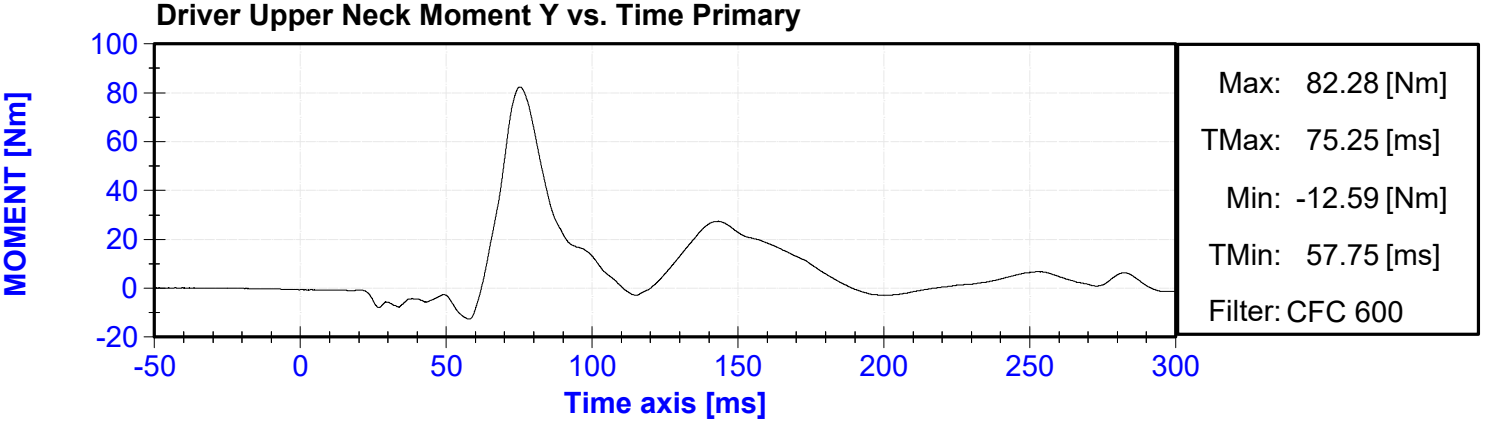
Driver Upper Neck Force X vs. Time Primary



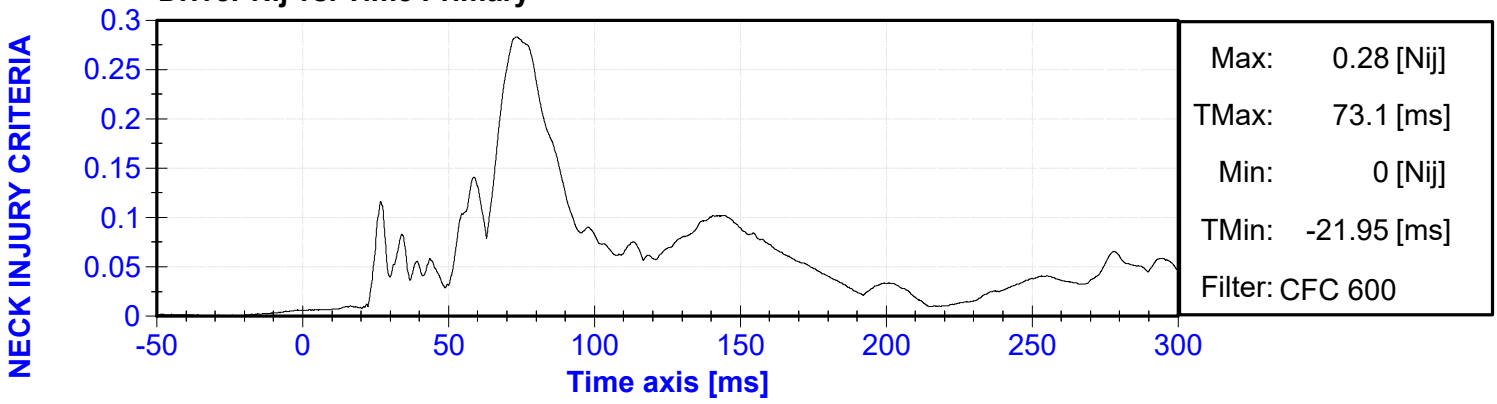
Driver Upper Neck Force Z vs. Time Primary



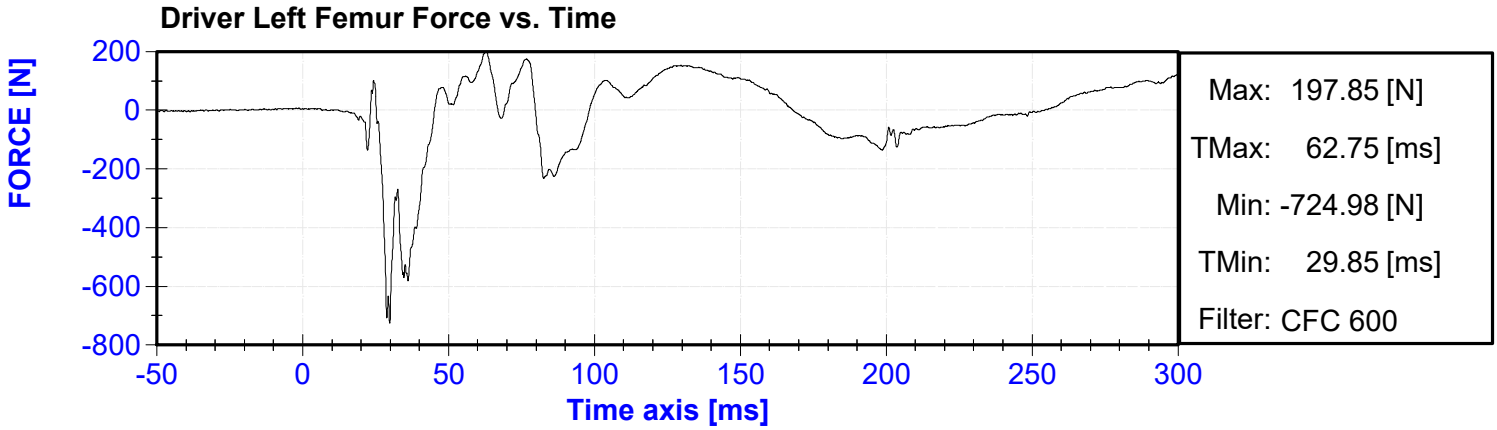
Driver Upper Neck Moment Y vs. Time Primary



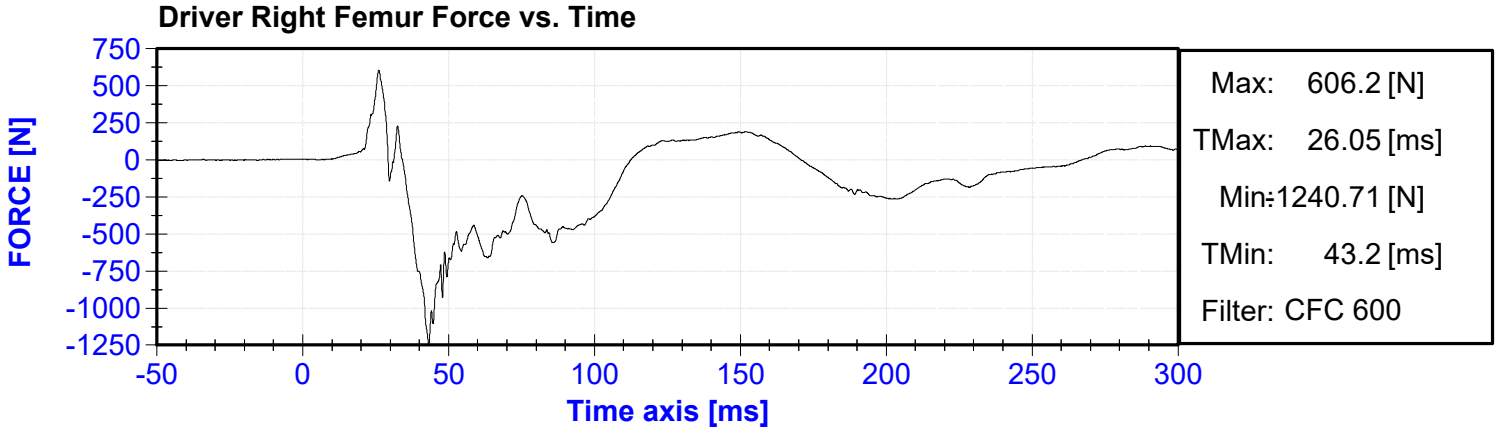
Driver Nij vs. Time Primary



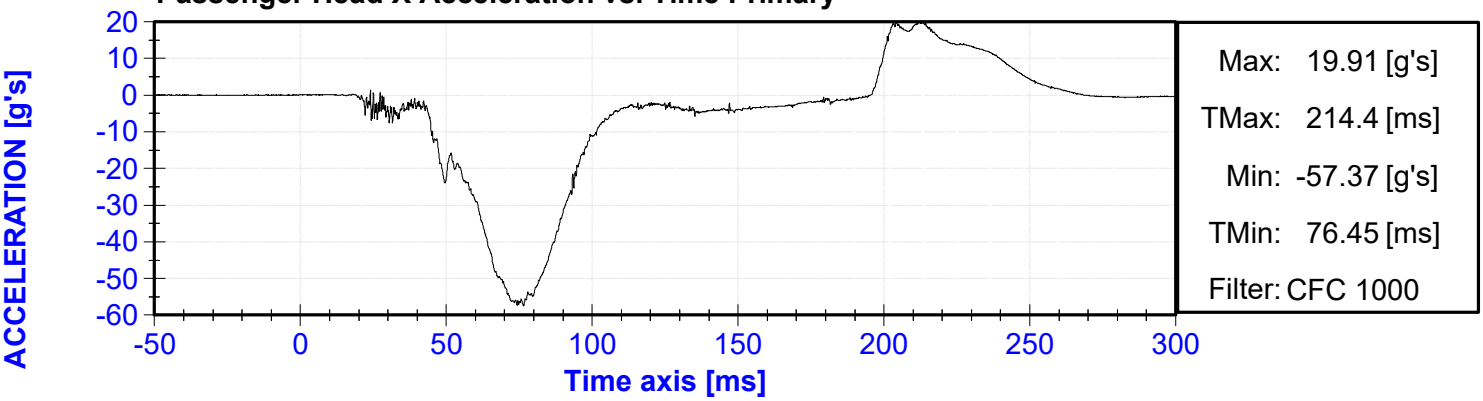
Driver Left Femur Force vs. Time



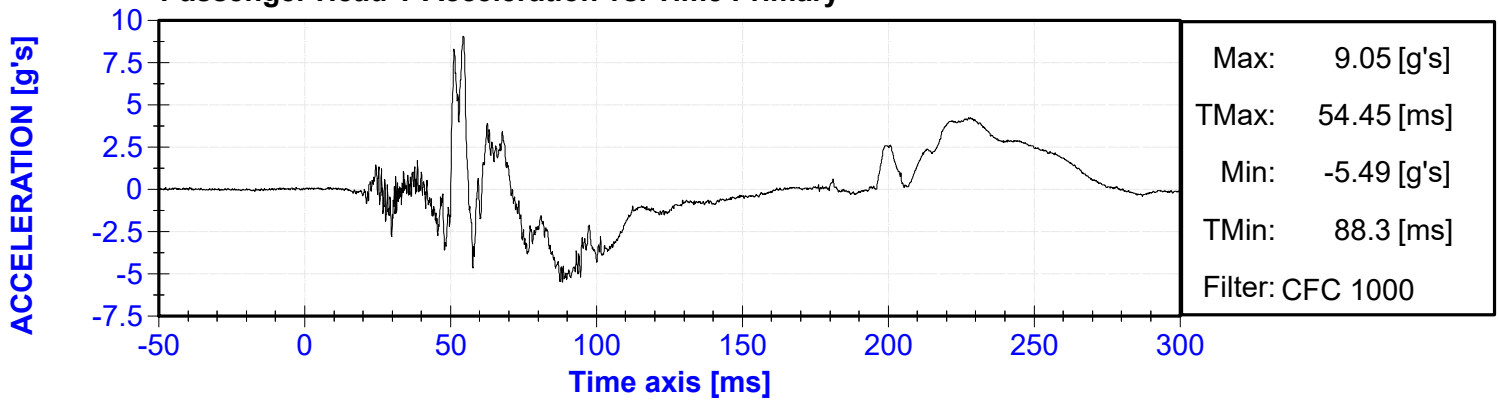
Driver Right Femur Force vs. Time



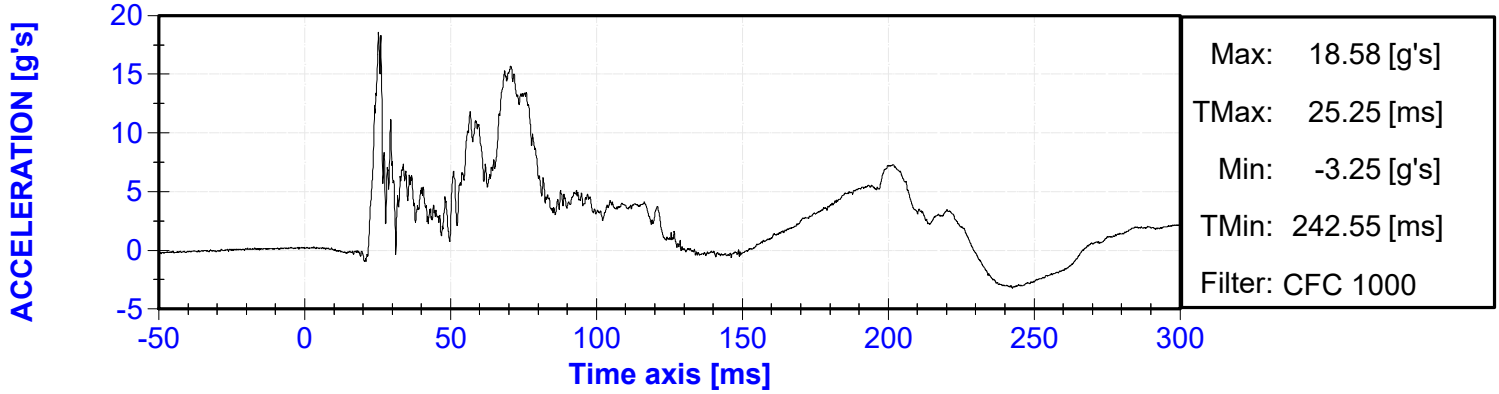
Passenger Head X Acceleration vs. Time Primary



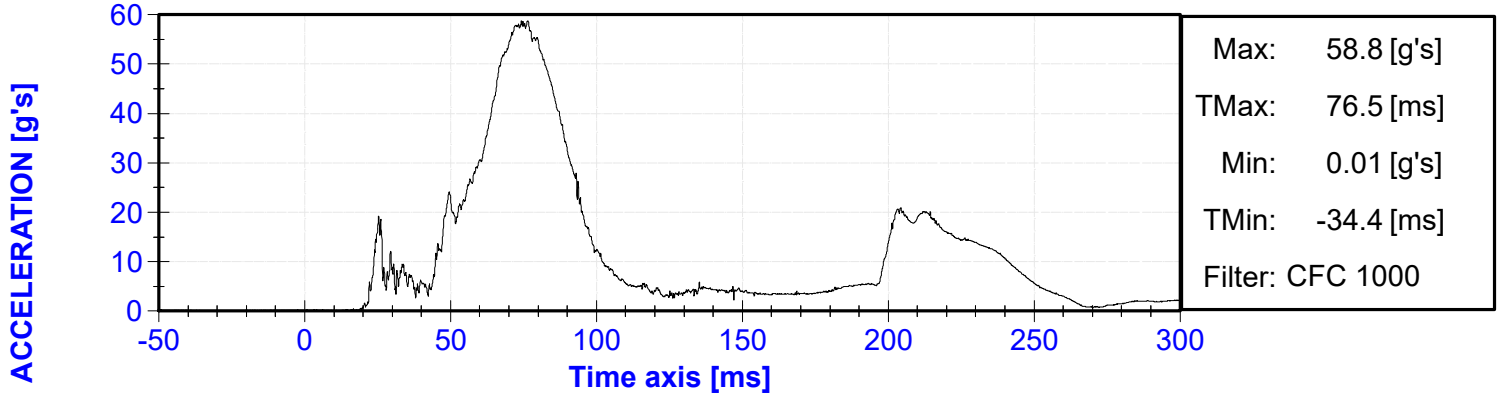
Passenger Head Y Acceleration vs. Time Primary



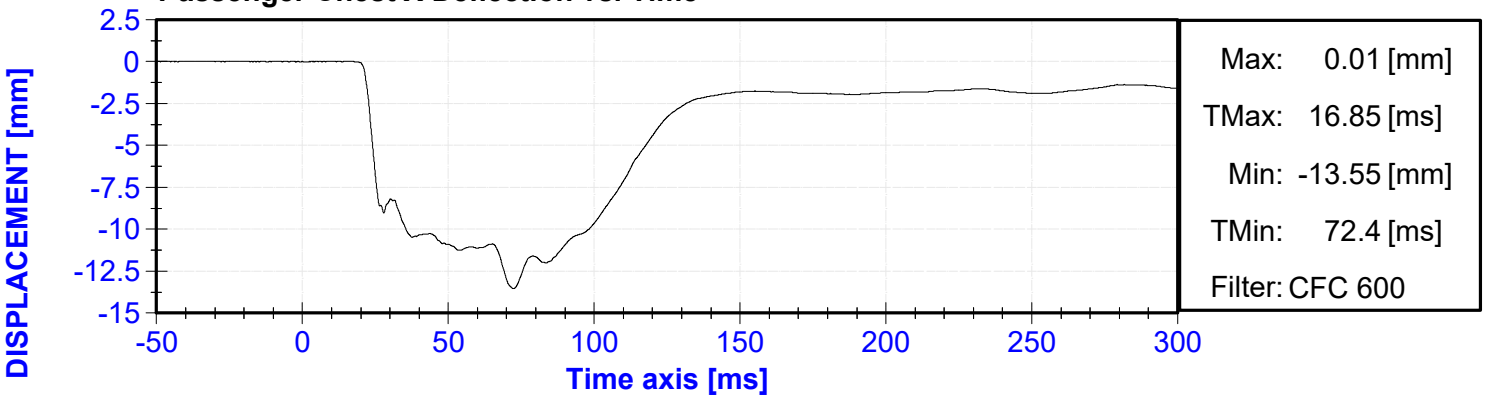
Passenger Head Z Acceleration vs. Time Primary

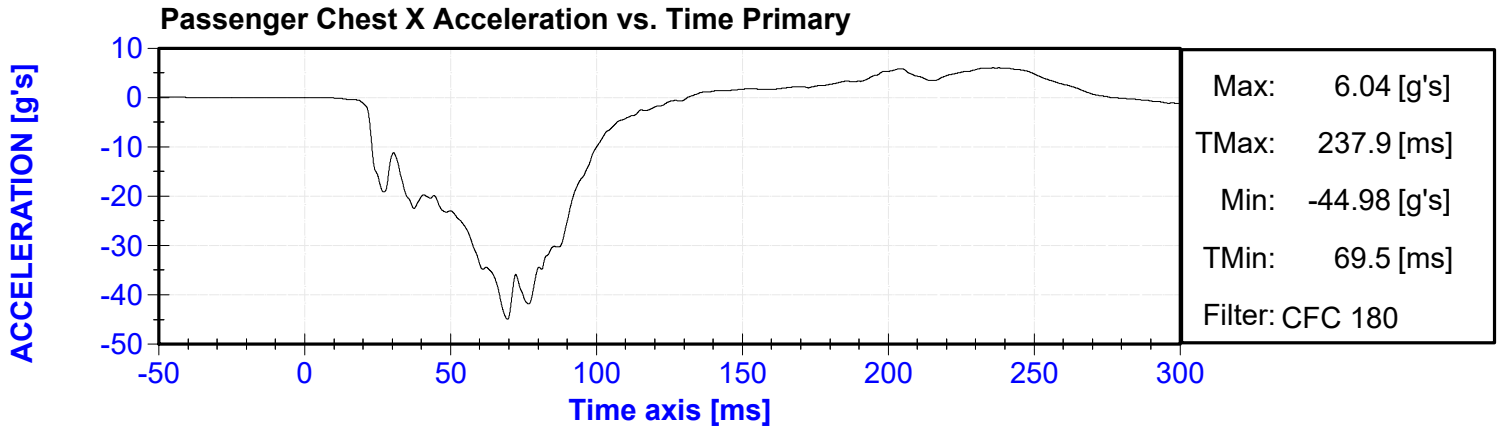


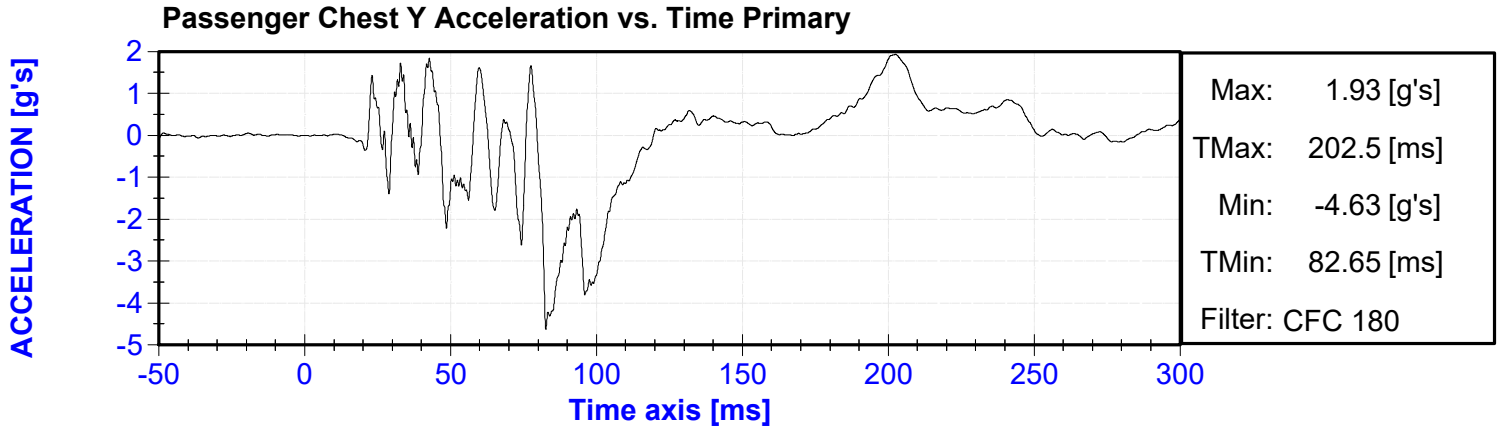
Passenger Head Resultant Acceleration vs. Time Primary

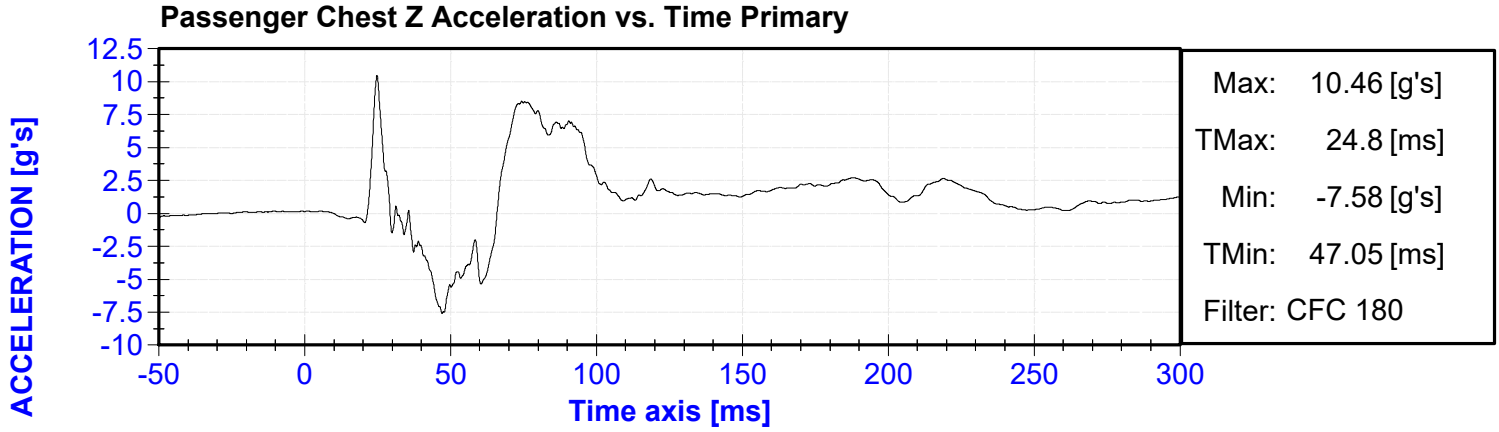


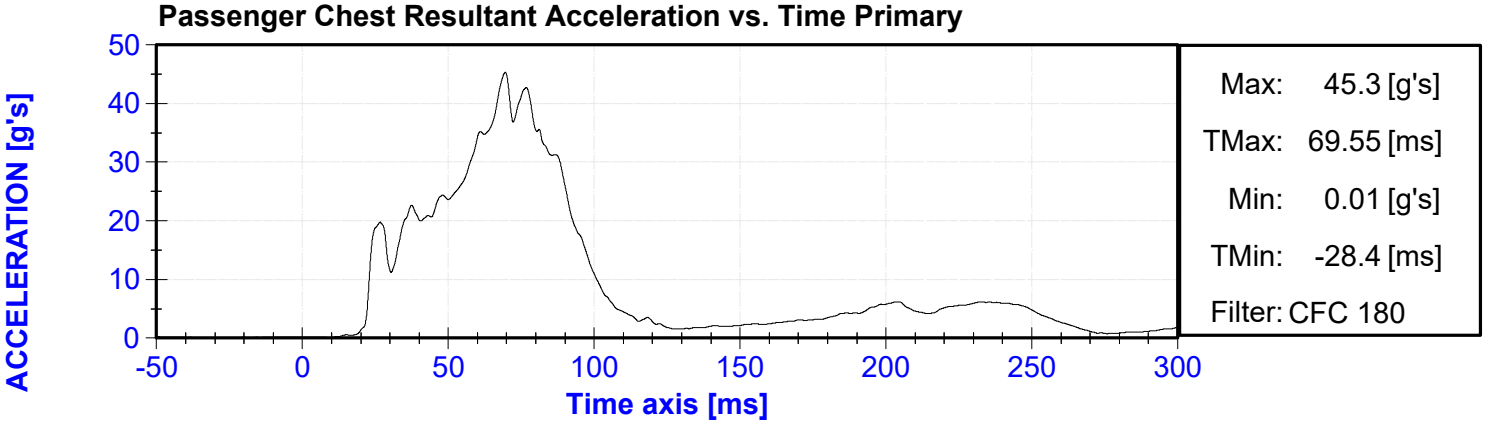
Passenger Chest X Deflection vs. Time

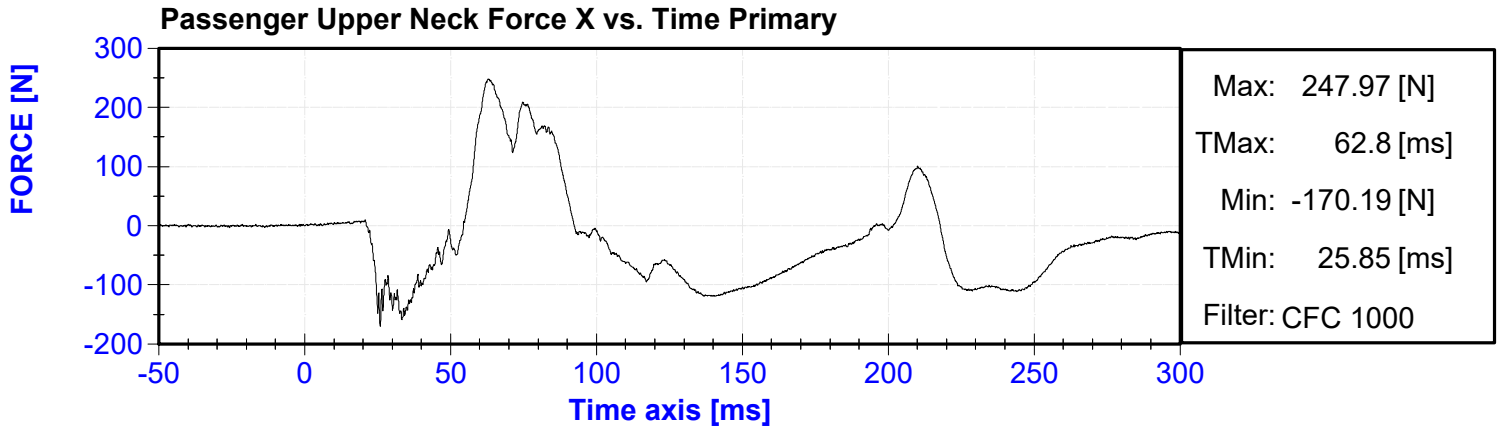


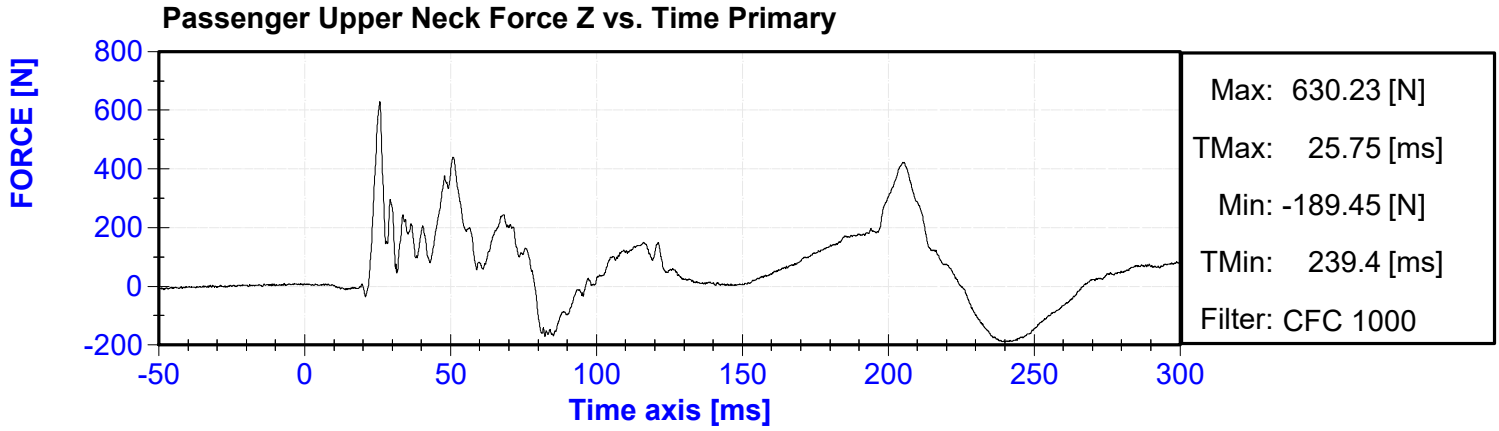

Passenger Chest X Acceleration vs. Time Primary
ACCELERATION [g's]
Time axis [ms]
Max: 6.04 [g's]
TMax: 237.9 [ms]
Min: -44.98 [g's]
TMin: 69.5 [ms]
Filter: CFC 180

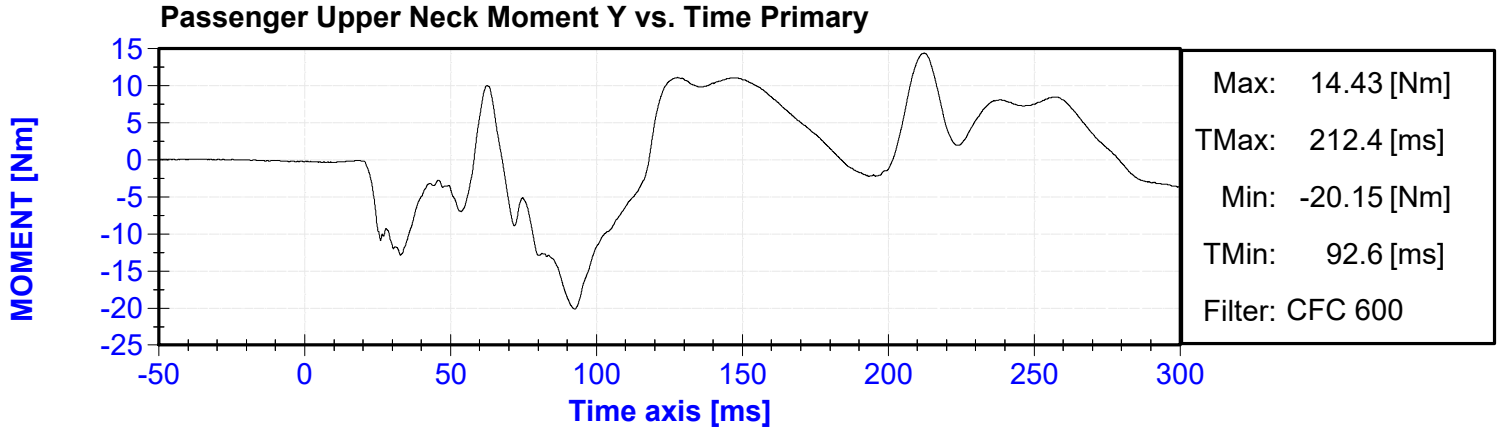

Passenger Chest Y Acceleration vs. Time Primary
ACCELERATION [g's]
Time axis [ms]
Max: 1.93 [g's]
TMax: 202.5 [ms]
Min: -4.63 [g's]
TMin: 82.65 [ms]
Filter: CFC 180

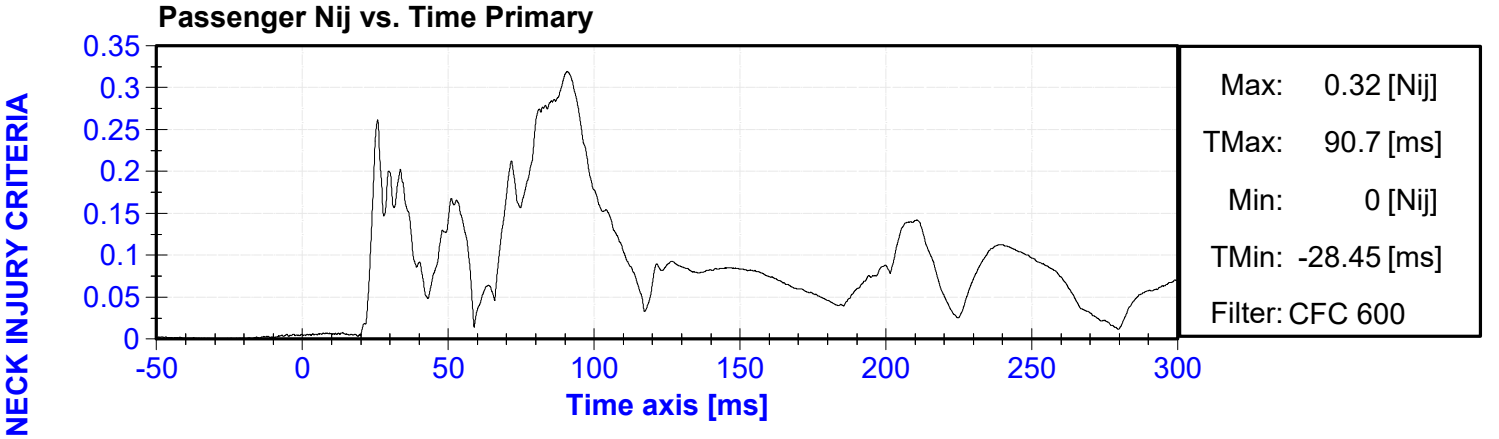

Passenger Chest Z Acceleration vs. Time Primary
ACCELERATION [g's]
Time axis [ms]
Max: 10.46 [g's]
TMax: 24.8 [ms]
Min: -7.58 [g's]
TMin: 47.05 [ms]
Filter: CFC 180

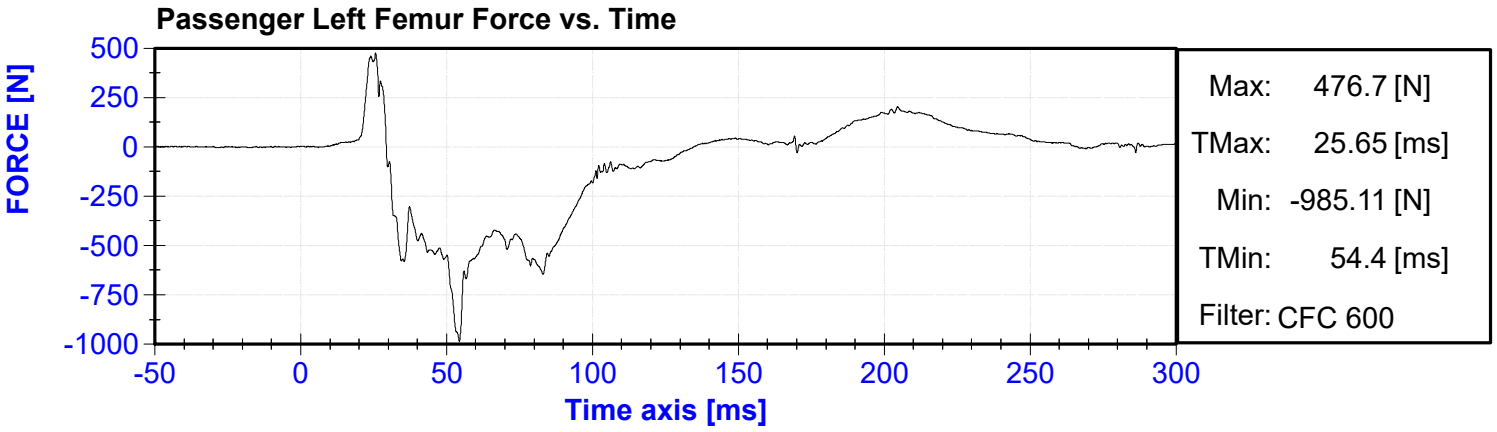

Passenger Chest Resultant Acceleration vs. Time Primary
ACCELERATION [g's]
Time axis [ms]
Max: 45.3 [g's]
TMax: 69.55 [ms]
Min: 0.01 [g's]
TMin: -28.4 [ms]
Filter: CFC 180

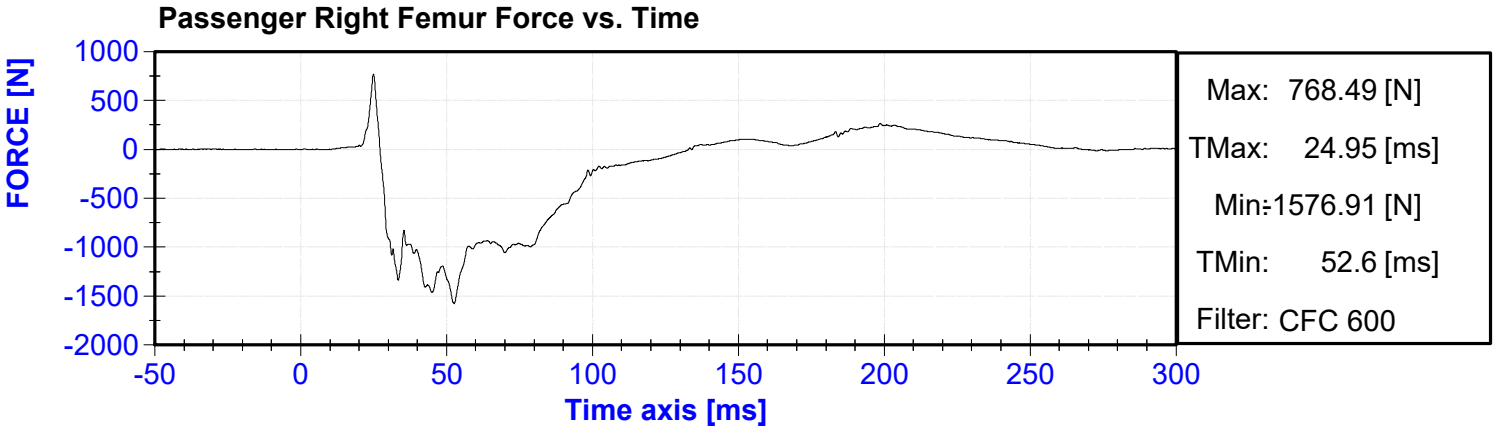

Passenger Upper Neck Force X vs. Time Primary
FORCE [N]
300
200
100
0
-100
-200
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 247.97 [N]
TMax: 62.8 [ms]
Min: -170.19 [N]
TMin: 25.85 [ms]
Filter: CFC 1000


Passenger Upper Neck Force Z vs. Time Primary
FORCE [N]
800
600
400
200
0
-200
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 630.23 [N]
TMax: 25.75 [ms]
Min: -189.45 [N]
TMin: 239.4 [ms]
Filter: CFC 1000


Passenger Upper Neck Moment Y vs. Time Primary
MOMENT [Nm]
15
10
5
0
-5
-10
-15
-20
-25
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 14.43 [Nm]
TMax: 212.4 [ms]
Min: -20.15 [Nm]
TMin: 92.6 [ms]
Filter: CFC 600


Passenger Nij vs. Time Primary
NECK INJURY CRITERIA
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 0.32 [Nij]
TMax: 90.7 [ms]
Min: 0 [Nij]
TMin: -28.45 [ms]
Filter: CFC 600


Passenger Left Femur Force vs. Time
FORCE [N]
500
250
0
-250
-500
-750
-1000
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 476.7 [N]
TMax: 25.65 [ms]
Min: -985.11 [N]
TMin: 54.4 [ms]
Filter: CFC 600


Passenger Right Femur Force vs. Time
FORCE [N]
1000
500
0
-500
-1000
-1500
-2000
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 768.49 [N]
TMax: 24.95 [ms]
Min: -1576.91 [N]
TMin: 52.6 [ms]
Filter: CFC 600

APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

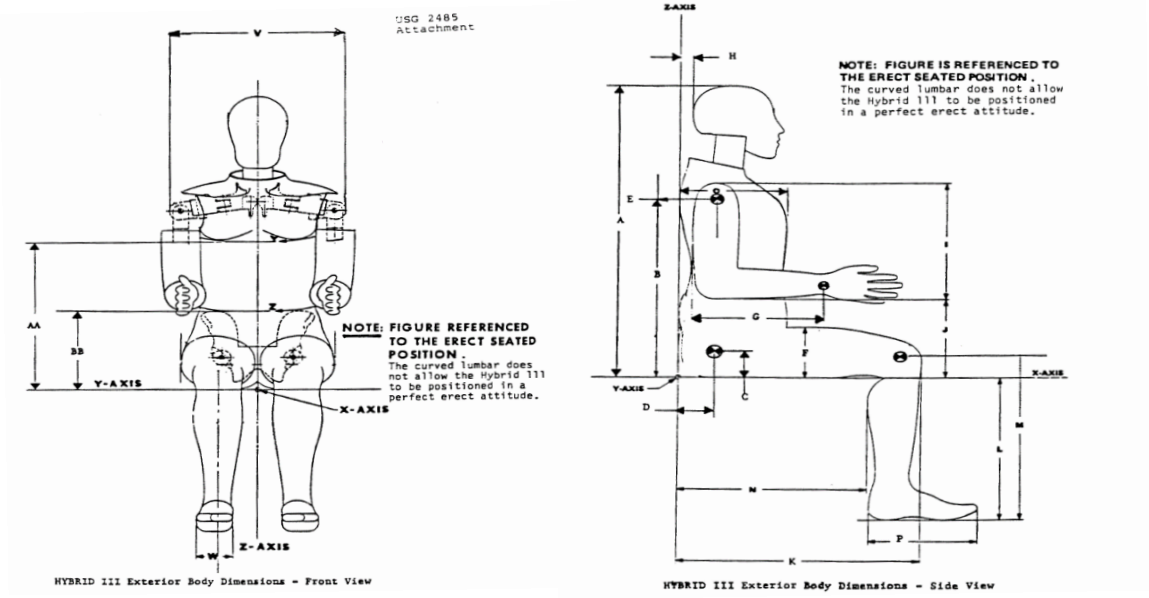
HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 065

External Measurements - Hybrid 3 - 50th Male

Technician: J. Rios Date: 1/28/2025

Dummy Serial Number: 065



Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.8	Pass
B	Shoulder Pivot Height	19.9	20.5	20.3	Pass
C	H-Point Height	3.3	3.5	3.3	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.5	Pass
F	Thigh Clearance	5.5	6.1	5.7	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.8	Pass
H	Head Back to Backline	1.6	1.8	1.7	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.4	Pass
J	Elbow Rest Height	7.5	8.3	7.8	Pass
K	Buttock to Knee Length	22.8	23.8	23.4	Pass
L	Popliteal Height	16.9	17.9	17.4	Pass
M	Knee Pivot Height	19.1	19.7	19.5	Pass
N	Buttock Popliteal Length	17.8	18.8	18.5	Pass
O	Chest Depth without Jacket	8.4	9.0	8.7	Pass
P	Foot Length (right)	9.9	10.5	10.3	Pass
V	Shoulder Breadth	16.3	17.2	16.8	Pass
W	Foot Breadth	3.6	4.2	3.9	Pass
Y	Chest Circumference with Jacket	38.2	39.4	38.9	Pass
Z	Waist Circumference	32.9	34.1	33.6	Pass
AA	Reference Location (Chest Circumference)	16.9	17.1	17.0	Pass
BB	Reference Location (Waist Circumference)	8.9	9.1	9.0	Pass

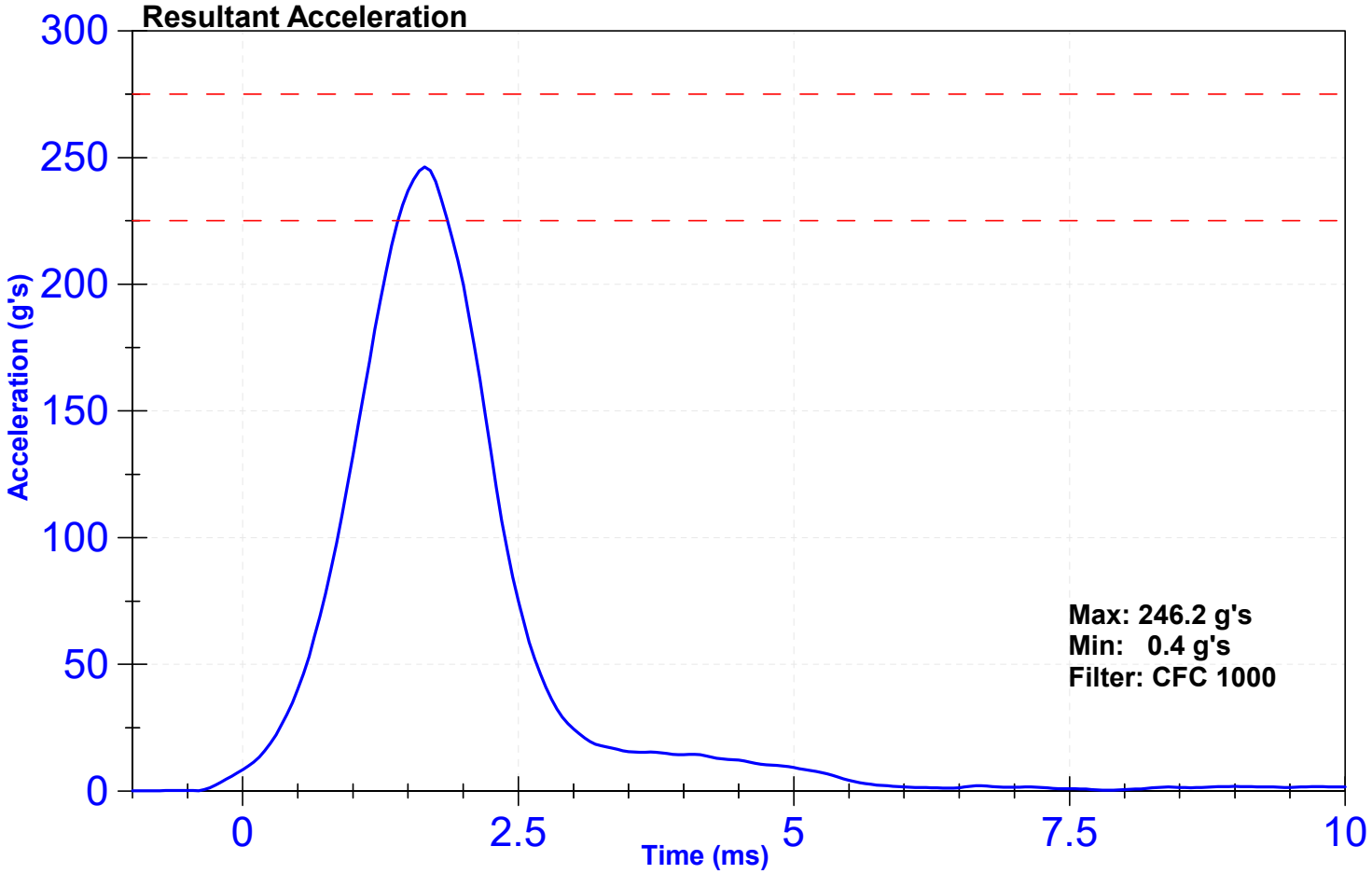
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

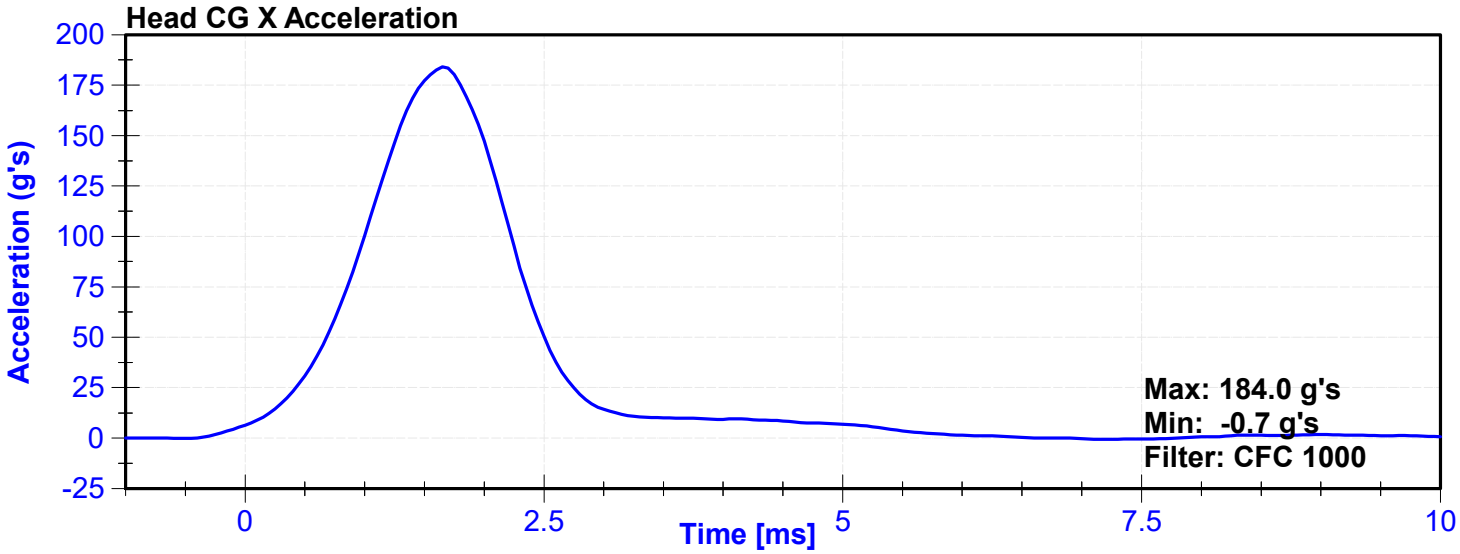
Results

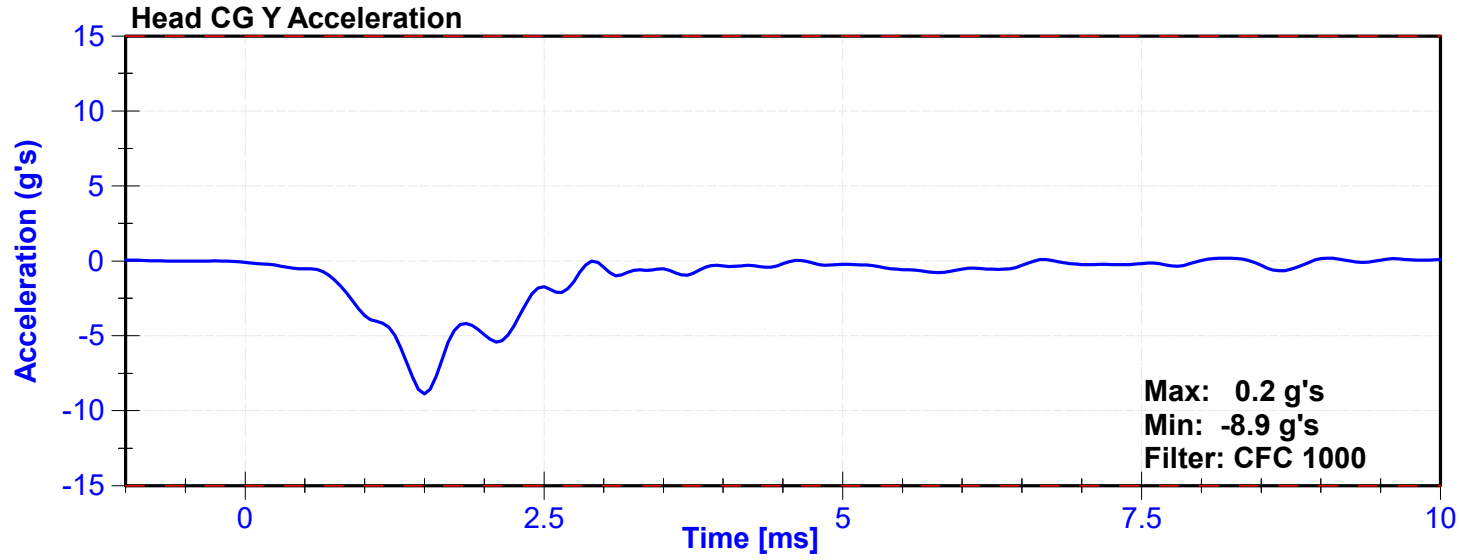
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	18	Pass
Resultant Acceleration	225	275	g's	246.2	Pass
Oscillation	0	10	%	6.2	Pass
Lateral Acceleration	-15	15	g's	-8.9	Pass

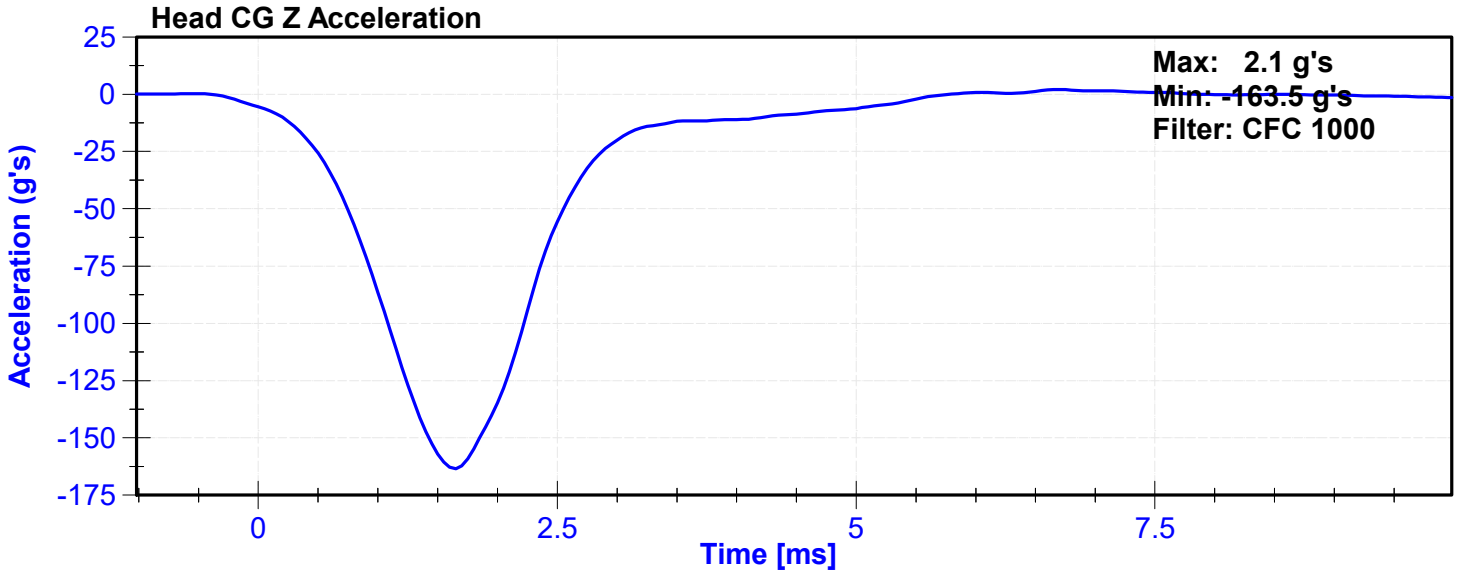
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P52152	10/31/2024	4/29/2025
Y Accelerometer	Endevco	P58888	10/31/2024	4/29/2025
Z Accelerometer	Endevco	P58911	10/31/2024	4/29/2025




Head CG X Acceleration
Acceleration (g's)
200
175
150
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 184.0 g's
Min: -0.7 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 0.2 g's
Min: -8.9 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
25
0
-25
-50
-75
-100
-125
-150
-175
0
2.5
5
7.5
Time [ms]
Max: 2.1 g's
Min: -163.5 g's
Filter: CFC 1000

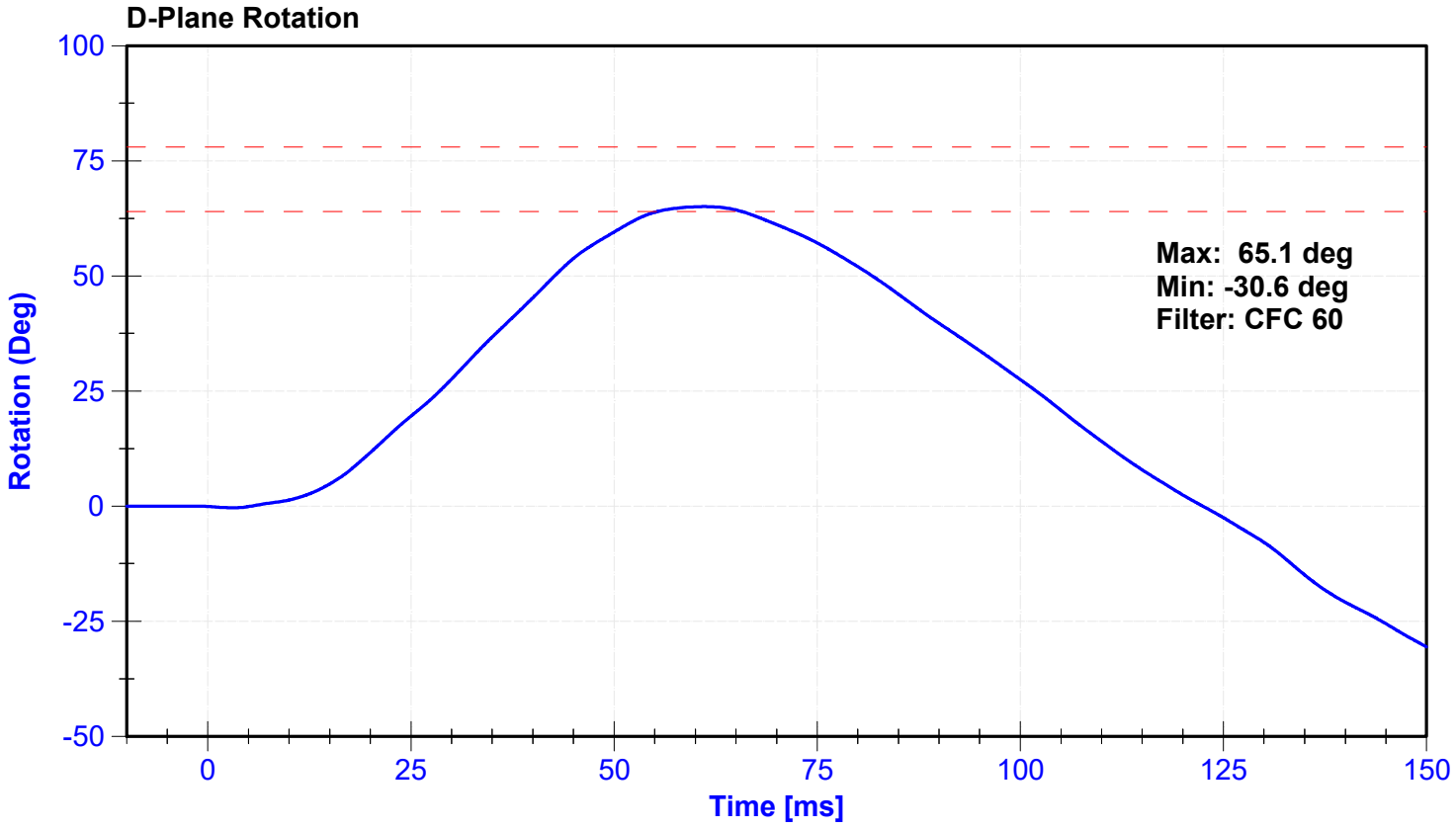
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

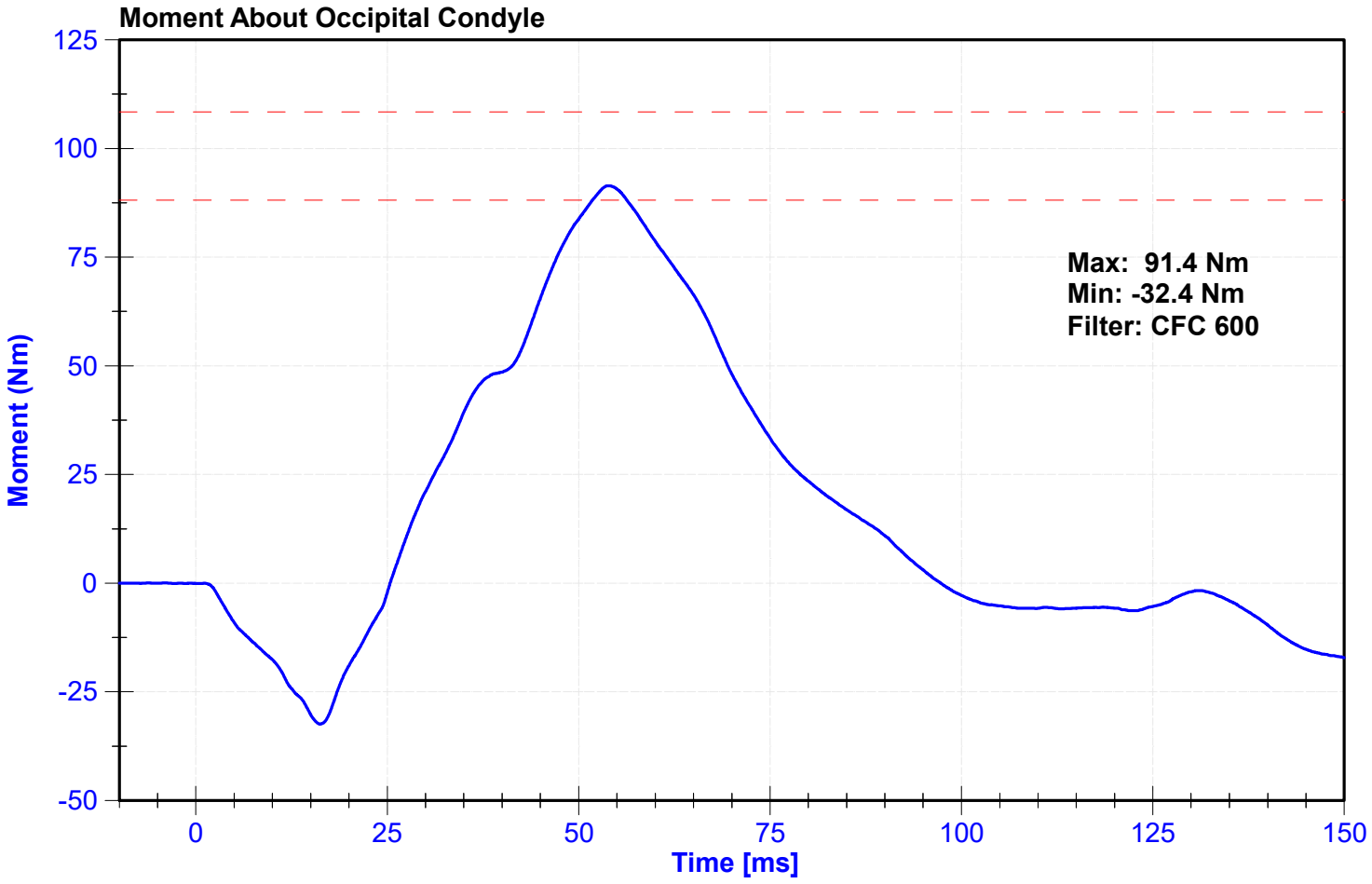
Results

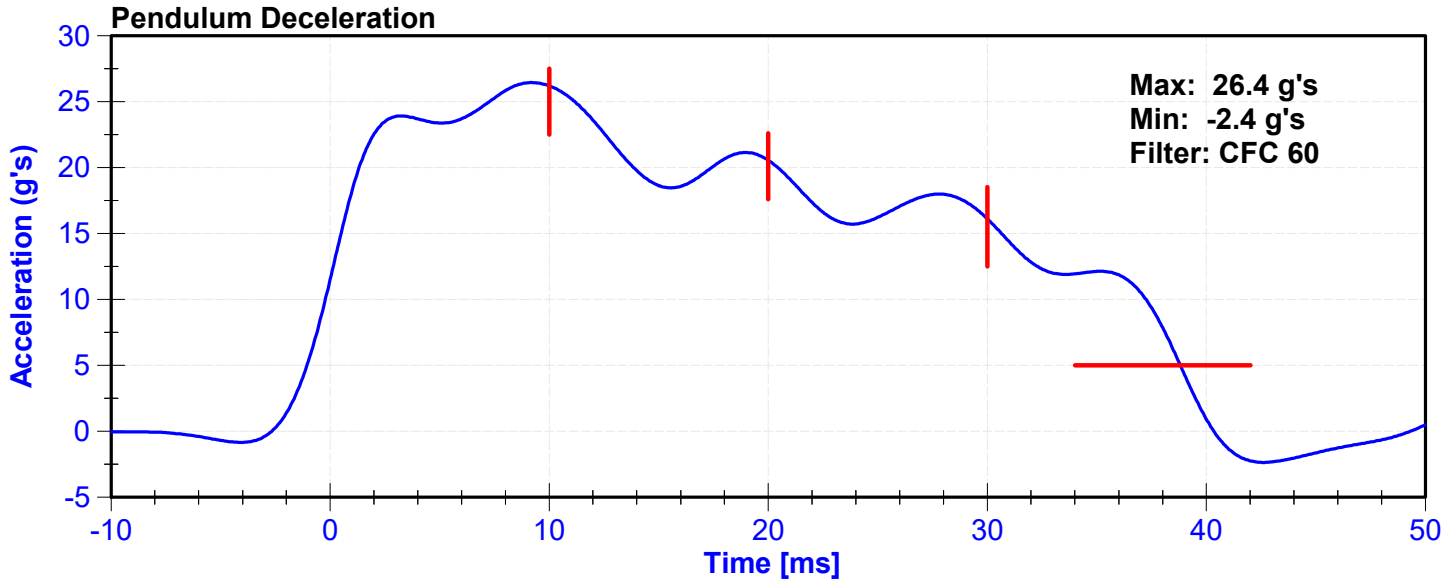
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	20	Pass
Velocity	6.89	7.13	m/s	6.907	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	26.19	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	20.55	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	16.11	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	26.4	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	38.8	Pass
Maximum D Plane Rotation	64	78	deg	65.1	Pass
Time to Maximum Rotation	57	64	ms	61.1	Pass
Rotation Decay to Zero	113	127	ms	122.5	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	91.45	Pass
Time to Maximum Moment	47	58	ms	53.9	Pass
Moment Decay to Zero	97	107	ms	97.3	Pass

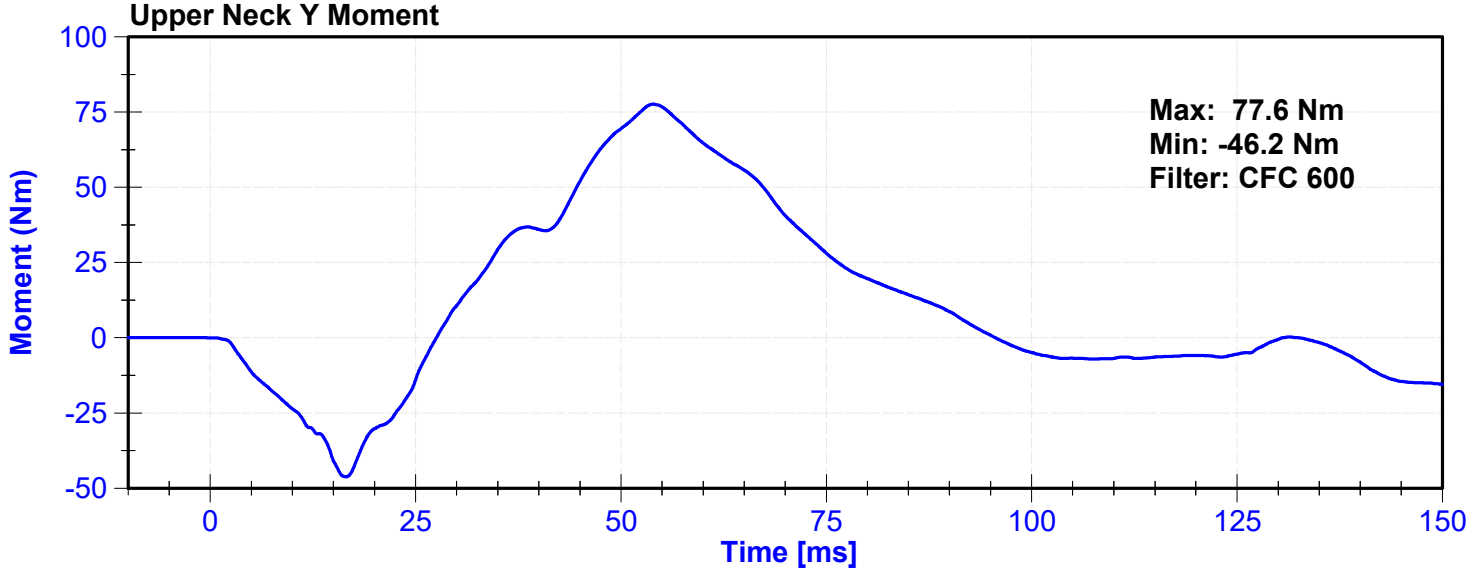
Transducer Calibrations

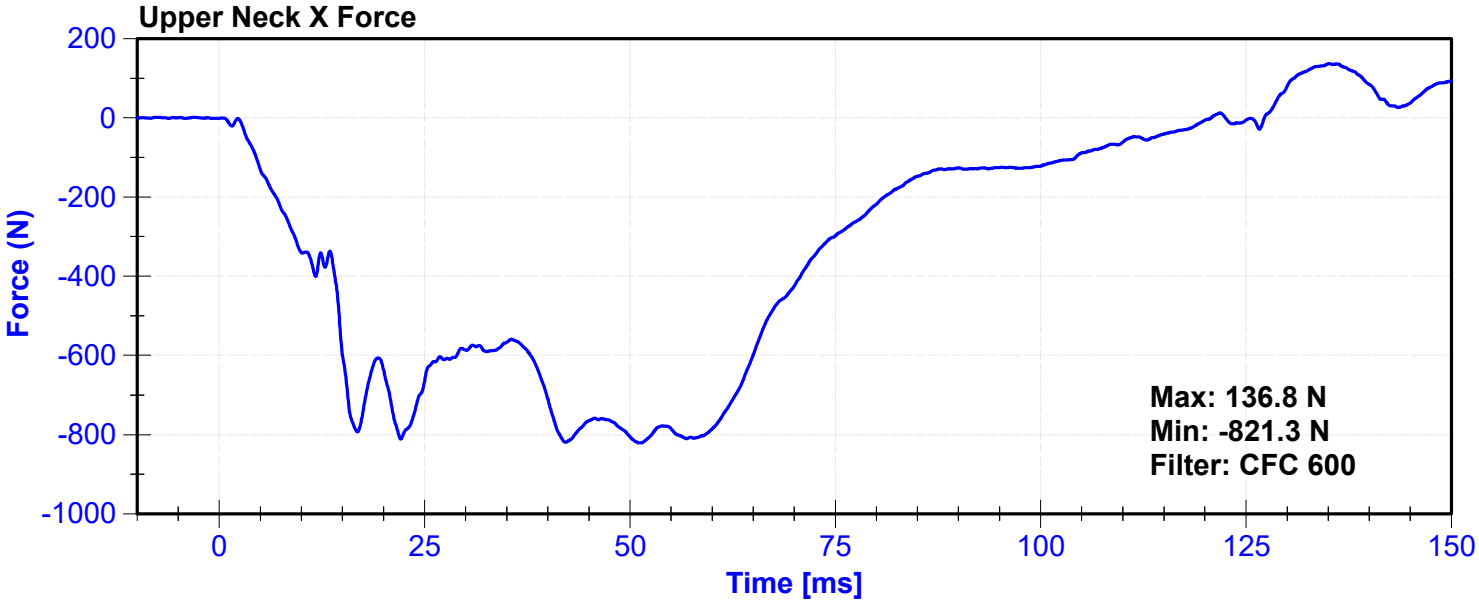
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16646	10/17/2024	4/15/2025
Pendulum Potentiometer	ETI	LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Humanetics	851-FX	5/22/2024	5/22/2025


D-Plane Rotation
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 65.1 deg
Min: -30.6 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
125
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 91.4 Nm
Min: -32.4 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 26.4 g's
Min: -2.4 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 77.6 Nm
Min: -46.2 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 136.8 N
Min: -821.3 N
Filter: CFC 600
Force (N)
Time [ms]

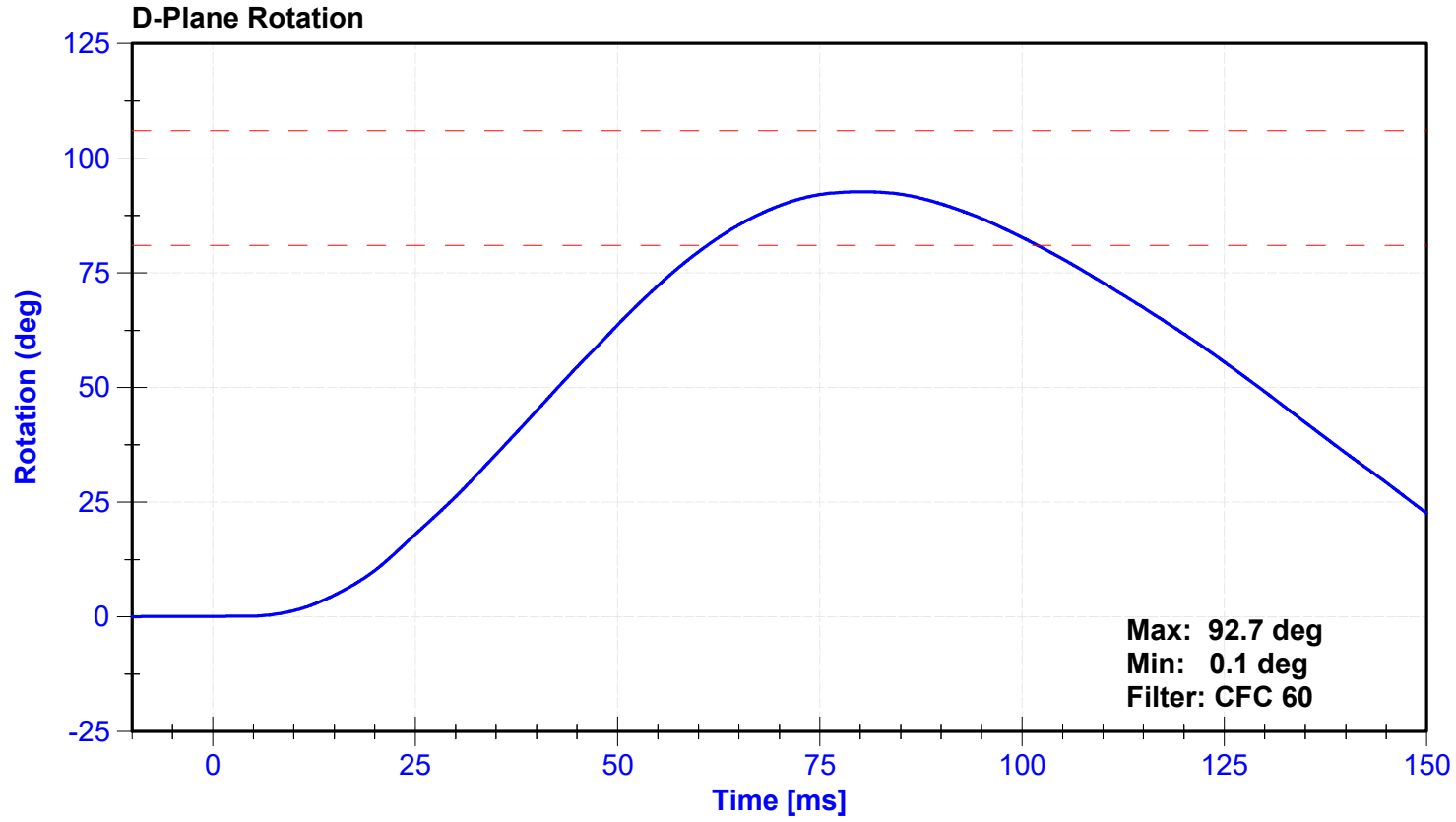
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

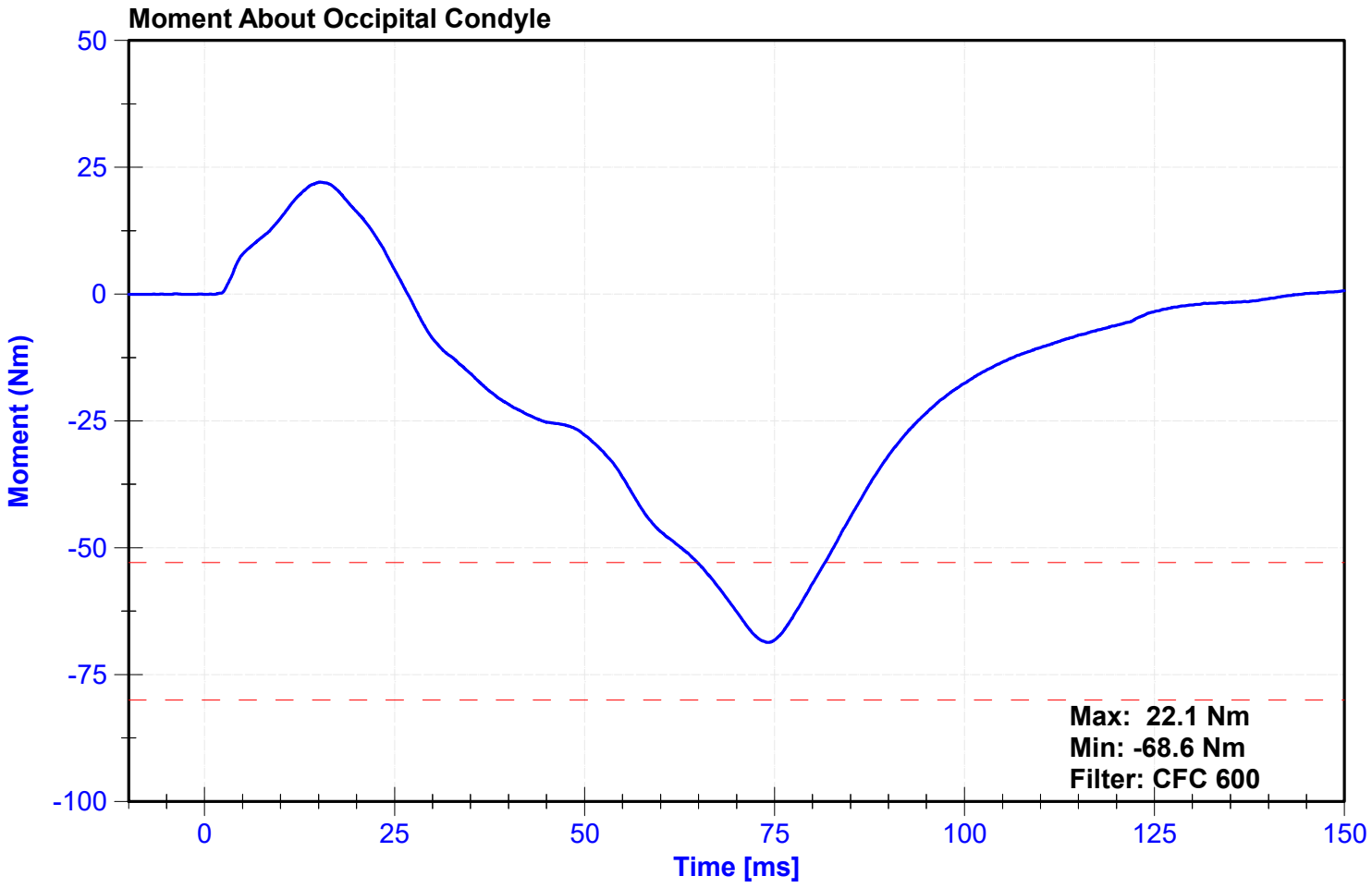
Results

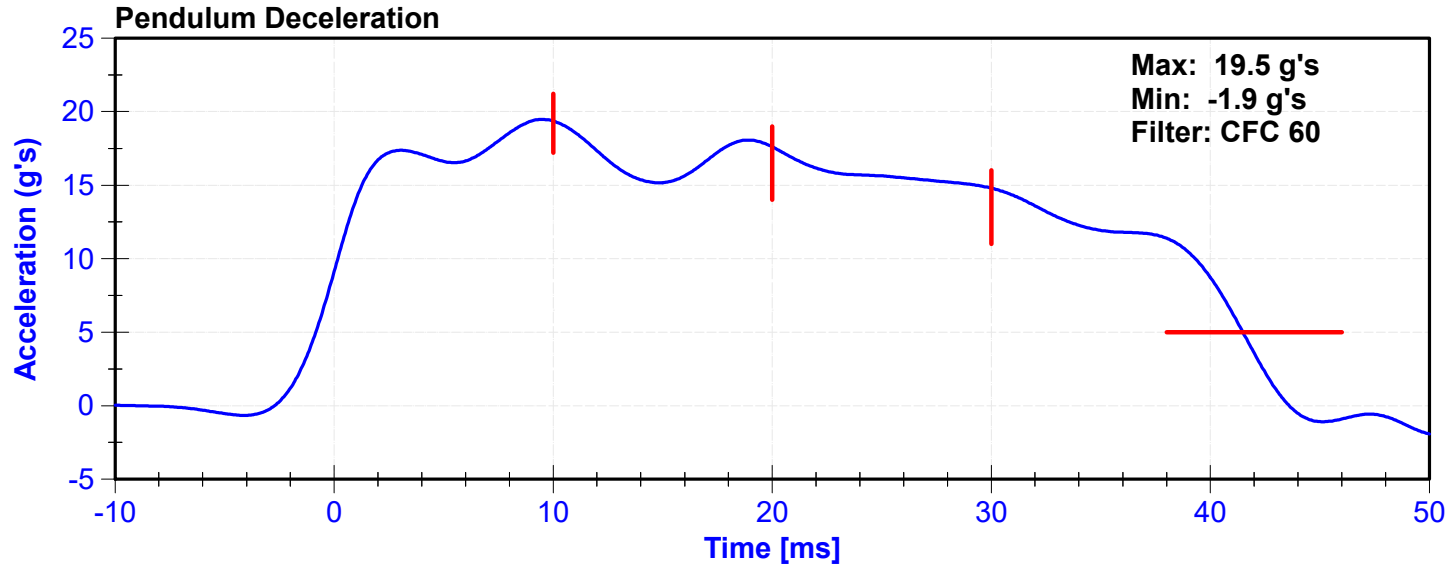
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	20	Pass
Velocity	5.94	6.19	m/s	5.991	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	19.36	Pass
Pendulum Deceleration at 20ms	14	19	g's	17.6	Pass
Pendulum Deceleration at 30ms	11	16	g's	14.8	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	19.5	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	41.5	Pass
Maximum D Plane Rotation	81	106	deg	92.7	Pass
Time to Maximum Rotation	72	82	ms	80.3	Pass
Rotation Decay to Zero	147	174	ms	167.4	Pass
Minimum Moment About OC	-80	-52.9	Nm	-68.63	Pass
Time to Minimum Moment	65	79	ms	74.1	Pass
Moment Decay to Zero	120	148	ms	144.4	Pass

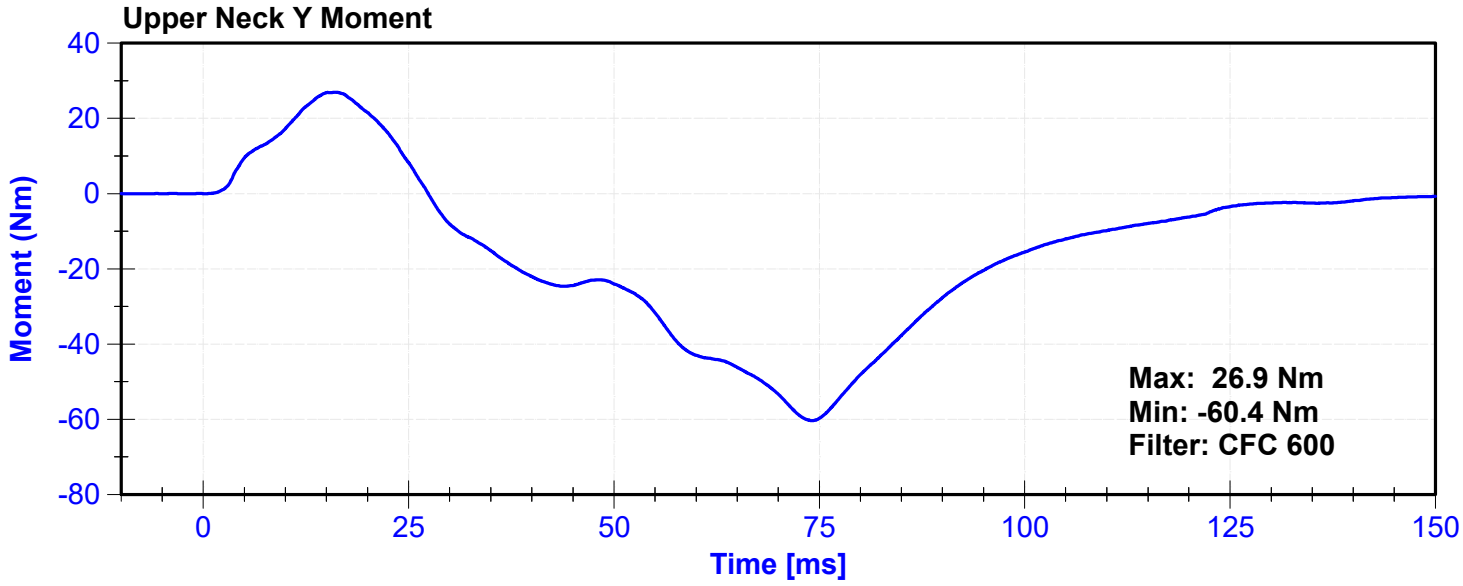
Transducer Calibrations

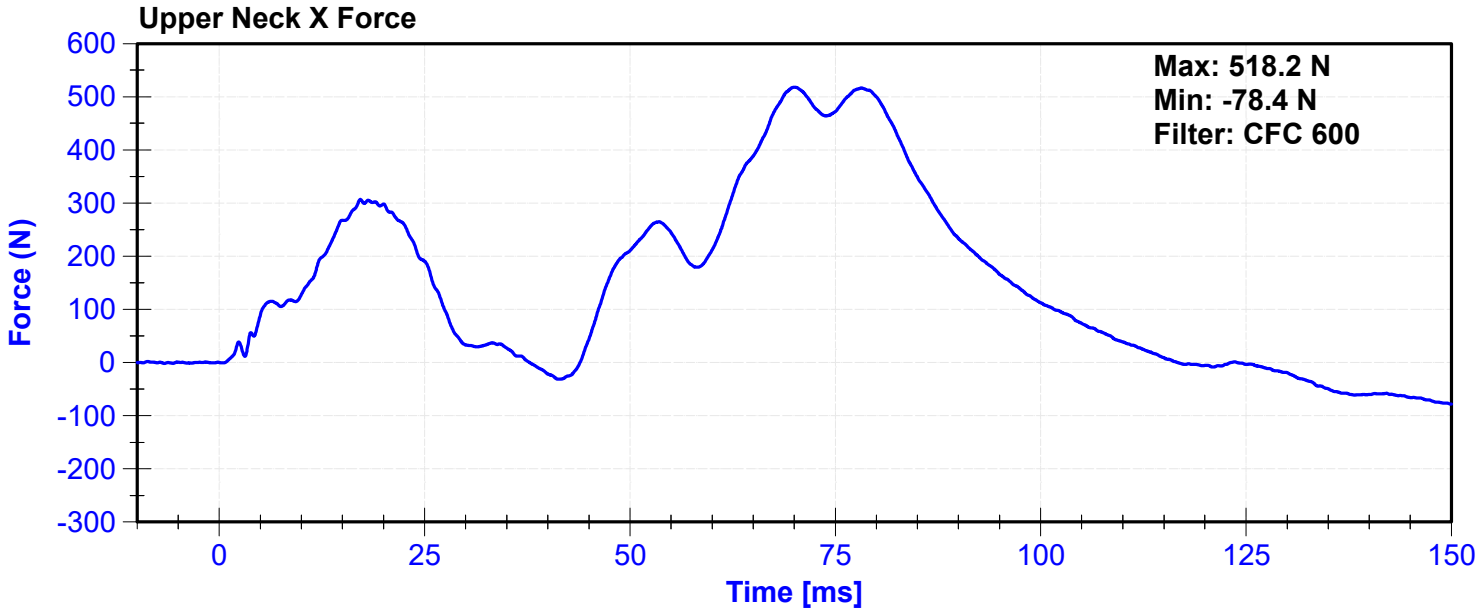
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16646	10/17/2024	4/15/2025
Pendulum Potentiometer	ETI	SP22G_LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	SP22G_LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Humanetics	851-FX	5/22/2024	5/22/2025


D-Plane Rotation
Rotation (deg)
125
100
75
50
25
0
-25
0
25
50
75
100
125
150
Time [ms]
Max: 92.7 deg
Min: 0.1 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
50
25
0
-25
-50
-75
-100
0
25
50
75
100
125
150
Time [ms]
Max: 22.1 Nm
Min: -68.6 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 19.5 g's
Min: -1.9 g's
Filter: CFC 60
Acceleration (g's)
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
Time [ms]


Upper Neck Y Moment
Max: 26.9 Nm
Min: -60.4 Nm
Filter: CFC 600
Moment (Nm)
40
20
0
-20
-40
-60
-80
0
25
50
75
100
125
150
Time [ms]


Upper Neck X Force
Max: 518.2 N
Min: -78.4 N
Filter: CFC 600
Force (N)
600
500
400
300
200
100
0
-100
-200
-300
0
25
50
75
100
125
150
Time [ms]

ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

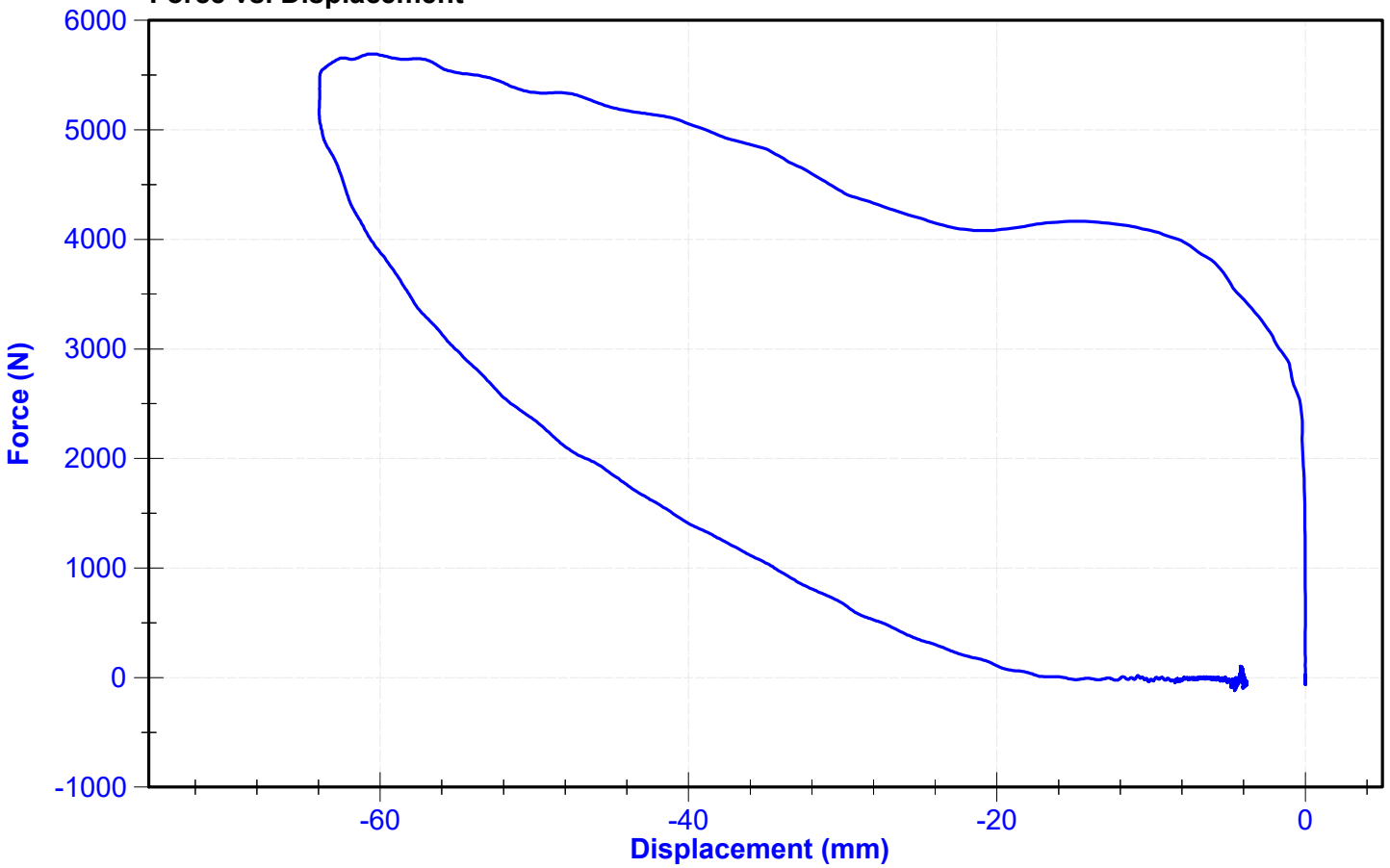
Results

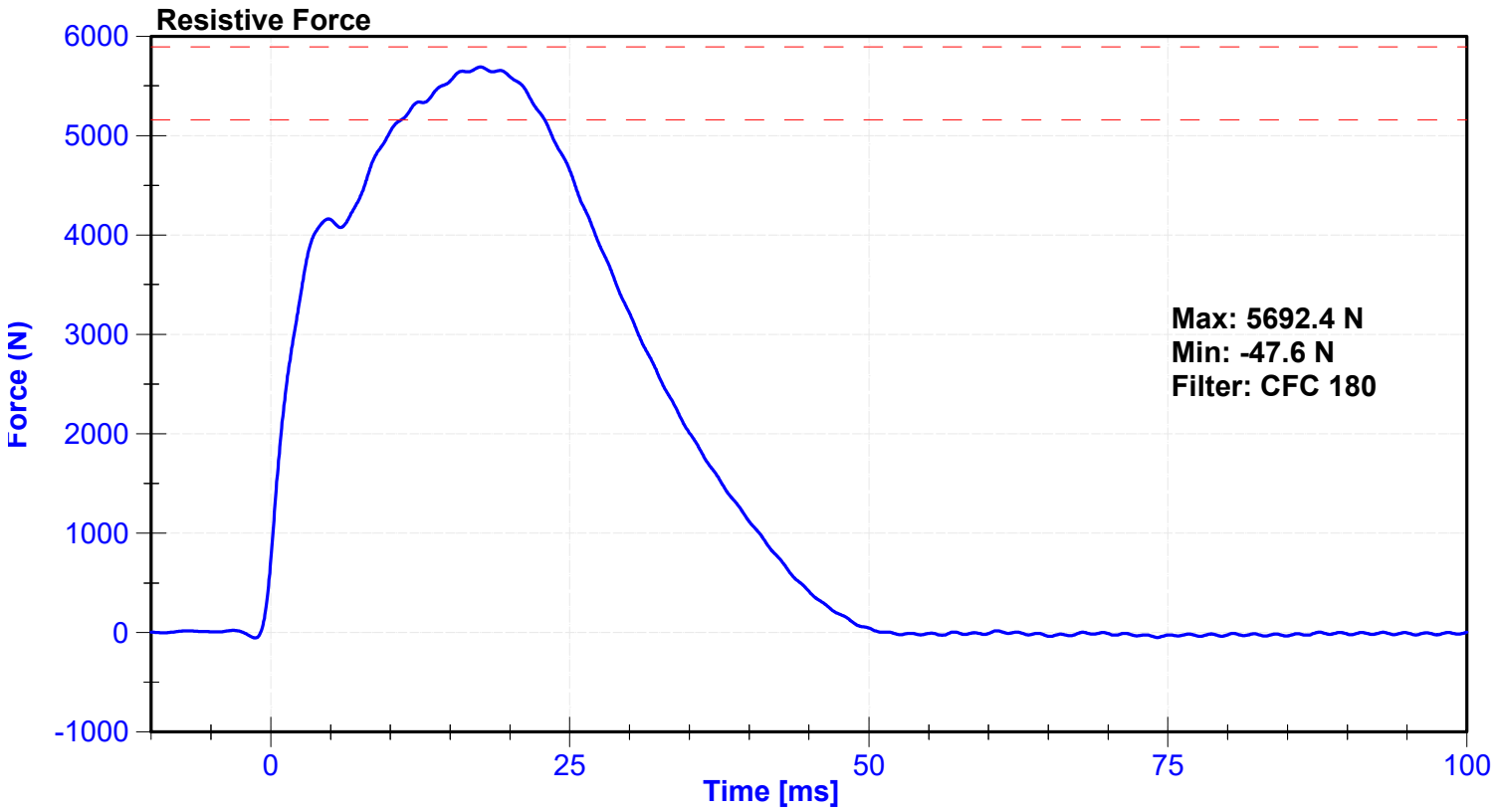
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	6.59	6.83	m/s	6.701	Pass
Chest Displacement	-72.6	-63.5	mm	-63.97	Pass
Resistive Force	5160	5894	N	5692.4	Pass
Hysteresis	69	85	%	72.8	Pass

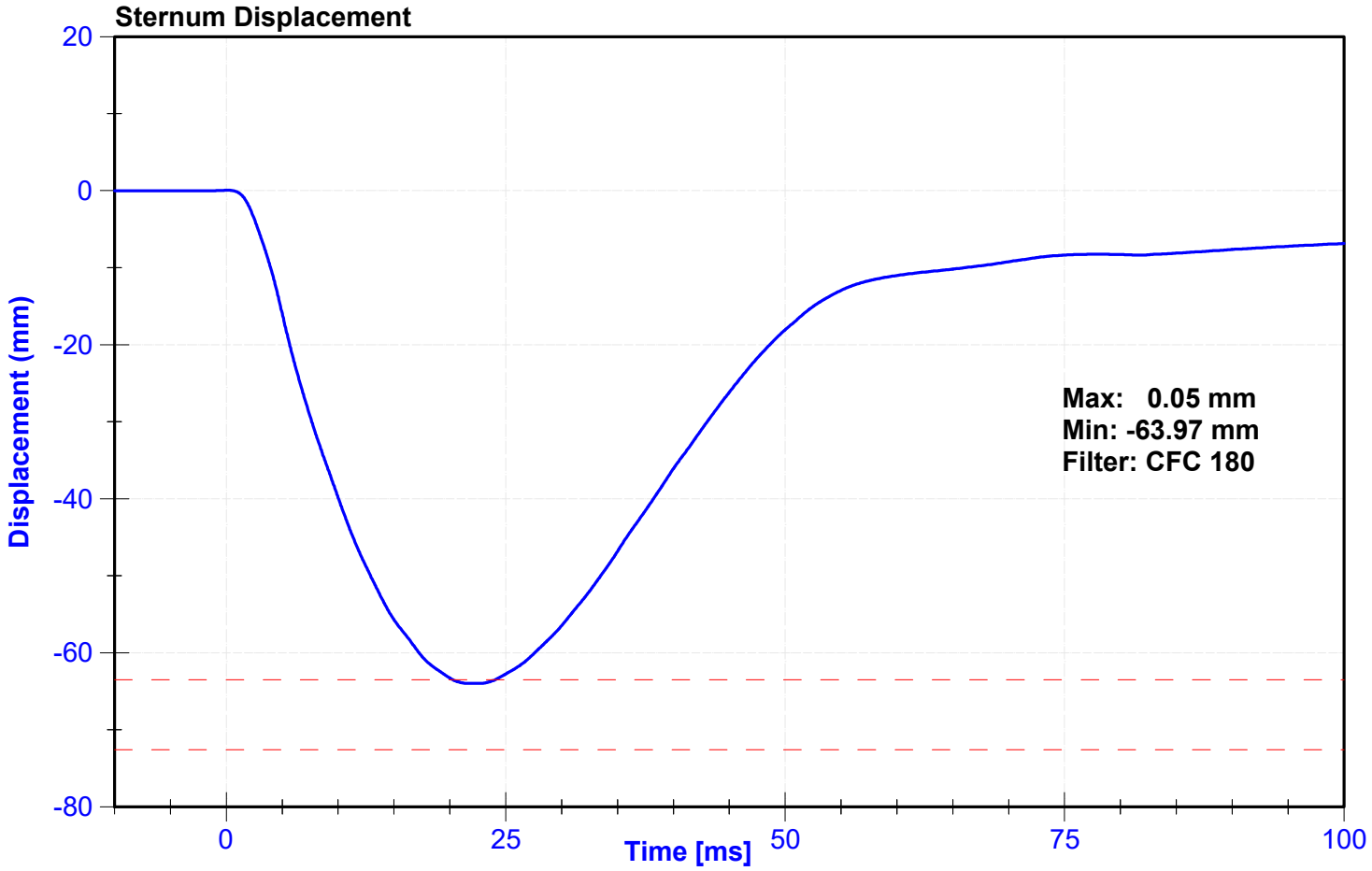
Transducer Calibrations

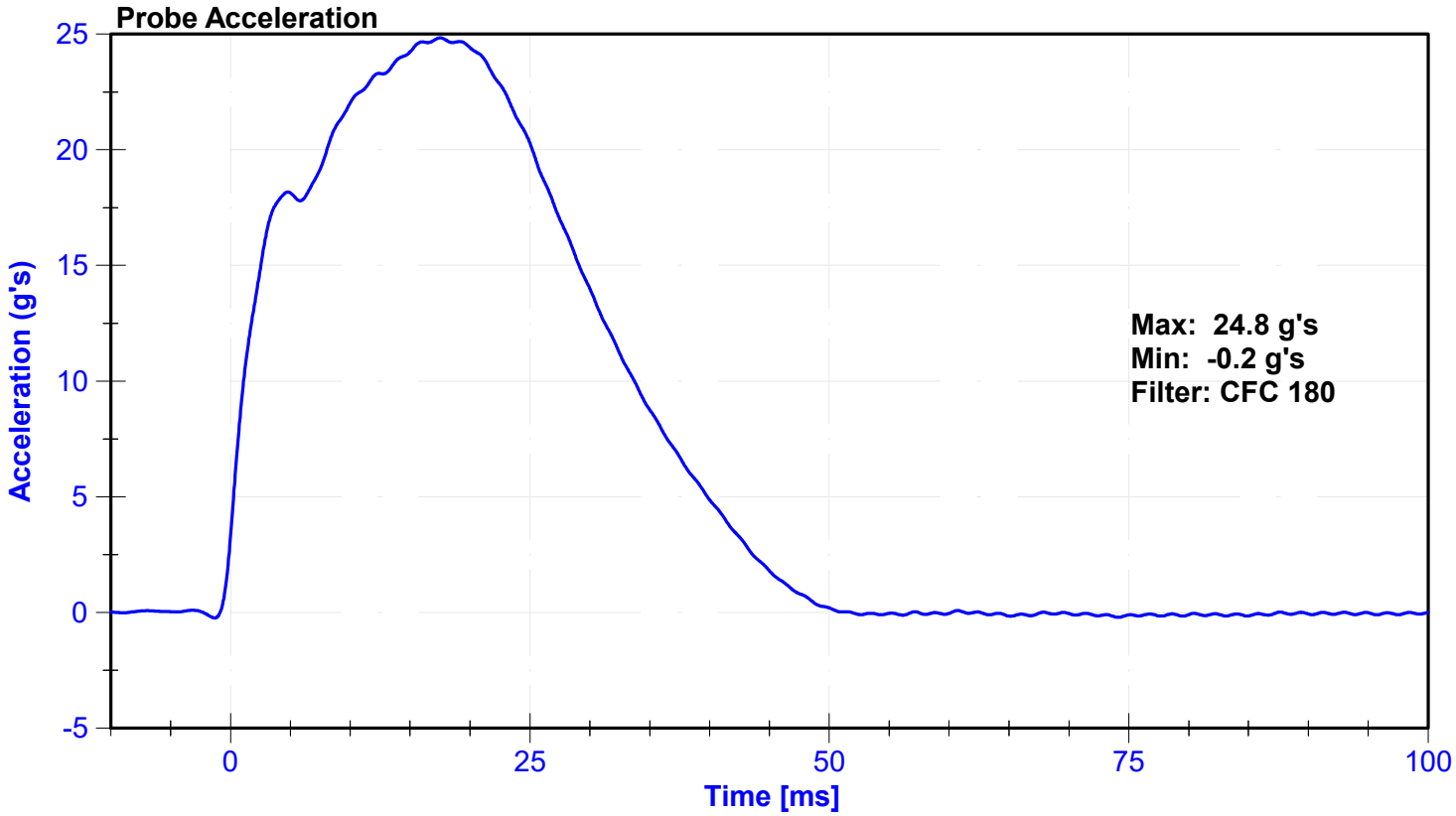
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Chest Potentiometer	Servo	1046	10/31/2024	5/1/2025

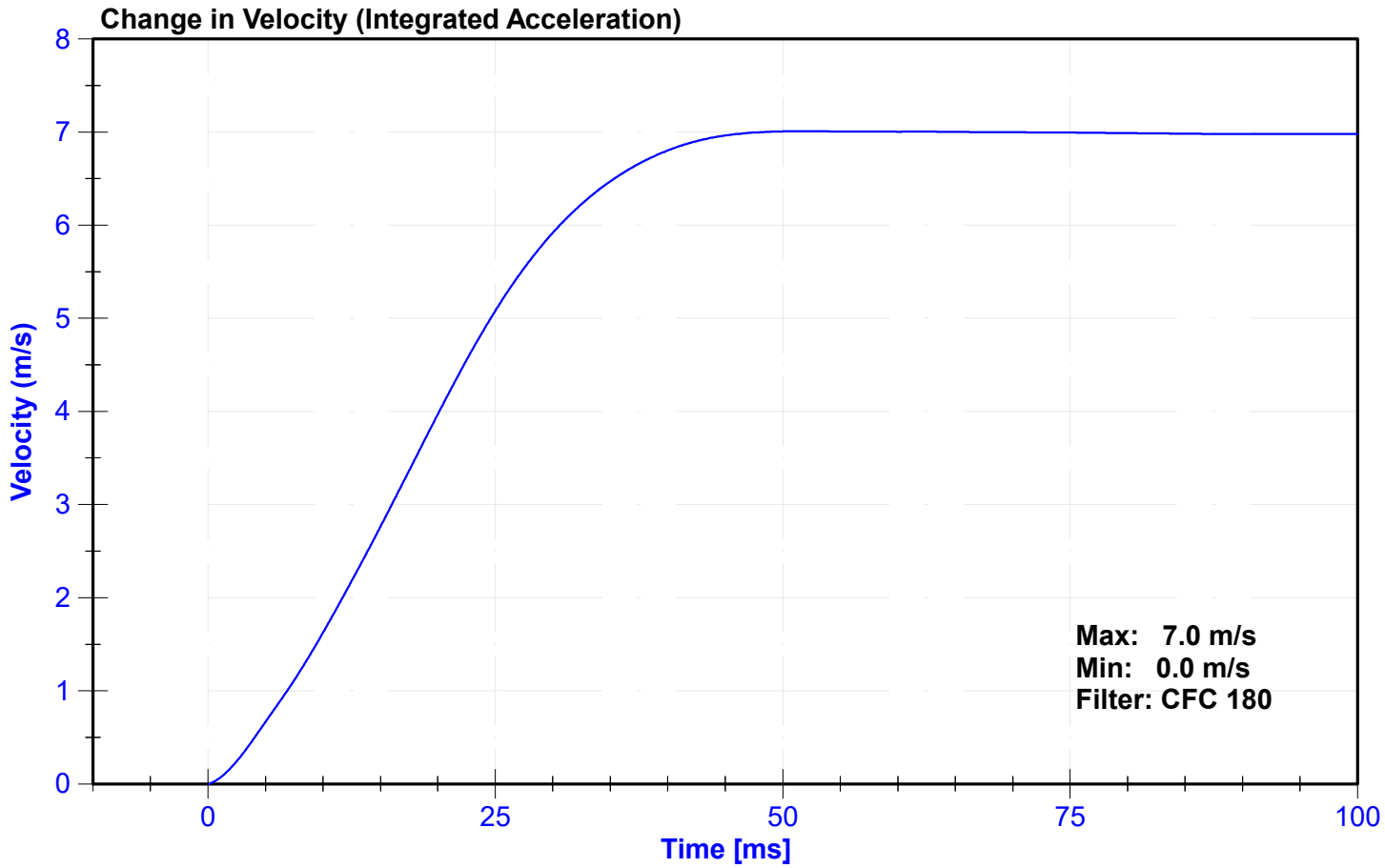
Force vs. Displacement




Resistive Force
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
25
50
75
100
Time [ms]
Max: 5692.4 N
Min: -47.6 N
Filter: CFC 180


Sternum Displacement
Displacement (mm)
20
0
-20
-40
-60
-80
0
25
50
75
100
Time [ms]
Max: 0.05 mm
Min: -63.97 mm
Filter: CFC 180


Probe Acceleration
Acceleration (g's)
25
20
15
10
5
0
-5
0
25
50
75
100
Time [ms]
Max: 24.8 g's
Min: -0.2 g's
Filter: CFC 180


Change in Velocity (Integrated Acceleration)
Velocity (m/s)
8
7
6
5
4
3
2
1
0
0
25
50
75
100
Time [ms]
Max: 7.0 m/s
Min: 0.0 m/s
Filter: CFC 180

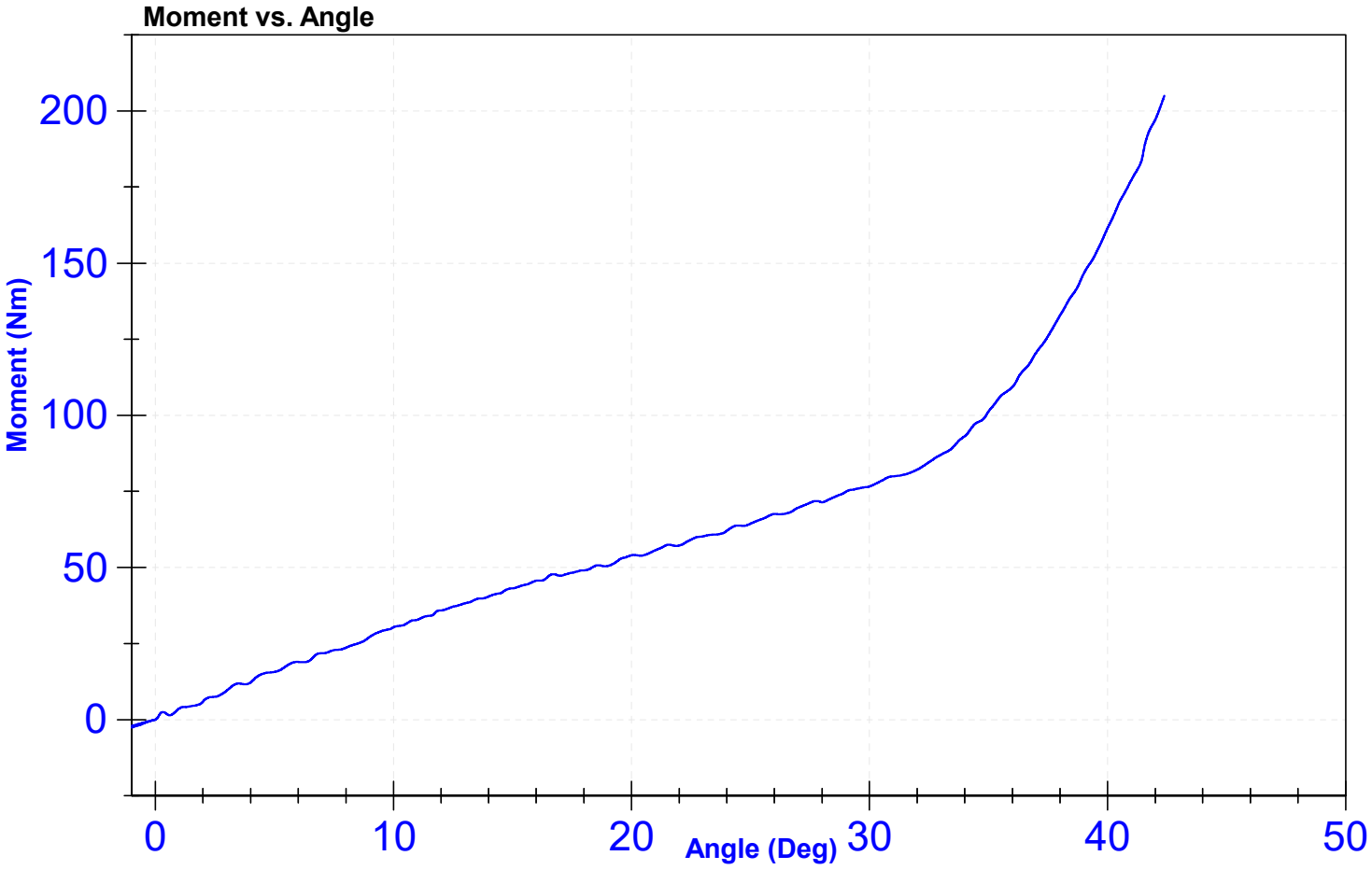
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	19	Pass
Average Velocity	5	10	deg/s	7.4	Pass
Angle at 203Nm	40	50	deg	42.3	Pass
Moment at 30 degrees	0	94.9	Nm	76.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	9/23/2024	9/23/2025
Load Cell	PCB 2301-02A	694	2024-01-31	2025-01-30



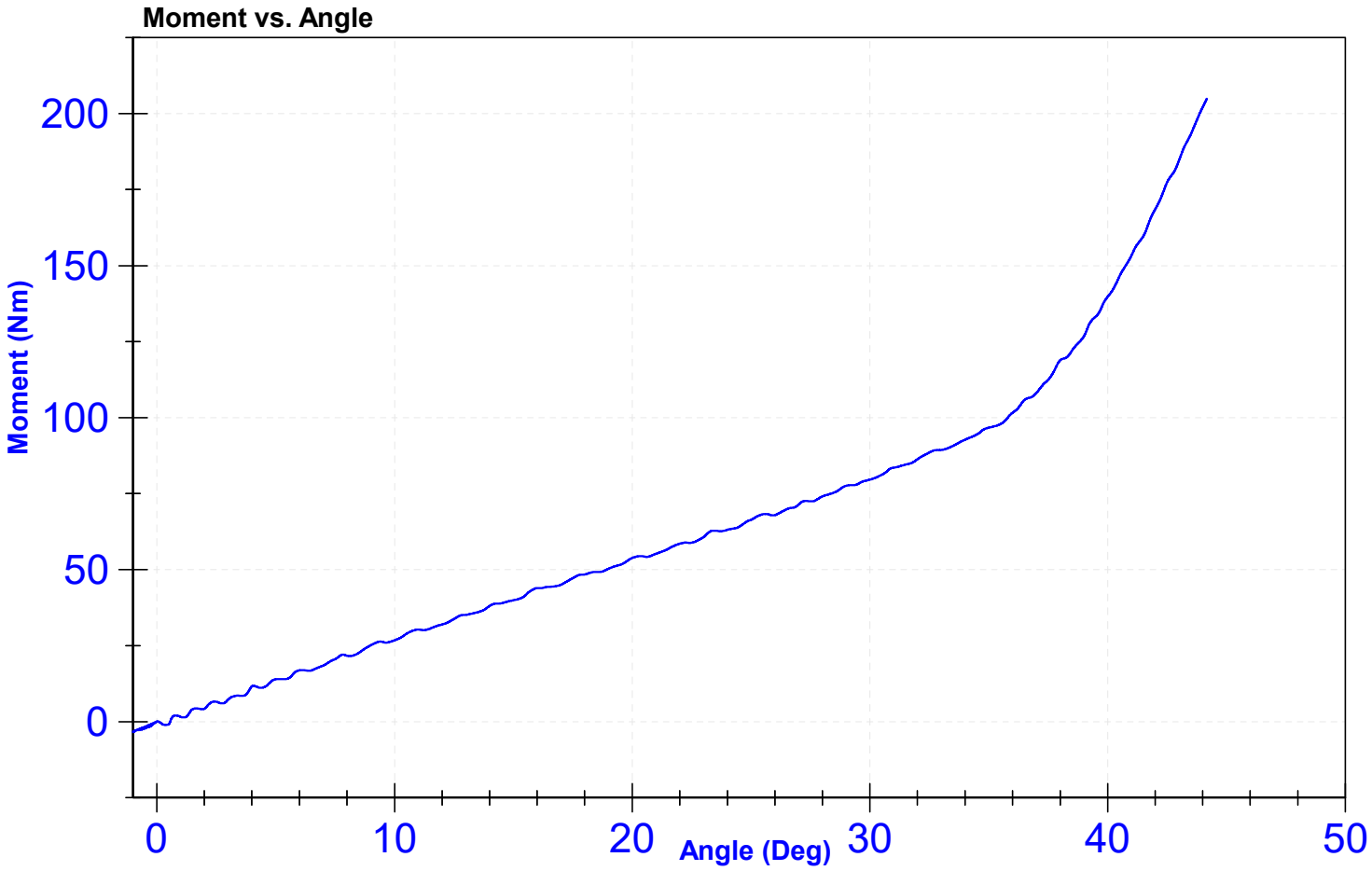
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	19	Pass
Average Velocity	5	10	deg/s	7.5	Pass
Angle at 203Nm	40	50	deg	44.1	Pass
Moment at 30 degrees	0	94.9	Nm	79.6	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	9/23/2024	9/23/2025
Load Cell	PCB 2301-02A	694	2024-01-31	2025-01-30



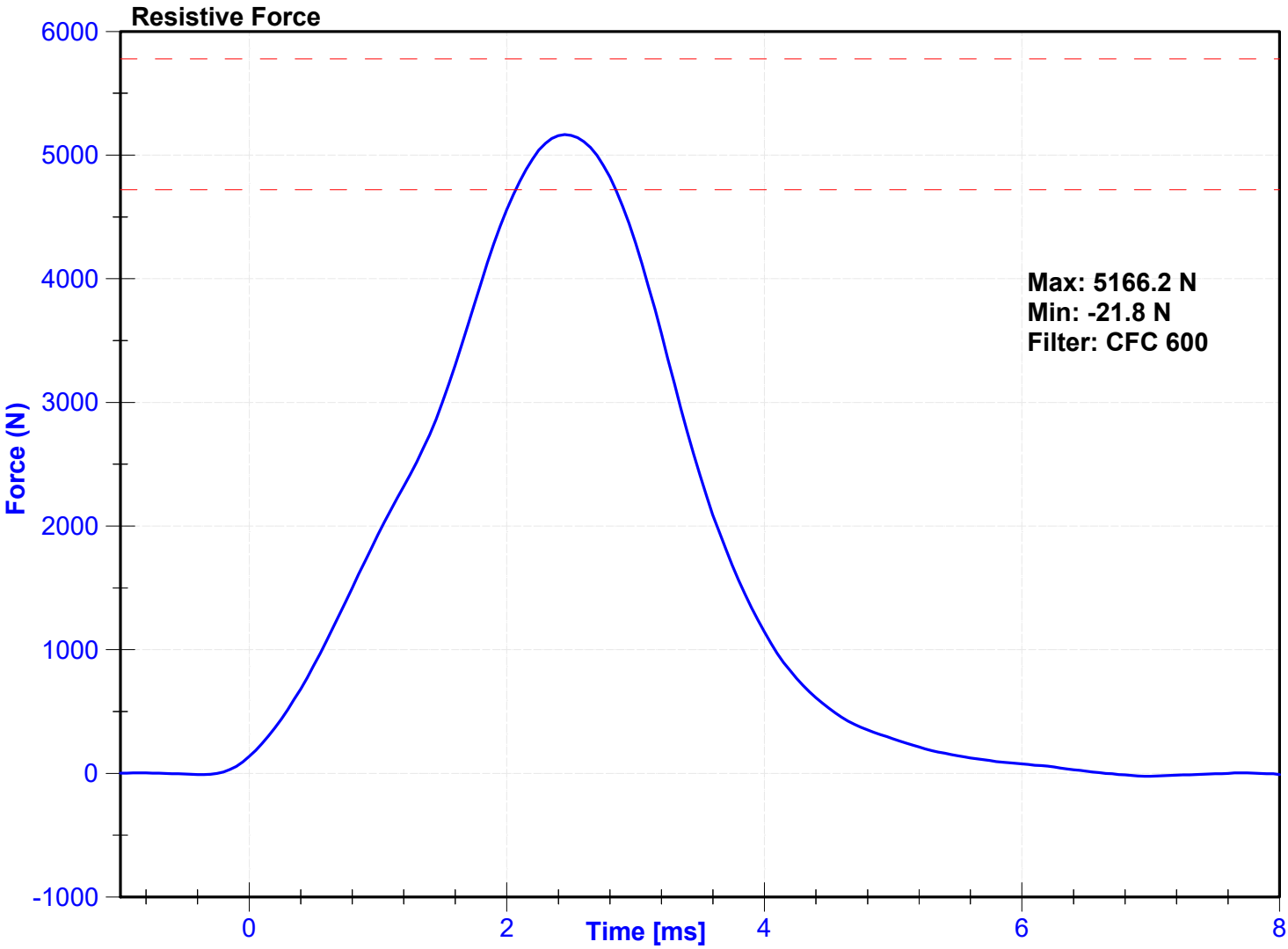
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

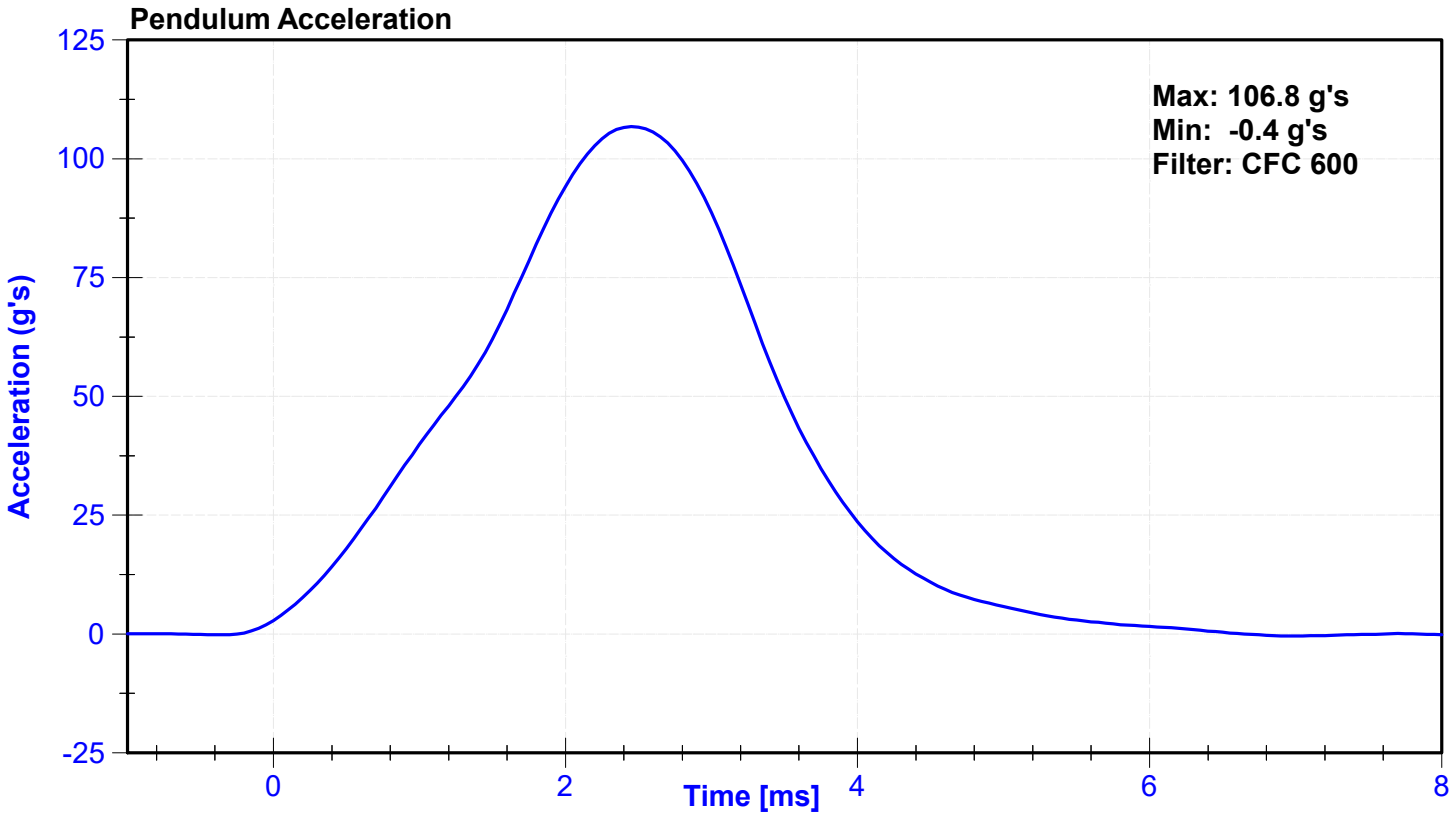
Results

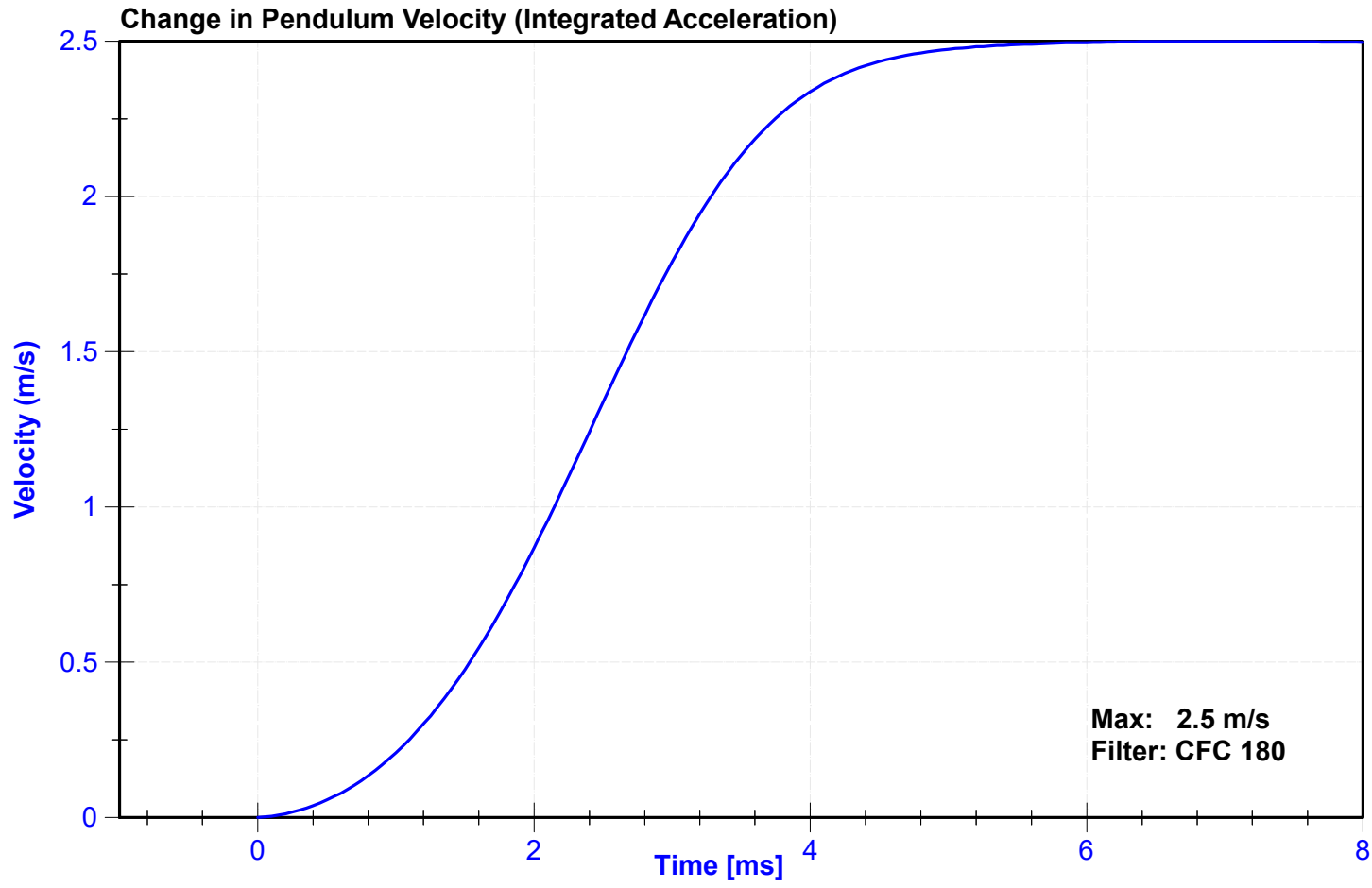
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	17	Pass
Velocity	2.07	2.13	m/s	2.103	Pass
Maximum Resistive Force	4720	5780	N	5166.2	Pass

Transducer Calibrations

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




Pendulum Acceleration
Max: 106.8 g's
Min: -0.4 g's
Filter: CFC 600
Acceleration (g's)
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]


Change in Pendulum Velocity (Integrated Acceleration)
Max: 2.5 m/s
Filter: CFC 180
Velocity (m/s)
2.5
2
1.5
1
0.5
0
0
2
4
6
8
Time [ms]

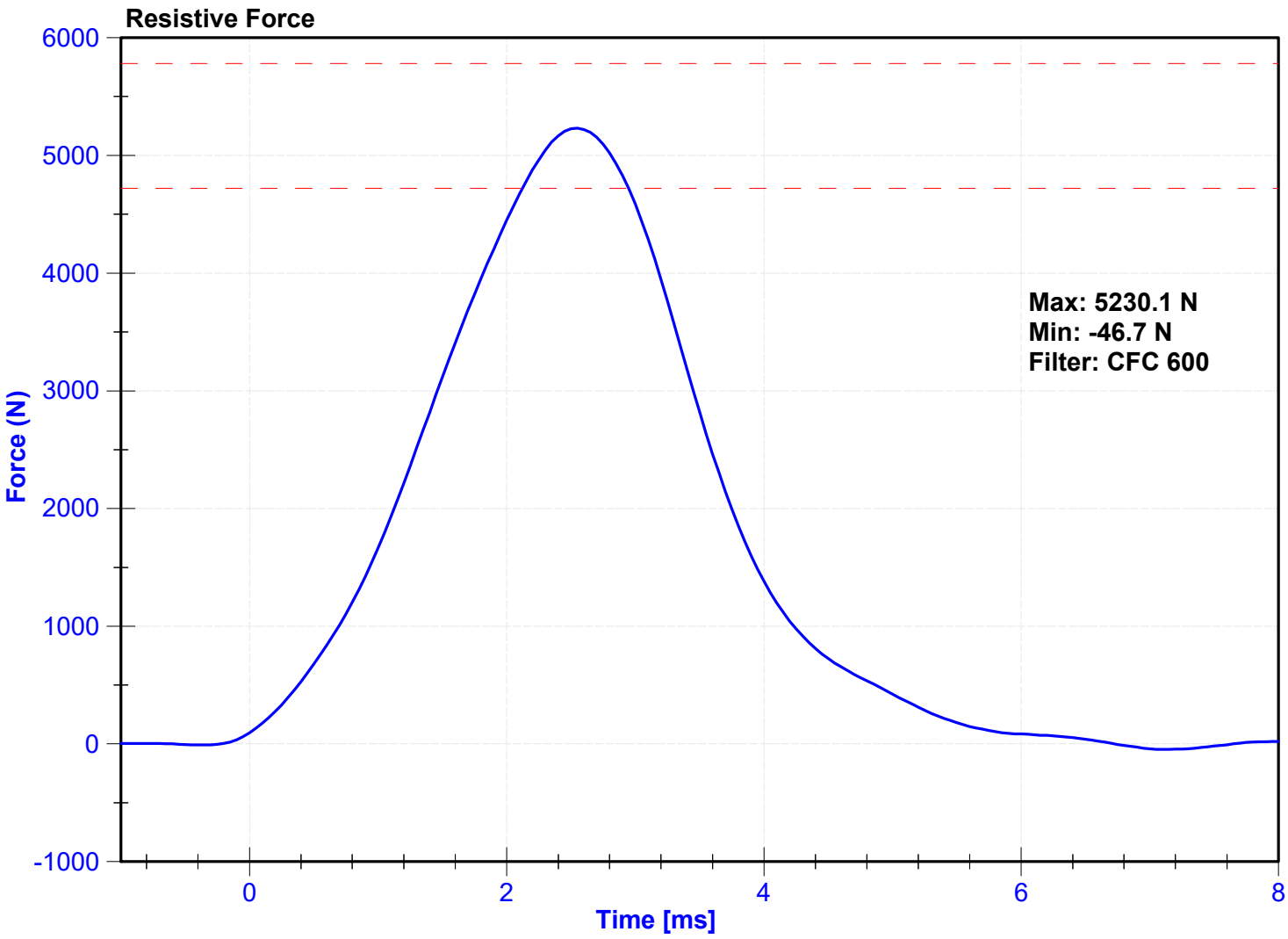
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

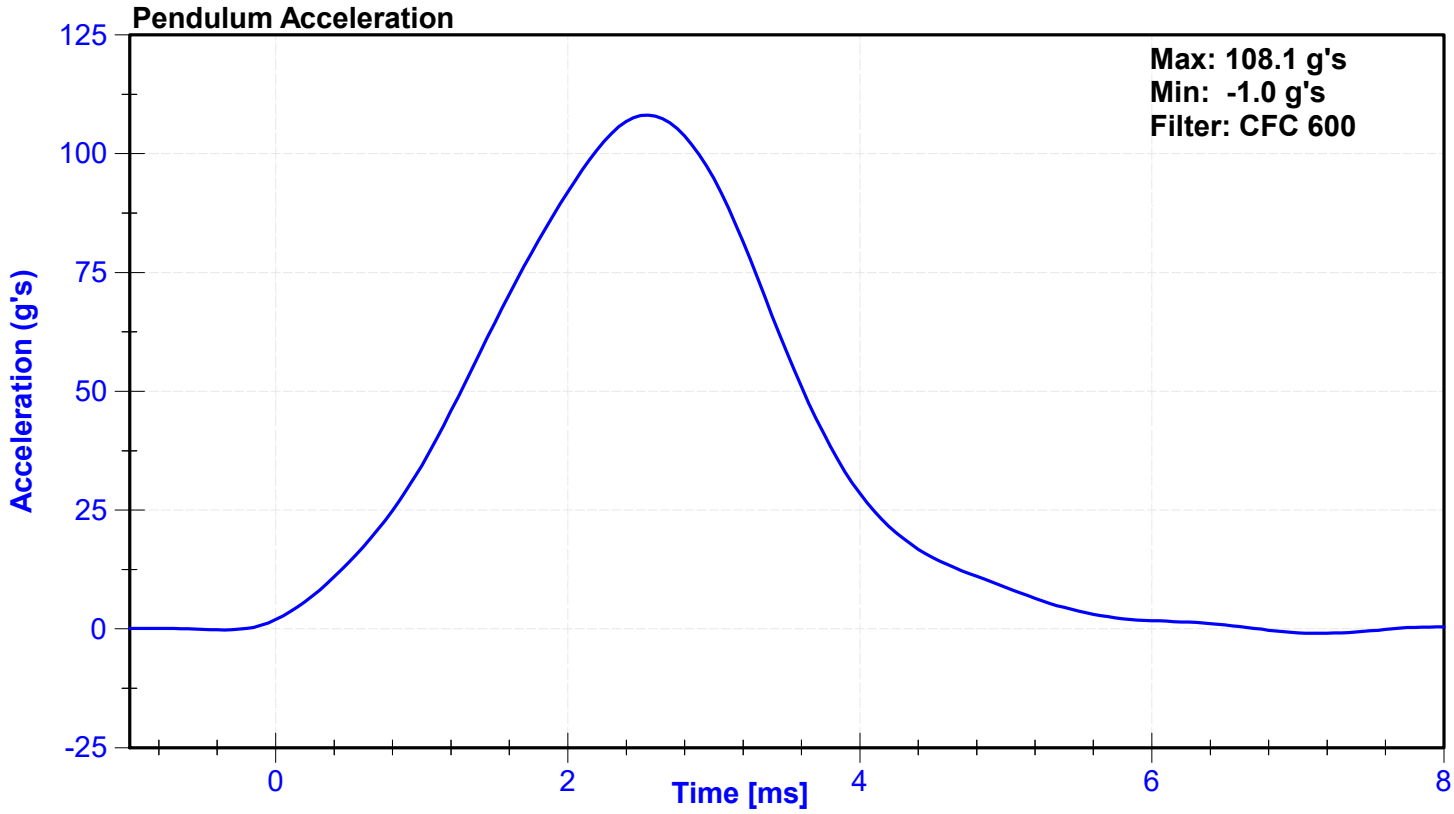
Results

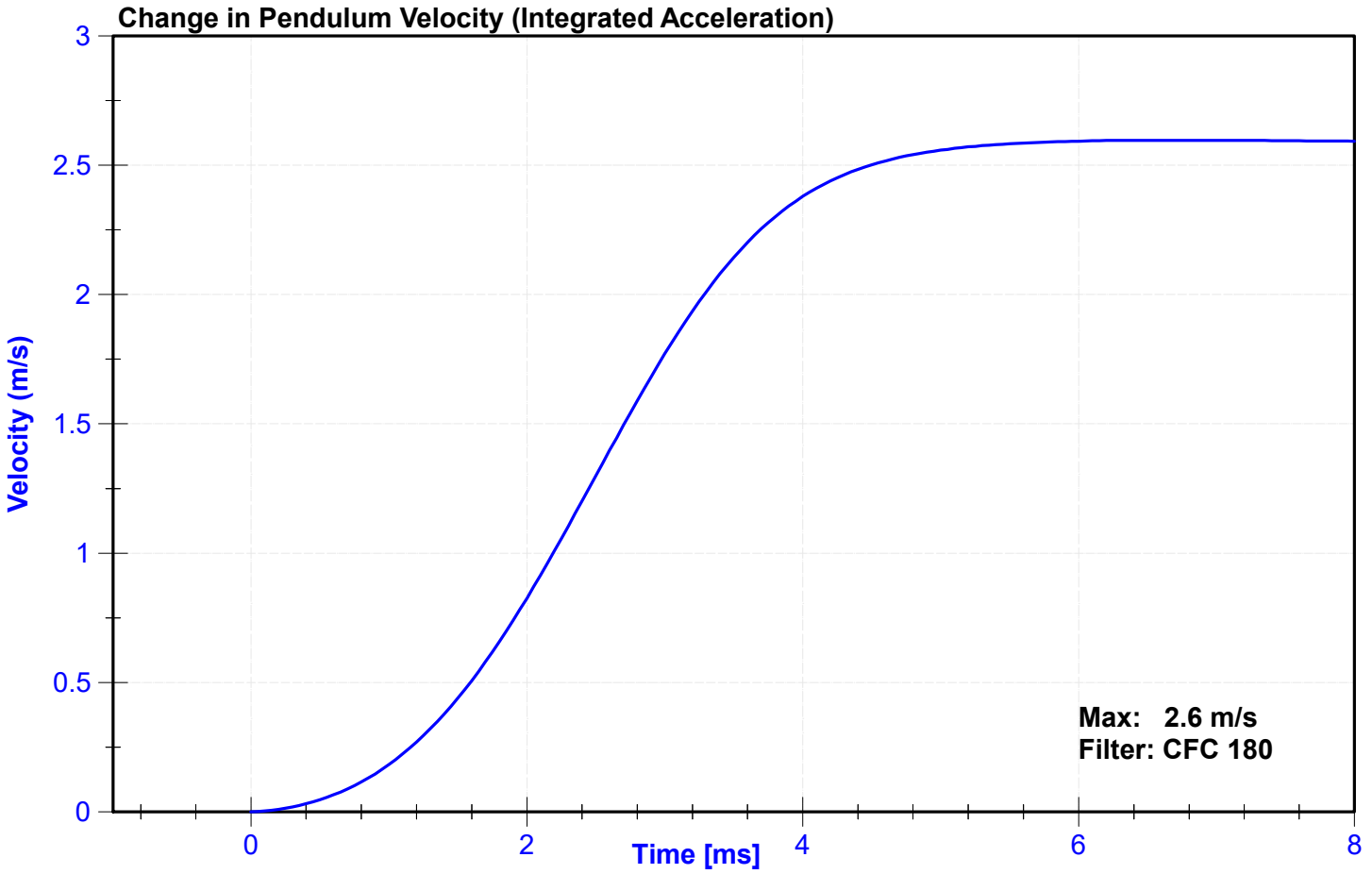
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	17	Pass
Velocity	2.07	2.13	m/s	2.101	Pass
Maximum Resistive Force	4720	5780	N	5230.1	Pass

Transducer Calibrations

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




Pendulum Acceleration
Max: 108.1 g's
Min: -1.0 g's
Filter: CFC 600
Acceleration (g's)
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]


Change in Pendulum Velocity (Integrated Acceleration)
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
Max: 2.6 m/s
Filter: CFC 180
0
2
4
6
8
Time [ms]

CALIBRATION TEST RESULTS

PRE-TEST

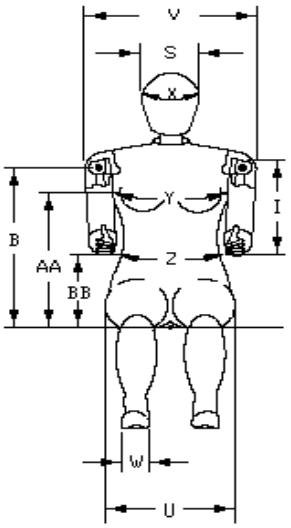
HYBRID III 5TH PERCENTILE - PASSENGER ATD

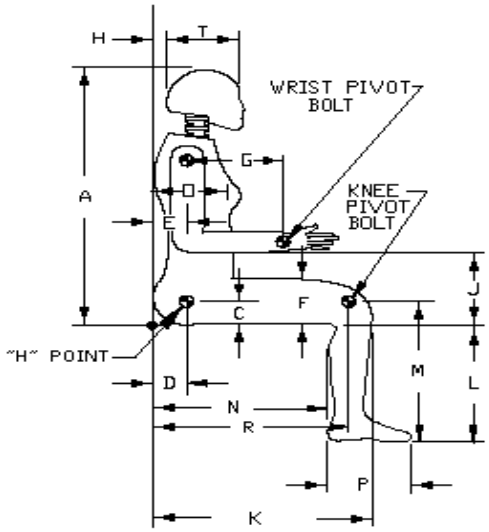
SERIAL NO: 137

External Measurements - Hybrid 3 - 5th Female

Technician: J. Rios Date: 1/25/2025

Dummy Serial Number: 137





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	782	Pass
B	Shoulder Pivot Height	432	457	439	Pass
C	H-Point Height	81	86	86	Pass
D	H-Point from Backline	145	150	148	Pass
E	Shoulder Pivot from Backline	69	84	77	Pass
F	Thigh Clearance	119	135	127	Pass
G	Back of Elbow to Wrist Pivot	244	259	252	Pass
H	Head Back to Backline	43	48	45	Pass
I	Shoulder to Elbow Length	277	297	288	Pass
J	Elbow Rest Height	183	203	195	Pass
K	Buttock to Knee Length	521	546	529	Pass
L	Popliteal Height	356	376	361	Pass
M	Knee Pivot Height	394	419	407	Pass
N	Buttock Popliteal Length	414	439	431	Pass
O	Chest Depth without Jacket	175	191	184	Pass
P	Foot Length (right)	219	234	224	Pass
R	Buttock To Knee Pivot Length	457	483	468	Pass
S	Head Breadth	137	147	144	Pass
T	Head Depth	178	188	182	Pass
U	Hip Breadth	300	315	308	Pass
V	Shoulder Breadth	351	366	360	Pass
W	Foot Breadth	79	94	83	Pass
X	Head Circumference	528	549	537	Pass
Y	Chest Circumference with Jacket	851	881	879	Pass
Z	Waist Circumference	460	790	630	Pass
AA	Reference Location (Chest Circumference)	333	358	341	Pass
BB	Reference Location (Waist Circumference)	160	170	165	Pass

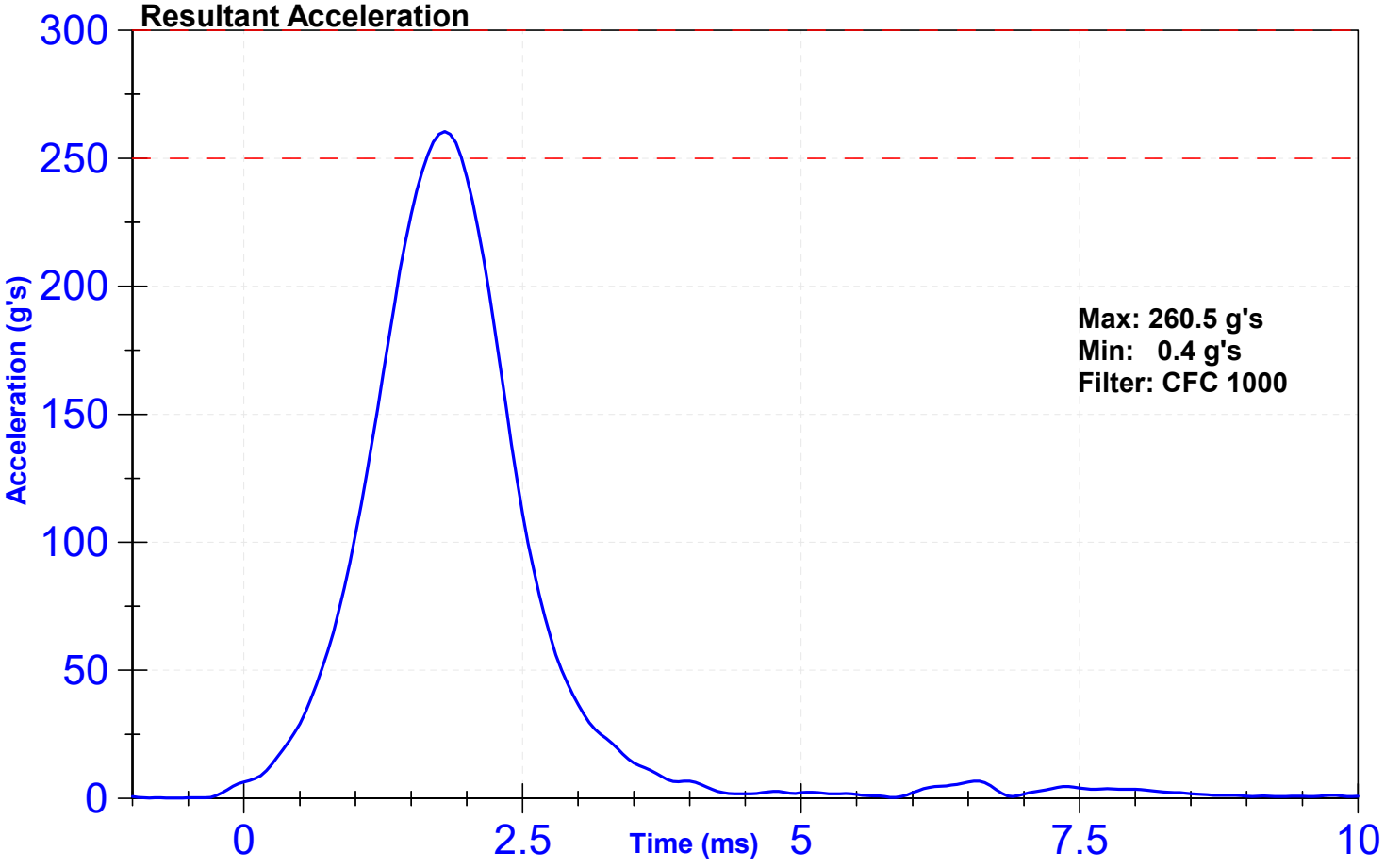
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

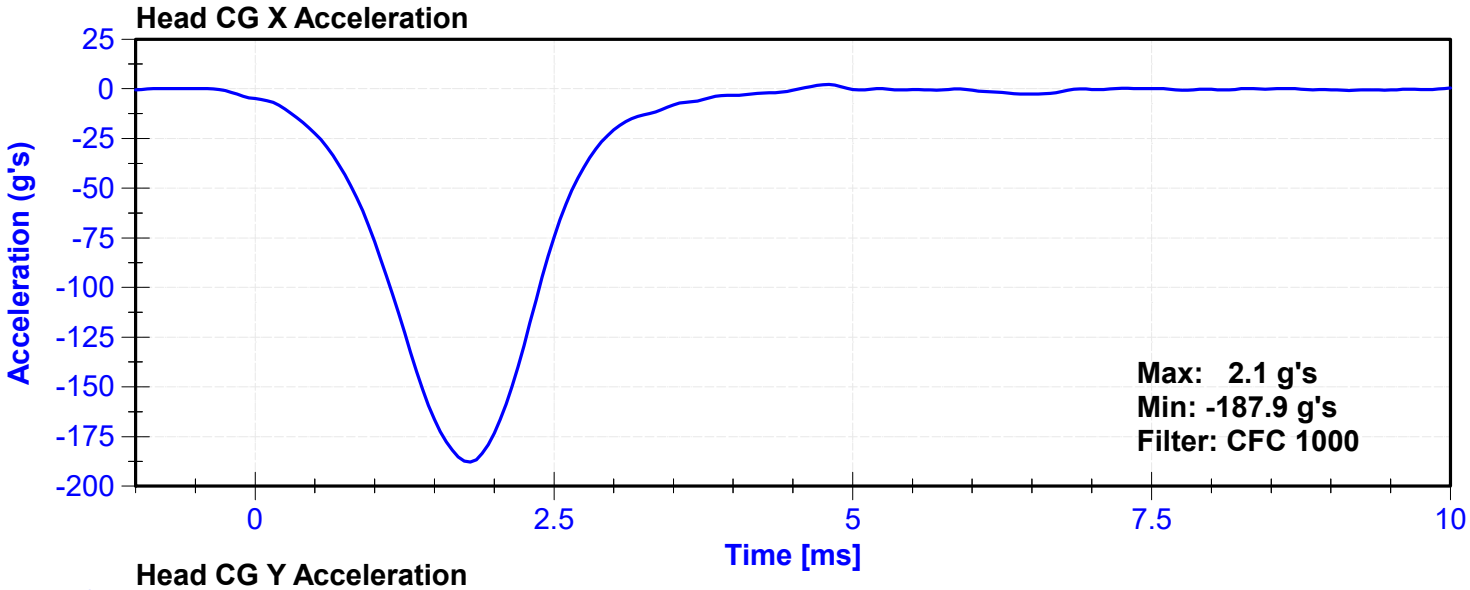
Results

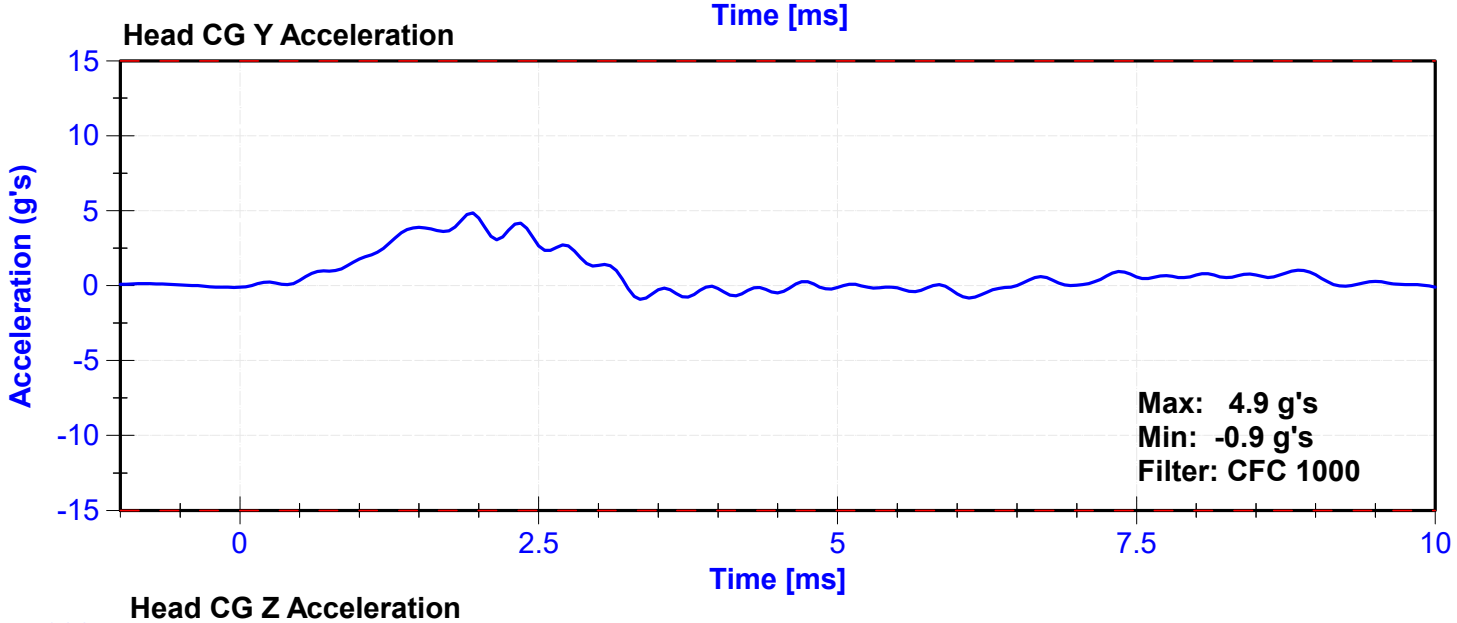
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.8	Pass
Humidity	10	70	%	15	Pass
Resultant Acceleration	250	300	g's	260.5	Pass
Oscillation	0	10	%	2.5	Pass
Lateral Acceleration	-15	15	g's	4.9	Pass

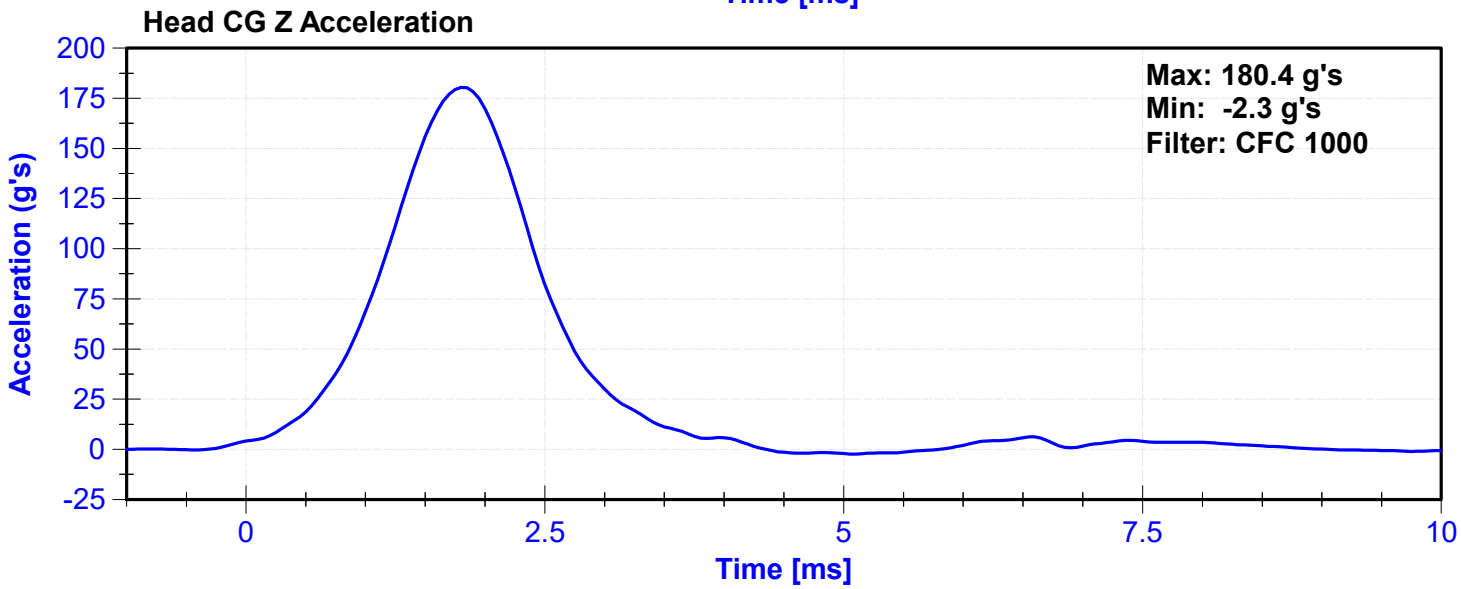
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P79417	8/19/2024	2/15/2025
Y Accelerometer	Endevco	P83335	8/19/2024	2/15/2025
Z Accelerometer	Endevco	P64149	8/19/2024	2/15/2025




Head CG X Acceleration
Acceleration (g's)
25
0
-25
-50
-75
-100
-125
-150
-175
-200
0
2.5
5
7.5
10
Time [ms]
Max: 2.1 g's
Min: -187.9 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 4.9 g's
Min: -0.9 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
200
175
150
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 180.4 g's
Min: -2.3 g's
Filter: CFC 1000

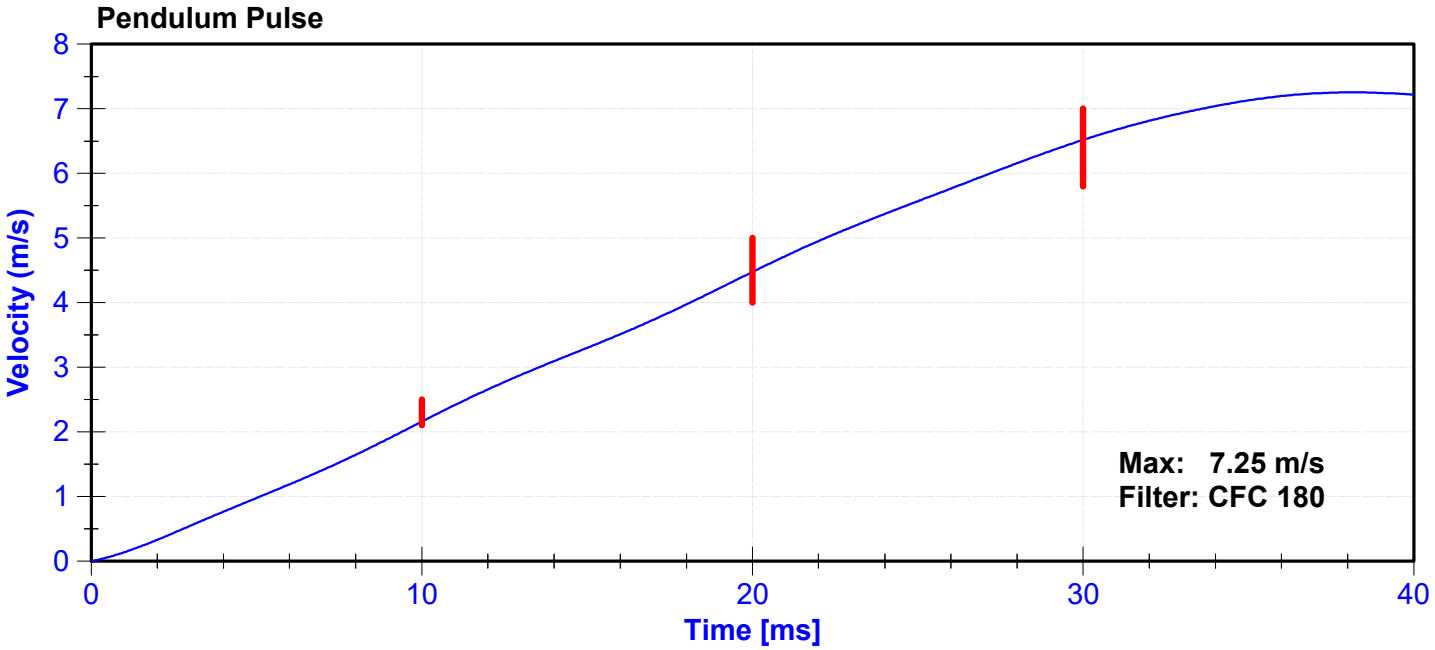
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

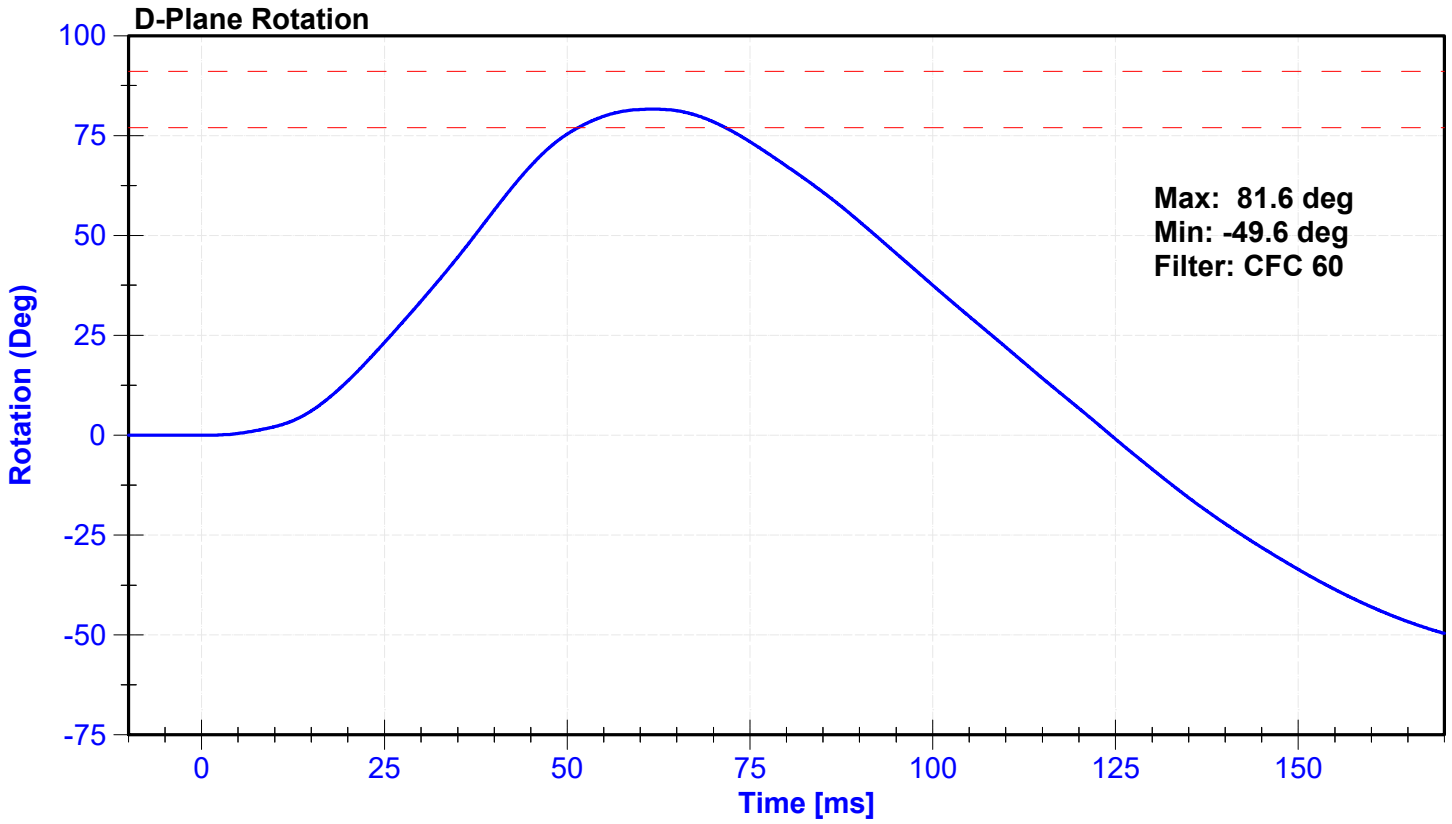
Results

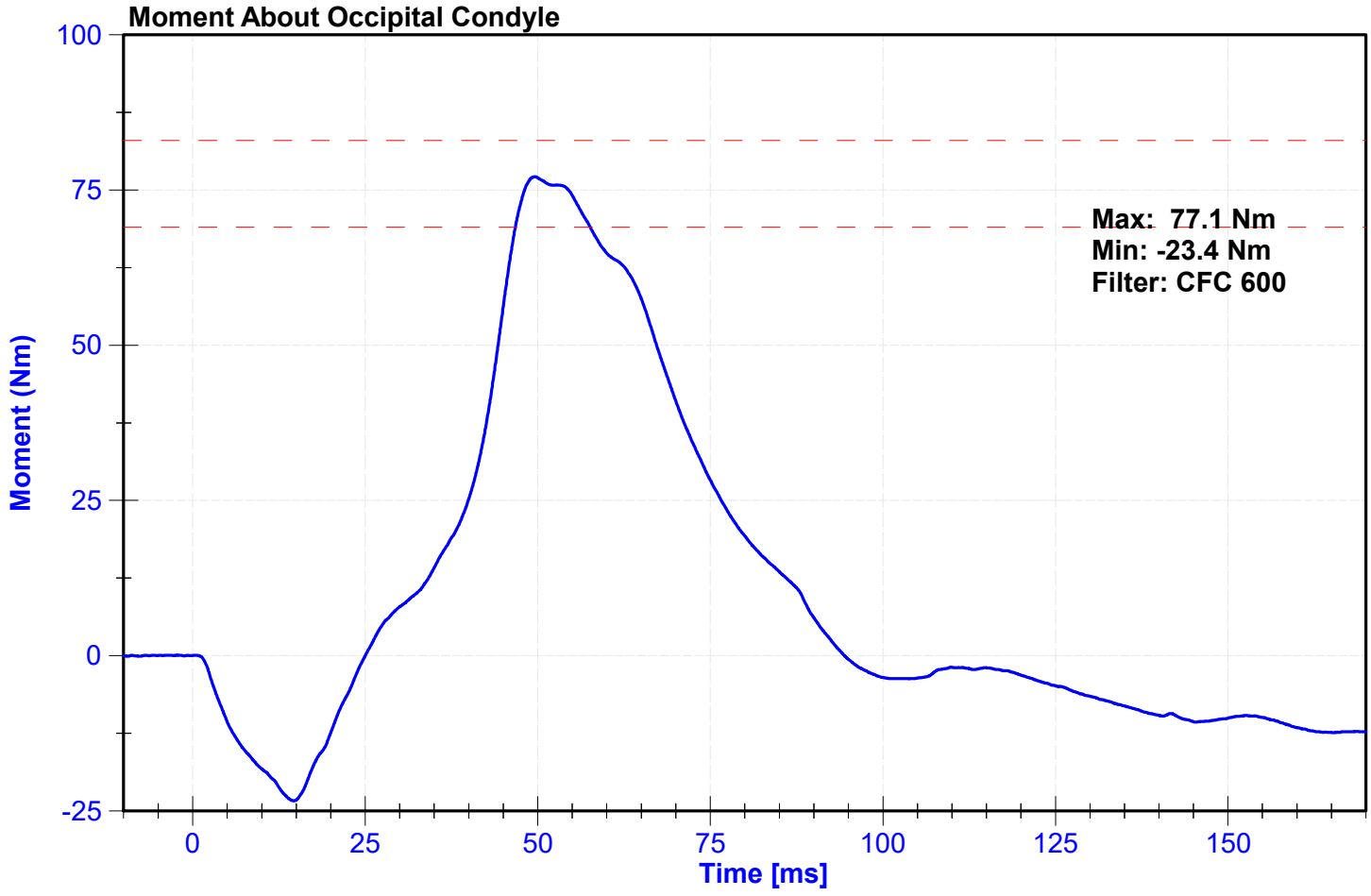
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	18	Pass
Velocity	6.89	7.13	m/s	7.005	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.16	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.47	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.52	Pass
Max D Plane Rotation	77	91	deg	81.6	Pass
Max Moment During Rotation Interval	69	83	Nm	77.1	Pass
Moment Decay to 10.0 Nm	80	100	ms	88.1	Pass

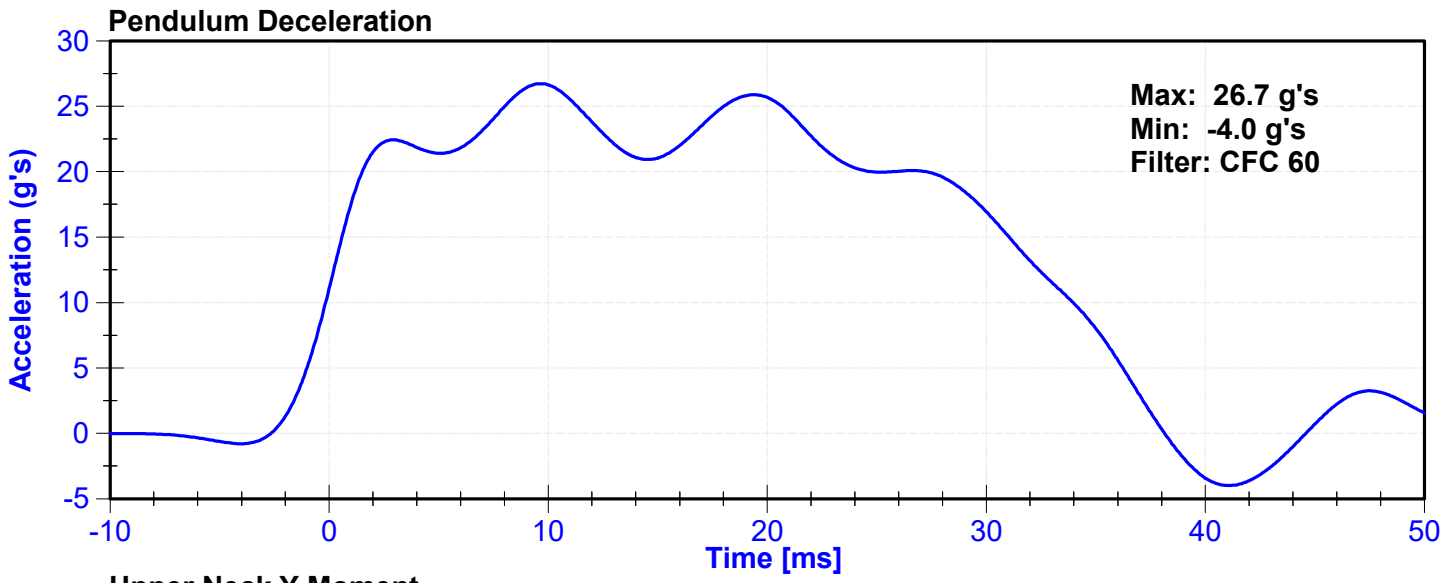
Transducer Calibrations

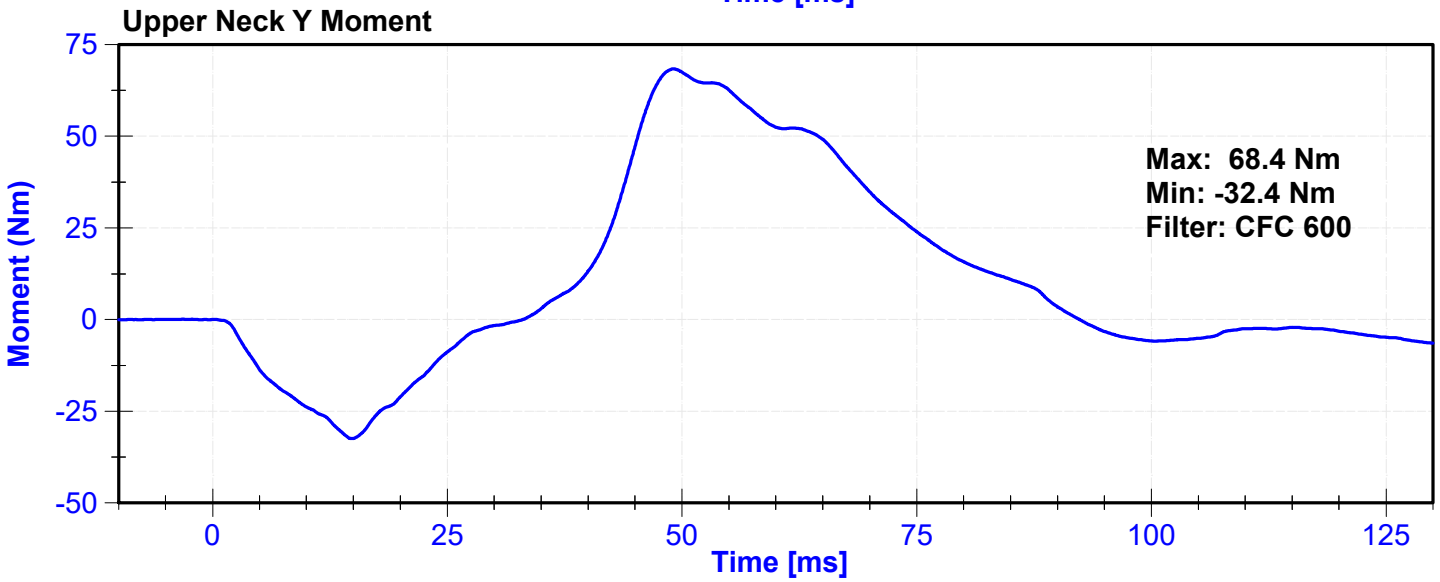
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16646	10/17/2024	4/15/2025
Pendulum Potentiometer	ETI	SP22G_LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	SP22G_LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Denton	2184-FX	7/10/2024	7/10/2025

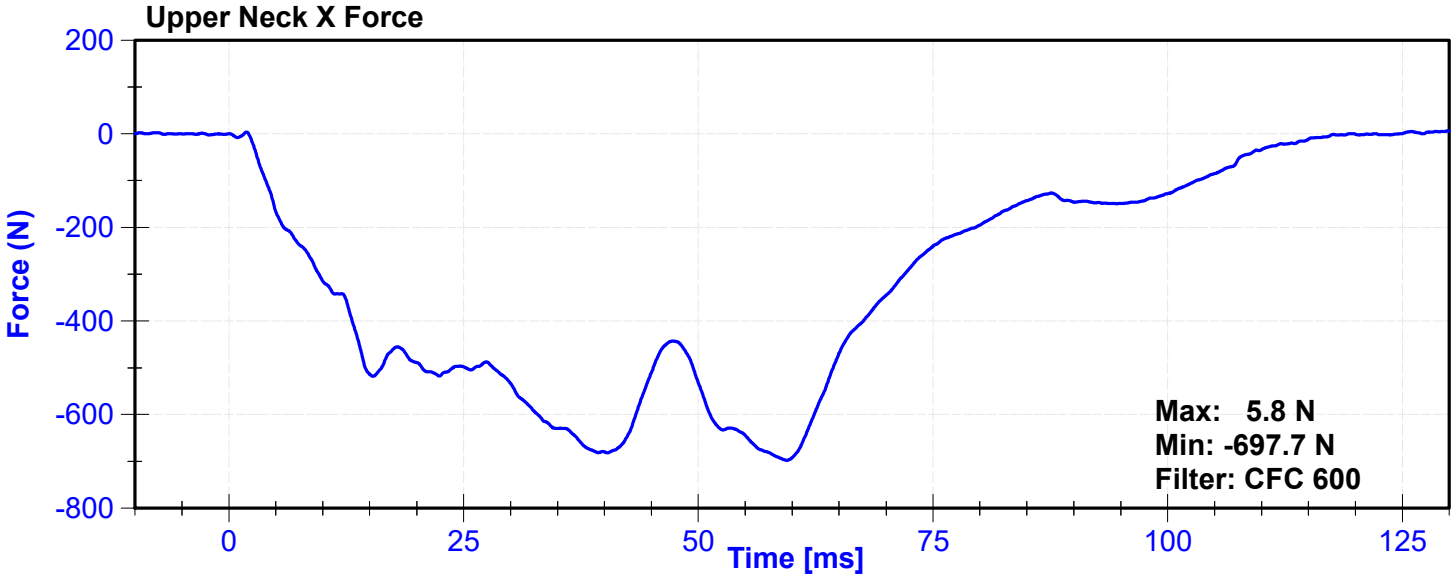



D-Plane Rotation
Max: 81.6 deg
Min: -49.6 deg
Filter: CFC 60
Rotation (Deg)
Time [ms]
100
75
50
25
0
-25
-50
-75
0
25
50
75
100
125
150


Moment About Occipital Condyle
Max: 77.1 Nm
Min: -23.4 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]
100
75
50
25
0
-25
0
25
50
75
100
125
150


Pendulum Deceleration
Acceleration (g's)
Time [ms]
Max: 26.7 g's
Min: -4.0 g's
Filter: CFC 60


Upper Neck Y Moment
Moment (Nm)
Time [ms]
Max: 68.4 Nm
Min: -32.4 Nm
Filter: CFC 600


Upper Neck X Force
Force (N)
Time [ms]
Max: 5.8 N
Min: -697.7 N
Filter: CFC 600

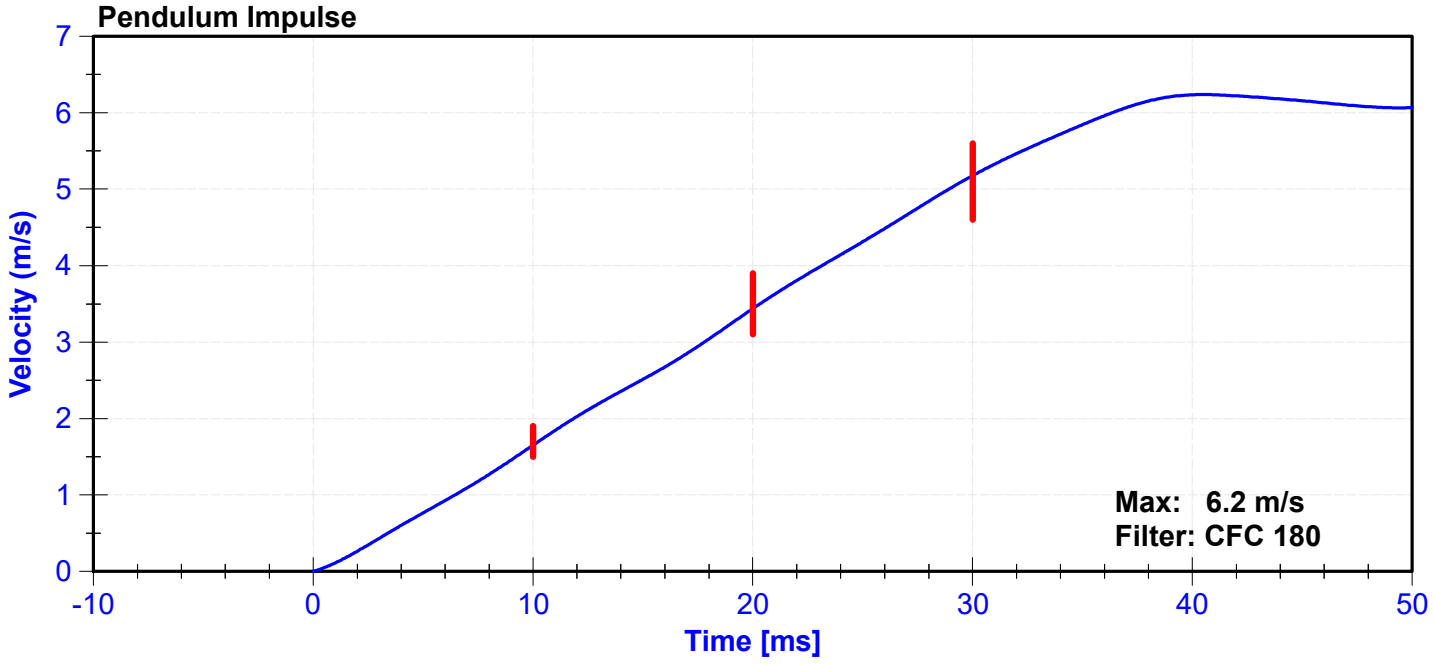
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

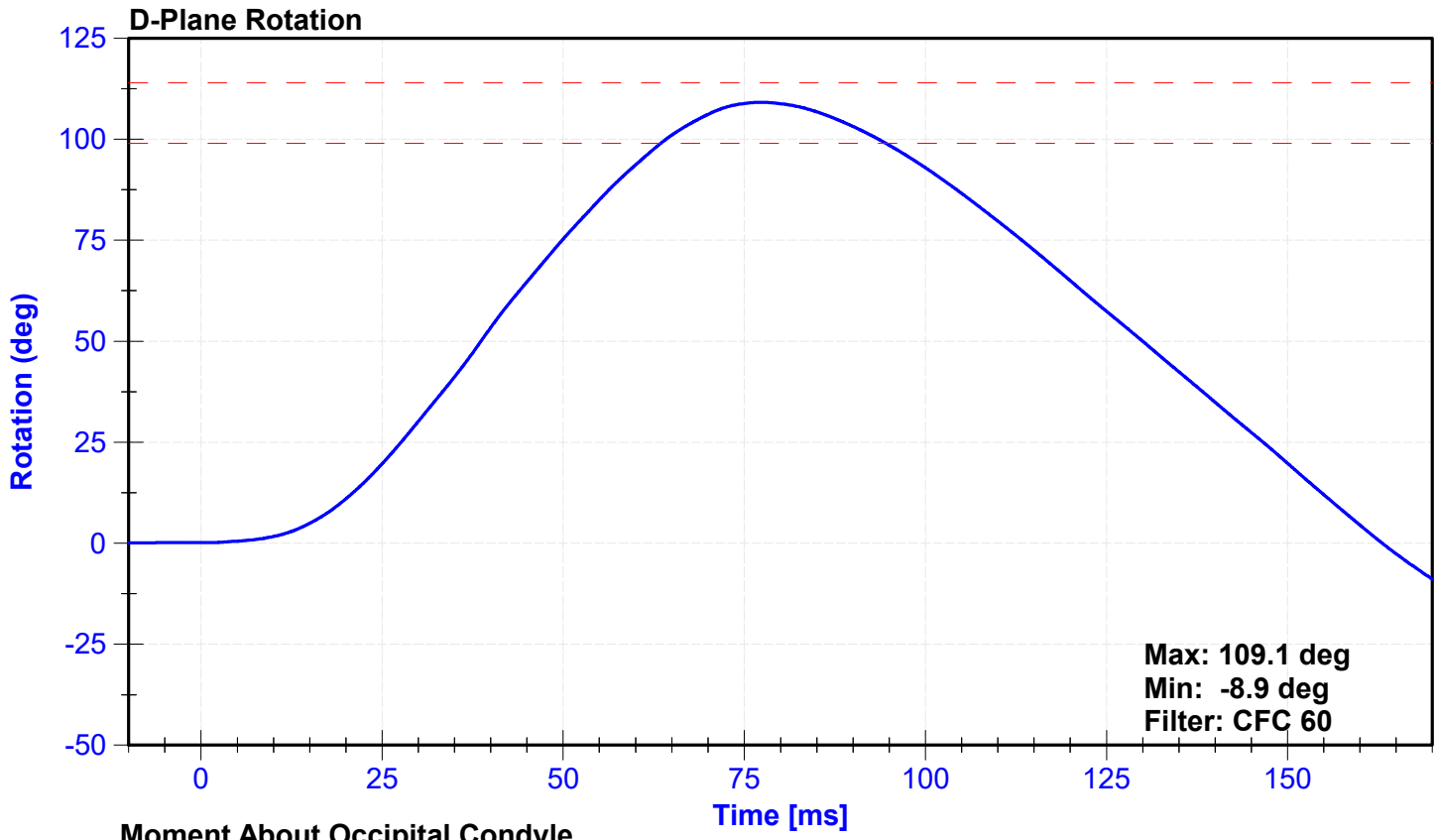
Results

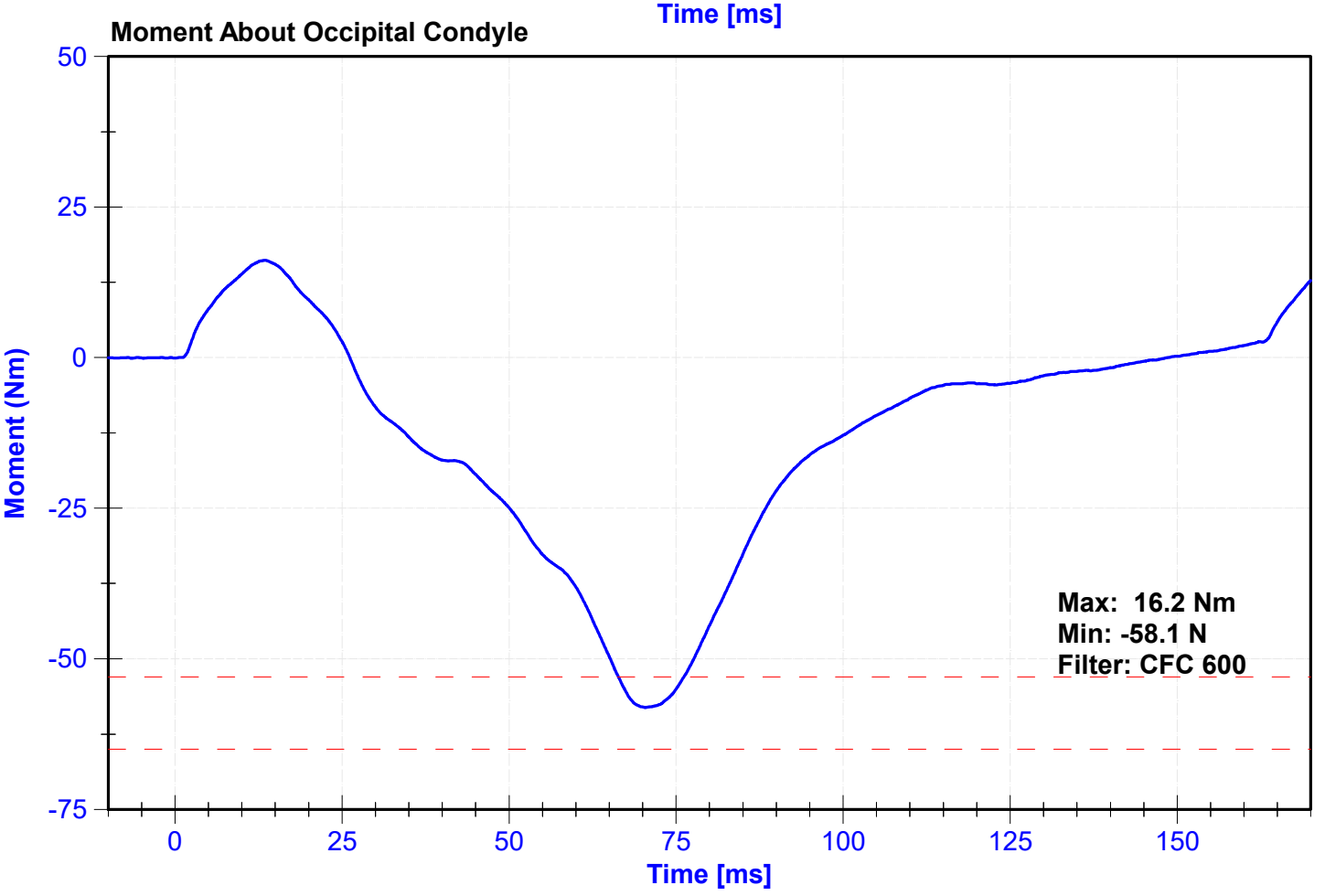
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	18	Pass
Velocity	5.95	6.19	m/s	5.985	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.65	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.44	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	5.18	Pass
D Plane Rotation	99	114	deg	109.1	Pass
Moment During Rotation Interval	-65	-53	Nm	-58.1	Pass
Moment Decay to -10Nm	94	114	ms	104.4	Pass

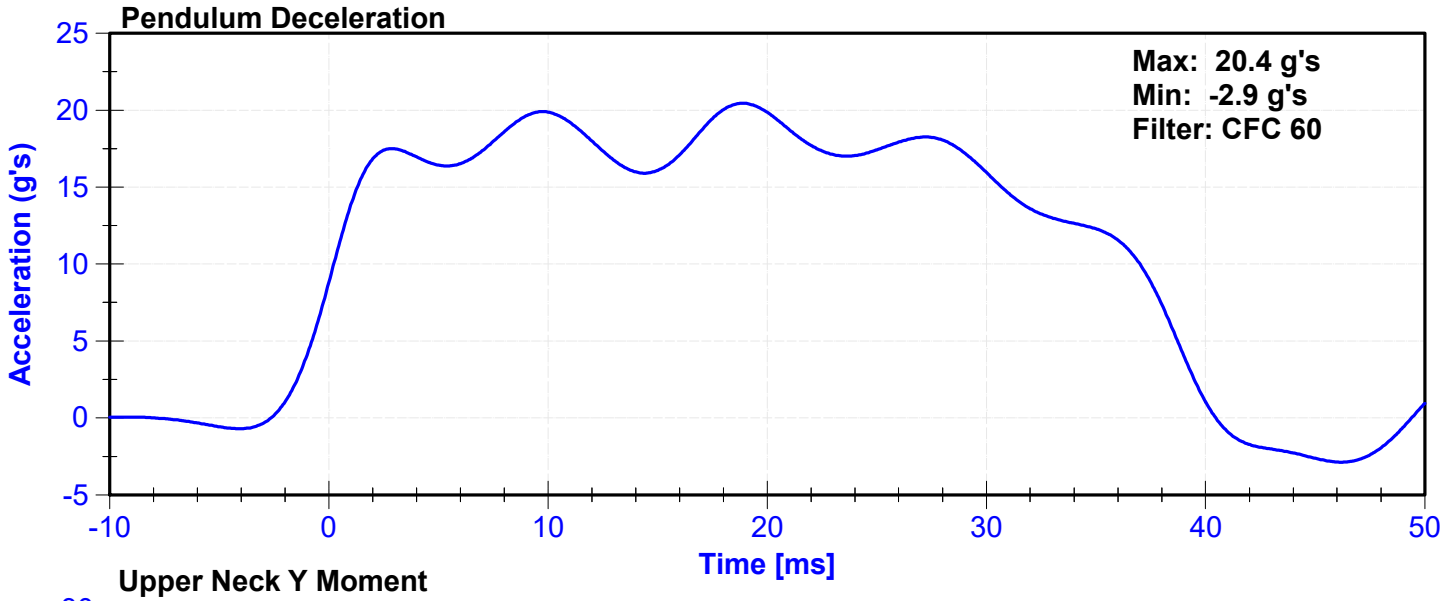
Transducer Calibrations

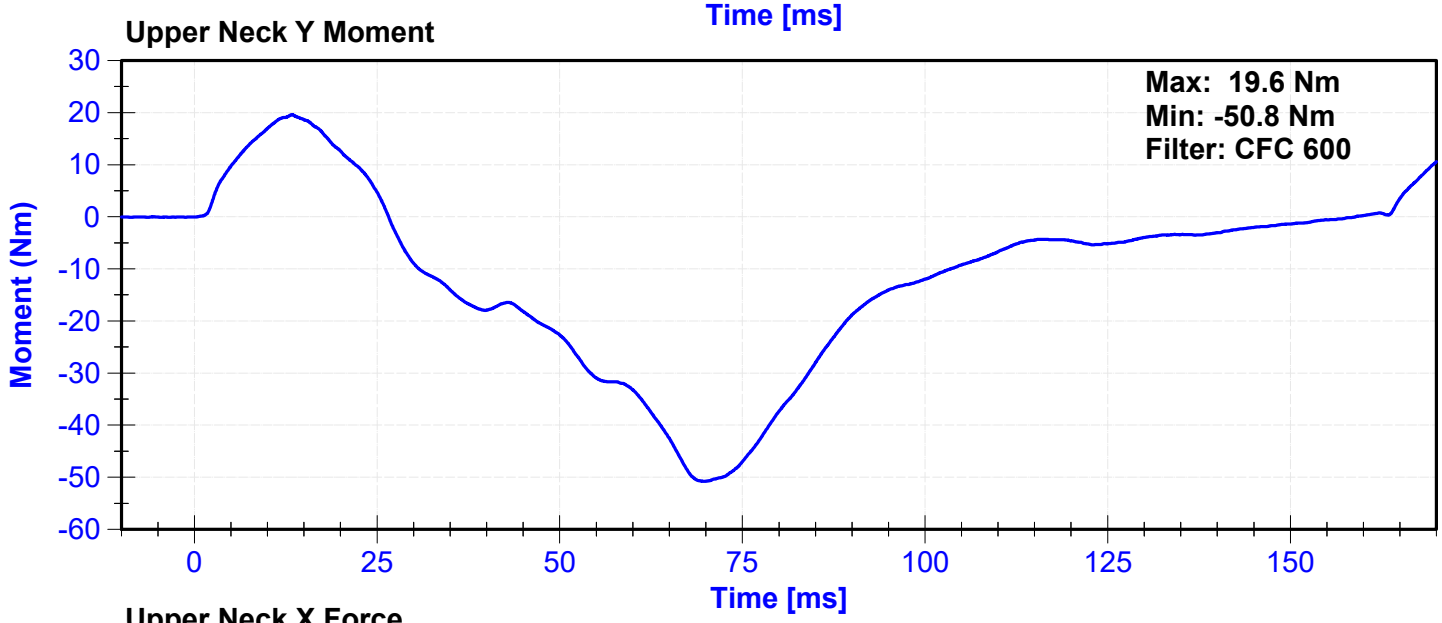
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16646	10/17/2024	4/15/2025
Pendulum Potentiometer	ETI	SP22G_LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	SP22G_LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Denton	2184-FX	7/10/2024	7/10/2025

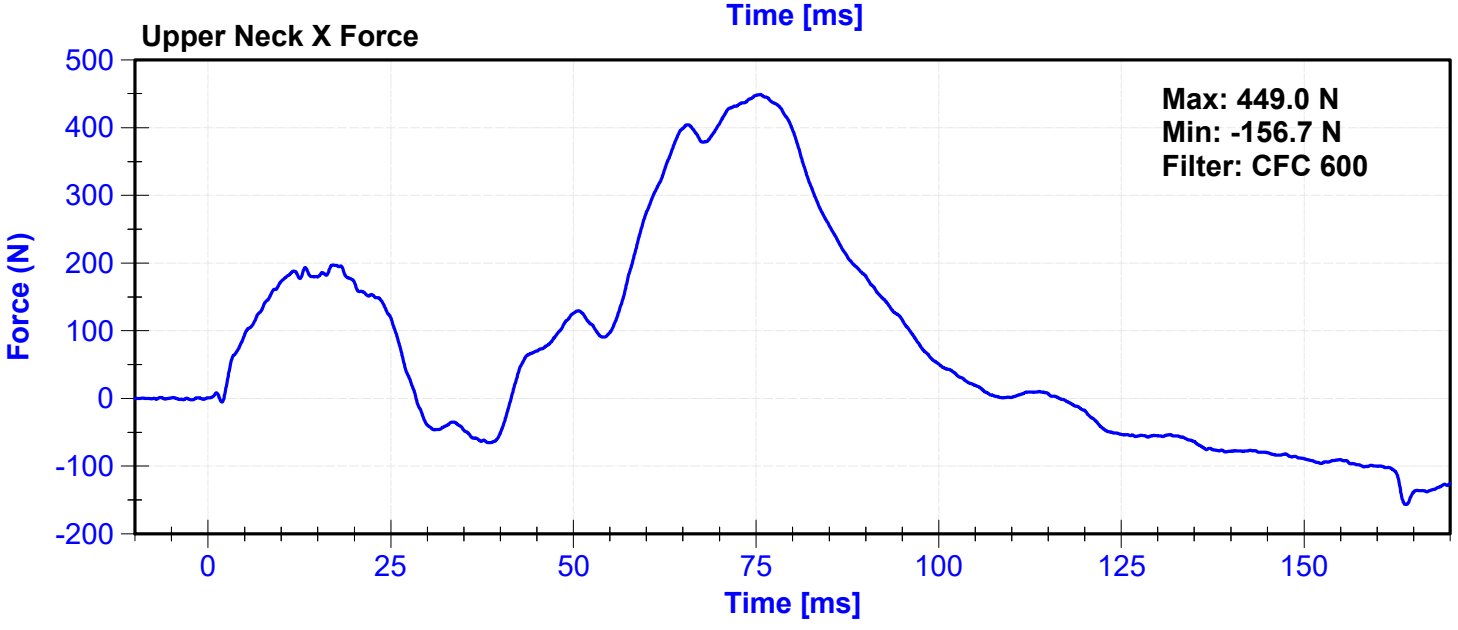



D-Plane Rotation
Rotation (deg)
125
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 109.1 deg
Min: -8.9 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
50
25
0
-25
-50
-75
0
25
50
75
100
125
150
Time [ms]
Max: 16.2 Nm
Min: -58.1 N
Filter: CFC 600


Pendulum Deceleration
Max: 20.4 g's
Min: -2.9 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 19.6 Nm
Min: -50.8 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 449.0 N
Min: -156.7 N
Filter: CFC 600
Force (N)
Time [ms]

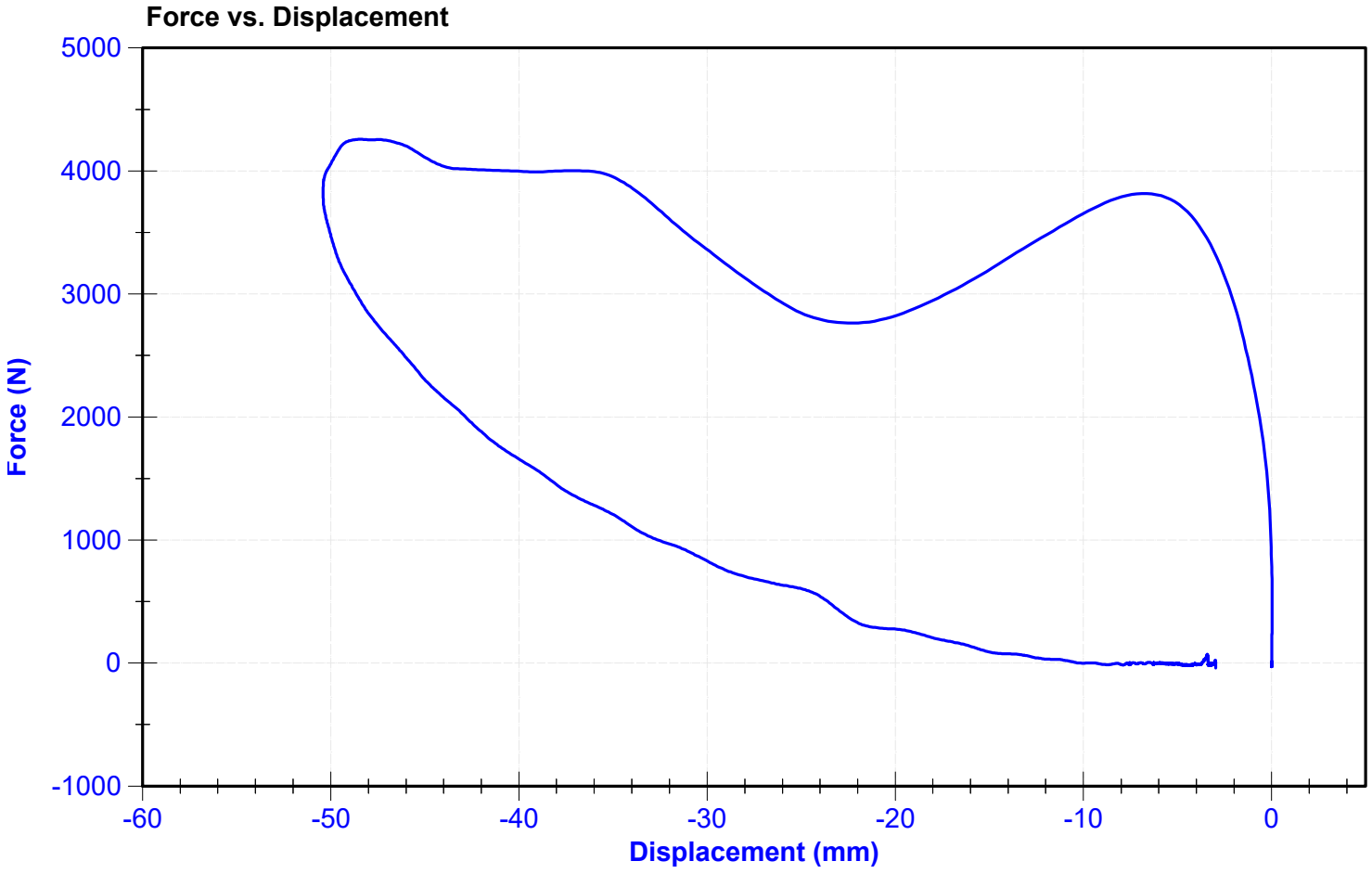
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

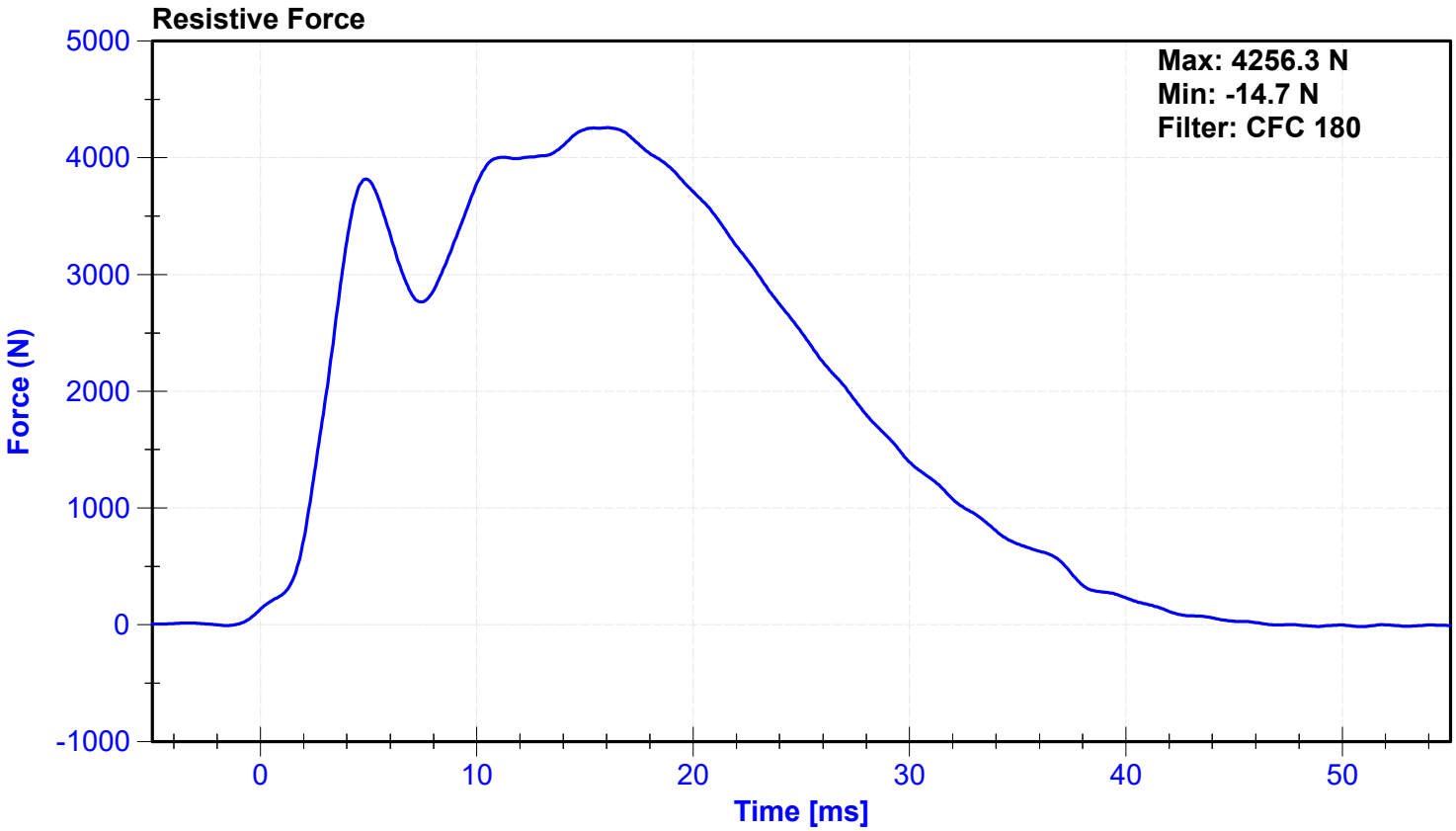
Results

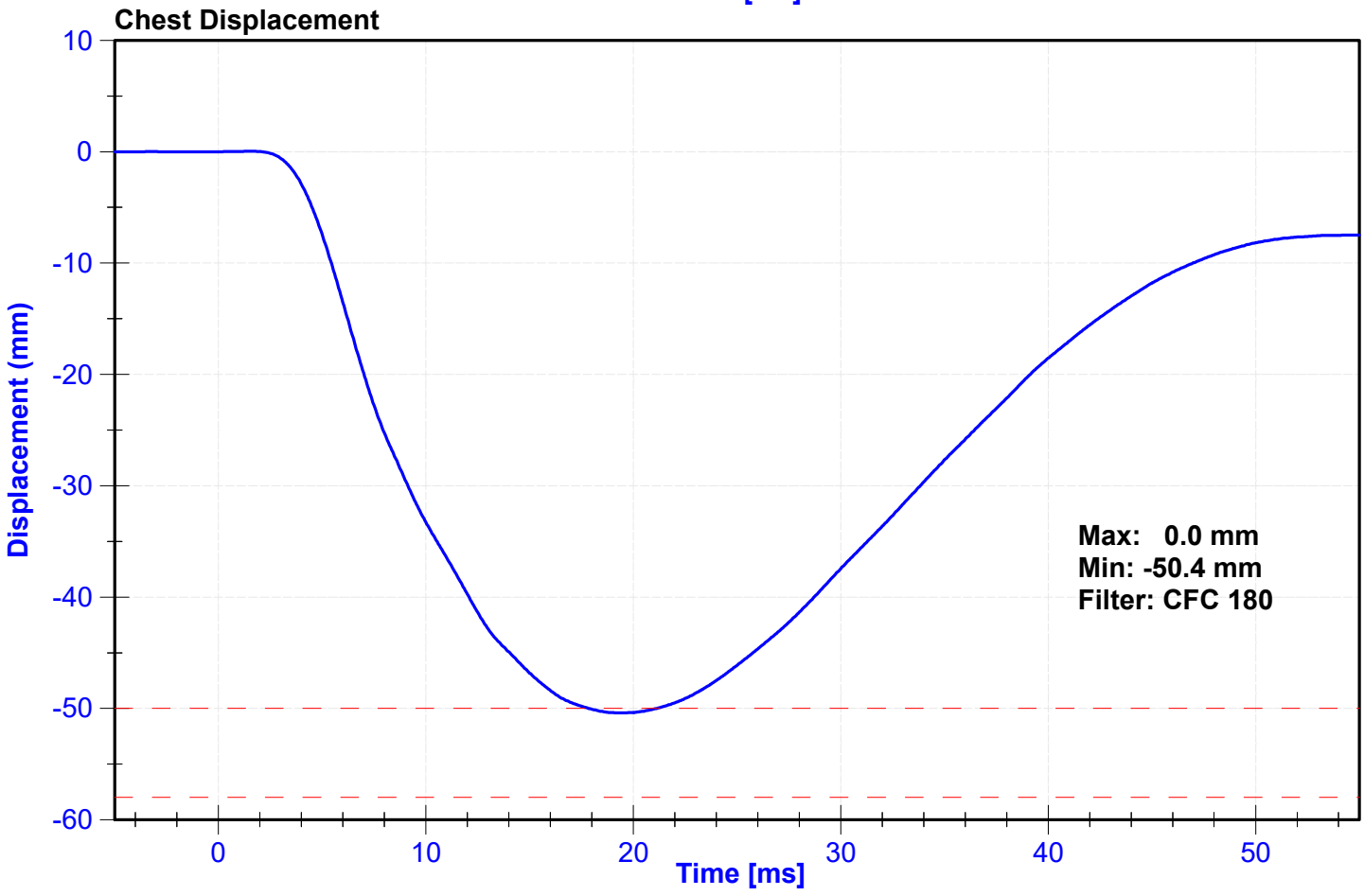
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	20	Pass
Velocity	6.59	6.83	m/s	6.700	Pass
Chest Deflection	-58	-50	mm	-50.4	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4063.7	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4256.3	Pass
Hysteresis	69	85	%	75.0	Pass

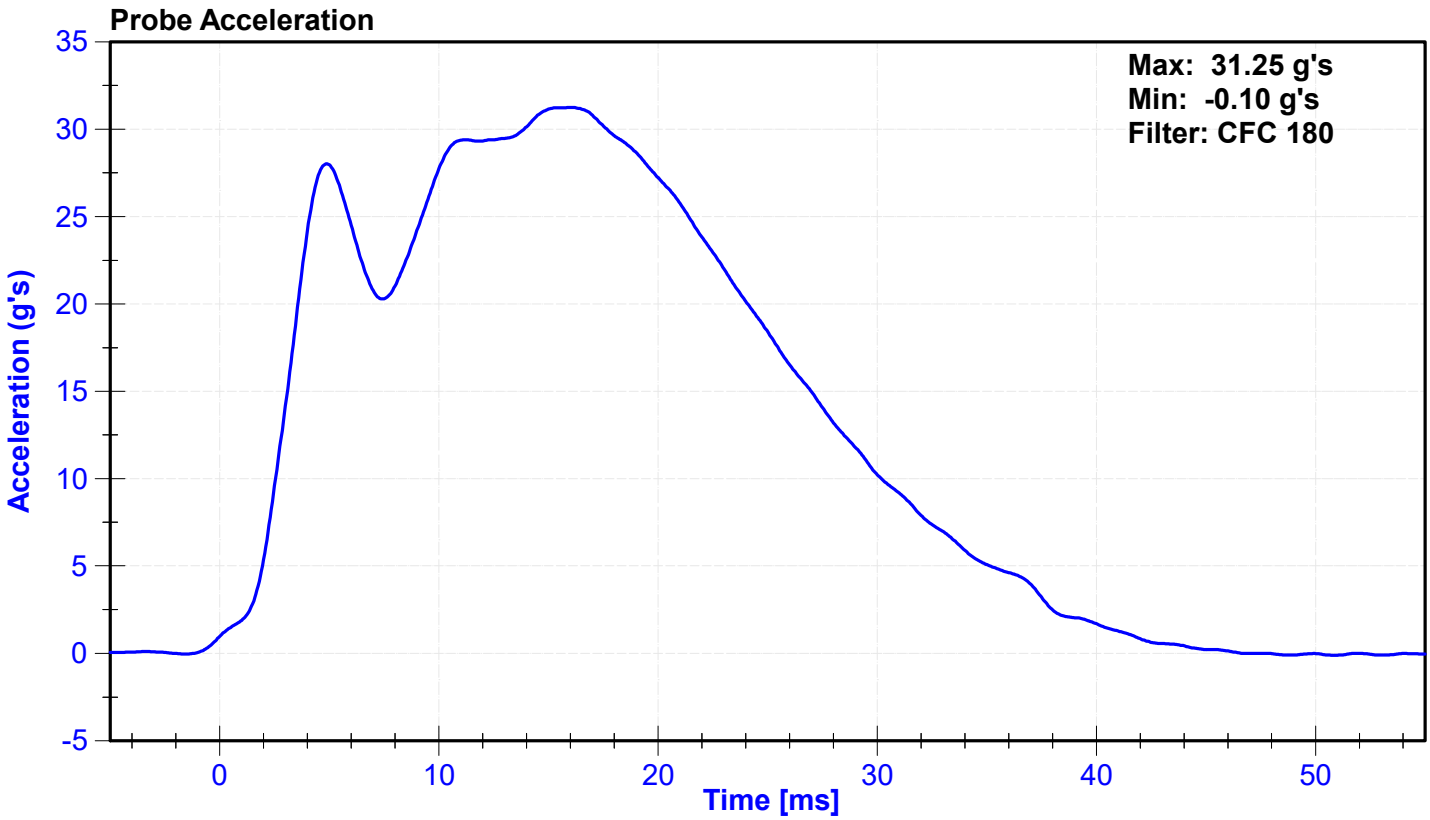
Transducer Calibrations

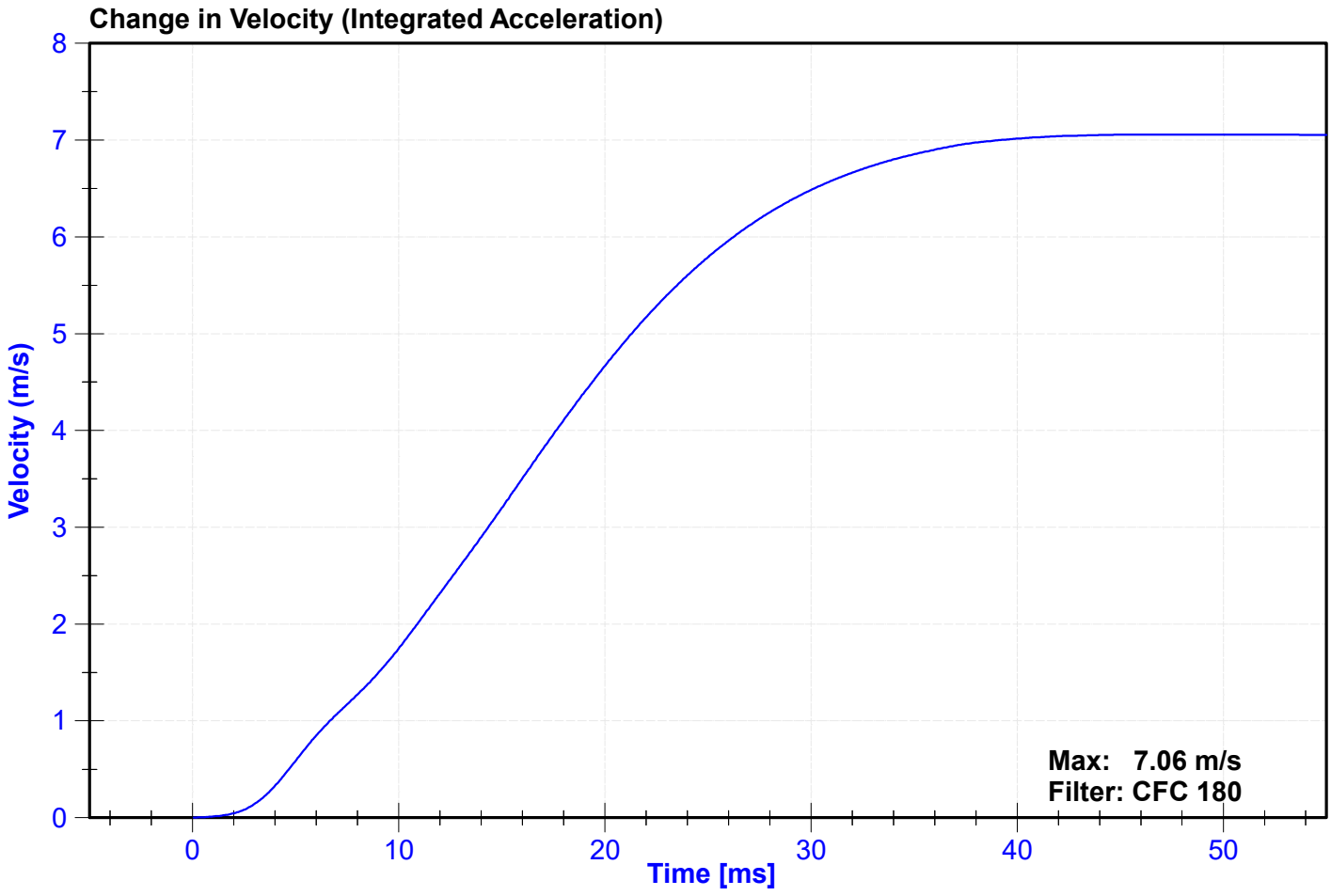
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Chest Potentiometer	Servo	0720	8/19/2024	2/17/2025




Resistive Force
Max: 4256.3 N
Min: -14.7 N
Filter: CFC 180
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]


Chest Displacement
Max: 0.0 mm
Min: -50.4 mm
Filter: CFC 180
Displacement (mm)
10
0
-10
-20
-30
-40
-50
-60
0
10
20
30
40
50
Time [ms]


Probe Acceleration
Max: 31.25 g's
Min: -0.10 g's
Filter: CFC 180
Acceleration (g's)
35
30
25
20
15
10
5
0
-5
0
10
20
30
40
50
Time [ms]


Change in Velocity (Integrated Acceleration)
Velocity (m/s)
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
Time [ms]
Max: 7.06 m/s
Filter: CFC 180

ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

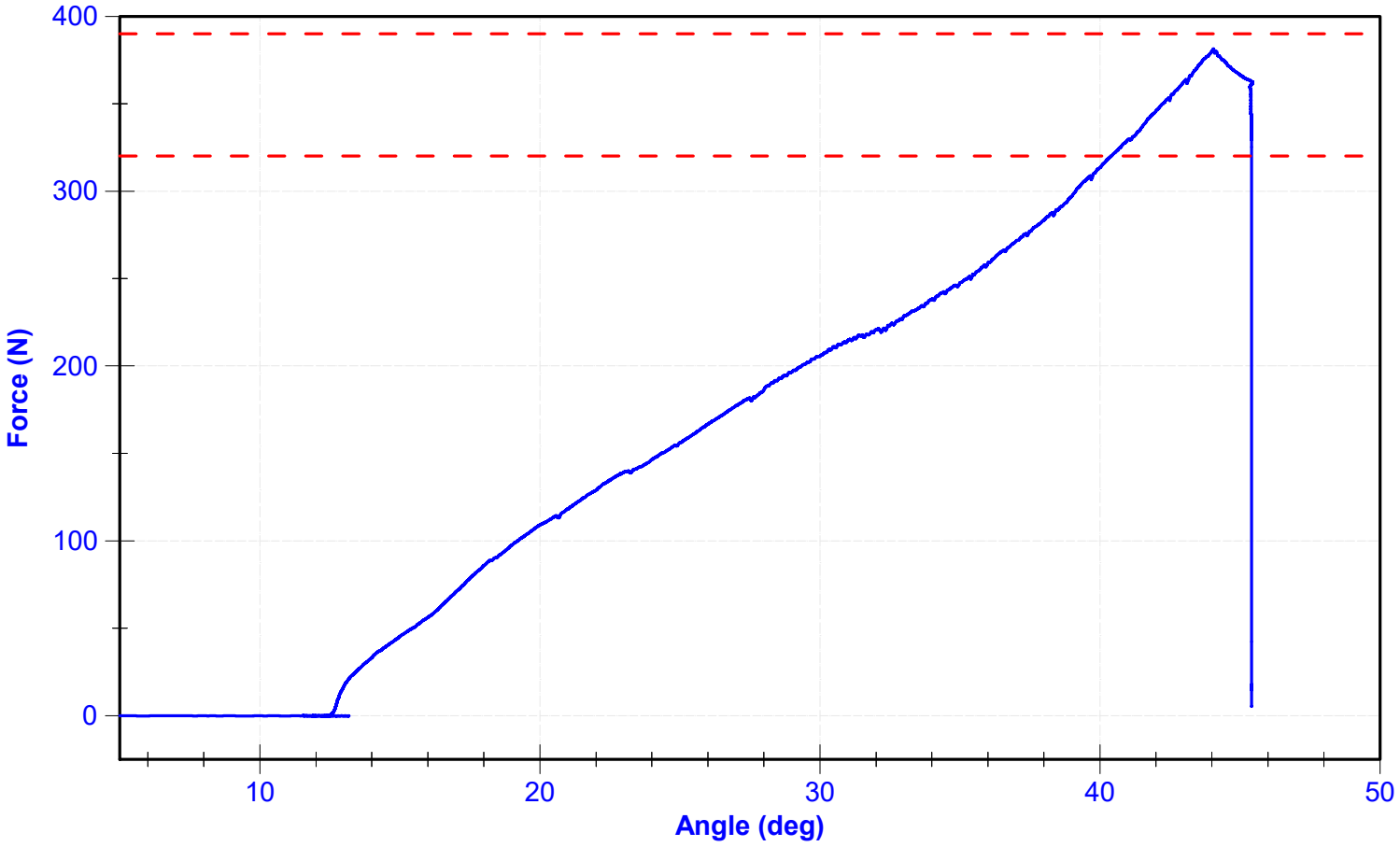
Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	ºC	21	Pass
Humidity	10	70	%	20	Pass
Initial Angle	0	20	deg	12.2	Pass
Force at 45 Degrees	320	390	N	381.4	Pass
Return Angle Relative to Initial	0	8	deg	2.2	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker	DS-1905226	2024-11-16	2025-11-16
Load Cell	Interface	493319	2024-08-14	2025-08-14

Force vs. Displacement



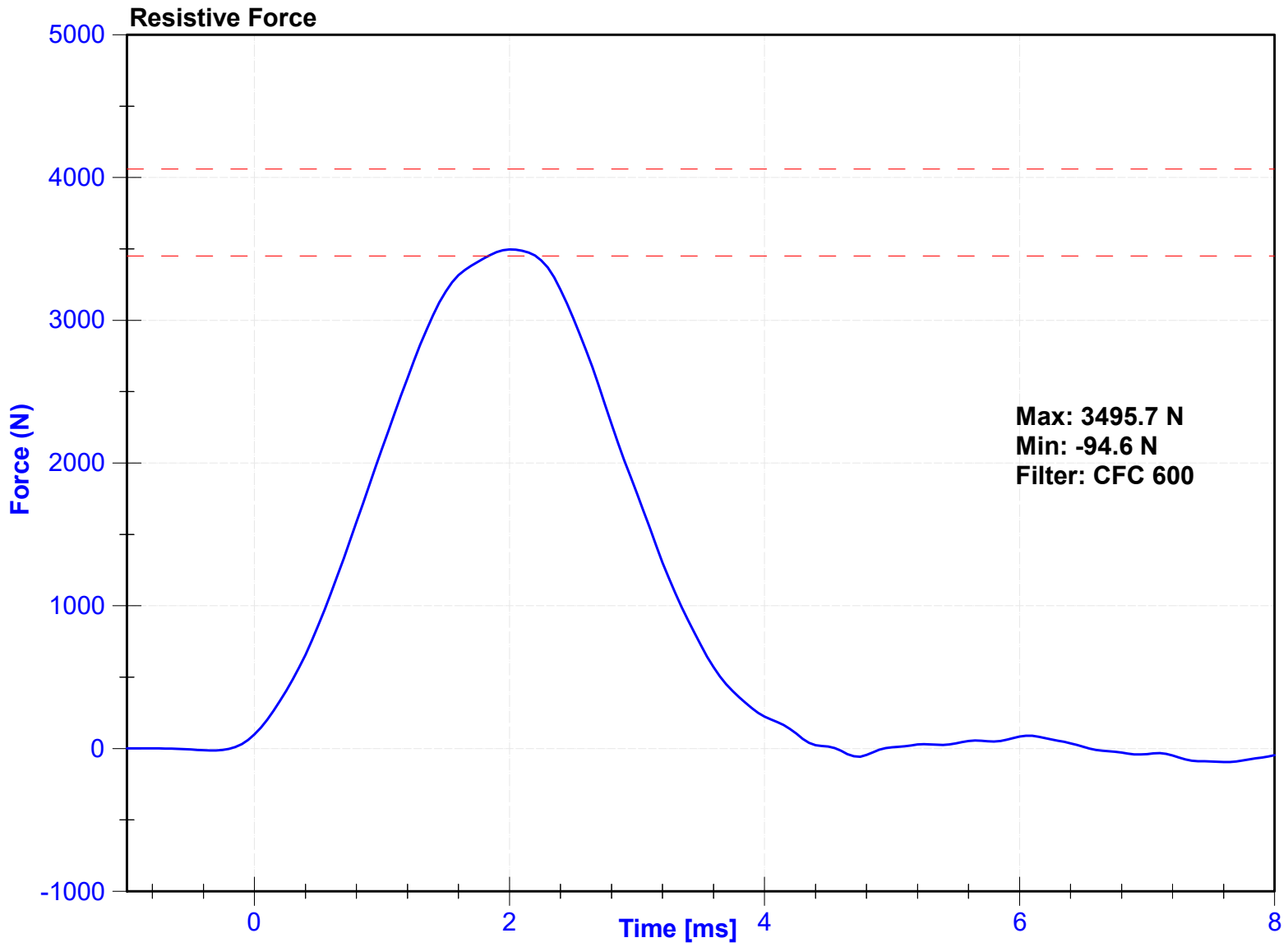
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

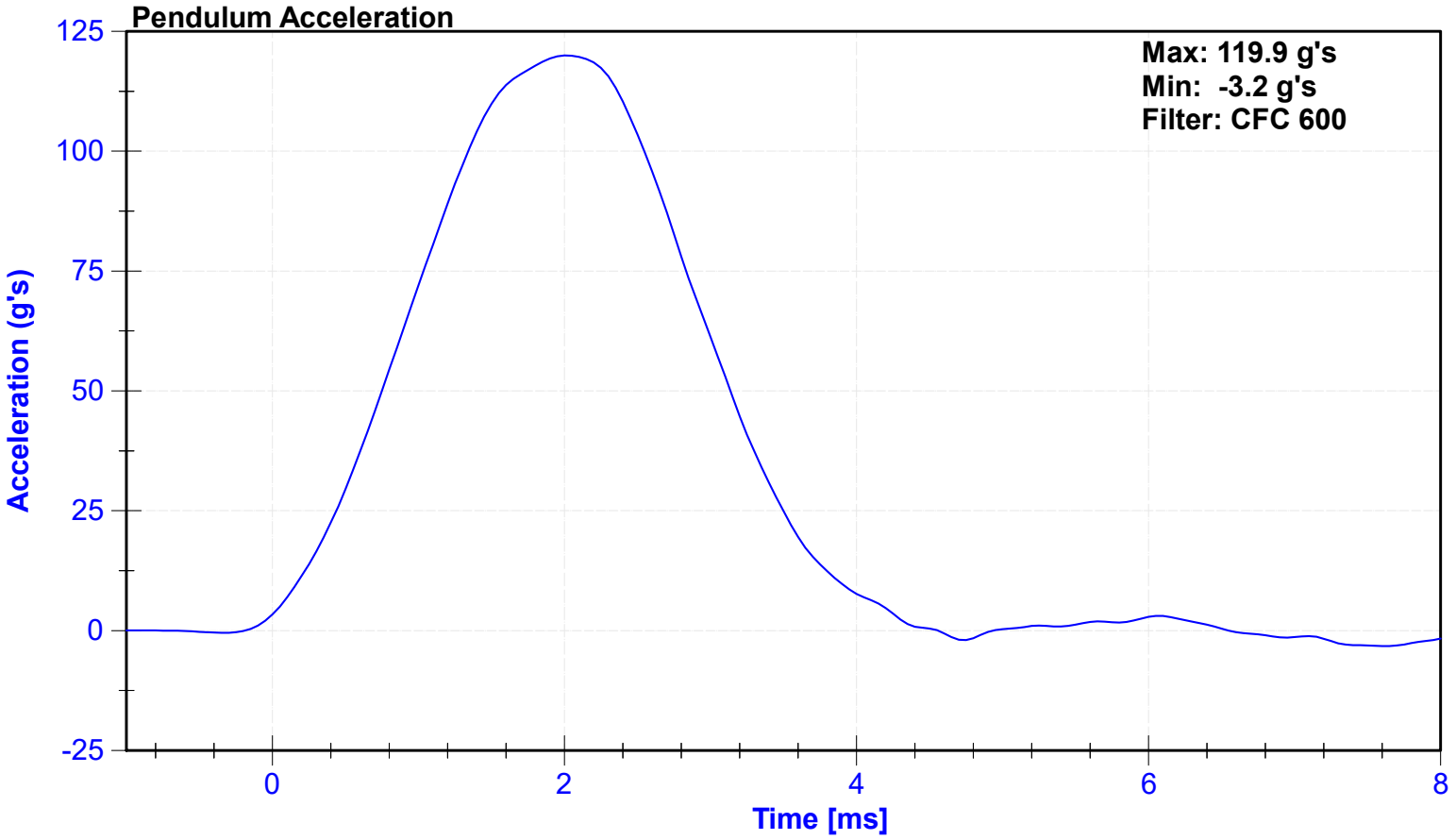
Results

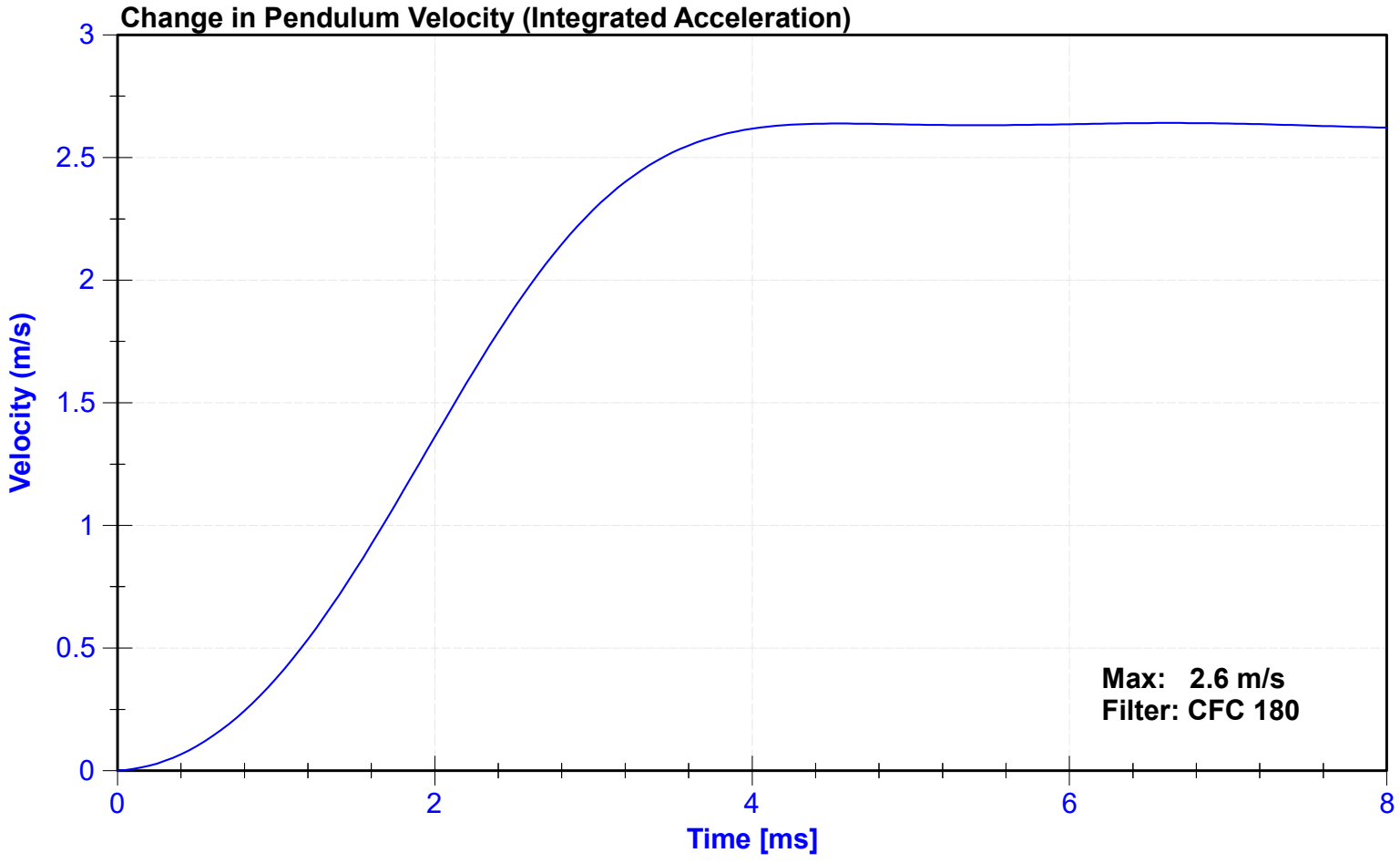
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	15	Pass
Velocity	2.07	2.13	m/s	2.093	Pass
Resistive Force	3450	4060	N	3495.7	Pass

Transducer Calibrations

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




Pendulum Acceleration
Max: 119.9 g's
Min: -3.2 g's
Filter: CFC 600
Acceleration (g's)
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]


Change in Pendulum Velocity (Integrated Acceleration)
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
Time [ms]
Max: 2.6 m/s
Filter: CFC 180

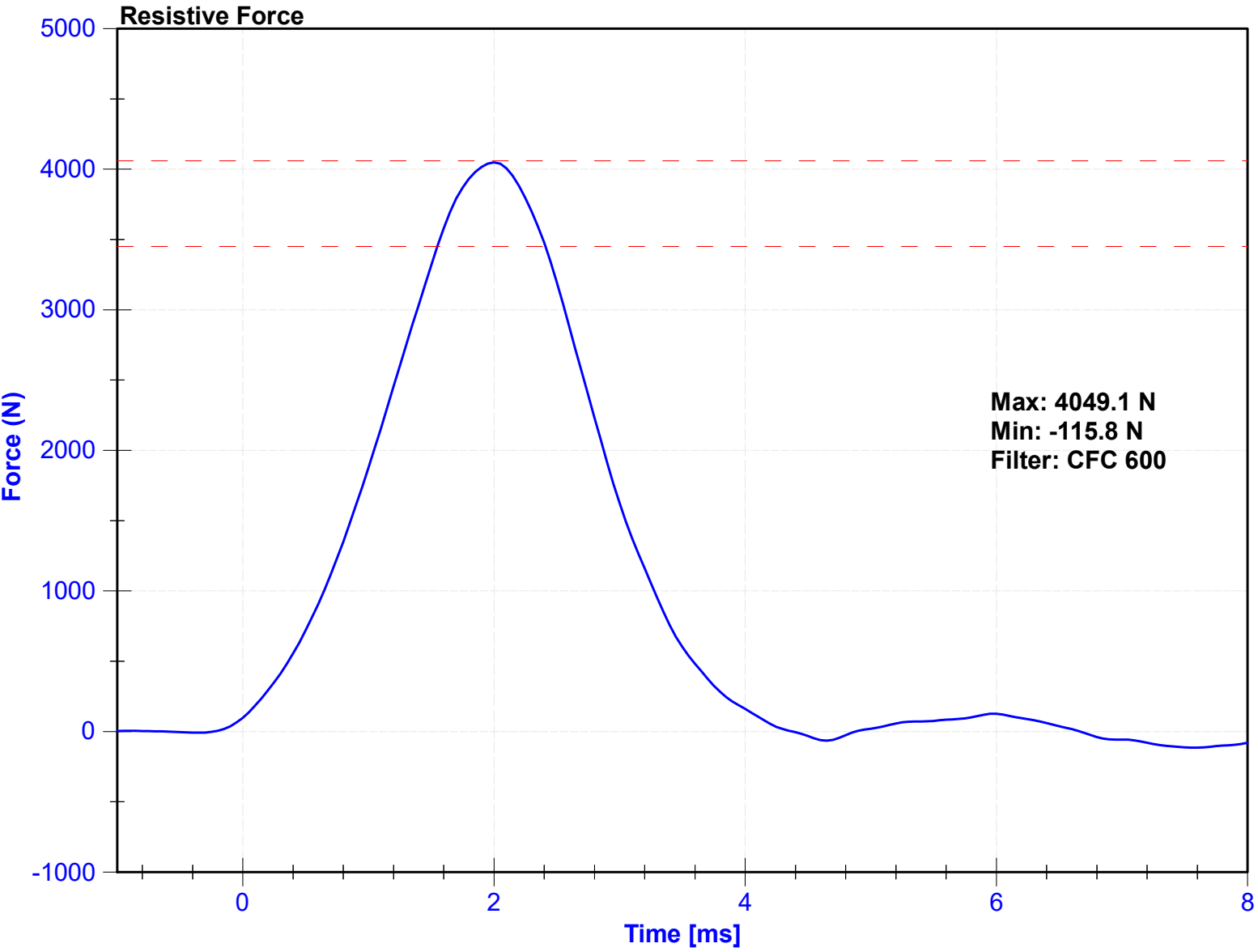
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

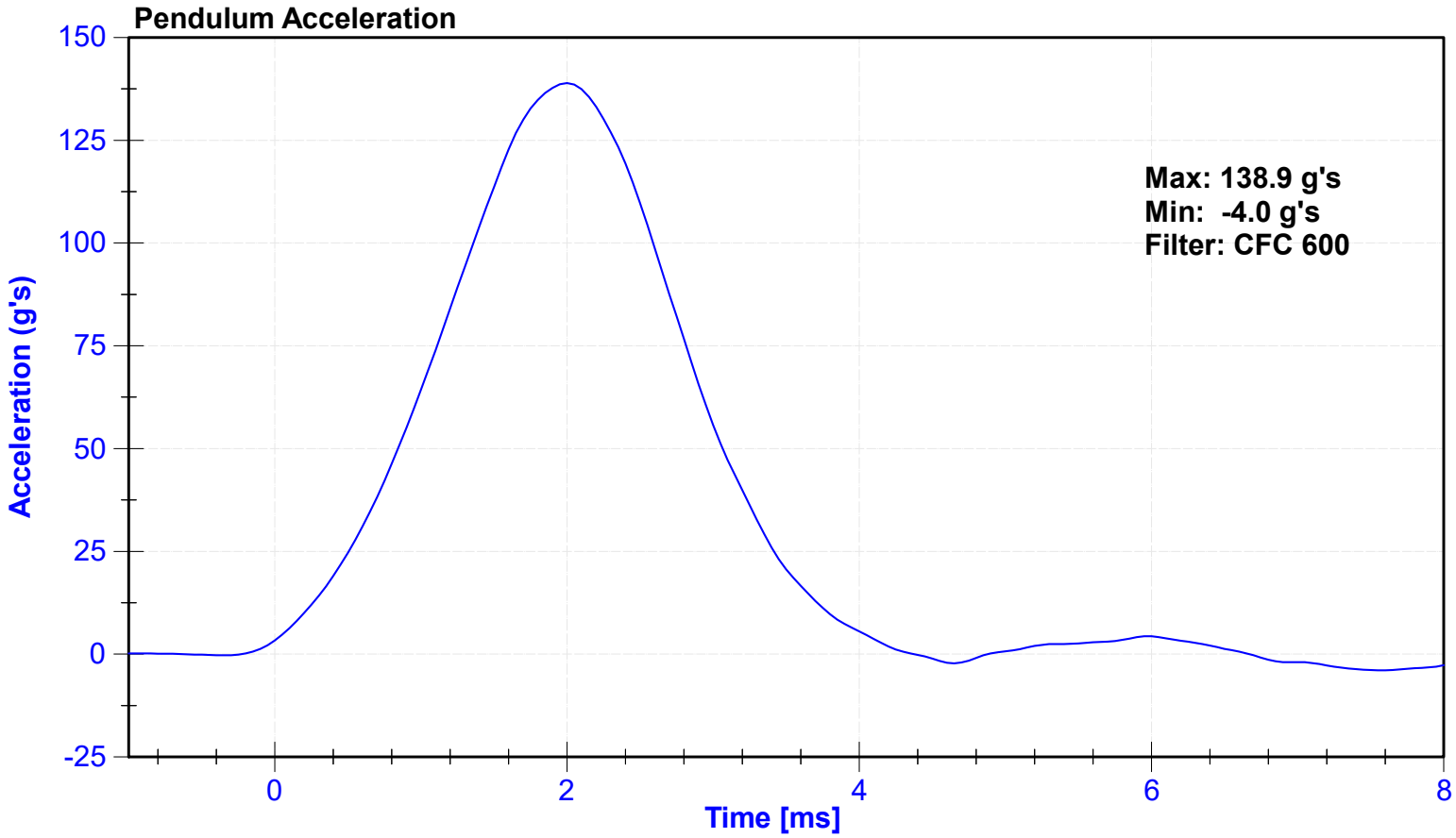
Results

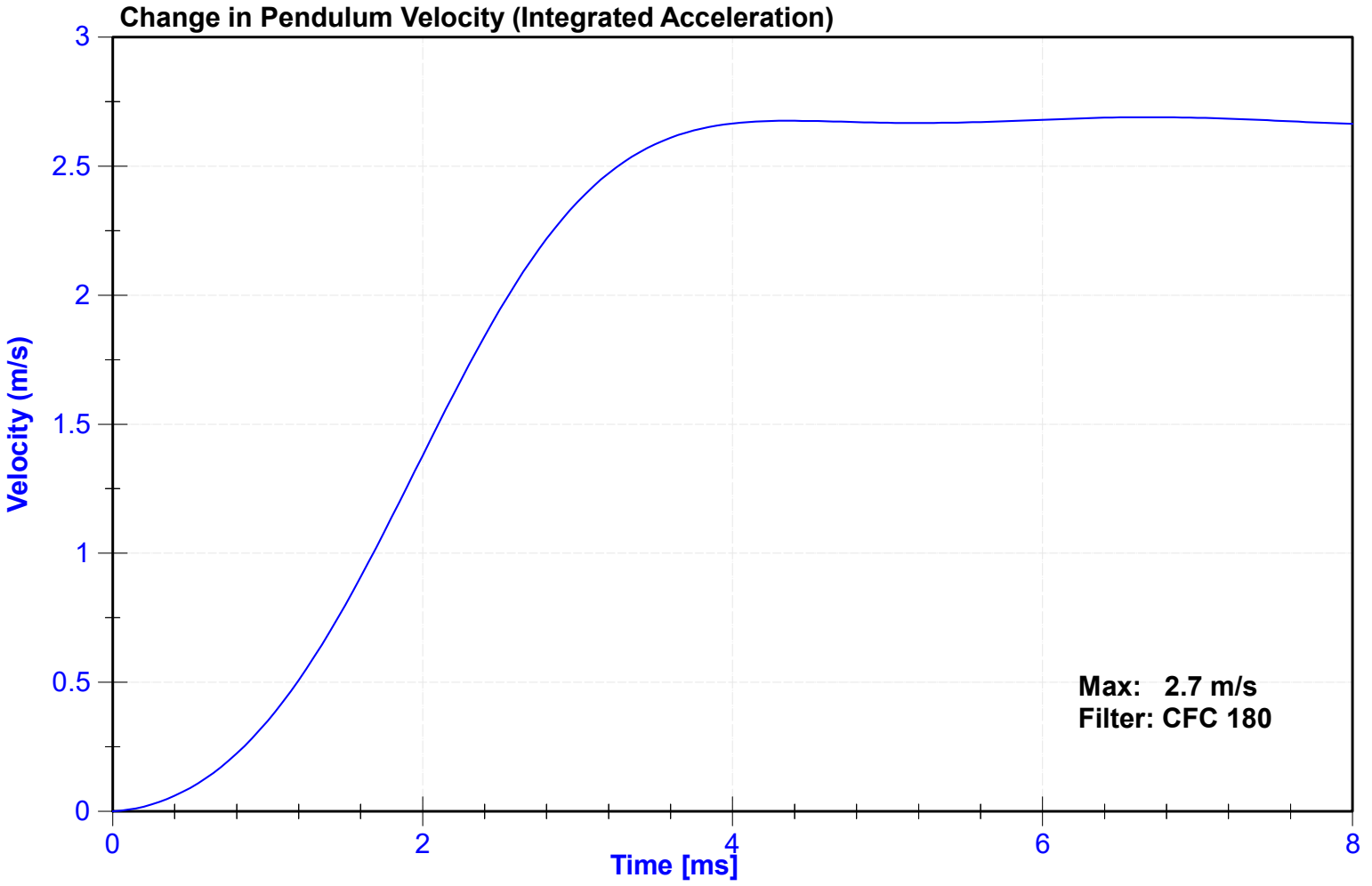
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	15	Pass
Velocity	2.07	2.13	m/s	2.090	Pass
Resistive Force	3450	4060	N	4049.1	Pass

Transducer Calibrations

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




Pendulum Acceleration
Max: 138.9 g's
Min: -4.0 g's
Filter: CFC 600
Acceleration (g's)
Time [ms]
150
125
100
75
50
25
0
-25
0
2
4
6
8


Change in Pendulum Velocity (Integrated Acceleration)
Max: 2.7 m/s
Filter: CFC 180
Velocity (m/s)
Time [ms]
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8

CALIBRATION TEST RESULTS

POST-TEST

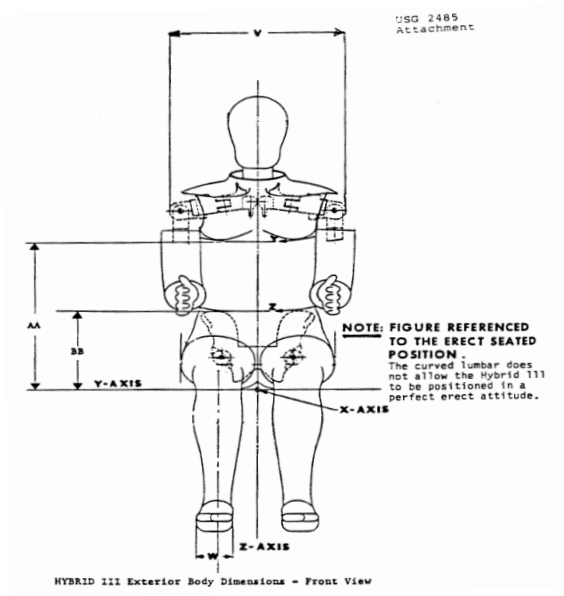
HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 065

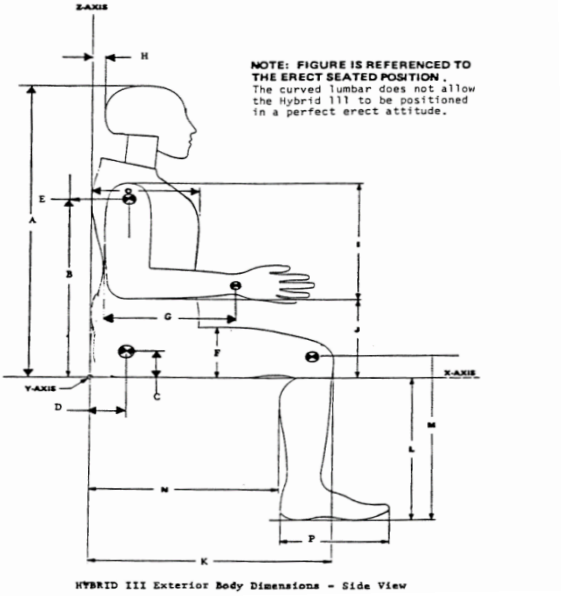
External Measurements - Hybrid 3 - 50th Male

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

Dummy Serial Number: 065



HYBRID III Exterior Body Dimensions - Front View



HYBRID III Exterior Body Dimensions - Side View

Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.8	Pass
B	Shoulder Pivot Height	19.9	20.5	20.2	Pass
C	H-Point Height	3.3	3.5	3.4	Pass
D	H-Point from Backline	5.3	5.5	5.4	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.6	Pass
F	Thigh Clearance	5.5	6.1	5.8	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.7	Pass
H	Head Back to Backline	1.6	1.8	1.7	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.3	Pass
J	Elbow Rest Height	7.5	8.3	7.9	Pass
K	Buttock to Knee Length	22.8	23.8	23.4	Pass
L	Popliteal Height	16.9	17.9	17.3	Pass
M	Knee Pivot Height	19.1	19.7	19.6	Pass
N	Buttock Popliteal Length	17.8	18.8	18.5	Pass
O	Chest Depth without Jacket	8.4	9.0	8.8	Pass
P	Foot Length (right)	9.9	10.5	10.4	Pass
V	Shoulder Breadth	16.3	17.2	16.7	Pass
W	Foot Breadth	3.6	4.2	3.9	Pass
Y	Chest Circumference with Jacket	38.2	39.4	38.7	Pass
Z	Waist Circumference	32.9	34.1	33.5	Pass
AA	Reference Location (Chest Circumference)	16.9	17.1	17.0	Pass
BB	Reference Location (Waist Circumference)	8.9	9.1	9.0	Pass

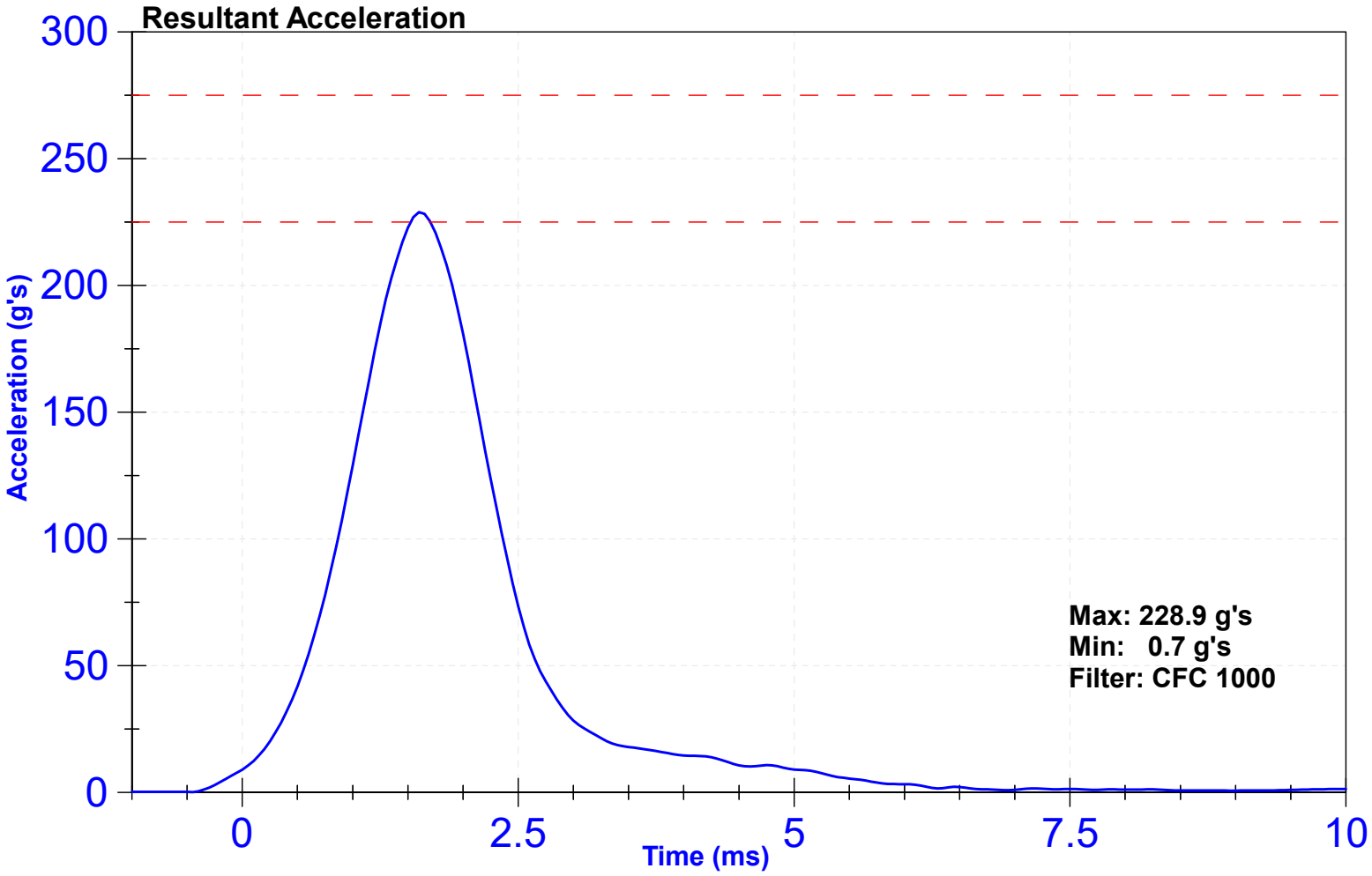
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

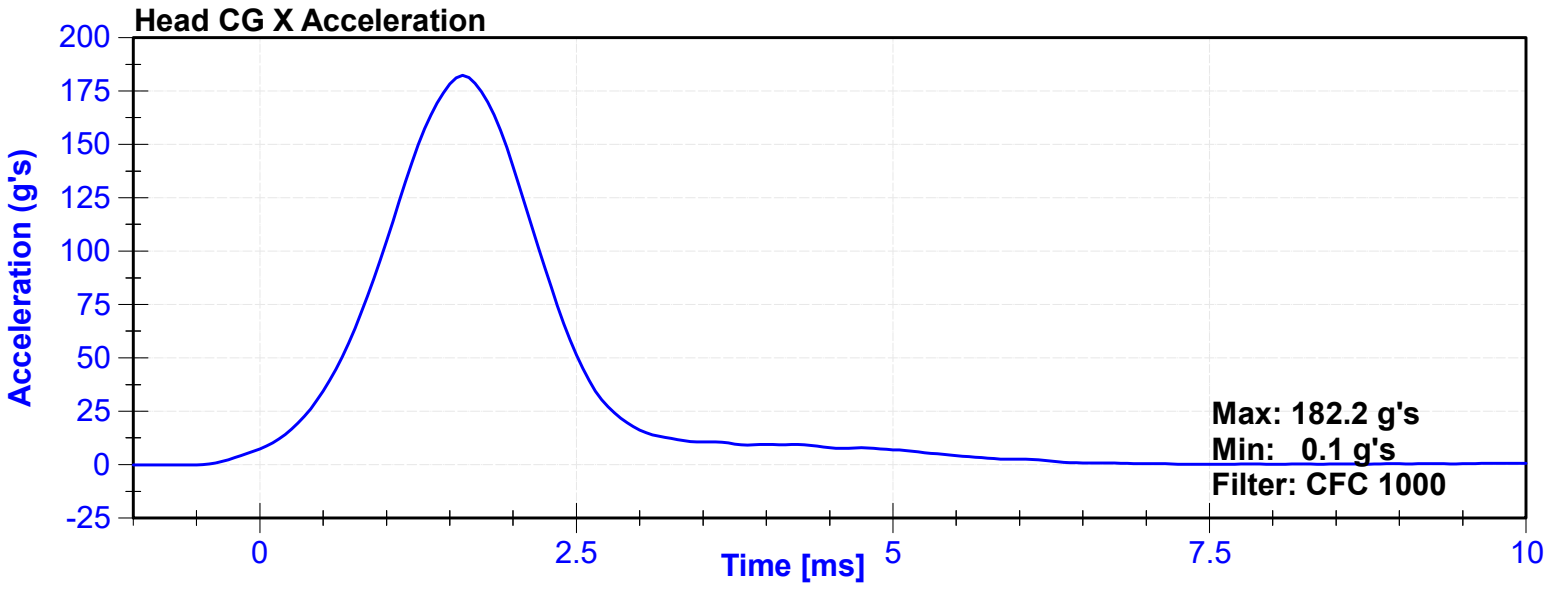
Results

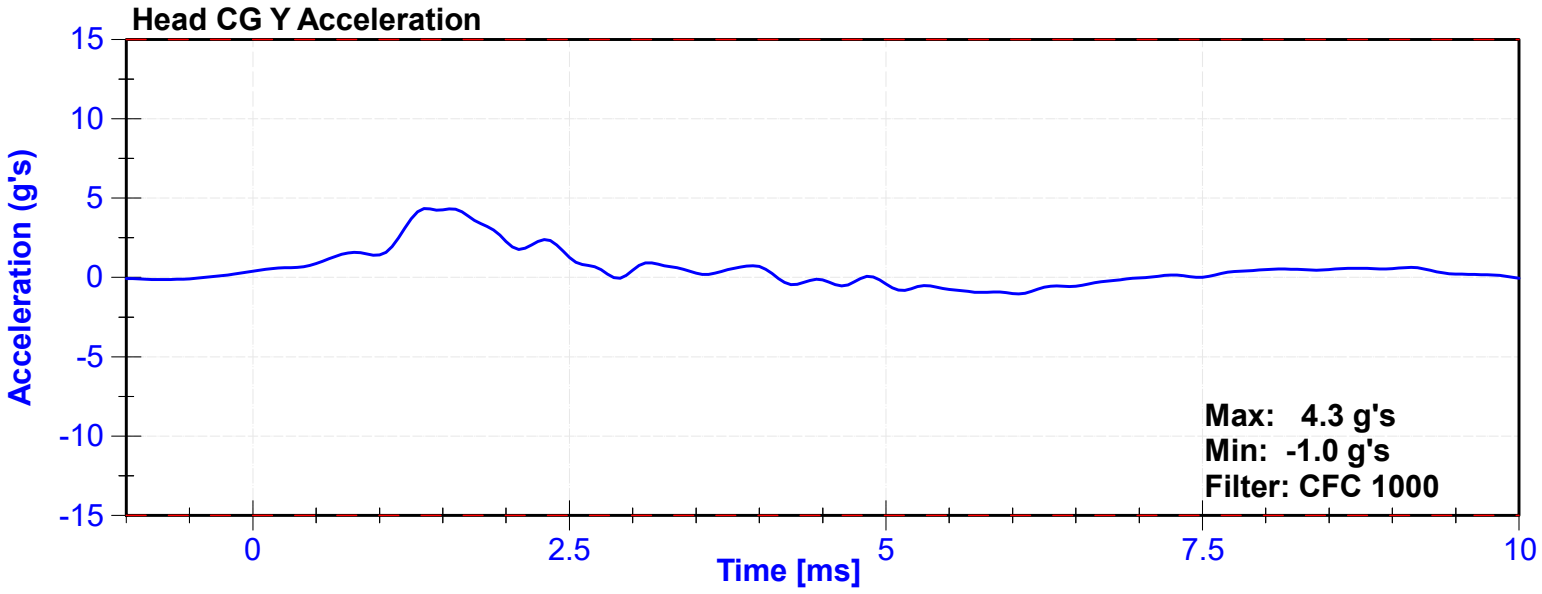
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	20	Pass
Resultant Acceleration	225	275	g's	228.9	Pass
Oscillation	0	10	%	4.6	Pass
Lateral Acceleration	-15	15	g's	4.3	Pass

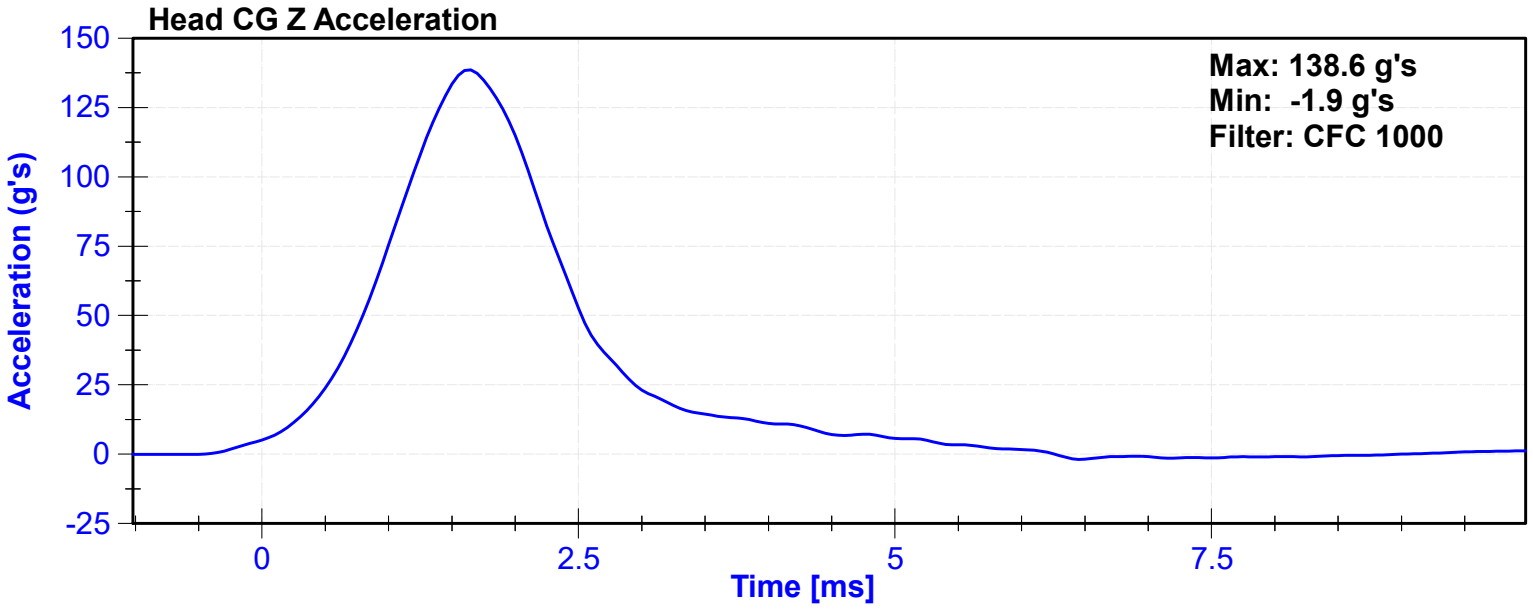
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P32464	3/20/2024	3/20/2025
Y Accelerometer	Endevco	P51736	3/20/2024	3/20/2025
Z Accelerometer	Endevco	T30979	3/20/2024	3/20/2025




Head CG X Acceleration
Acceleration (g's)
200
175
150
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 182.2 g's
Min: 0.1 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 4.3 g's
Min: -1.0 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
150
125
100
75
50
25
0
-25
0
2.5
5
7.5
Time [ms]
Max: 138.6 g's
Min: -1.9 g's
Filter: CFC 1000

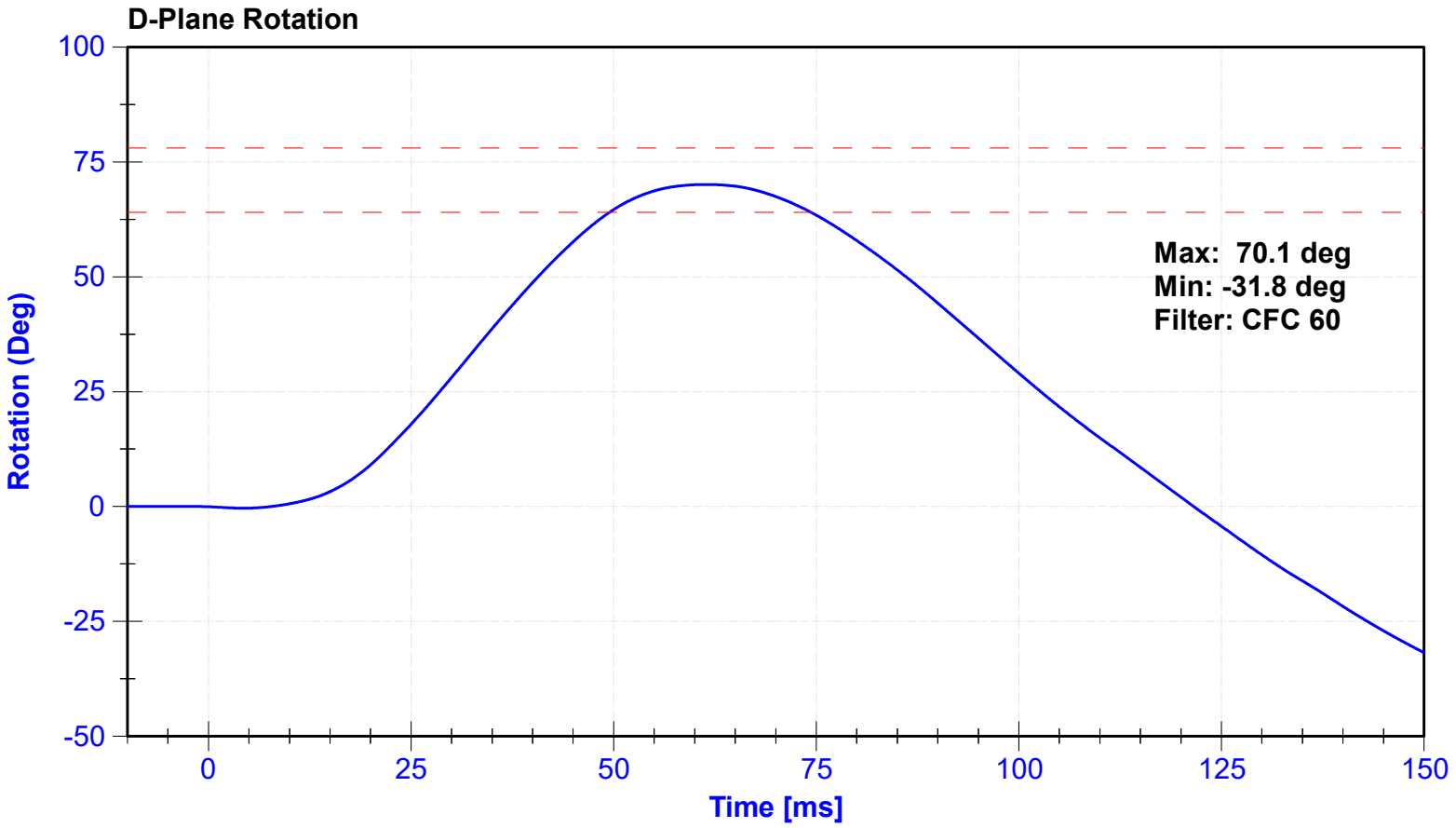
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

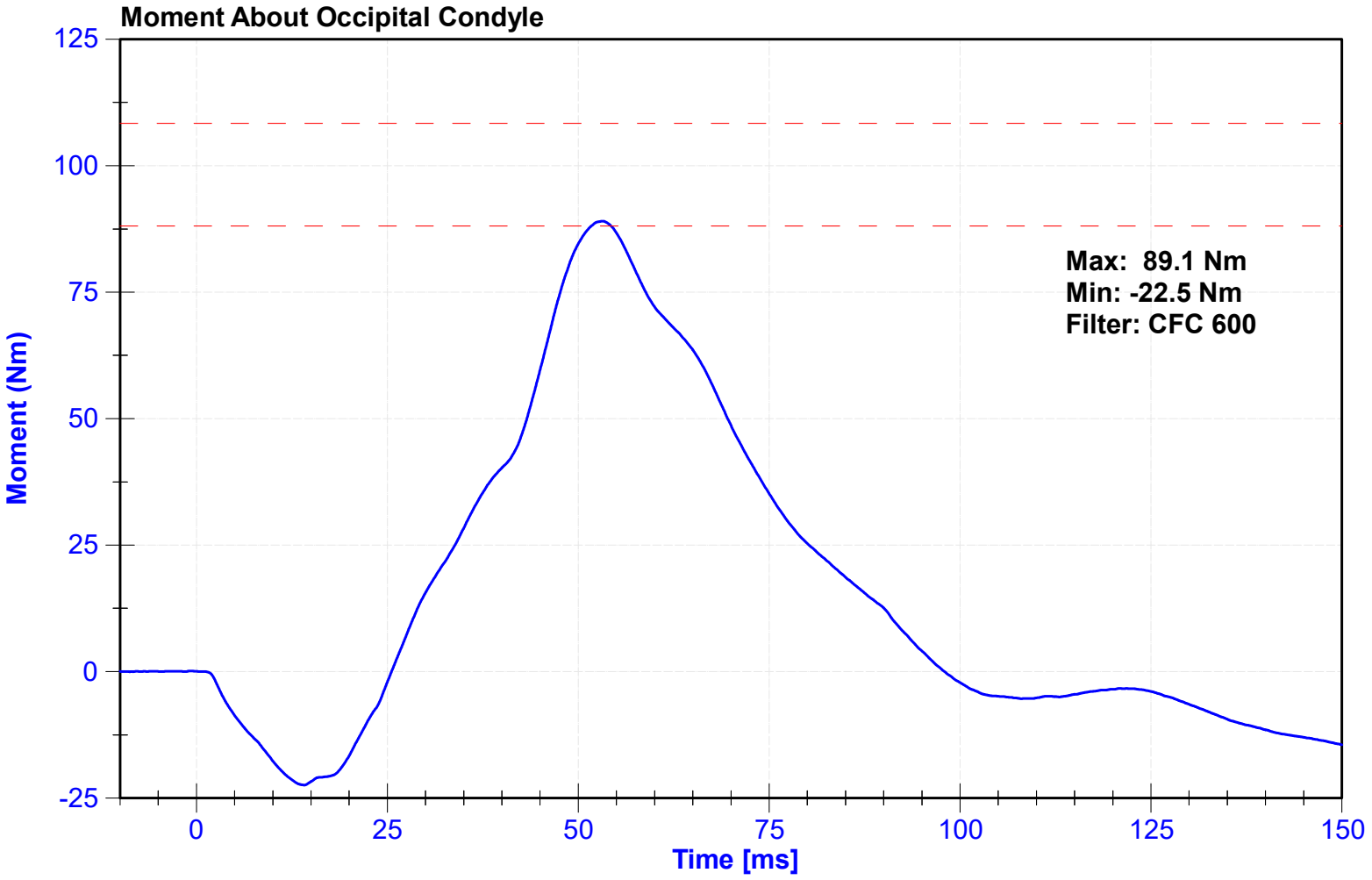
Results

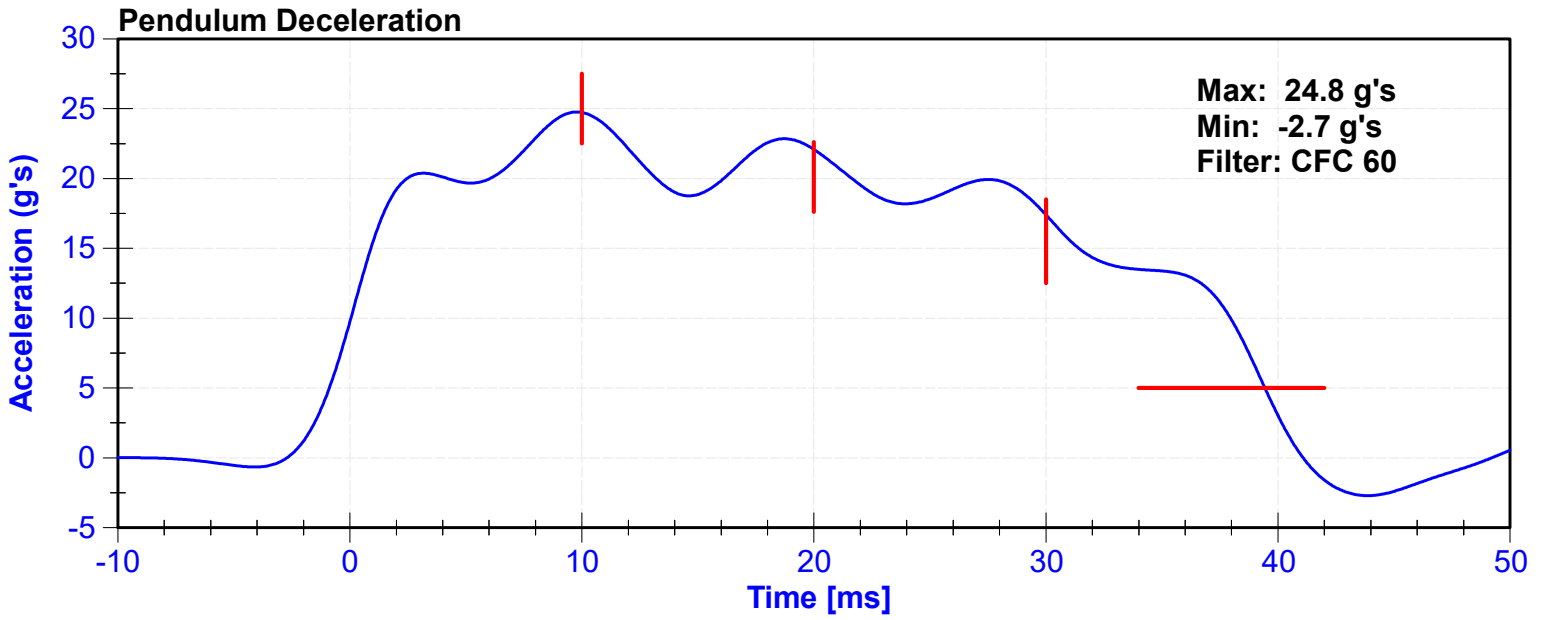
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	20	Pass
Velocity	6.89	7.13	m/s	6.904	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	24.73	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	22.07	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	17.39	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	24.8	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	39.4	Pass
Maximum D Plane Rotation	64	78	deg	70.1	Pass
Time to Maximum Rotation	57	64	ms	61.4	Pass
Rotation Decay to Zero	113	127	ms	121.6	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	89.06	Pass
Time to Maximum Moment	47	58	ms	53.2	Pass
Moment Decay to Zero	97	107	ms	97.9	Pass

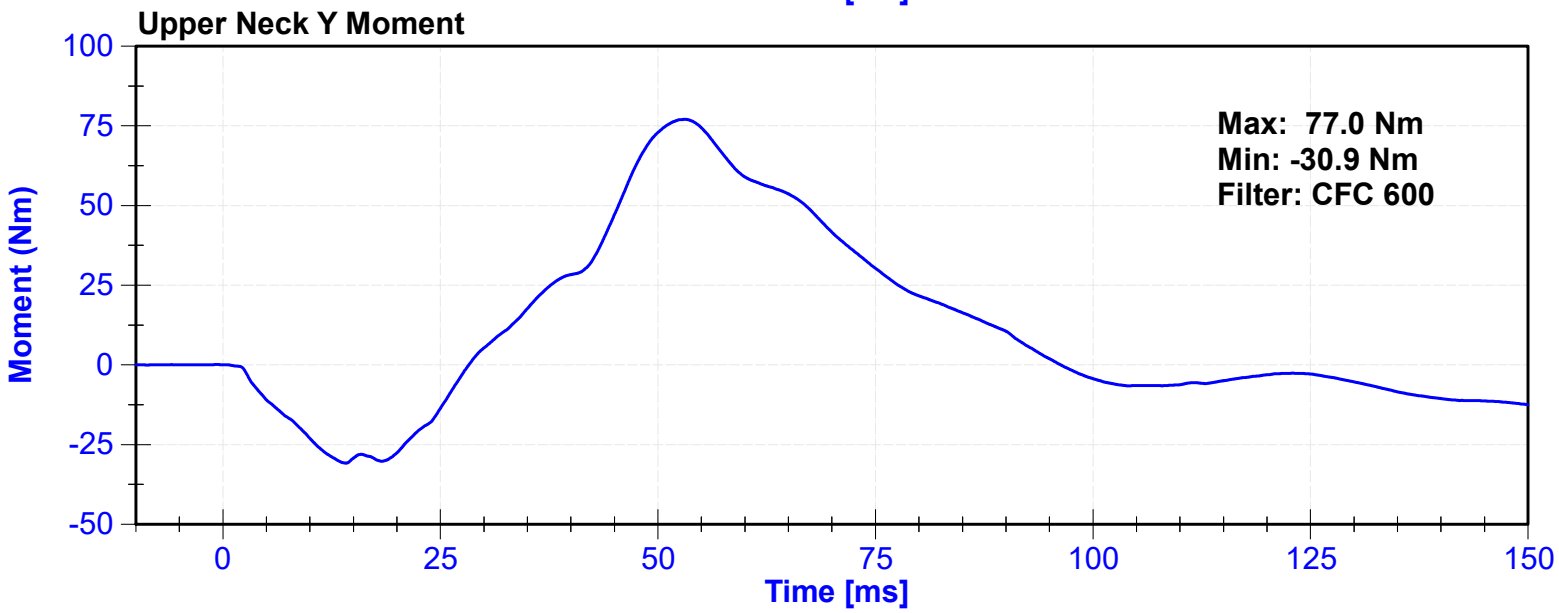
Transducer Calibrations

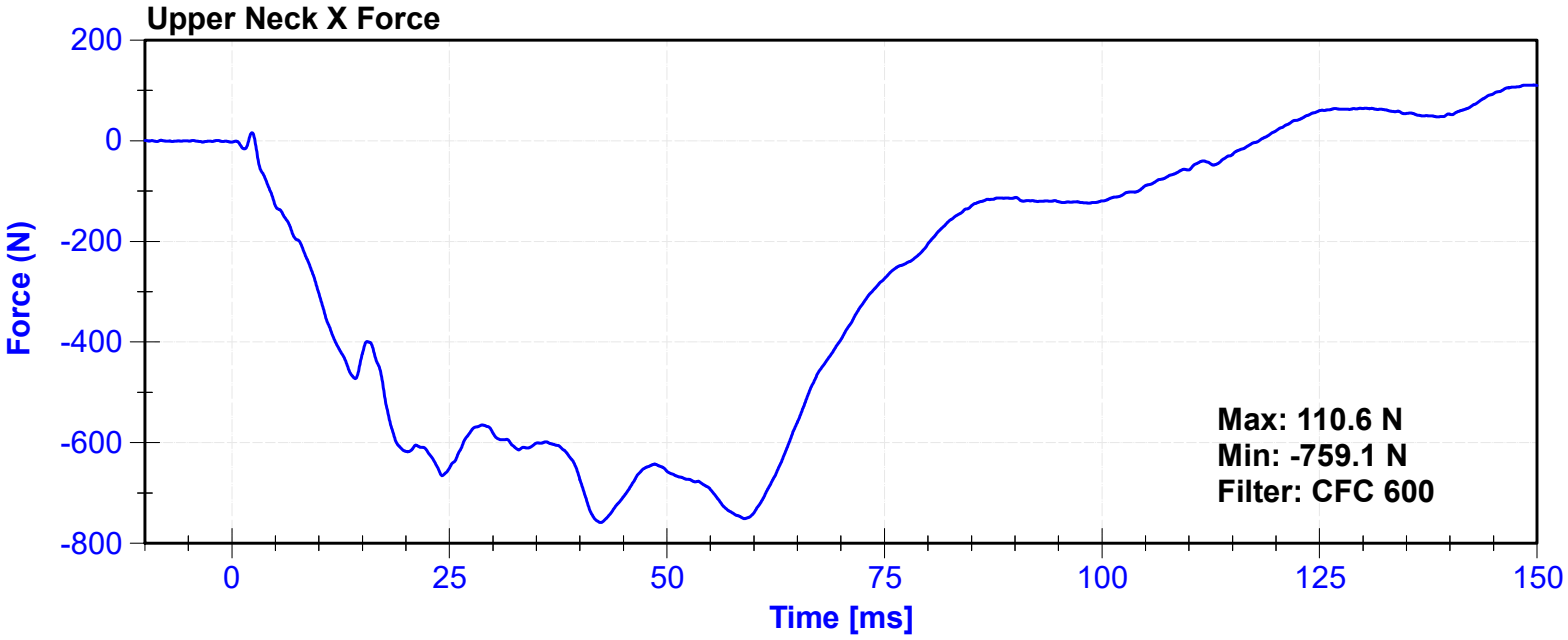
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16646	10/17/2024	4/15/2025
Pendulum Potentiometer	ETI	LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Humanetics	851-FX	5/22/2024	5/22/2025


D-Plane Rotation
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 70.1 deg
Min: -31.8 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
125
100
75
50
25
0
-25
0
25
50
75
100
125
150
Time [ms]
Max: 89.1 Nm
Min: -22.5 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 24.8 g's
Min: -2.7 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 77.0 Nm
Min: -30.9 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 110.6 N
Min: -759.1 N
Filter: CFC 600
Force (N)
Time [ms]

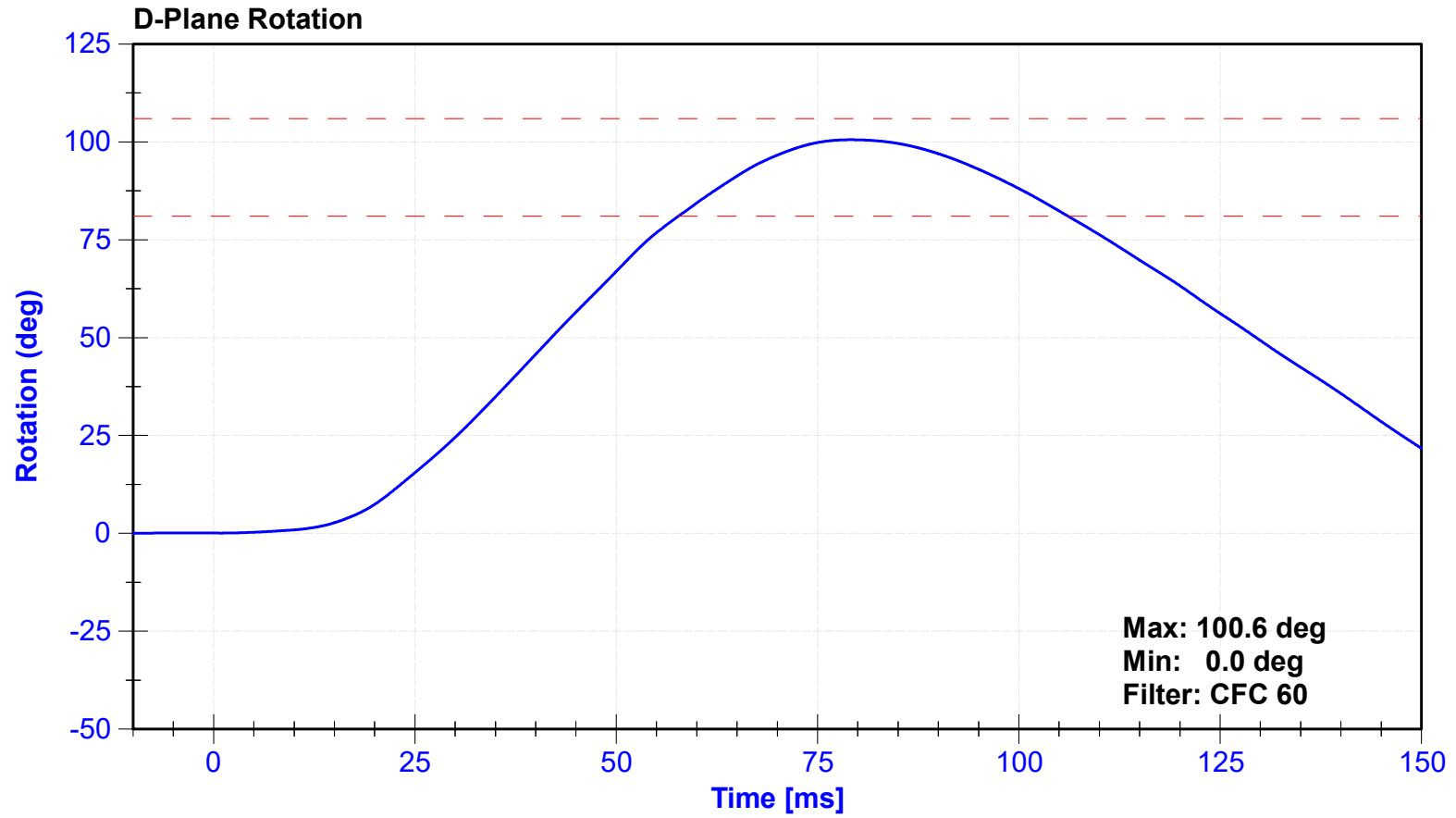
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

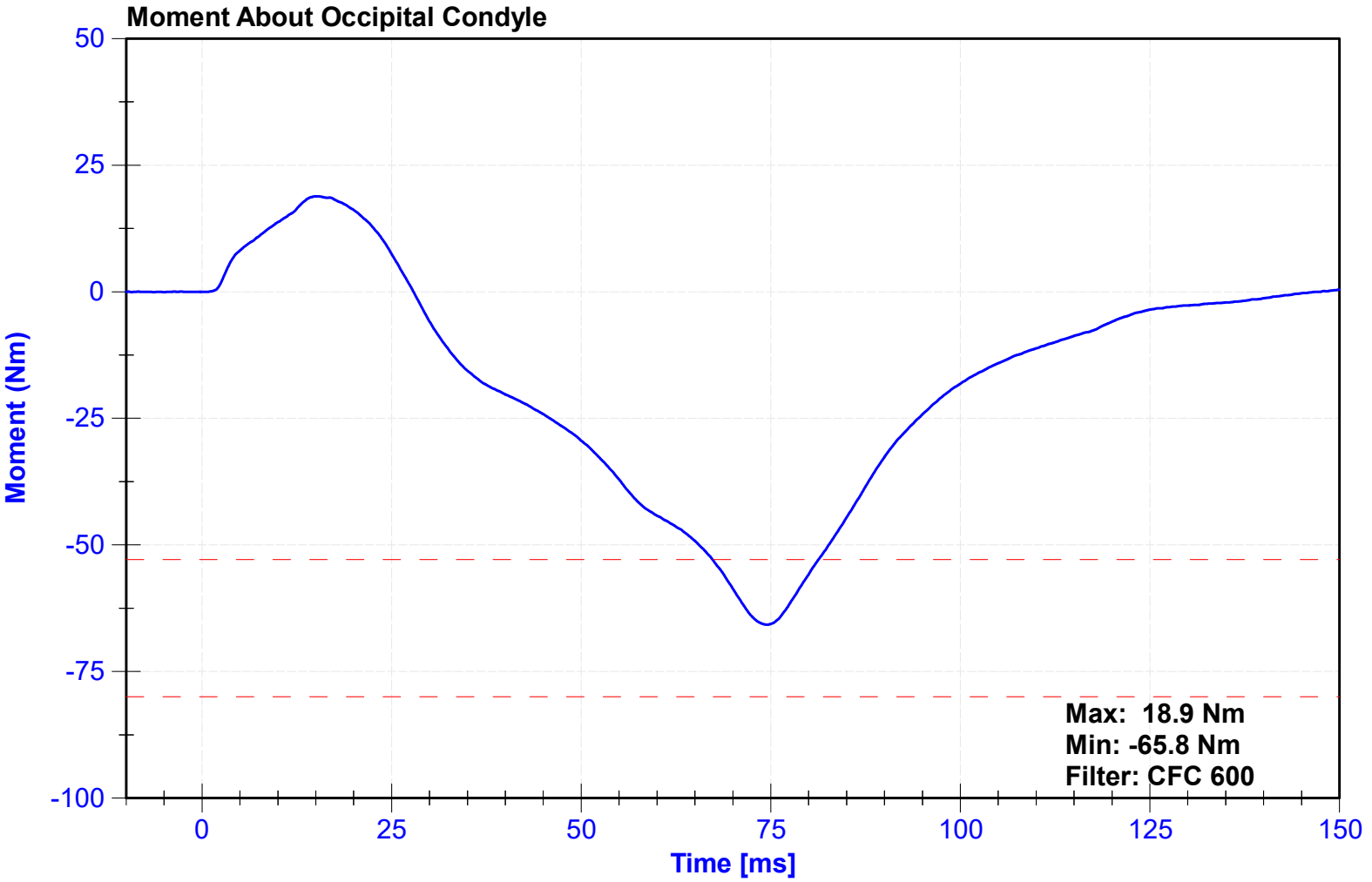
Results

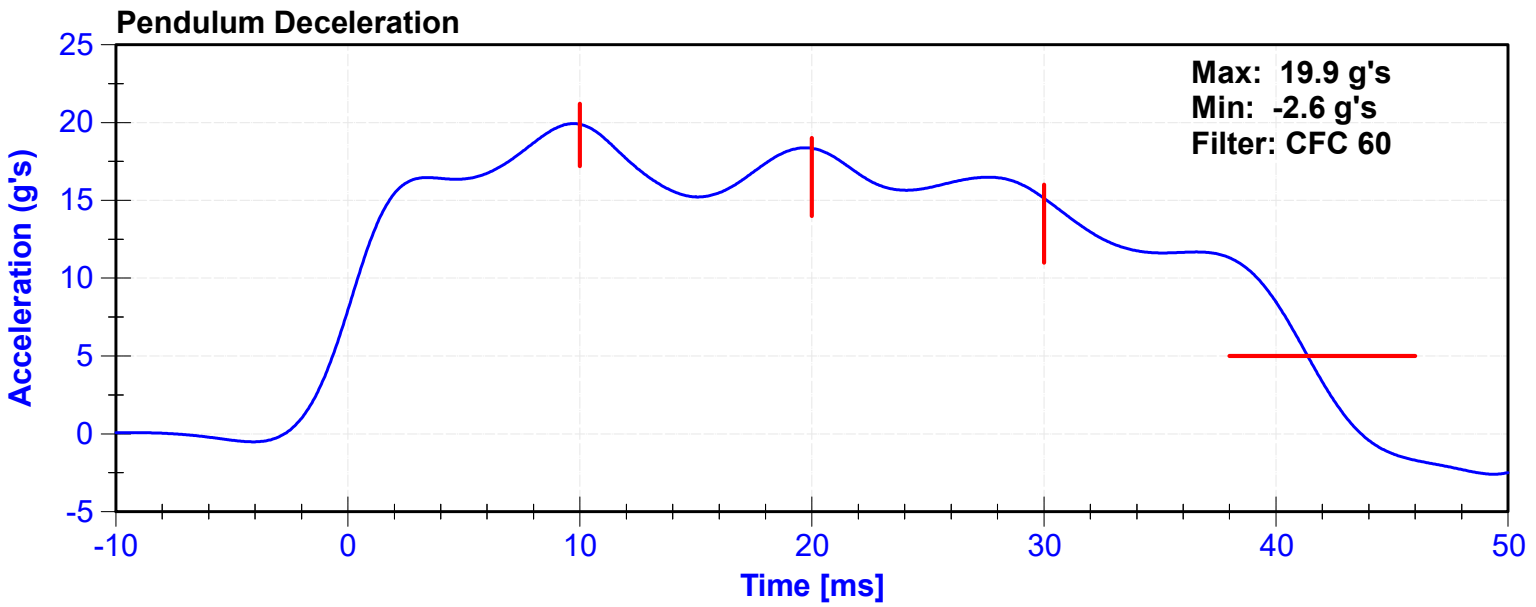
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	20	Pass
Velocity	5.94	6.19	m/s	5.953	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	19.88	Pass
Pendulum Deceleration at 20ms	14	19	g's	18.3	Pass
Pendulum Deceleration at 30ms	11	16	g's	15.1	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	19.9	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	41.4	Pass
Maximum D Plane Rotation	81	106	deg	100.6	Pass
Time to Maximum Rotation	72	82	ms	79.1	Pass
Rotation Decay to Zero	147	174	ms	166.1	Pass
Minimum Moment About OC	-80	-52.9	Nm	-65.76	Pass
Time to Minimum Moment	65	79	ms	74.6	Pass
Moment Decay to Zero	120	148	ms	146.8	Pass

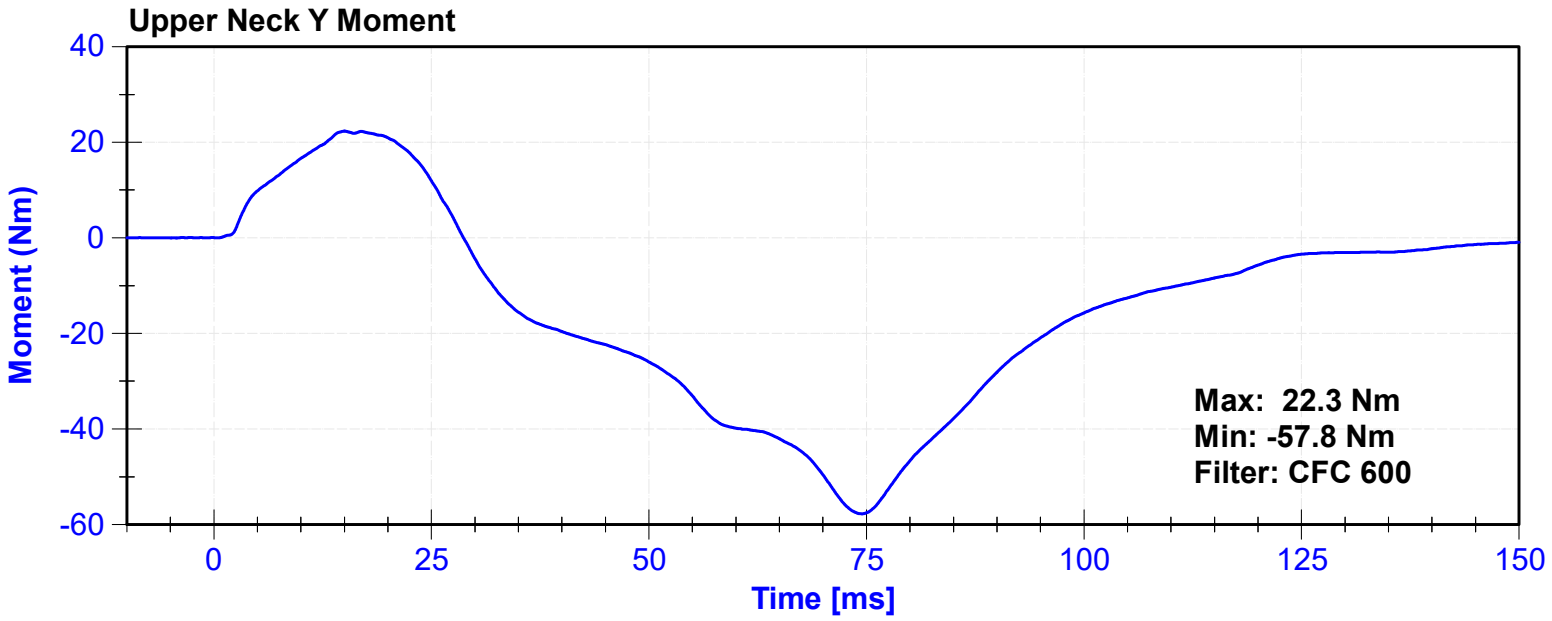
Transducer Calibrations

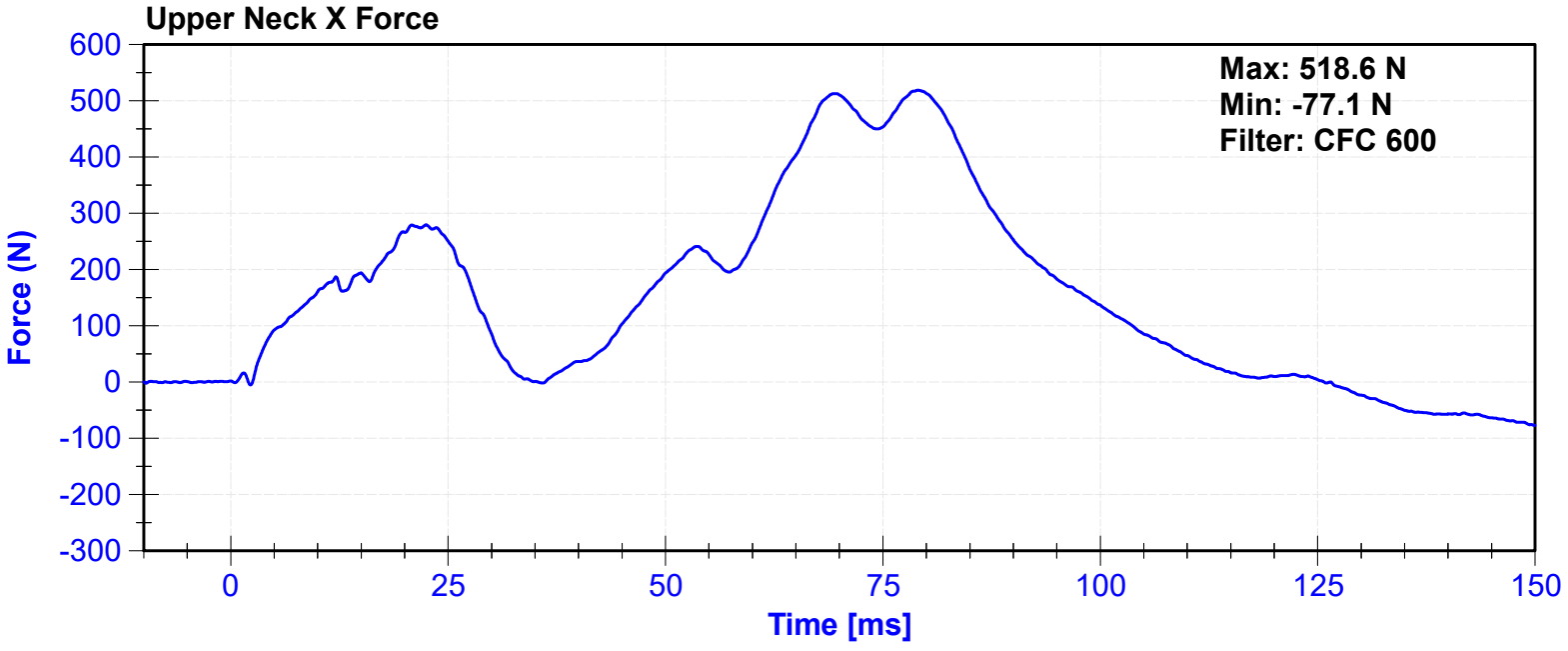
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16646	10/17/2024	4/15/2025
Pendulum Potentiometer	ETI	SP22G_LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	SP22G_LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Humanetics	851-FX	5/22/2024	5/22/2025


D-Plane Rotation
Rotation (deg)
125
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 100.6 deg
Min: 0.0 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
50
25
0
-25
-50
-75
-100
0
25
50
75
100
125
150
Time [ms]
Max: 18.9 Nm
Min: -65.8 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 19.9 g's
Min: -2.6 g's
Filter: CFC 60
Acceleration (g's)
25
20
15
10
5
0
-5
-10
0
10
20
30
40
50
Time [ms]


Upper Neck Y Moment
Max: 22.3 Nm
Min: -57.8 Nm
Filter: CFC 600
Moment (Nm)
40
20
0
-20
-40
-60
0
25
50
75
100
125
150
Time [ms]


Upper Neck X Force
Max: 518.6 N
Min: -77.1 N
Filter: CFC 600
Force (N)
600
500
400
300
200
100
0
-100
-200
-300
0
25
50
75
100
125
150
Time [ms]

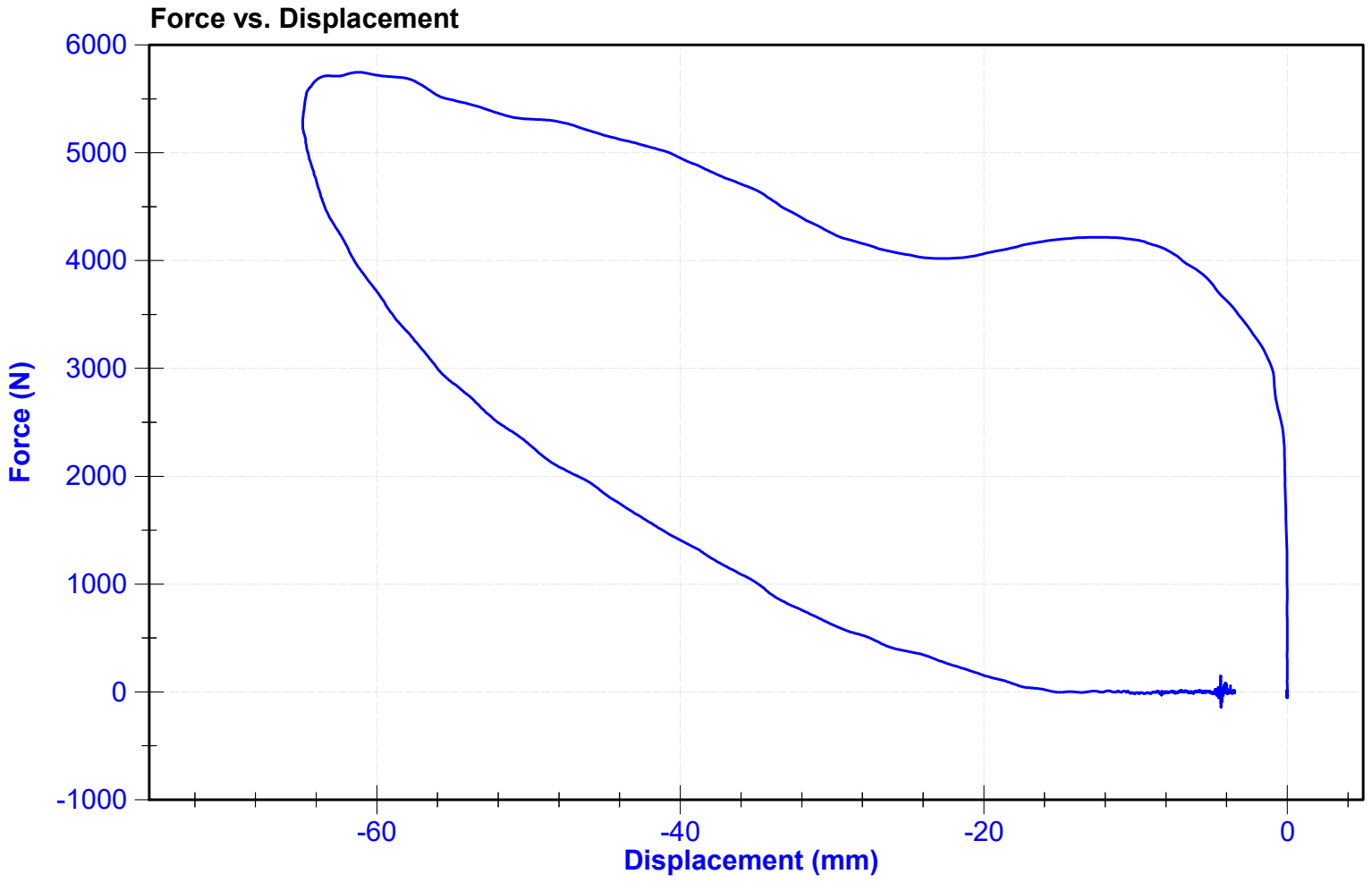
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

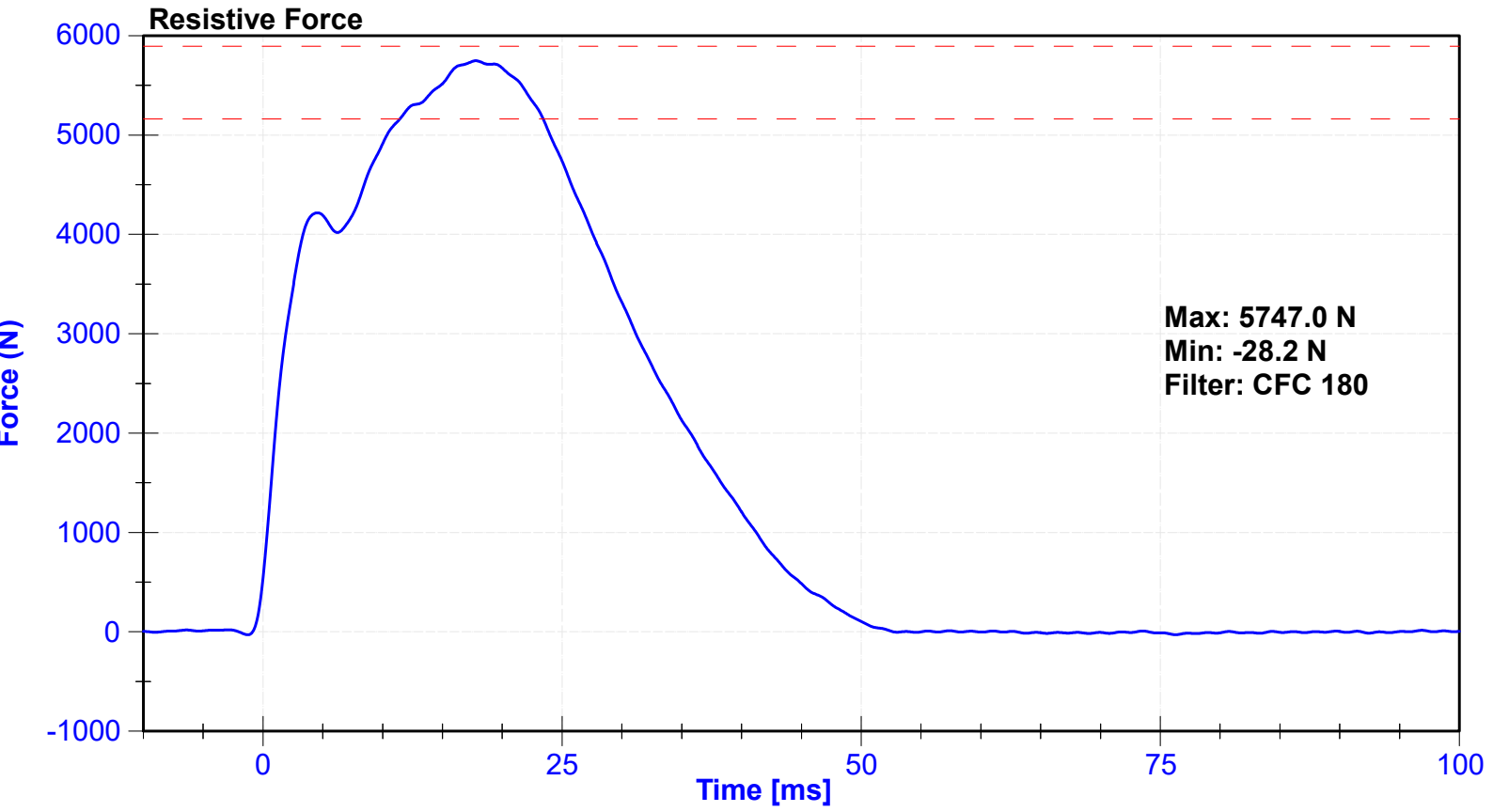
Results

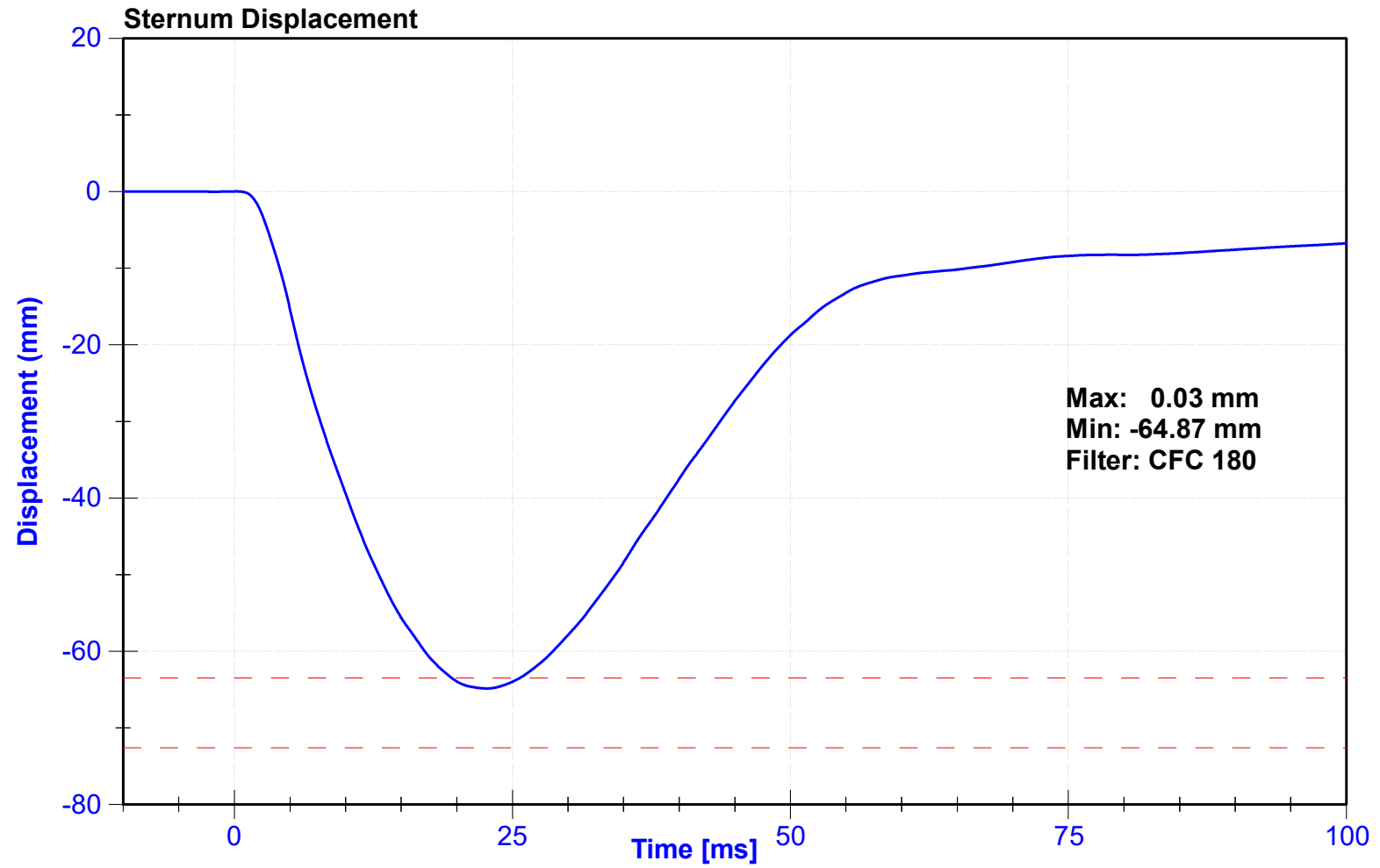
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	6.59	6.83	m/s	6.648	Pass
Chest Displacement	-72.6	-63.5	mm	-64.87	Pass
Resistive Force	5160	5894	N	5747.0	Pass
Hysteresis	69	85	%	72.4	Pass

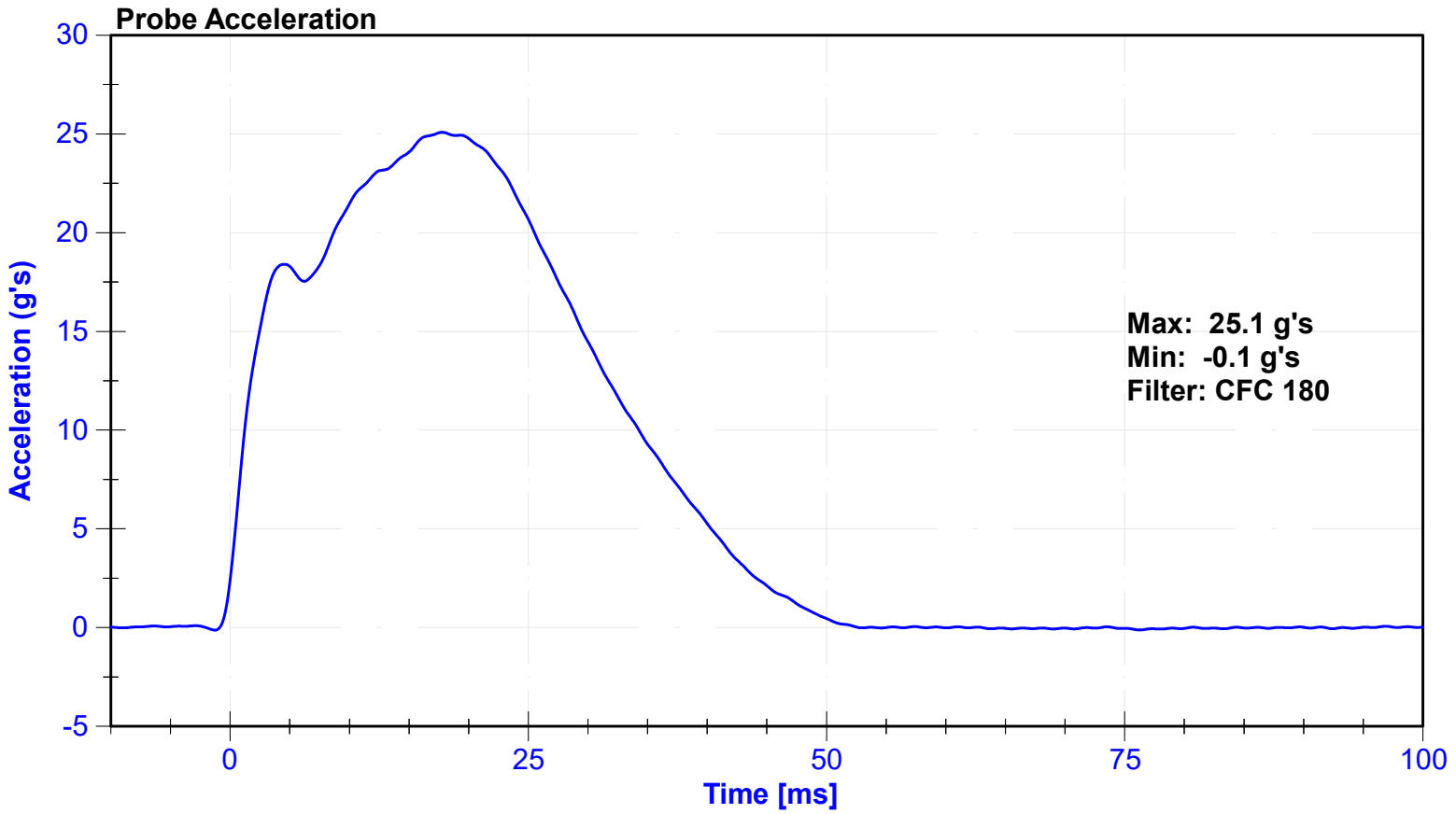
Transducer Calibrations

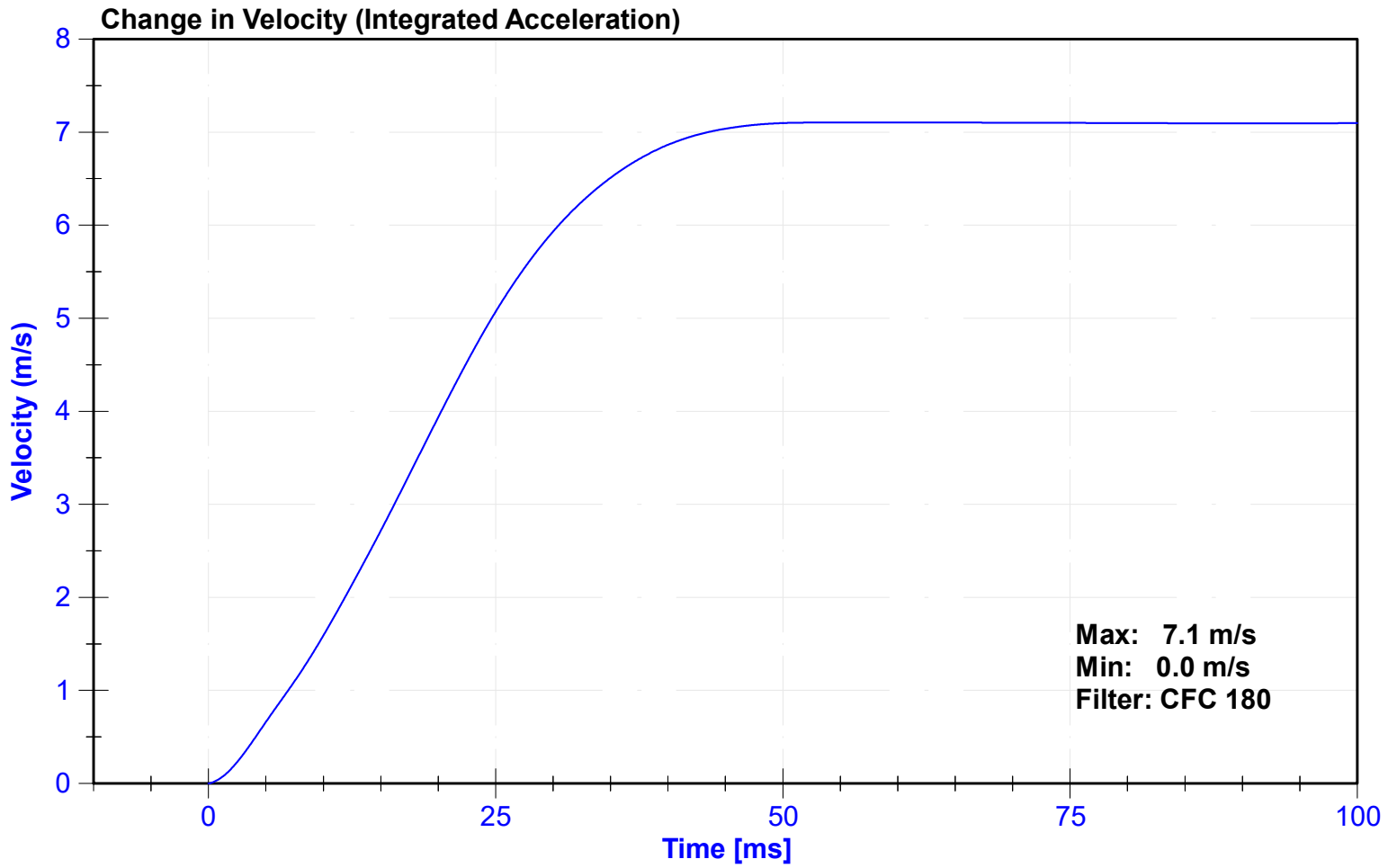
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Chest Potentiometer	Servo	1046	10/31/2024	5/1/2025




Resistive Force
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
25
50
75
100
Time [ms]
Max: 5747.0 N
Min: -28.2 N
Filter: CFC 180


Sternum Displacement
Displacement (mm)
20
0
-20
-40
-60
-80
0
25
50
75
100
Time [ms]
Max: 0.03 mm
Min: -64.87 mm
Filter: CFC 180


Probe Acceleration
Acceleration (g's)
30
25
20
15
10
5
0
-5
0
25
50
75
100
Time [ms]
Max: 25.1 g's
Min: -0.1 g's
Filter: CFC 180


Change in Velocity (Integrated Acceleration)
Velocity (m/s)
8
7
6
5
4
3
2
1
0
0
25
50
75
100
Time [ms]
Max: 7.1 m/s
Min: 0.0 m/s
Filter: CFC 180

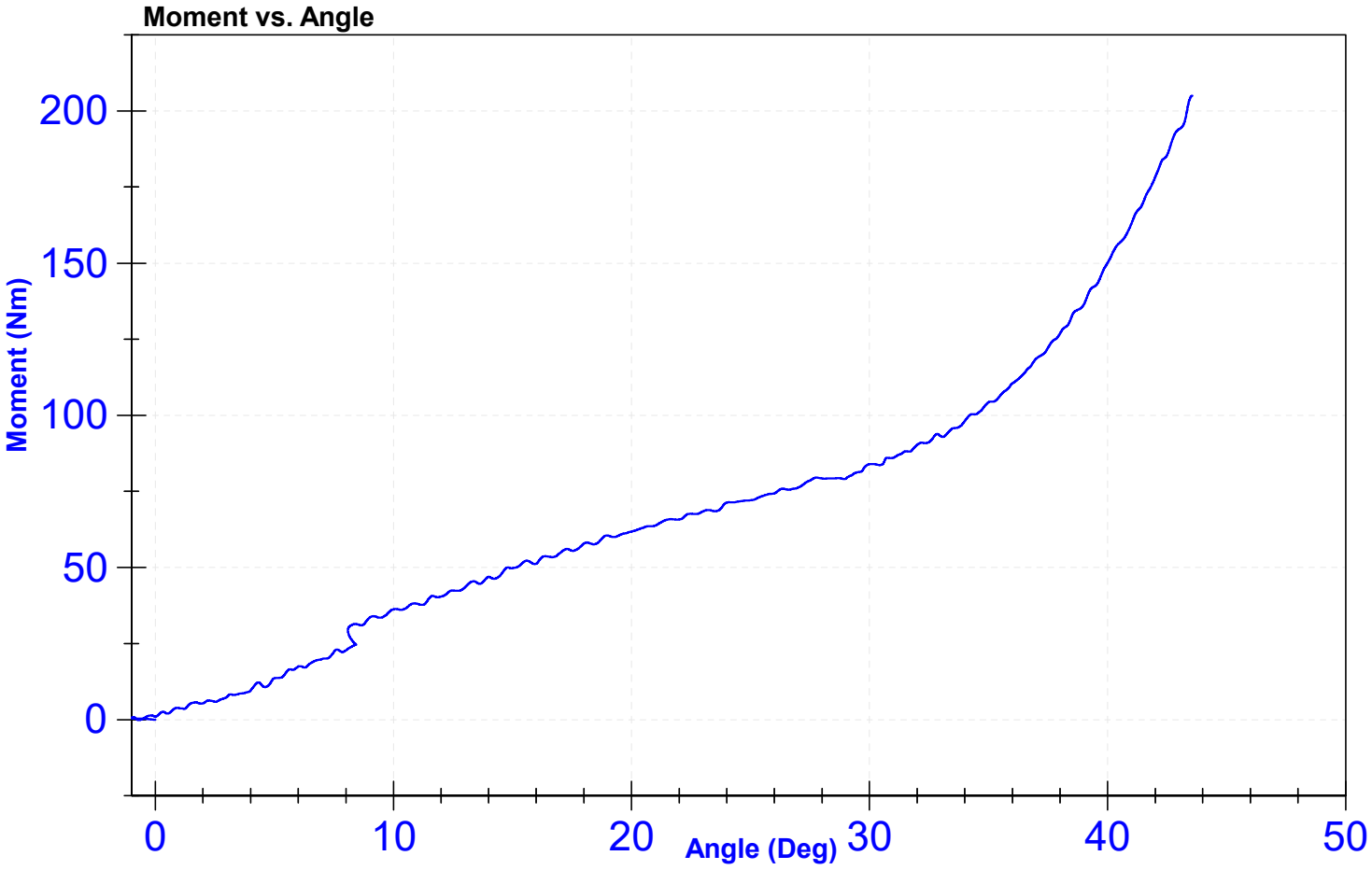
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	20	Pass
Average Velocity	5	10	deg/s	7.1	Pass
Angle at 203Nm	40	50	deg	43.4	Pass
Moment at 30 degrees	0	94.9	Nm	83.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	9/23/2024	9/23/2025
Load Cell	PCB 2301-02	115	2024-11-11	2025-11-11



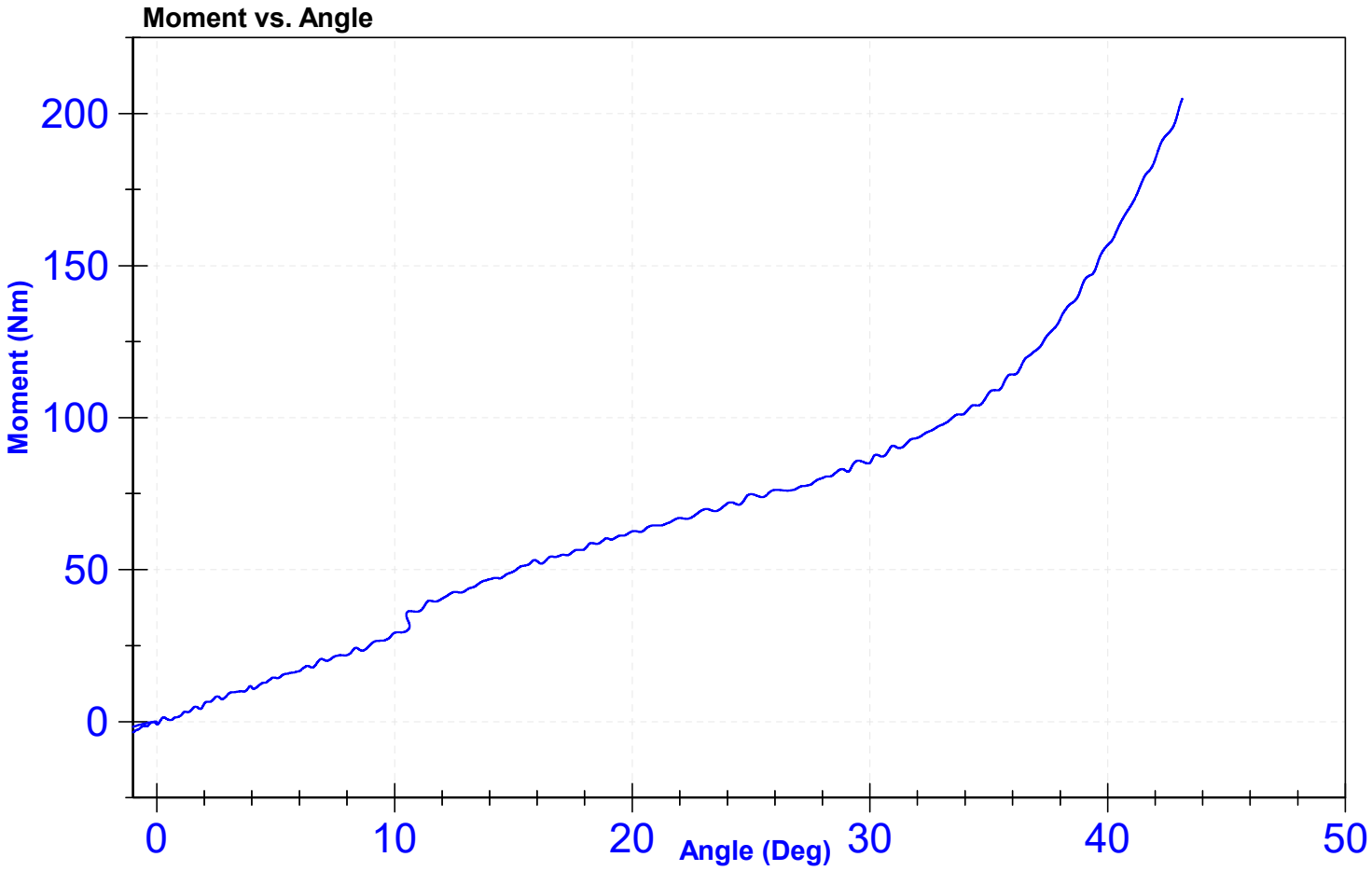
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	20	Pass
Average Velocity	5	10	deg/s	7.1	Pass
Angle at 203Nm	40	50	deg	43.1	Pass
Moment at 30 degrees	0	94.9	Nm	85.1	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	ETI SP22	DS-0008	9/23/2024	9/23/2025
Load Cell	PCB 2301-02	115	2024-11-11	2025-11-11



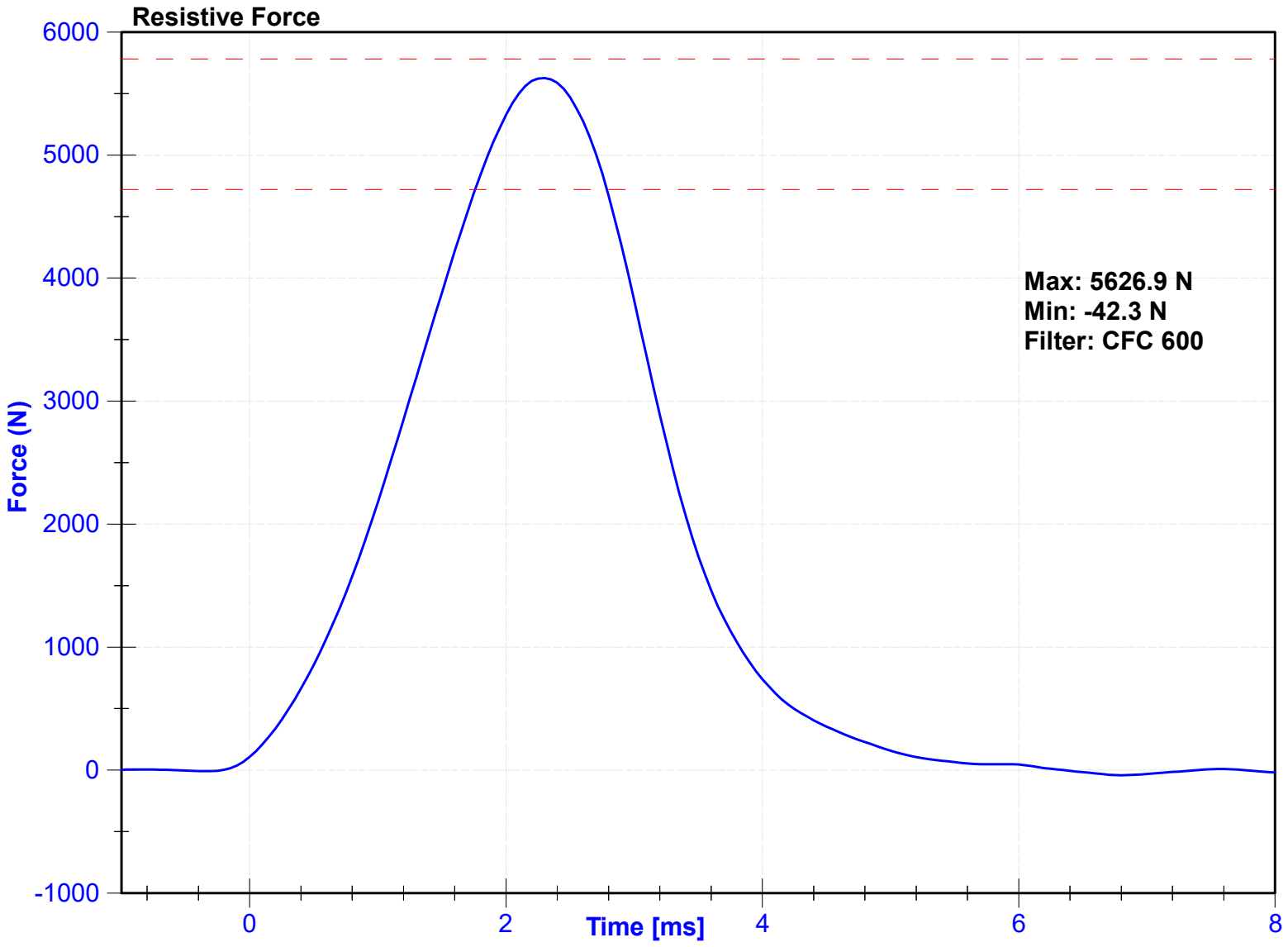
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

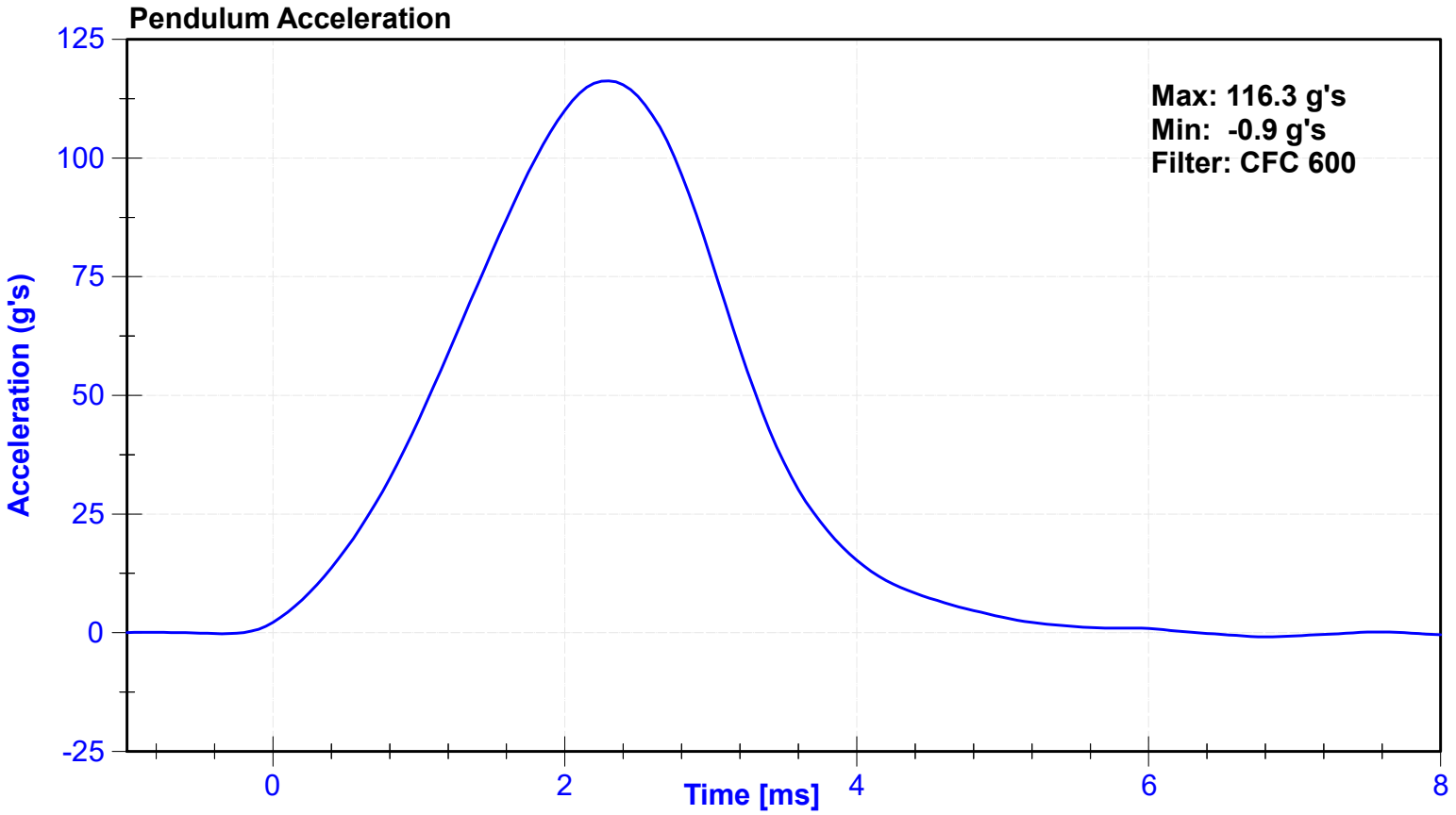
Results

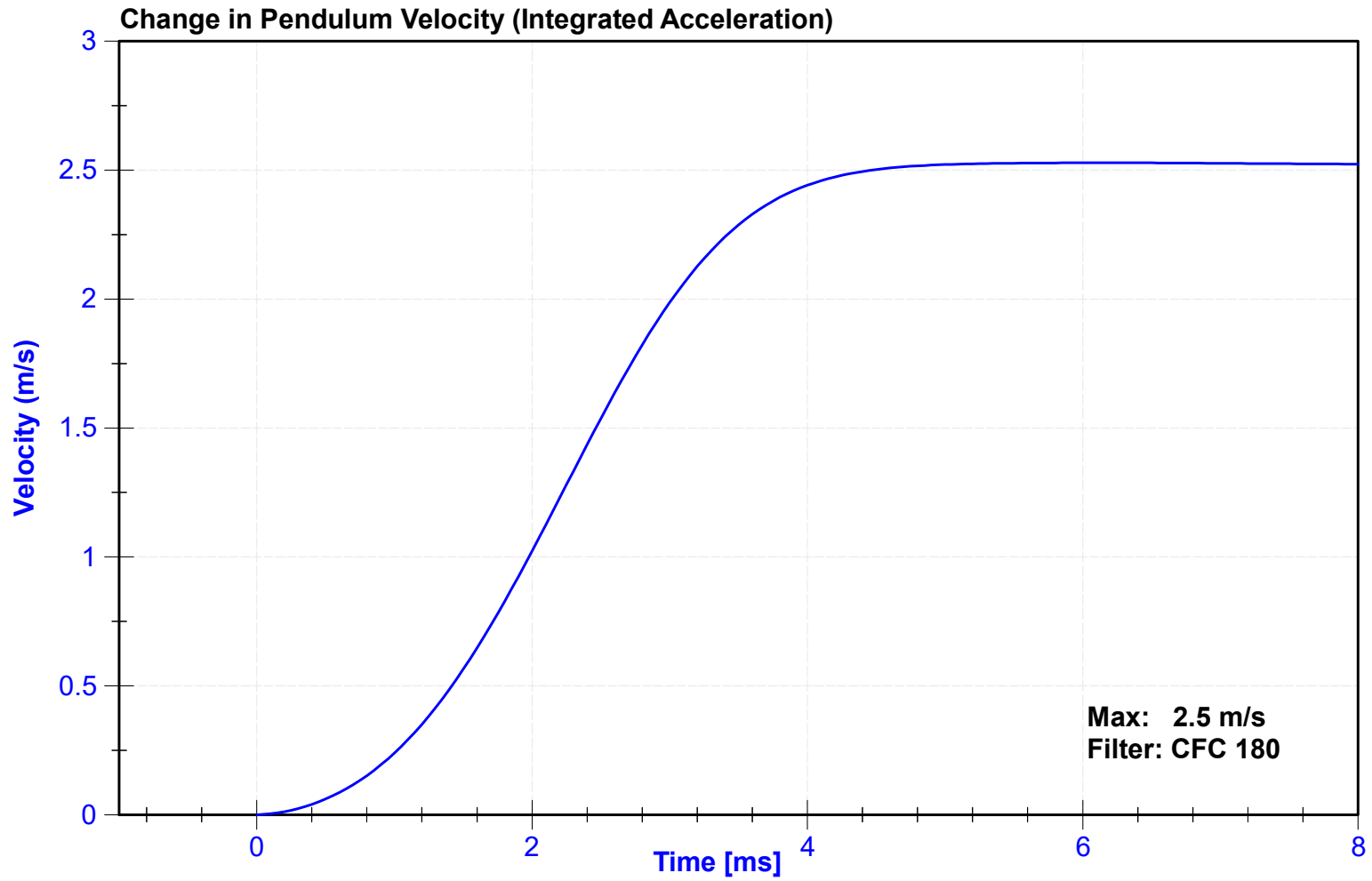
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	15	Pass
Velocity	2.07	2.13	m/s	2.121	Pass
Maximum Resistive Force	4720	5780	N	5626.9	Pass

Transducer Calibrations

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




Pendulum Acceleration
Max: 116.3 g's
Min: -0.9 g's
Filter: CFC 600
Acceleration (g's)
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]


Change in Pendulum Velocity (Integrated Acceleration)
Max: 2.5 m/s
Filter: CFC 180
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
Time [ms]

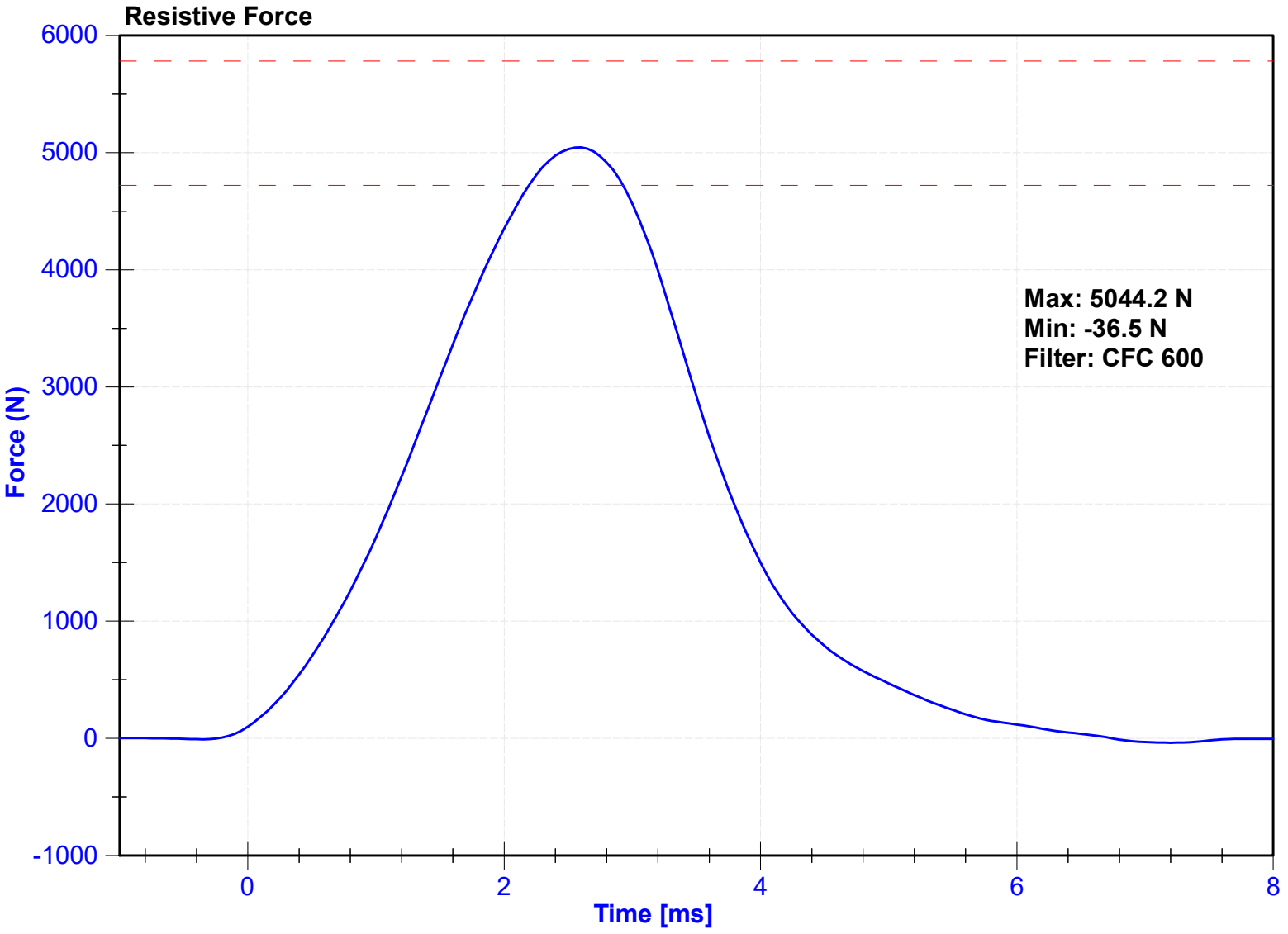
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

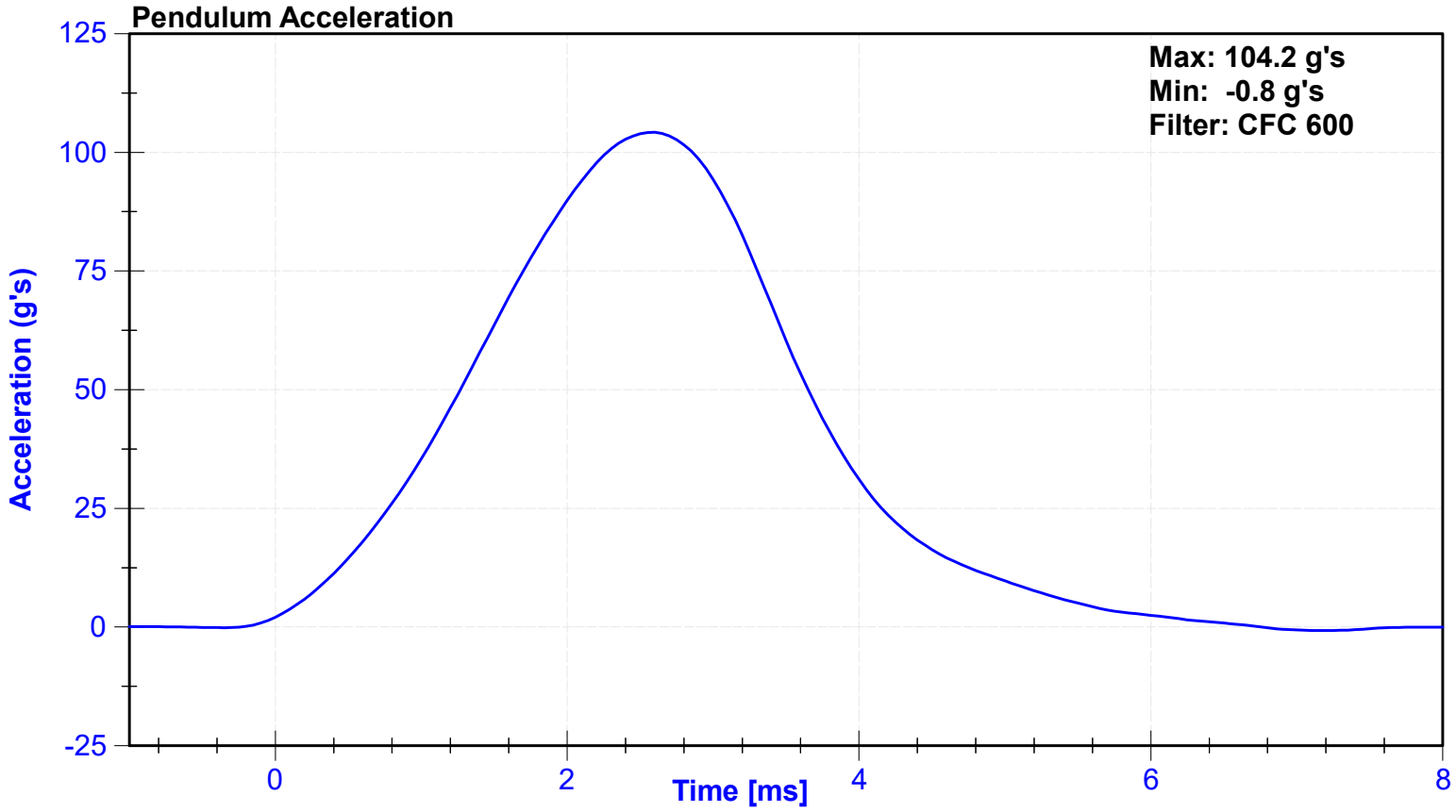
Results

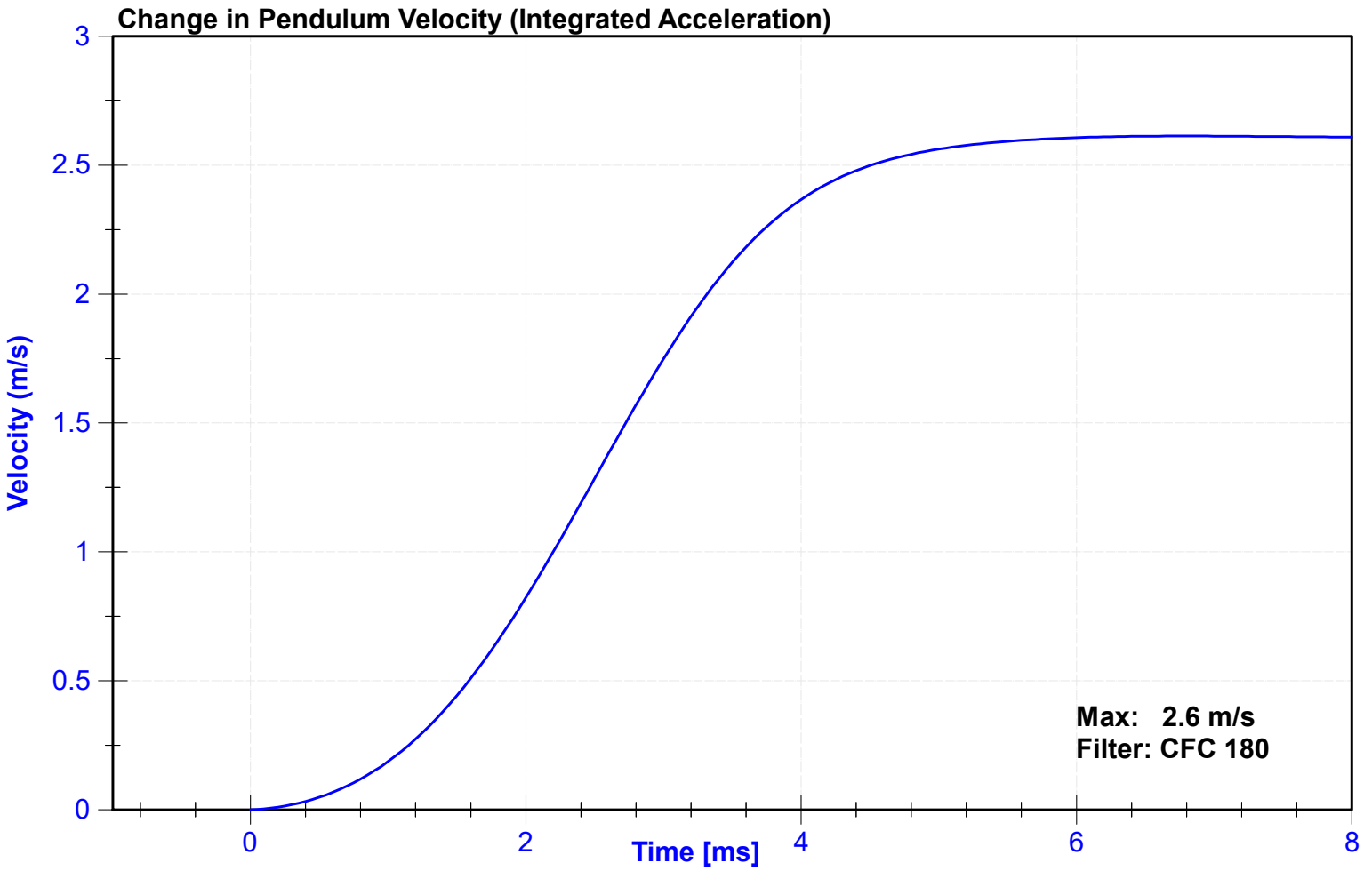
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	15	Pass
Velocity	2.07	2.13	m/s	2.118	Pass
Maximum Resistive Force	4720	5780	N	5044.2	Pass

Transducer Calibrations

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




Pendulum Acceleration
Max: 104.2 g's
Min: -0.8 g's
Filter: CFC 600
Acceleration (g's)
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]


Change in Pendulum Velocity (Integrated Acceleration)
Max: 2.6 m/s
Filter: CFC 180
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
Time [ms]

CALIBRATION TEST RESULTS

POST-TEST

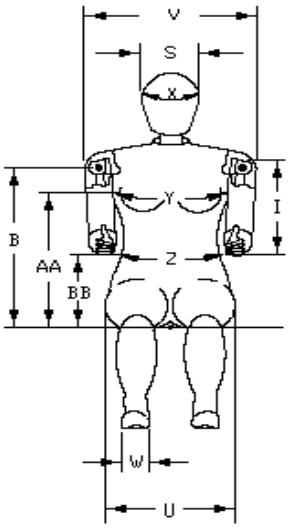
HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

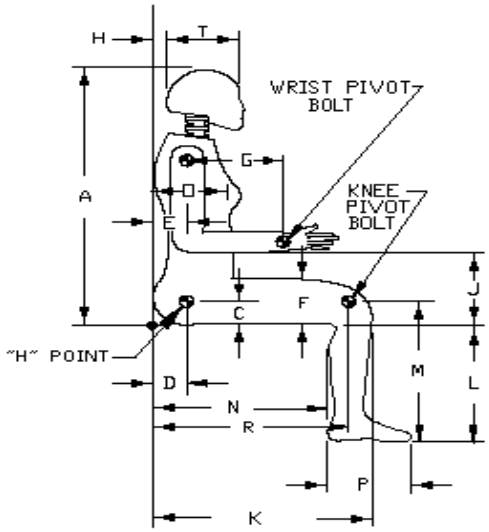
SERIAL NO: 137

External Measurements - Hybrid 3 - 5th Female

Technician: J. Rios Date: 2/10/2025

Dummy Serial Number: 137





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	783	Pass
B	Shoulder Pivot Height	432	457	442	Pass
C	H-Point Height	81	86	85	Pass
D	H-Point from Backline	145	150	148	Pass
E	Shoulder Pivot from Backline	69	84	77	Pass
F	Thigh Clearance	119	135	128	Pass
G	Back of Elbow to Wrist Pivot	244	259	251	Pass
H	Head Back to Backline	43	48	45	Pass
I	Shoulder to Elbow Length	277	297	287	Pass
J	Elbow Rest Height	183	203	195	Pass
K	Buttock to Knee Length	521	546	532	Pass
L	Popliteal Height	356	376	362	Pass
M	Knee Pivot Height	394	419	404	Pass
N	Buttock Popliteal Length	414	439	431	Pass
O	Chest Depth without Jacket	175	191	187	Pass
P	Foot Length (right)	219	234	224	Pass
R	Buttock To Knee Pivot Length	457	483	465	Pass
S	Head Breadth	137	147	141	Pass
T	Head Depth	178	188	182	Pass
U	Hip Breadth	300	315	307	Pass
V	Shoulder Breadth	351	366	360	Pass
W	Foot Breadth	79	94	84	Pass
X	Head Circumference	528	549	537	Pass
Y	Chest Circumference with Jacket	851	881	871	Pass
Z	Waist Circumference	460	790	622	Pass
AA	Reference Location (Chest Circumference)	333	358	344	Pass
BB	Reference Location (Waist Circumference)	160	170	166	Pass

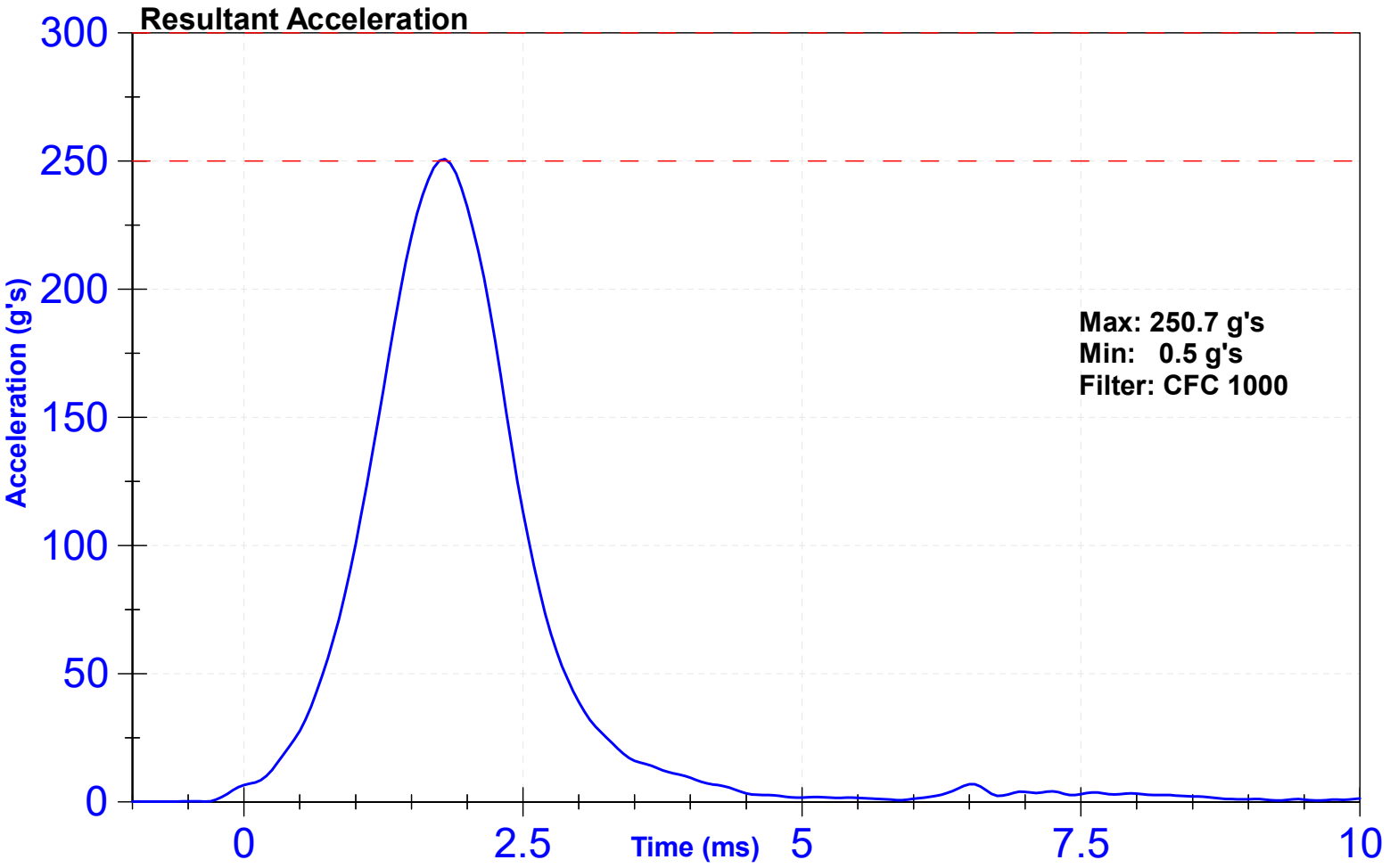
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

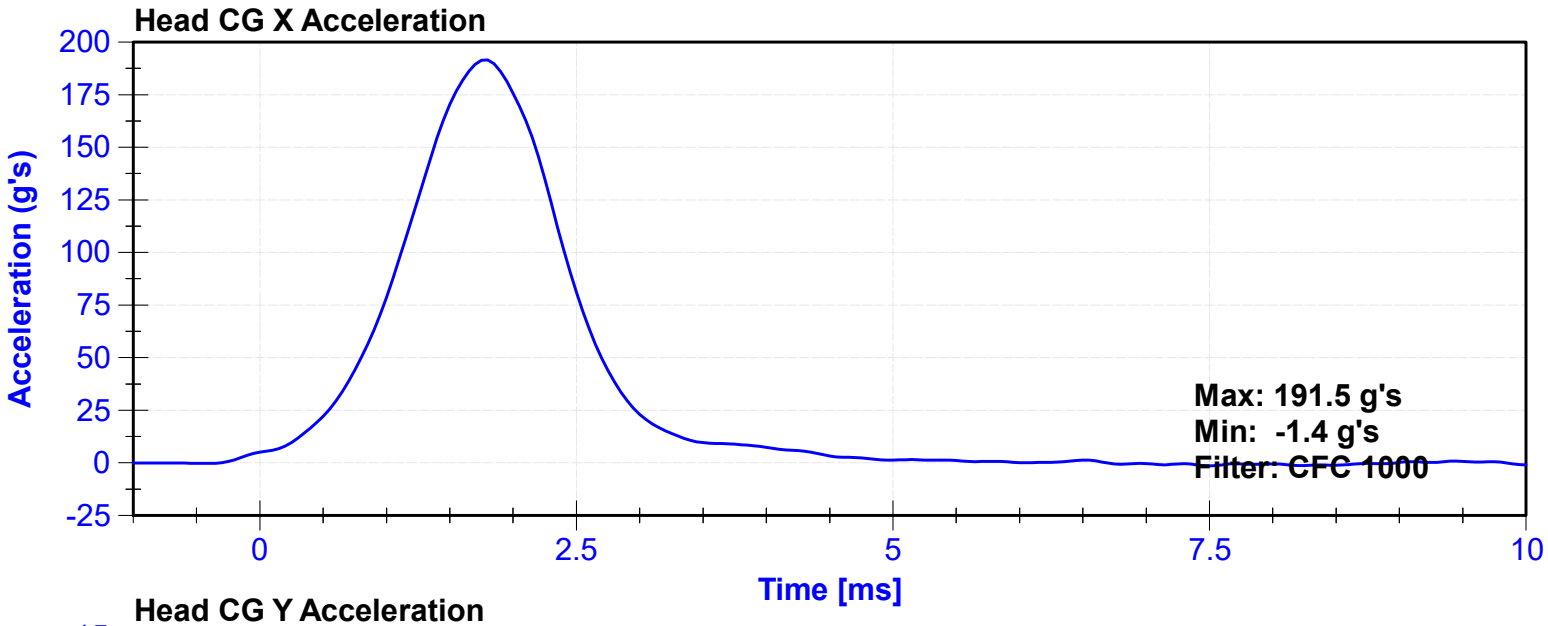
Results

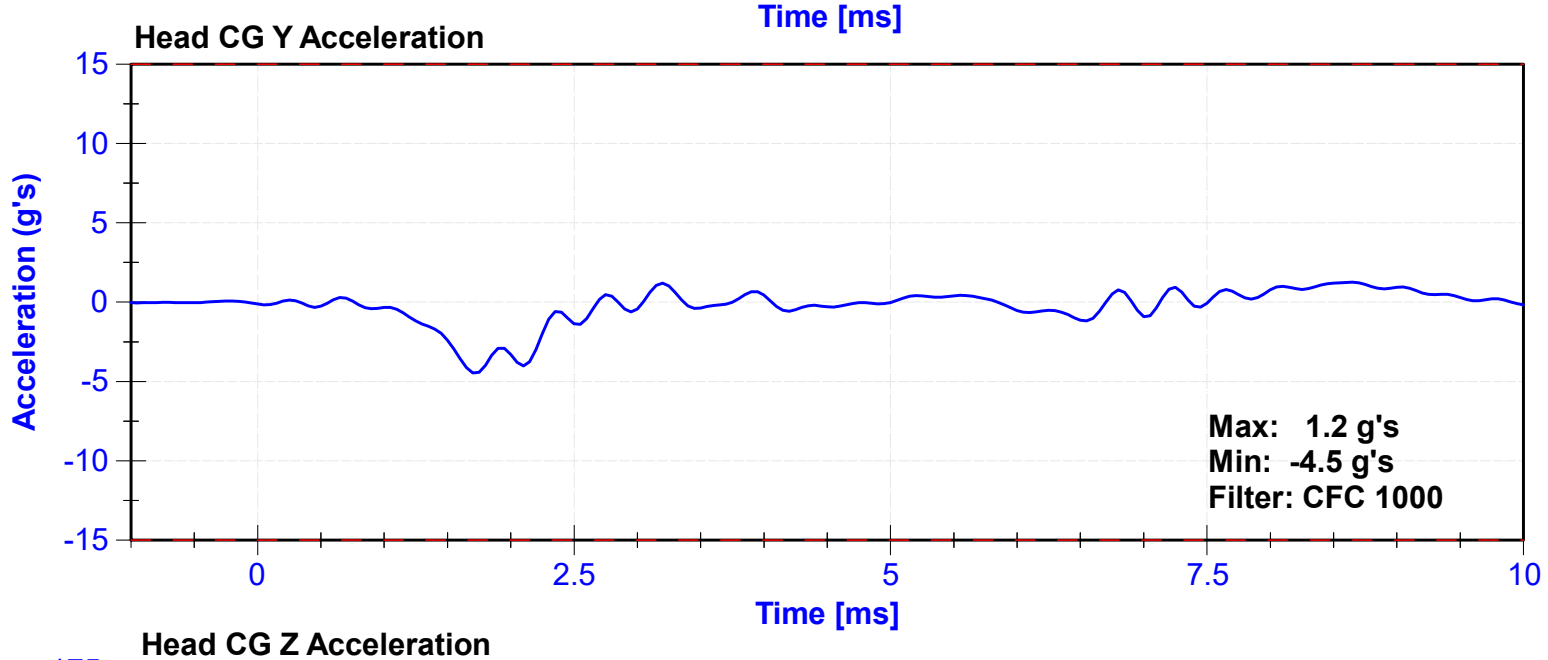
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.7	Pass
Humidity	10	70	%	17	Pass
Resultant Acceleration	250	300	g's	250.7	Pass
Oscillation	0	10	%	2.7	Pass
Lateral Acceleration	-15	15	g's	-4.5	Pass

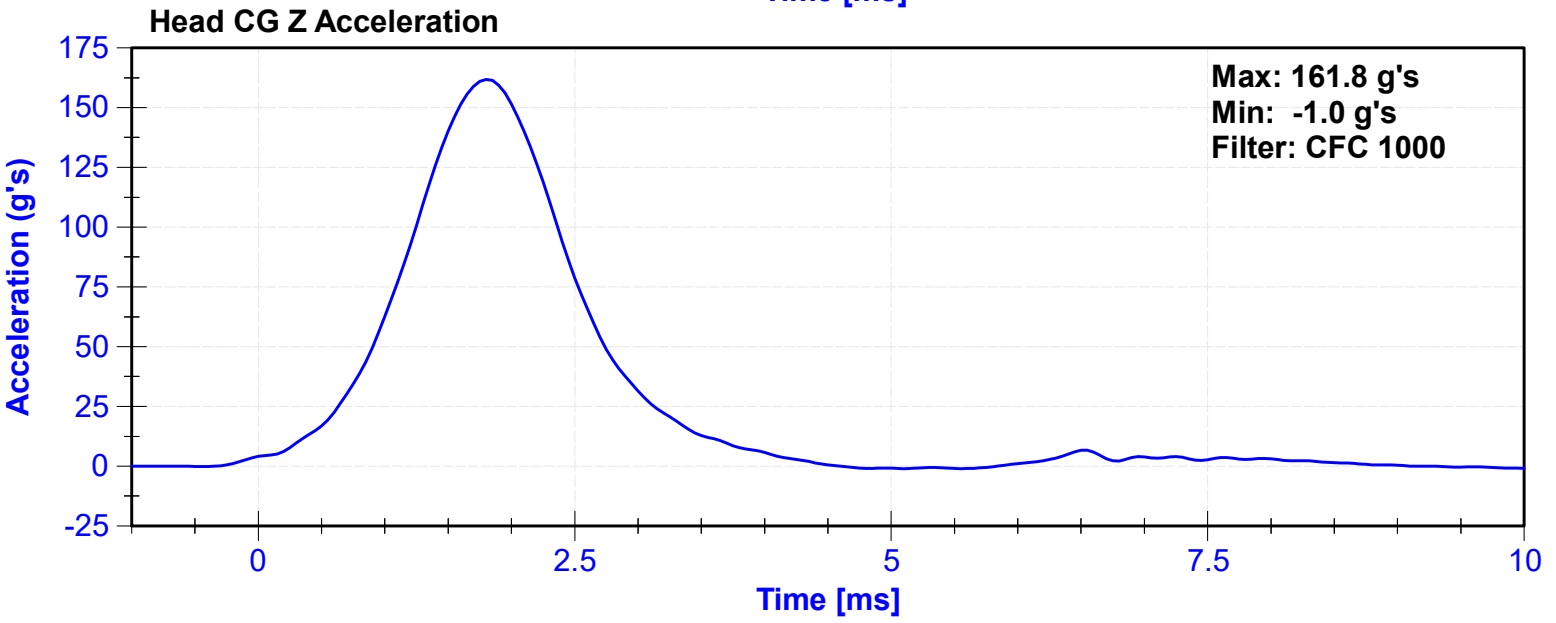
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P79417	8/19/2024	2/15/2025
Y Accelerometer	Endevco	P83335	8/19/2024	2/15/2025
Z Accelerometer	Endevco	P64149	8/19/2024	2/15/2025




Head CG X Acceleration
Acceleration (g's)
200
175
150
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 191.5 g's
Min: -1.4 g's
Filter: CFC 1000


Head CG Y Acceleration
Acceleration (g's)
15
10
5
0
-5
-10
-15
0
2.5
5
7.5
10
Time [ms]
Max: 1.2 g's
Min: -4.5 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
175
150
125
100
75
50
25
0
-25
0
2.5
5
7.5
10
Time [ms]
Max: 161.8 g's
Min: -1.0 g's
Filter: CFC 1000

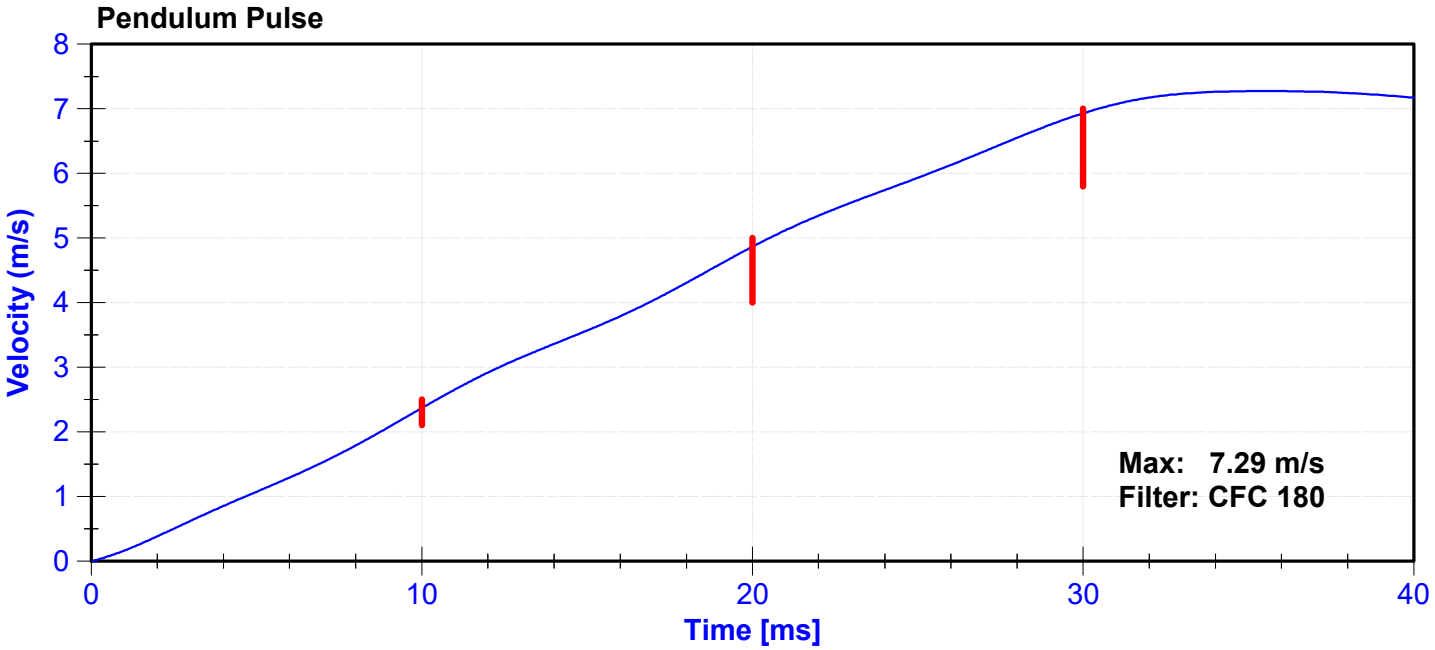
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

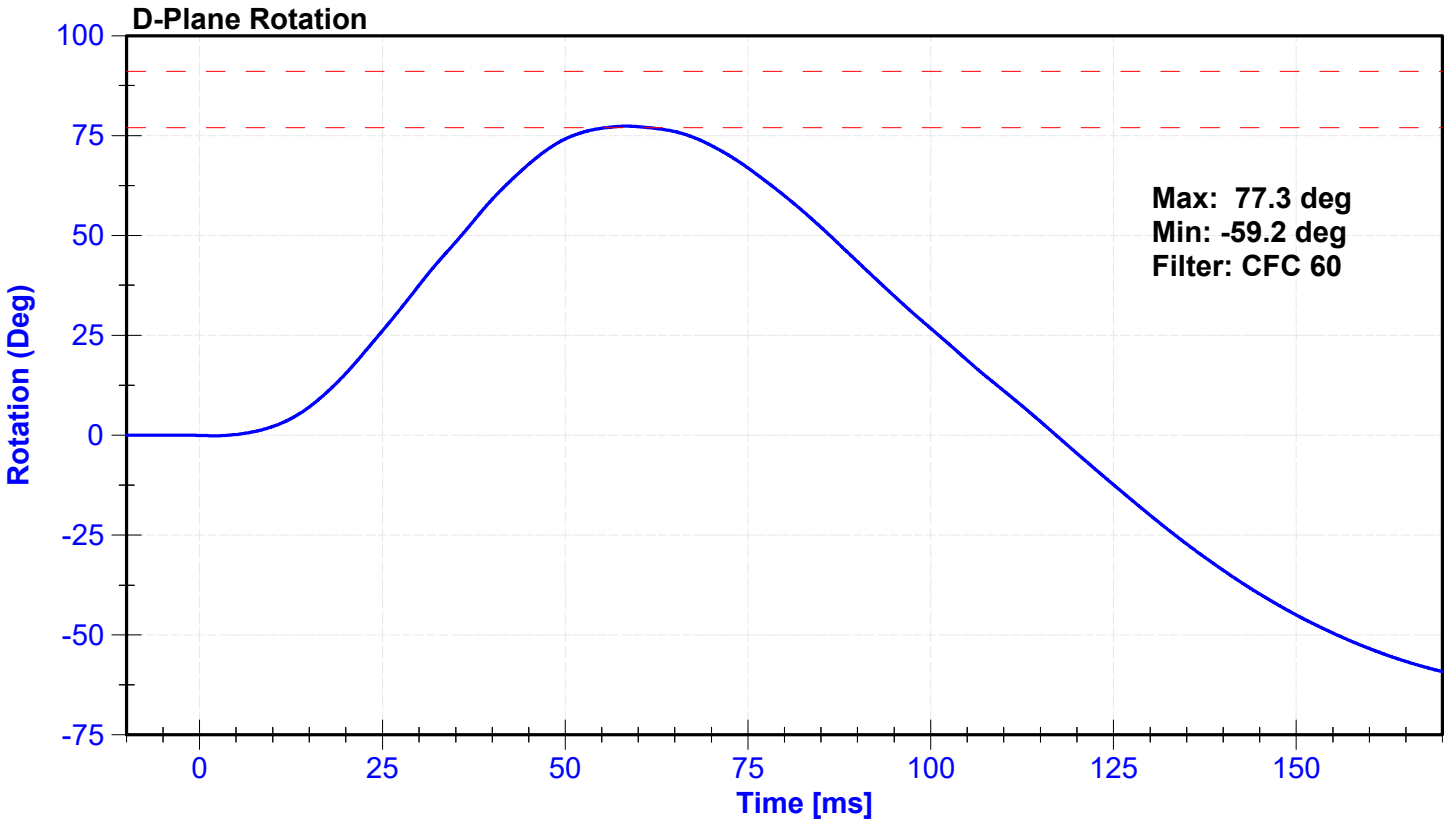
Results

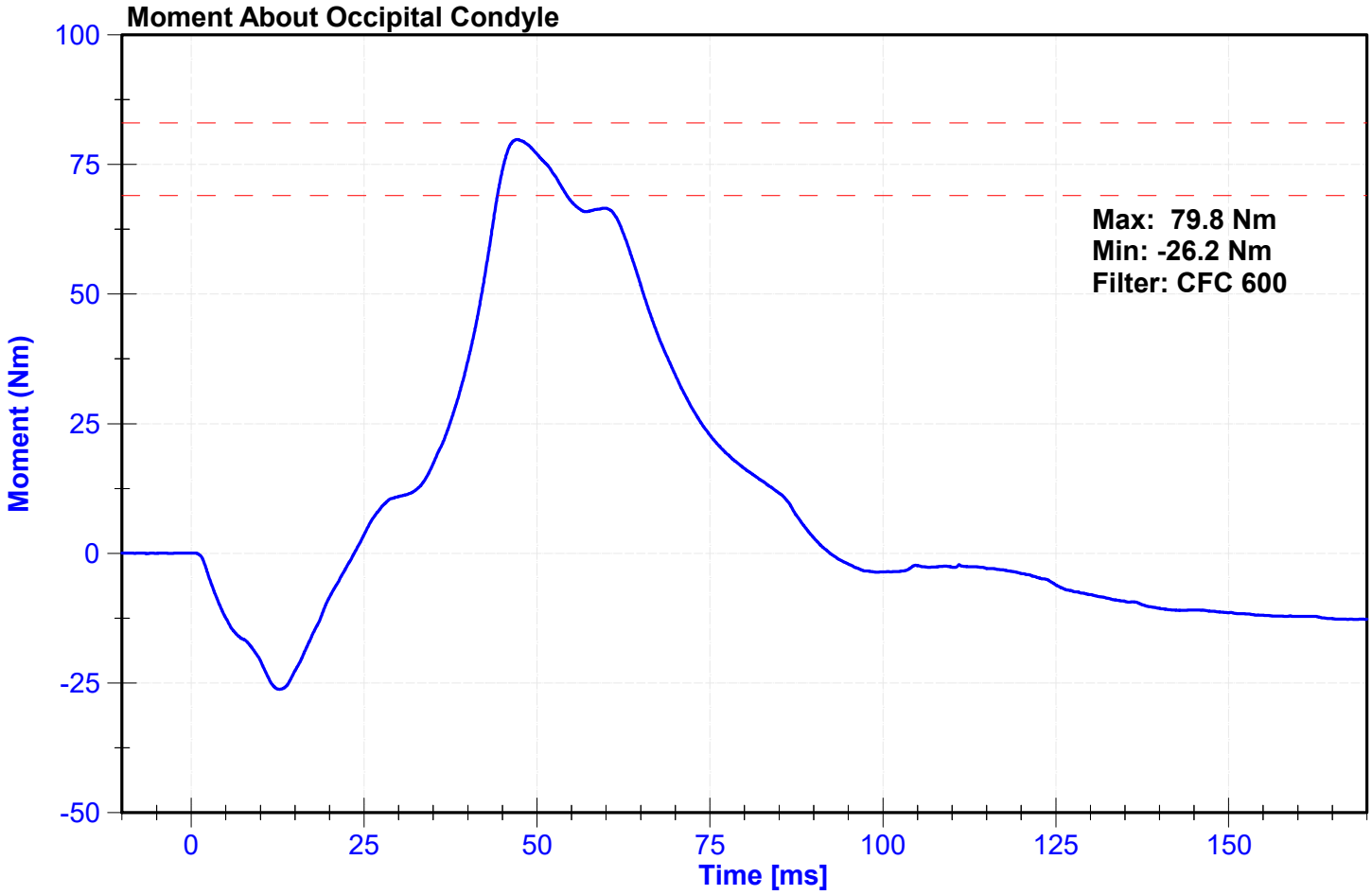
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	17	Pass
Velocity	6.89	7.13	m/s	7.052	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.37	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.86	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.93	Pass
Max D Plane Rotation	77	91	deg	77.3	Pass
Max Moment During Rotation Interval	69	83	Nm	79.8	Pass
Moment Decay to 10.0 Nm	80	100	ms	86.3	Pass

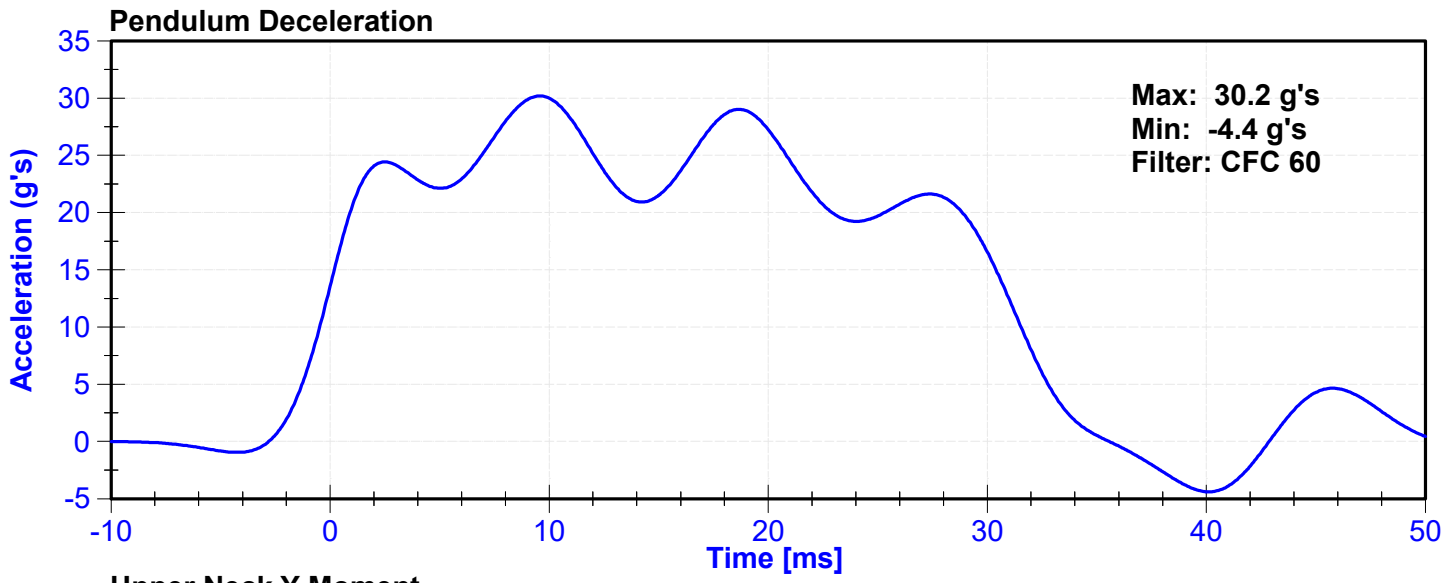
Transducer Calibrations

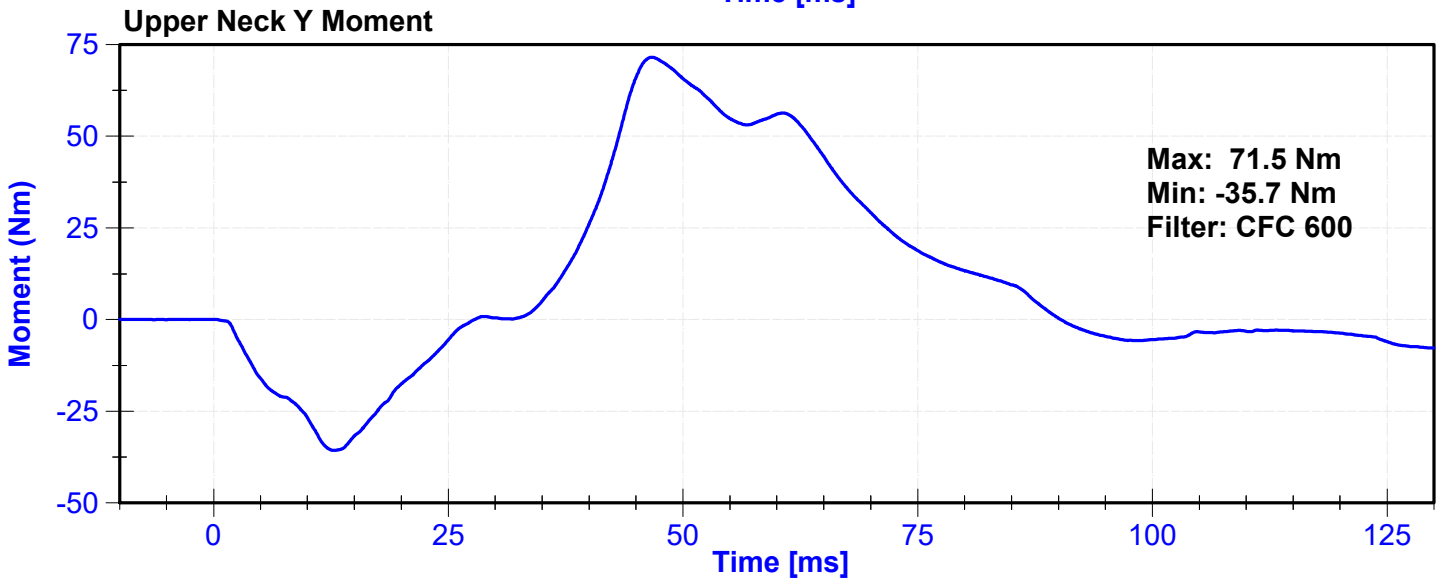
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Pendulum Potentiometer	ETI	SP22G_LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	SP22G_LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Denton	2184-FX	7/10/2024	7/10/2025

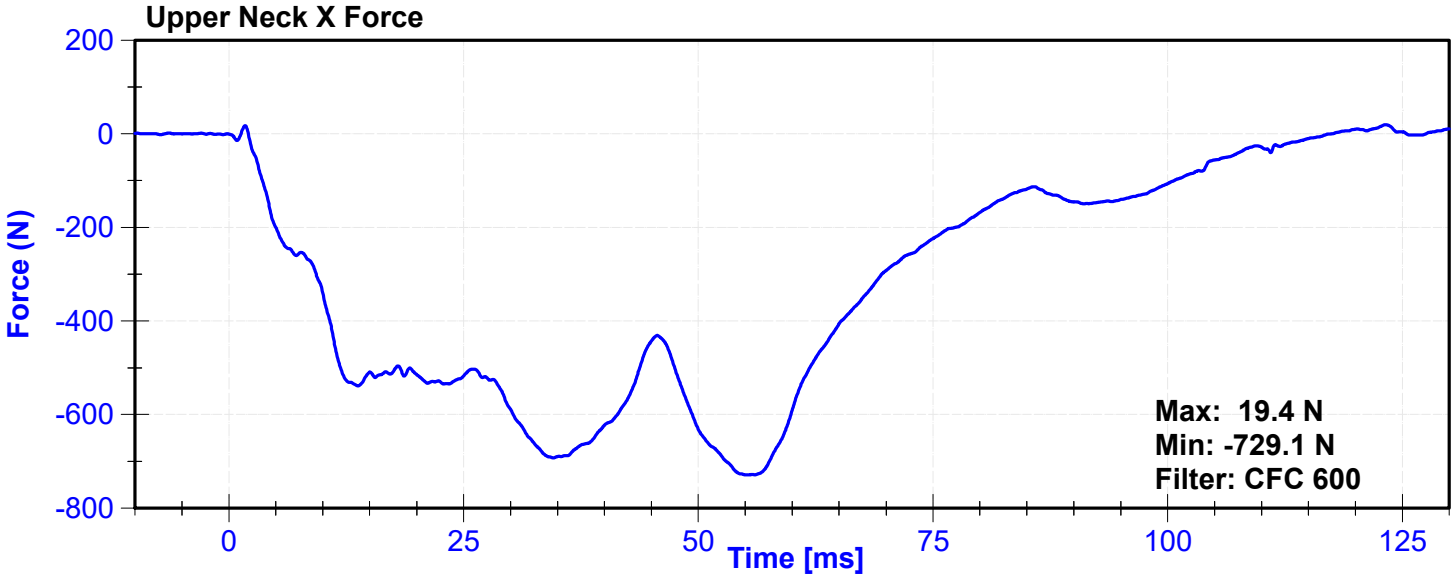



D-Plane Rotation
Rotation (Deg)
Time [ms]
Max: 77.3 deg
Min: -59.2 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
Time [ms]
Max: 79.8 Nm
Min: -26.2 Nm
Filter: CFC 600


Pendulum Deceleration
Acceleration (g's)
Time [ms]
Max: 30.2 g's
Min: -4.4 g's
Filter: CFC 60


Upper Neck Y Moment
Moment (Nm)
Time [ms]
Max: 71.5 Nm
Min: -35.7 Nm
Filter: CFC 600


Upper Neck X Force
Force (N)
Time [ms]
Max: 19.4 N
Min: -729.1 N
Filter: CFC 600

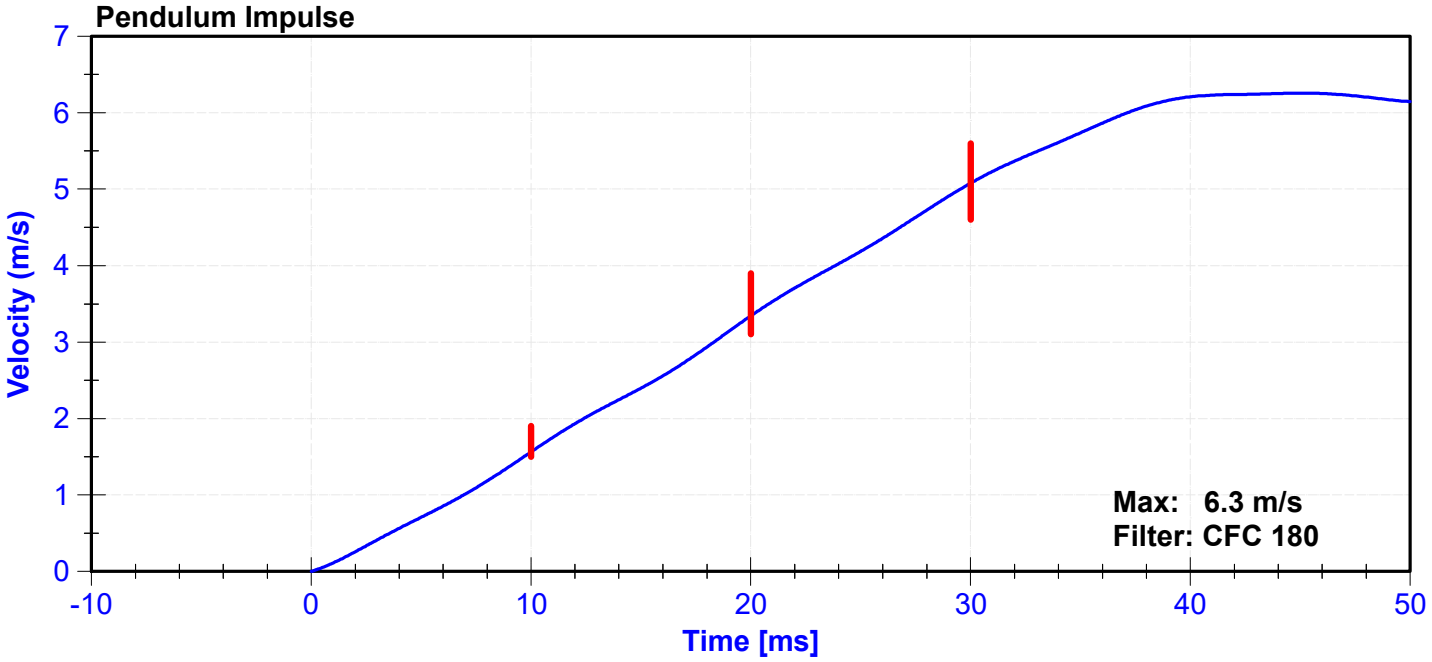
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

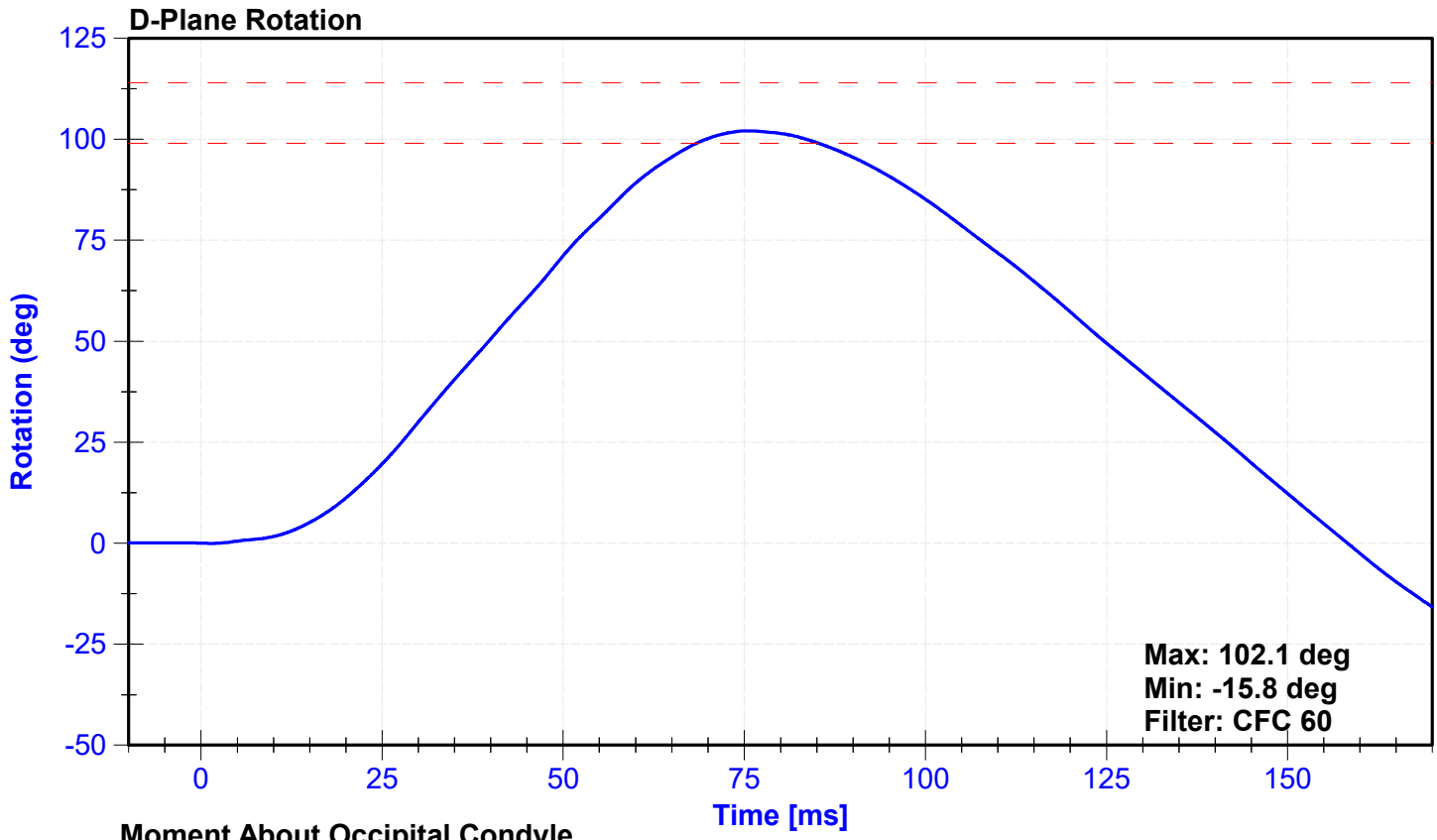
Results

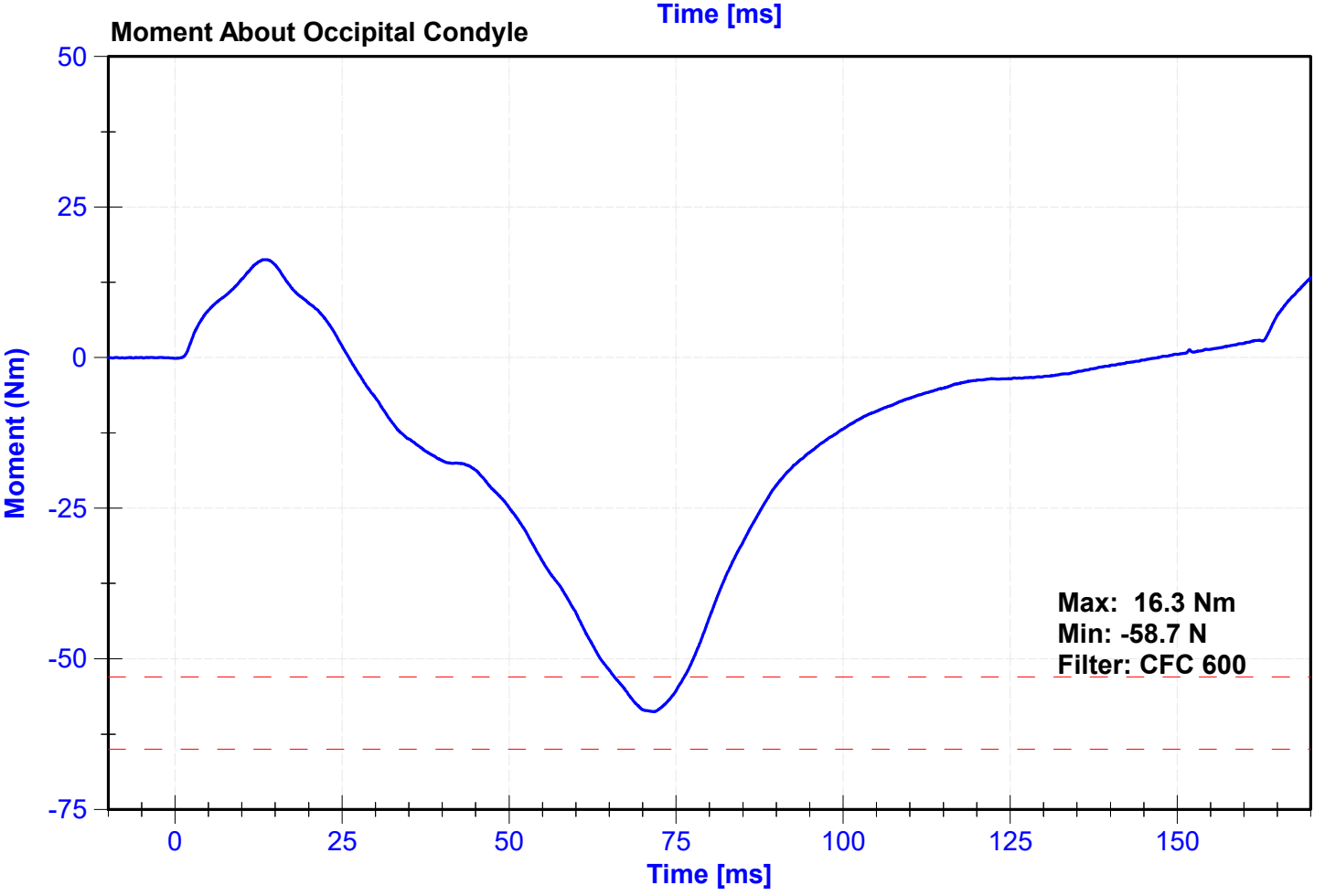
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	17	Pass
Velocity	5.95	6.19	m/s	6.042	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.56	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.34	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	5.08	Pass
D Plane Rotation	99	114	deg	102.1	Pass
Moment During Rotation Interval	-65	-53	Nm	-58.7	Pass
Moment Decay to -10Nm	94	114	ms	102.8	Pass

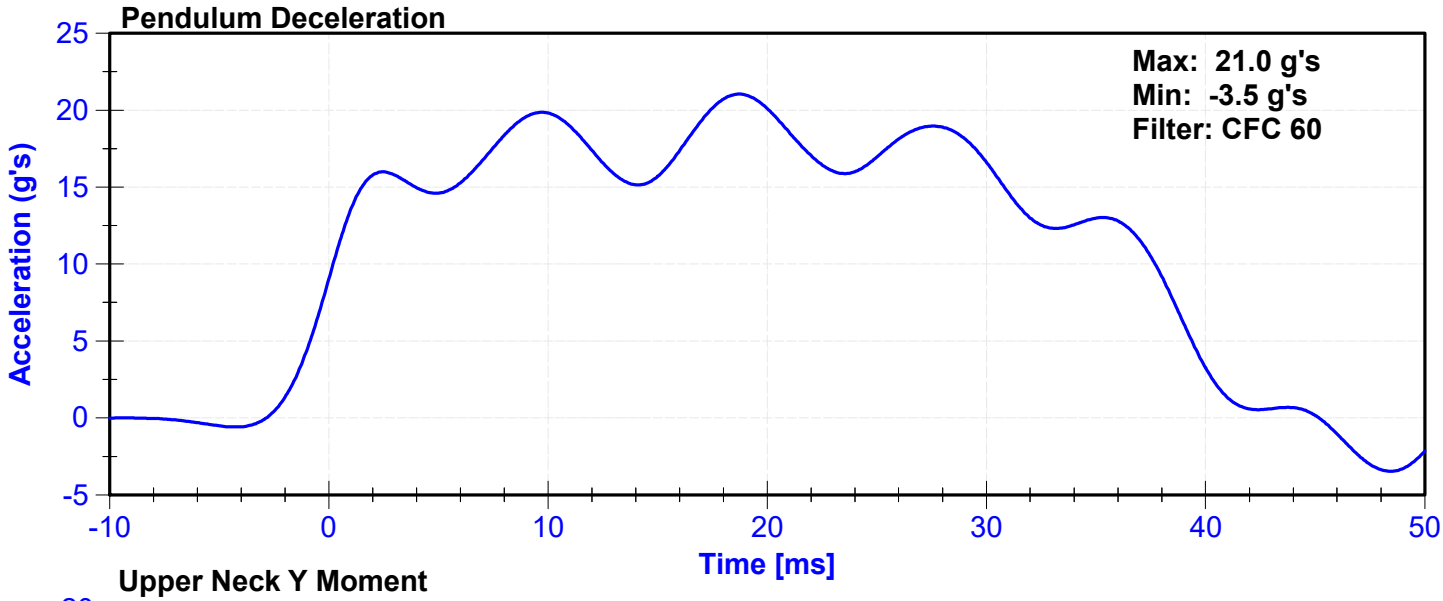
Transducer Calibrations

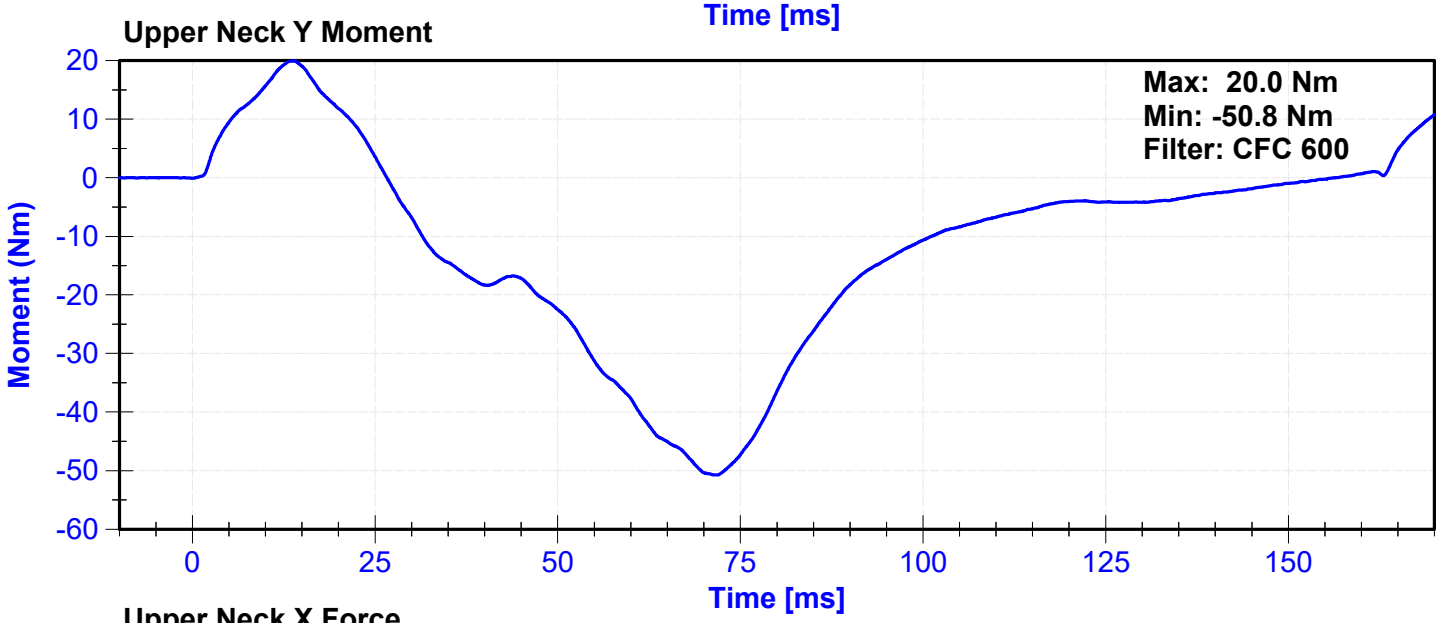
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Pendulum Potentiometer	ETI	SP22G_LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	SP22G_LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Denton	2184-FX	7/10/2024	7/10/2025

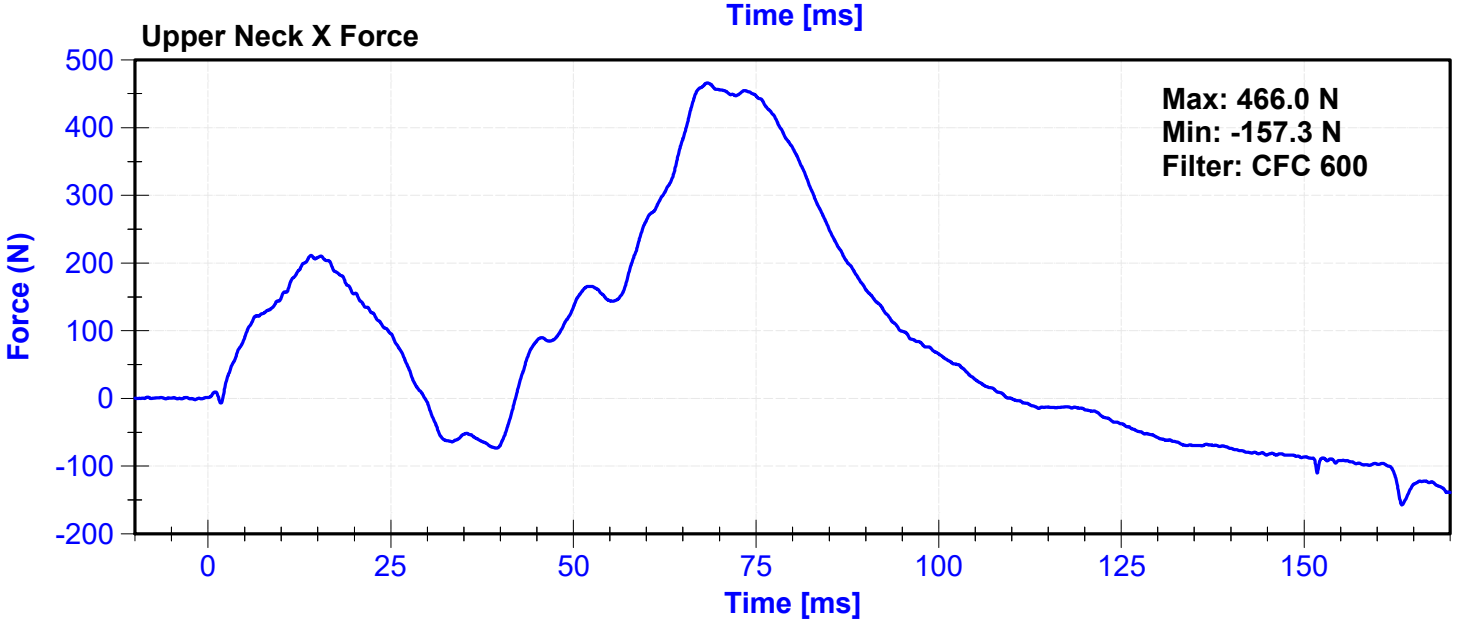



D-Plane Rotation
Rotation (deg)
125
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 102.1 deg
Min: -15.8 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
50
25
0
-25
-50
-75
0
25
50
75
100
125
150
Time [ms]
Max: 16.3 Nm
Min: -58.7 N
Filter: CFC 600


Pendulum Deceleration
Max: 21.0 g's
Min: -3.5 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 20.0 Nm
Min: -50.8 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 466.0 N
Min: -157.3 N
Filter: CFC 600
Force (N)
Time [ms]

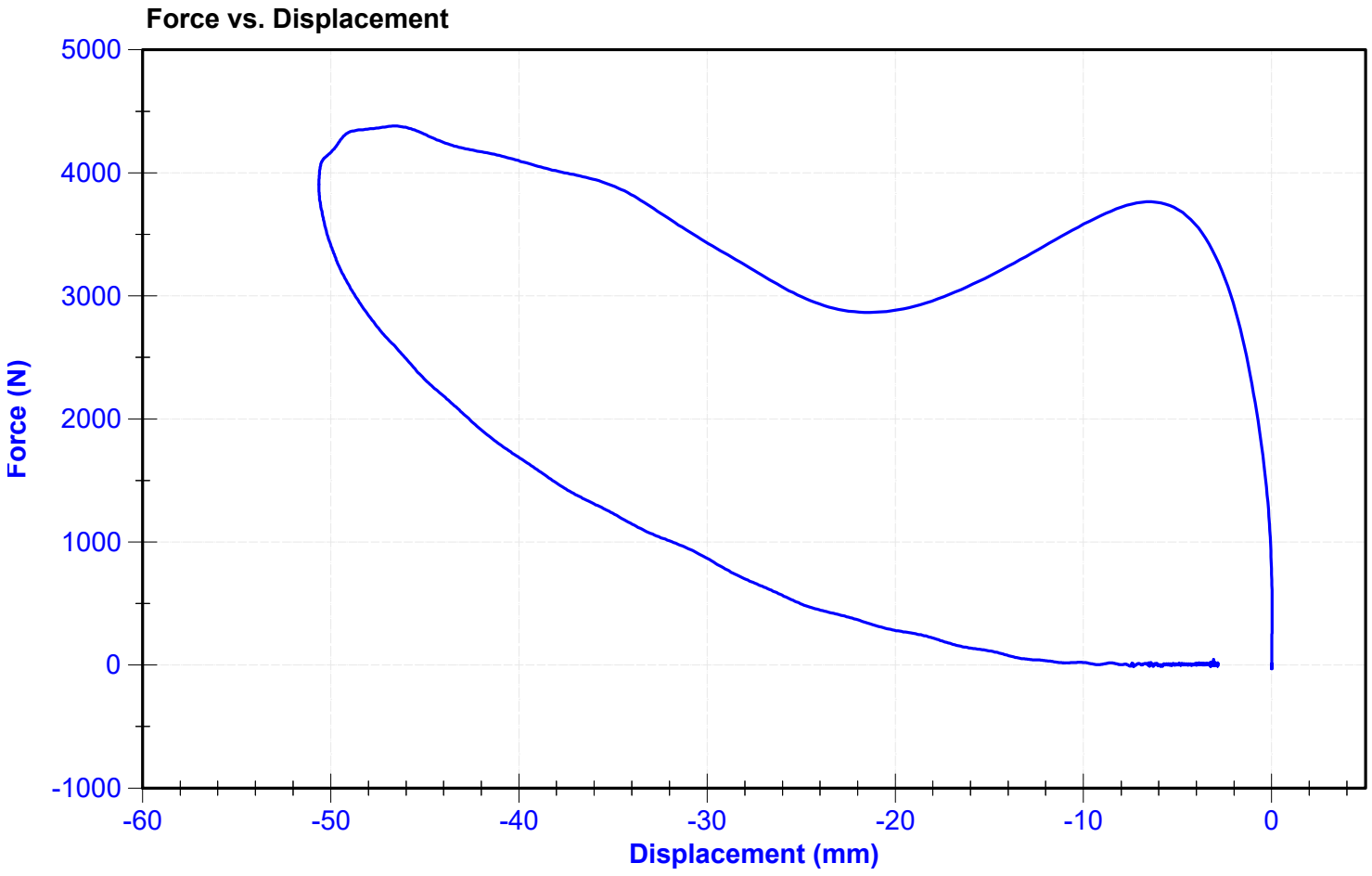
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

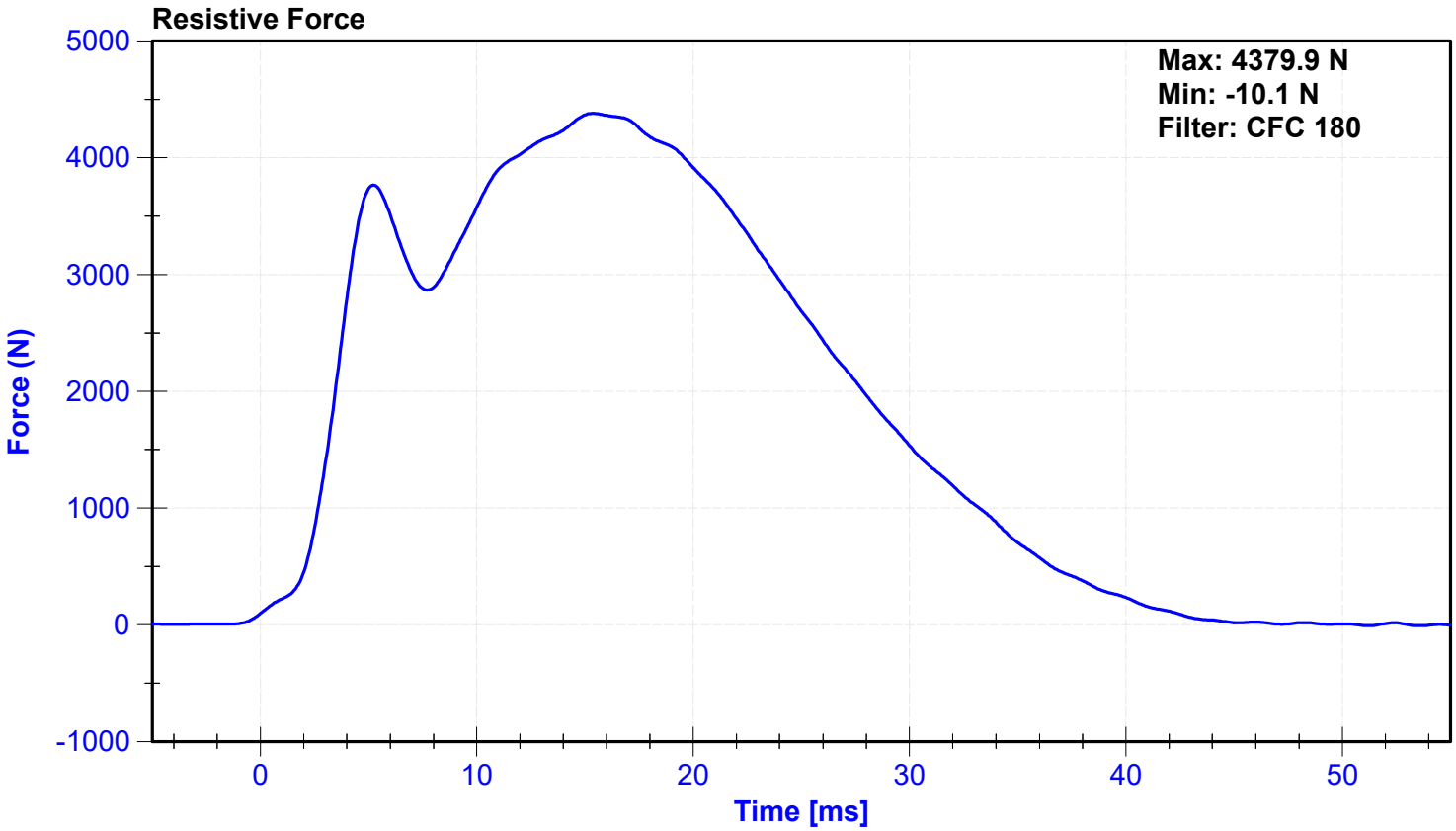
Results

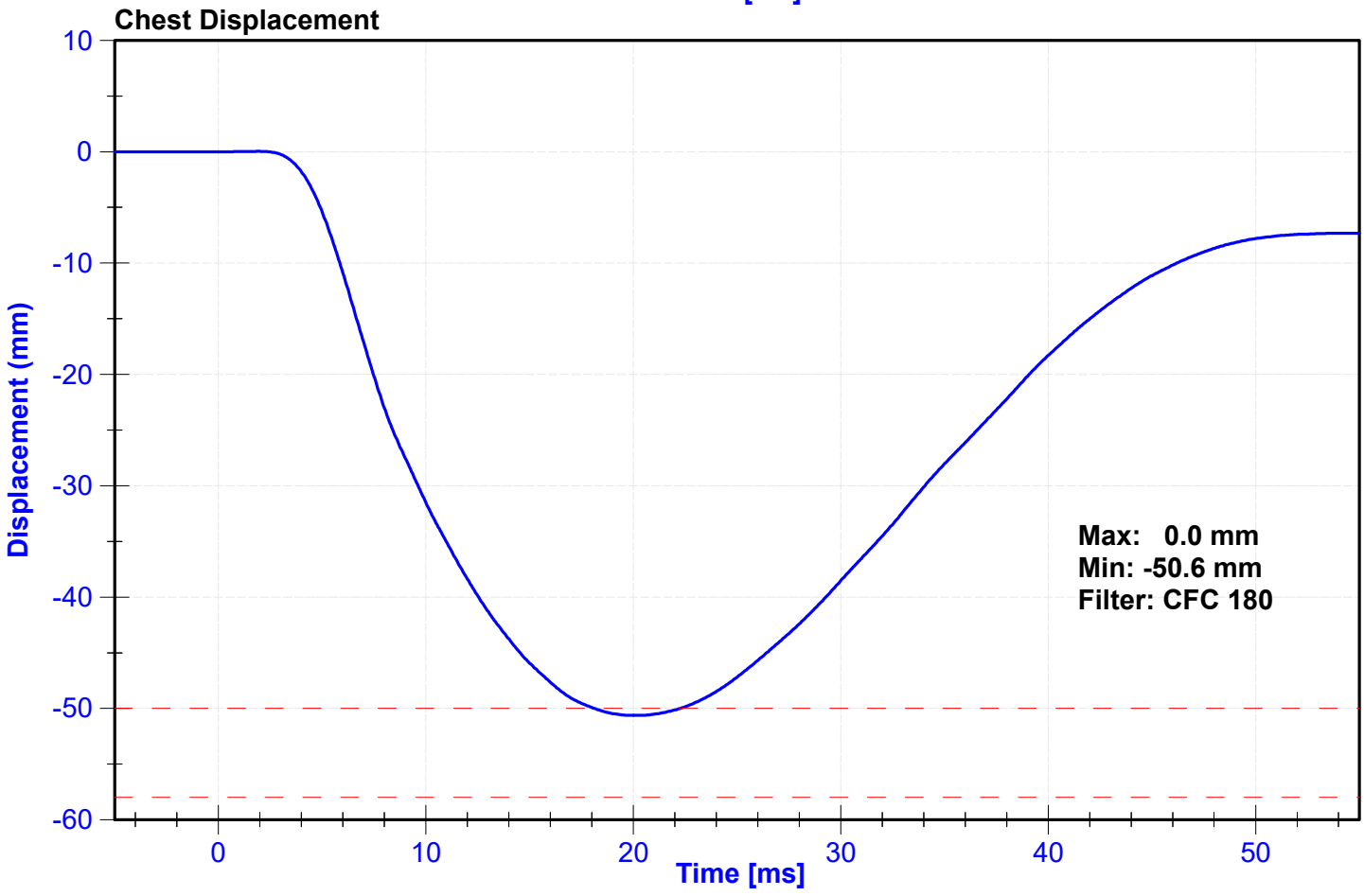
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	17	Pass
Velocity	6.59	6.83	m/s	6.672	Pass
Chest Deflection	-58	-50	mm	-50.6	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4166.6	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4379.9	Pass
Hysteresis	69	85	%	74.8	Pass

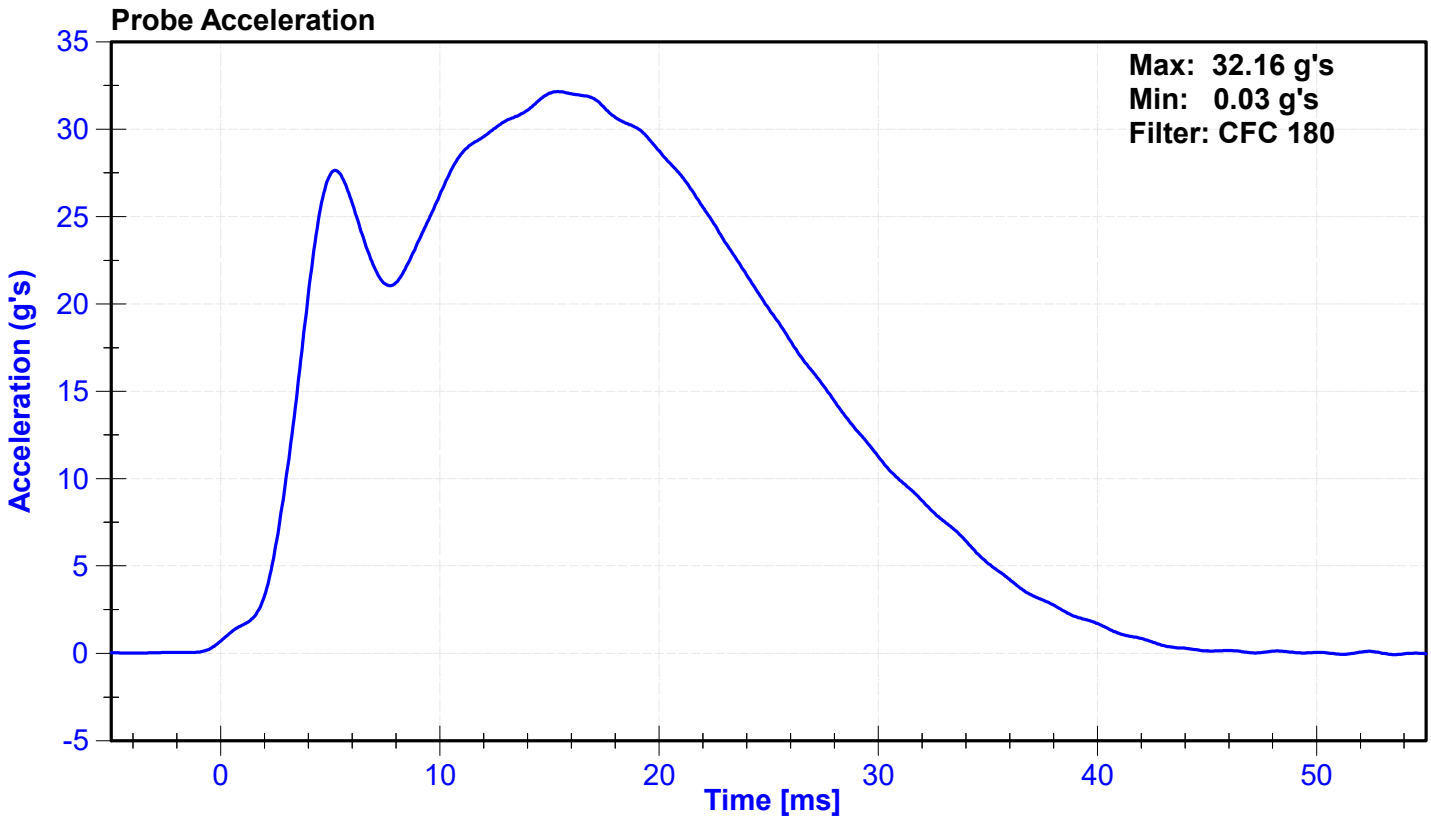
Transducer Calibrations

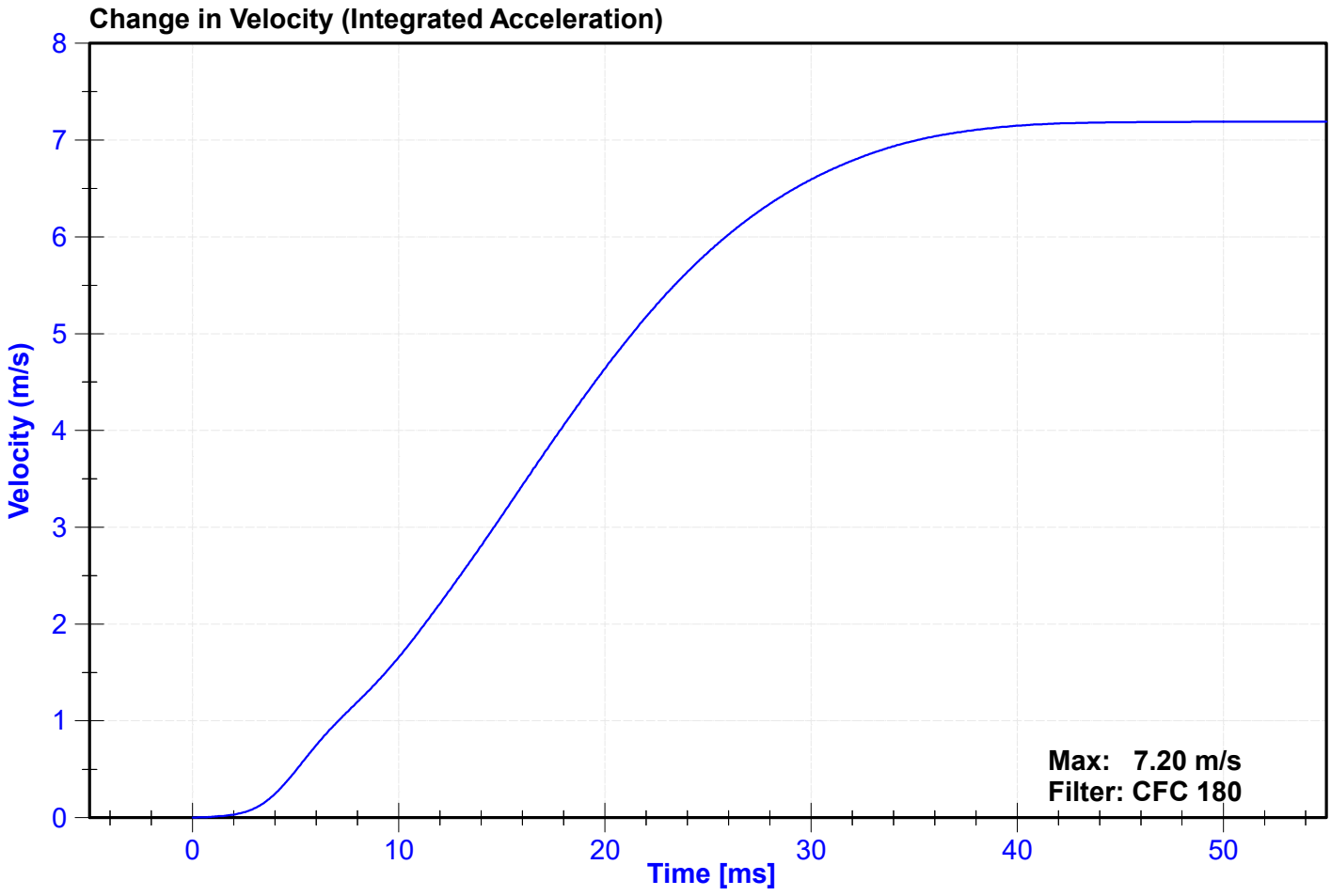
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	05/26/2025
Chest Potentiometer	Servo	0720	08/19/2024	02/17/2025




Resistive Force
Max: 4379.9 N
Min: -10.1 N
Filter: CFC 180
Force (N)
5000
4000
3000
2000
1000
0
-1000
0
10
20
30
40
50
Time [ms]


Chest Displacement
Max: 0.0 mm
Min: -50.6 mm
Filter: CFC 180
Displacement (mm)
10
0
-10
-20
-30
-40
-50
-60
0
10
20
30
40
50
Time [ms]


Probe Acceleration
Max: 32.16 g's
Min: 0.03 g's
Filter: CFC 180
Acceleration (g's)
35
30
25
20
15
10
5
0
-5
0
10
20
30
40
50
Time [ms]


Change in Velocity (Integrated Acceleration)
Velocity (m/s)
8
7
6
5
4
3
2
1
0
Max: 7.20 m/s
Filter: CFC 180
0
10
20
30
40
50
Time [ms]

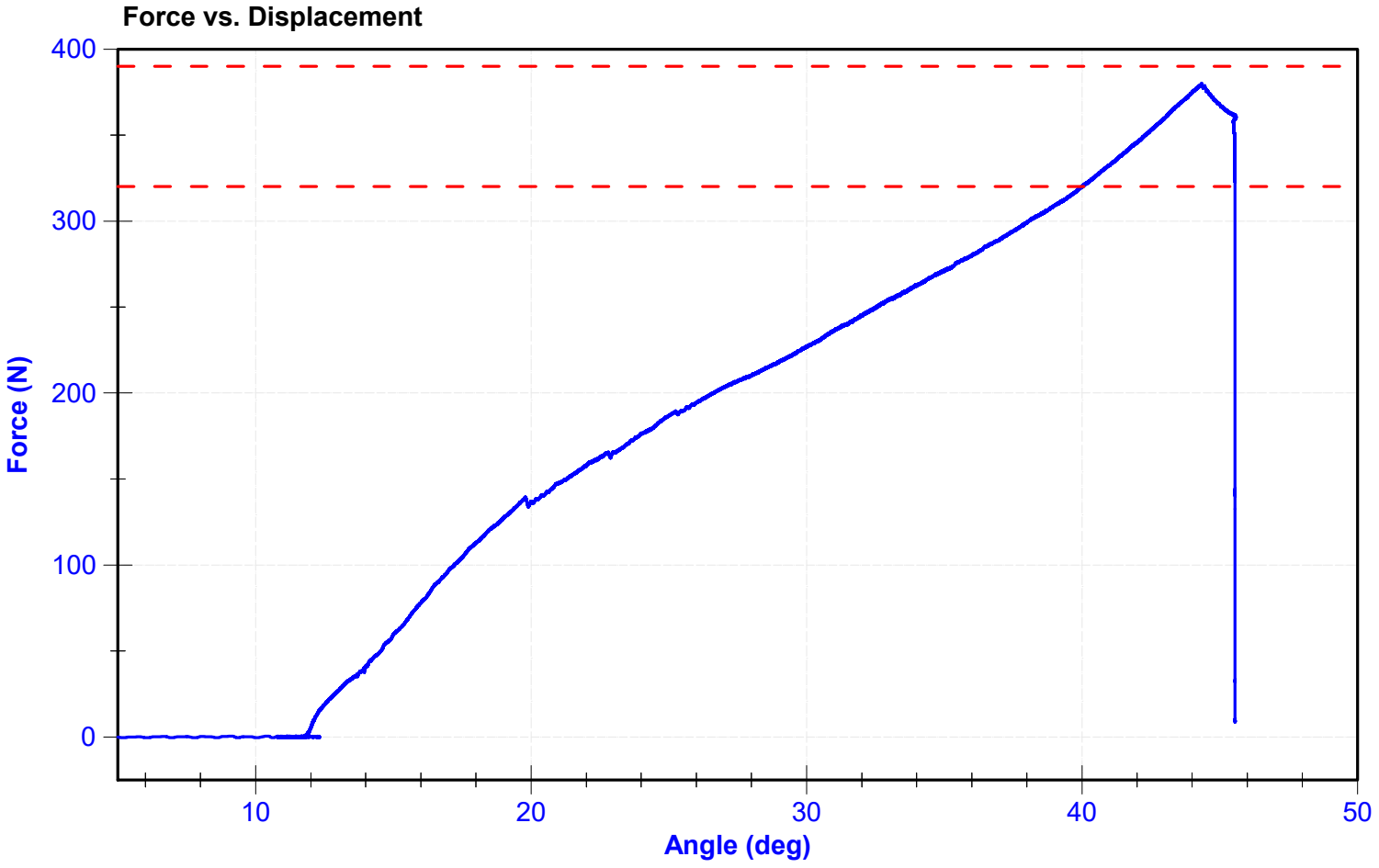
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	ºC	20.9	Pass
Humidity	10	70	%	17	Pass
Initial Angle	0	20	deg	11.5	Pass
Force at 45 Degrees	320	390	N	380.1	Pass
Return Angle Relative to Initial	0	8	deg	5.0	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Potentiometer	Rieker	DS-1905226	2024-11-16	2025-11-16
Load Cell	Load Cell	493319	2024-08-14	2025-08-14



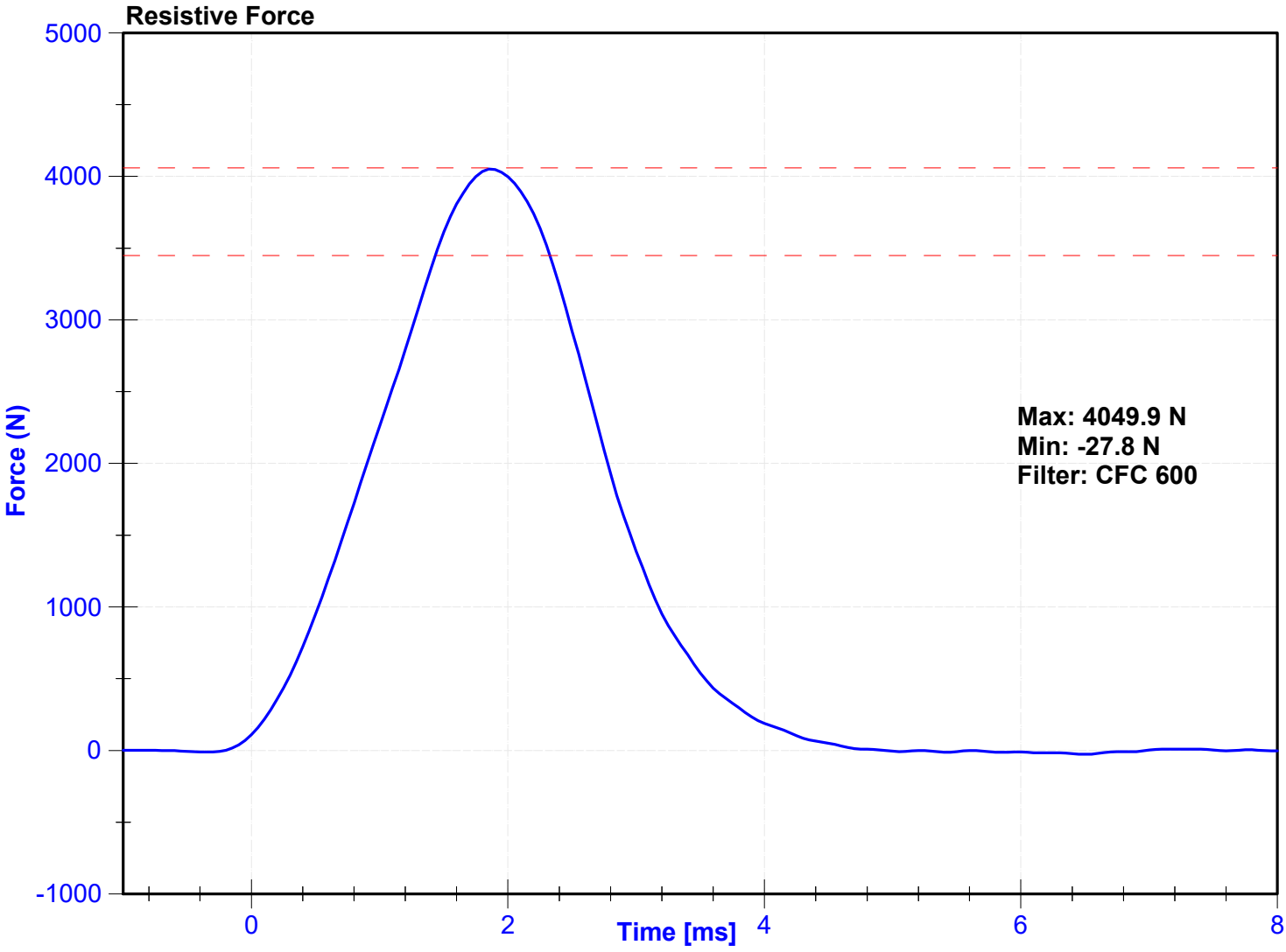
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

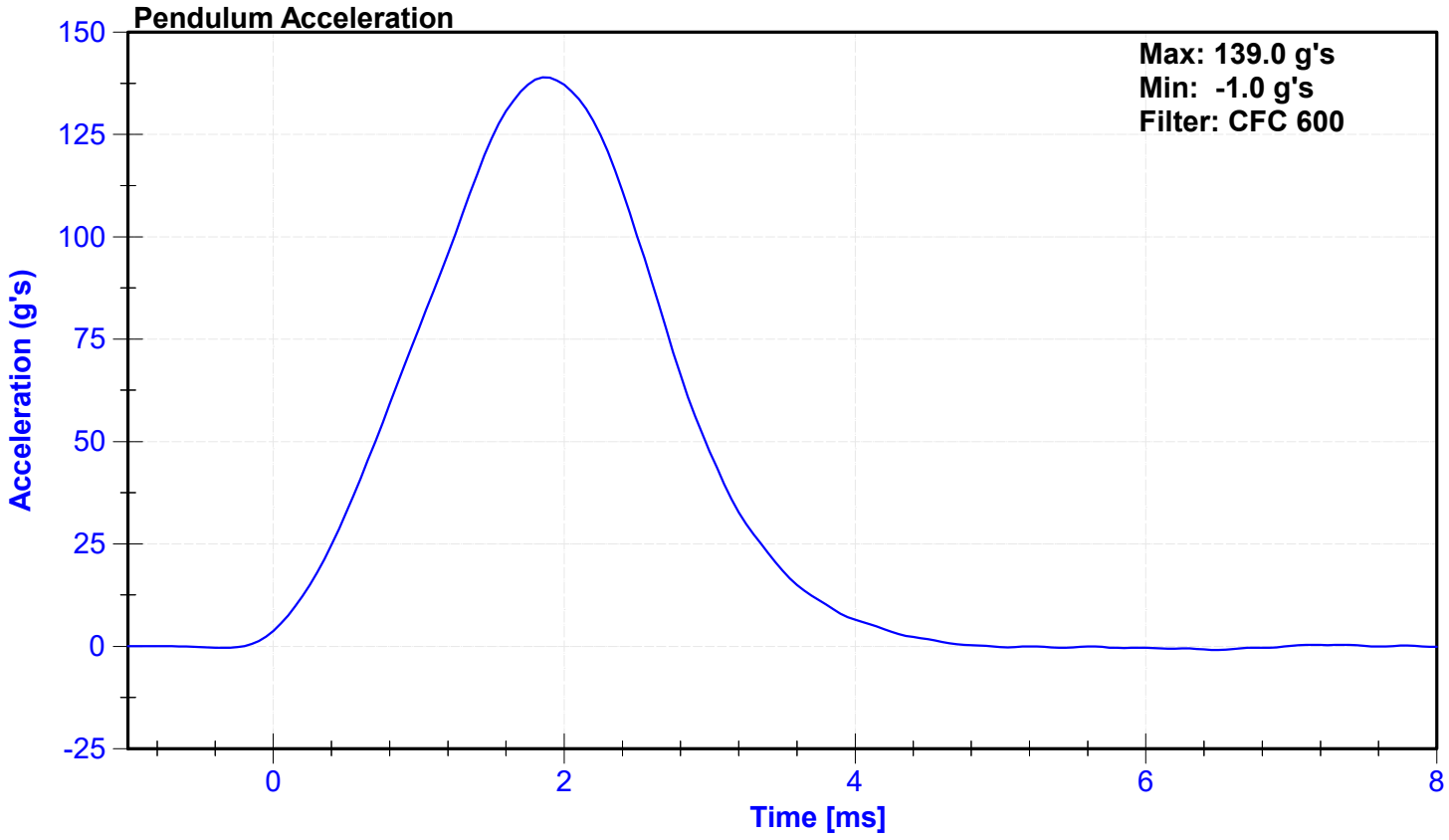
Results

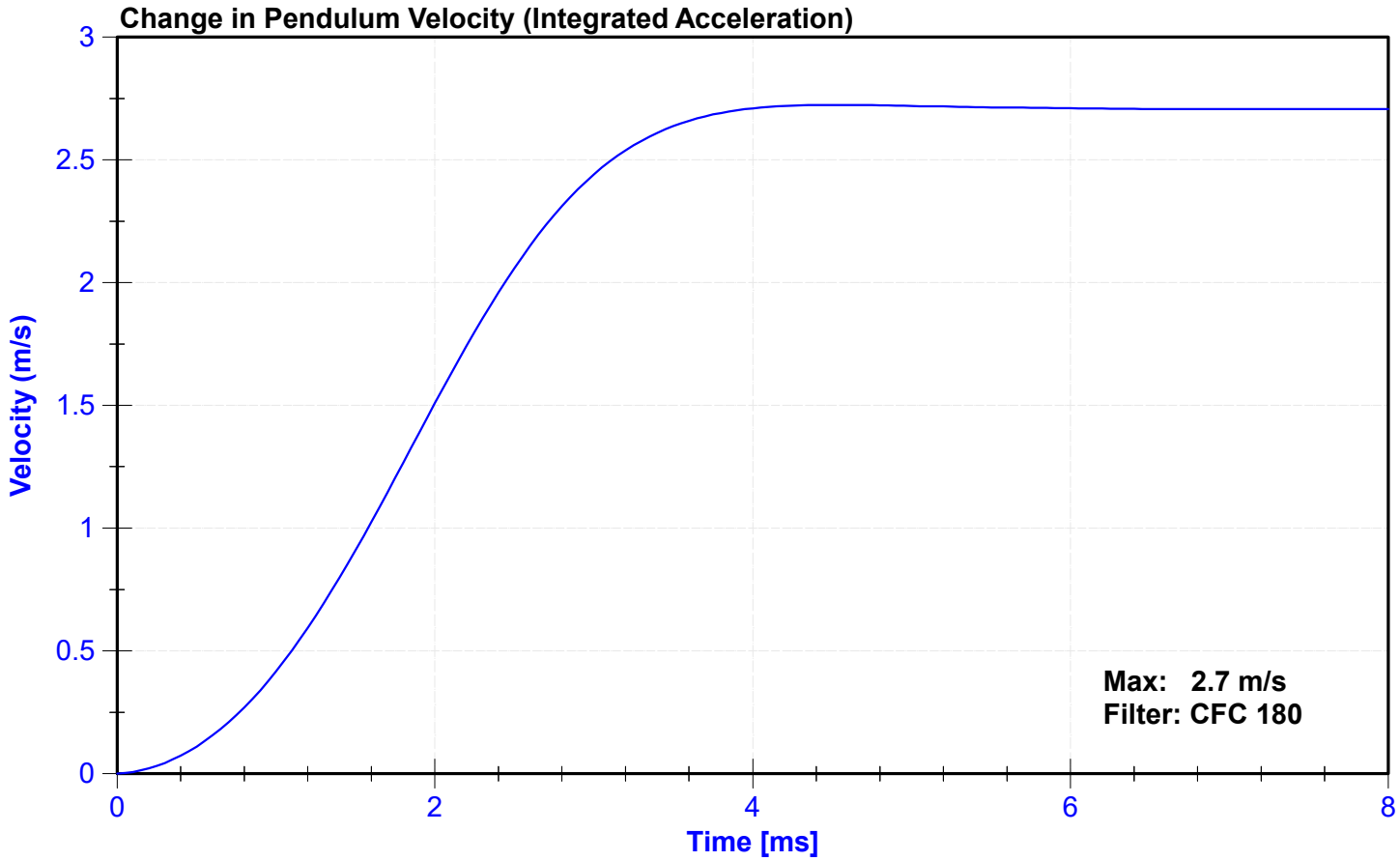
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	17	Pass
Velocity	2.07	2.13	m/s	2.123	Pass
Resistive Force	3450	4060	N	4049.9	Pass

Transducer Calibrations

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




Pendulum Acceleration
Max: 139.0 g's
Min: -1.0 g's
Filter: CFC 600
Acceleration (g's)
150
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]


Change in Pendulum Velocity (Integrated Acceleration)
Max: 2.7 m/s
Filter: CFC 180
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
Time [ms]

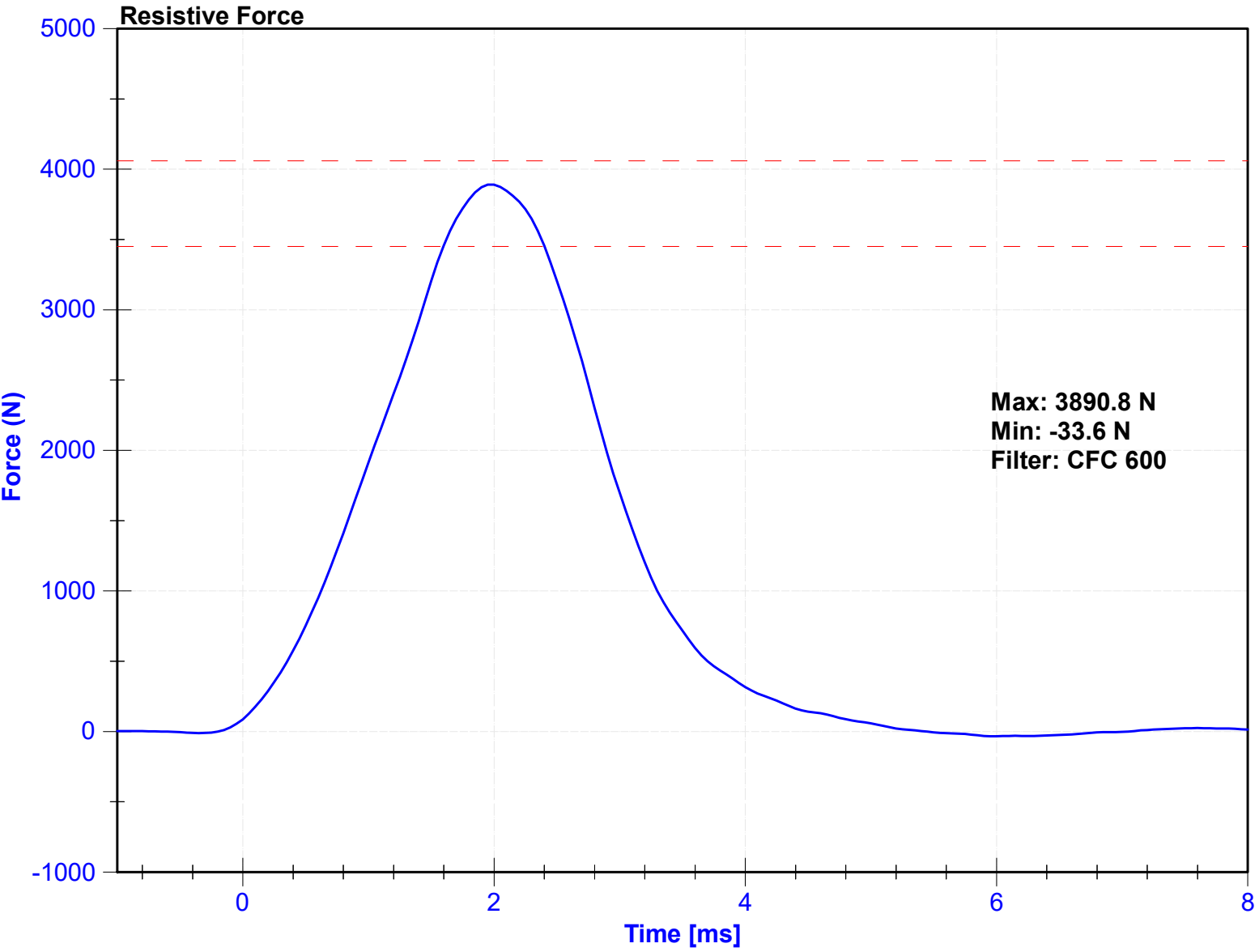
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

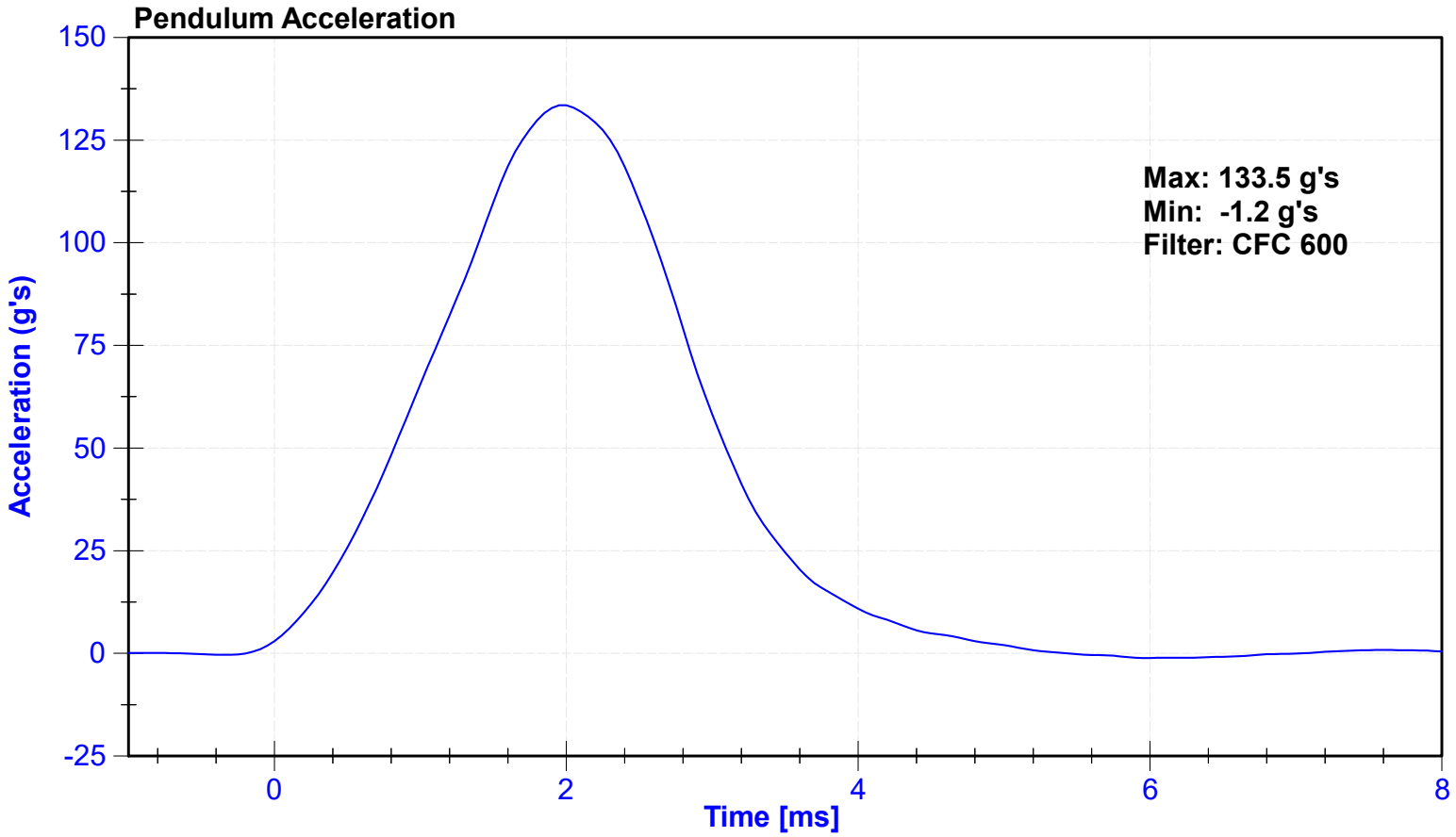
Results

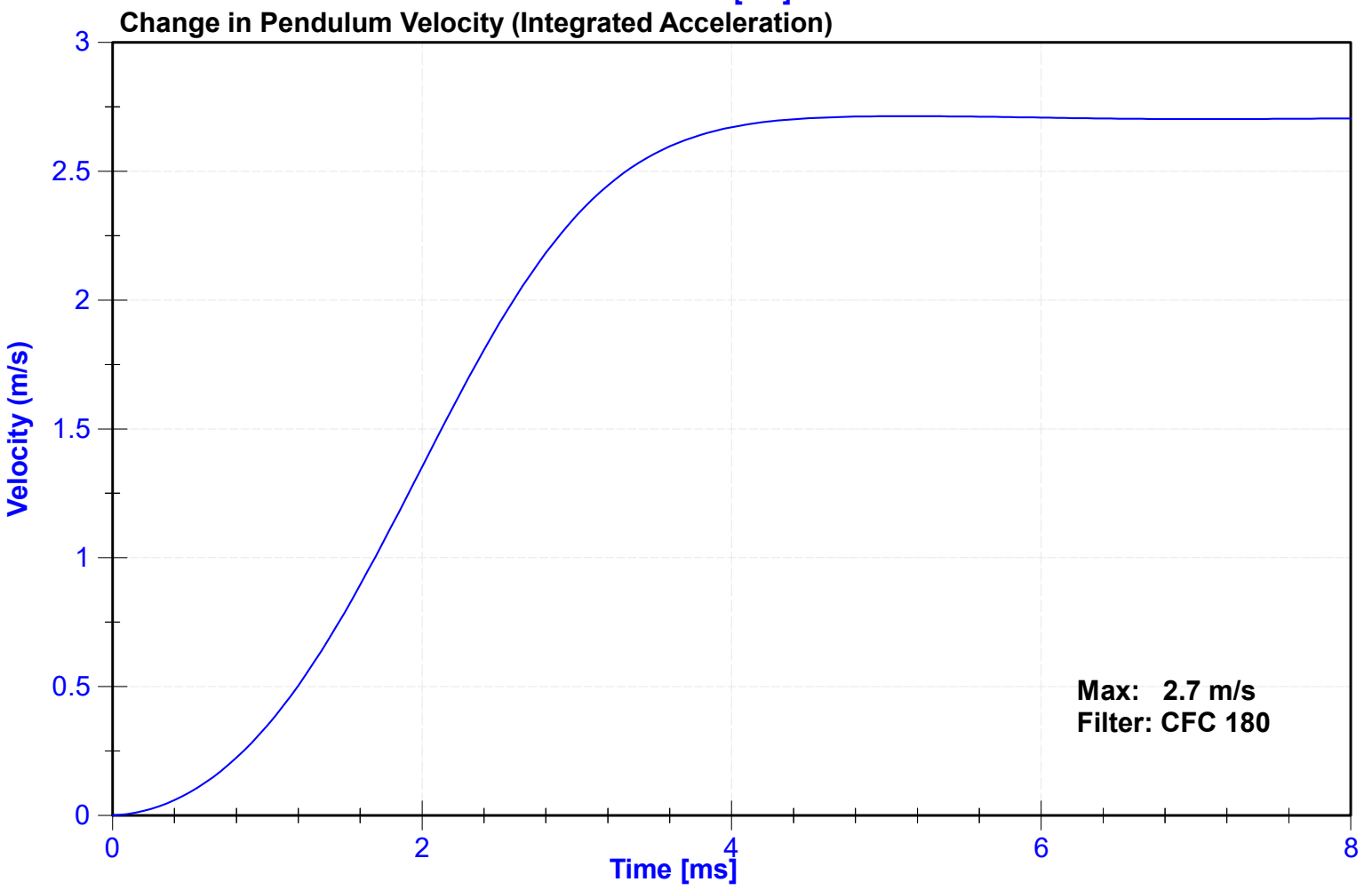
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	17	Pass
Velocity	2.07	2.13	m/s	2.121	Pass
Resistive Force	3450	4060	N	3890.8	Pass

Transducer Calibrations

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




Pendulum Acceleration
Acceleration (g's)
150
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]
Max: 133.5 g's
Min: -1.2 g's
Filter: CFC 600


Change in Pendulum Velocity (Integrated Acceleration)
Velocity (m/s)
3
2.5
2
1.5
1
0.5
0
0
2
4
6
8
Time [ms]
Max: 2.7 m/s
Filter: CFC 180

APPENDIX D

TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

Table 1 – Driver Dummy Instrumentation

Instrumentation		Axis/Location	Hybrid III 50th S/N: 065		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X	P52152	Endevco	10/31/2024
		Y	P58888	Endevco	10/31/2024
		Z	P58911	Endevco	10/31/2024
	Redundant	X	P52012	Endevco	10/31/2024
		Y	P51979	Endevco	10/31/2024
		Z	P49204	Endevco	10/31/2024
Head Angular Rate Sensors		X	21126	DTS ARS	07/31/2024
		Y	15697	DTS PRO-18K	07/31/2024
		Z	11335	DTS ARS	07/31/2024
Upper Neck Load Cell		FX, Fy, Fz MX,MY, MZ	851-FX	Humanetics	05/22/2024
Chest Accelerometers	Primary	X	P58887	Endevco	10/31/2024
		Y	P66917	Endevco	10/31/2024
		Z	P49197	Endevco	10/31/2024
	Redundant	X	P49213	Endevco	10/31/2024
		Y	P63840	Endevco	10/31/2024
		Z	P83313	Endevco	10/31/2024
Chest Potentiometer		X	1046	Servo	10/31/2024
Pelvis Accelerometer		X	P51699	Endevco	10/31/2024
		Y	P94090	Endevco	10/31/2024
		Z	P83437	Endevco	10/31/2024
Femur Load Cells - Left	Primary	Z	117-FZ1	Denton	05/22/2024
	Redundant	Z	117-FZ2	Denton	05/22/2024
Femur Load Cells - Right	Primary	Z	109-FZ1	Denton	05/22/2024
	Redundant	Z	109-FZ2	Denton	05/22/2024
Tibia Load Cells - Left	Upper	MX, MY, FZ	652-FZ	Denton	05/20/2024
	Lower	MX, MY, FZ	364-FZ	Denton	09/13/2024
Tibia Load Cells – Right	Upper	MX, MY, FZ	371-FZ	Denton	05/20/2024
	Lower	MX, MY, FZ	673-FZ	Denton	05/20/2024
Foot Accelerometers - Left	Rear	X	P69797	Endevco	10/31/2024
	Front	Z	P51729	Endevco	10/31/2024
Foot Accelerometers - Right	Rear	X	T20878	Endevco	10/31/2024
	Front	Z	P51685	Endevco	10/31/2024
Seat belt Load Cells	Lap		290	Denton	06/21/2024
	Shoulder		278	GFE	06/21/2024

Table 2 – Front Passenger Dummy Instrumentation

Instrumentation		Axis/Location	Hybrid III 5th S/N: 137		
			Serial Number	Manufacturer	Calibration Date
Head Accelerometers	Primary	X	P79417	Endevco	08/19/2024
		Y	P83335	Endevco	08/19/2024
		Z	P64149	Endevco	08/19/2024
	Redundant	X	P52008	Endevco	08/19/2024
		Y	P52045	Endevco	08/19/2024
		Z	P74774	Endevco	08/19/2024
Head Angular Rate Sensors		X	15696	DTS ARS	07/31/2024
		Y	14908	DTS ARS	07/31/2024
		Z	14909	DTS ARS	07/31/2024
Upper Neck Load Cell		FX, Fy, Fz MX,MY, MZ	2184-FX	Denton	07/10/2024
Chest Accelerometers	Primary	X	P58780	Endevco	08/19/2024
		Y	P83346	Endevco	08/19/2024
		Z	P49190	Endevco	08/19/2024
	Redundant	X	P58794	Endevco	08/19/2024
		Y	P69791	Endevco	08/19/2024
		Z	T11253	Endevco	08/19/2024
Chest Potentiometer		X	0720	Servo	08/19/2024
Pelvis Accelerometer		X	P58735	Endevco	08/19/2024
		Y	P77587	Endevco	08/19/2024
		Z	P51285	Endevco	08/19/2024
Femur Load Cells - Left	Primary	Z	DT0998-FZ1	Denton	05/22/2024
	Redundant	Z	DT0998-FZ2	Denton	05/22/2024
Femur Load Cells - Right	Primary	Z	DH3271-FZ1	Denton	05/22/2024
	Redundant	Z	DH3271-FZ2	Denton	05/22/2024
Tibia Load Cells - Left	Upper	MX, MY, FZ	476-FZ	Denton	05/20/2024
	Lower	MX, MY, FZ	363-FZ	Denton	05/20/2024
Tibia Load Cells – Right	Upper	MX, MY, FZ	361-FZ	Denton	05/20/2024
	Lower	MX, MY, FZ	359-FZ	Denton	05/20/2024
Foot Accelerometers - Left	Rear	X	P78959	Endevco	08/19/2024
	Front	Z	P83418	Endevco	08/19/2024
Foot Accelerometers - Right	Rear	X	P63998	Endevco	08/19/2024
	Front	Z	P80265	Endevco	08/19/2024
Seat belt Load Cells	Lap		168	Denton	06/21/2024
	Shoulder		156	Denton	06/21/2024

Table 3 – Vehicle Instrumentation

Instrumentation			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember/Rear Seat Accelerometers	Left	Primary	X	G23860	Endevco	11/16/2024
			Z	G23865	Endevco	11/16/2024
		Redundant	X	G23862	Endevco	11/16/2024
	Right	Primary	X	G23692	Endevco	10/15/2024
			Z	A293488	Measurement Specialties	10/21/2024
		Redundant	X	G25013	Endevco	11/05/2024
Engine Accelerometers	Top		X	G23695	Endevco	11/05/2024
	Bottom		X	G23420	Endevco	11/01/2024