REPORT NUMBER: NCAP-CAL-25-001

NEW CAR ASSESSMENT PROGRAM (NCAP)
FRONTAL BARRIER IMPACT TEST

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

NHTSA No: M20254200

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

February 27, 2025

FINAL REPORT

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

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Prepared by: Matthew Pronko Date: February 27, 2025
Matthew Pronko, Test Engineer

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

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

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16. Abstract

A 56.30 km/h (35 mph), NCAP frontal rigid barrier impact test was conducted on a 2025 KIA K4 4 Door Sedan 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 January 7, 2025.

The impact velocity of the vehicle was 56.36 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 417 mm at crush zone 5. 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	374.908	700	348.575
Maximum Chest Compression	mm	63	-25.173	52	-17.602
Nij		1	0.167	1	0.302
Neck Tension	N	4170	574.715	2620	525.741
Neck Compression	N	4000	-174.097	2520	-310.425
Left Femur Force	N	10008	-653.962	6805	-1403.105
Right Femur Force	N	10008	-702.844	6805	-215.460

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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, dated May 2018.

SUMMARY

A load cell barrier consisting of 128 load cells was impacted by a 2025 KIA K4 4 Door Sedan at a velocity of 56.36 km/h. The test was performed at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on January 7, 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 shoulder belts to measure dummy torso 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 100 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 417 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 and the head restraint. The upper torso contacted the frontal airbag. Both knees contacted the steering column shroud.

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 glove box.

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)	374.908	0.167	574.715	-174.097	37.516	-25.173	-653.962	-702.844
Passenger (5th)	348.575	0.302	525.741	-310.425	44.499	-17.602	-1403.105	-215.460

GENERAL COMMENTS:

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

Data Anomalies:

- No Questionable Channels

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 Indicant FMVSS No. 212 and FMVSS No. 219 (Partial)

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 KIA K4 4 Door Sedan
NHTSA No.: M20254200
Test Program: NCAP Frontal Barrier Impact Test
Test Date: 01/07/2025

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20254200	Traction Control System (TCS)	Yes
Model Year	2025	Power Steering	Yes
Make	KIA	Power Window Auto-Reverse	No
Model	K4	Driver Frontal Airbag	Yes
Body Style	4 Door Sedan	Driver Curtain Airbag	Yes
VIN	3KPFU4DE1SE007657	Driver Head/Torso Airbag	No
Body Color	Aurora Black Pearl	Driver Torso Airbag	No
Odometer Reading (km /mi)	18	Driver Torso/Pelvis Airbag	Yes
Engine Displacement (L)	2.0	Driver Pelvis Airbag	No
Type / No. Cylinders	I4	Driver Knee Airbag	No
Engine Placement	Transverse	Front Pass. Frontal Airbag	Yes
Transmission Type	Automatic	Front Pass. Curtain Airbag	Yes
Transmission Speeds	CVT	Front Pass. Head/Torso Airbag	No
Overdrive	Yes	Front Pass. Torso Airbag	No
Final Drive	Front Wheel Drive	Front Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Front Pass. Pelvis Airbag	No
Sunroof / T-Top	No	Front Pass. Knee Airbag	No
Running Boards	No	Driver Pretensioner	Yes
Tilt Steering Wheel	Yes	Driver Load Limiter	Yes
Power Seats	No	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	KIA Mexico, S.A. De C.V.	GVWR (KG)	1780
Date of Manufacture	08/24	GAWR Front (KG)	1071
		GAWR Rear (KG)	898

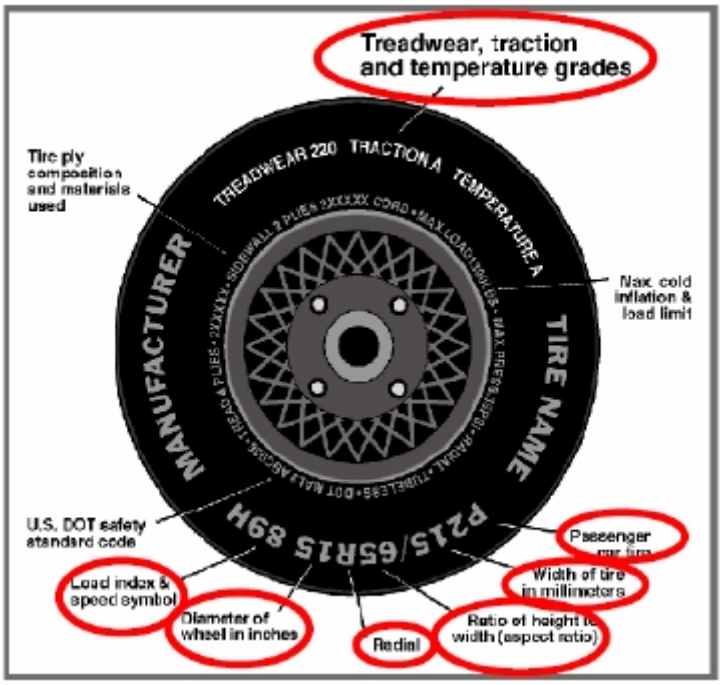
VEHICLE SEATING AND WEIGHT CAPACITY DATA

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)				385
Cargo Wt. (RCLW) (kg)				45

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

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

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)	235	215
Recommended Tire Size	225/45R17	225/45R17
Tire Size on Vehicle	225/45R17	225/45R17
Tire Manufacturer	Kumho	Kumho
Tire Model	Solus TA51	Solus TA51
Treadwear	520	520
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	2 Steel, 1 Polyester, 1 Nylon	2 Steel, 1 Polyester, 1 Nylon
Load Index / Speed Symbol	91W	91W
Tire Material	Rubber	Rubber
DOT Safety Code Left	000 U1YATC 2824	000 U1YATC 2824
DOT Safety Code Right	000 U1YATC 2824	000 U1YATC 2824

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

Test Vehicle: 2025 KIA K4 4 Door Sedan | NHTSA No.: M20254200
Test Program: NCAP Frontal Barrier Impact Test | Test Date: 01/07/2025

TEST VEHICLE WEIGHTS

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	408	279		443	339	
Right	kg	422	257		451	313	
Ratio	%	60.8	39.2		57.8	42.2	
Total	kg	830	536	1366	894	652	1546

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1366	(A)
Weight of 1 P572E ATD & 1 P572O ATD	kg	142	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	45	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1553	(A+B+C)

TEST VEHICLE ATTITUDES AND CG

Condition	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	725	724	750	751	1068
As Tested	mm	713	715	713	716	1148
Post-Test	mm	776	783	709	705	

GENERAL TEST VEHICLE DATA

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2721
Total Vehicle Length at Left Side	mm	4645
Total Vehicle Length at Centerline	mm	4711
Total Vehicle Length at Right Side	mm	4645
Weight of Ballast in Cargo Area	kg	0
Weight of Vehicle Components Removed	kg	25
Amount of Stoddard Solvent in Fuel Tank	L	43.7

LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:

Trunk Carpeting, Spare Tire, Jack, Taillight, Rear Door Panels with Speakers, Brake Light, and Rear Underbody Shield

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

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

TARGET VEHICLE STRUCTURAL MEASUREMENT

No.	Description	Pre-Test
1	Total Length	4711
2	Total Width	1812
3*	Bumper Top Height	557
4*	Bumper Bottom Height	461
5*	Longitudinal Member Top Height	521
6	Distance Between Longitudinal Members	1044
7	Longitudinal Member Width	63
8*	Engine Top Height	803
9*	Engine Bottom Height	190
10	Engine and Gearbox Width	467
11	Front Bumper-Engine Distance	662
12*	Front Shock Absorber Fixing Height	852
13*	Bonnet Leading Edge Height	687
14	Front Shock Absorber Fixing Width	1169
15	Front Bumper – Front Axle Distance	897
16	Front Axle – A Pillar Distance	497
17	A-Pillar – B-Pillar Distance	1097
18	B-Pillar – Rear Axle Distance	1128
19	B-Pillar – C-Pillar Distance	987
20*	Roof Sill Bottom Height	1278
21*	Roof Sill Top Height	1308
22*	Floor Sill Bottom Height	242
23*	Floor Sill Top Height	353

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

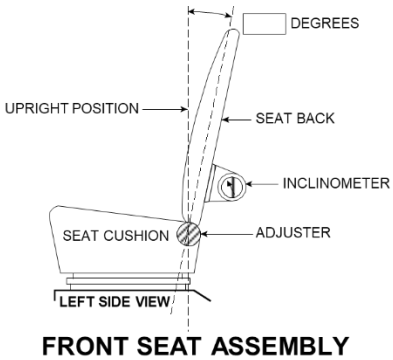
DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

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	-1.1
Passenger Seat Back Angle	-5.3



FRONT SEAT ASSEMBLY

SEAT FORE / AFT POSITIONS

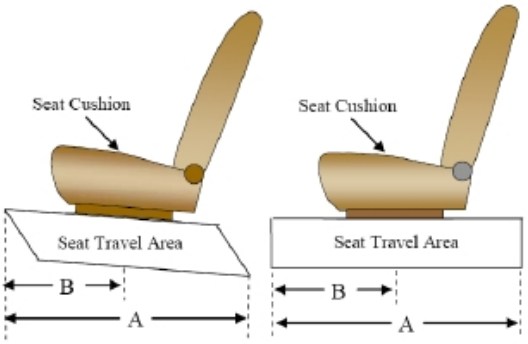
The driver's seat was positioned at the mid-point of fore/aft travel at its lowest position. The passenger's seat was positioned at the most forward position of fore/aft travel. Zero is defined as the forward most position.

Seating Position	Total Fore / Aft Travel	Placed in Position #
Driver Seat	41 (0-40)	15
Passenger Seat	41 (0-40)	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	3 (0-2)	0
Passenger Seat	3 (0-2)	0



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

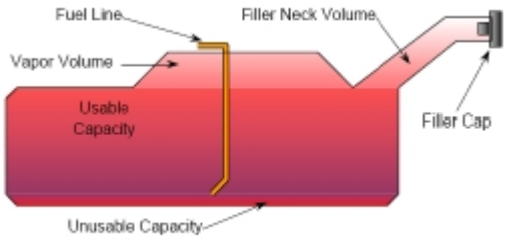
Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

FUEL TANK CAPACITY

Description	Liters
Usable Capacity of “Standard Tank”	47.0
Usable Capacity of “Optional Tank”	N/A
92%-94% of Usable Capacity	43.2 - 44.2
Actual Amount of Solvent Used	43.7
1/3 of Usable Capacity	15.7

FUEL PUMP

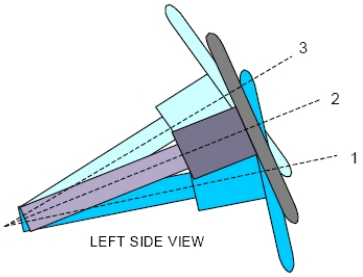
The vehicle is equipped with an electric fuel pump. The fuel filler neck is on the left side of the vehicle. The pump creates positive pressure in the fuel lines, pushing the gasoline to the engine. See form 1 for more information.



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.



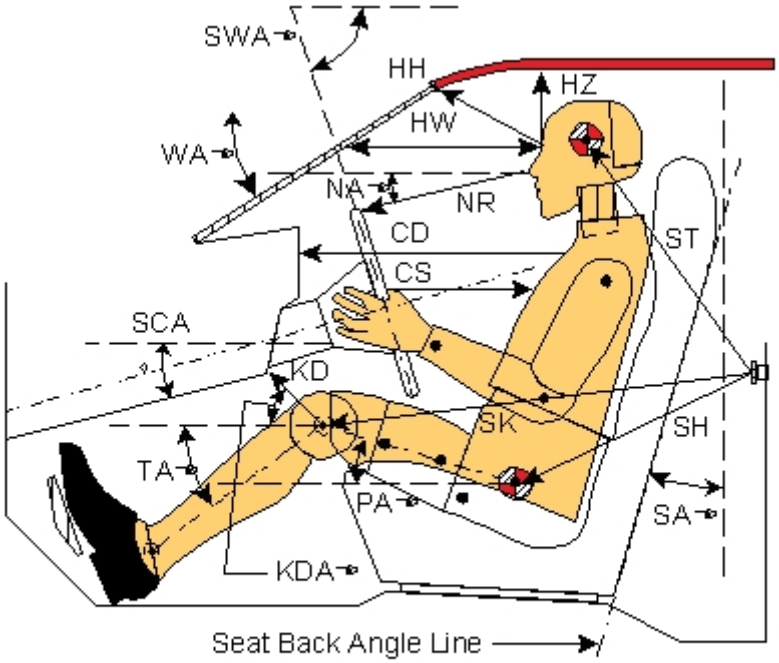
STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONS

Description	Degrees	Fore / Aft Position (mm)
Lowermost position No. 1	19.1	
Geometric center position No. 2	21.8	
Uppermost position No. 3	24.5	
Telescoping Steering Wheel Travel		50
Test Position	21.8	25

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

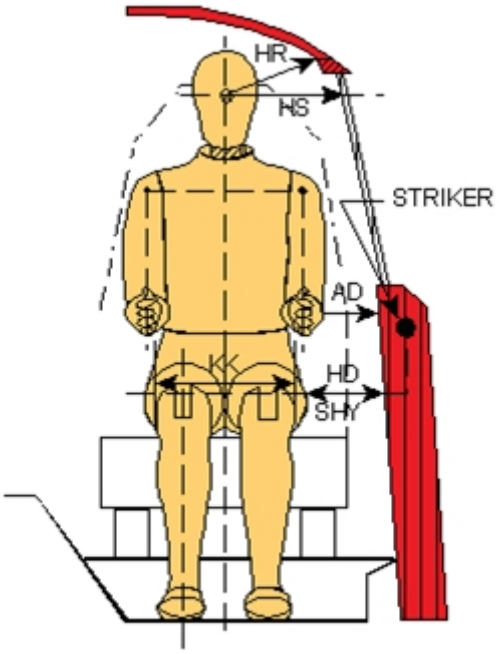


Left Side View

Code	Measurement Description	Driver (SN: 065)		Passenger (SN: 137)	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		27.7		
SWA°	Steering Wheel Angle		21.8		
SCA°	Steering Column Angle		68.2		
SA°	Seat Back Angle (on headrest post)		-1.1		-5.3
HZ	Head to Roof (Z)	175	90.0	208	90.0
HH	Head to Header	363	25.1	290	42.7
HW	Head to Windshield	618	0.0	625	0.0
NR	Nose to Rim / Dash	413	4.6	495	23.4
CD	Chest to Dash	597		430	
CS	Chest to Steering Hub	344	0.6		
RA	Rim to Abdomen	245	0.0		
KDL	Left Knee to Dash	201	28.6	137	29.8
KDR	Right Knee to Dash	191	27.0	149	29.4
PA°	Pelvic Angle		24.6		20.2
TA°	Tibia Angle		24.4		33.6
SK	Striker to Knee	585	19.0	725	13.0
ST	Striker to Head	420	76.7	381	52.9
SH	Striker to H-Point	382	51.6	471	34.3

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

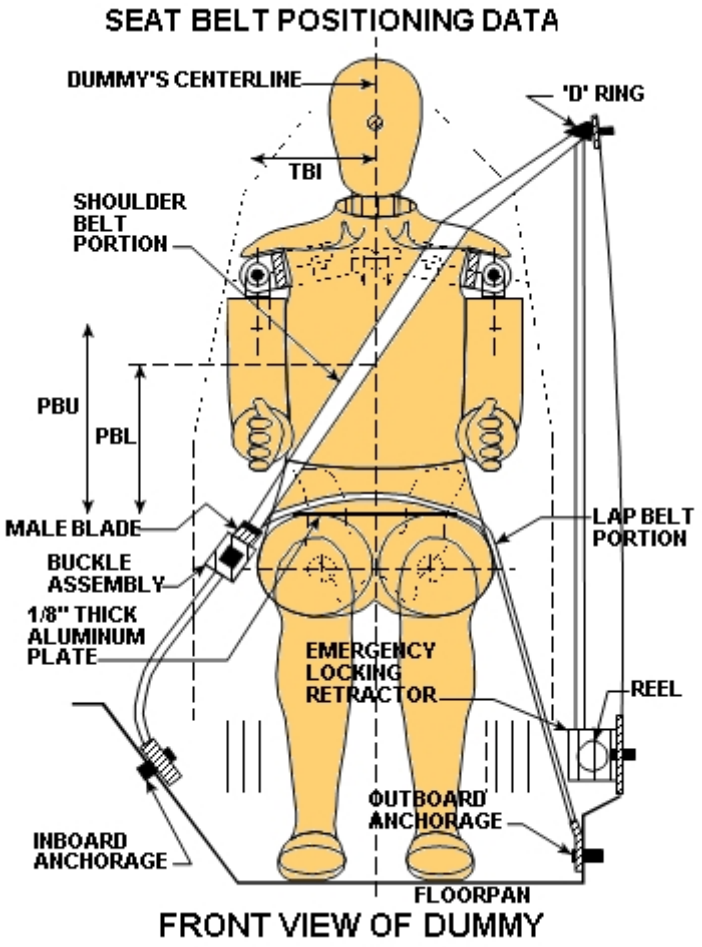


Front View

Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	148	82
HD	H-Point to Door	150	226
HR	Head to Side Header	223	255
HS	Head to Side Window	358	385
KK	Knee to Knee	345	212
SHY	Striker to H-Point (Y Direction)	255	272
AA	Ankle to Ankle	375	173

DATA SHEET NO. 5
SEAT BELT POSITIONING DATA

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025



SEAT BELT POSITIONING MEASUREMENTS

Measurement Description	Units	Driver	Passenger
PBU — Top surface of reference to belt upper edge	mm	335	277
PBL — Top surface of reference to belt lower edge	mm	245	190

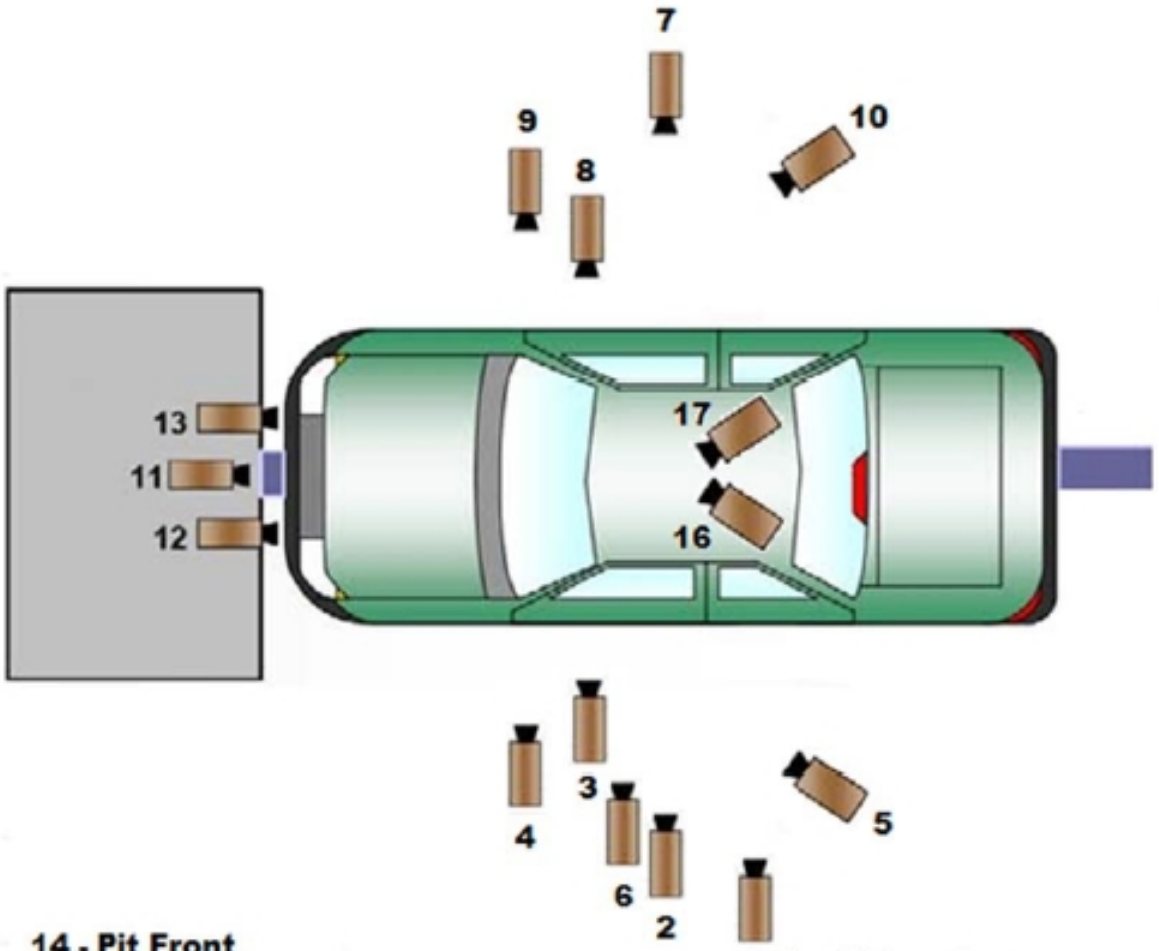
BELT LENGTH DATA

Measurement Description	Units	Driver	Passenger
Shoulder belt length as measured on ATD	mm	885	933
Lap Belt Length as measured on ATD	mm	790	800
Remainder of belt on reel	mm	875	822
Total belt length for continuous webbing systems	mm	2550	2555

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

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

CAMERA POSITIONS FOR FRONTAL IMPACTS



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

Test Vehicle: 2025 KIA K4 4 Door Sedan NHTSA No.: M20254200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 01/07/2025

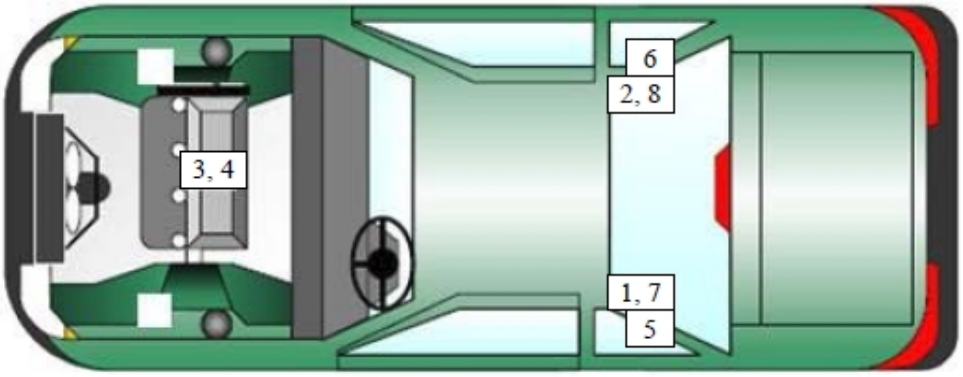
CAMERA LOCATIONS

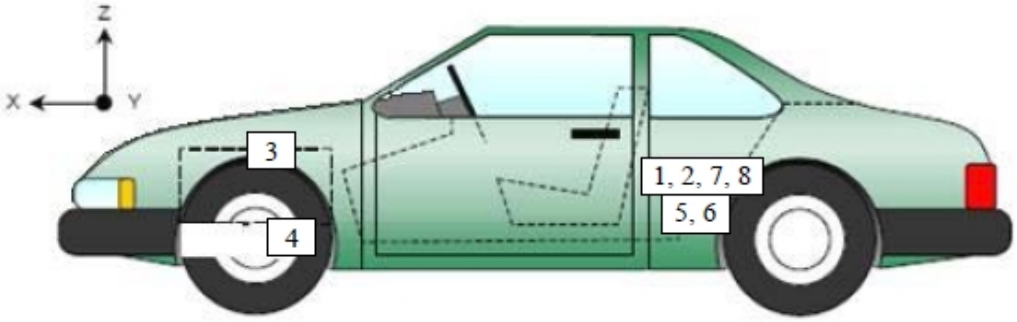
No.	Camera View	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall				Zoom	60
2	Left Overall	-1257	-7342	-1501	24	1000
3	Driver Close-Up	-1380	-6342	-1492	50	1000
4	Left Front Half	-904	-6245	-1486	28	1000
5	Left Angle	-3925	-4763	-2459	50	1000
6	Steering Column	-1405	-7241	-2350	75	1000
7	Right Overall	-1303	7032	-1520	24	1000
8	Passenger Close-Up	-1391	5958	-1493	50	1000
9	Right Front Half	-1002	6056	-1460	28	1000
10	Right Angle	-3940	4573	-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	-3022	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 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025





VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	1935	-313	342
2	Right Rear Accelerometer – X Direction	1936	307	329
3	Engine Top X	4017	157	-199
4	Engine Bottom X	4064	221	441
5	Left Rear Accelerometer – Z Direction	1935	-313	342
6	Right Rear Accelerometer – Z Direction	1936	307	329
7	Left Rear Accelerometer – X Direction Redundant	1935	-328	342
8	Right Rear Accelerometer – X Direction Redundant	1935	322	328

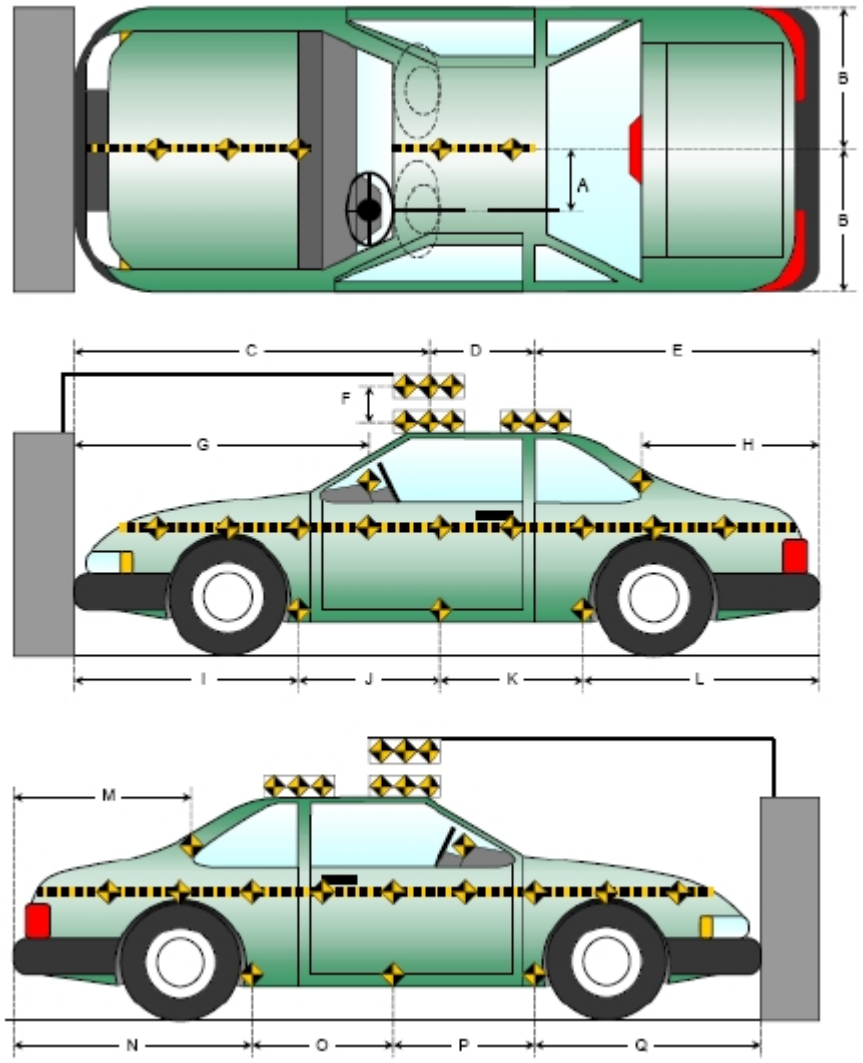
Reference Points:
X – Rear Surface of Vehicle (+ forward)
Y – Vehicle Centerline (+ to right)
Z – Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

Item	Value
A	346
B	906
C	2251
D	864
E	1596
F	350
G	1703
H	1141
I	1316
J	941
K	949
L	1505
M	1142
N	1508
O	945
P	943
Q	1315

All units in millimeters



DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

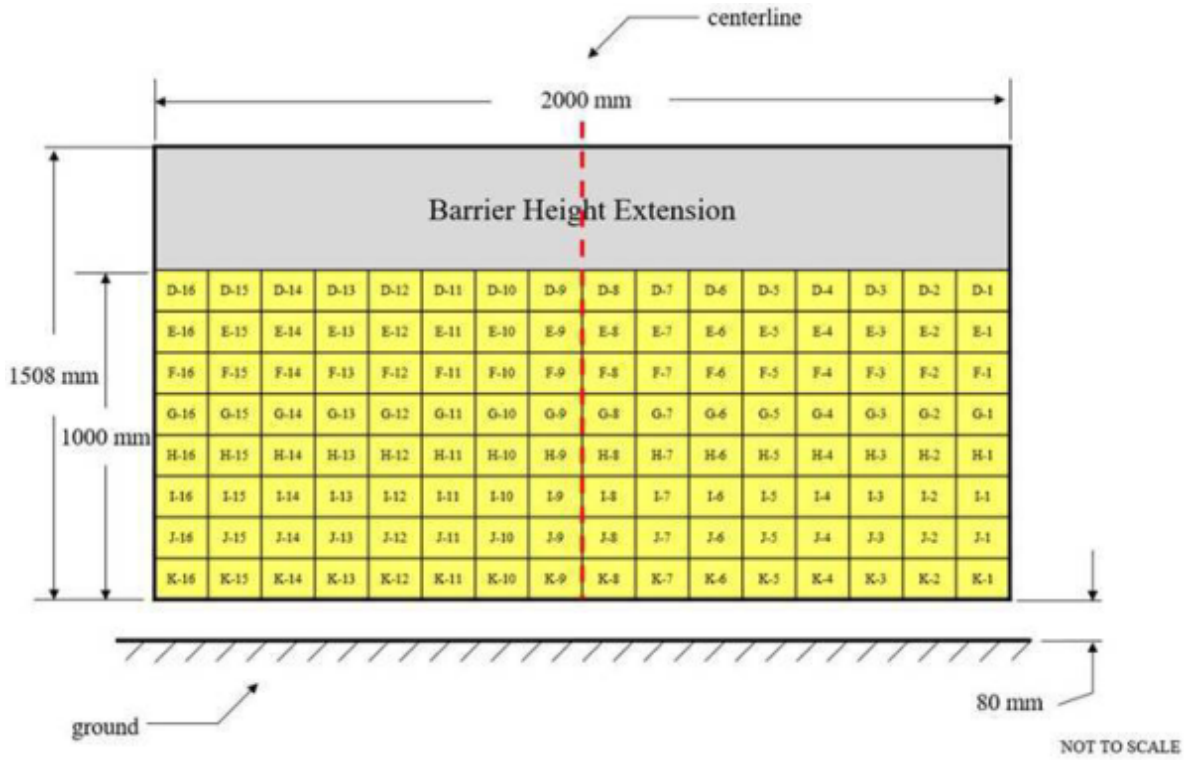


Figure 1 - Load Cell Locations on a 128-Load Cell Barrier with Plywood Height Extension*
Please note above diagram is not actual representation of load cell barrier used.

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

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 KIA K4 4 Door Sedan NHTSA No.: M20254200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 01/07/2025

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

Description	Driver	Passenger
Dummy Type / Serial No.	Hybrid III 50th Male / 065	Hybrid III 5th Female / 137
Head Contact	Frontal Airbag & Head Restraint	Frontal Airbag & Head Restraint
Upper Torso Contact	Frontal Airbag	Frontal Airbag
Lower Torso Contact	None	None
Left Knee Contact	Steering Column Shroud	Glove Box
Right Knee Contact	Steering Column Shroud	Glove Box

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	None
Window Damage	None
Other	None

VEHICLE REBOUND FROM BARRIER

Measured Parameter	Units	Value
Left Side	mm	1150
Center	mm	1146
Right Side	mm	1126
Average	mm	1141

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

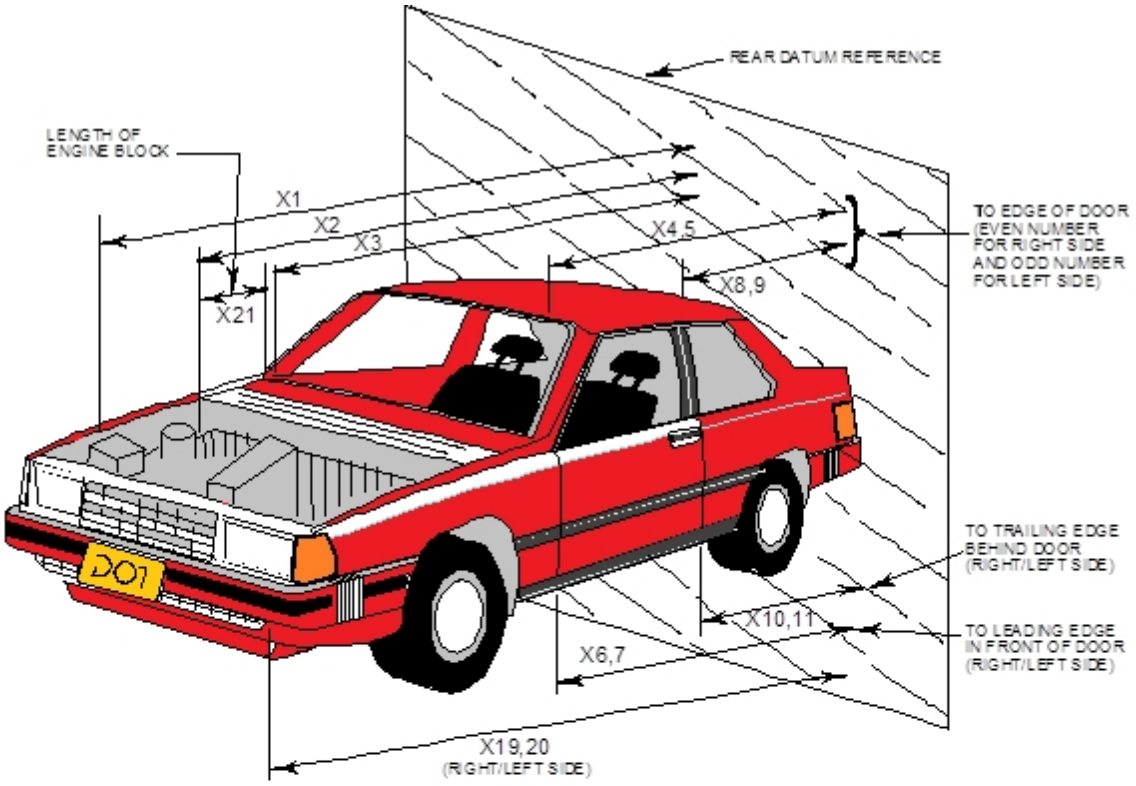
Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

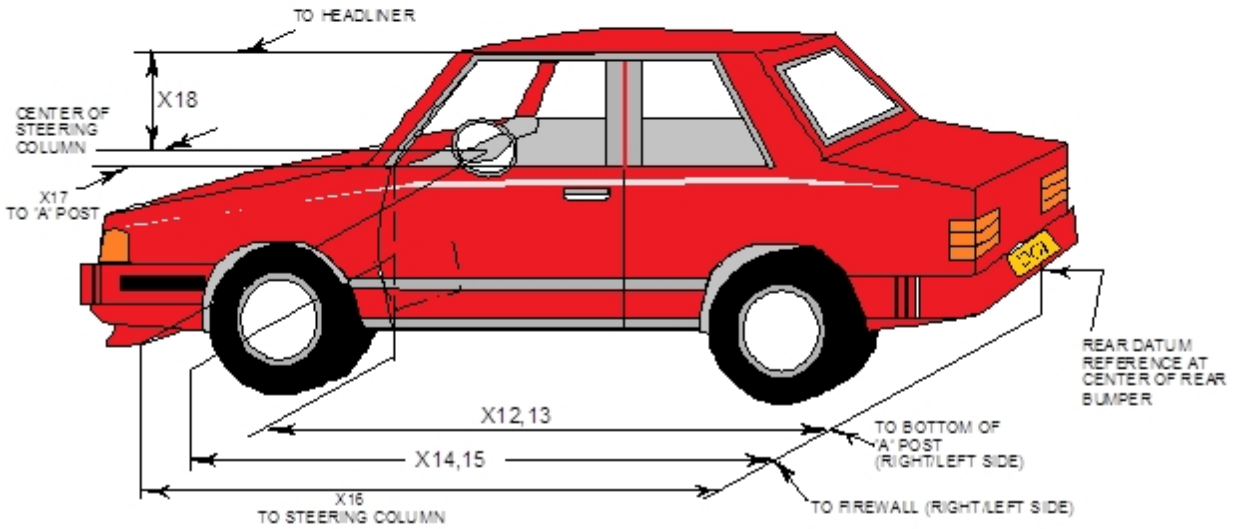
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 12
VEHICLE PROFILE MEASUREMENTS

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025





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

Test Vehicle: 2025 KIA K4 4 Door Sedan NHTSA No.: M20254200
Test Program: NCAP Frontal Barrier Impact Test Test Date: 01/07/2025

No.	Measurement Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4711	4302	-409
2	Rear Surface of Vehicle (RSOV) to Front of Engine	4049	3887	-162
3	RSOV to Firewall	3716	3710	-6
4	RSOV to Upper Leading Edge of Right Door	3320	3320	0
5	RSOV to Upper Leading Edge of Left Door	3317	3316	-1
6	RSOV to Lower Leading Edge of Right Door	3344	3347	3
7	RSOV to Lower Leading Edge of Left Door	3341	3344	3
8	RSOV to Upper Trailing Edge of Right Door	2222	2222	0
9	RSOV to Upper Trailing Edge of Left Door	2220	2221	1
10	RSOV to Lower Trailing Edge of Right Door	2240	2245	5
11	RSOV to Lower Trailing Edge of Left Door	2237	2240	3
12	RSOV to Bottom of “A” Post of Right Side	3388	3388	0
13	RSOV to Bottom of “A” Post of Left Side	3386	3380	-6
14	RSOV to Firewall, Right Side	3895	3894	-1
15	RSOV to Firewall, Left Side	3894	3883	-11
16	RSOV to Steering Column	2843	2900	57
17	Center of Steering Column to “A” Post	304	301	-3
18	Center of Steering Column to Headliner	387	403	16
19	RSOV to Right Side of Front Bumper	4675	4251	-424
20	RSOV to Left Side of Front Bumper	4675	4300	-375
21	Length of Engine Block	191	191	0
RD	RSOV to Right Side of Dash Panel	3091	3095	4
CD	RSOV to Center of Dash Panel	3018	3016	-2
LD	RSOV to Left Side of Dash Panel	3065	3064	-1

All Dimensions in mm

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

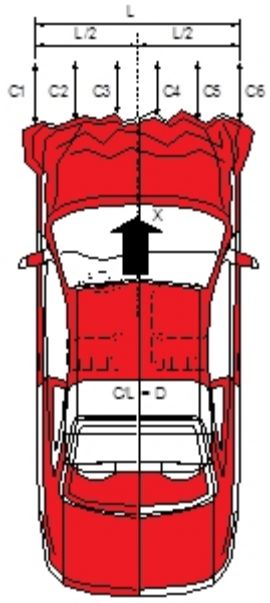
Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

VEHICLE INFORMATION

VIN:	3KPFU4DE1SE007657	Wheelbase (mm):	2721
Vehicle Size Category:	Passenger Car	Test Weight (kg):	1546

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):	56.36
Velocity Change (km/h):	75.16
Time of Separation (ms):	153



CRUSH PROFILE

Collision Deformation Classification:	12FDEW2
Midpoint of Damage:	C4
Damage Region Length (mm):	1503
Impact Mode:	Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	4493	4187	306
C2	Crush Zone 2 at Left Side	mm	4687	4304	383
C3	Crush Zone 3 at Left Side	mm	4706	4308	398
C4	Crush Zone 4 at Right Side	mm	4707	4298	409
C5	Crush Zone 5 at Right Side	mm	4684	4267	417
C6	Crush Zone 6 at Right Side	mm	4488	4134	354
L	C1 to C6	mm	1422	1503	-81

DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS

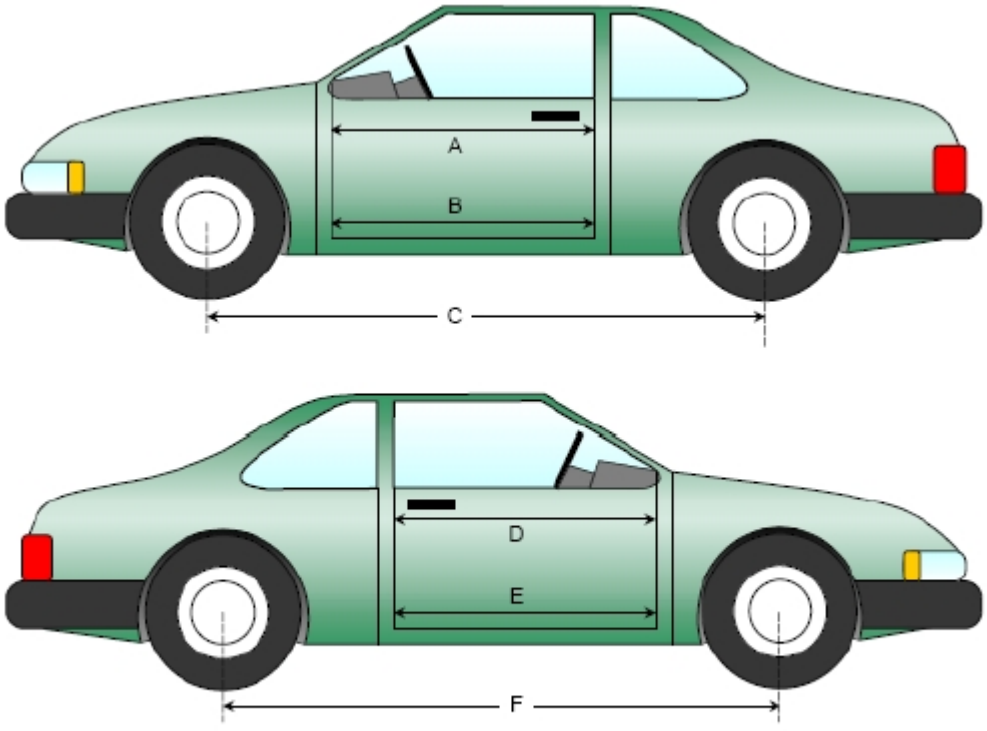
Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

DOOR OPENING WIDTH

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	1019	1019	0
B	Left Side Lower	mm	897	898	1
D	Right Side Upper	mm	1019	1019	0
E	Right Side Lower	mm	890	889	-1

WHEELBASE MEASUREMENTS

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2721	2675	-46
F	Right Side Wheelbase	mm	2721	2675	-46



Left & Right Side Views

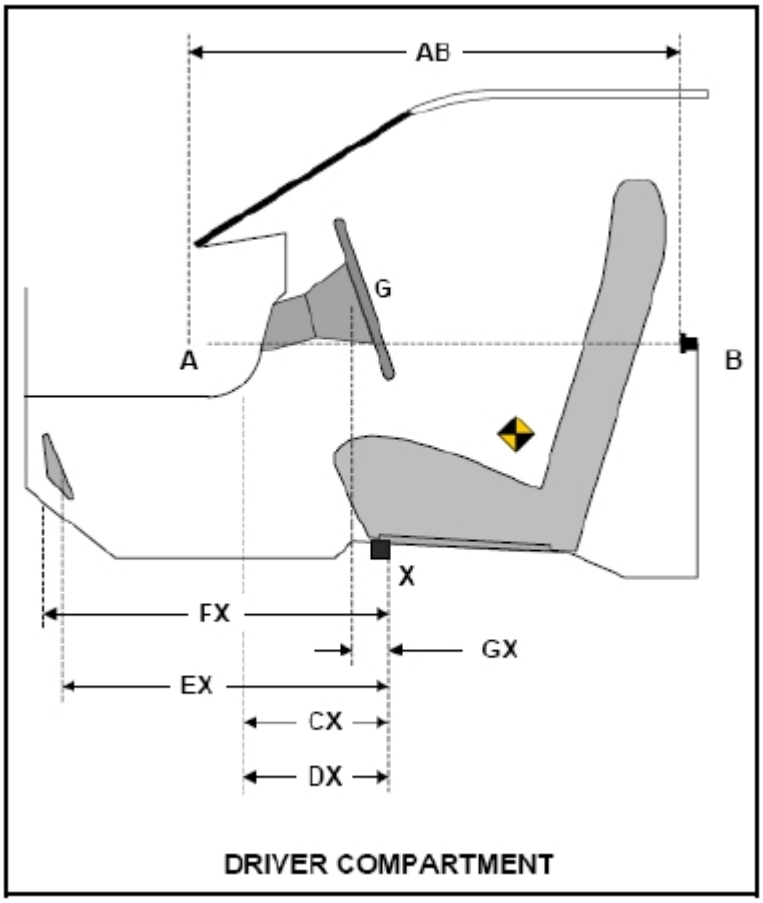
DATA SHEET NO.14 … (CONTINUED)
VEHICLE INTRUSION MEASUREMENTS

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

DRIVER COMPARTMENT INTRUSION

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	766	766	0
CX	Left Knee Bolster to X	mm	289	288	-1
DX	Right Knee Bolster to X	mm	267	266	-1
EX	Brake Pedal to X	mm	572	510	-62
FX	Foot Rest to X	mm	592	576	-16
GX	Center of Steering Column Wheel Hub to X	mm	63	120	57

X = Front of Seat Track (Stationary)



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

Test Vehicle:	2025 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

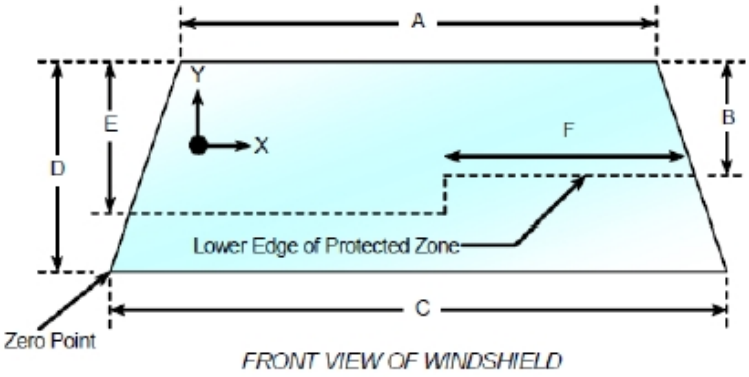
Windshield Mounting Details: A trim surrounds the top and side of windshield while a plastic shroud is on the bottom.

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	2262.5	2262.5	100%
Right Side	2262.5	2262.5	100%
Total	4525	4525	100%



FRONT VIEW OF WINDSHIELD

Item	Units	Value
A	mm	1265
B	mm	340
C	mm	1670
D	mm	795
E	mm	526
F	mm	460

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 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025

FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21°C Test Time: 12:10 PM

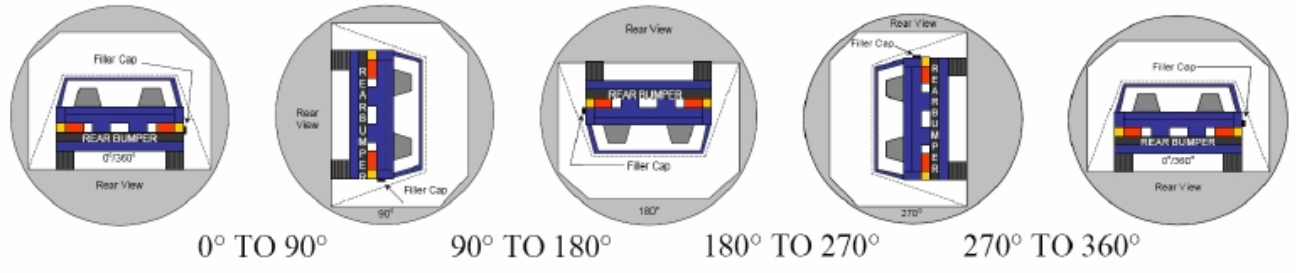
STODDARD SOLVENT SPILLAGE MEASUREMENTS

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 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025



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°	70	300	370
90° to 180°	69	300	369
180° to 270°	61	300	361
270° to 360°	66	300	366

FMVSS 301 SPILLAGE TABLE

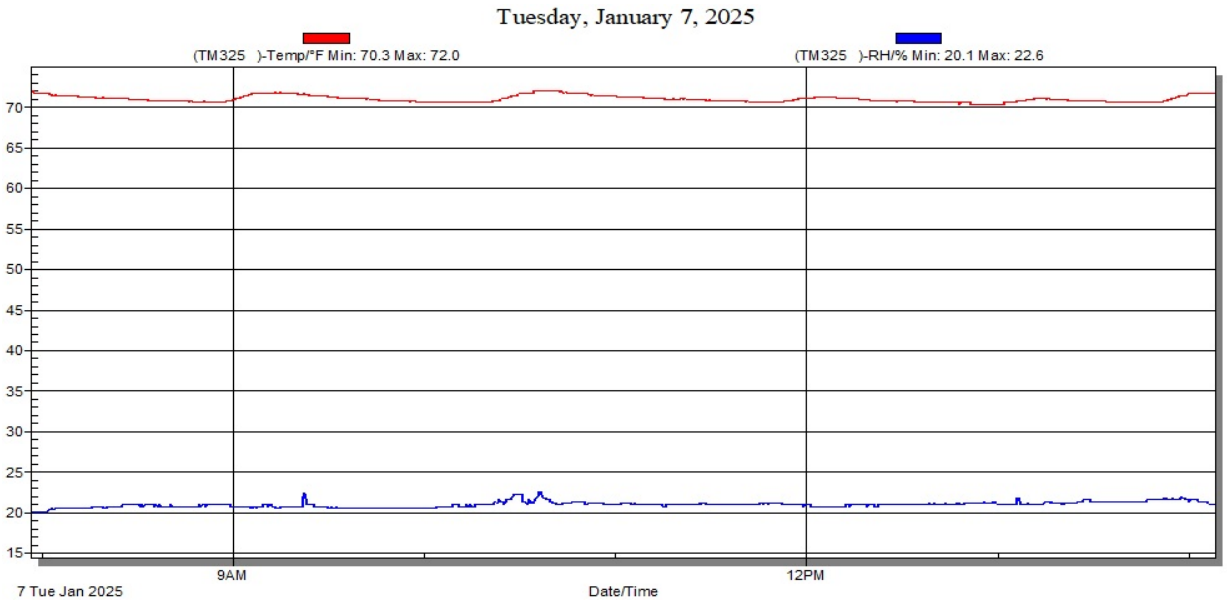
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	
90° to 180°	0	0	0	
180° to 270°	0	0	0	
270° to 360°	0	0	0	

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 KIA K4 4 Door Sedan	NHTSA No.:	M20254200
Test Program:	NCAP Frontal Barrier Impact Test	Test Date:	01/07/2025



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

APPENDIX A

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[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.*

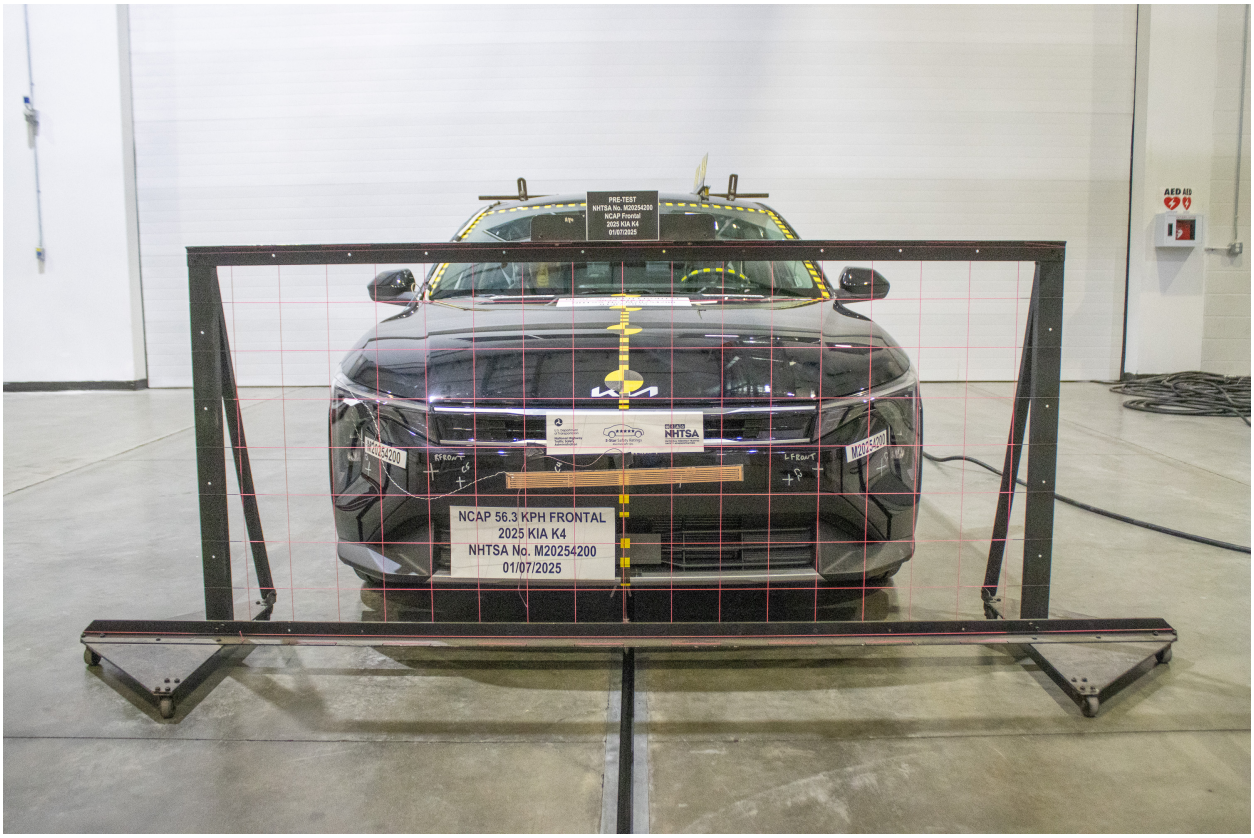


Figure A-1: Load Cell Location



Figure A-2: Pre-Test Load Cell Wall



Figure A-3: Post-Test Load Cell Wall



Figure A-4: Manufacturer's Label

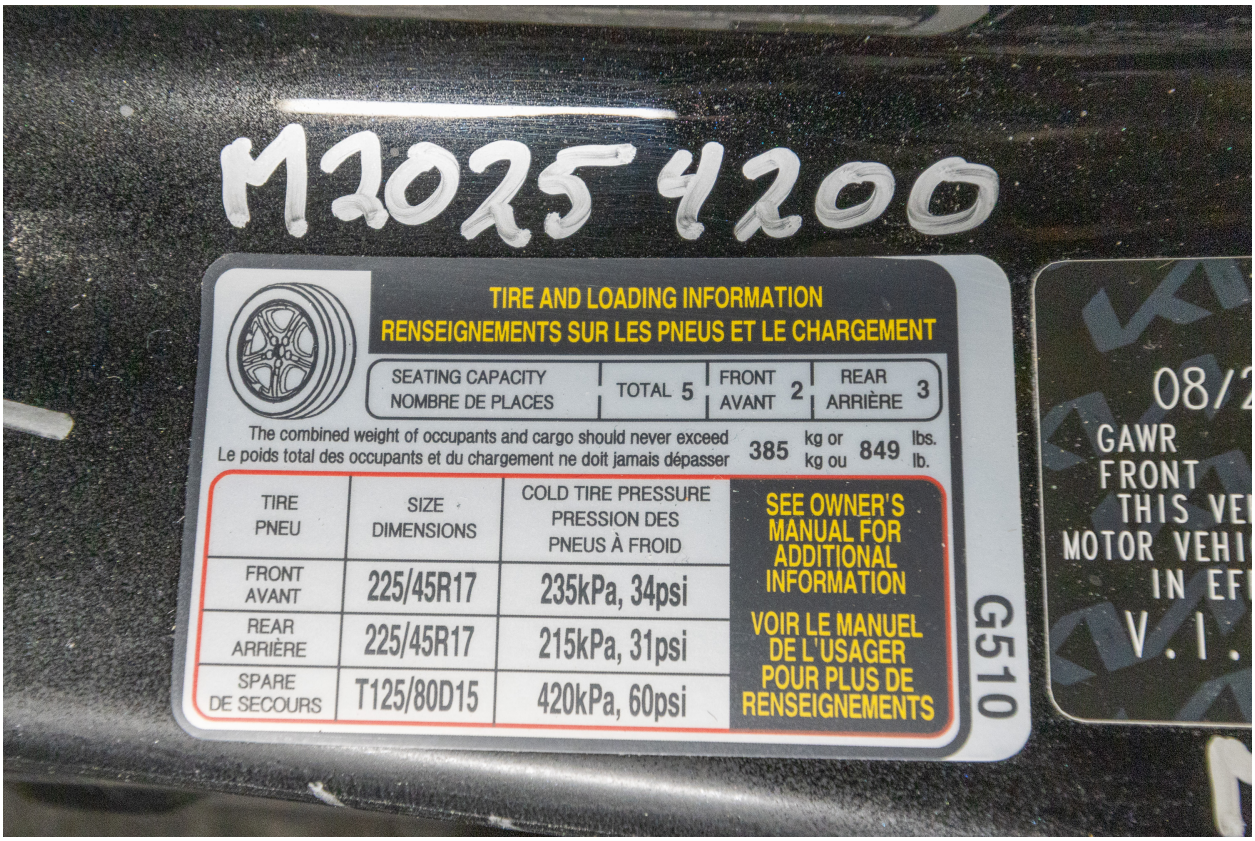


Figure A-5: Tire Placard



Figure A-6: 2025 KIA K4 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

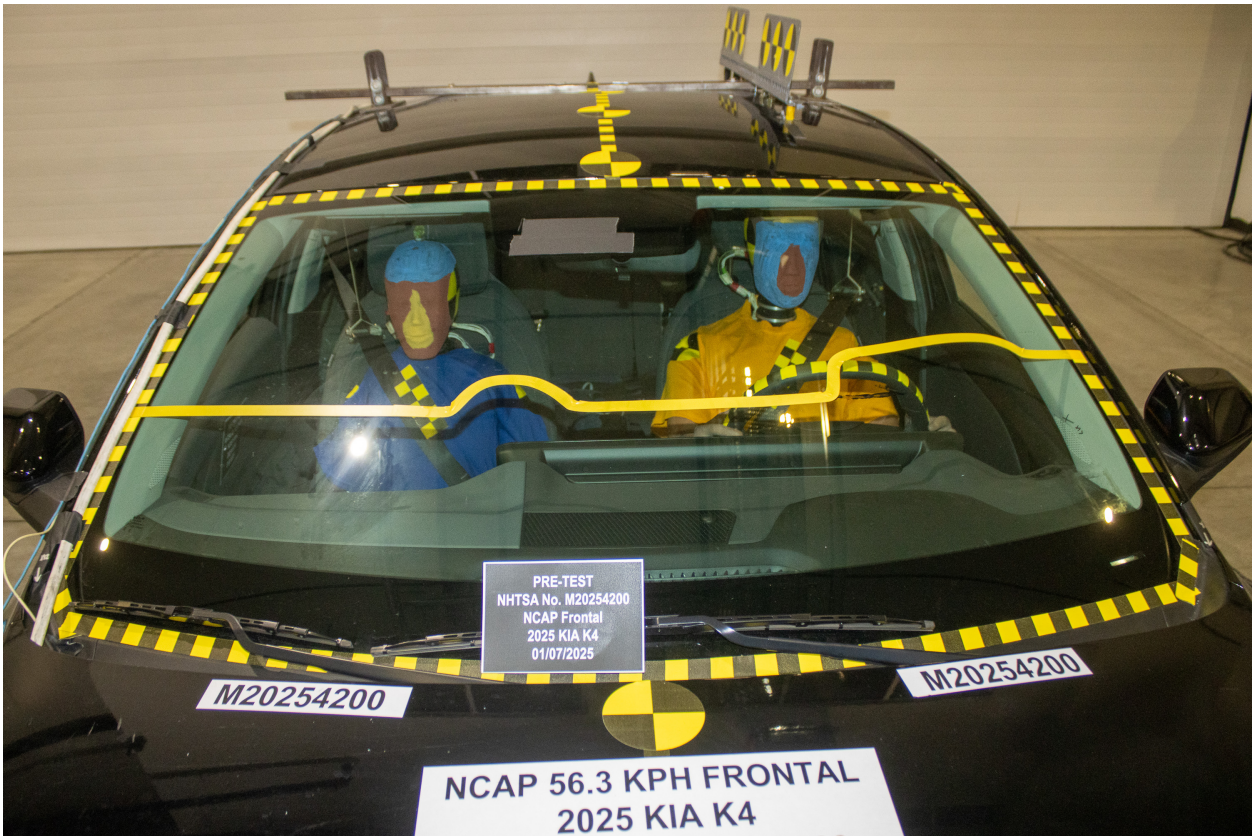


Figure A-18: Pre-Test Windshield View

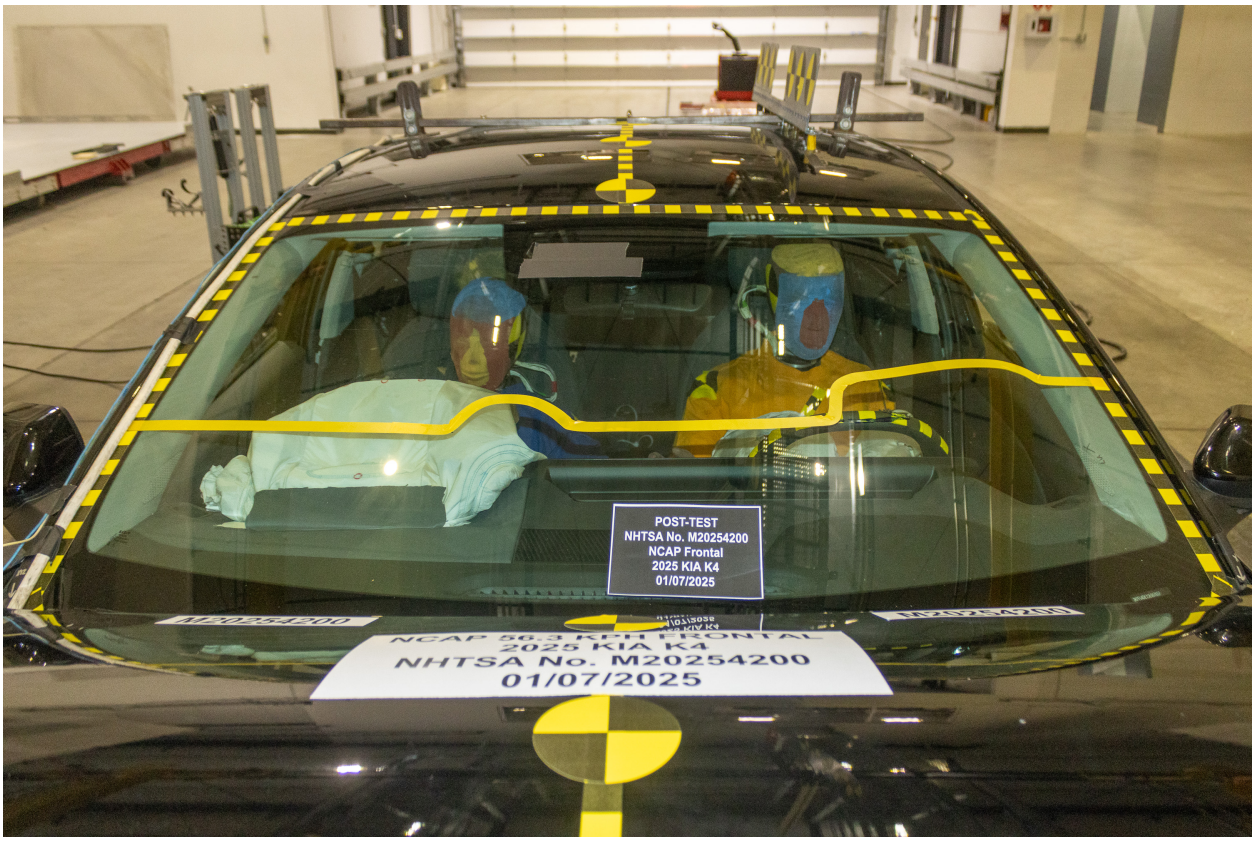


Figure A-19: Post-Test Windshield View



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

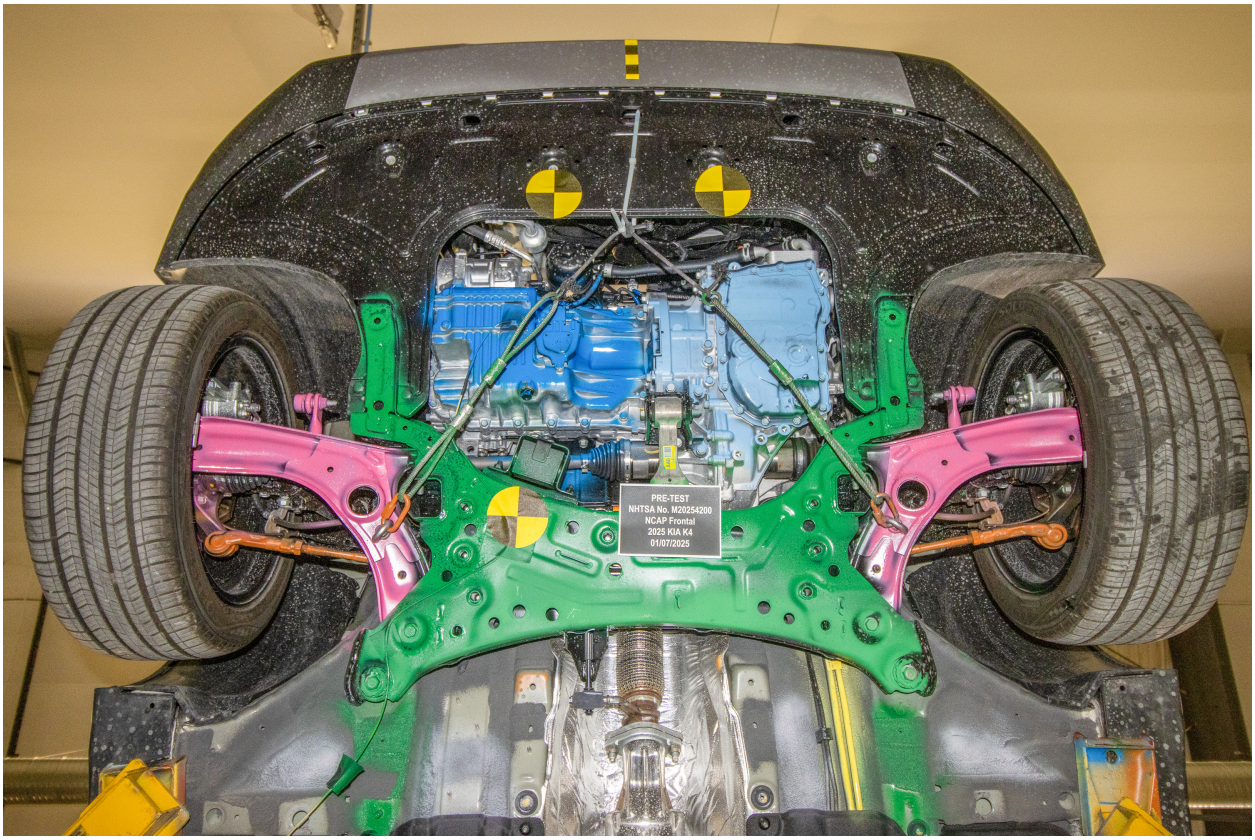


Figure A-24: Pre-Test Front Underbody View



Figure A-25: Post-Test Front Underbody View

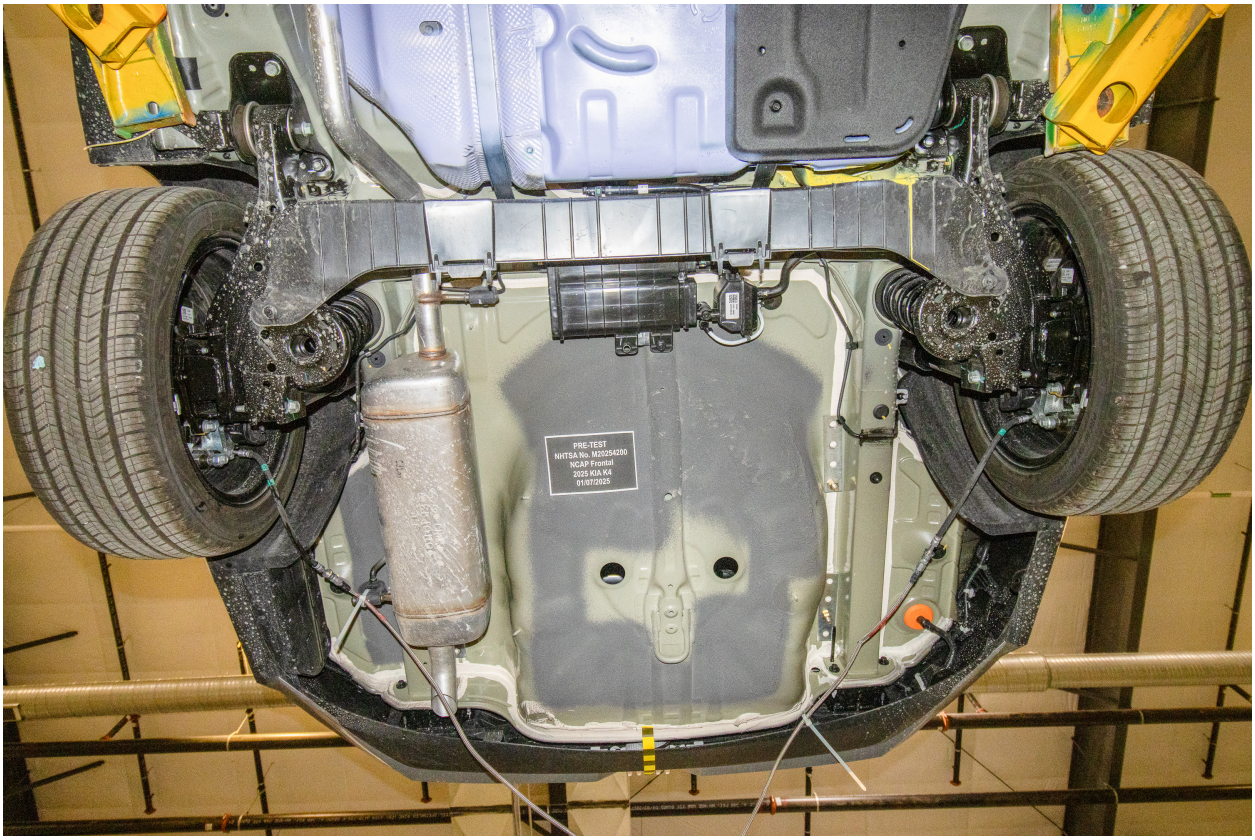


Figure A-26: Pre-Test Rear Underbody View

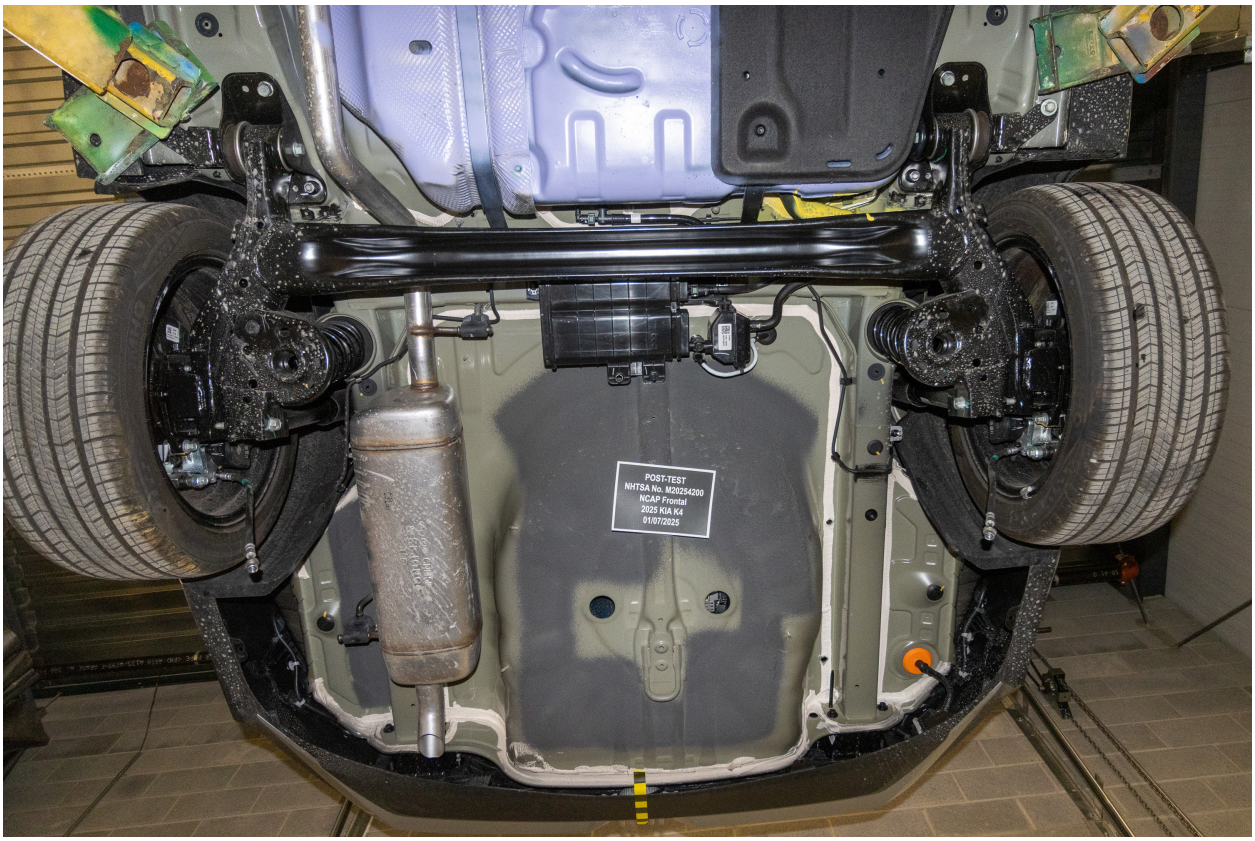


Figure A-27: Post-Test Rear Underbody View



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

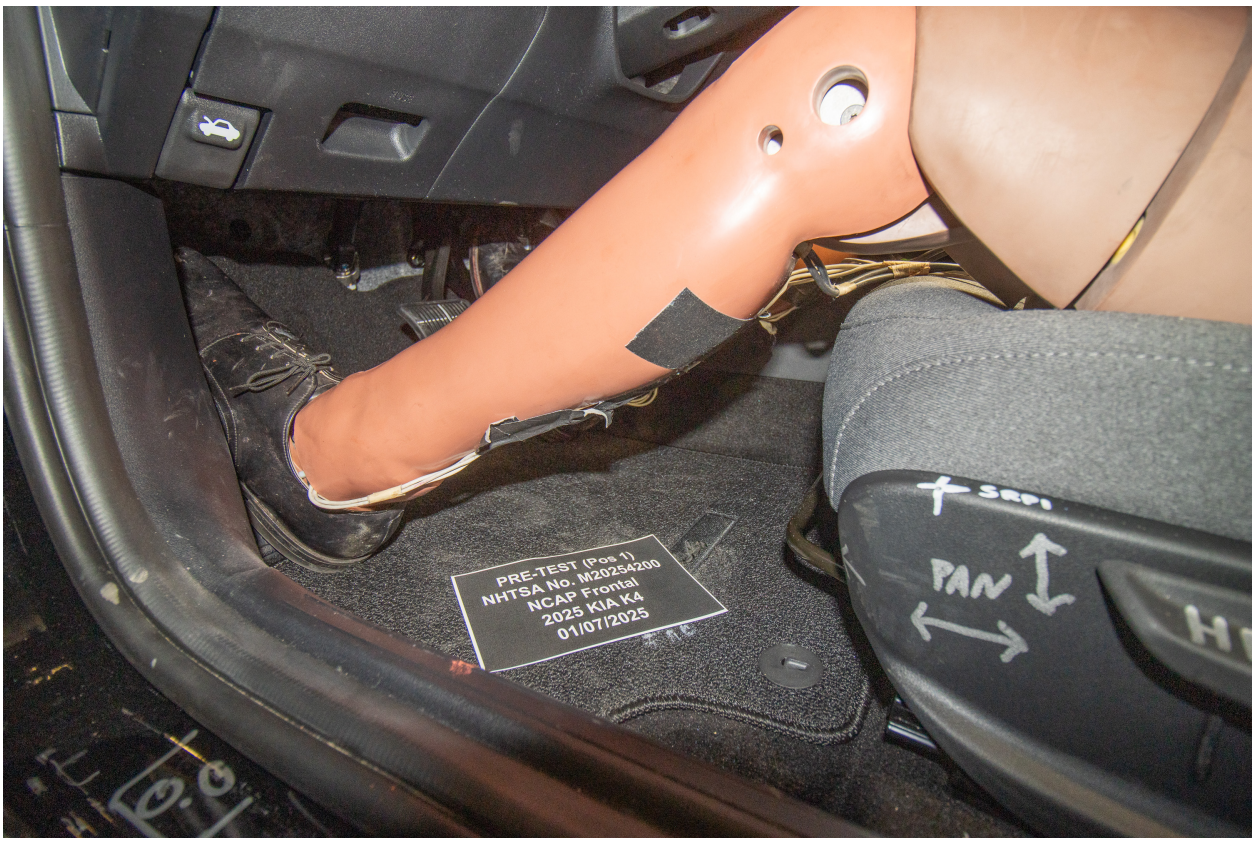


Figure A-42: Pre-Test Driver Dummy Feet

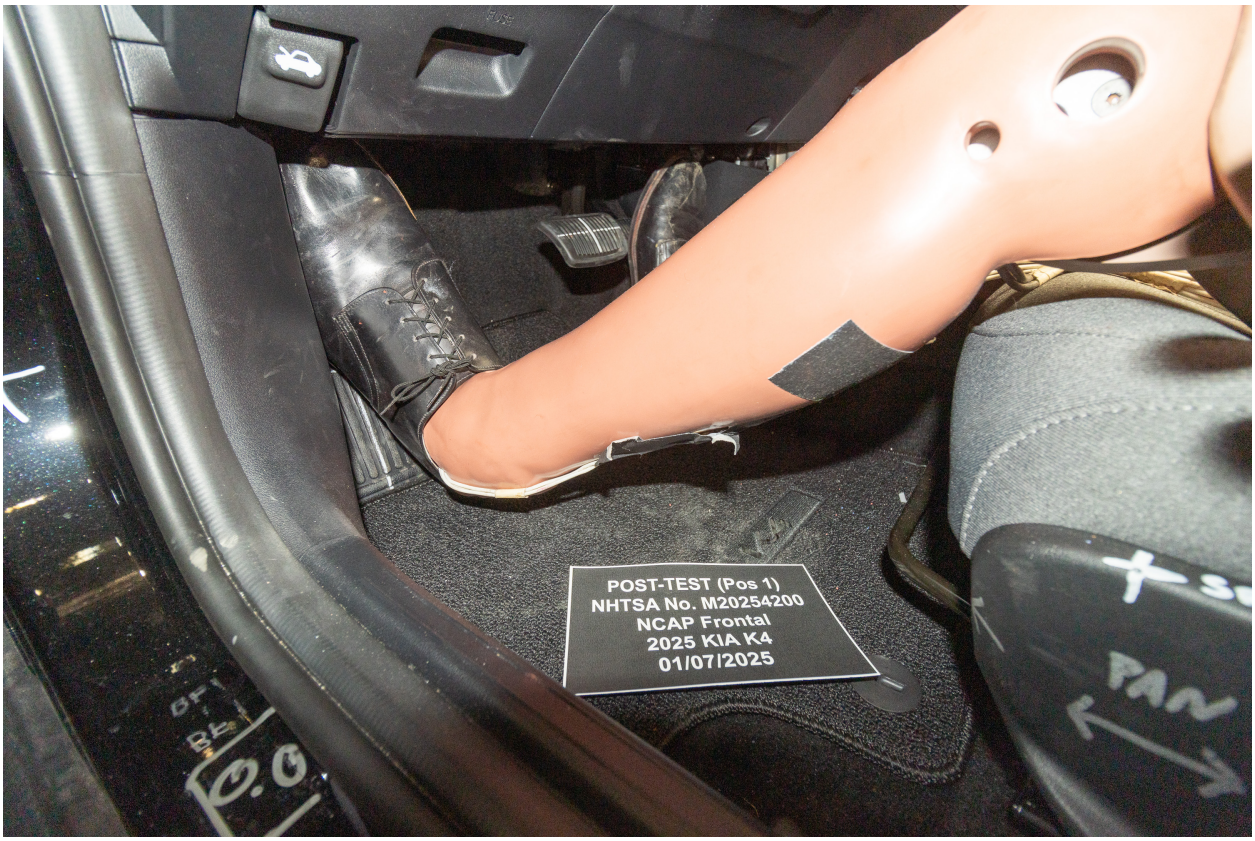


Figure A-43: Post-Test Driver Dummy Feet



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

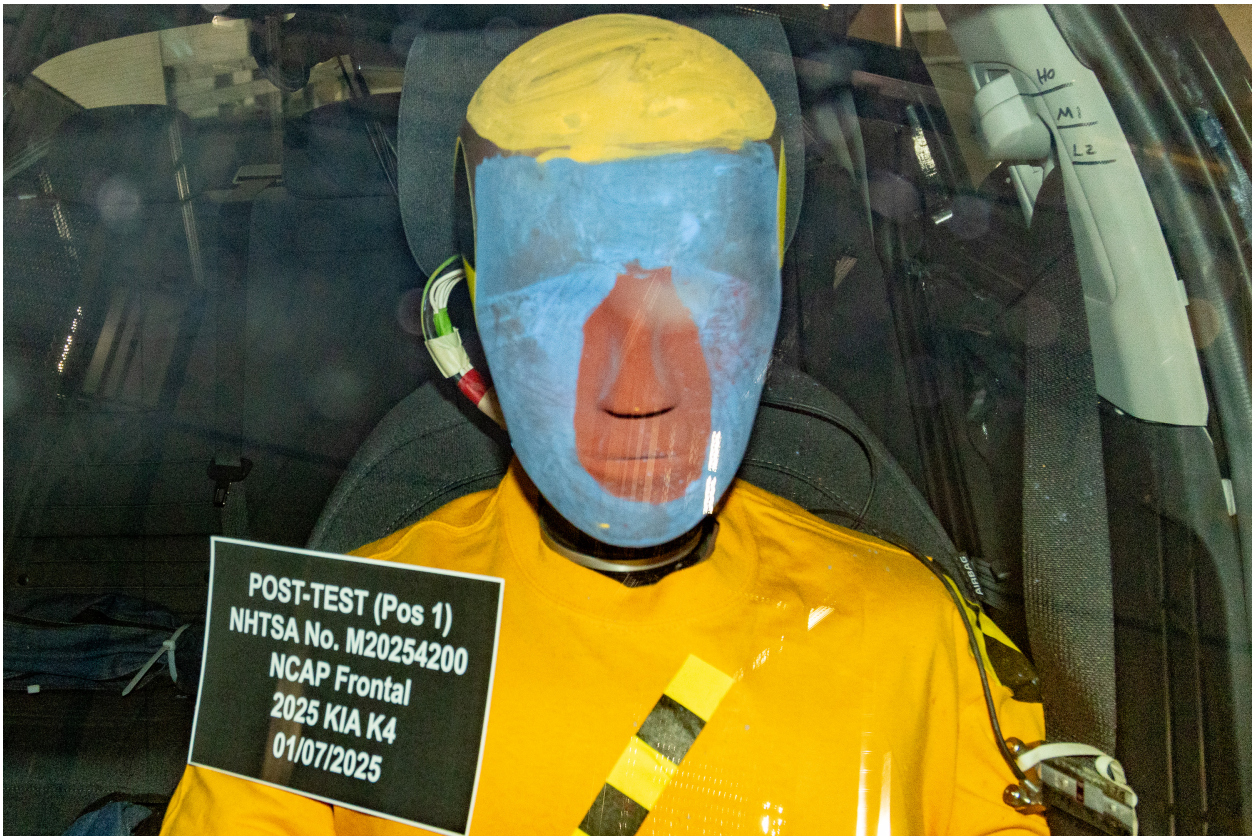


Figure A-48: Post-Test Driver Dummy Face



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

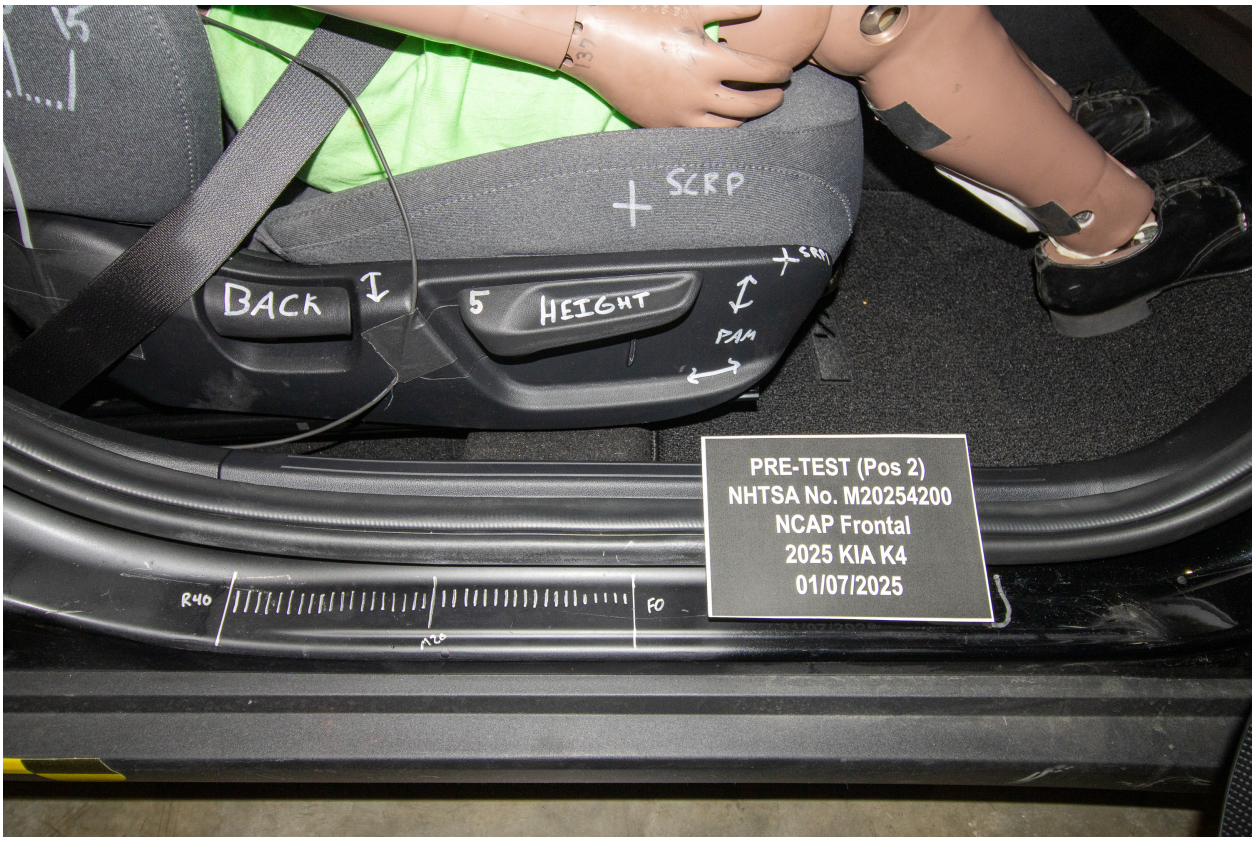


Figure A-59: Pre-Test Passenger's Seat Fore-Aft Markings



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

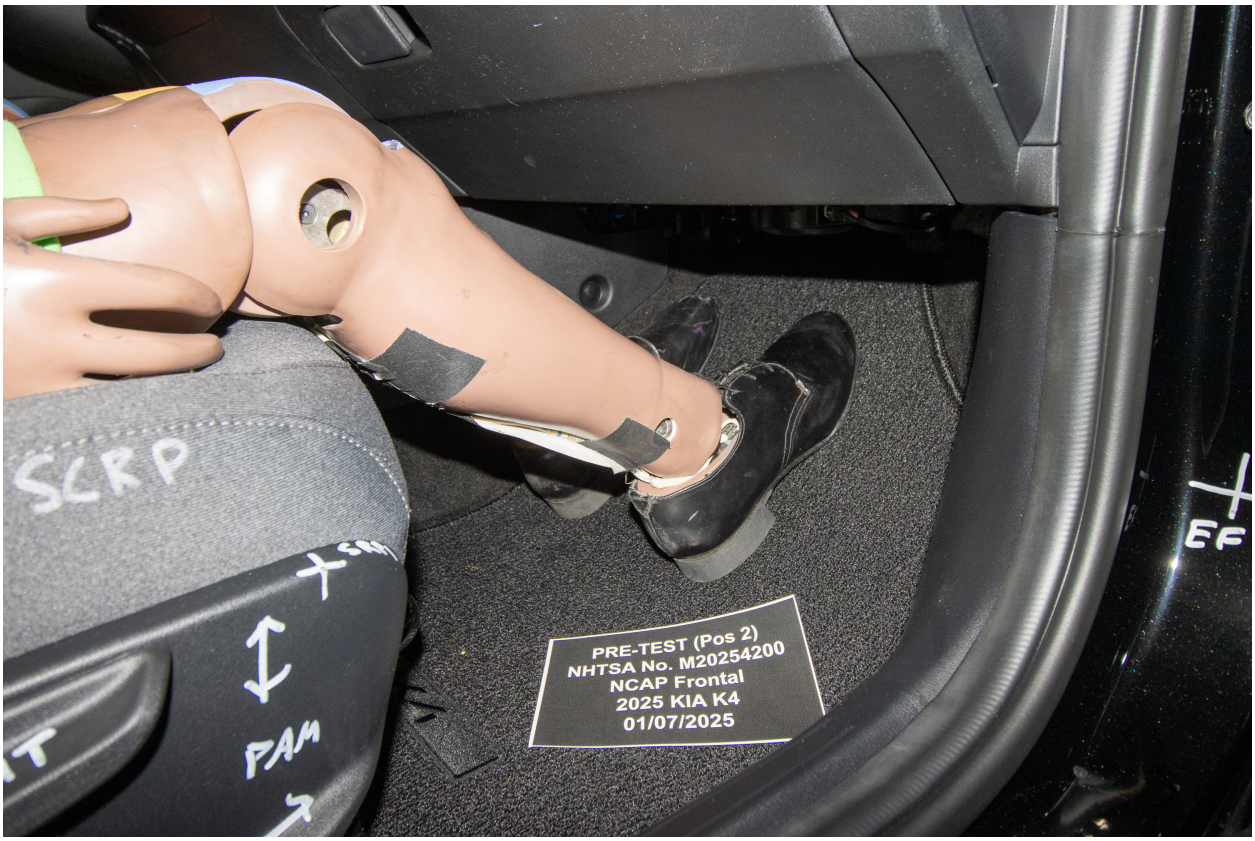


Figure A-65: Pre-Test Passenger Dummy Feet

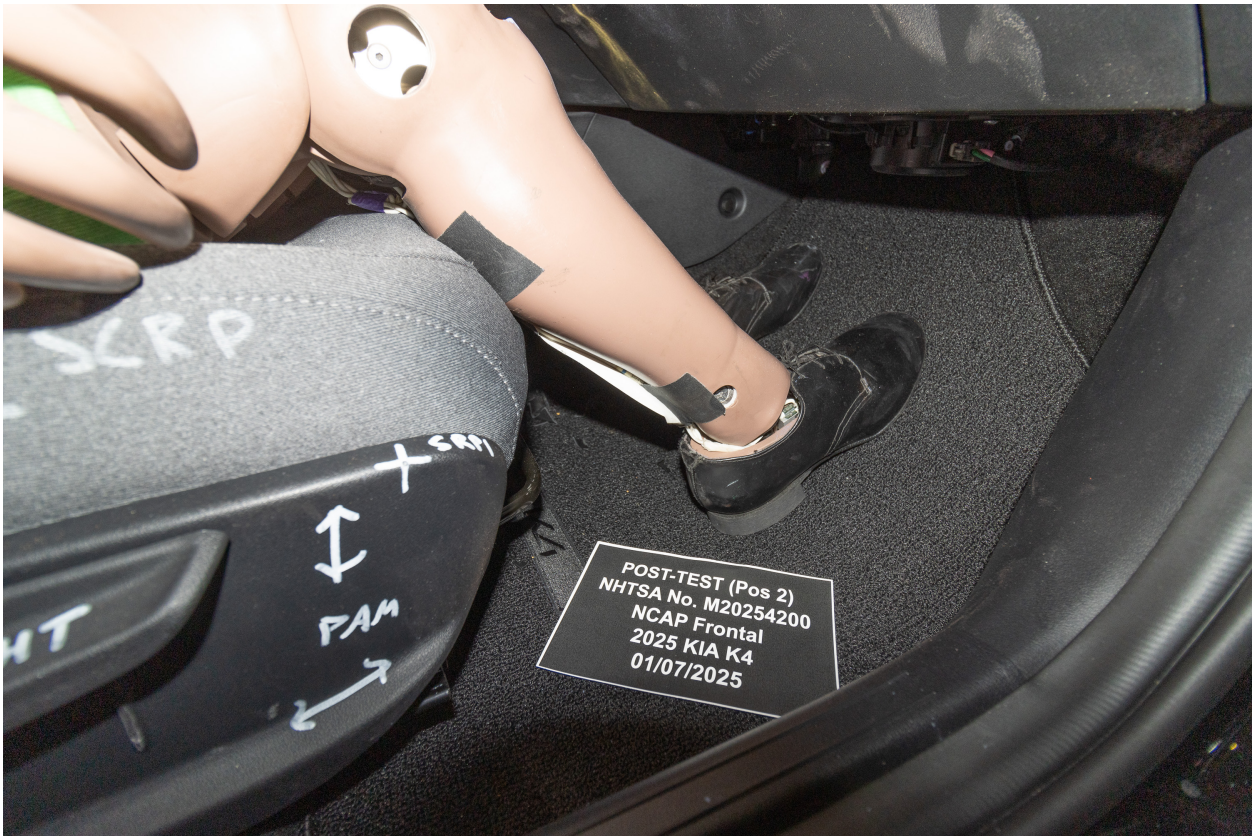


Figure A-66: Post-Test Passenger Dummy Feet



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

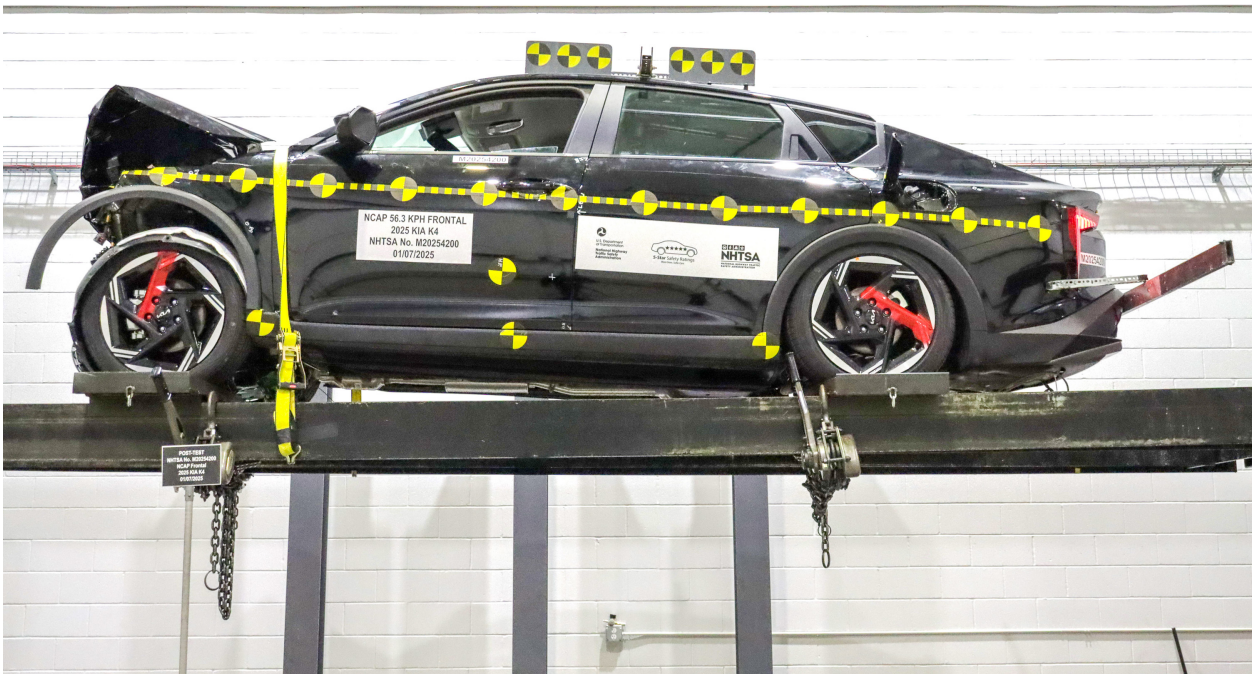


Figure A-77: Vehicle at 0º on Static Rollover Device

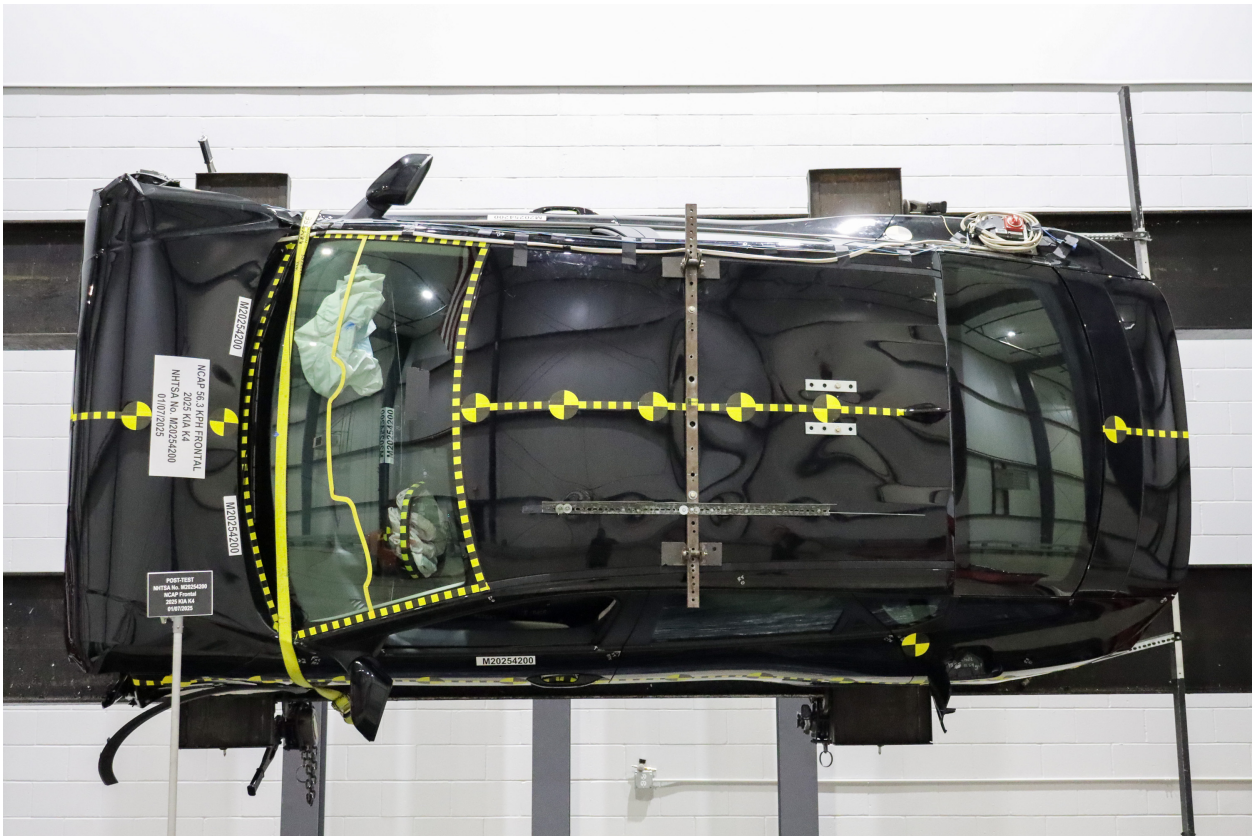


Figure A-78: Vehicle at 90º on Static Rollover Device

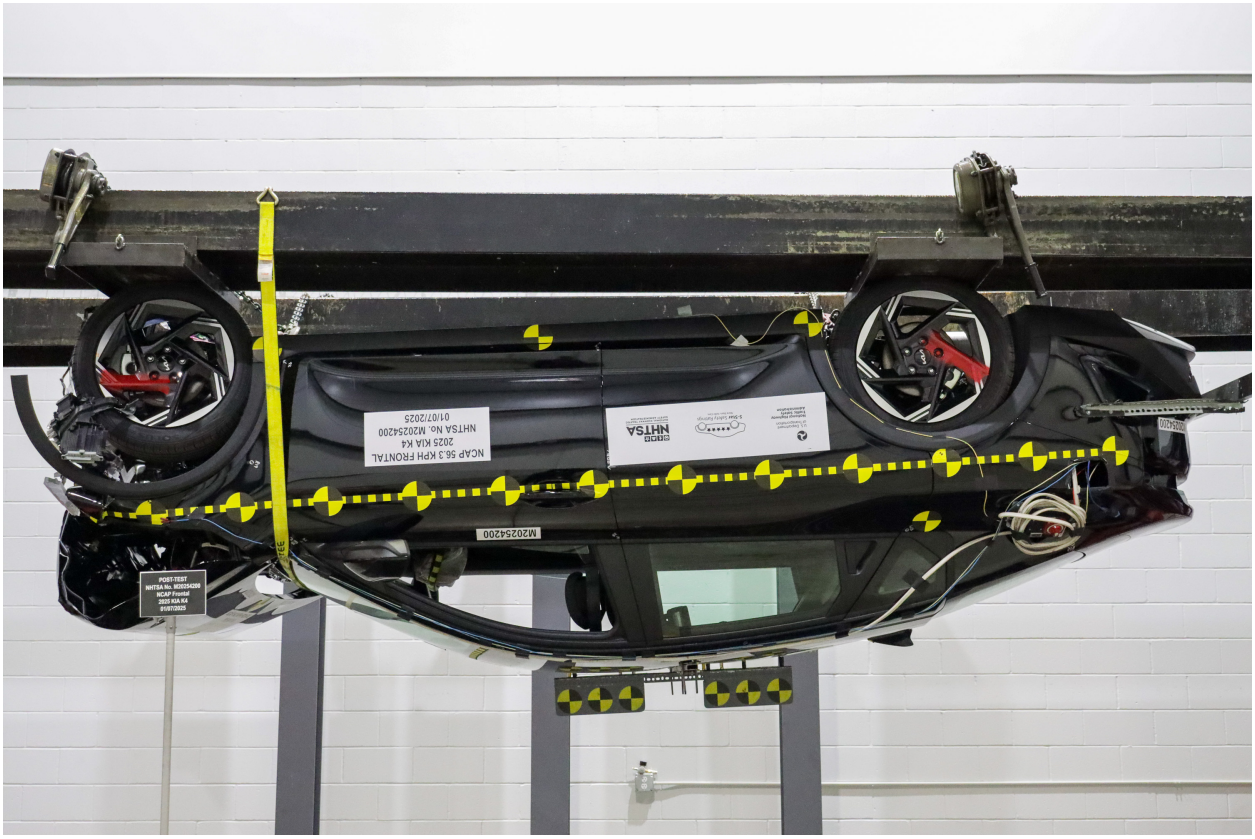


Figure A-79: Vehicle at 180º on Static Rollover Device

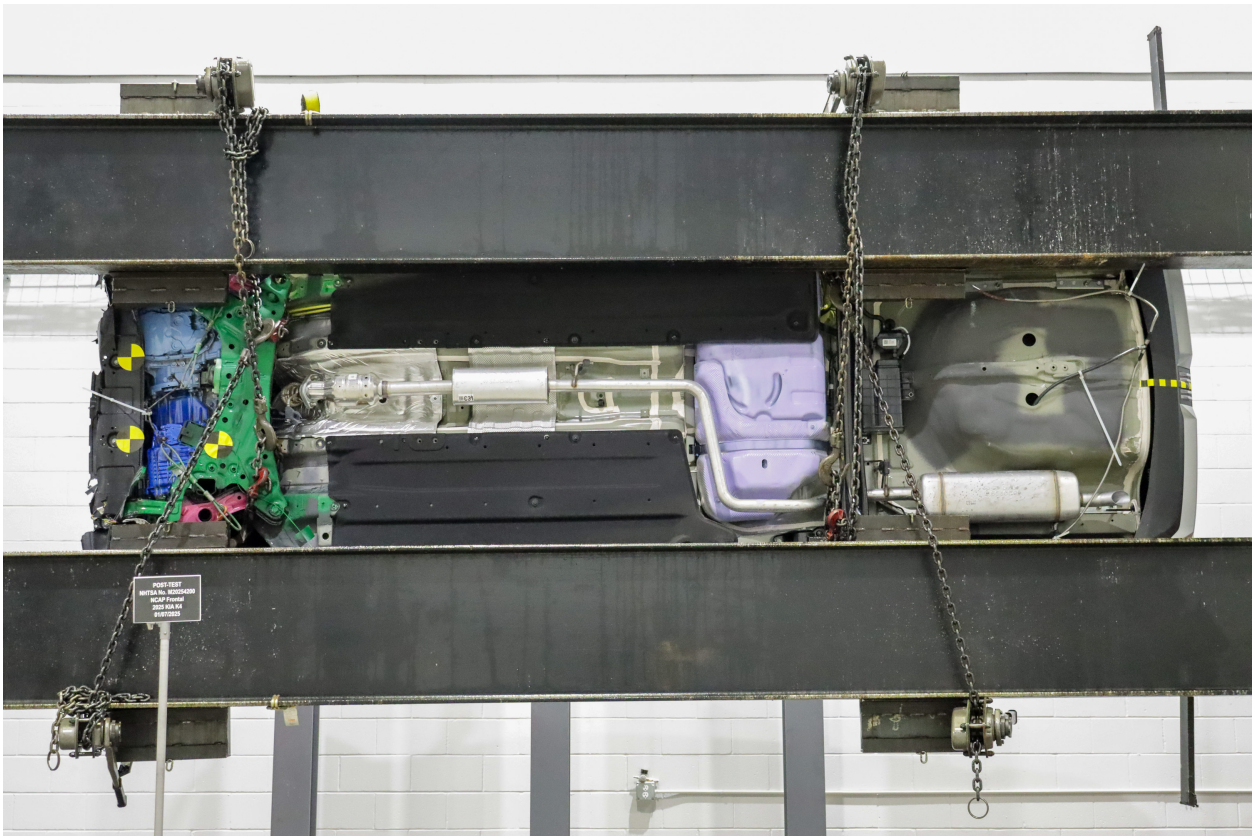


Figure A-80: Vehicle at 270º on Static Rollover Device



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

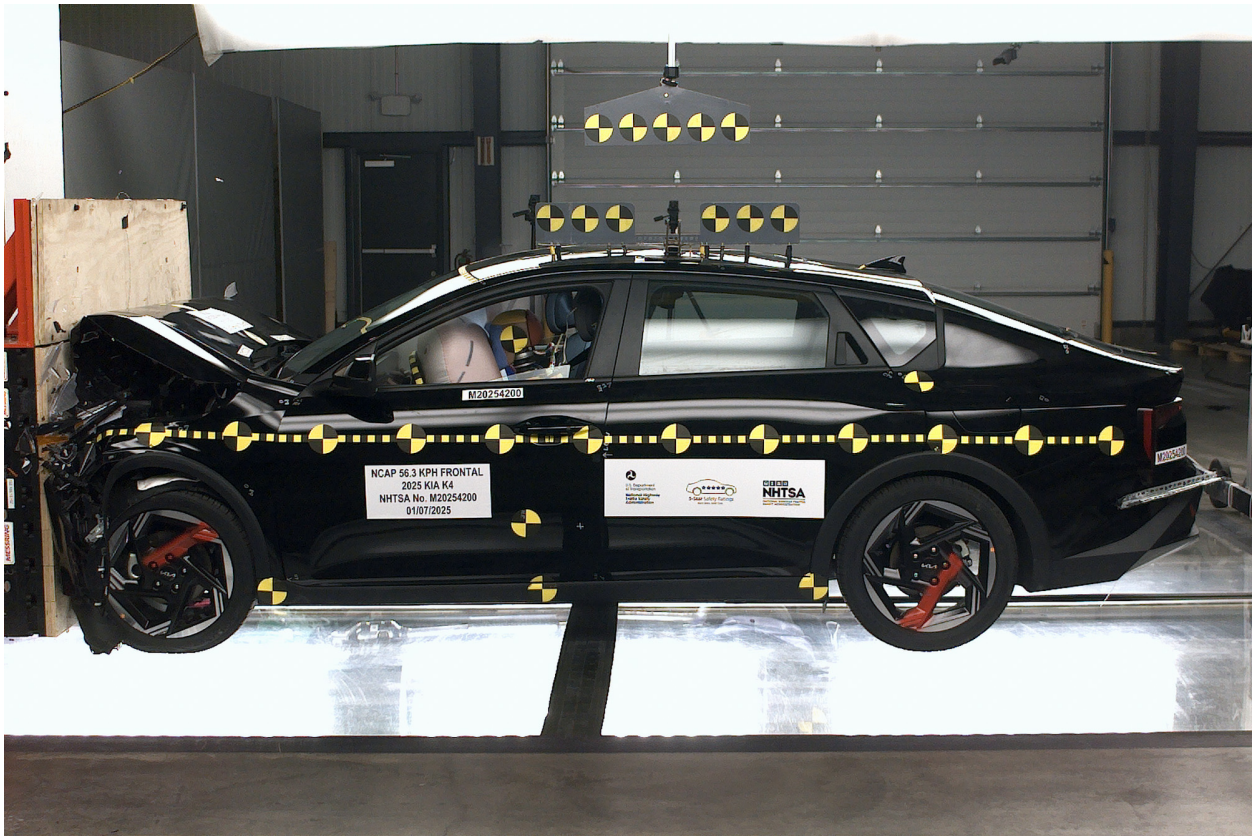
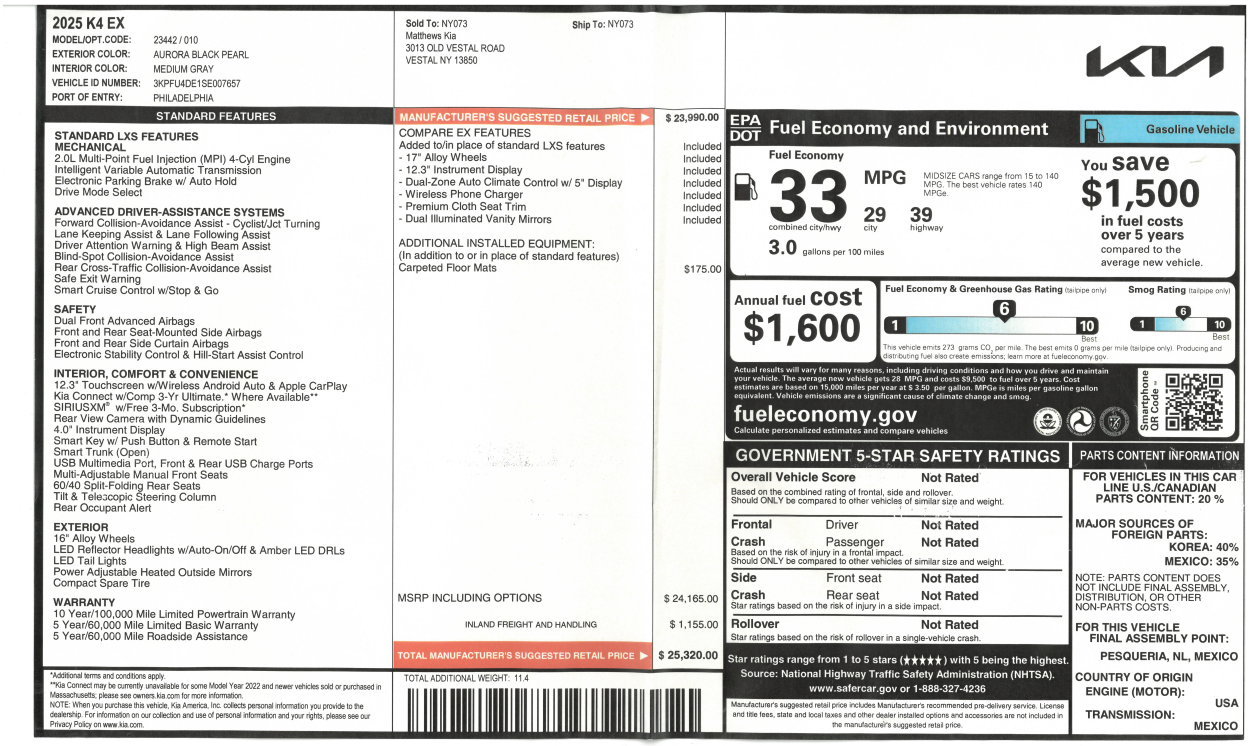


Figure A-82: 2025 KIA K4 Frontal Impact Event



2025 K4 EX
MODEL/OPT.CODE: 23442 / 010
EXTERIOR COLOR: AURORA BLACK PEARL
INTERIOR COLOR: MEDIUM GRAY
VEHICLE ID NUMBER: 3KPFU4DE1SE007657
PORT OF ENTRY: PHILADELPHIA

Sold To: NY073
Matthews Kia
3013 OLD VESTAL ROAD
VESTAL NY 13850

Ship To: NY073

STANDARD FEATURES

STANDARD LXS FEATURES
MECHANICAL
2.0L Multi-Point Fuel Injection (MPI) 4-Cyl Engine
Intelligent Variable Automatic Transmission
Electronic Parking Brake w/ Auto Hold
Drive Mode Select

ADVANCED DRIVER-ASSISTANCE SYSTEMS
Forward Collision-Avoidance Assist - Cyclist/Jct Turning
Lane Keeping Assist & Lane Following Assist
Driver Attention Warning & High Beam Assist
Blind-Spot Collision-Avoidance Assist
Rear Cross-Traffic Collision-Avoidance Assist
Safe Exit Warning
Smart Cruise Control w/Stop & Go

SAFETY
Dual Front Advanced Airbags
Front and Rear Seat-Mounted Side Airbags
Front and Rear Side Curtain Airbags
Electronic Stability Control & Hill-Start Assist Control

INTERIOR, COMFORT & CONVENIENCE
12.3" Touchscreen w/Wireless Android Auto & Apple CarPlay
Kia Connect w/Comp 3-Yr Ultimate.* Where Available**
SIRIUSXM® w/Free 3-Mo. Subscription*
Rear View Camera with Dynamic Guidelines
4.0" Instrument Display
Smart Key w/ Push Button & Remote Start
Smart Trunk (Open)
USB Multimedia Port, Front & Rear USB Charge Ports
Multi-Adjustable Manual Front Seats
60/40 Split-Folding Rear Seats
Tilt & Telescopic Steering Column
Rear Occupant Alert

EXTERIOR
16" Alloy Wheels
LED Reflector Headlights w/Auto-On/Off & Amber LED DRLs
LED Tail Lights
Power Adjustable Heated Outside Mirrors
Compact Spare Tire

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

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

MANUFACTURER'S SUGGESTED RETAIL PRICE ▶	$ 23,990.00
COMPARE EX FEATURES	
Added to/in place of standard LXS features	Included
- 17" Alloy Wheels	Included
- 12.3" Instrument Display	Included
- Dual-Zone Auto Climate Control w/ 5" Display	Included
- Wireless Phone Charger	Included
- Premium Cloth Seat Trim	Included
- Dual Illuminated Vanity Mirrors	Included
ADDITIONAL INSTALLED EQUIPMENT: (In addition to or in place of standard features)	
Carpeted Floor Mats	$175.00
MSRP INCLUDING OPTIONS	$ 24,165.00
INLAND FREIGHT AND HANDLING	$ 1,155.00
TOTAL MANUFACTURER'S SUGGESTED RETAIL PRICE ▶	$ 25,320.00

TOTAL ADDITIONAL WEIGHT: 11.4

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy
33 MPG combined city/hwy
29 city
39 highway
3.0 gallons per 100 miles
MIDSIZE CARS range from 15 to 140 MPG. The best vehicle rates 140 MPGe.

You save $1,500 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost $1,600

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 6 (1 – 10, Best)
Smog Rating (tailpipe only): 6 (1 – 10, Best)
This vehicle emits 273 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions, learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs $9,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $ 3.50 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code

GOVERNMENT 5-STAR SAFETY RATINGS

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

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

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

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

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

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

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CAR LINE U.S./CANADIAN PARTS CONTENT: 20 %

MAJOR SOURCES OF FOREIGN PARTS:
KOREA: 40%
MEXICO: 35%

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

FOR THIS VEHICLE FINAL ASSEMBLY POINT:
PESQUERIA, NL, MEXICO

COUNTRY OF ORIGIN
ENGINE (MOTOR): USA
TRANSMISSION: MEXICO

Figure A-83: Monroney Label Photograph

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA TRACES

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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
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Plot 16	Passenger Head X Acceleration vs. Time Primary	B-8
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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
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Plot 27	Passenger Upper Neck Moment Y vs. Time Primary	B-11
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Plot 29	Passenger Left Femur Force vs. Time	B-12
Plot 30	Passenger Right Femur Force vs. Time	B-12

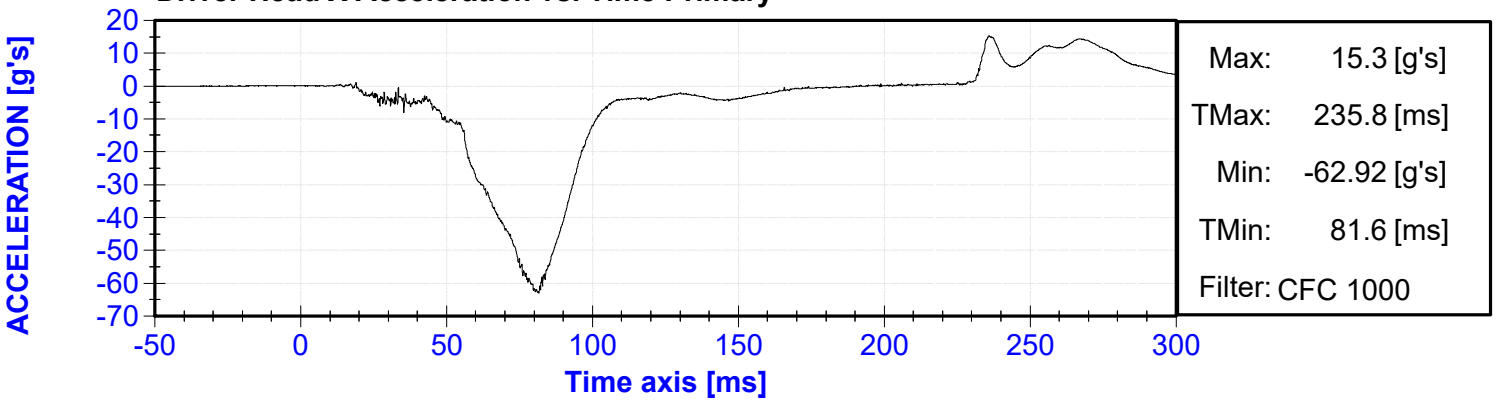
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.NHTSA.gov

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

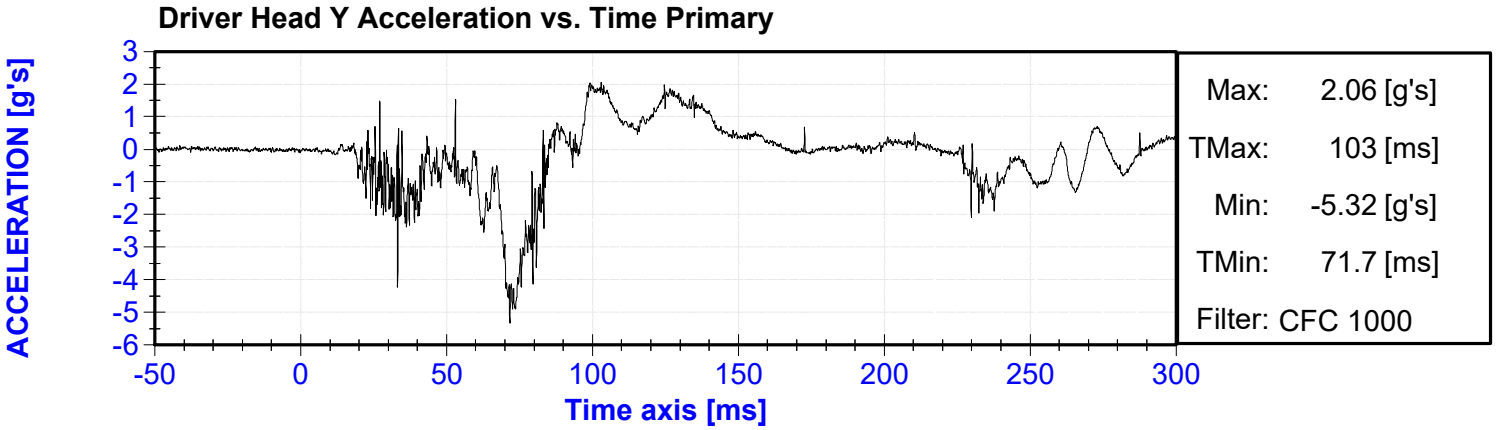
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver 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

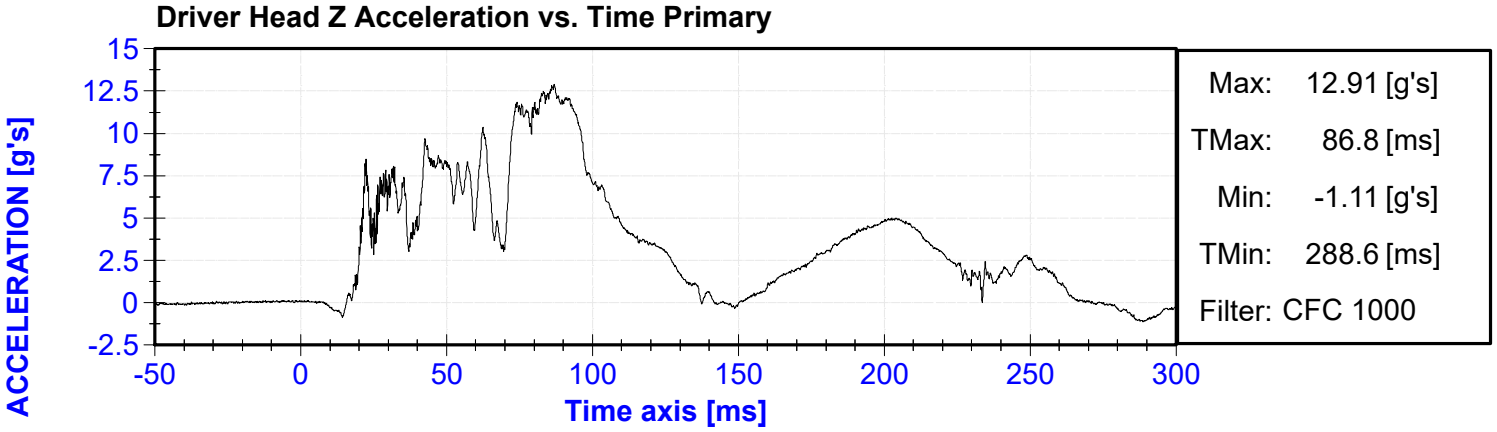
Driver Head X Acceleration vs. Time Primary



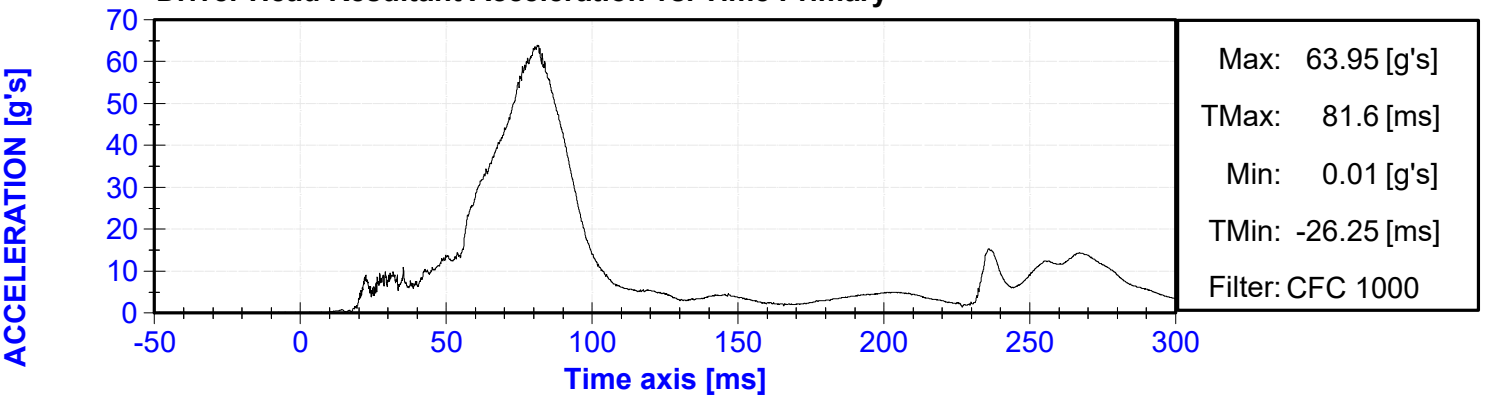
Driver Head Y Acceleration vs. Time Primary



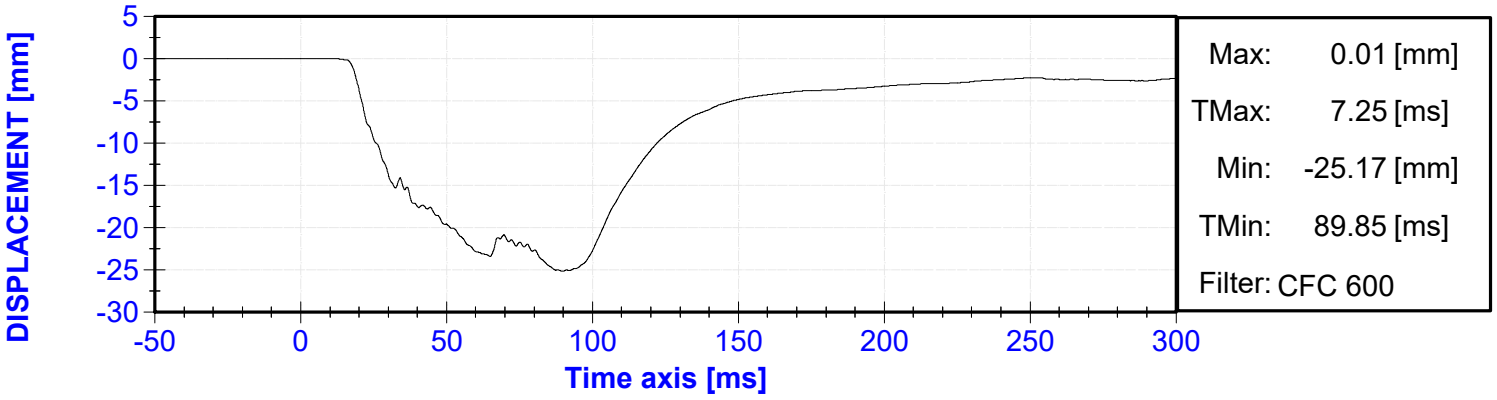
Driver Head Z Acceleration vs. Time Primary



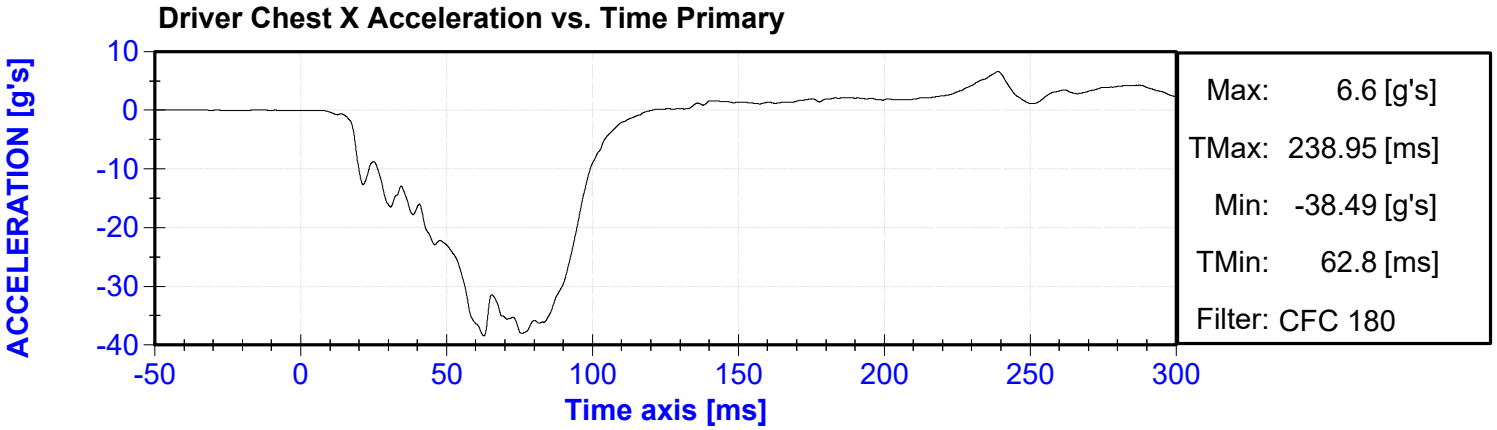
Driver Head Resultant Acceleration vs. Time Primary



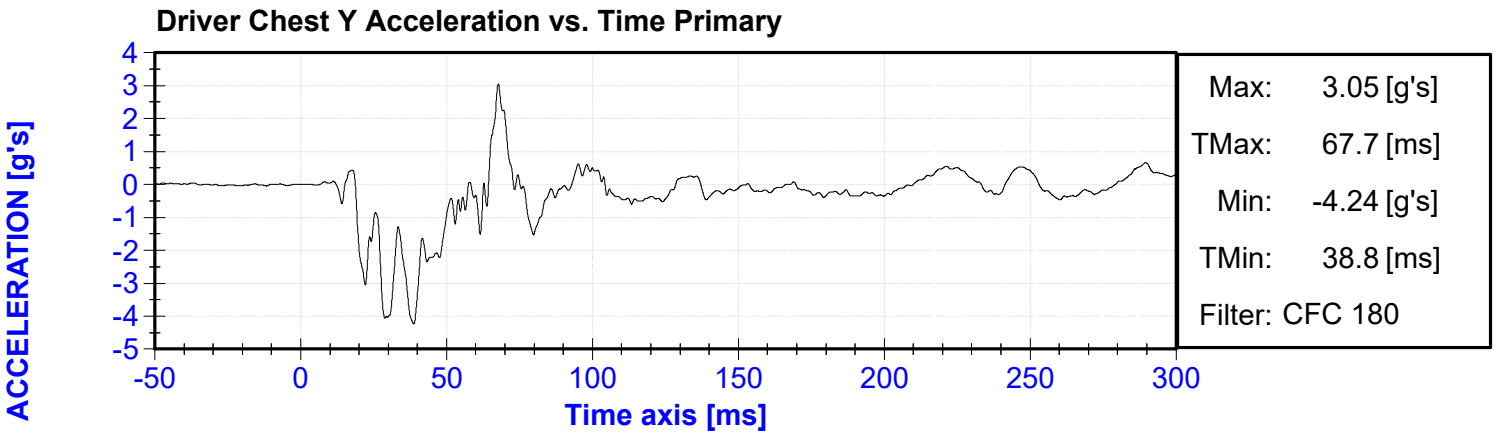
Driver Chest X Deflection vs. Time



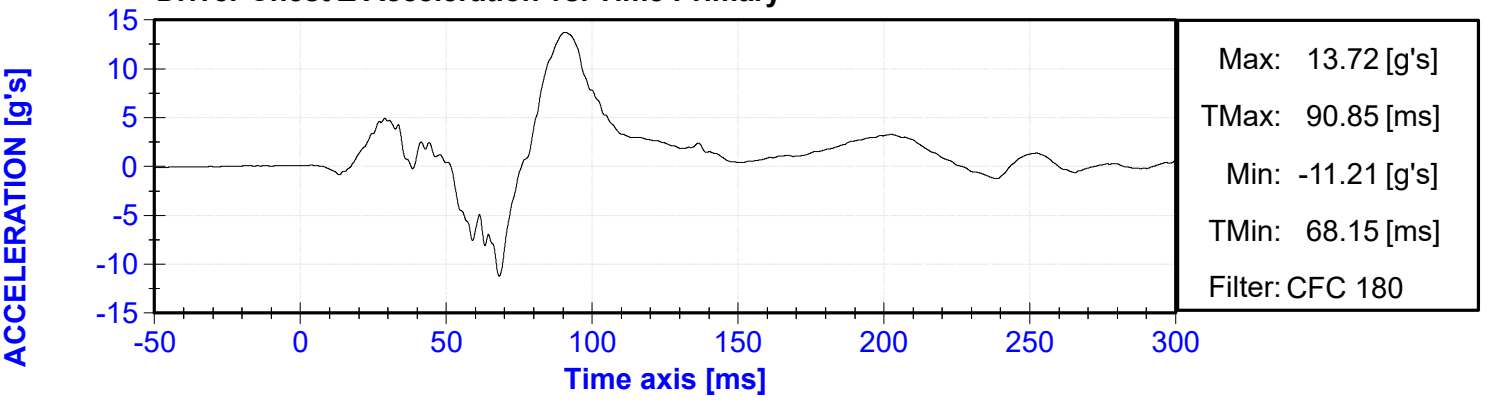
Driver Chest X Acceleration vs. Time Primary



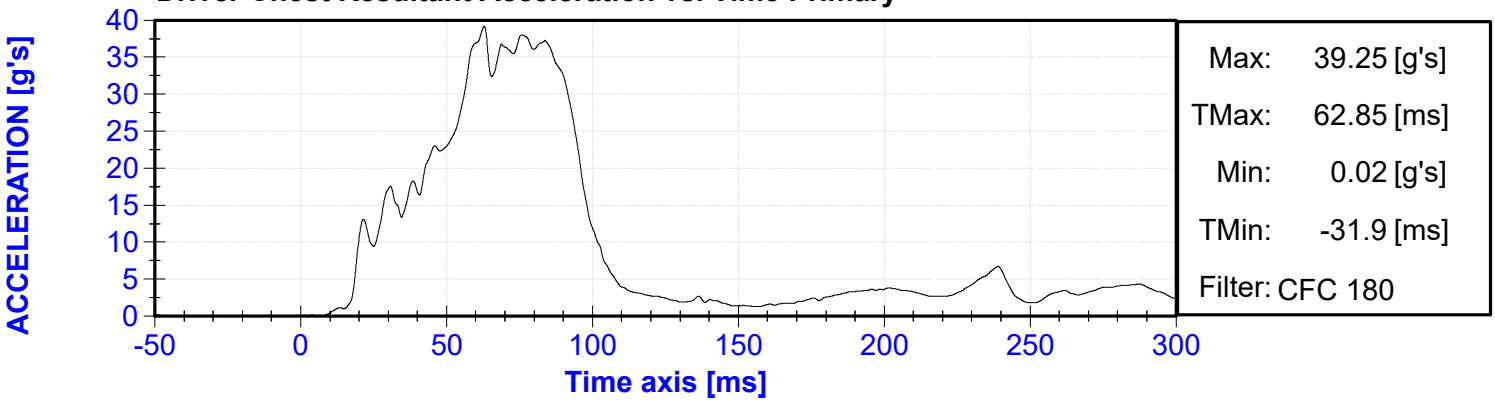
Driver Chest Y Acceleration vs. Time Primary



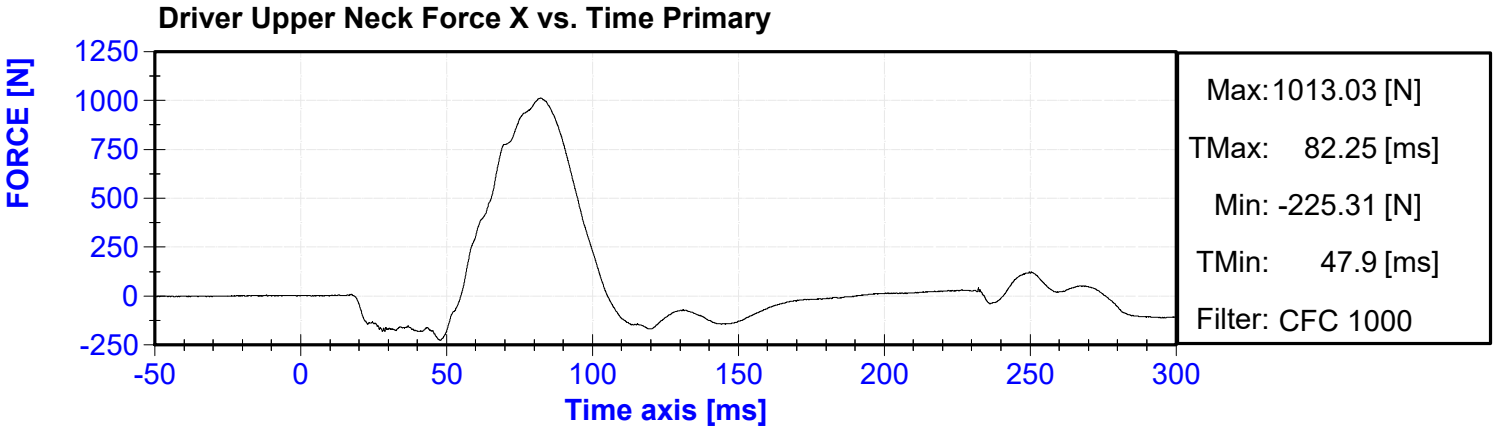
Driver Chest Z Acceleration vs. Time Primary



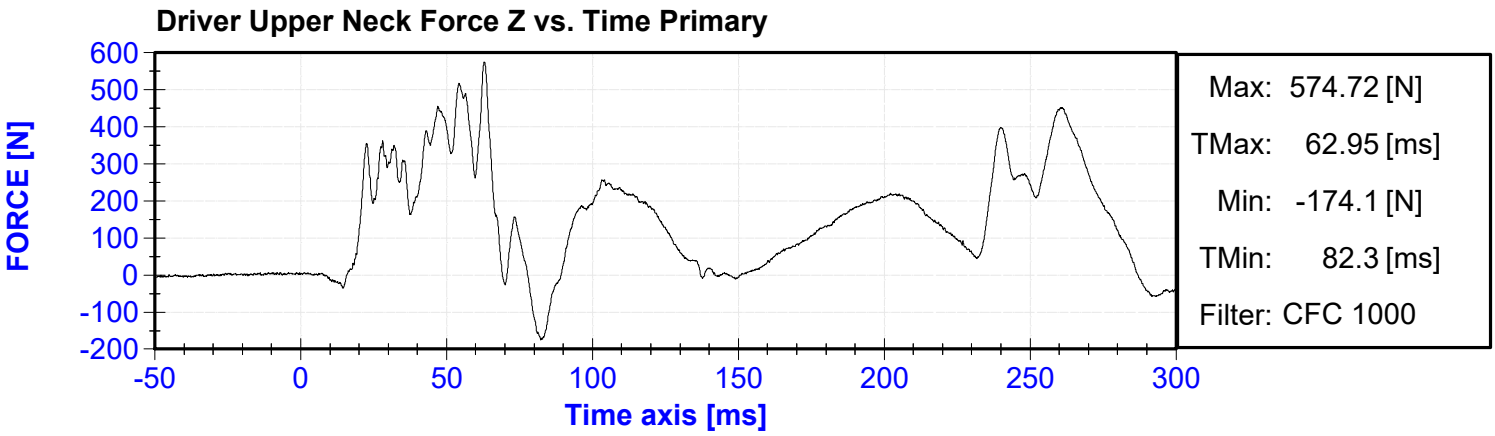
Driver Chest Resultant Acceleration vs. Time Primary



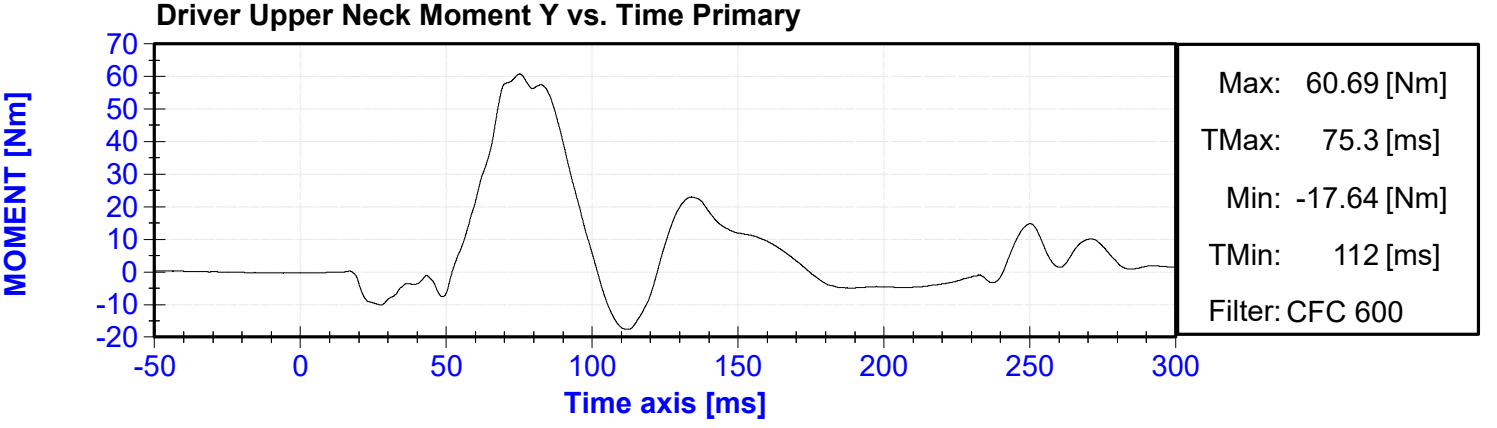
Driver Upper Neck Force X vs. Time Primary



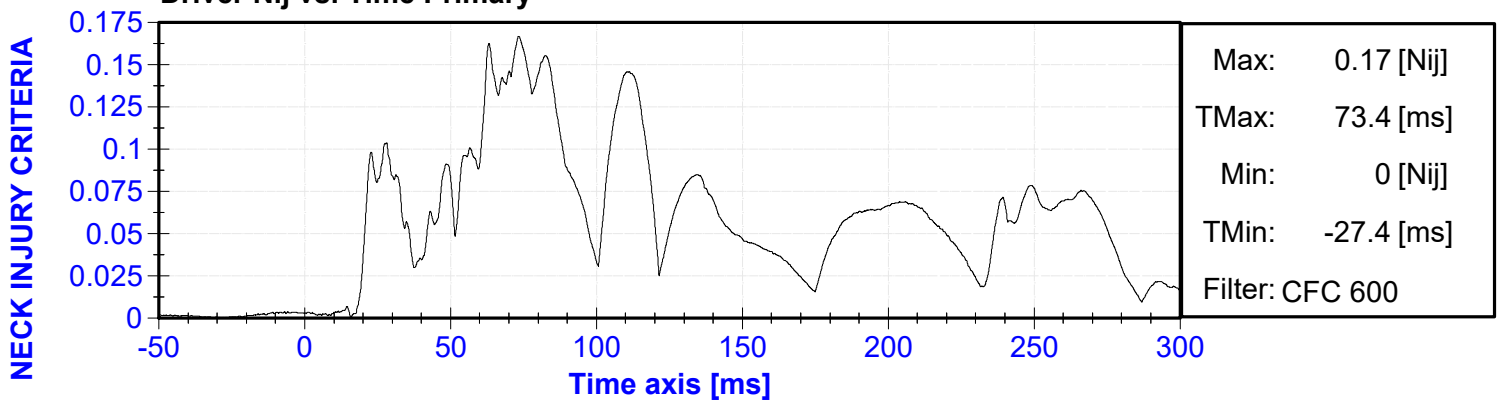
Driver Upper Neck Force Z vs. Time Primary



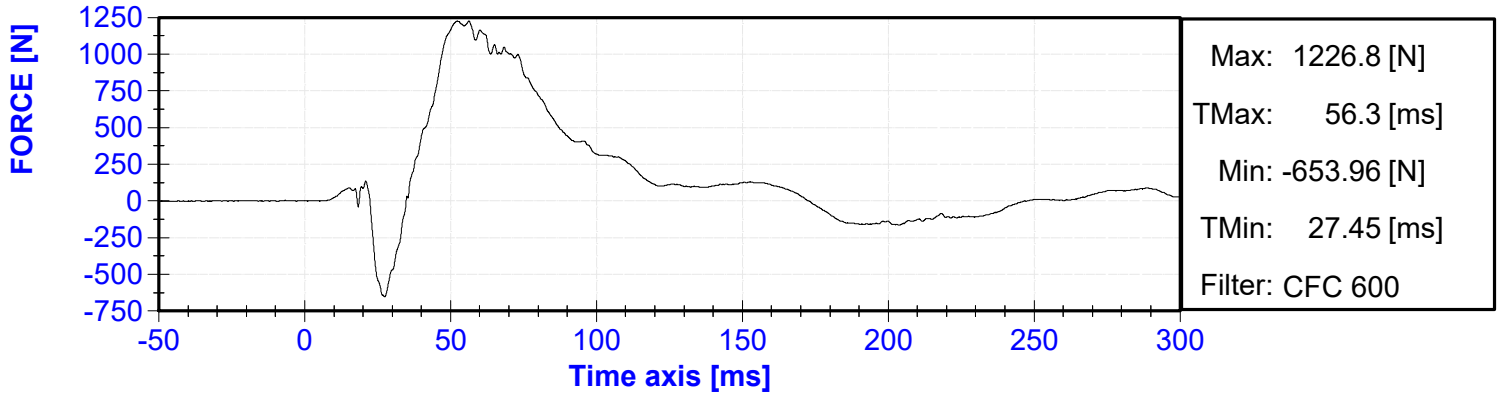
Driver Upper Neck Moment Y vs. Time Primary



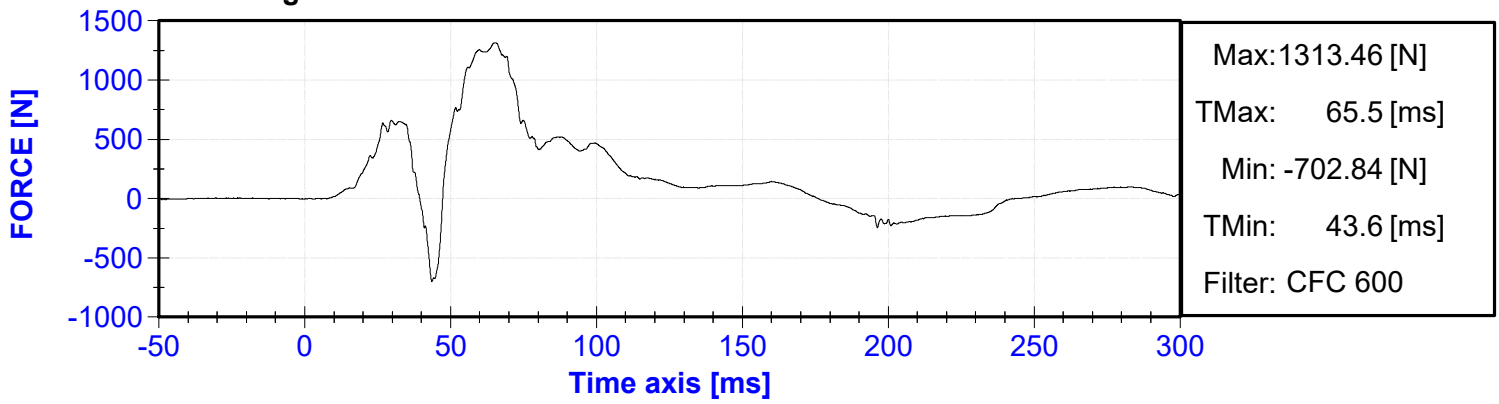
Driver Nij vs. Time Primary



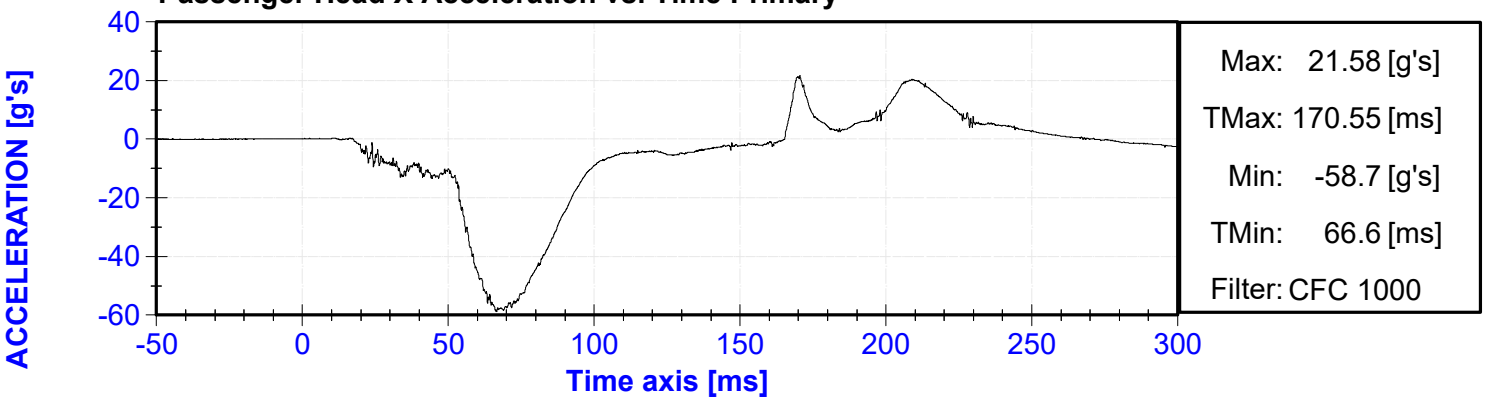
Driver Left Femur Force vs. Time



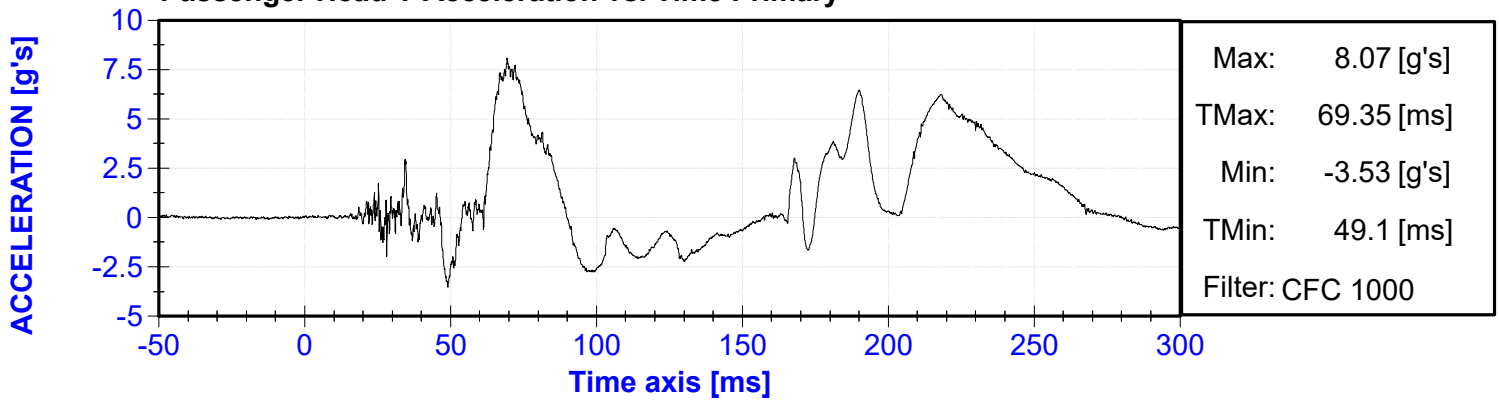
Driver Right Femur Force vs. Time



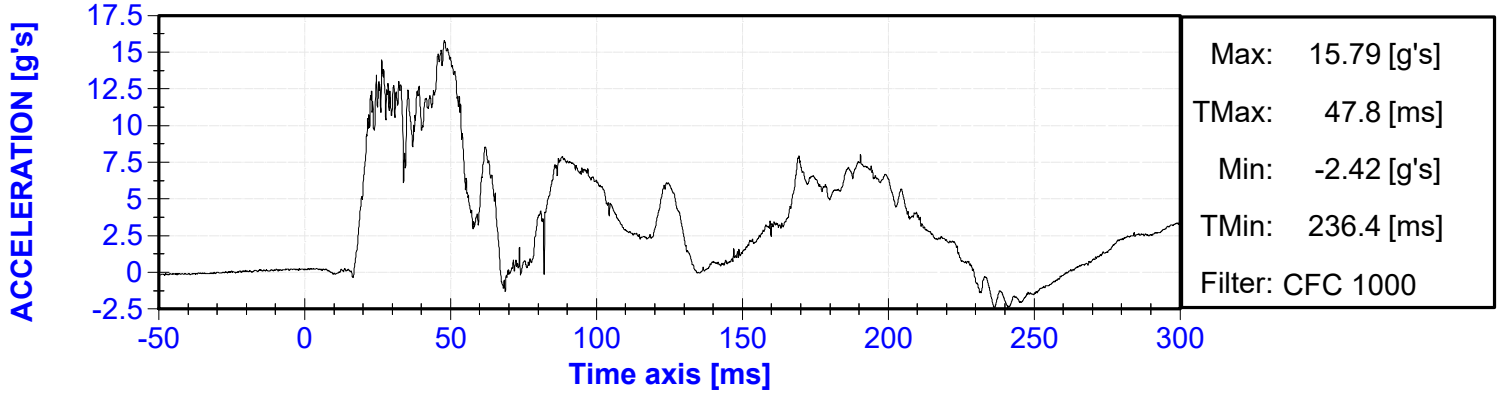
Passenger Head X Acceleration vs. Time Primary



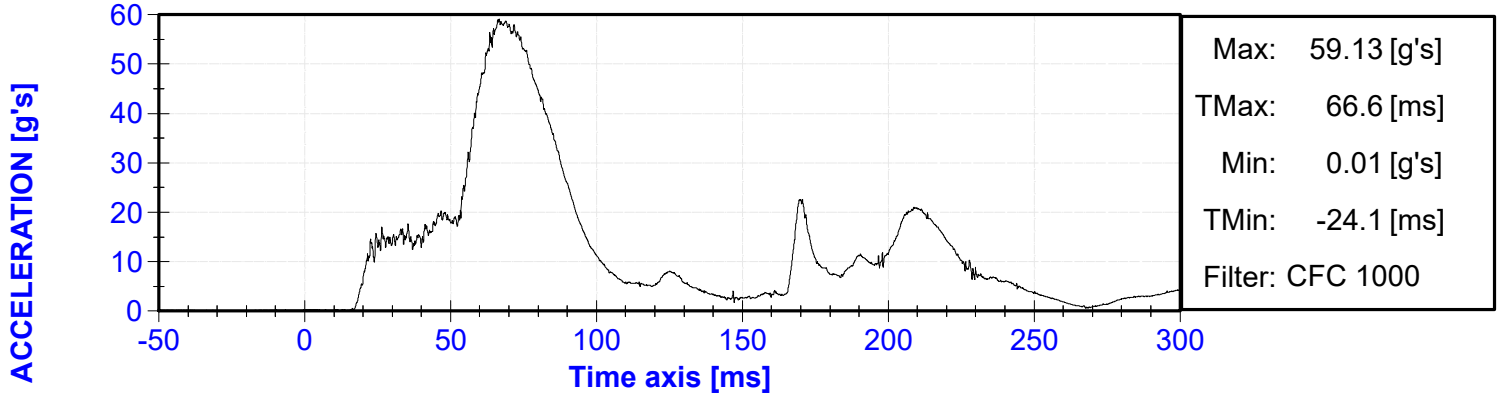
Passenger Head Y Acceleration vs. Time Primary



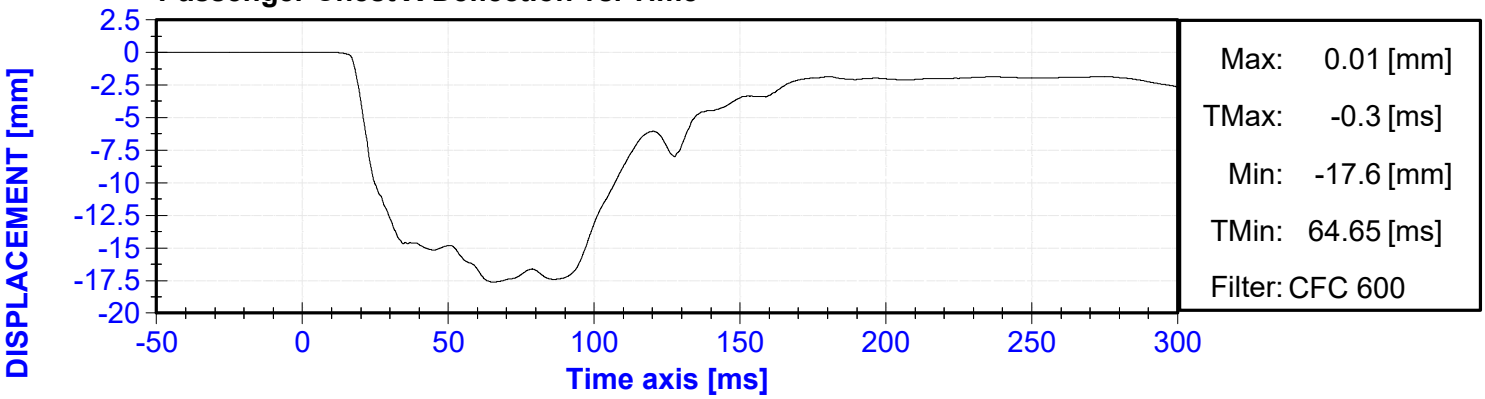
Passenger Head Z Acceleration vs. Time Primary

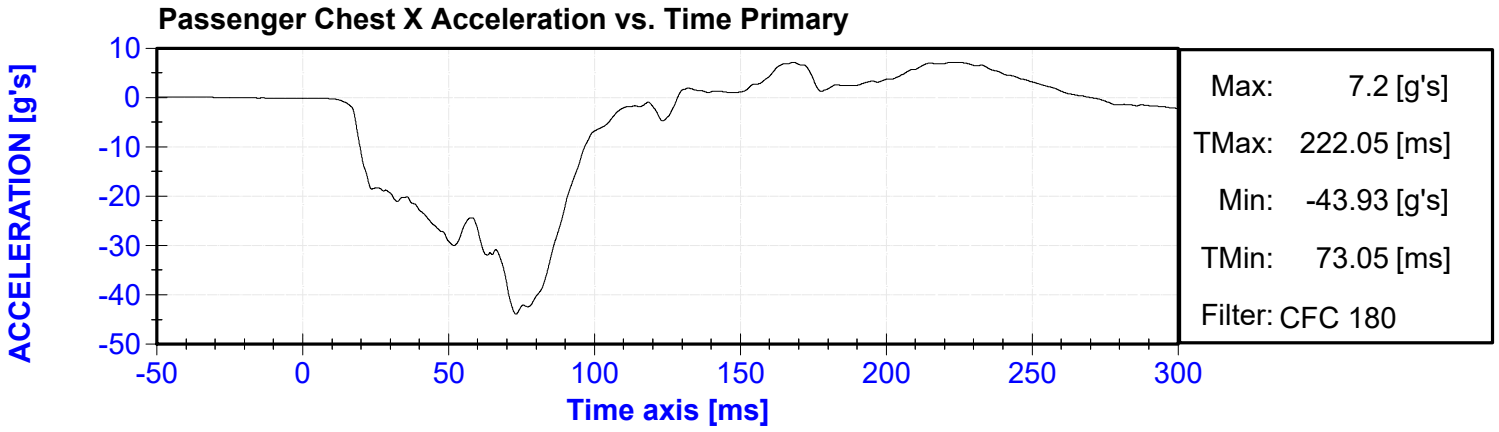


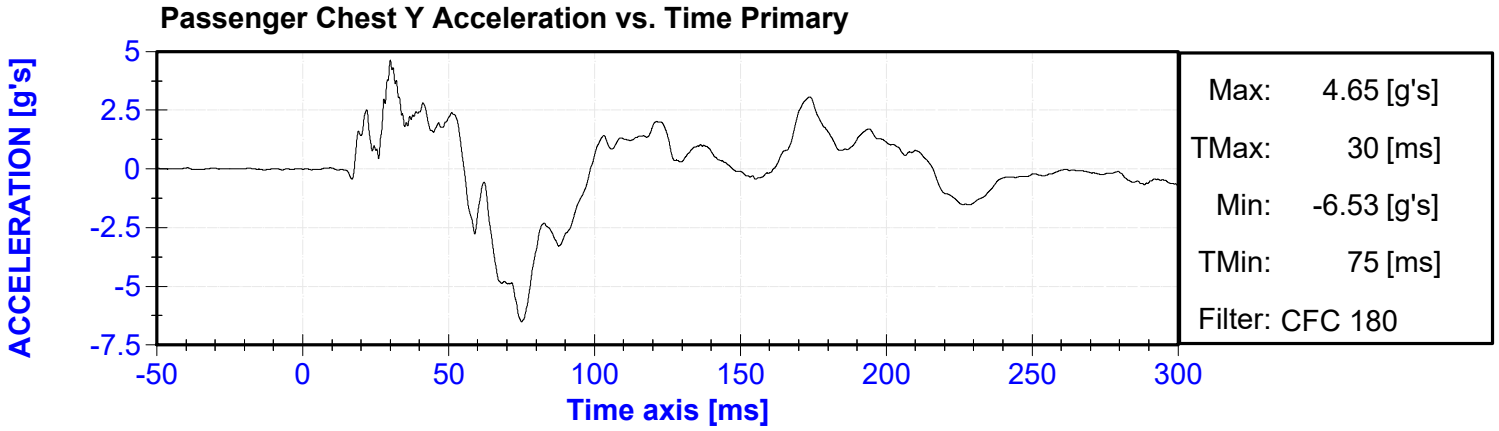
Passenger Head Resultant Acceleration vs. Time Primary

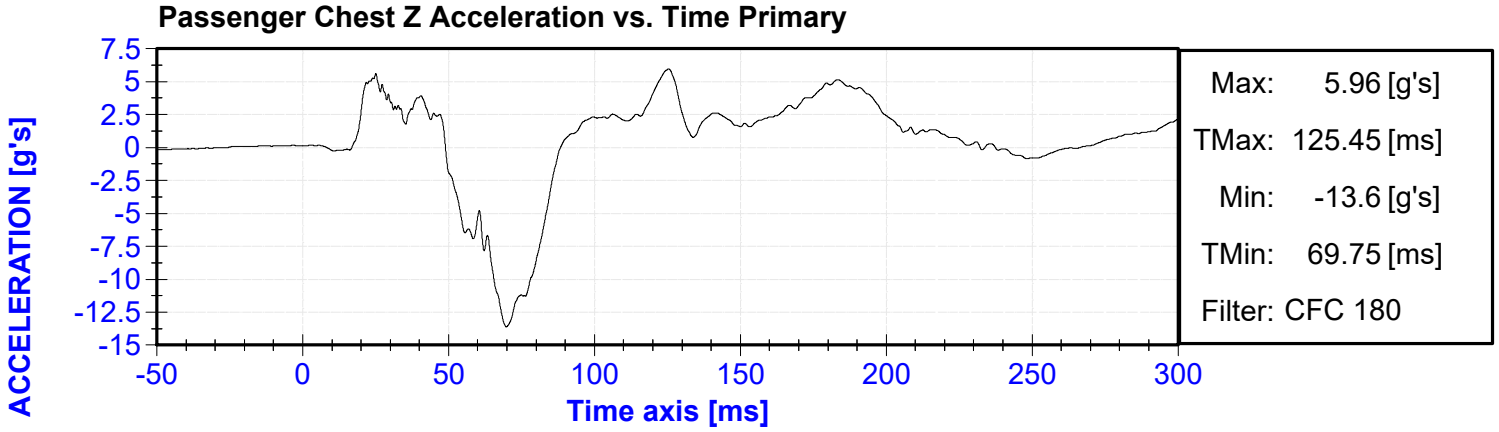


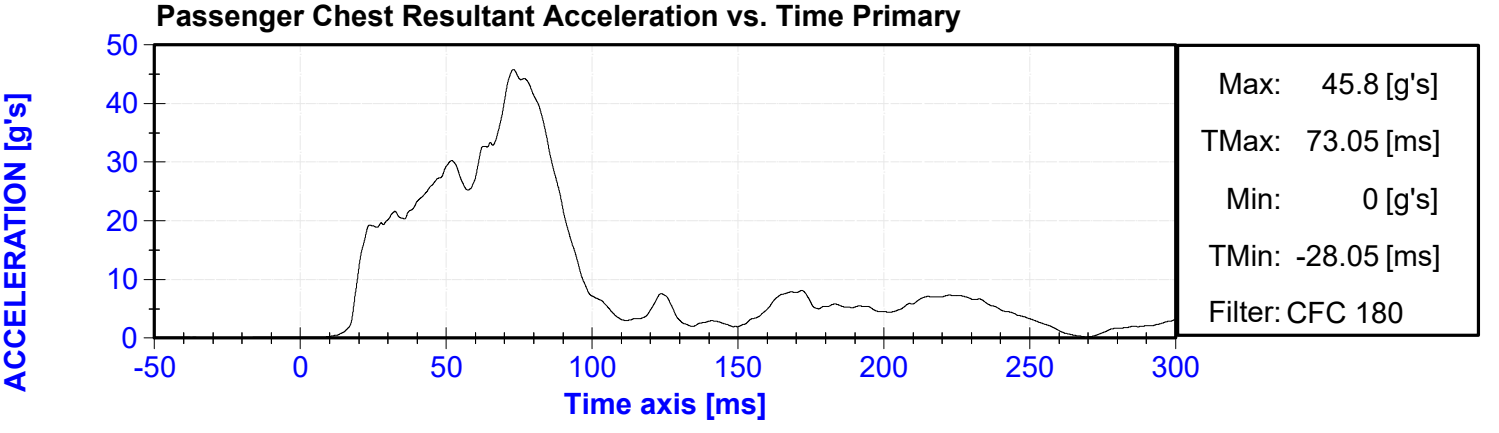
Passenger Chest X Deflection vs. Time

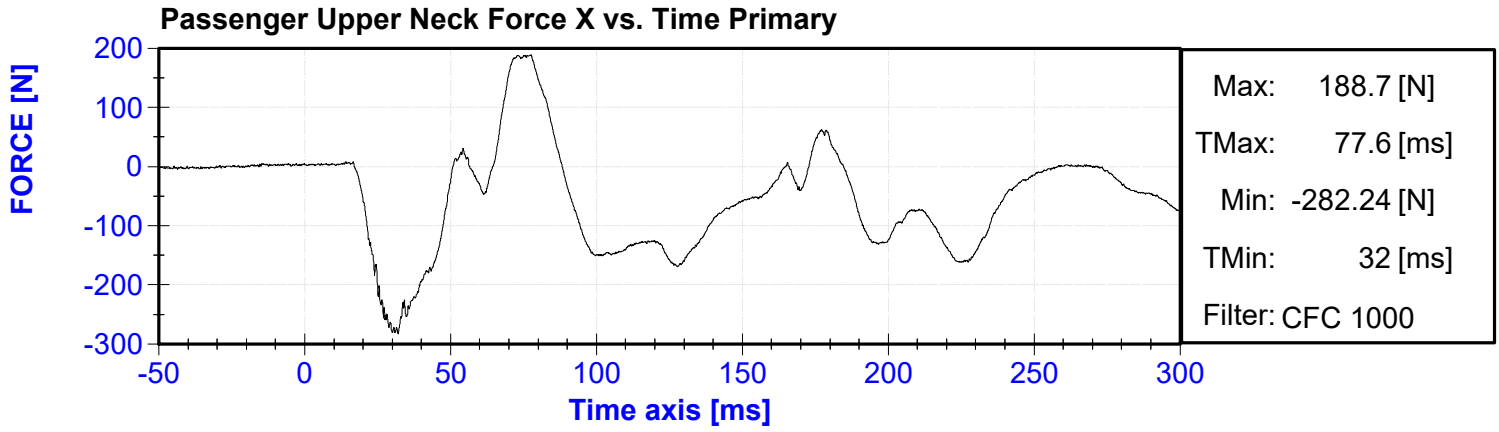


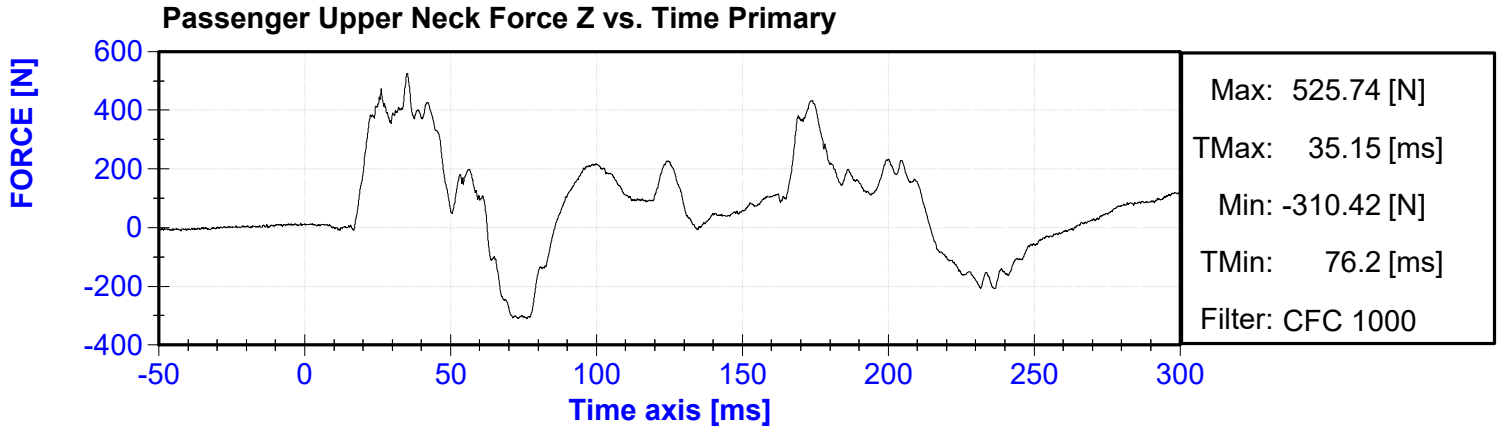

Passenger Chest X Acceleration vs. Time Primary
ACCELERATION [g's]
Time axis [ms]
Max: 7.2 [g's]
TMax: 222.05 [ms]
Min: -43.93 [g's]
TMin: 73.05 [ms]
Filter: CFC 180

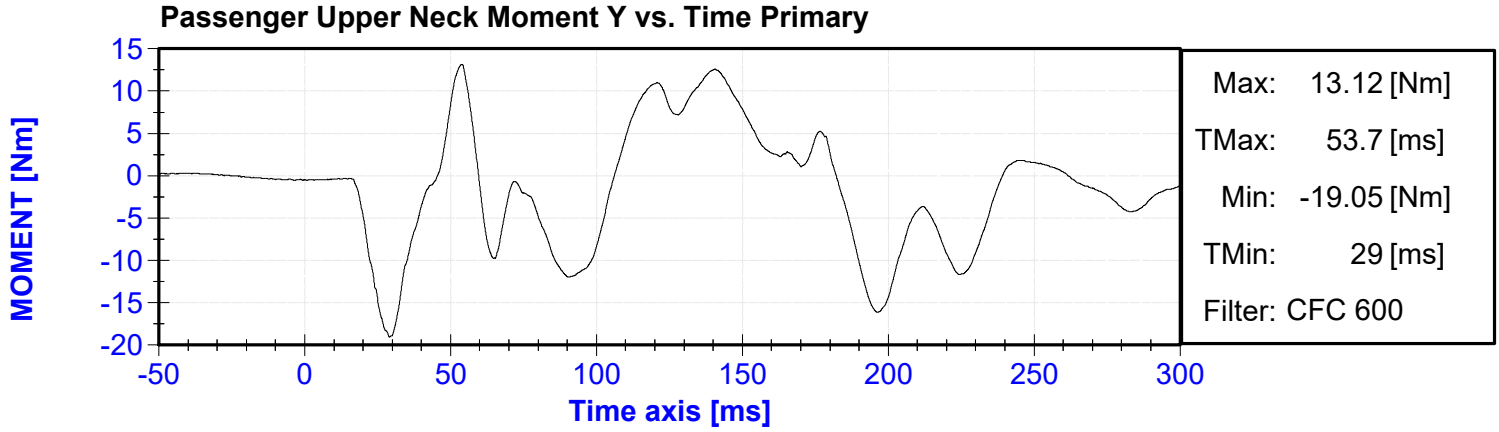

Passenger Chest Y Acceleration vs. Time Primary
ACCELERATION [g's]
Time axis [ms]
Max: 4.65 [g's]
TMax: 30 [ms]
Min: -6.53 [g's]
TMin: 75 [ms]
Filter: CFC 180

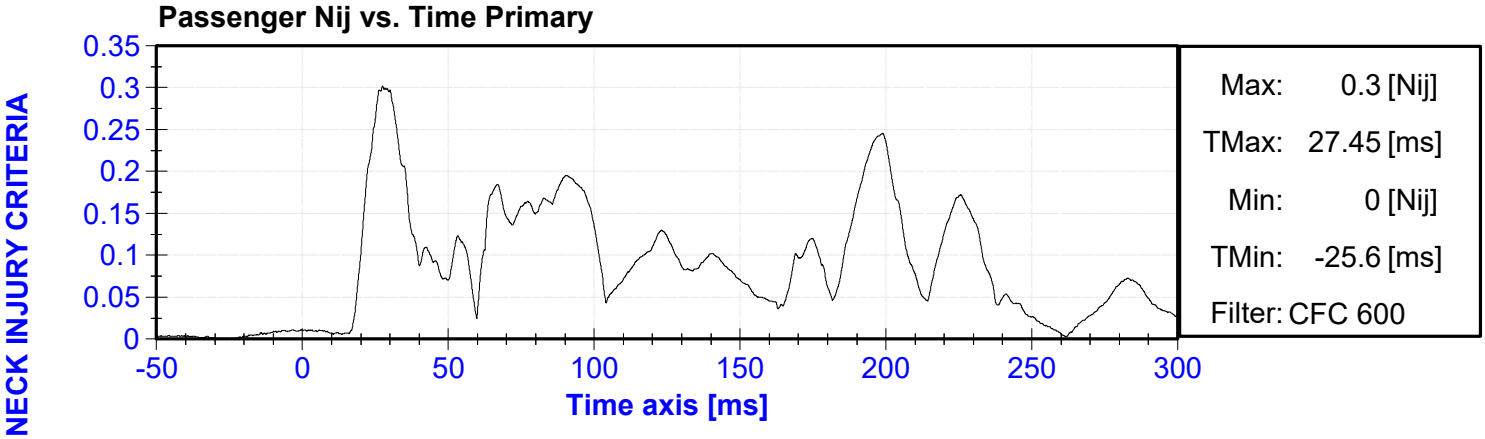

Passenger Chest Z Acceleration vs. Time Primary
ACCELERATION [g's]
Time axis [ms]
Max: 5.96 [g's]
TMax: 125.45 [ms]
Min: -13.6 [g's]
TMin: 69.75 [ms]
Filter: CFC 180

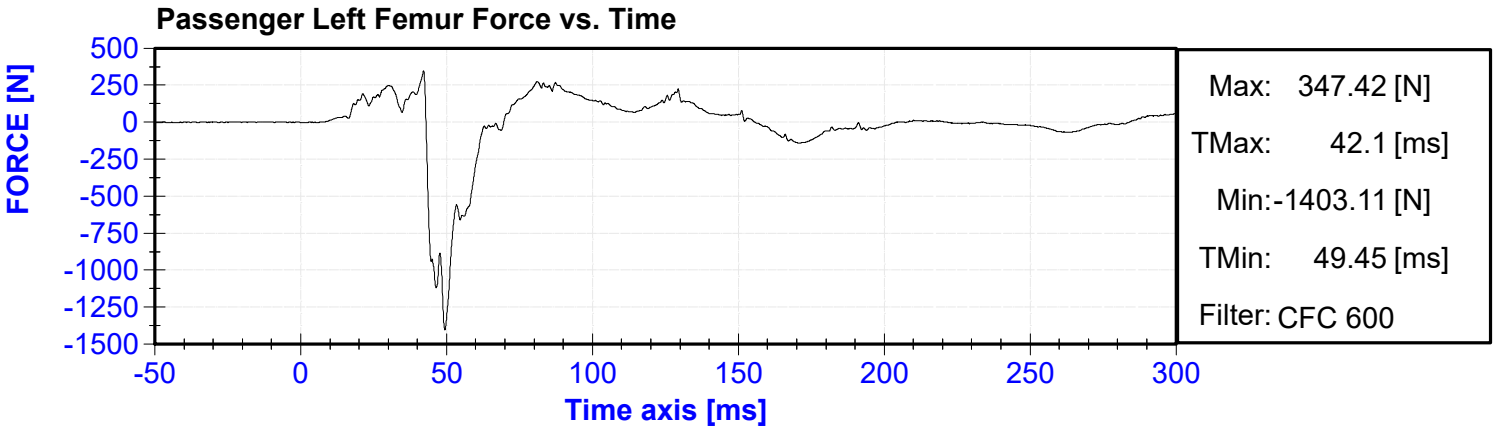

Passenger Chest Resultant Acceleration vs. Time Primary
ACCELERATION [g's]
Time axis [ms]
Max: 45.8 [g's]
TMax: 73.05 [ms]
Min: 0 [g's]
TMin: -28.05 [ms]
Filter: CFC 180

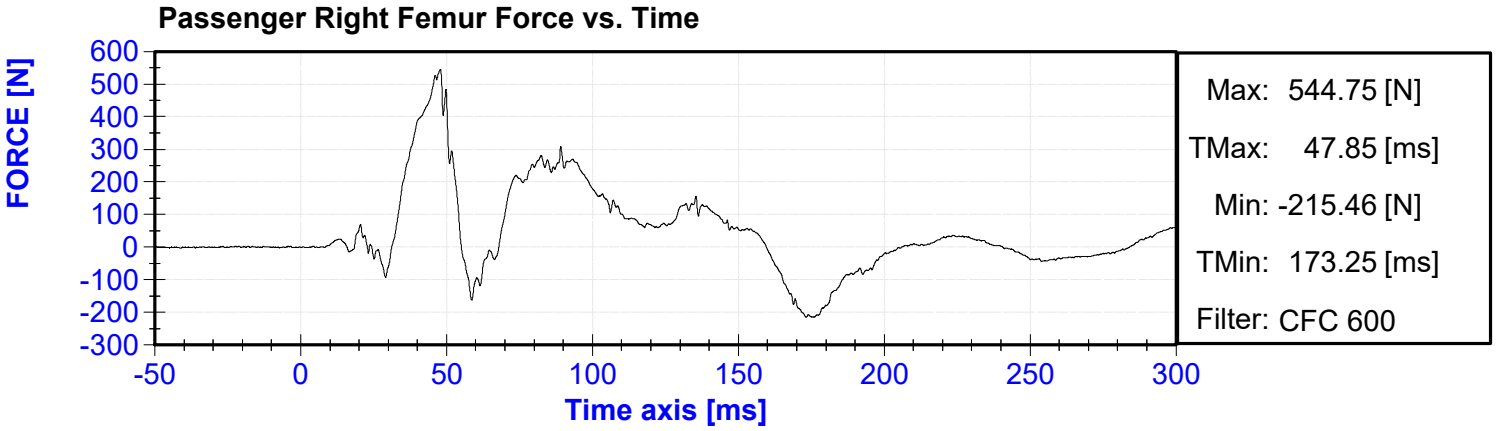

Passenger Upper Neck Force X vs. Time Primary
FORCE [N]
200
100
0
-100
-200
-300
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 188.7 [N]
TMax: 77.6 [ms]
Min: -282.24 [N]
TMin: 32 [ms]
Filter: CFC 1000


Passenger Upper Neck Force Z vs. Time Primary
FORCE [N]
600
400
200
0
-200
-400
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 525.74 [N]
TMax: 35.15 [ms]
Min: -310.42 [N]
TMin: 76.2 [ms]
Filter: CFC 1000


Passenger Upper Neck Moment Y vs. Time Primary
MOMENT [Nm]
15
10
5
0
-5
-10
-15
-20
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 13.12 [Nm]
TMax: 53.7 [ms]
Min: -19.05 [Nm]
TMin: 29 [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: 0.3 [Nij]
TMax: 27.45 [ms]
Min: 0 [Nij]
TMin: -25.6 [ms]
Filter: CFC 600


Passenger Left Femur Force vs. Time
FORCE [N]
500
250
0
-250
-500
-750
-1000
-1250
-1500
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 347.42 [N]
TMax: 42.1 [ms]
Min:-1403.11 [N]
TMin: 49.45 [ms]
Filter: CFC 600


Passenger Right Femur Force vs. Time
FORCE [N]
600
500
400
300
200
100
0
-100
-200
-300
-50
0
50
100
150
200
250
300
Time axis [ms]
Max: 544.75 [N]
TMax: 47.85 [ms]
Min: -215.46 [N]
TMin: 173.25 [ms]
Filter: CFC 600

APPENDIX C

DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

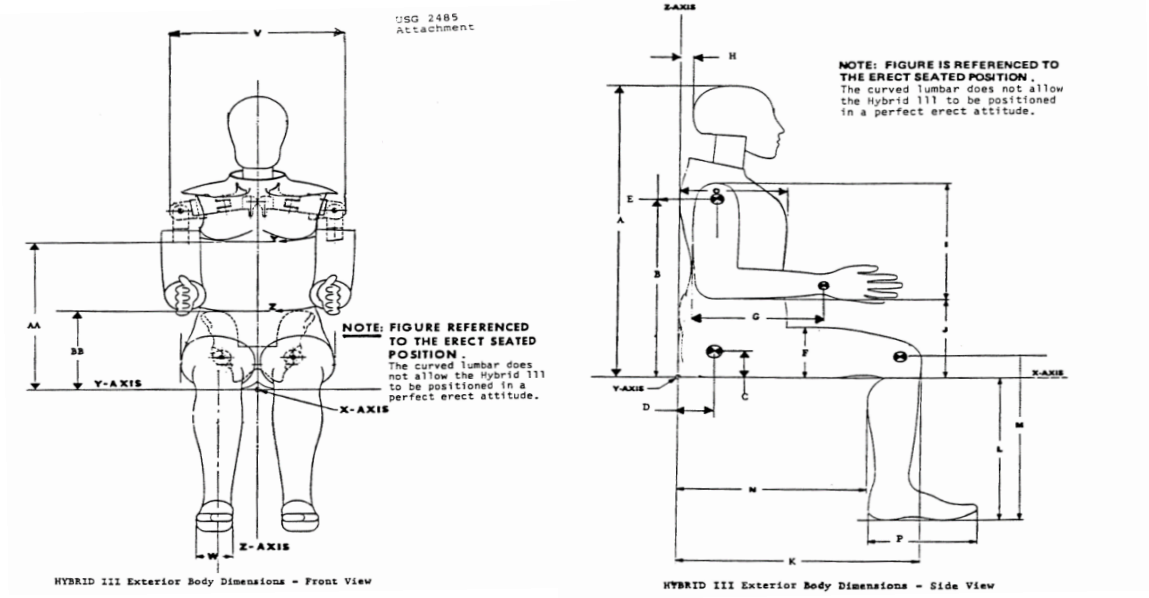
HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 065

External Measurements - Hybrid 3 - 50th Male

Technician: J. Rios Date: 11/26/2024

Dummy Serial Number: 065



Symbol	Description	Specification (in)		Result (in)	Pass/Fail
A	Sitting Height	34.6	35.0	34.9	Pass
B	Shoulder Pivot Height	19.9	20.5	20.1	Pass
C	H-Point Height	3.3	3.5	3.4	Pass
D	H-Point from Backline	5.3	5.5	5.5	Pass
E	Shoulder Pivot from Backline	3.3	3.7	3.5	Pass
F	Thigh Clearance	5.5	6.1	5.8	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	11.6	Pass
H	Head Back to Backline	1.6	1.8	1.6	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.2	Pass
J	Elbow Rest Height	7.5	8.3	7.8	Pass
K	Buttock to Knee Length	22.8	23.8	23.0	Pass
L	Popliteal Height	16.9	17.9	17.5	Pass
M	Knee Pivot Height	19.1	19.7	19.6	Pass
N	Buttock Popliteal Length	17.8	18.8	18.3	Pass
O	Chest Depth without Jacket	8.4	9.0	8.6	Pass
P	Foot Length (right)	9.9	10.5	10.3	Pass
V	Shoulder Breadth	16.3	17.2	16.5	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	8.9	Pass

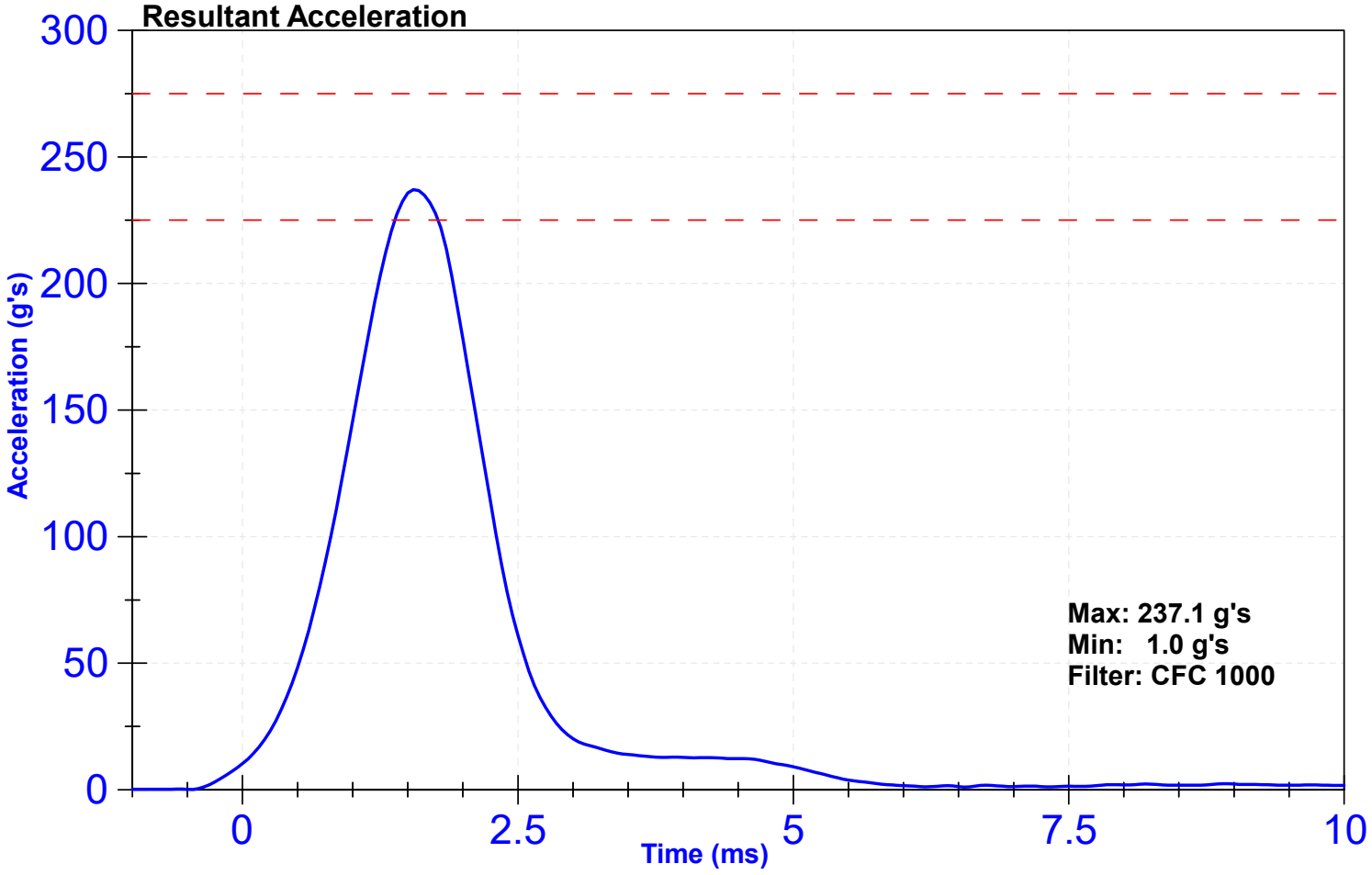
ATD Manufacturer	Humanetics	Test Technician	Z.Putt
ATD Serial Number	065	Laboratory Supervisor	Z.Putt

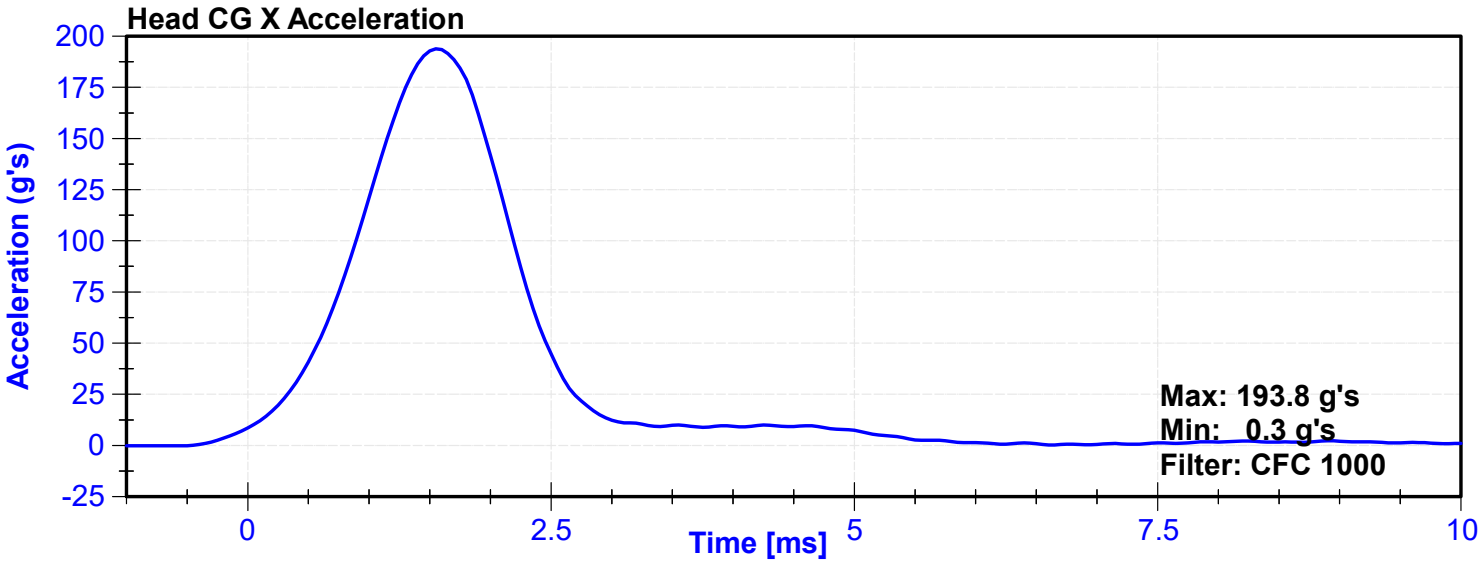
Results

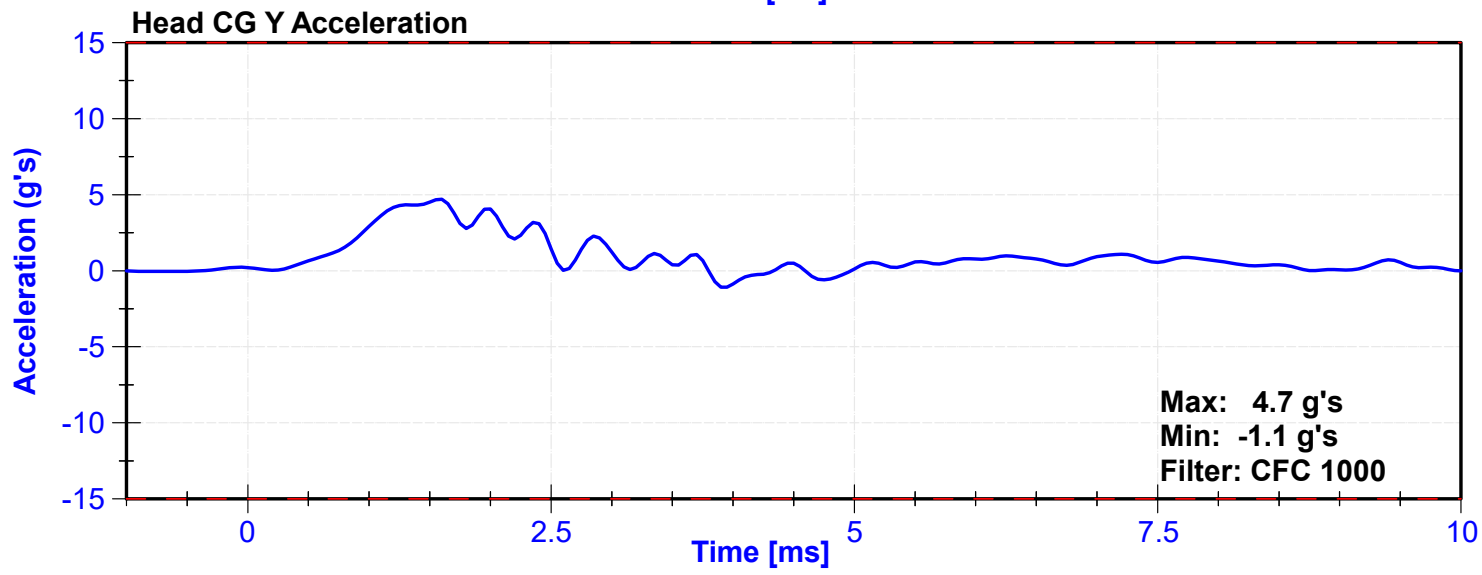
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21.8	Pass
Humidity	10	70	%	48.1	Pass
Resultant Acceleration	225	275	g's	237.1	Pass
Oscillation	0	10	%	5.4	Pass
Lateral Acceleration	-15	15	g's	4.7	Pass

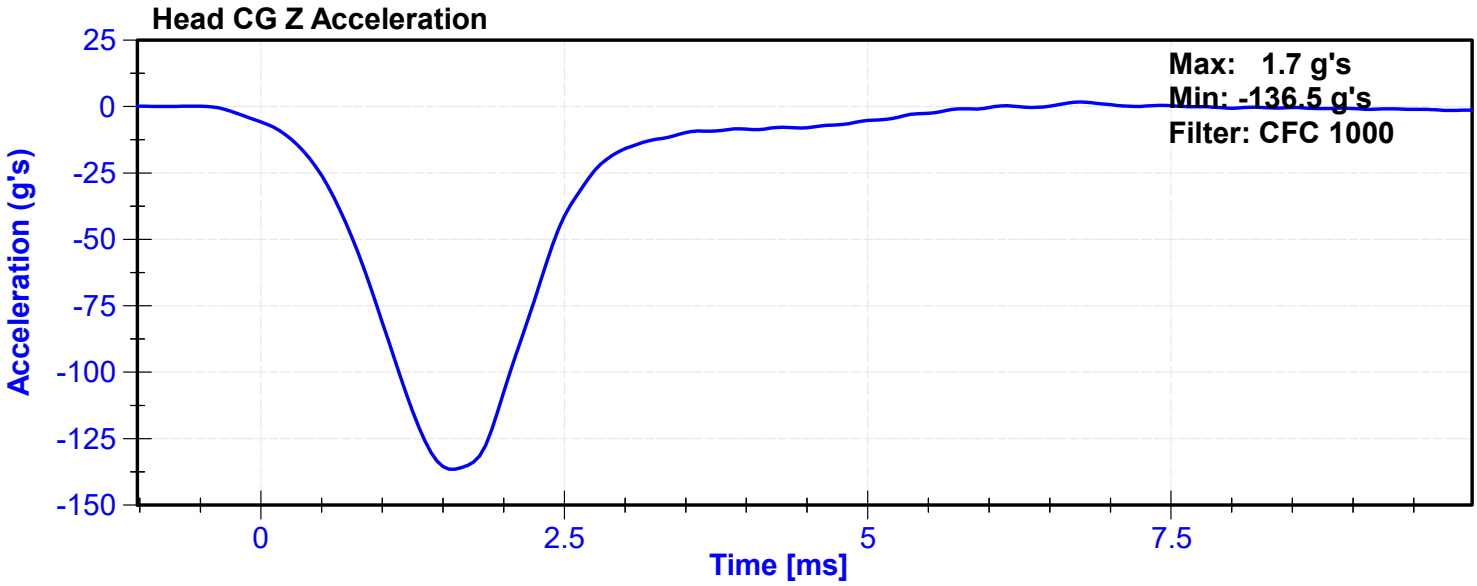
Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	Endevco	P52383	9/9/2024	3/8/2025
Y Accelerometer	Measurement Specialties	A341256	9/9/2024	3/8/2025
Z Accelerometer	Endevco	P71303	9/9/2024	3/8/2025




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: 193.8 g's
Min: 0.3 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: 4.7 g's
Min: -1.1 g's
Filter: CFC 1000


Head CG Z Acceleration
Acceleration (g's)
25
0
-25
-50
-75
-100
-125
-150
0
2.5
5
7.5
Time [ms]
Max: 1.7 g's
Min: -136.5 g's
Filter: CFC 1000

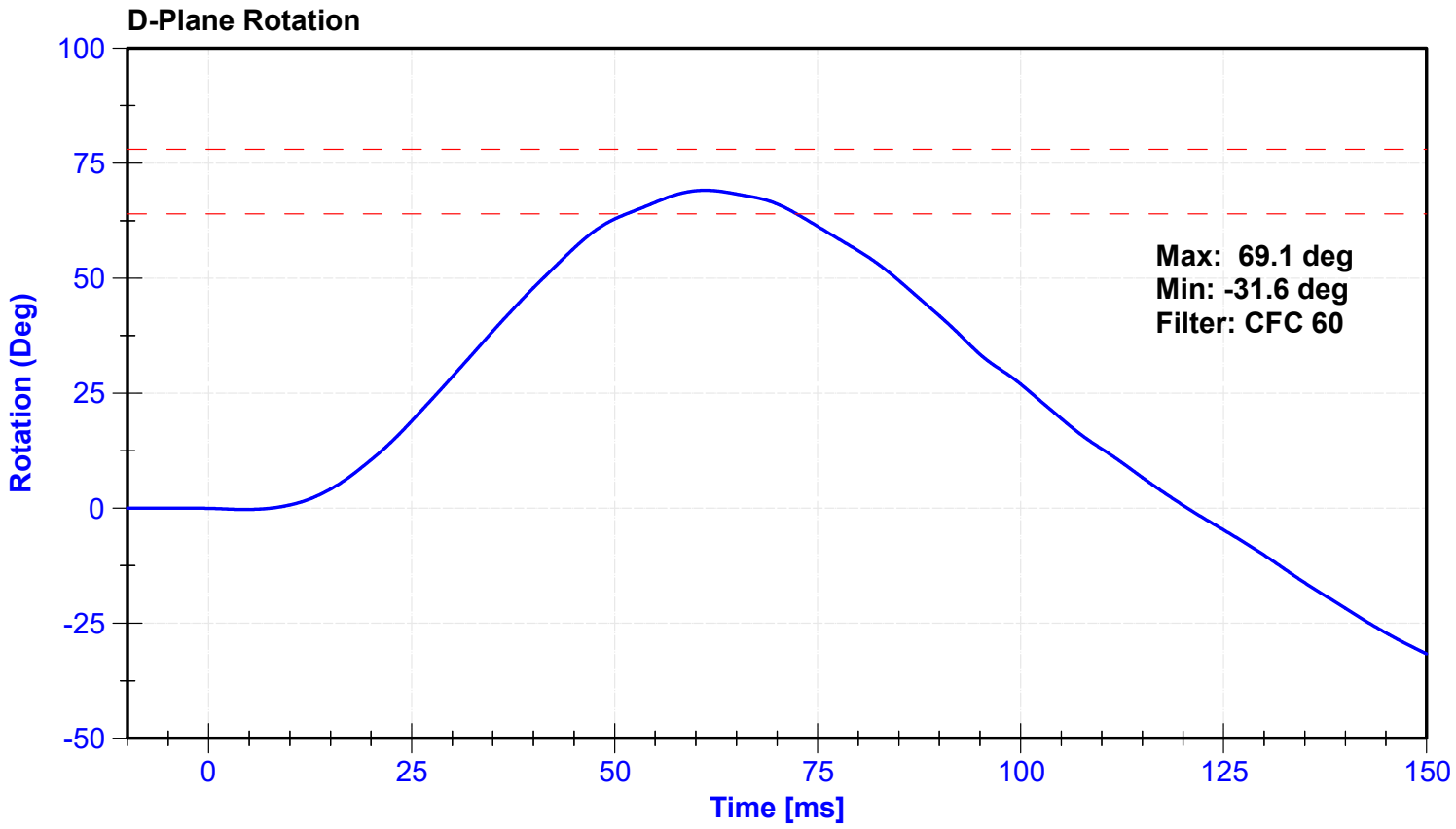
ATD Manufacturer	Humanetics	Test Technician	Z.Putt
ATD Serial Number	065	Laboratory Supervisor	Z.Putt

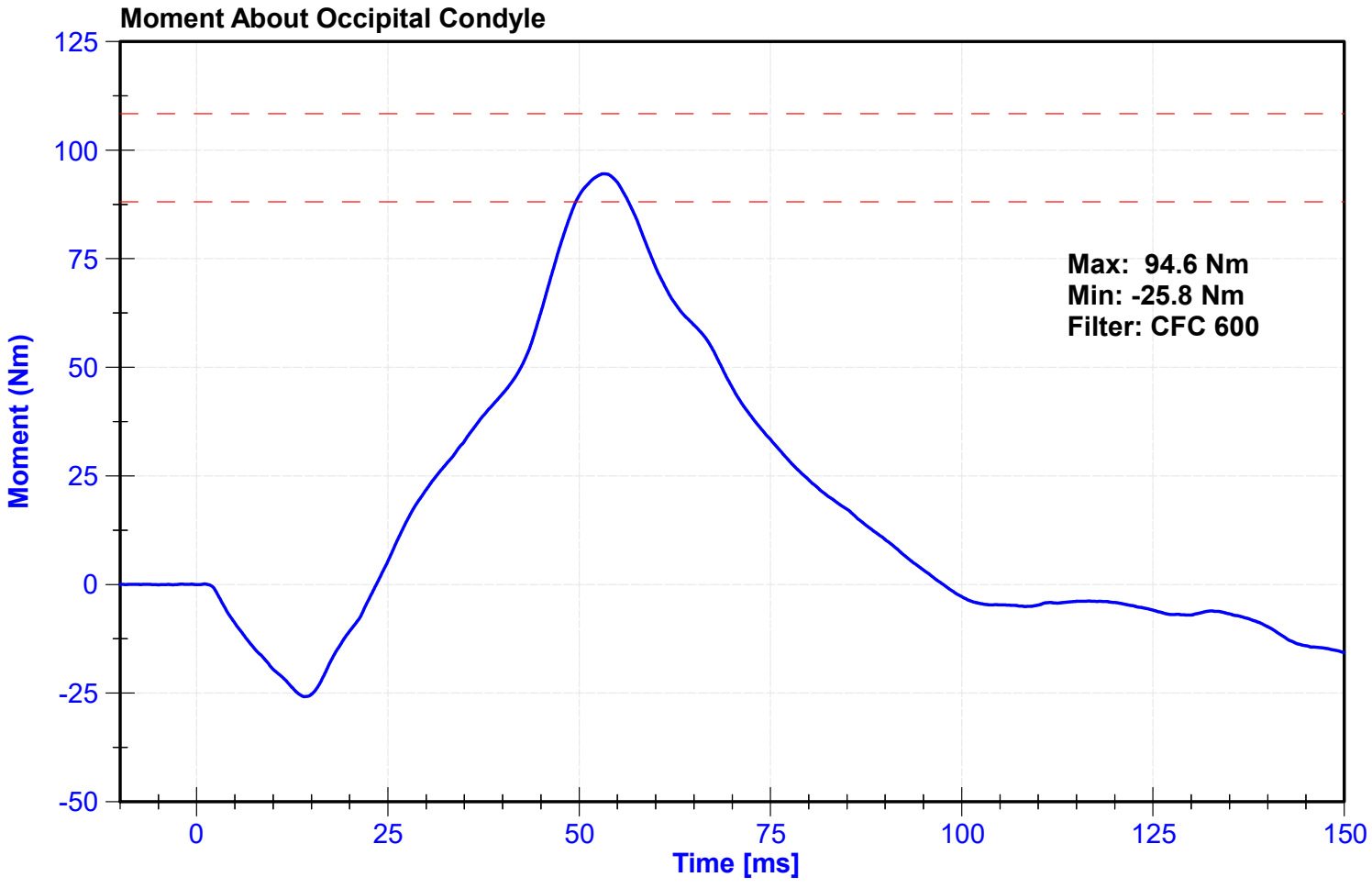
Results

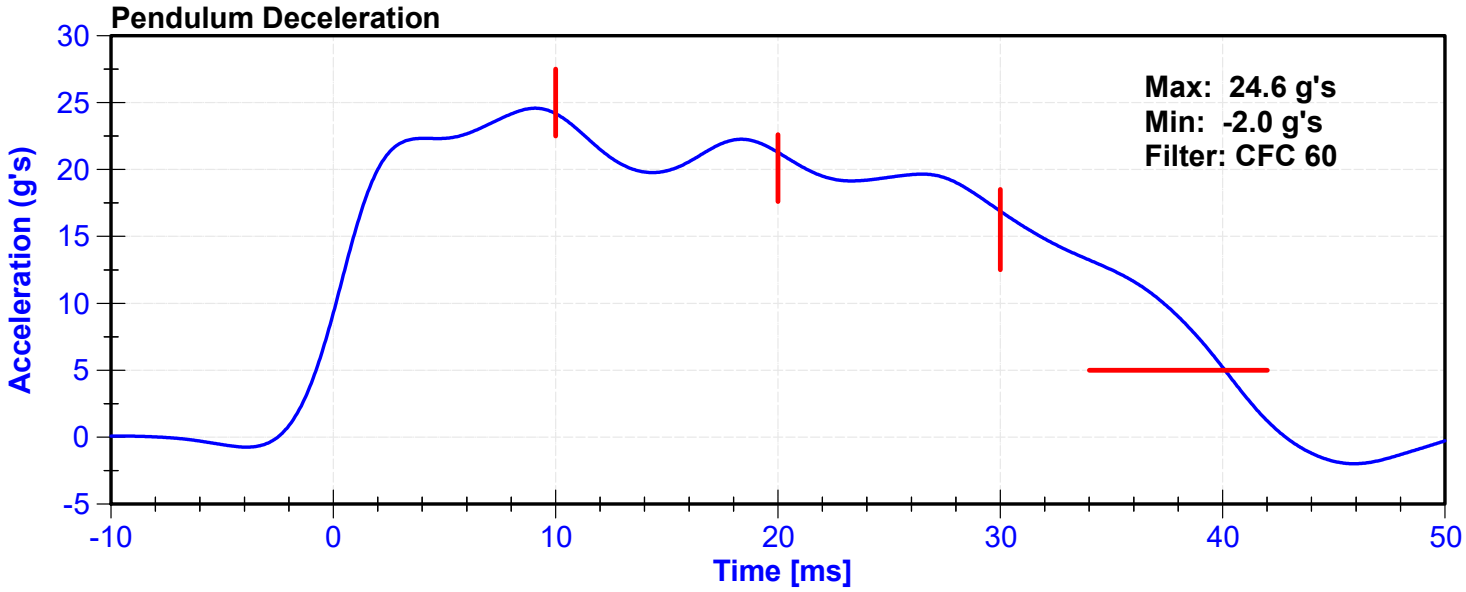
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	40.7	Pass
Velocity	6.89	7.13	m/s	7.025	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	24.17	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	21.27	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	16.88	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	24.6	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	40.1	Pass
Maximum D Plane Rotation	64	78	deg	69.1	Pass
Time to Maximum Rotation	57	64	ms	61.1	Pass
Rotation Decay to Zero	113	127	ms	120.6	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	94.56	Pass
Time to Maximum Moment	47	58	ms	53.1	Pass
Moment Decay to Zero	97	107	ms	97.6	Pass

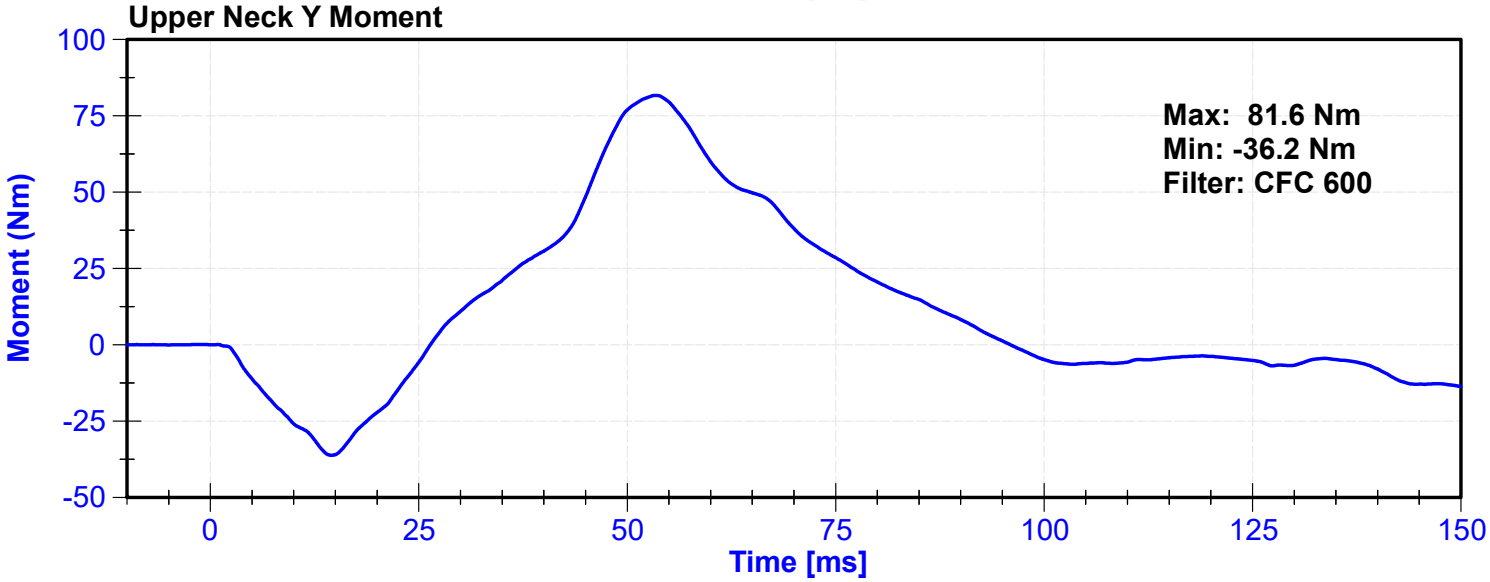
Transducer Calibrations

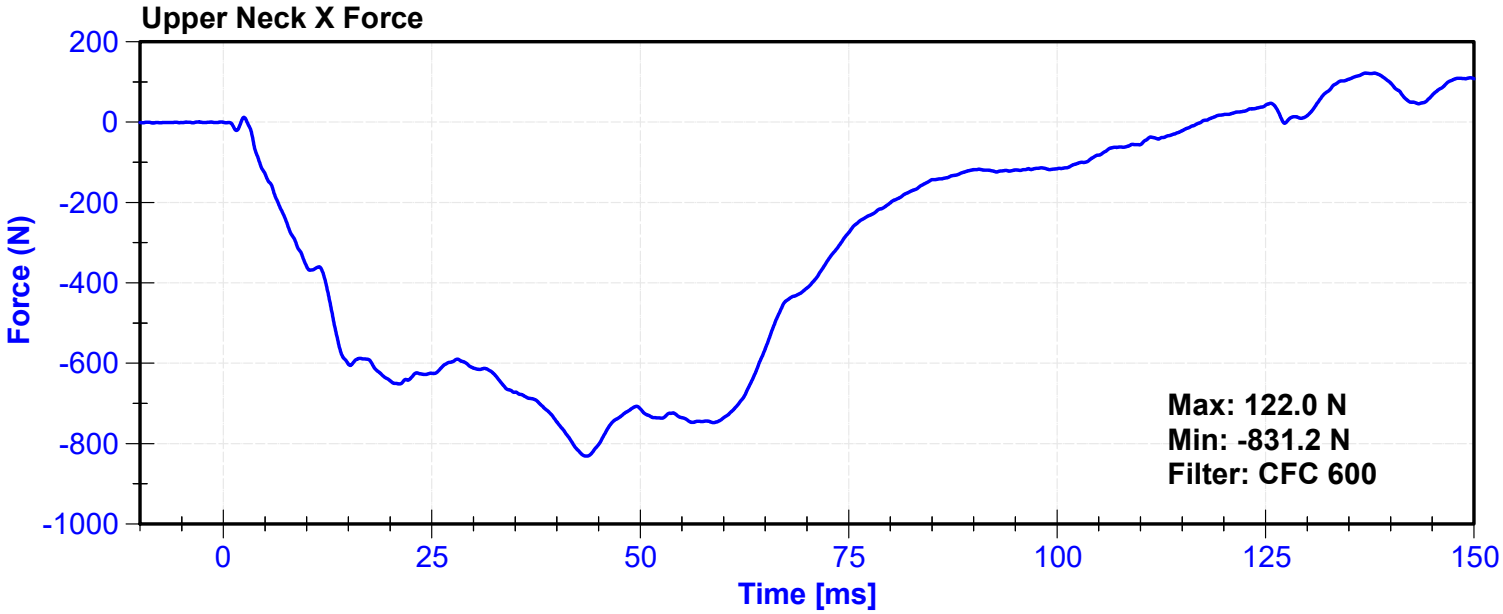
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16686	8/28/2024	2/24/2025
Pendulum Potentiometer	Honeywell	A825	9/13/2024	9/13/2025
Condyle Potentiometer	Honeywell	J119	9/13/2024	9/13/2025
Upper Neck Load Cell	Humanetics	851-FX	5/22/2024	5/22/2025


D-Plane Rotation
Rotation (Deg)
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 69.1 deg
Min: -31.6 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: 94.6 Nm
Min: -25.8 Nm
Filter: CFC 600


Pendulum Deceleration
Acceleration (g's)
Time [ms]
Max: 24.6 g's
Min: -2.0 g's
Filter: CFC 60


Upper Neck Y Moment
Moment (Nm)
Time [ms]
Max: 81.6 Nm
Min: -36.2 Nm
Filter: CFC 600


Upper Neck X Force
Force (N)
Time [ms]
Max: 122.0 N
Min: -831.2 N
Filter: CFC 600

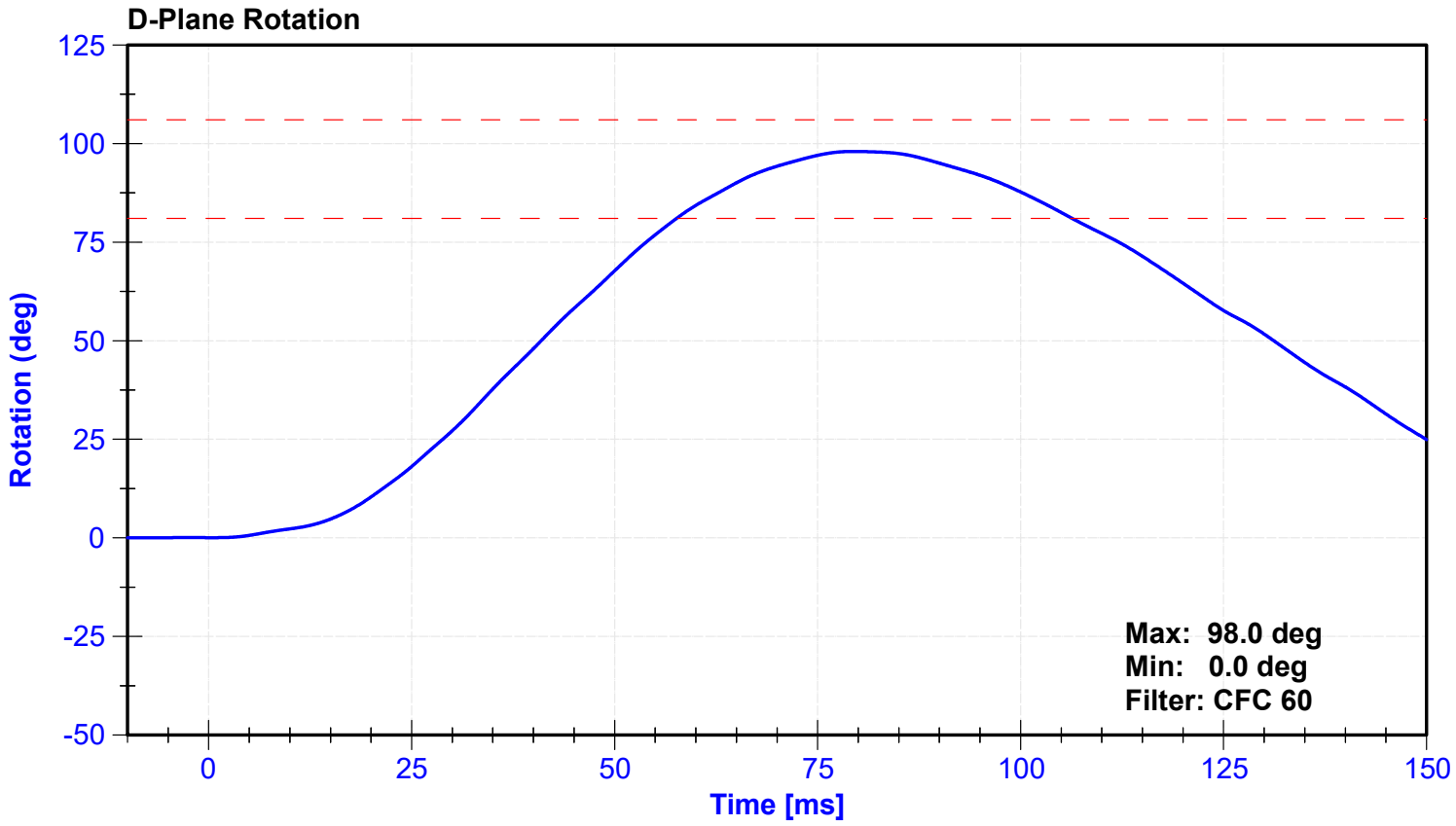
ATD Manufacturer	Humanetics	Test Technician	Z.Putt
ATD Serial Number	065	Laboratory Supervisor	Z.Putt

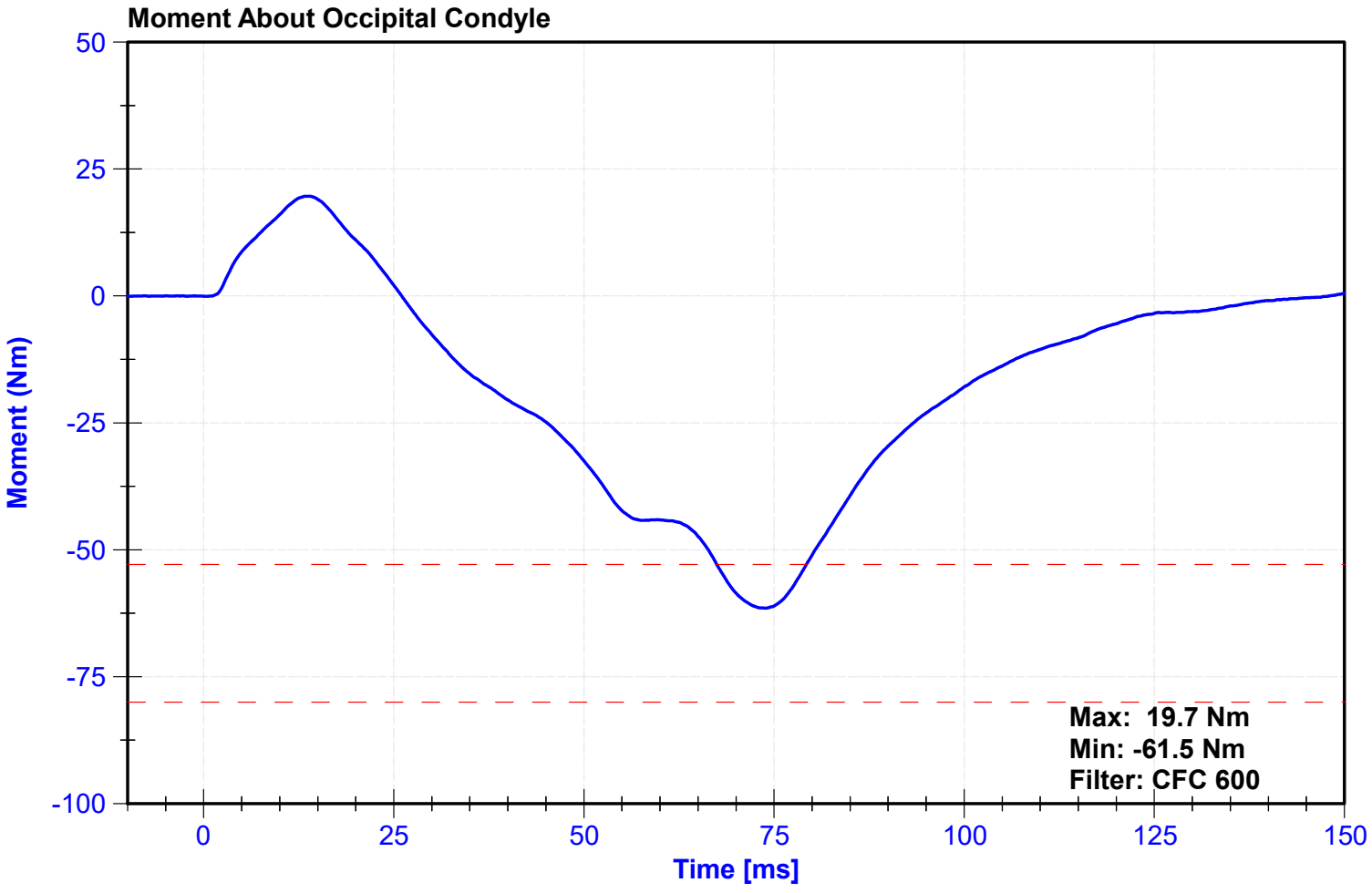
Results

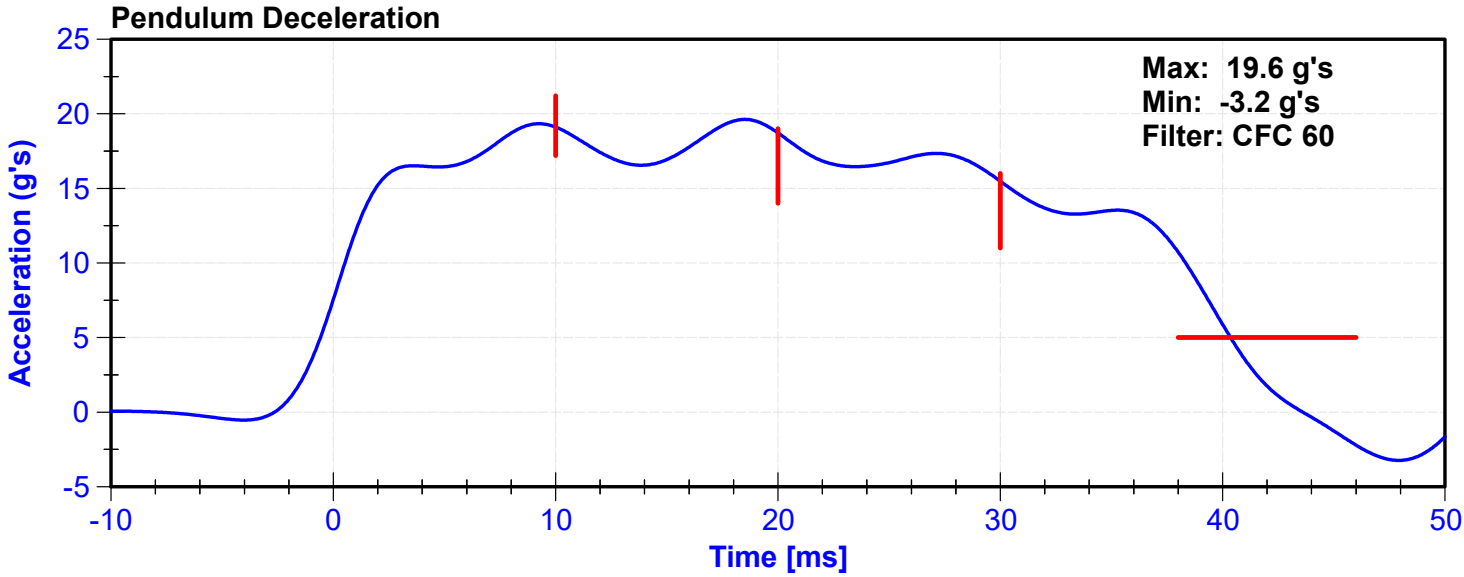
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.2	Pass
Humidity	10	70	%	40.7	Pass
Velocity	5.94	6.19	m/s	6.035	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	19.11	Pass
Pendulum Deceleration at 20ms	14	19	g's	18.7	Pass
Pendulum Deceleration at 30ms	11	16	g's	15.5	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	19.6	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	40.4	Pass
Maximum D Plane Rotation	81	106	deg	98.0	Pass
Time to Maximum Rotation	72	82	ms	79.4	Pass
Rotation Decay to Zero	147	174	ms	168.9	Pass
Minimum Moment About OC	-80	-52.9	Nm	-61.49	Pass
Time to Minimum Moment	65	79	ms	73.9	Pass
Moment Decay to Zero	120	148	ms	148.0	Pass

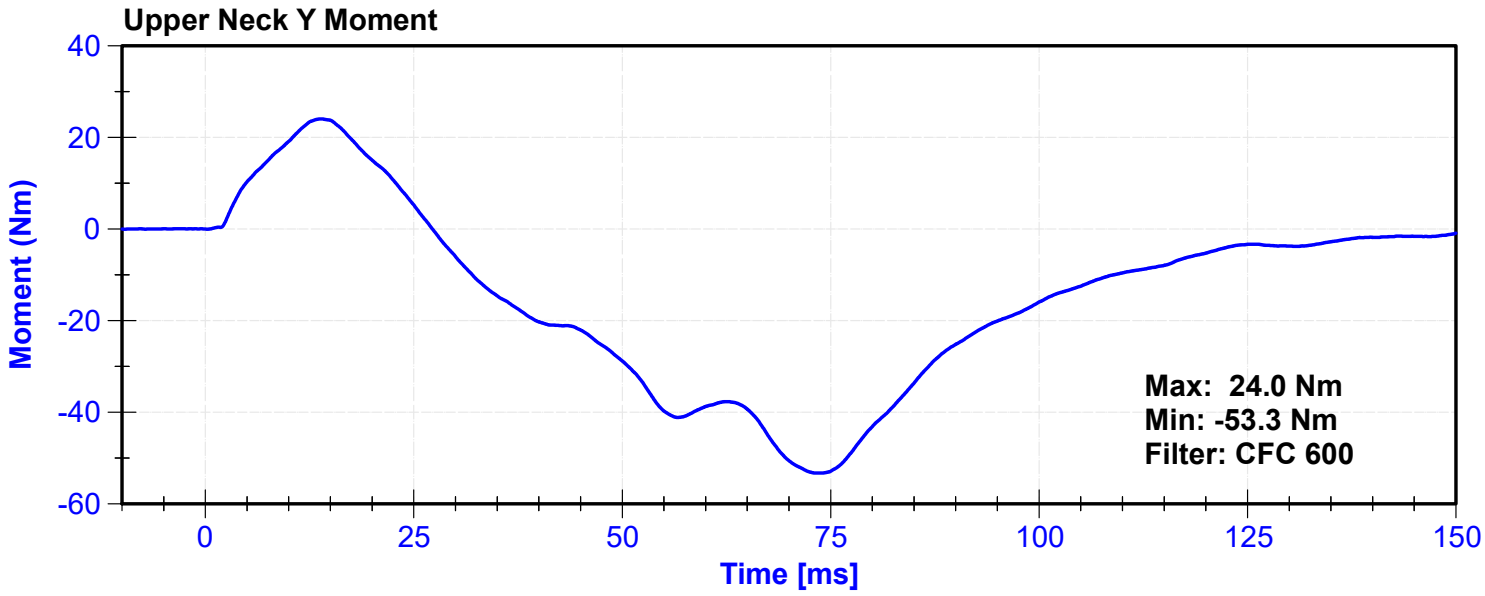
Transducer Calibrations

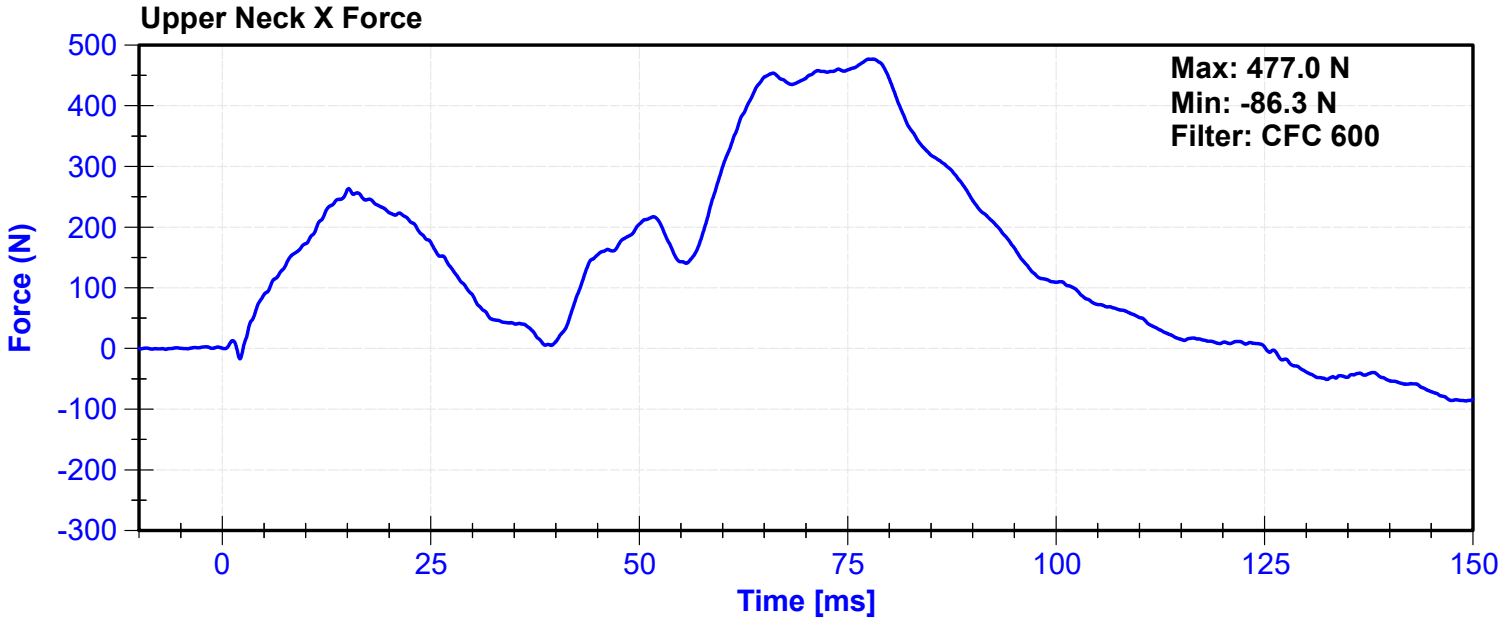
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16686	8/28/2024	2/24/2025
Pendulum Potentiometer	Honeywell	F78BA102-B1_A825	9/13/2024	9/13/2025
Condyle Potentiometer	Honeywell	F78BA102-B1_J119	9/13/2024	9/13/2025
Upper Neck Load Cell	Humanetics	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: 98.0 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: 19.7 Nm
Min: -61.5 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 19.6 g's
Min: -3.2 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: 24.0 Nm
Min: -53.3 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: 477.0 N
Min: -86.3 N
Filter: CFC 600
Force (N)
500
400
300
200
100
0
-100
-200
-300
0
25
50
75
100
125
150
Time [ms]

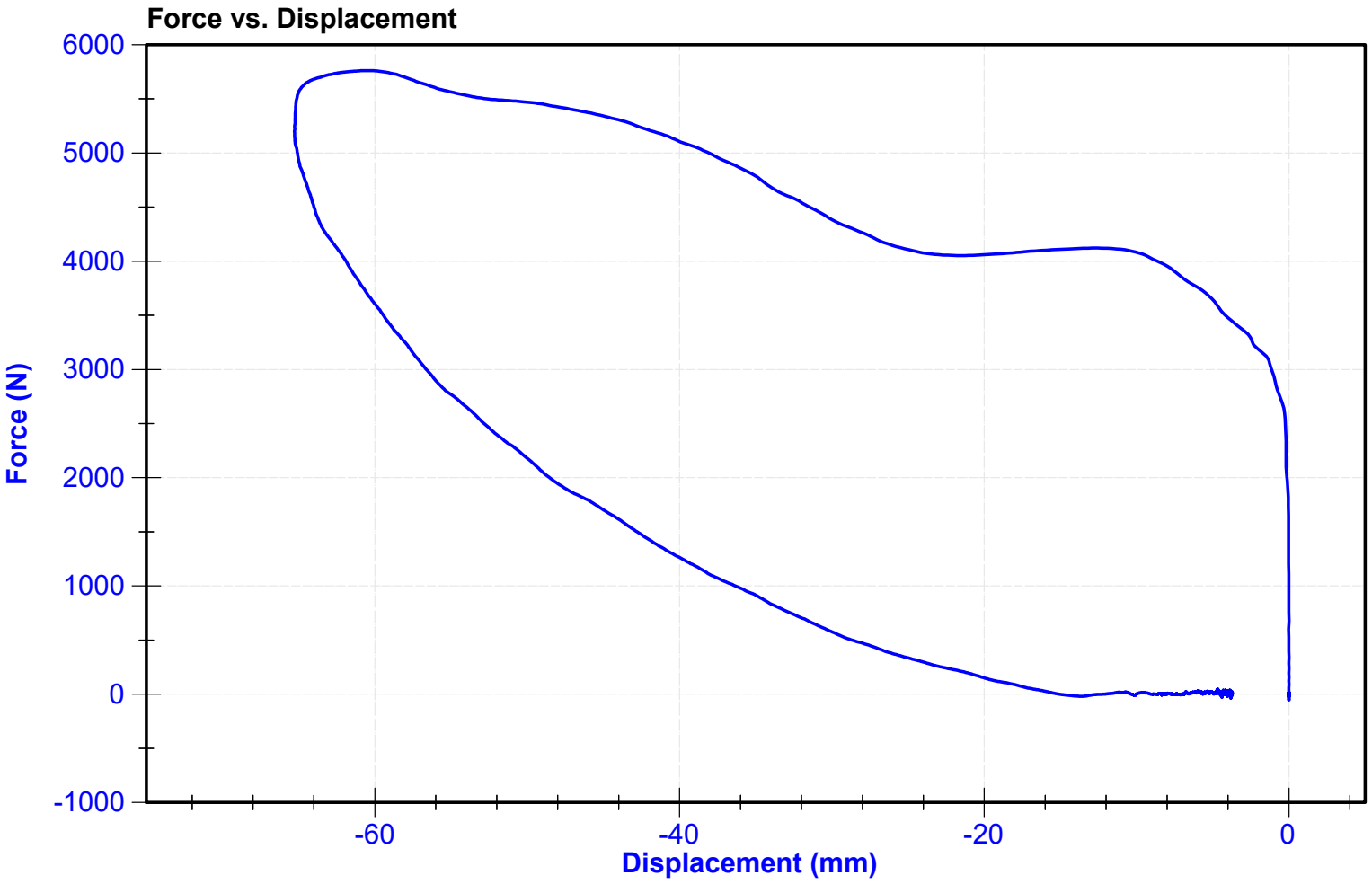
ATD Manufacturer	Humanetics	Test Technician	Z.Putt
ATD Serial Number	065	Laboratory Supervisor	Z.Putt

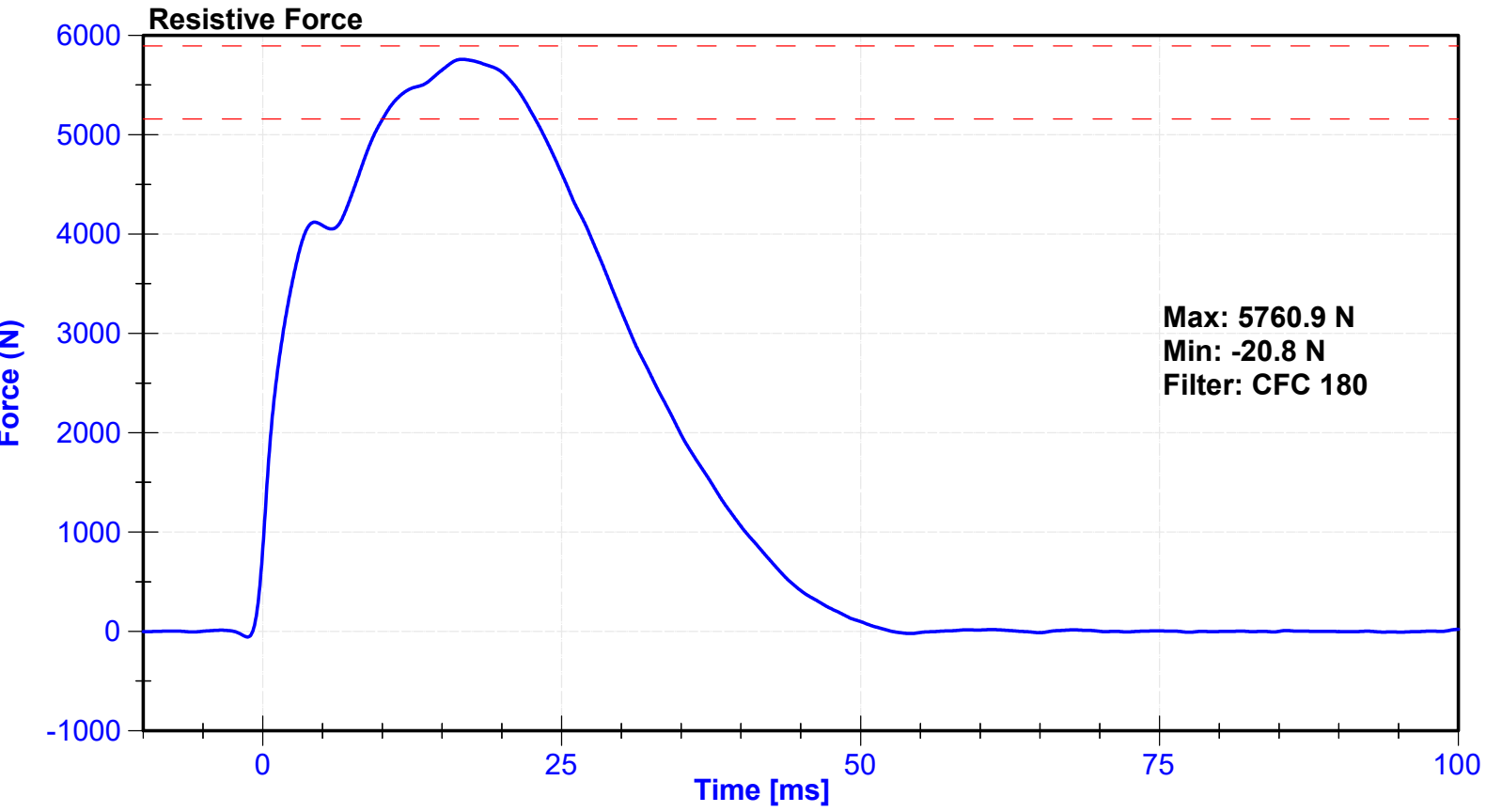
Results

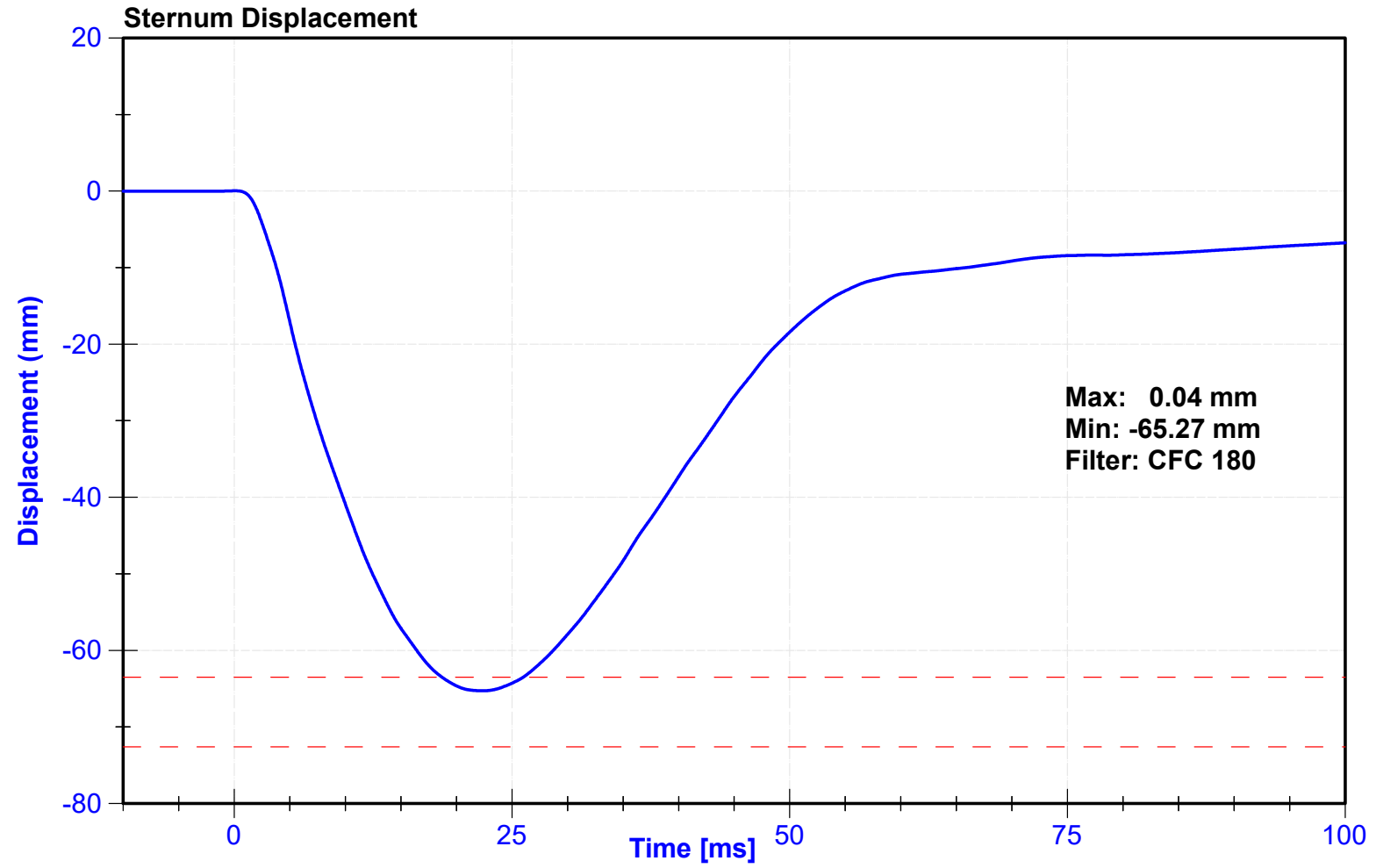
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.7	Pass
Humidity	10	70	%	44.7	Pass
Velocity	6.59	6.83	m/s	6.721	Pass
Chest Displacement	-72.6	-63.5	mm	-65.27	Pass
Resistive Force	5160	5894	N	5760.9	Pass
Hysteresis	69	85	%	73.7	Pass

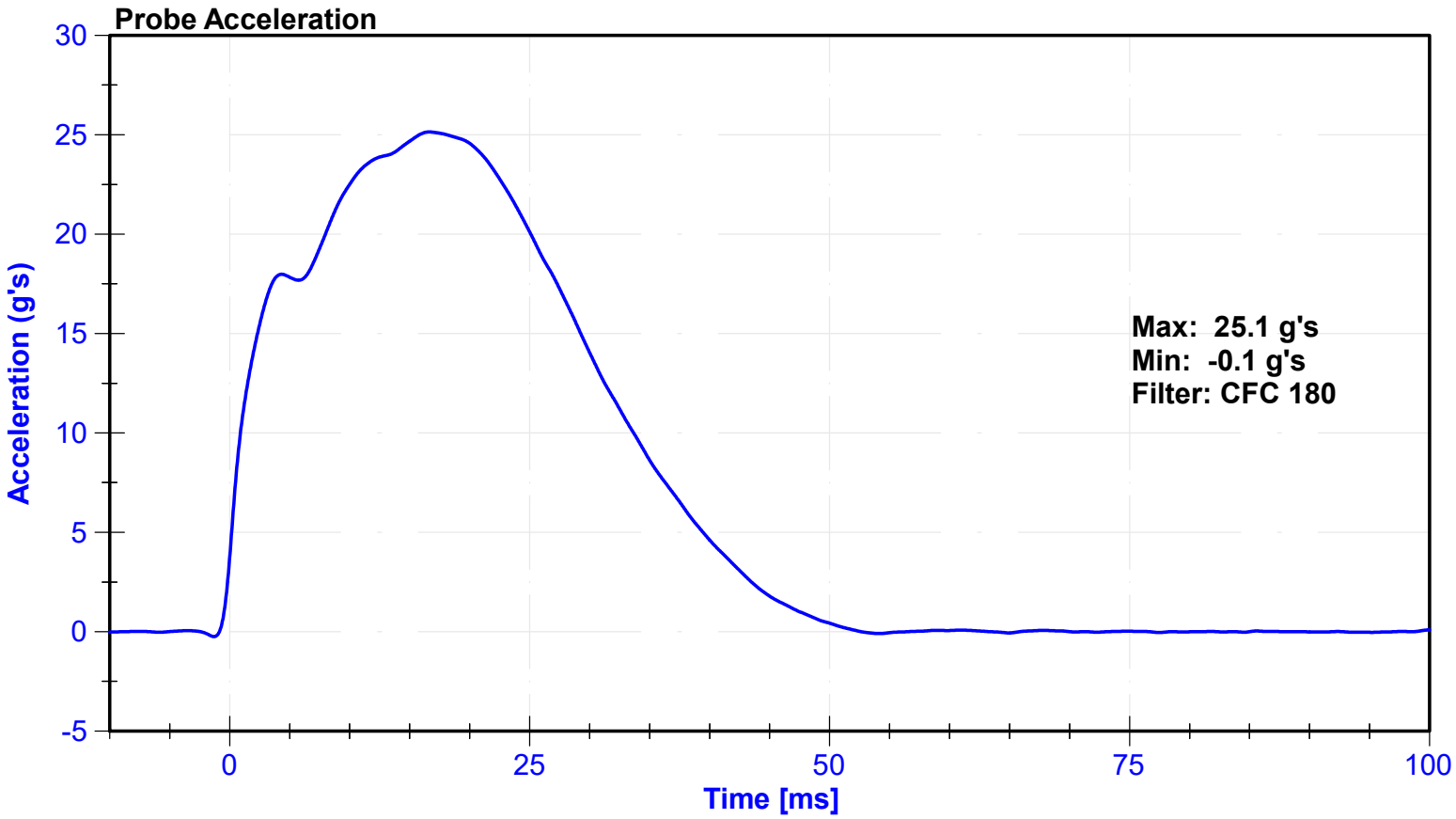
Transducer Calibrations

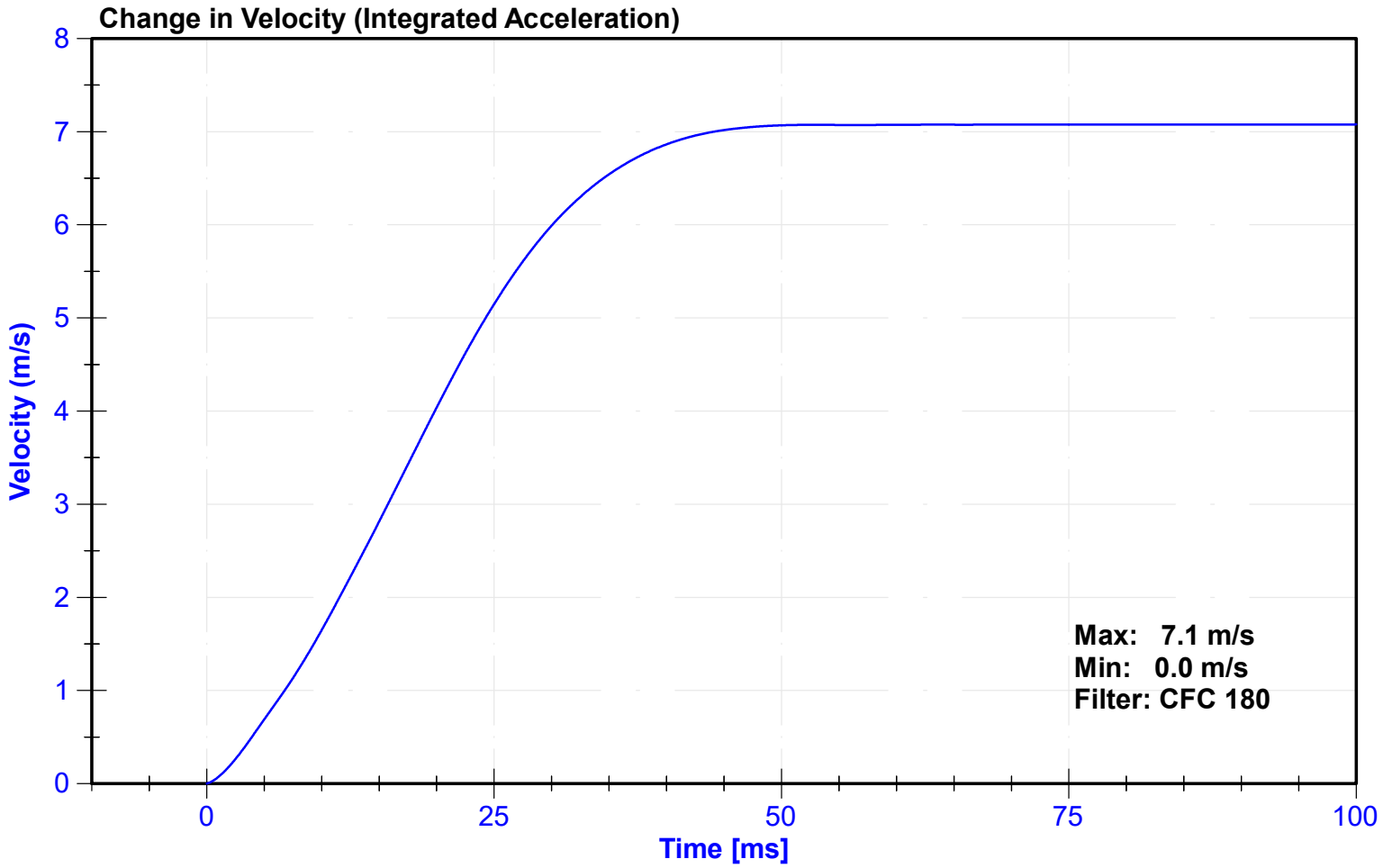
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	P94662	10/3/2024	4/1/2025
Chest Potentiometer	Servo	1046	10/31/2024	5/1/2025




Resistive Force
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
25
50
75
100
Time [ms]
Max: 5760.9 N
Min: -20.8 N
Filter: CFC 180


Sternum Displacement
Displacement (mm)
20
0
-20
-40
-60
-80
0
25
50
75
100
Time [ms]
Max: 0.04 mm
Min: -65.27 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

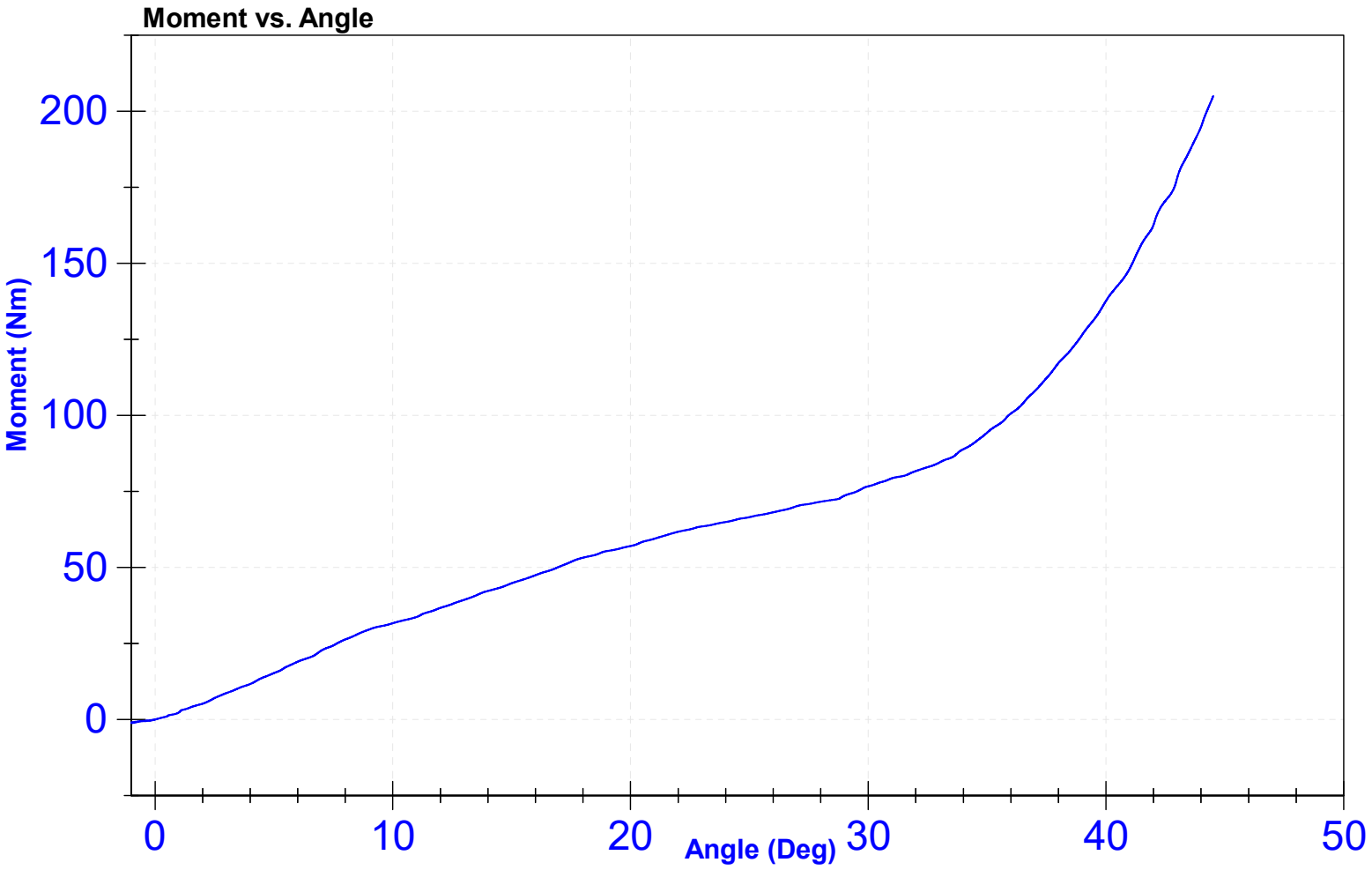
ATD Manufacturer	Humanetics	Test Technician	Z.Putt
ATD Serial Number	065	Laboratory Supervisor	Z.Putt

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.6	Pass
Humidity	10	70	%	34	Pass
Average Velocity	5	10	deg/s	7.4	Pass
Angle at 203Nm	40	50	deg	44.4	Pass
Moment at 30 degrees	0	94.9	Nm	76.7	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



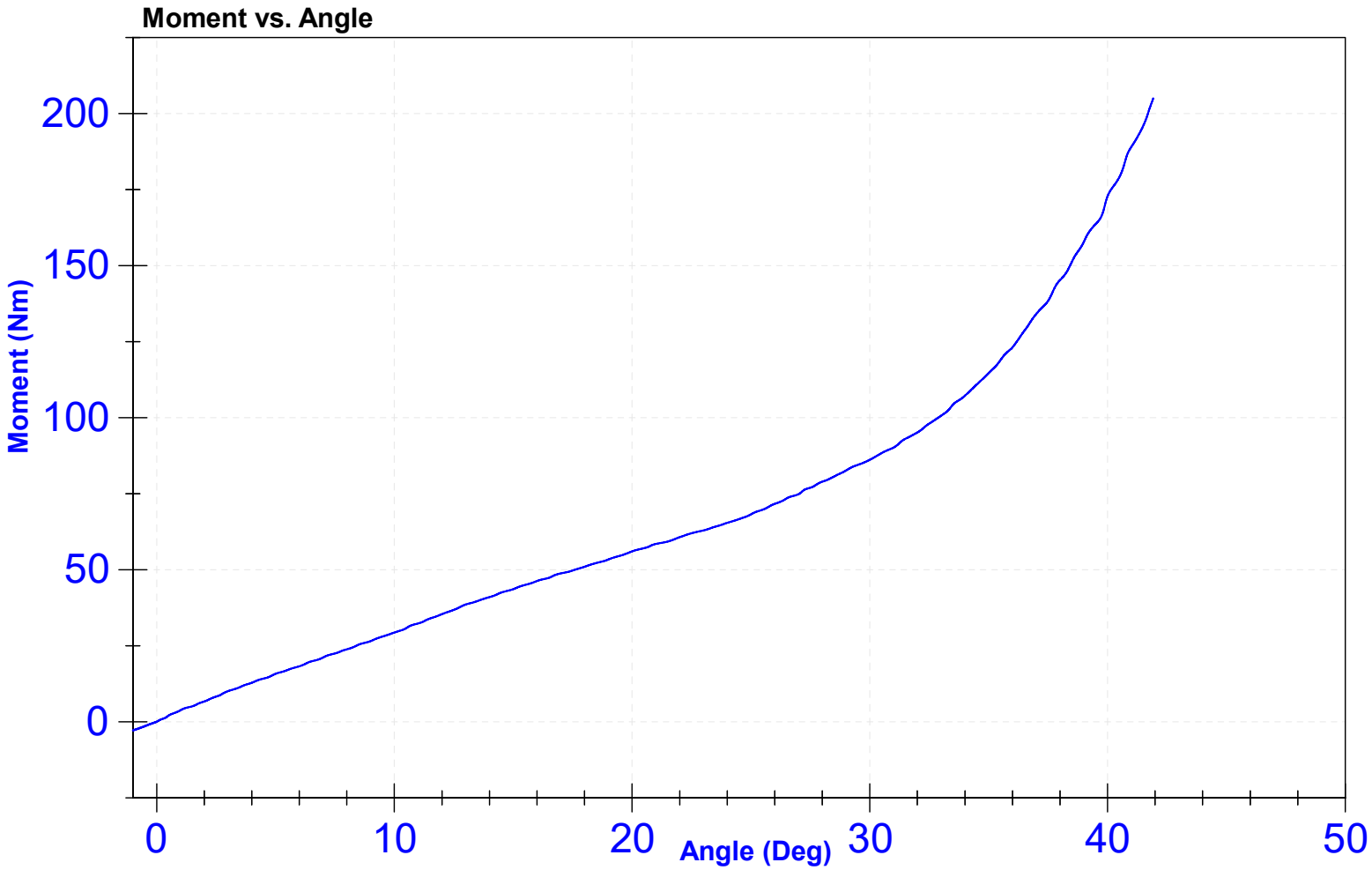
ATD Manufacturer	Humanetics	Test Technician	Z.Putt
ATD Serial Number	065	Laboratory Supervisor	Z.Putt

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.6	Pass
Humidity	10	70	%	34	Pass
Average Velocity	5	10	deg/s	7.1	Pass
Angle at 203Nm	40	50	deg	41.8	Pass
Moment at 30 degrees	0	94.9	Nm	86.1	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 2301-02A	694	2024-01-31	2025-01-30



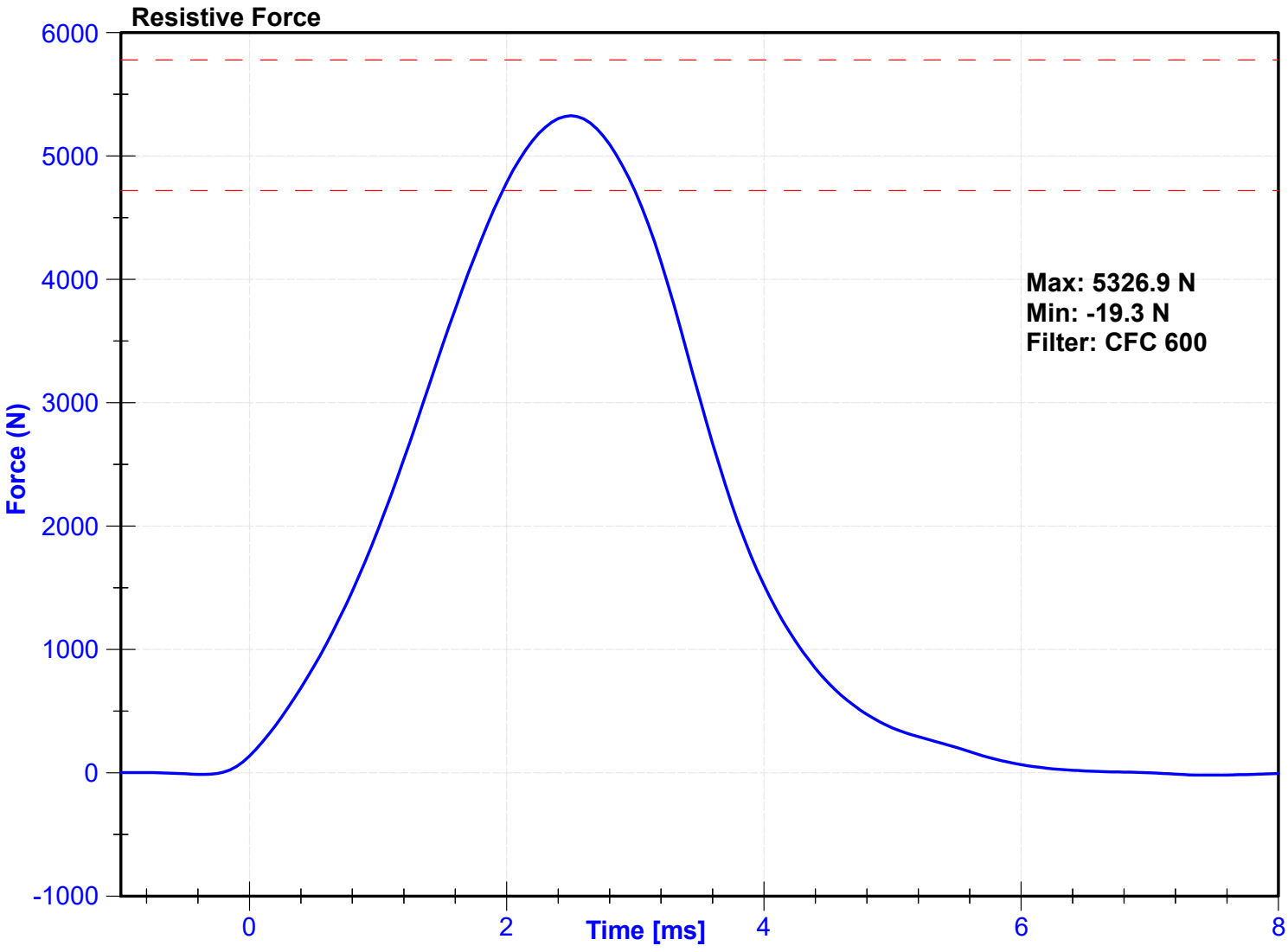
ATD Manufacturer	Humanetics	Test Technician	Z.Putt
ATD Serial Number	065	Laboratory Supervisor	Z.Putt

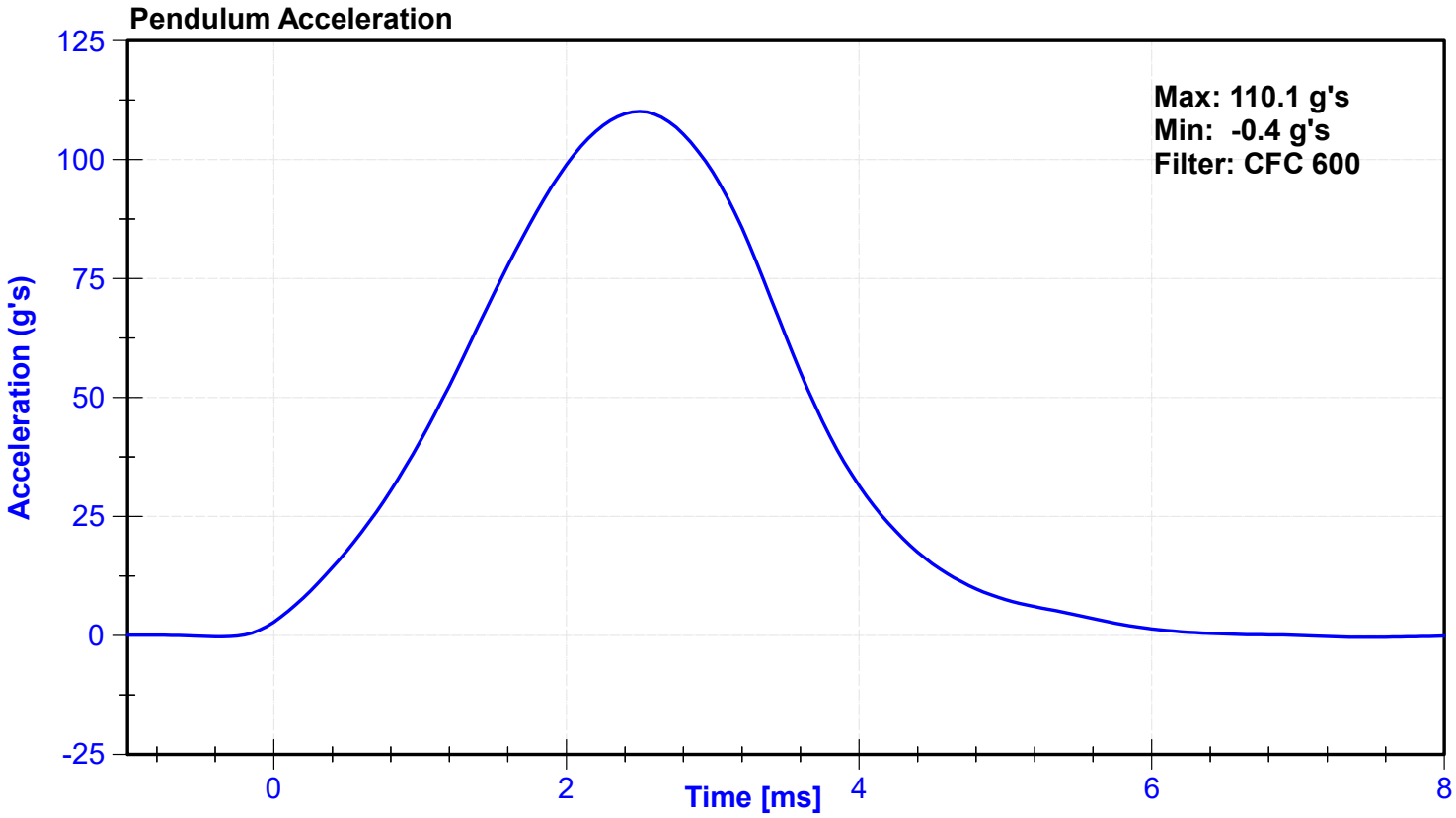
Results

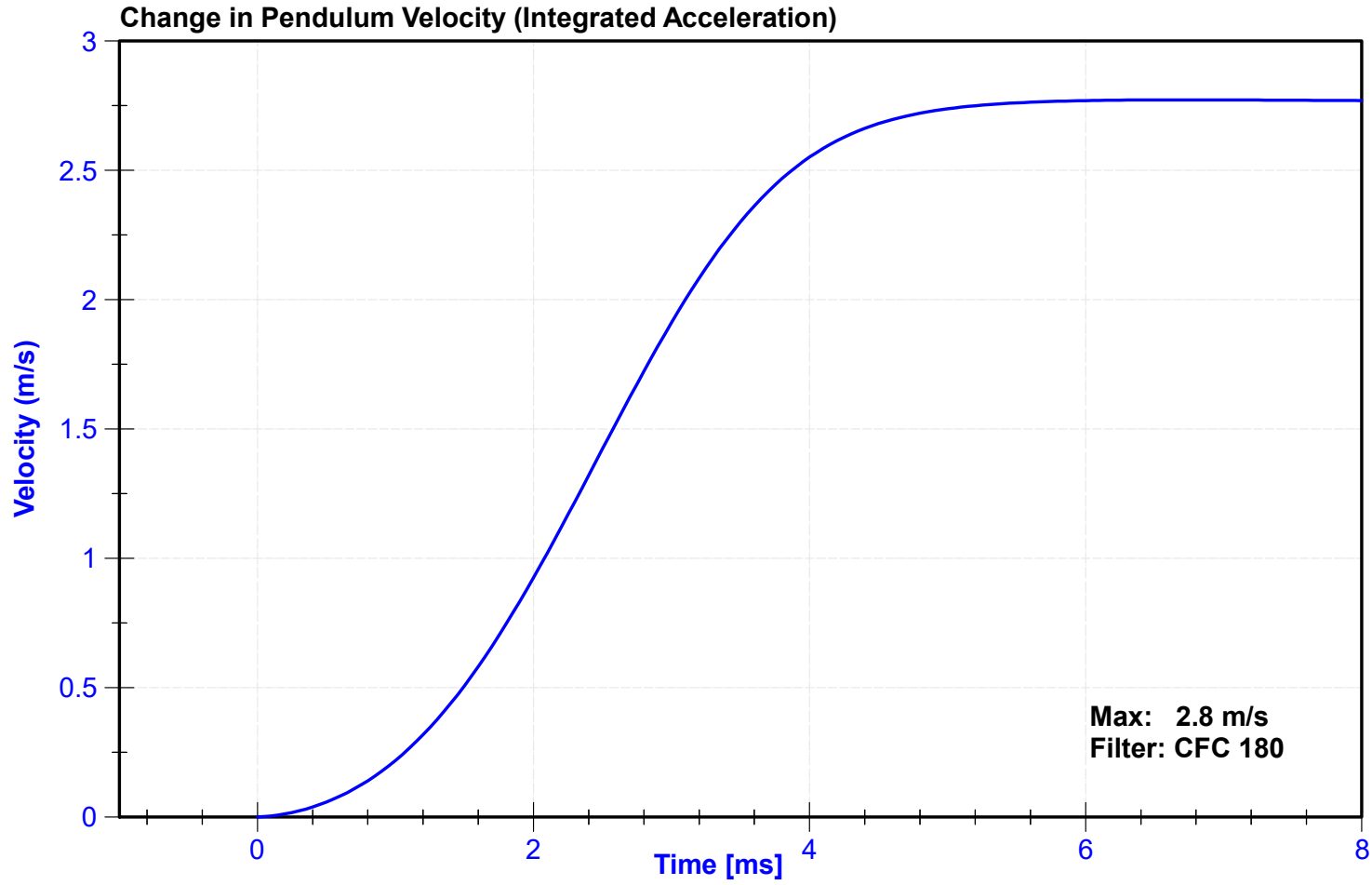
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21.4	Pass
Humidity	10	70	%	44.7	Pass
Velocity	2.07	2.13	m/s	2.071	Pass
Maximum Resistive Force	4720	5780	N	5326.9	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T29720	6/12/2024	12/9/2024




Pendulum Acceleration
Max: 110.1 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: 2.8 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]

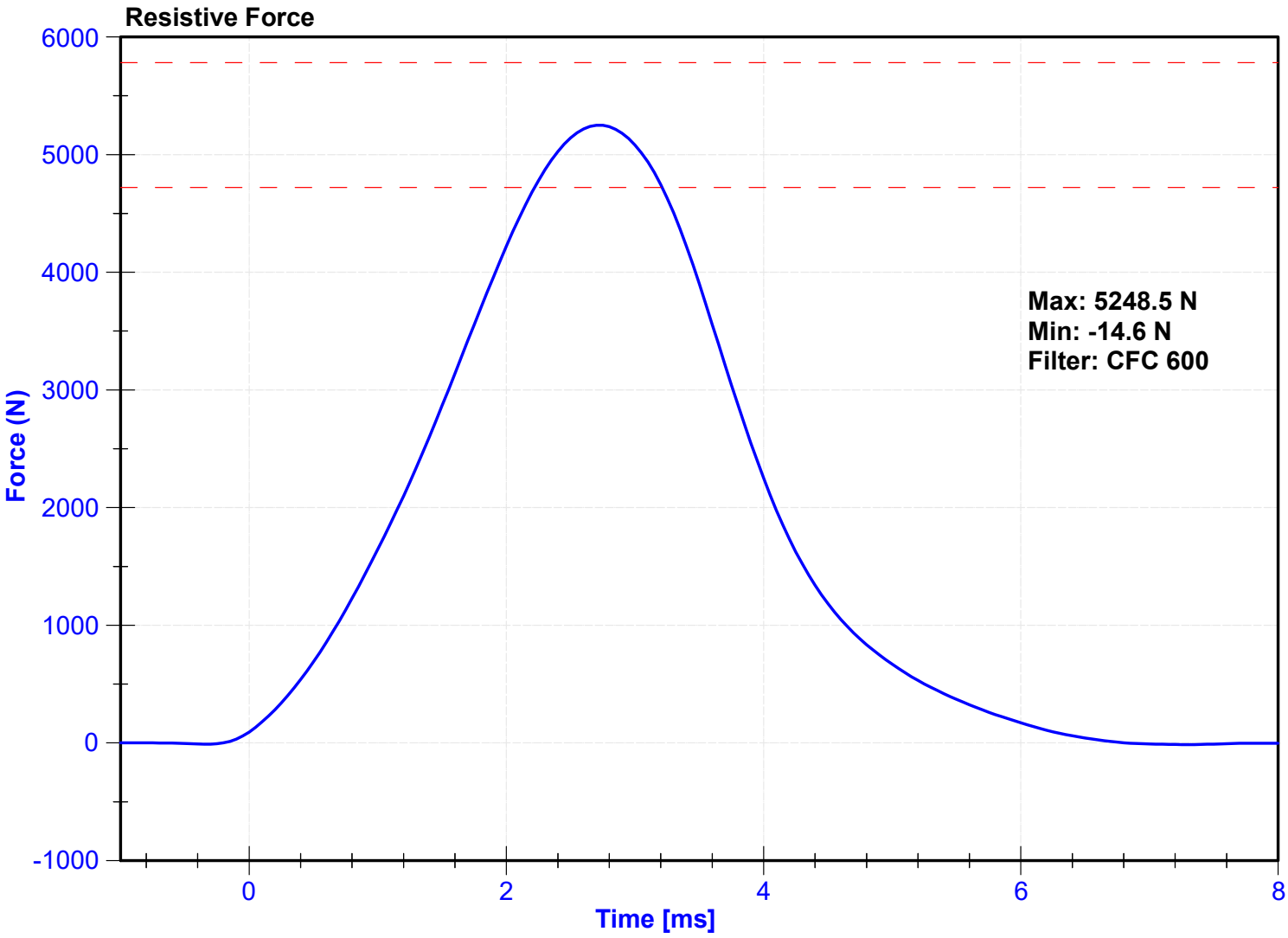
ATD Manufacturer	Humanetics	Test Technician	Z.Putt
ATD Serial Number	065	Laboratory Supervisor	Z.Putt

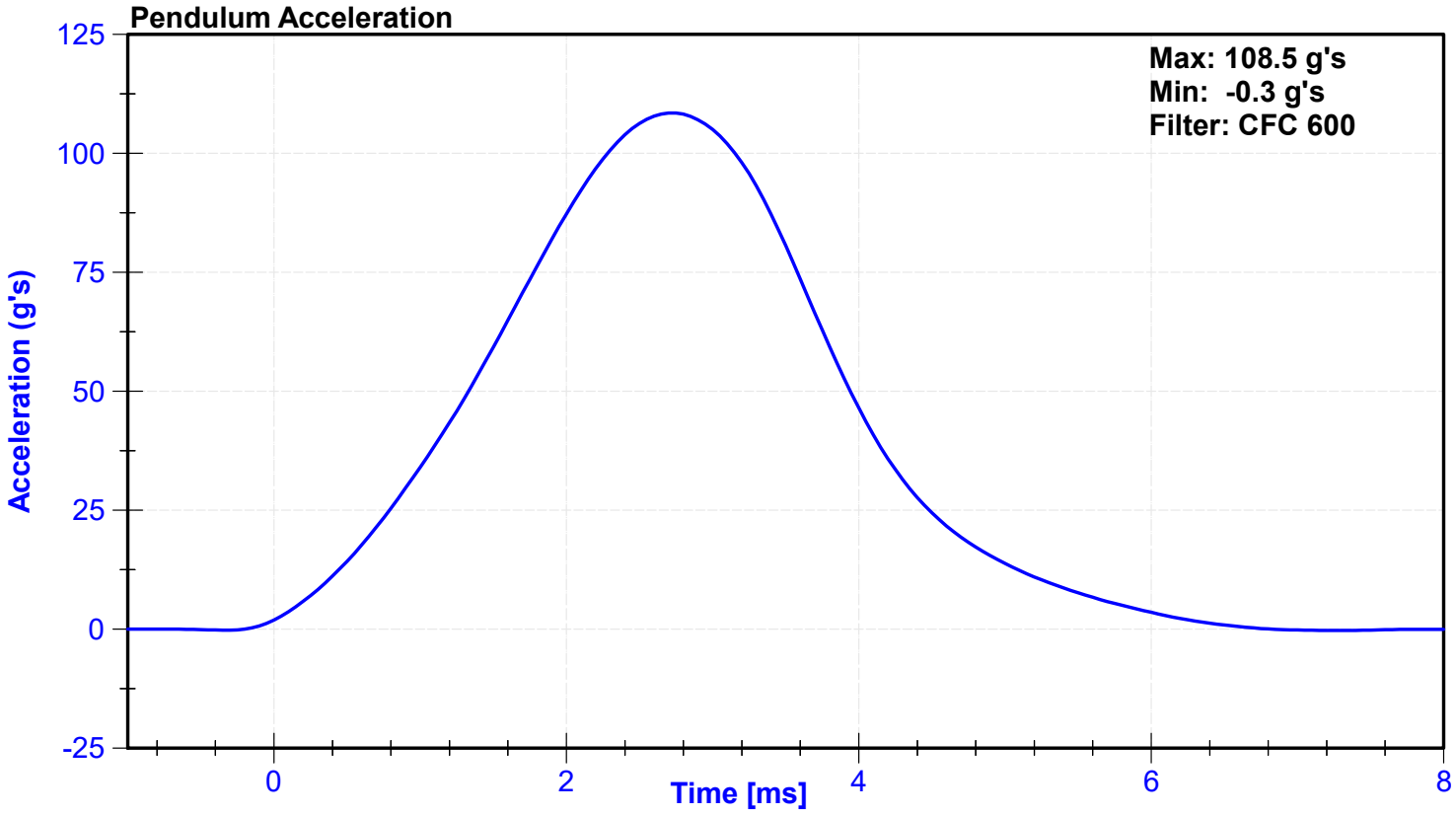
Results

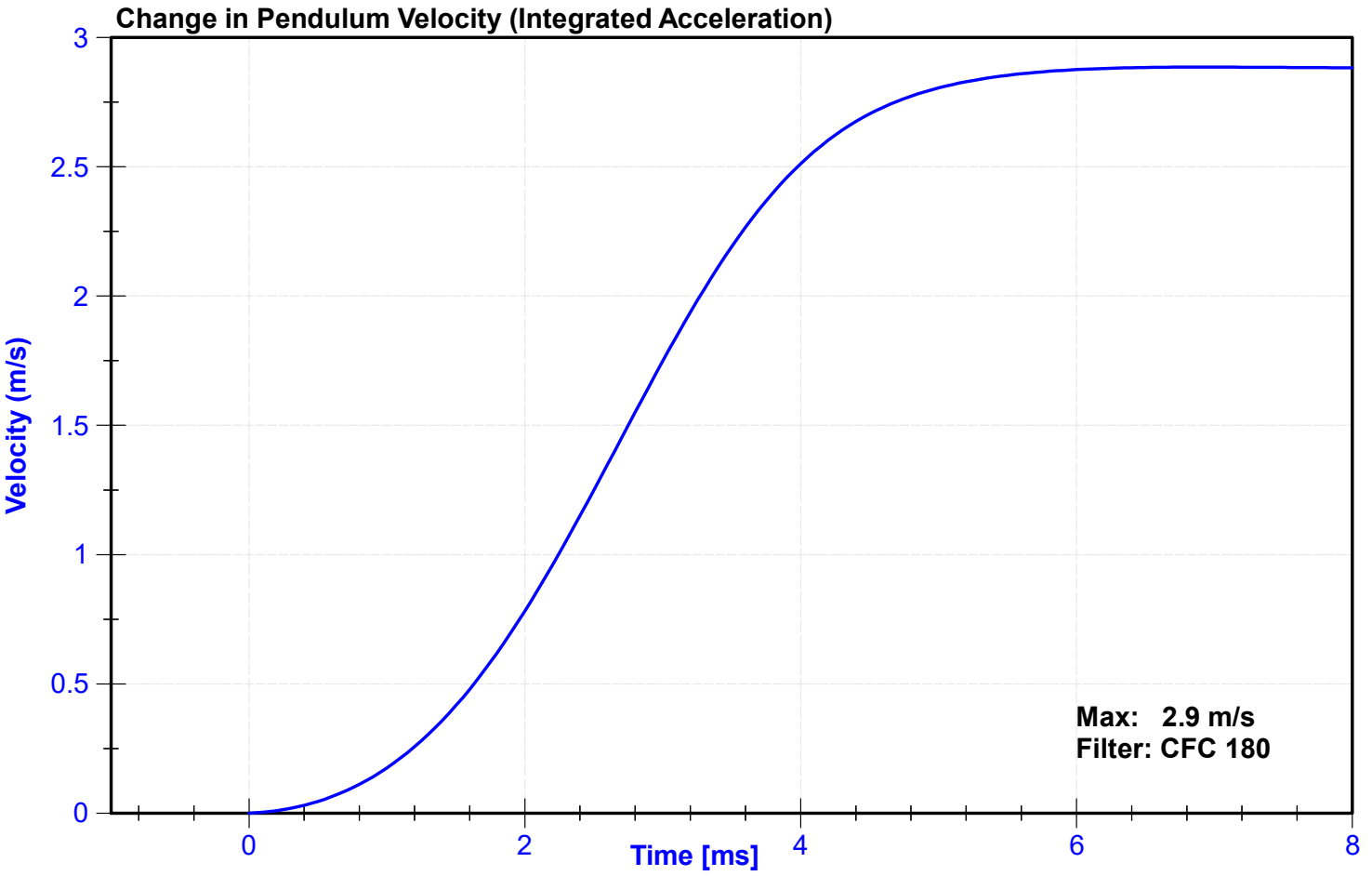
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21.4	Pass
Humidity	10	70	%	44.7	Pass
Velocity	2.07	2.13	m/s	2.07	Pass
Maximum Resistive Force	4720	5780	N	5248.5	Pass

Transducer Calibrations

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	T29720	6/12/2024	12/9/2024




Pendulum Acceleration
Max: 108.5 g's
Min: -0.3 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: 2.9 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

PRE-TEST

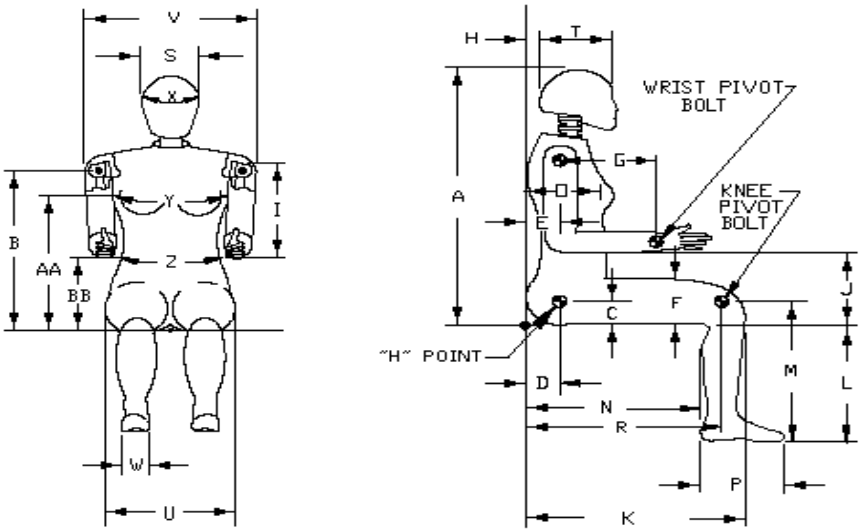
HYBRID III 5TH PERCENTILE - PASSENGER ATD

SERIAL NO: 137

External Measurements - Hybrid 3 - 5th Female

Technician: J. Rios Date: 11/21/2024

Dummy Serial Number: 137



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	779	Pass
B	Shoulder Pivot Height	432	457	451	Pass
C	H-Point Height	81	86	85	Pass
D	H-Point from Backline	145	150	146	Pass
E	Shoulder Pivot from Backline	69	84	74	Pass
F	Thigh Clearance	119	135	131	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	282	Pass
J	Elbow Rest Height	183	203	192	Pass
K	Buttock to Knee Length	521	546	532	Pass
L	Popliteal Height	356	376	364	Pass
M	Knee Pivot Height	394	419	407	Pass
N	Buttock Popliteal Length	414	439	430	Pass
O	Chest Depth without Jacket	175	191	185	Pass
P	Foot Length (right)	219	234	226	Pass
R	Buttock To Knee Pivot Length	457	483	472	Pass
S	Head Breadth	137	147	143	Pass
T	Head Depth	178	188	183	Pass
U	Hip Breadth	300	315	308	Pass
V	Shoulder Breadth	351	366	360	Pass
W	Foot Breadth	79	94	85	Pass
X	Head Circumference	528	549	541	Pass
Y	Chest Circumference with Jacket	851	881	874	Pass
Z	Waist Circumference	460	790	614	Pass
AA	Reference Location (Chest Circumference)	333	358	337	Pass
BB	Reference Location (Waist Circumference)	160	170	165	Pass

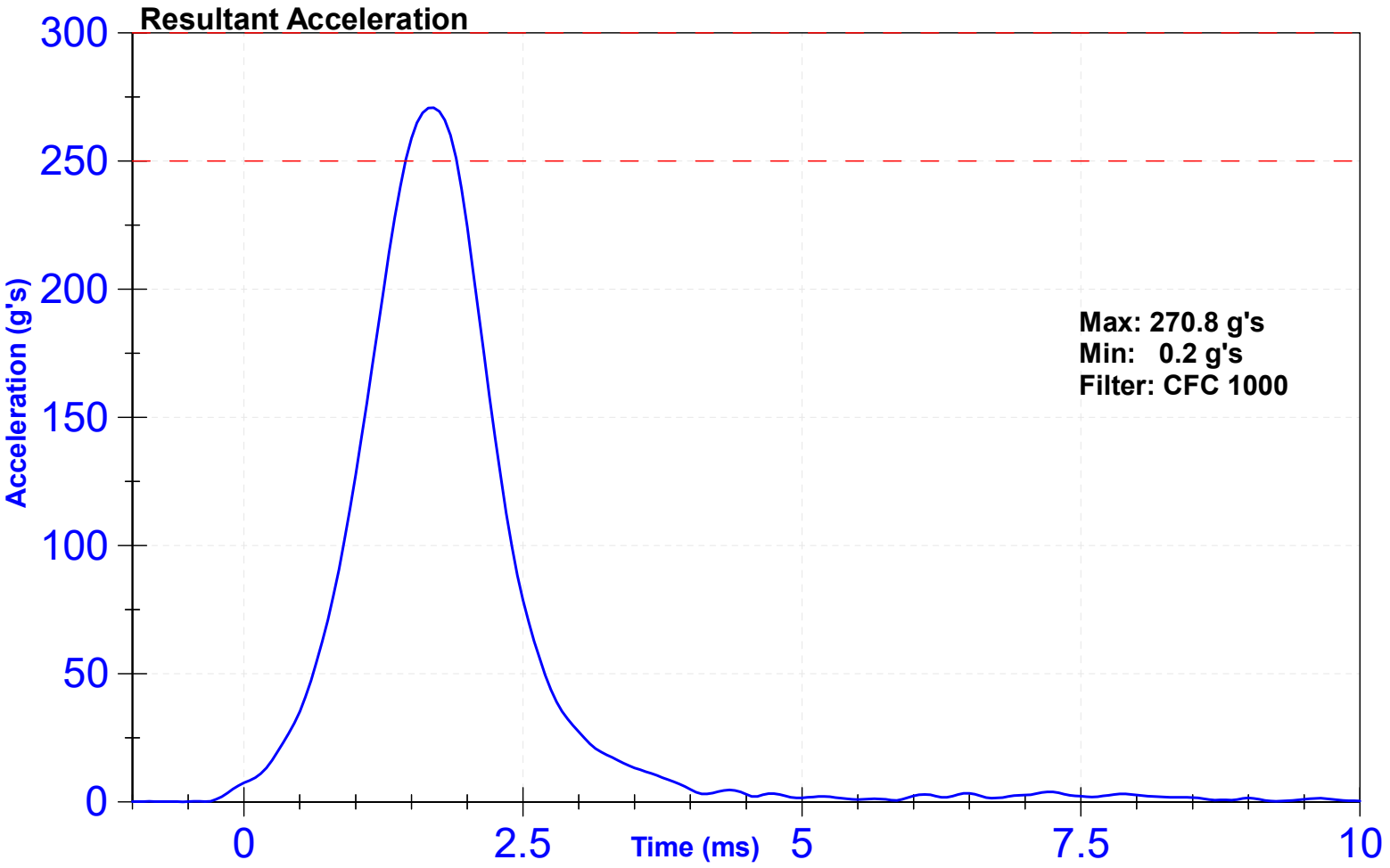
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

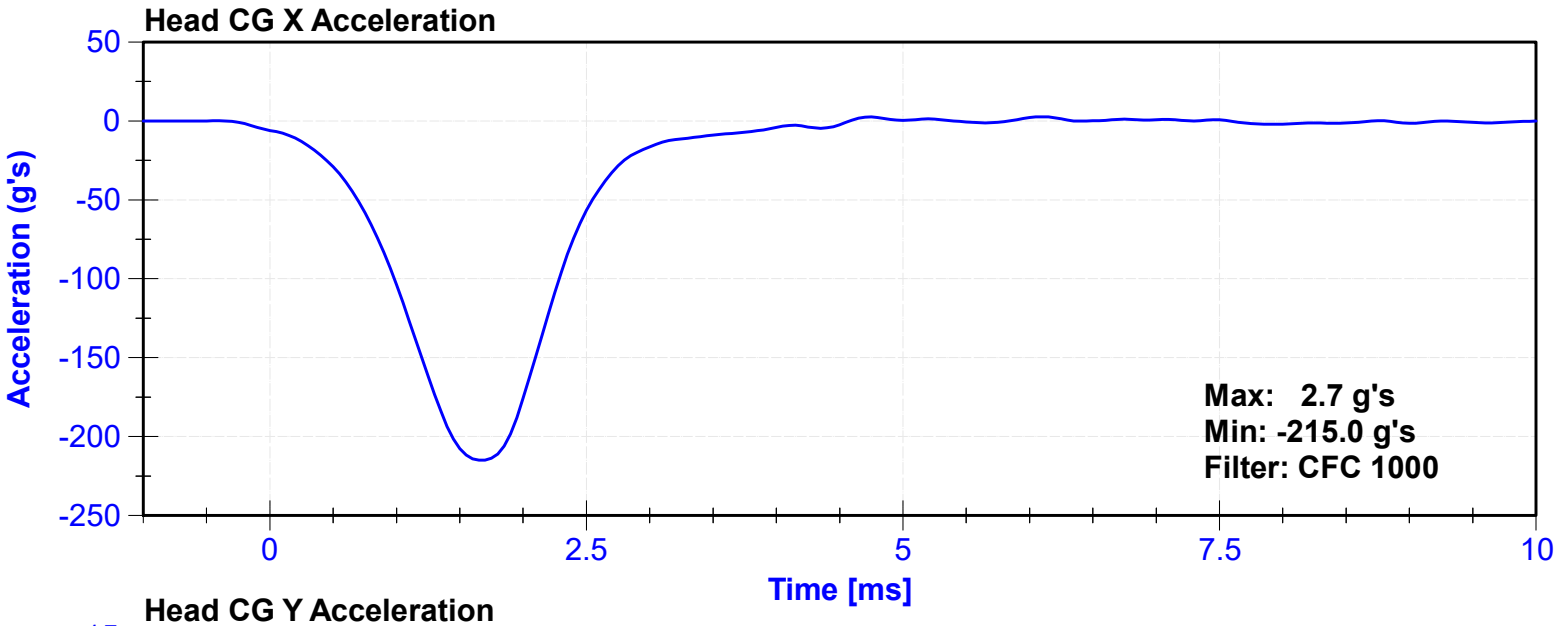
Results

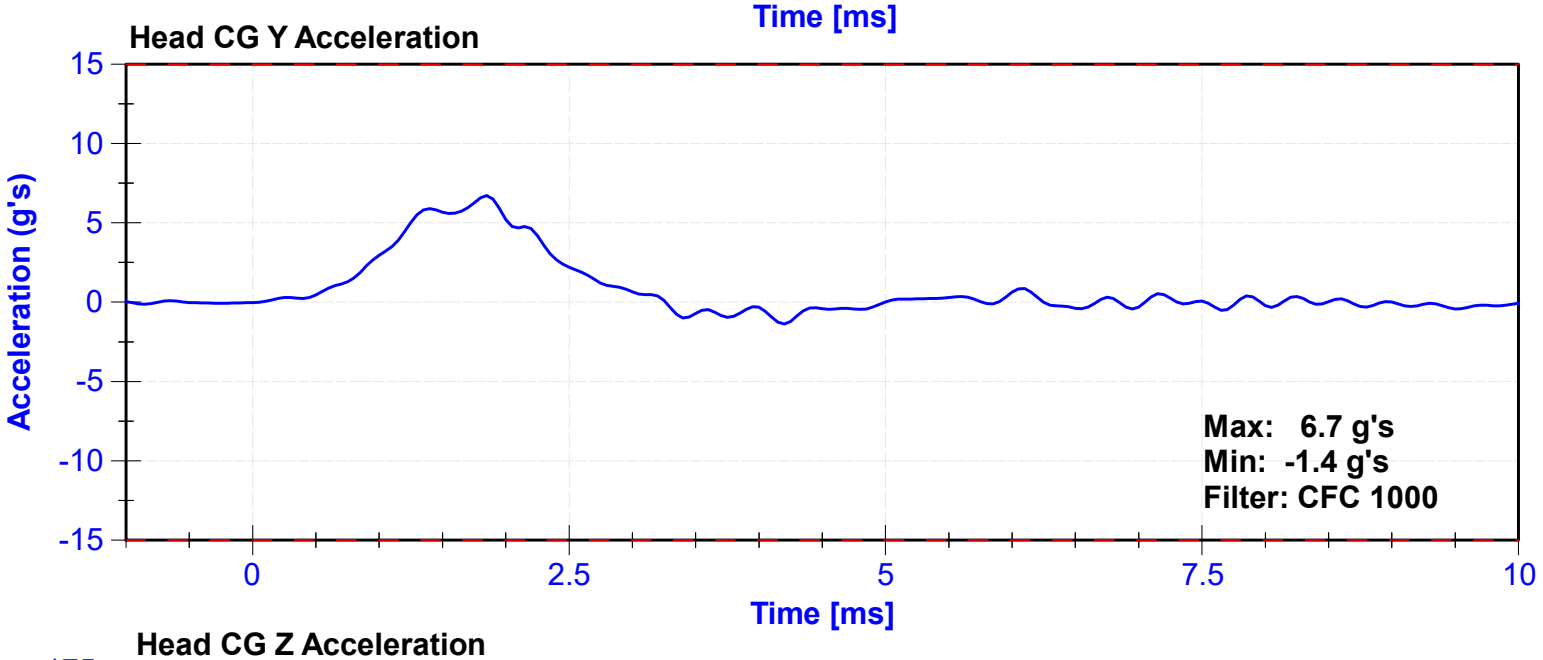
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.6	Pass
Humidity	10	70	%	35	Pass
Resultant Acceleration	250	300	g's	270.8	Pass
Oscillation	0	10	%	1.7	Pass
Lateral Acceleration	-15	15	g's	6.7	Pass

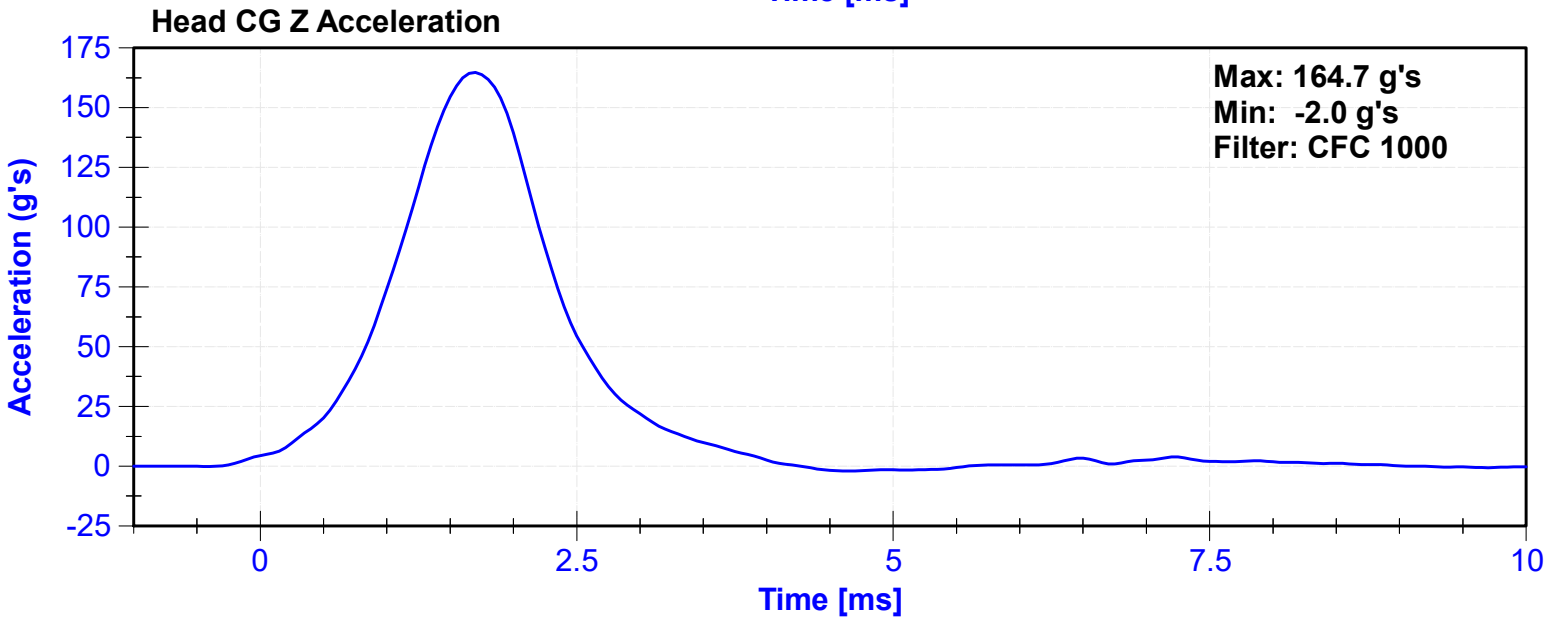
Transducer Calibrations

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)
50
0
-50
-100
-150
-200
-250
0
2.5
5
7.5
10
Time [ms]
Max: 2.7 g's
Min: -215.0 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: 6.7 g's
Min: -1.4 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: 164.7 g's
Min: -2.0 g's
Filter: CFC 1000

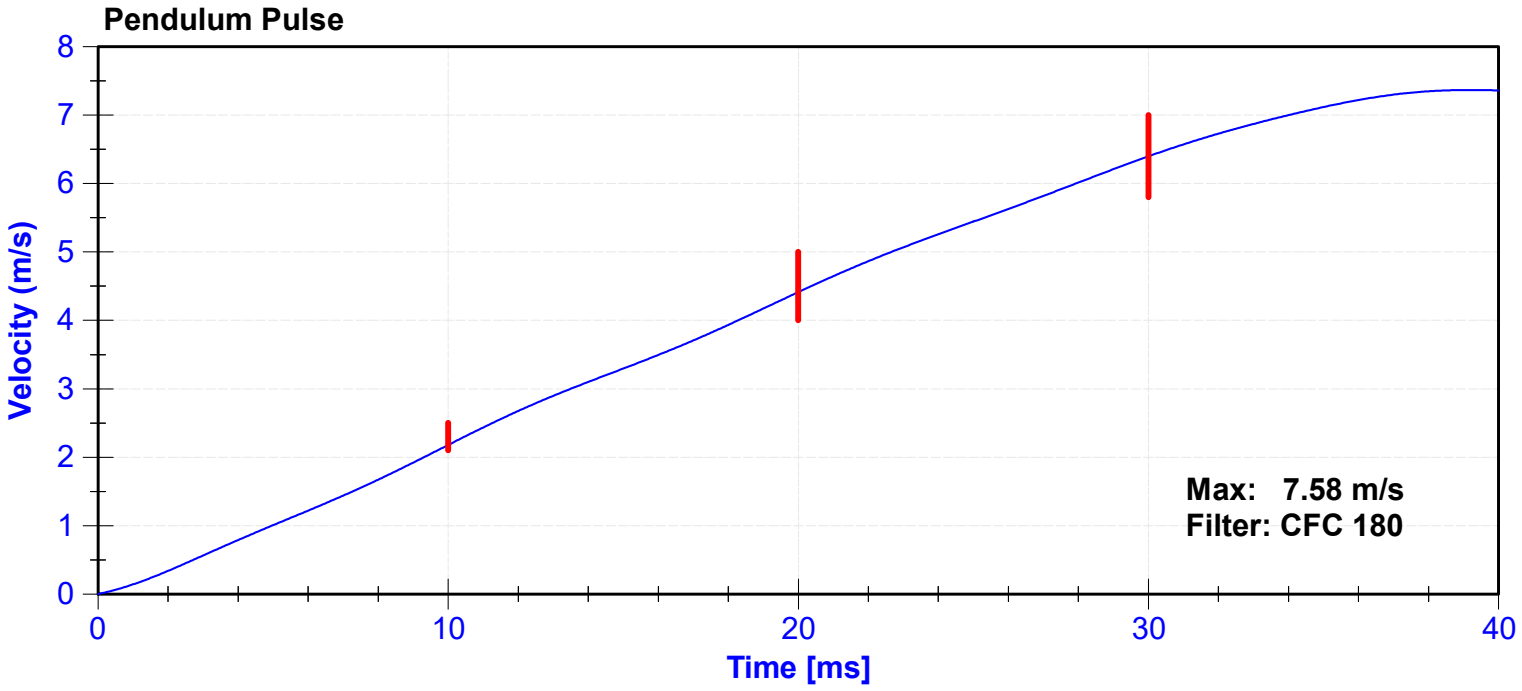
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

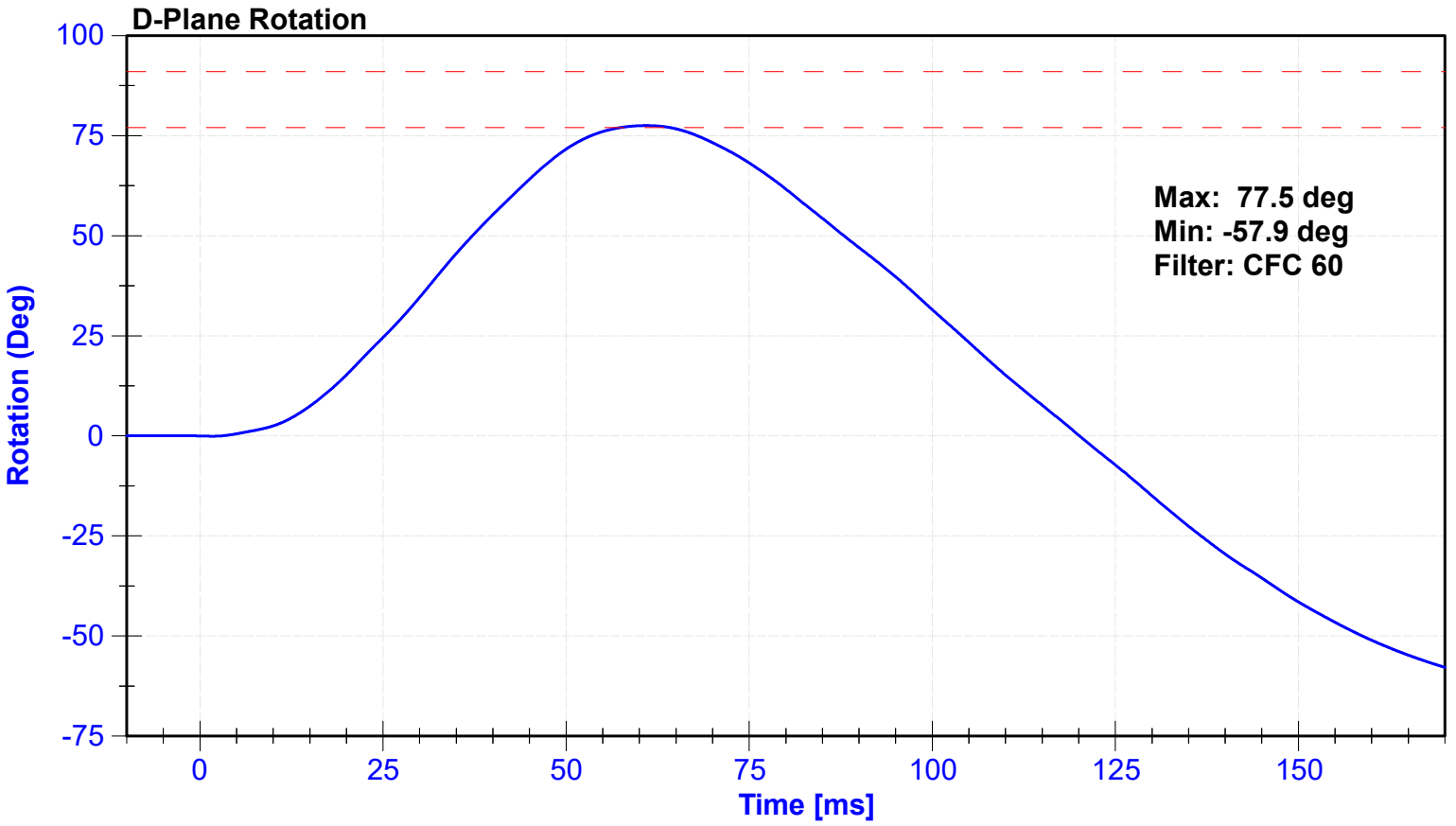
Results

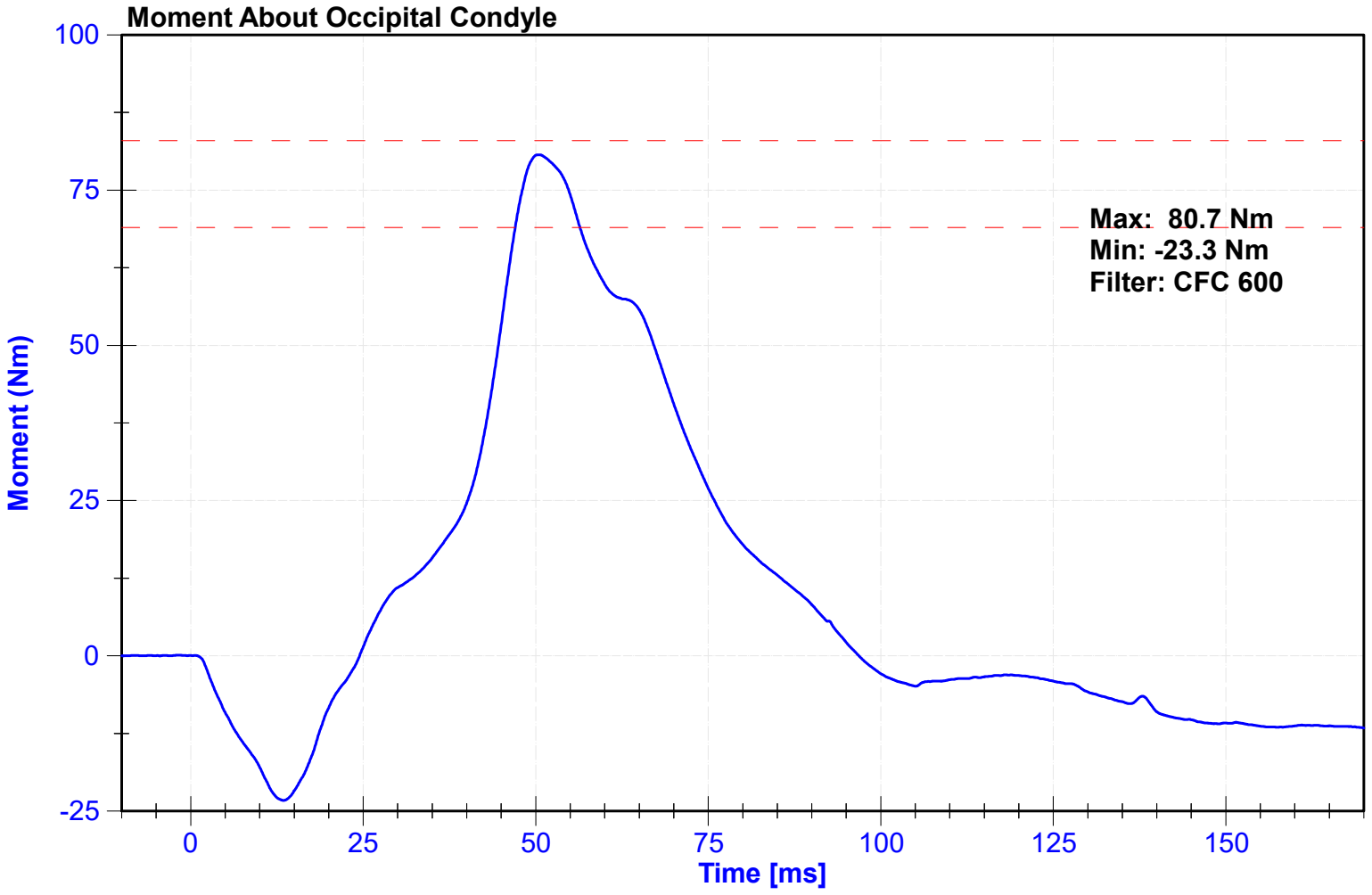
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	63	Pass
Velocity	6.89	7.13	m/s	7.023	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.18	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.41	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.40	Pass
Max D Plane Rotation	77	91	deg	77.5	Pass
Max Moment During Rotation Interval	69	83	Nm	80.7	Pass
Moment Decay to 10.0 Nm	80	100	ms	88.4	Pass

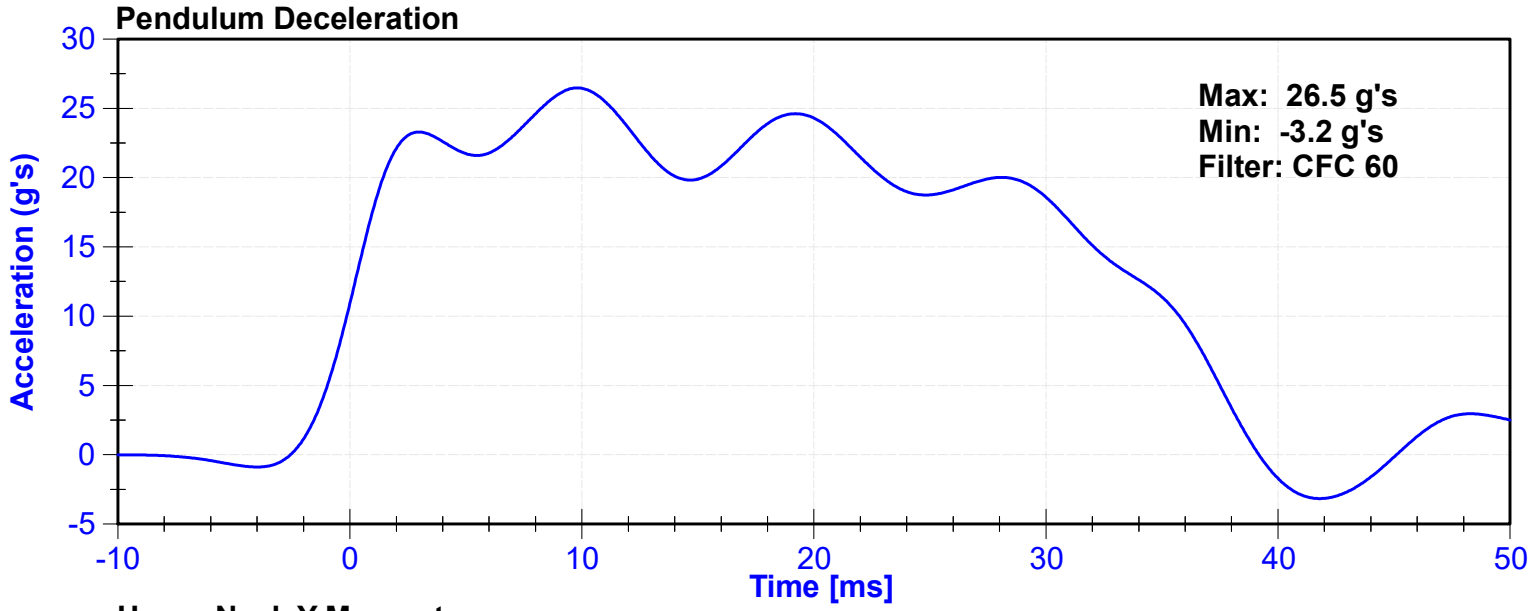
Transducer Calibrations

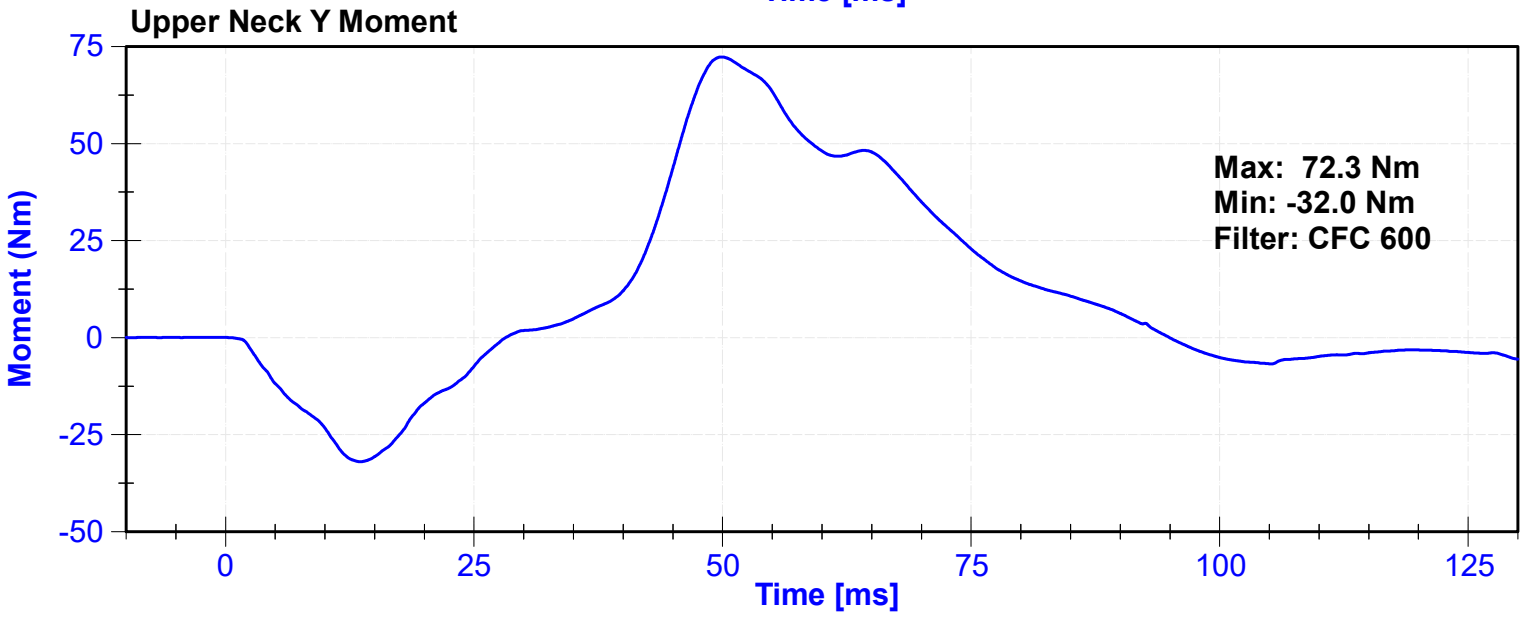
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/30/2024	4/28/2025
Pendulum Potentiometer	ETI	SP22G_LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	SP22G_LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Denton	2184-FX	7/10/2024	7/10/2025

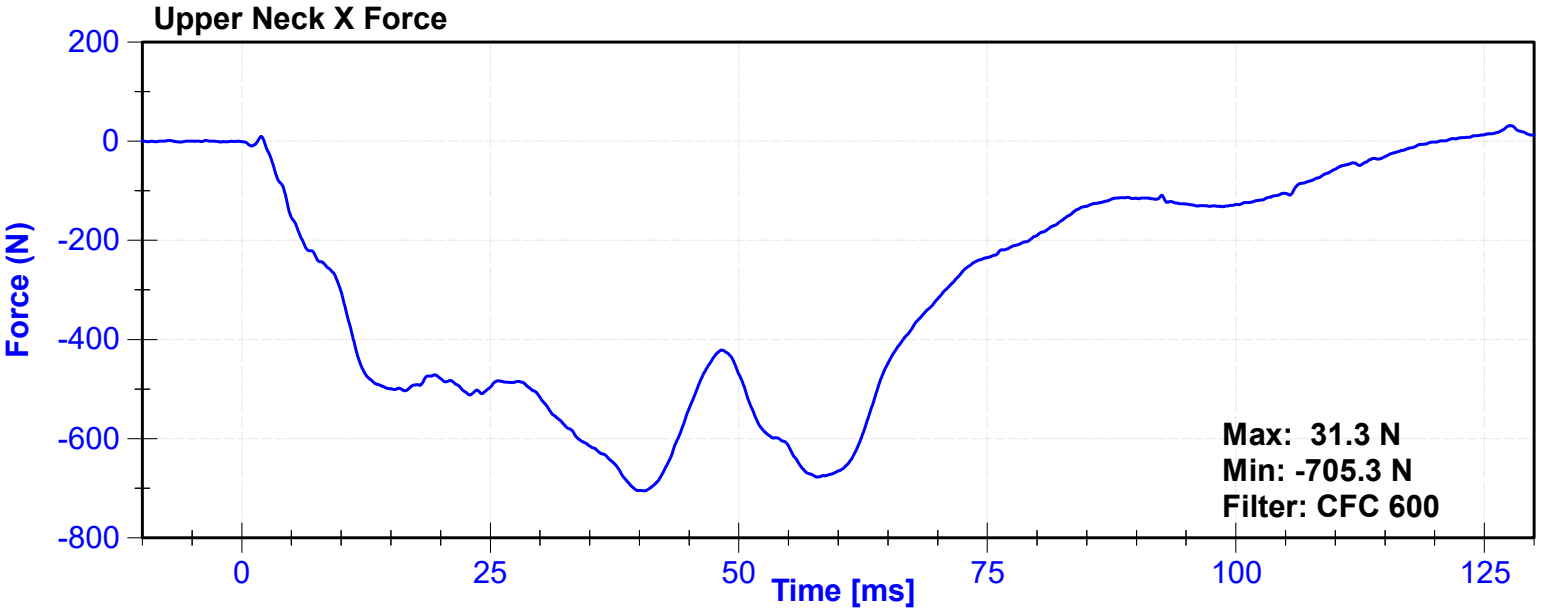



D-Plane Rotation
Max: 77.5 deg
Min: -57.9 deg
Filter: CFC 60
Rotation (Deg)
100
75
50
25
0
-25
-50
-75
0
25
50
75
100
125
150
Time [ms]


Moment About Occipital Condyle
Max: 80.7 Nm
Min: -23.3 Nm
Filter: CFC 600
Moment (Nm)
100
75
50
25
0
-25
0
25
50
75
100
125
150
Time [ms]


Pendulum Deceleration
Acceleration (g's)
Time [ms]
Max: 26.5 g's
Min: -3.2 g's
Filter: CFC 60


Upper Neck Y Moment
Moment (Nm)
Time [ms]
Max: 72.3 Nm
Min: -32.0 Nm
Filter: CFC 600


Upper Neck X Force
Force (N)
Time [ms]
Max: 31.3 N
Min: -705.3 N
Filter: CFC 600

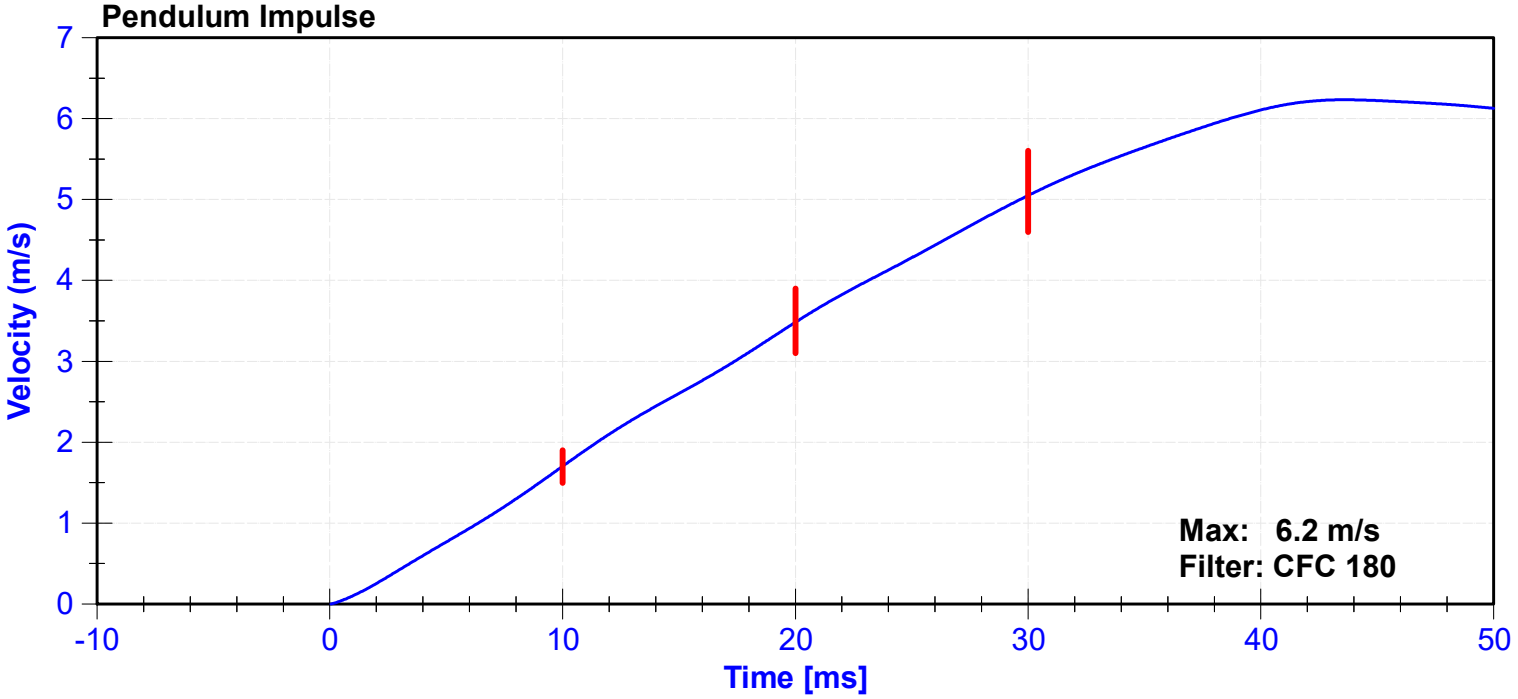
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

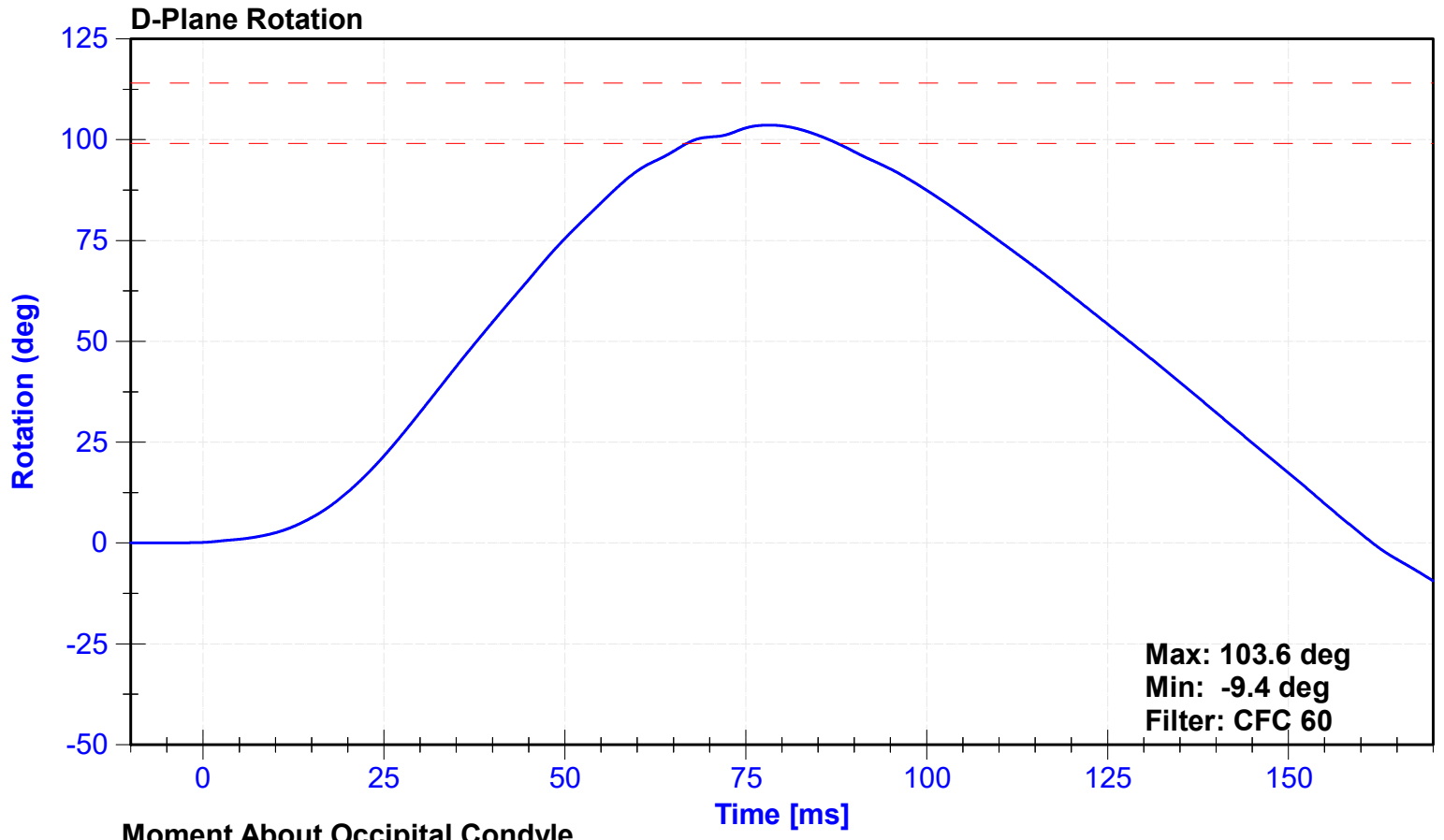
Results

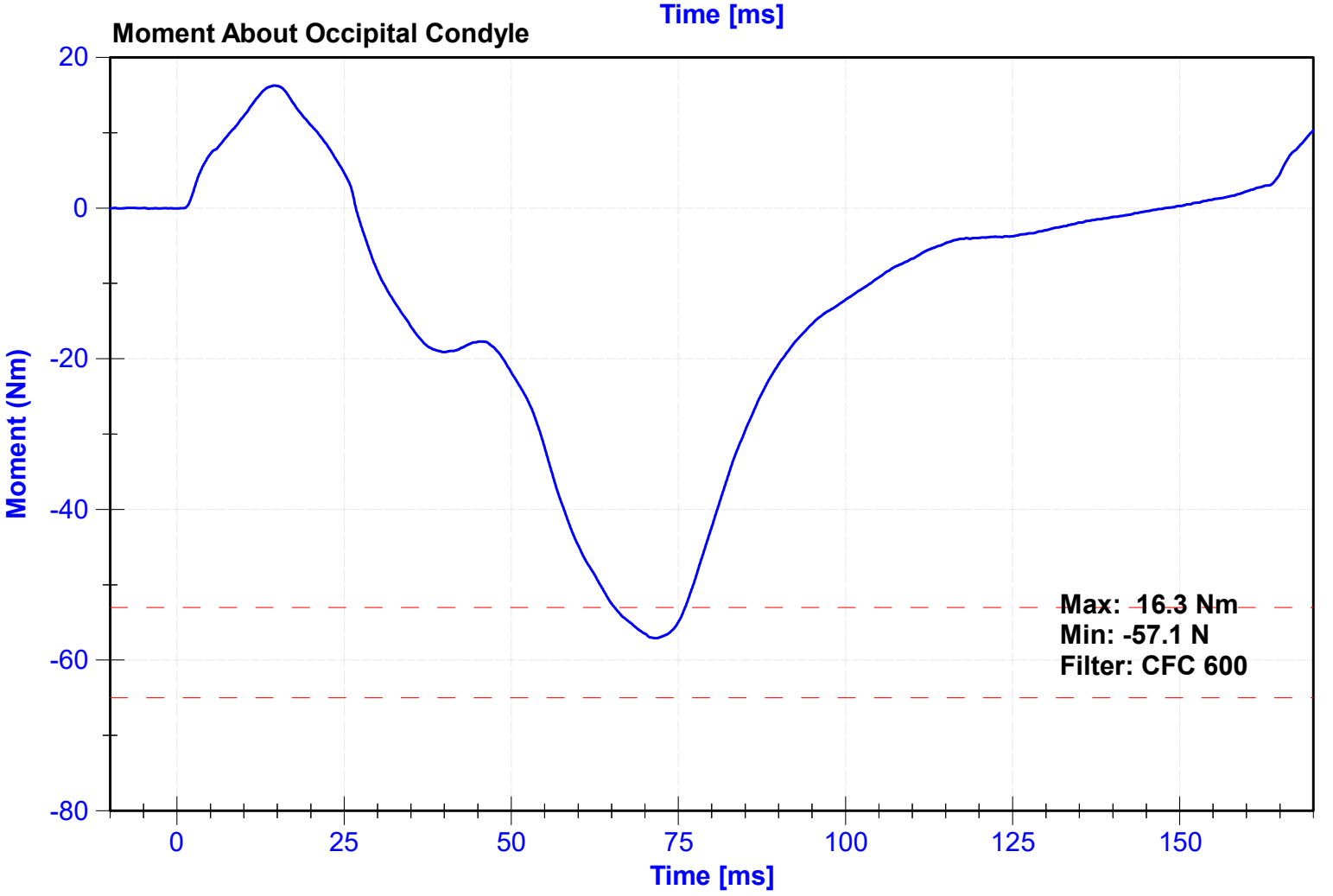
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	35	Pass
Velocity	5.95	6.19	m/s	6.002	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.70	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.48	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	5.05	Pass
D Plane Rotation	99	114	deg	103.6	Pass
Moment During Rotation Interval	-65	-53	Nm	-57.1	Pass
Moment Decay to -10Nm	94	114	ms	103.7	Pass

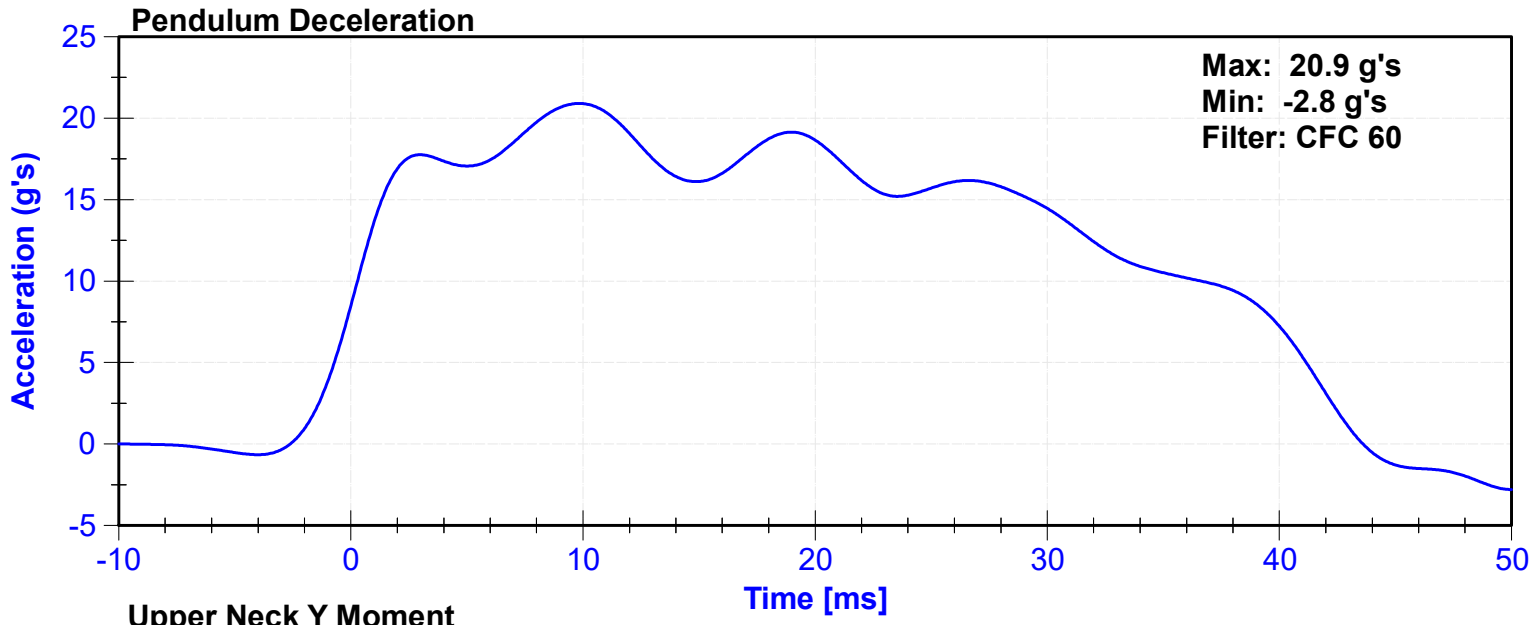
Transducer Calibrations

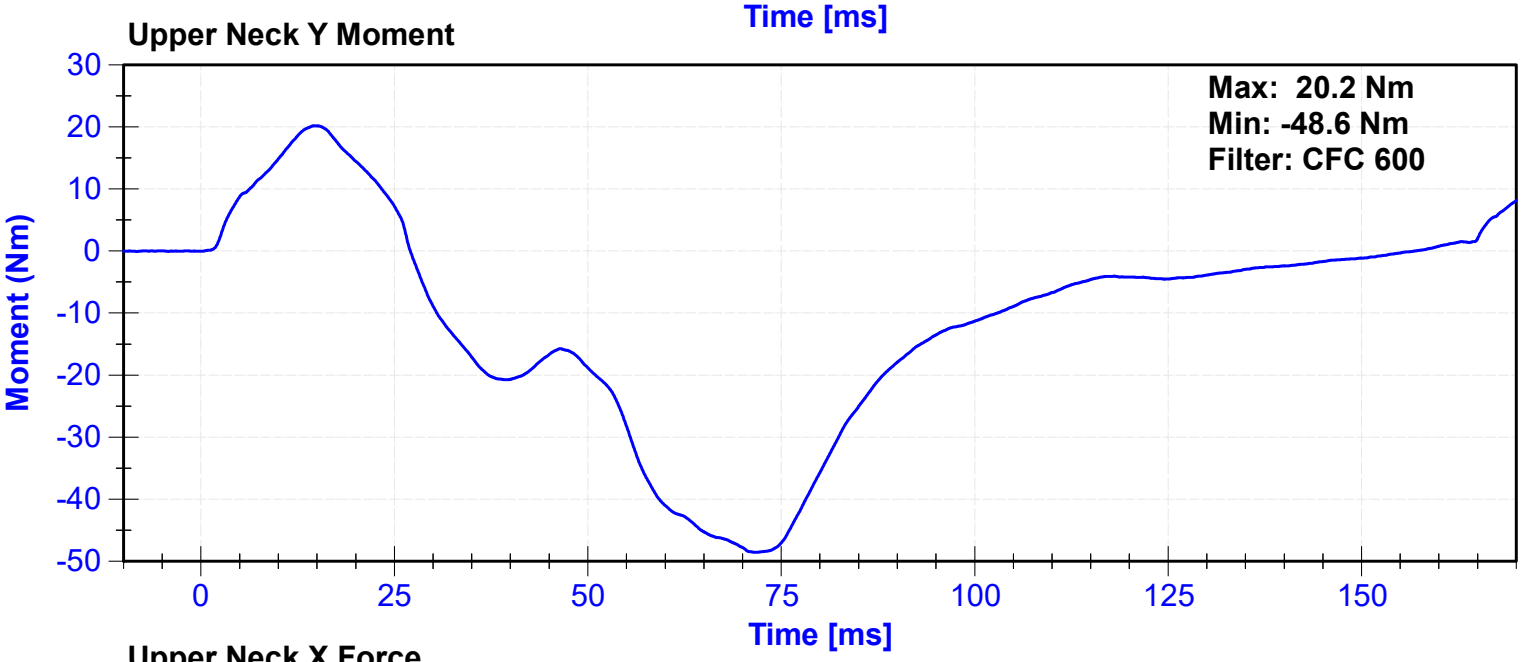
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/30/2024	4/28/2025
Pendulum Potentiometer	ETI	SP22G_LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	SP22G_LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Denton	2184-FX	7/10/2024	7/10/2025

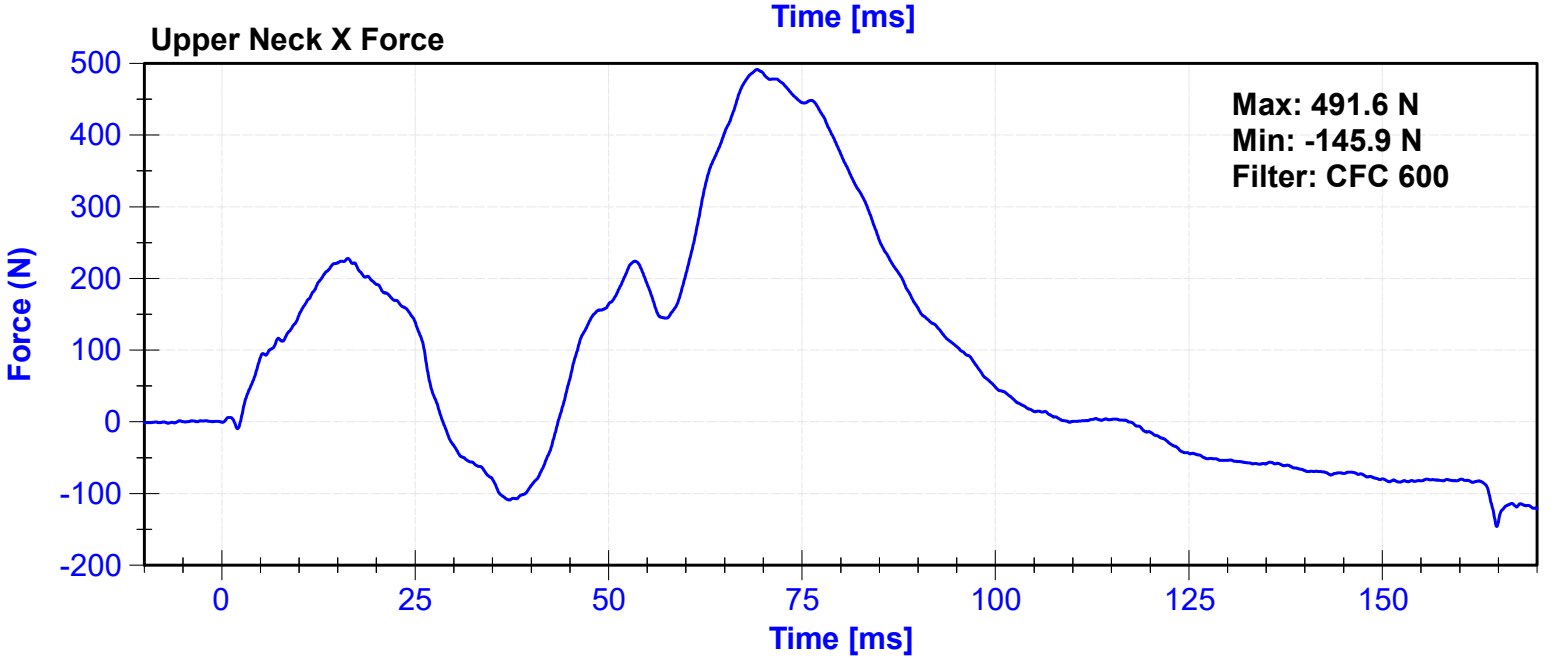



D-Plane Rotation
Rotation (deg)
125
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 103.6 deg
Min: -9.4 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
20
0
-20
-40
-60
-80
0
25
50
75
100
125
150
Time [ms]
Max: 16.3 Nm
Min: -57.1 N
Filter: CFC 600


Pendulum Deceleration
Max: 20.9 g's
Min: -2.8 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: 20.2 Nm
Min: -48.6 Nm
Filter: CFC 600
Moment (Nm)
30
20
10
0
-10
-20
-30
-40
-50
0
25
50
75
100
125
150
Time [ms]


Upper Neck X Force
Max: 491.6 N
Min: -145.9 N
Filter: CFC 600
Force (N)
500
400
300
200
100
0
-100
-200
0
25
50
75
100
125
150
Time [ms]

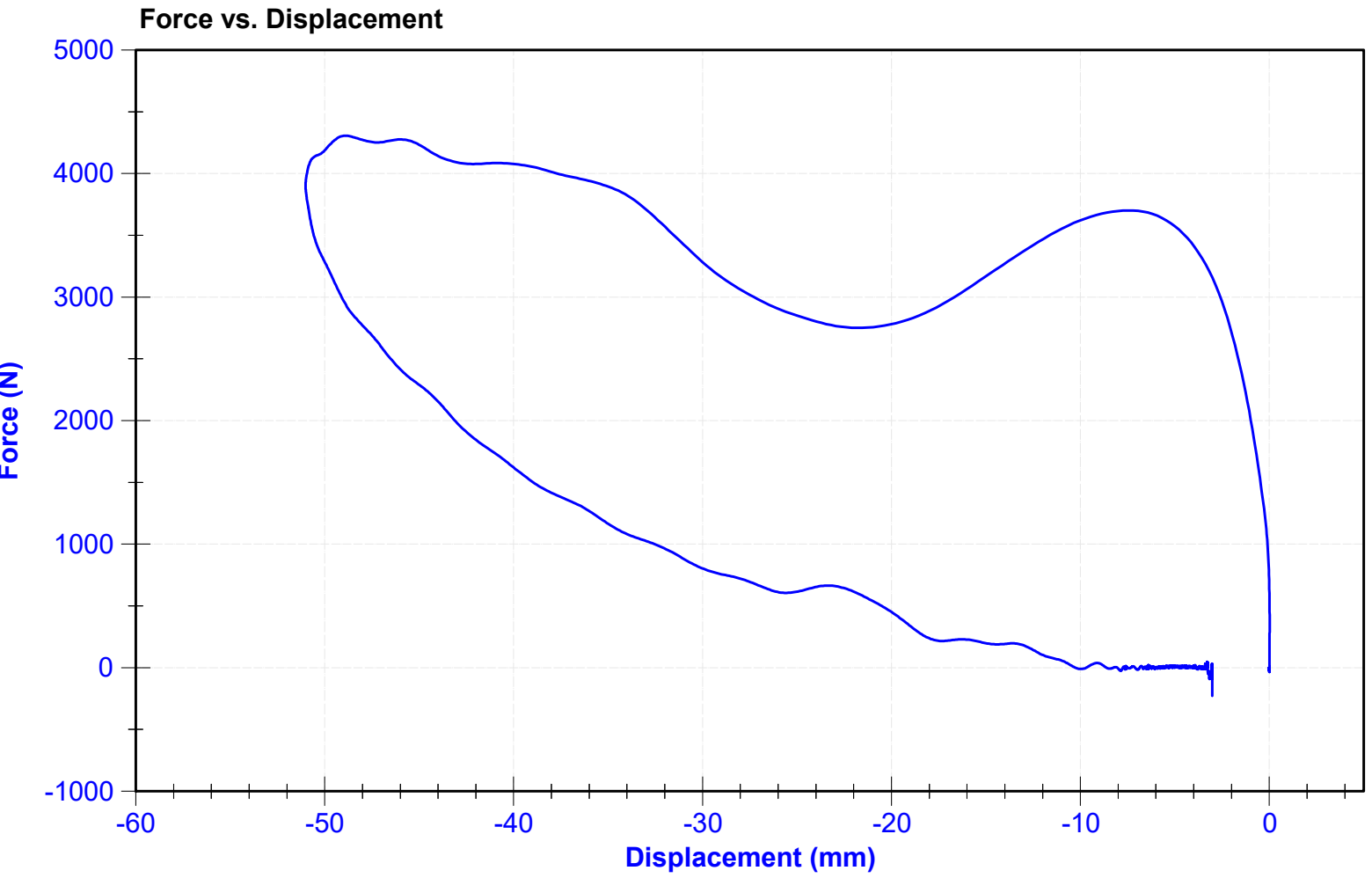
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

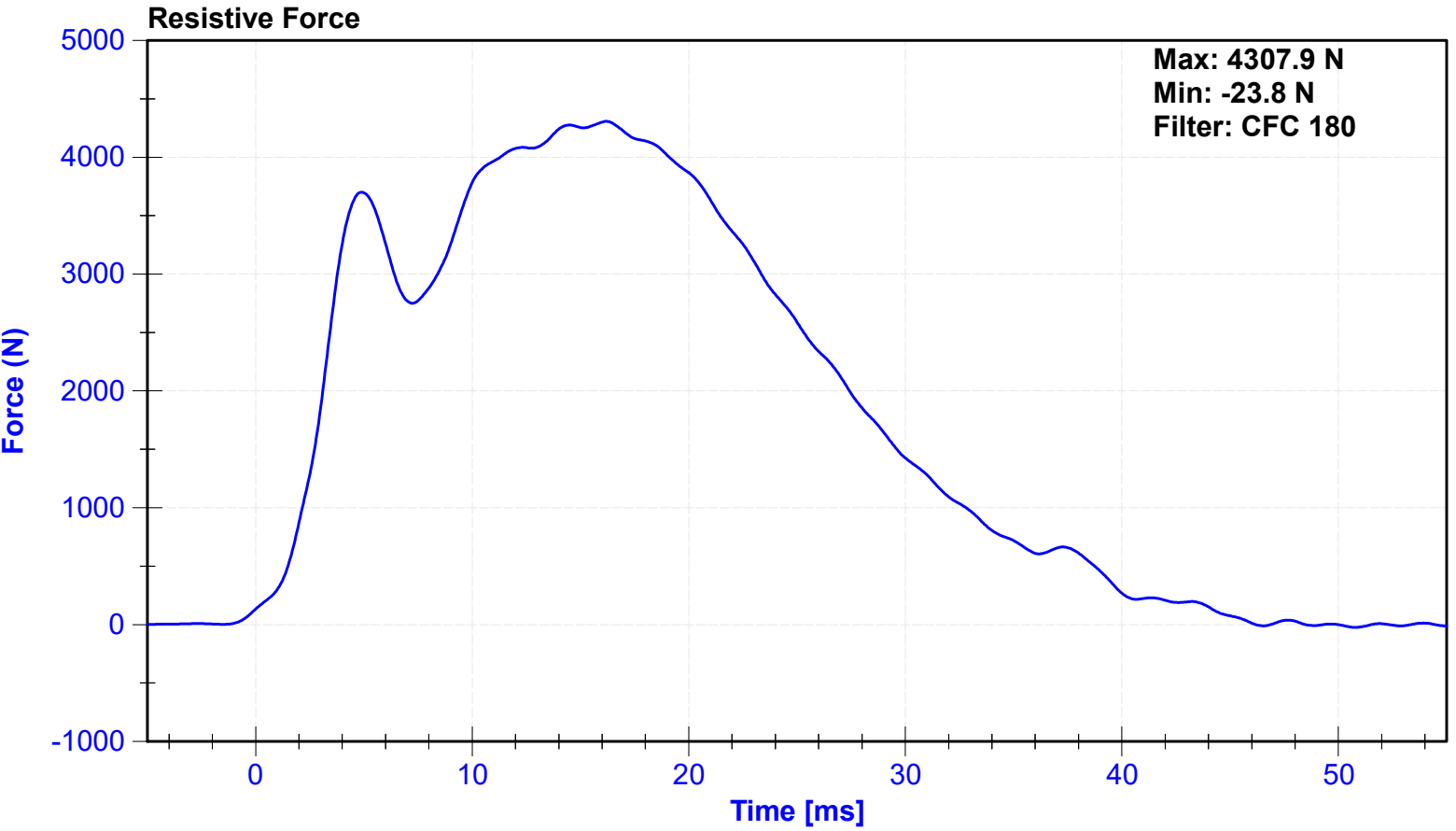
Results

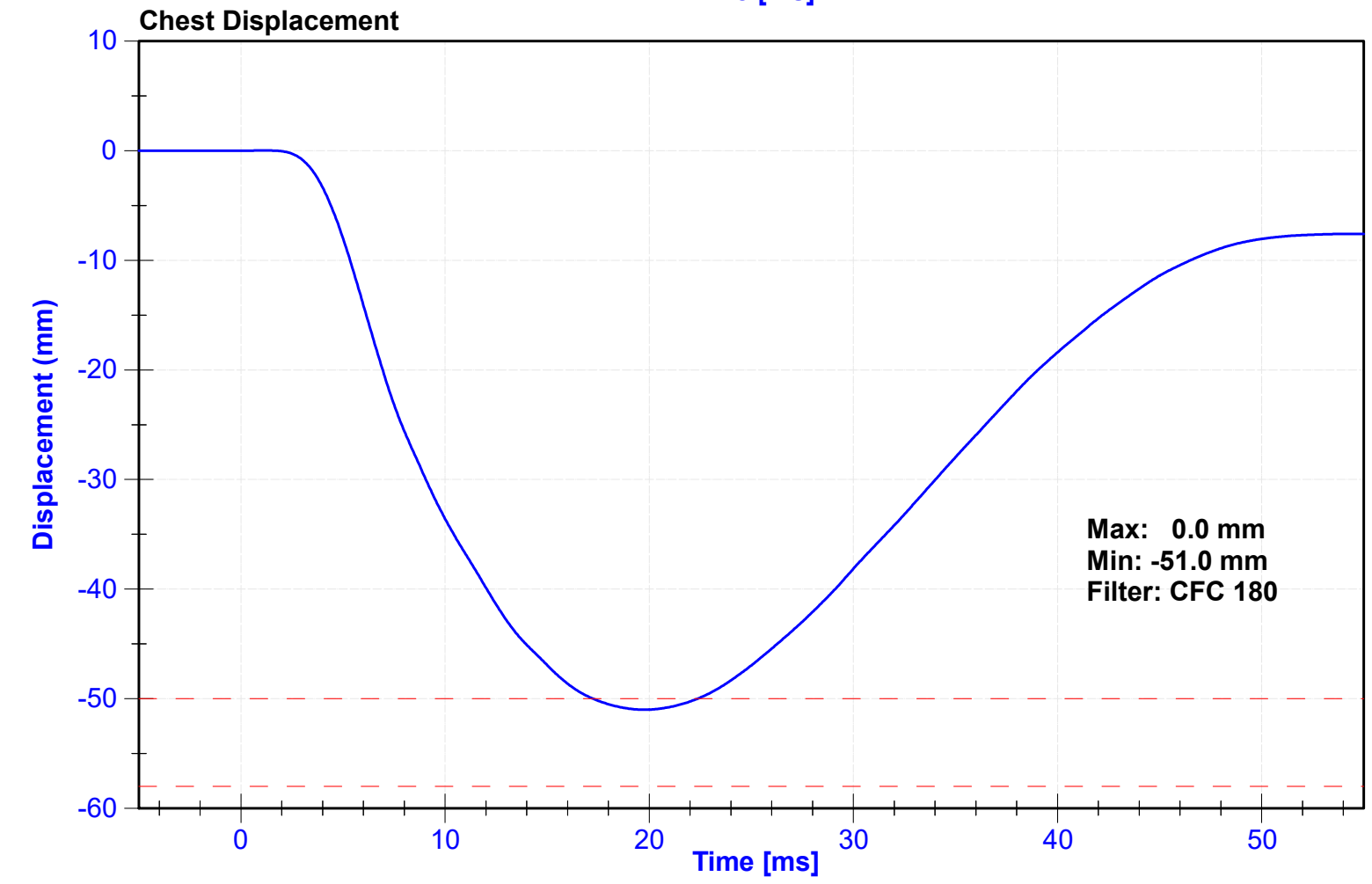
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.6	Pass
Humidity	10	70	%	35	Pass
Velocity	6.59	6.83	m/s	6.686	Pass
Chest Deflection	-58	-50	mm	-51.0	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4192.7	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4307.9	Pass
Hysteresis	69	85	%	73.4	Pass

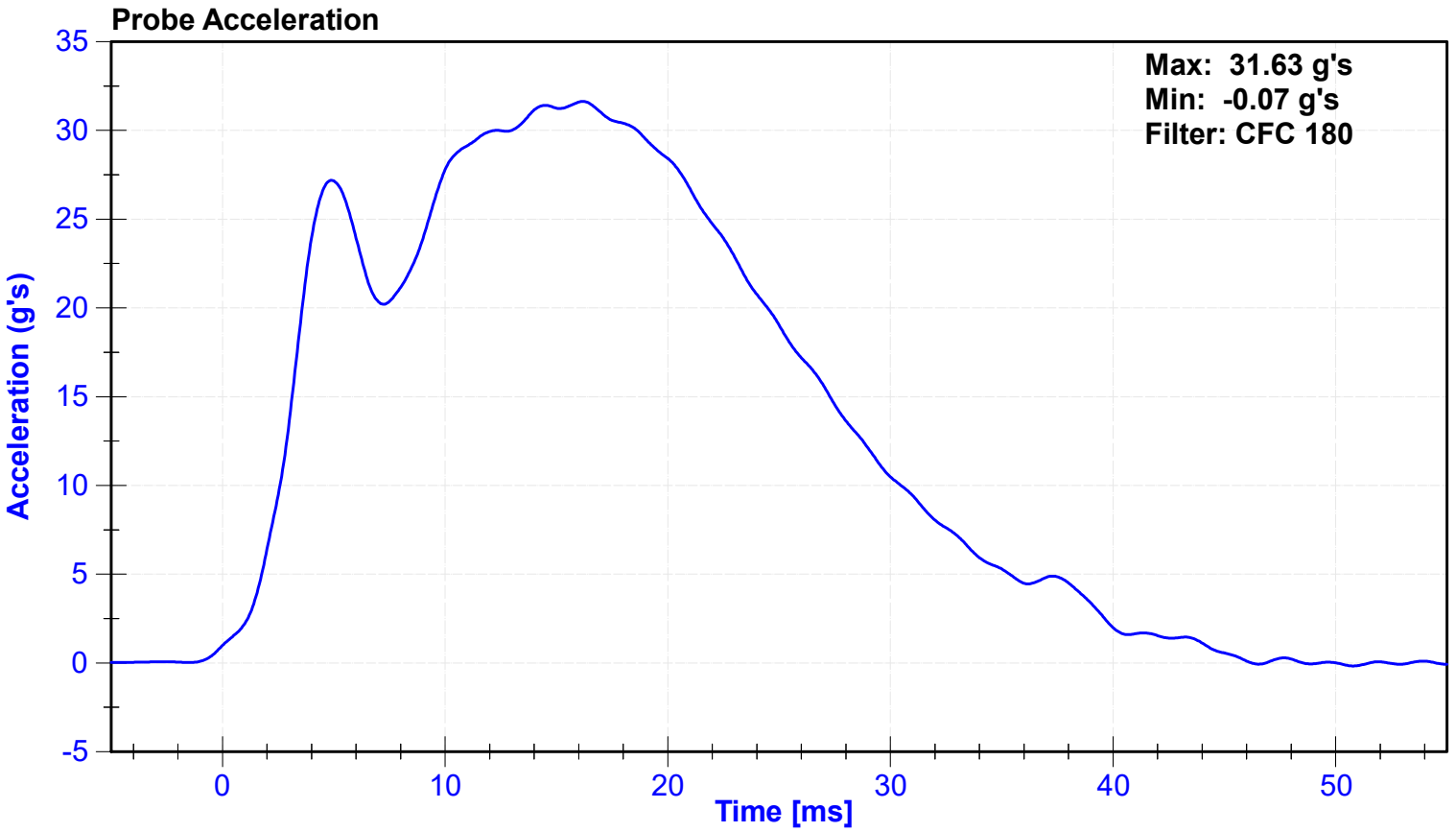
Transducer Calibrations

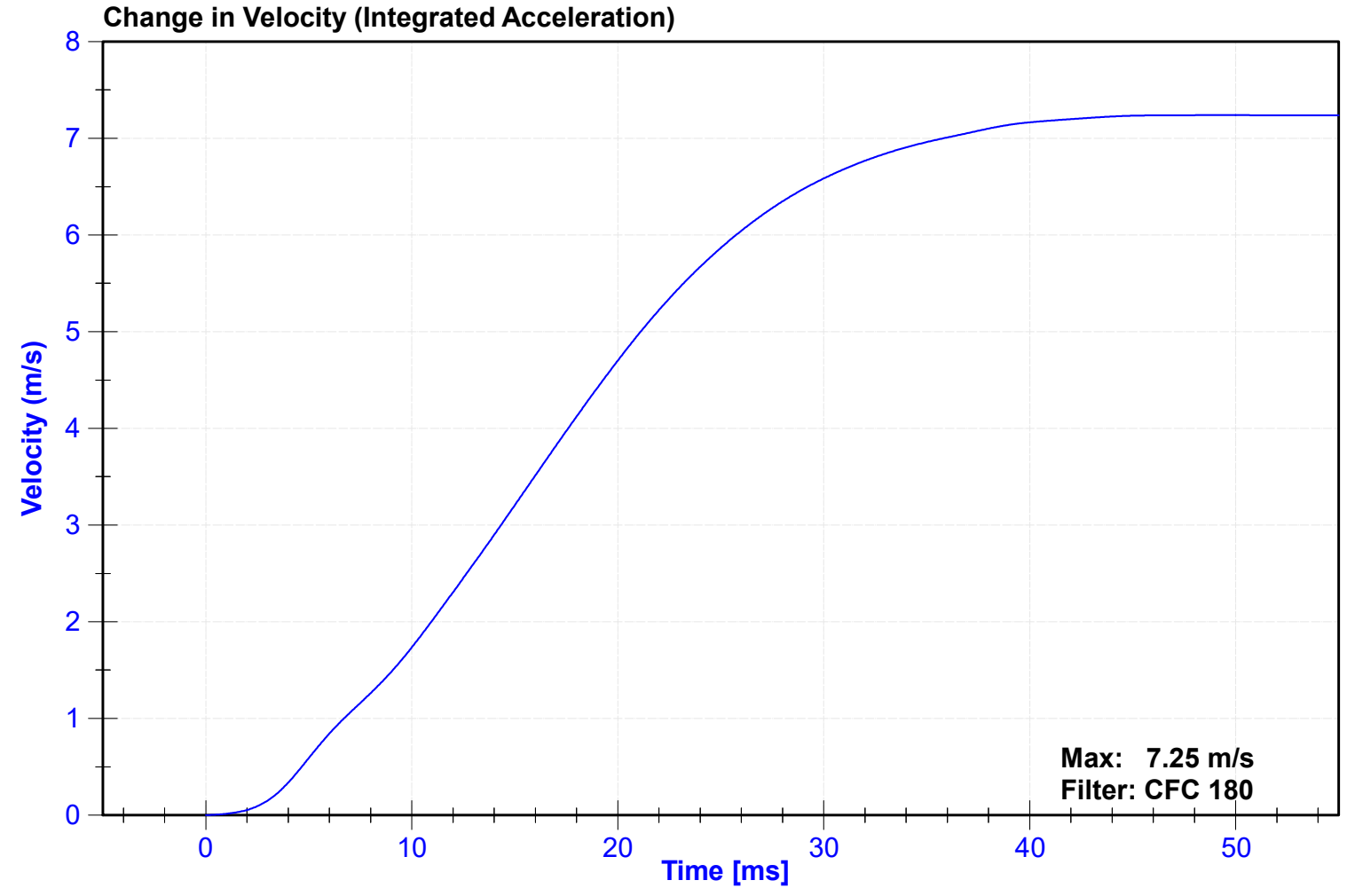
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18599	9/13/2024	3/12/2025
Chest Potentiometer	Servo	0720	8/19/2024	2/17/2025




Resistive Force
Max: 4307.9 N
Min: -23.8 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: -51.0 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: 31.63 g's
Min: -0.07 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)
Max: 7.25 m/s
Filter: CFC 180
Velocity (m/s)
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
Time [ms]

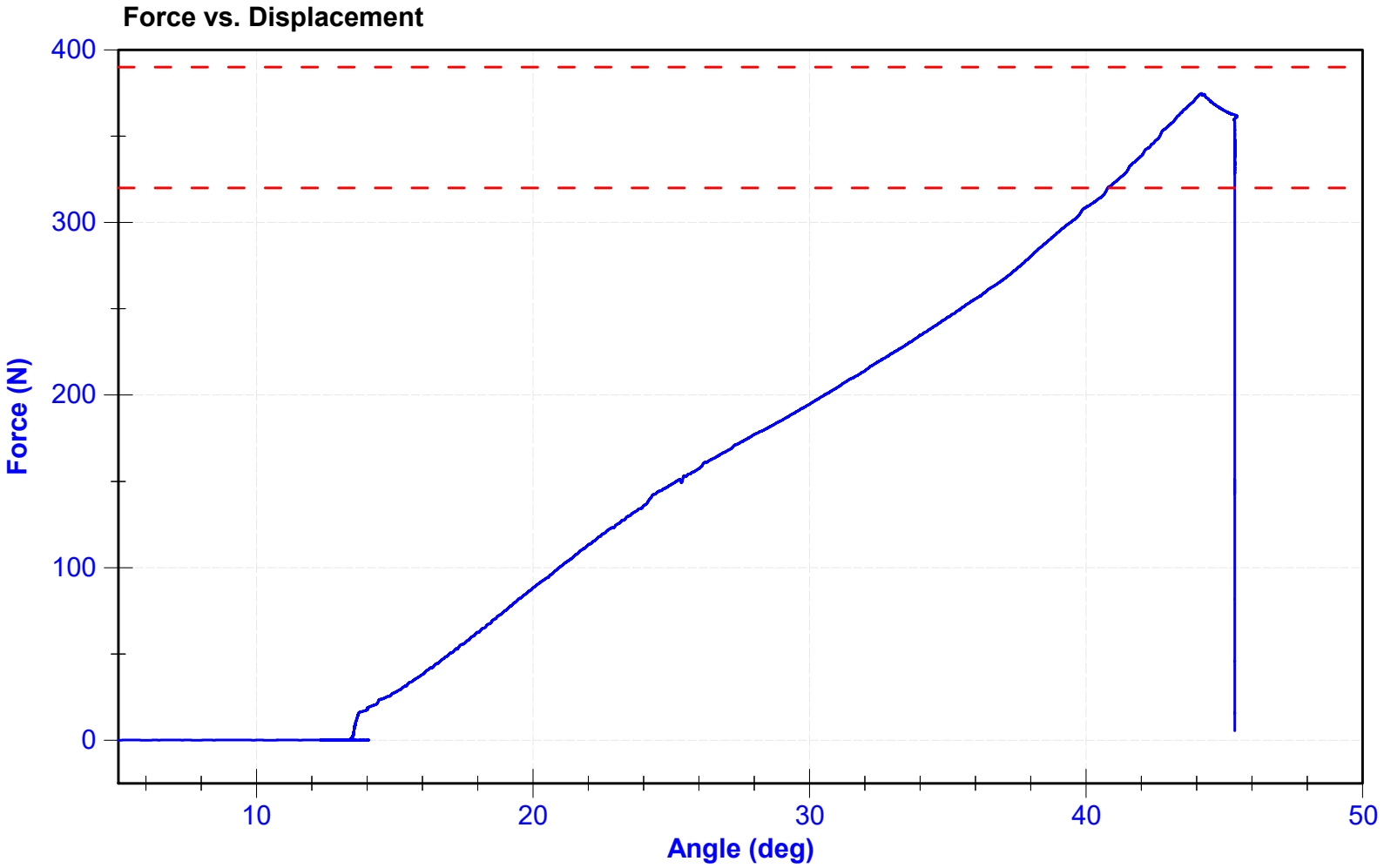
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	ºC	20.6	Pass
Humidity	10	70	%	35	Pass
Initial Angle	0	20	deg	13.1	Pass
Force at 45 Degrees	320	390	N	374.8	Pass
Return Angle Relative to Initial	0	8	deg	4.4	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	1134516	2023-11-30	2024-11-29



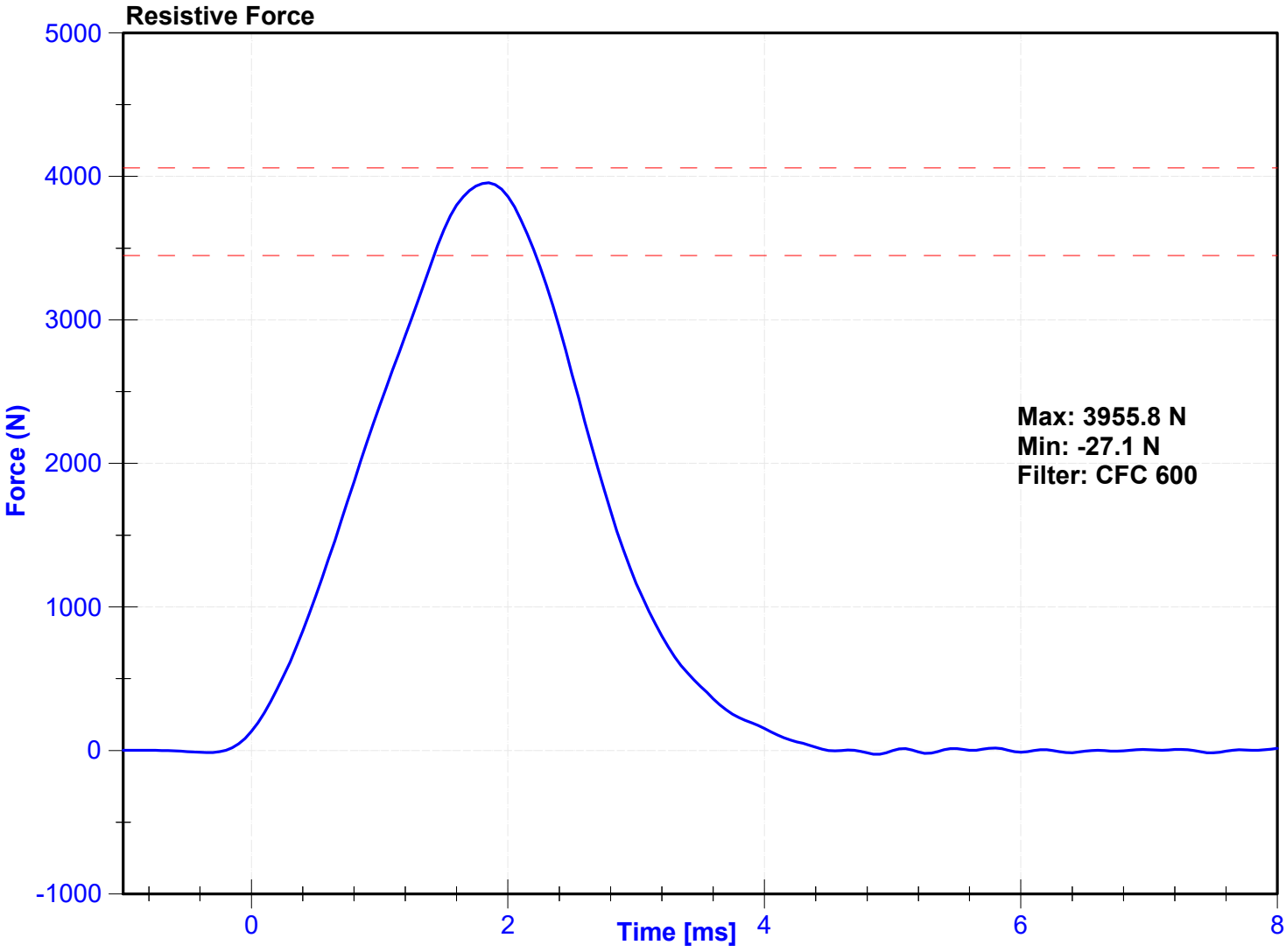
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

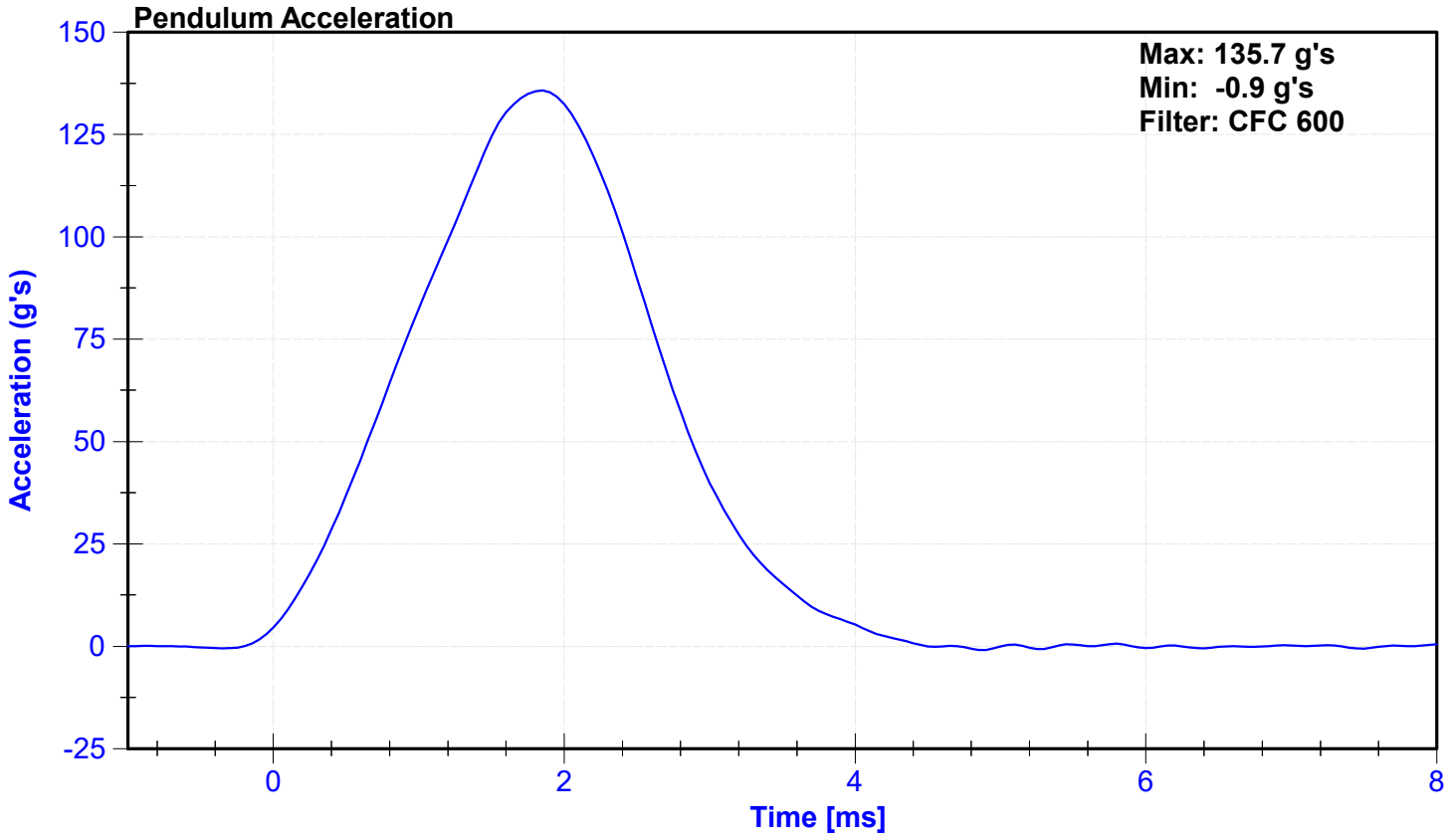
Results

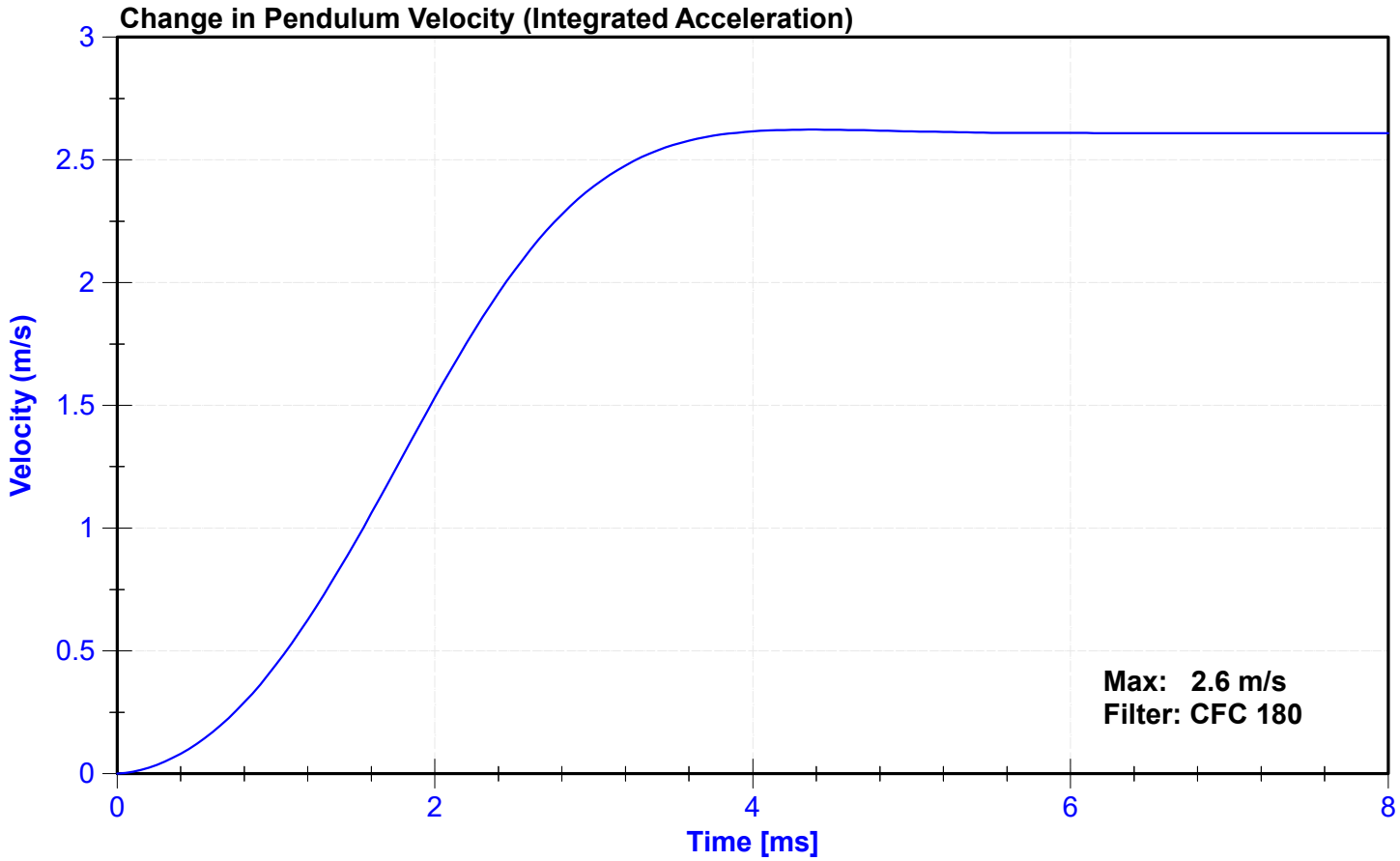
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.8	Pass
Humidity	10	70	%	41	Pass
Velocity	2.07	2.13	m/s	2.082	Pass
Resistive Force	3450	4060	N	3955.8	Pass

Transducer Calibrations

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




Pendulum Acceleration
Max: 135.7 g's
Min: -0.9 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: 2.6 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]

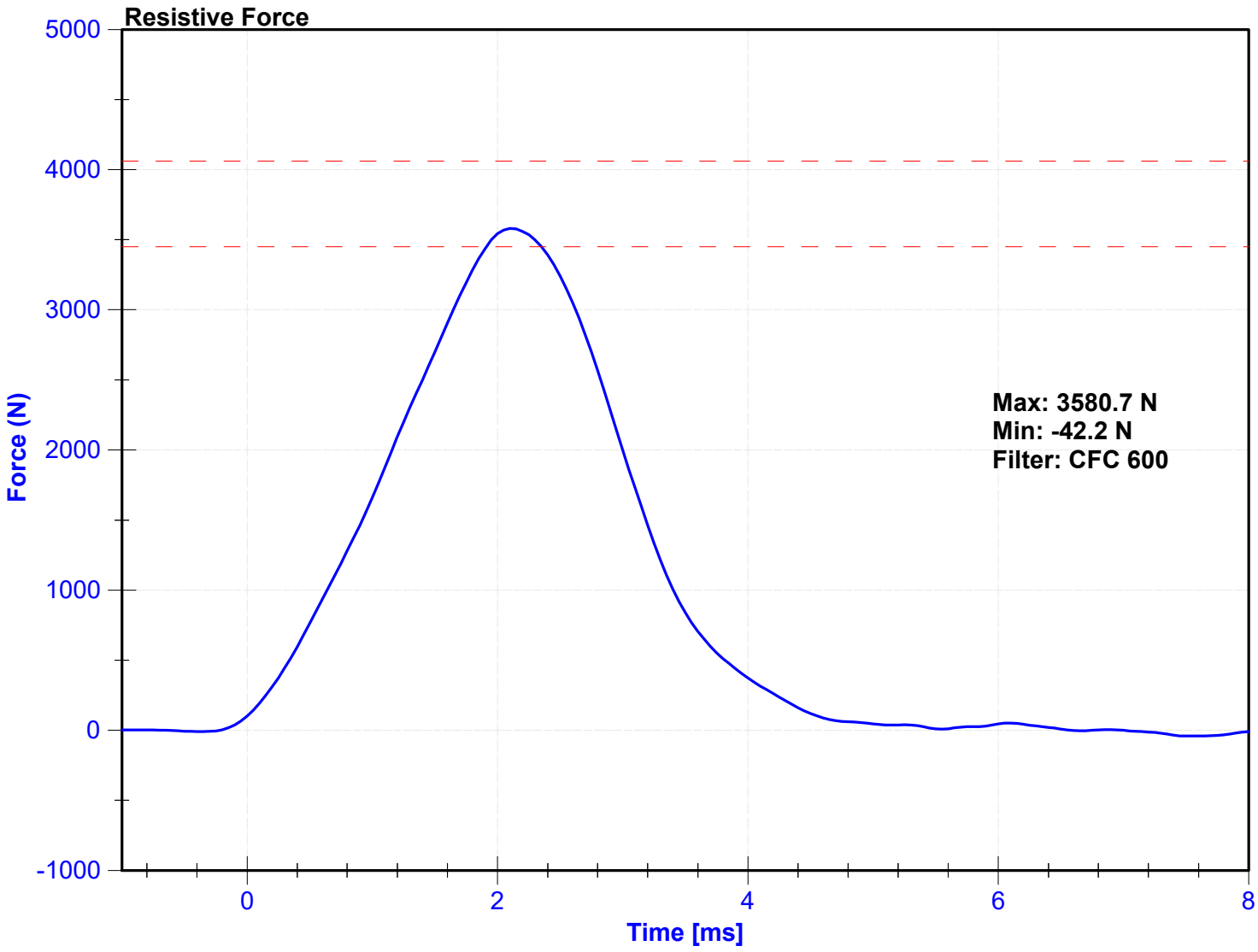
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

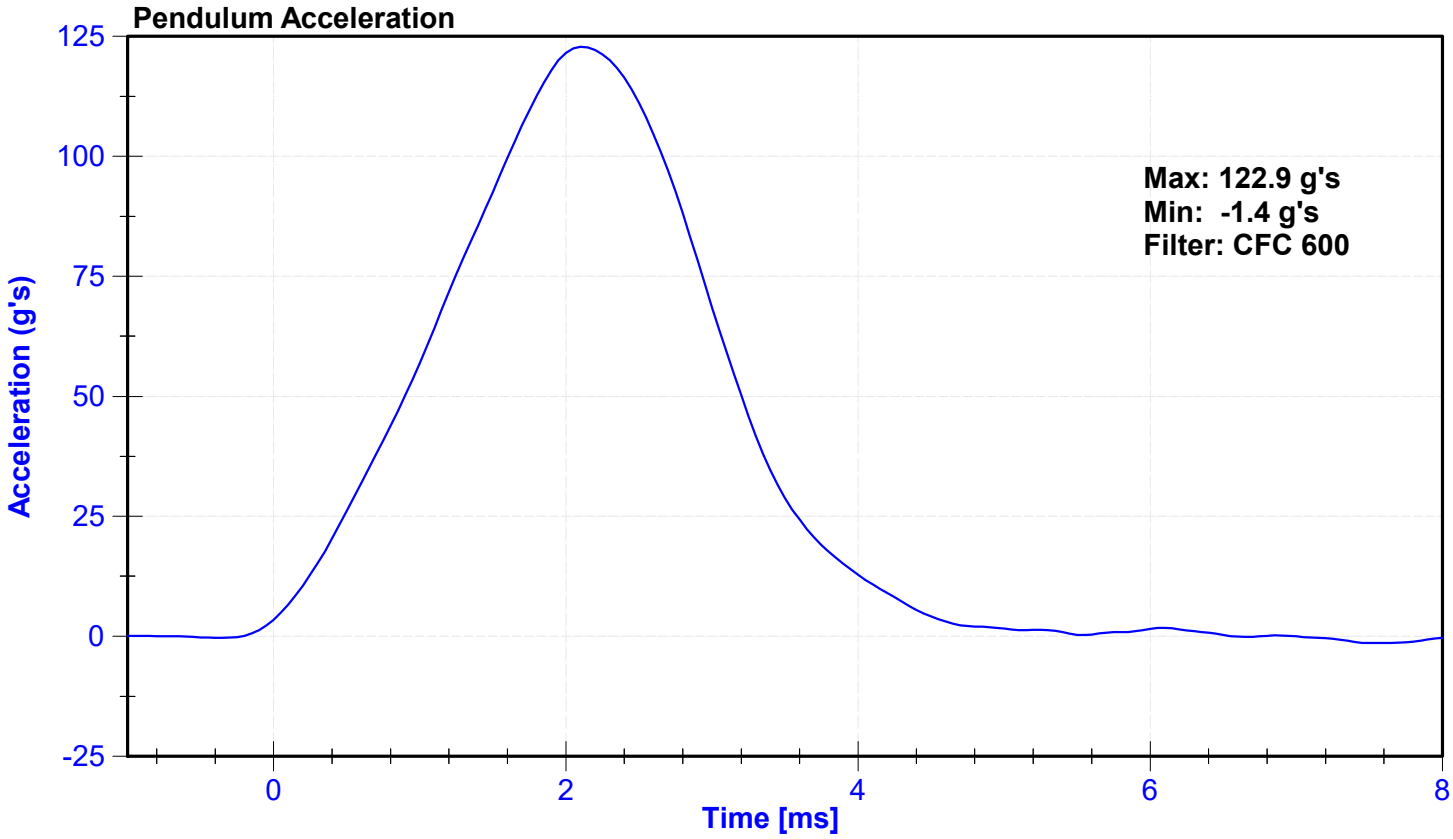
Results

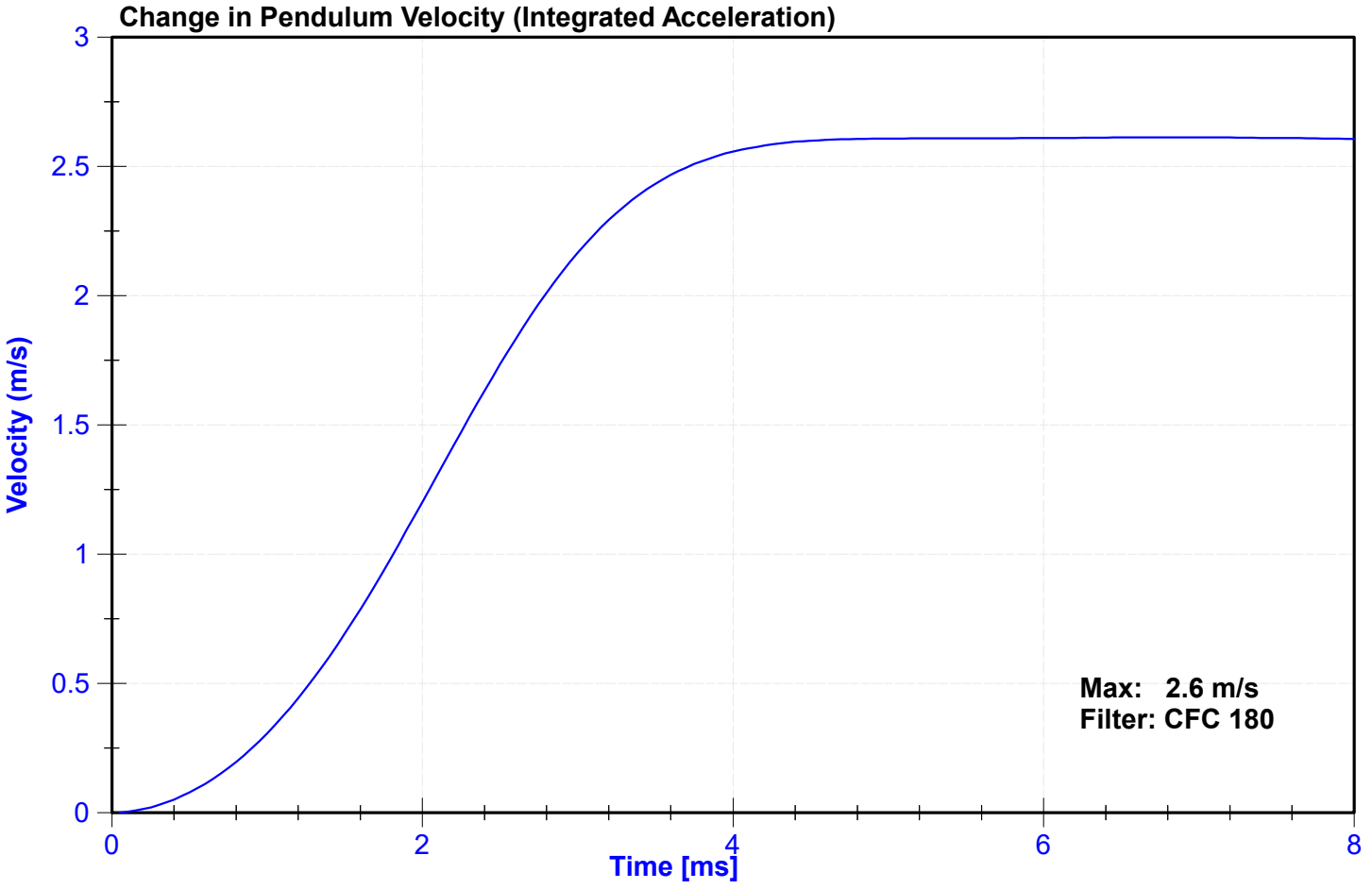
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.8	Pass
Humidity	10	70	%	41	Pass
Velocity	2.07	2.13	m/s	2.081	Pass
Resistive Force	3450	4060	N	3580.7	Pass

Transducer Calibrations

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




Pendulum Acceleration
Acceleration (g's)
125
100
75
50
25
0
-25
0
2
4
6
8
Time [ms]
Max: 122.9 g's
Min: -1.4 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: 2.6 m/s
Filter: CFC 180

CALIBRATION TEST RESULTS

POST-TEST

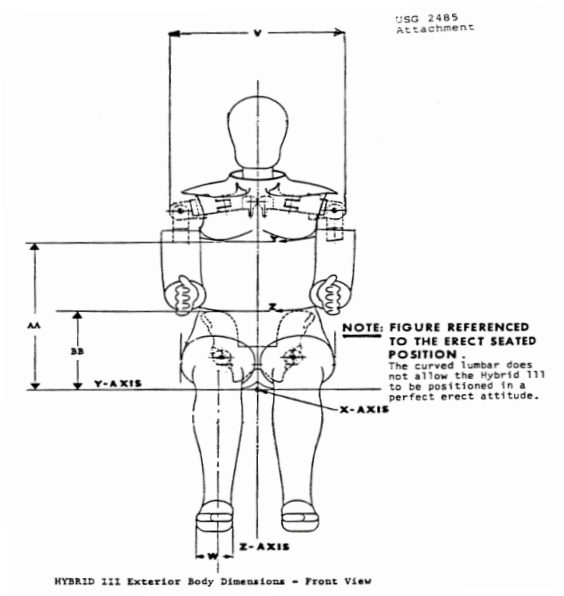
HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

SERIAL NO: 065

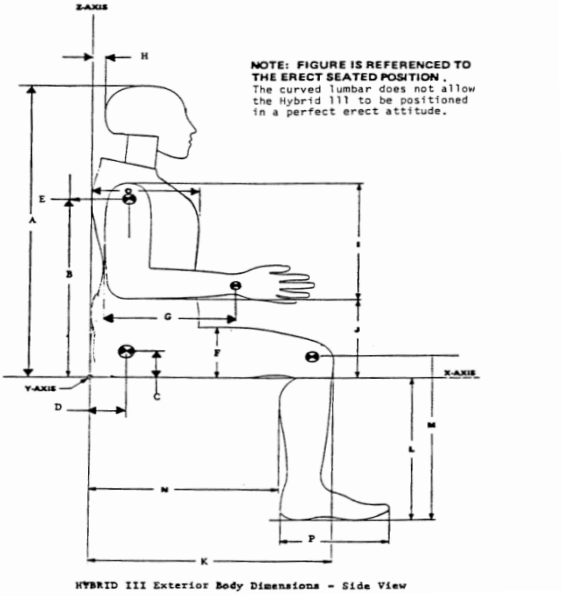
External Measurements - Hybrid 3 - 50th Male

Technician: J. Rios Date: 1/9/2025

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	34.7	Pass
B	Shoulder Pivot Height	19.9	20.5	20.3	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	3.5	Pass
F	Thigh Clearance	5.5	6.1	5.8	Pass
G	Back of Elbow to Wrist Pivot	11.4	12.0	12.0	Pass
H	Head Back to Backline	1.6	1.8	1.7	Pass
I	Shoulder to Elbow Length	13.0	13.6	13.2	Pass
J	Elbow Rest Height	7.5	8.3	7.7	Pass
K	Buttock to Knee Length	22.8	23.8	23.5	Pass
L	Popliteal Height	16.9	17.9	17.5	Pass
M	Knee Pivot Height	19.1	19.7	19.6	Pass
N	Buttock Popliteal Length	17.8	18.8	18.3	Pass
O	Chest Depth without Jacket	8.4	9.0	8.8	Pass
P	Foot Length (right)	9.9	10.5	10.3	Pass
V	Shoulder Breadth	16.3	17.2	16.9	Pass
W	Foot Breadth	3.6	4.2	3.9	Pass
Y	Chest Circumference with Jacket	38.2	39.4	38.8	Pass
Z	Waist Circumference	32.9	34.1	33.7	Pass
AA	Reference Location (Chest Circumference)	16.9	17.1	17.0	Pass
BB	Reference Location (Waist Circumference)	8.9	9.1	8.9	Pass

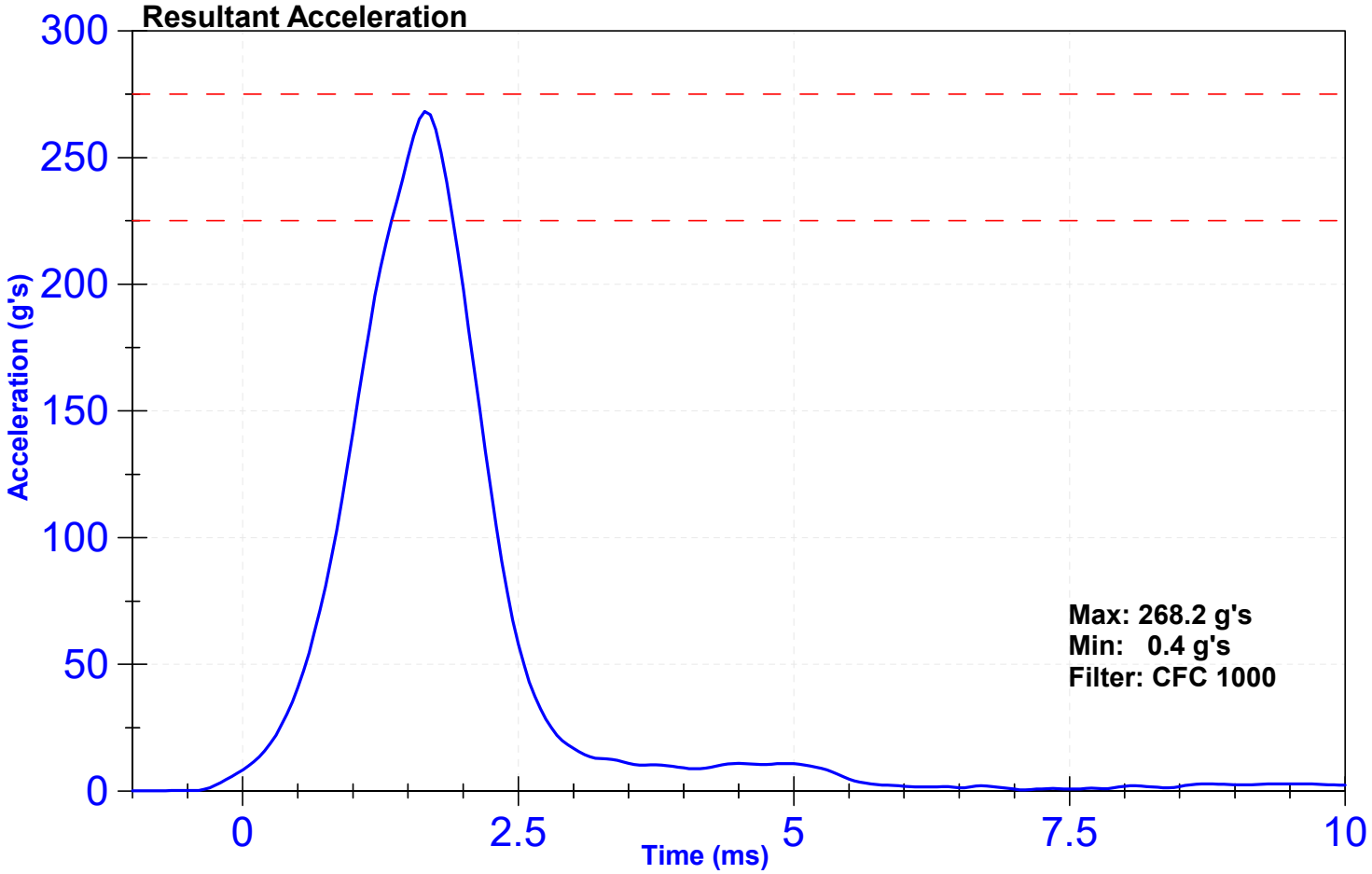
ATD Manufacturer	Humanetics	Test Technician	J.Kinderman
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

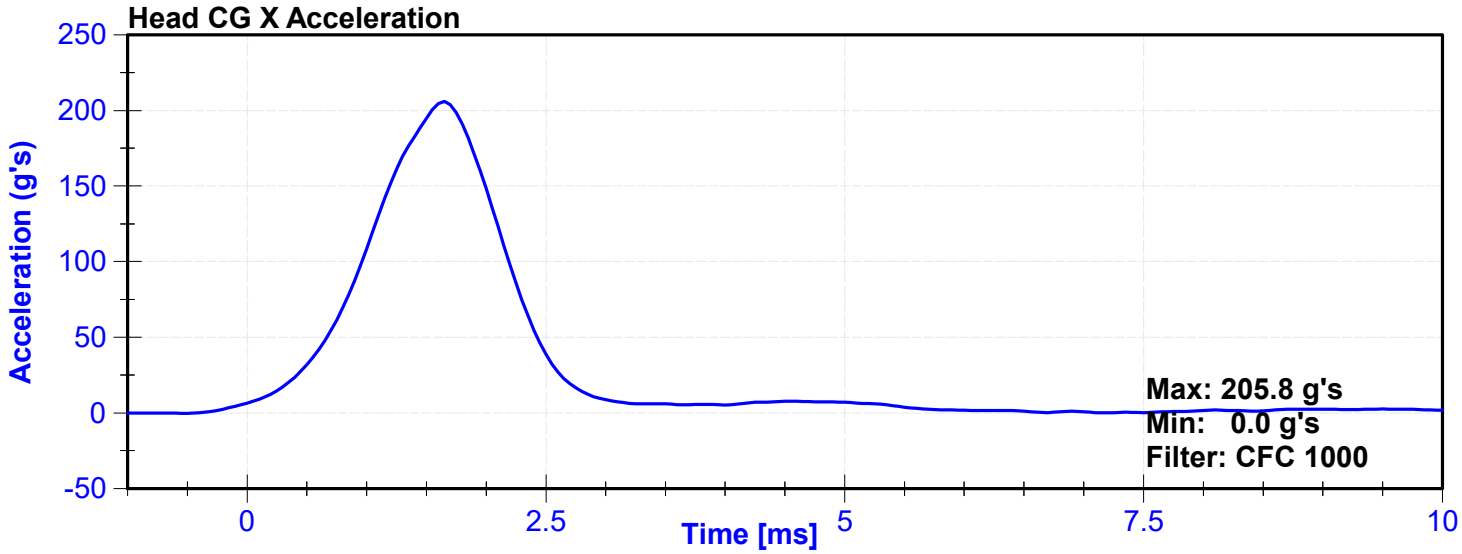
Results

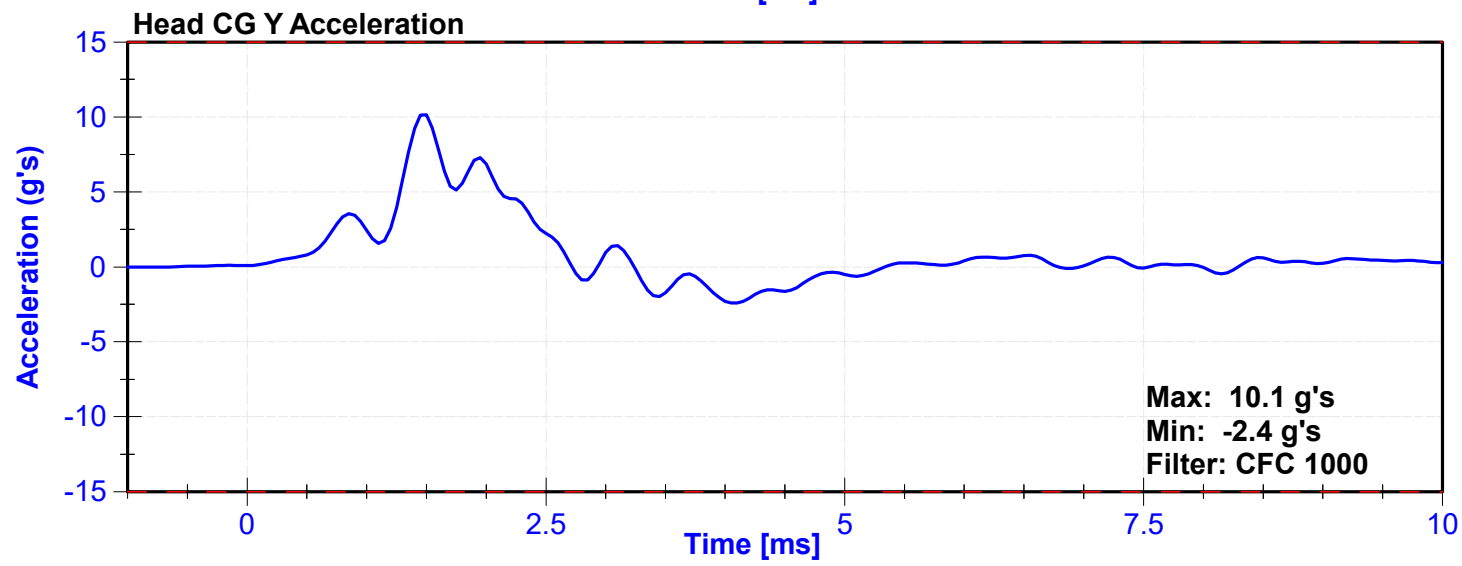
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	15	Pass
Resultant Acceleration	225	275	g's	268.2	Pass
Oscillation	0	10	%	4.0	Pass
Lateral Acceleration	-15	15	g's	10.1	Pass

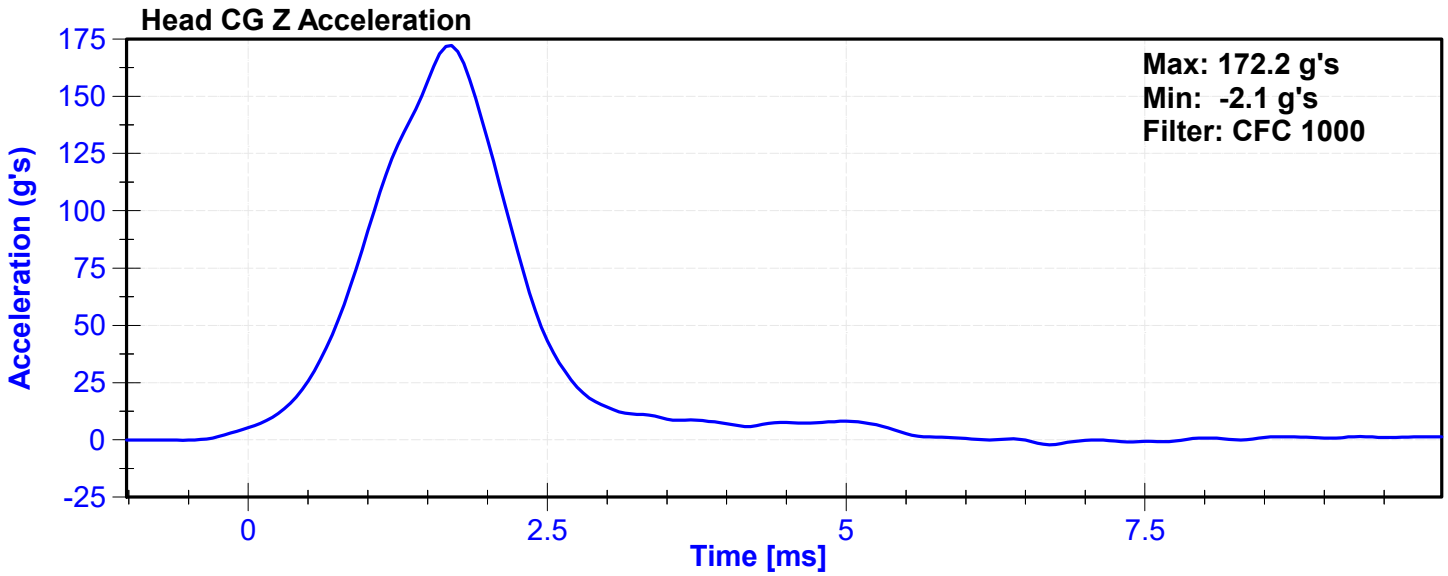
Transducer Calibrations

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)
250
200
150
100
50
0
-50
0
2.5
5
7.5
10
Time [ms]
Max: 205.8 g's
Min: 0.0 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: 10.1 g's
Min: -2.4 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
Time [ms]
Max: 172.2 g's
Min: -2.1 g's
Filter: CFC 1000

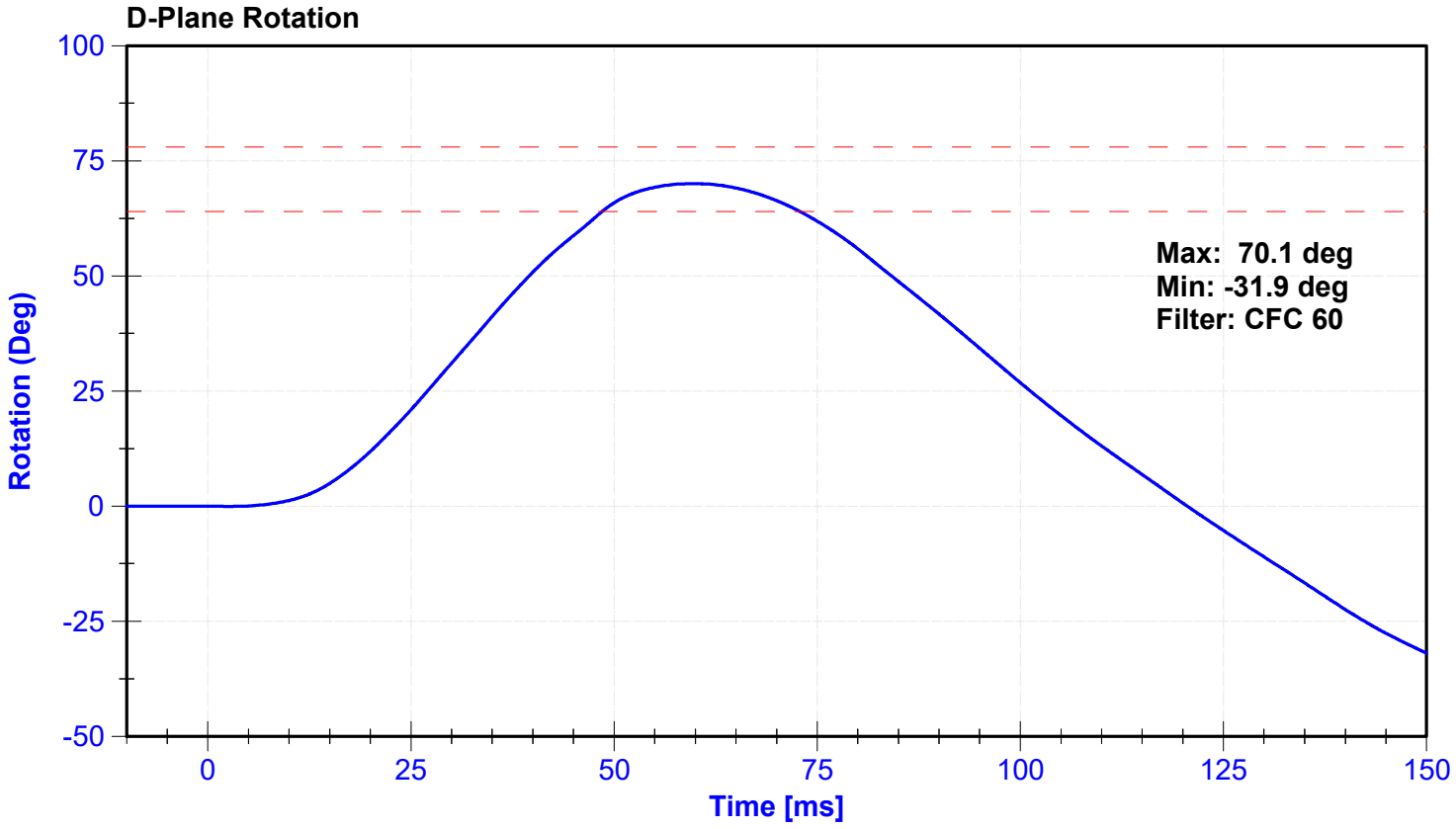
ATD Manufacturer	Humanetics	Test Technician	J. Kinderman
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

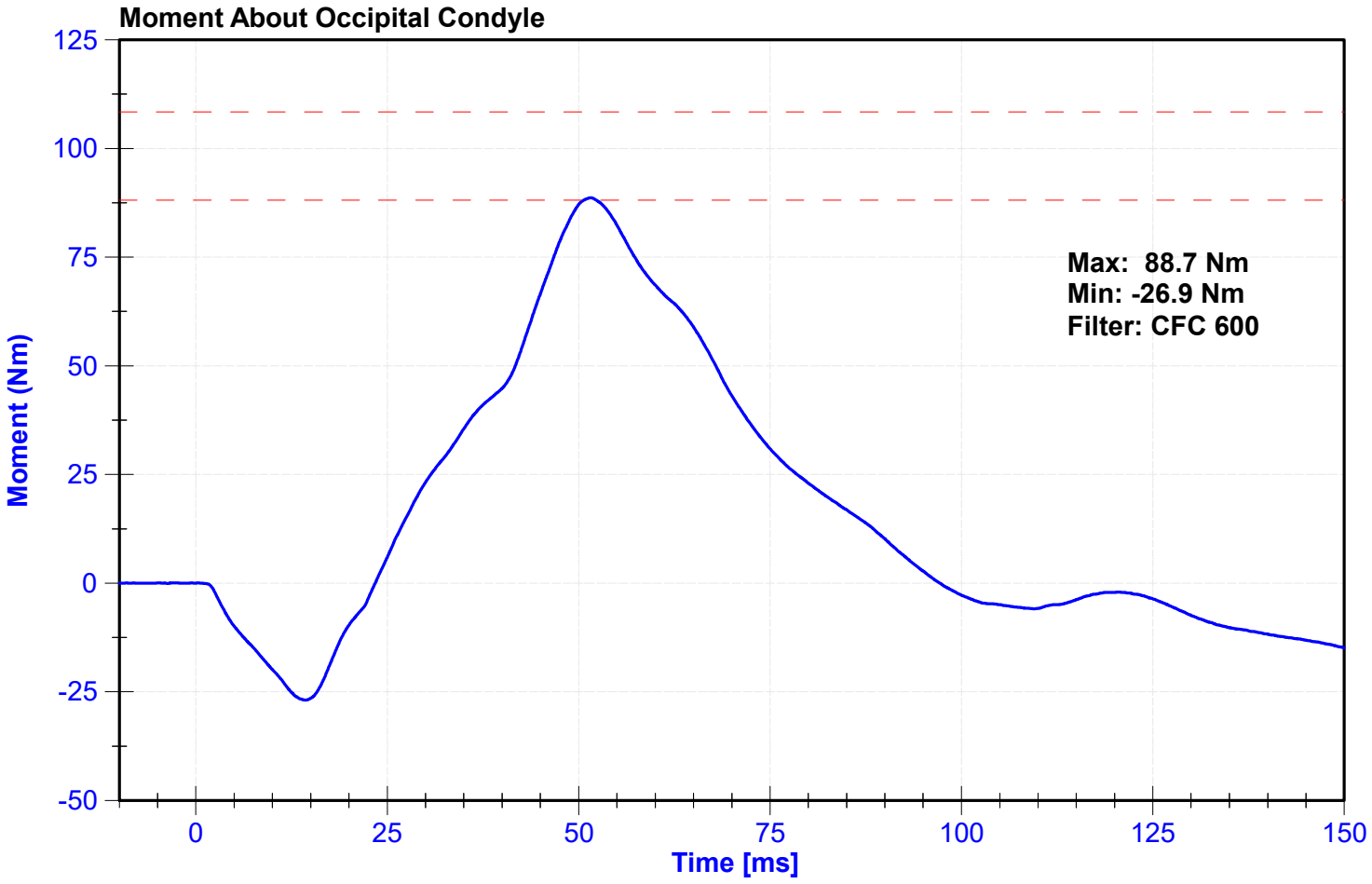
Results

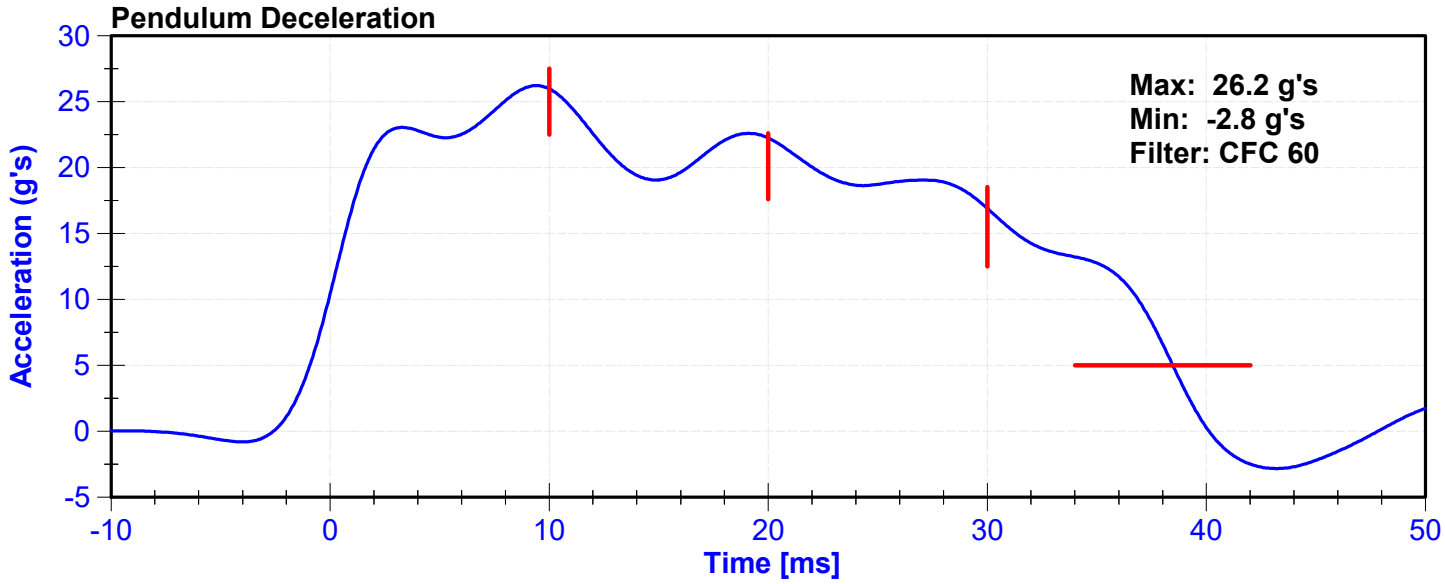
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	22	Pass
Velocity	6.89	7.13	m/s	6.952	Pass
Pendulum Deceleration at 10ms	22.5	27.5	g's	25.96	Pass
Pendulum Deceleration at 20ms	17.6	22.6	g's	22.24	Pass
Pendulum Deceleration at 30ms	12.5	18.5	g's	16.90	Pass
Max. Pendulum Deceleration After 30ms	0	29	g's	26.2	Pass
Pendulum Deceleration Time to 5 g's	34	42	ms	38.5	Pass
Maximum D Plane Rotation	64	78	deg	70.1	Pass
Time to Maximum Rotation	57	64	ms	59.8	Pass
Rotation Decay to Zero	113	127	ms	120.6	Pass
Moment About Occipital Condyle	88.1	108.4	Nm	88.68	Pass
Time to Maximum Moment	47	58	ms	51.6	Pass
Moment Decay to Zero	97	107	ms	97.2	Pass

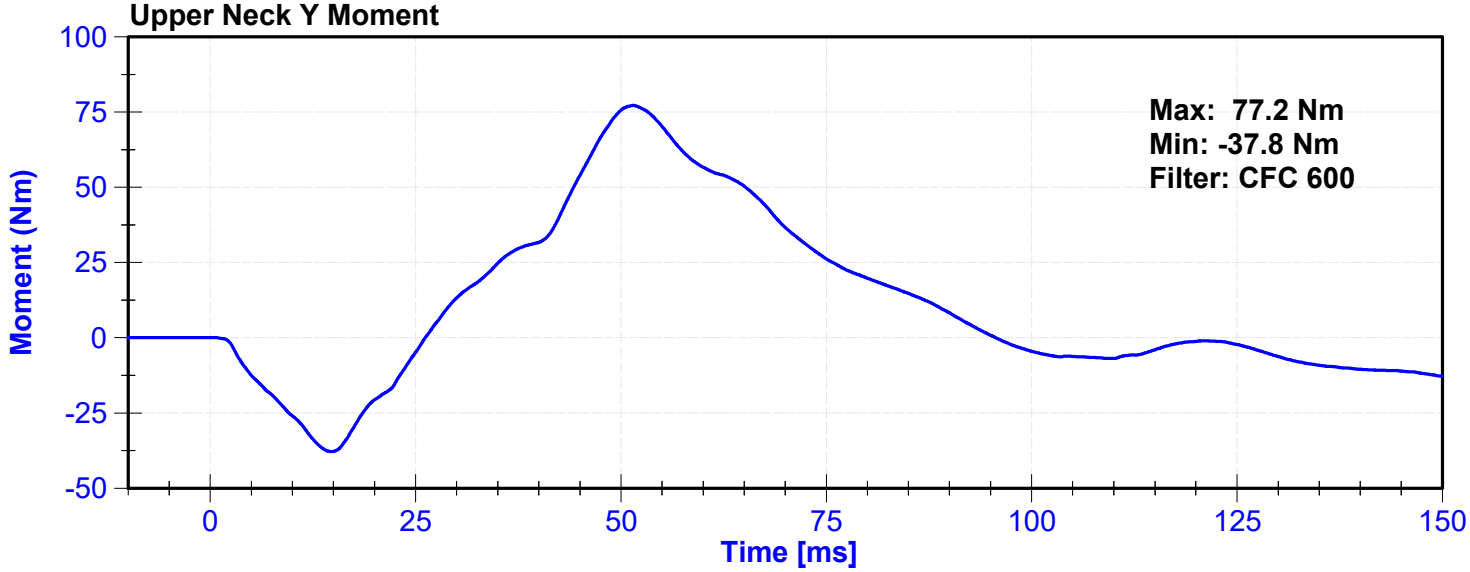
Transducer Calibrations

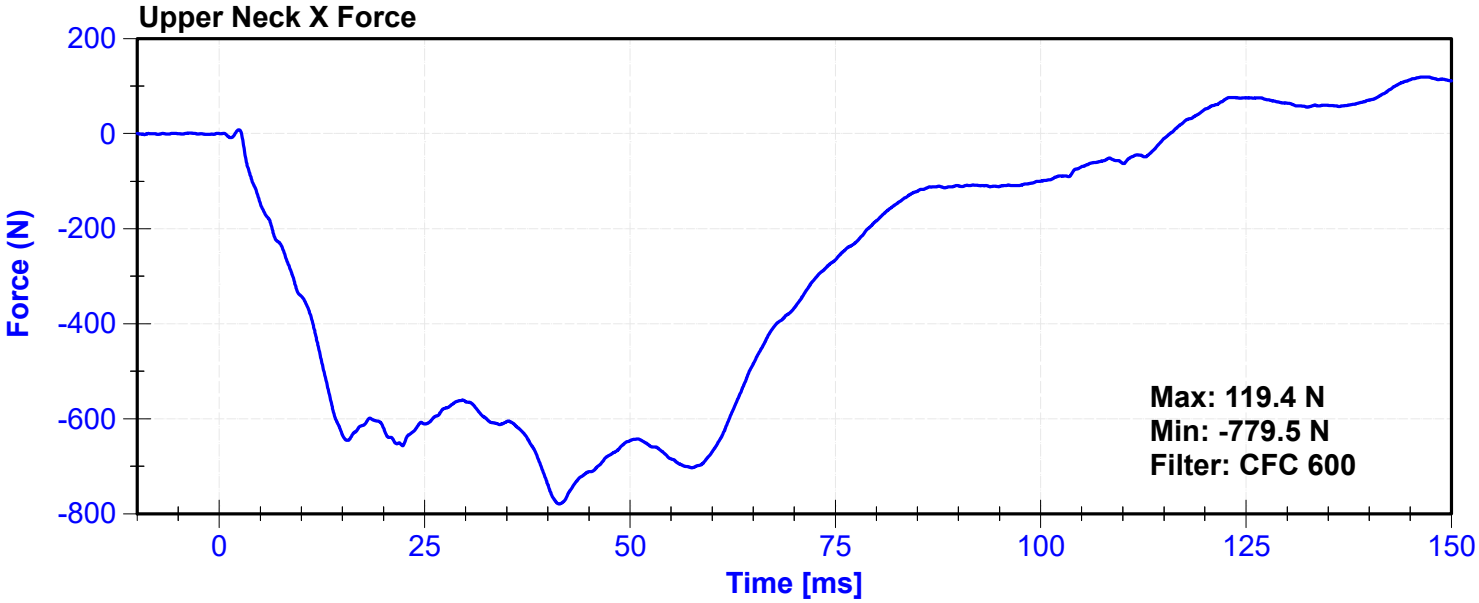
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/30/2024	4/28/2025
Pendulum Potentiometer	ETI	LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Humanetics	851-FX	5/22/2024	5/22/2025


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: -31.9 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: 88.7 Nm
Min: -26.9 Nm
Filter: CFC 600


Pendulum Deceleration
Acceleration (g's)
Time [ms]
Max: 26.2 g's
Min: -2.8 g's
Filter: CFC 60


Upper Neck Y Moment
Moment (Nm)
Time [ms]
Max: 77.2 Nm
Min: -37.8 Nm
Filter: CFC 600


Upper Neck X Force
Force (N)
Time [ms]
Max: 119.4 N
Min: -779.5 N
Filter: CFC 600

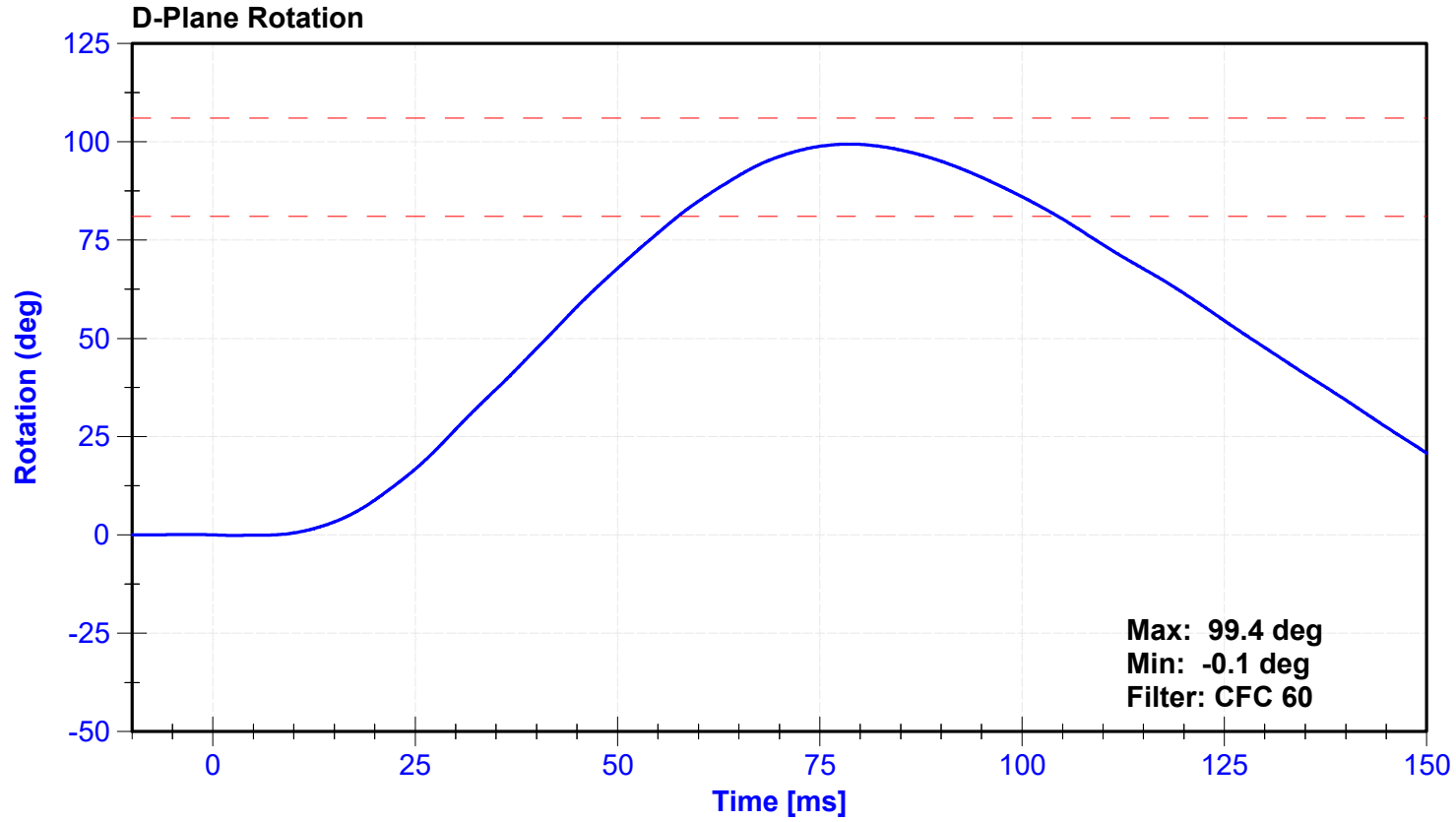
ATD Manufacturer	Humanetics	Test Technician	J. Kinderman
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

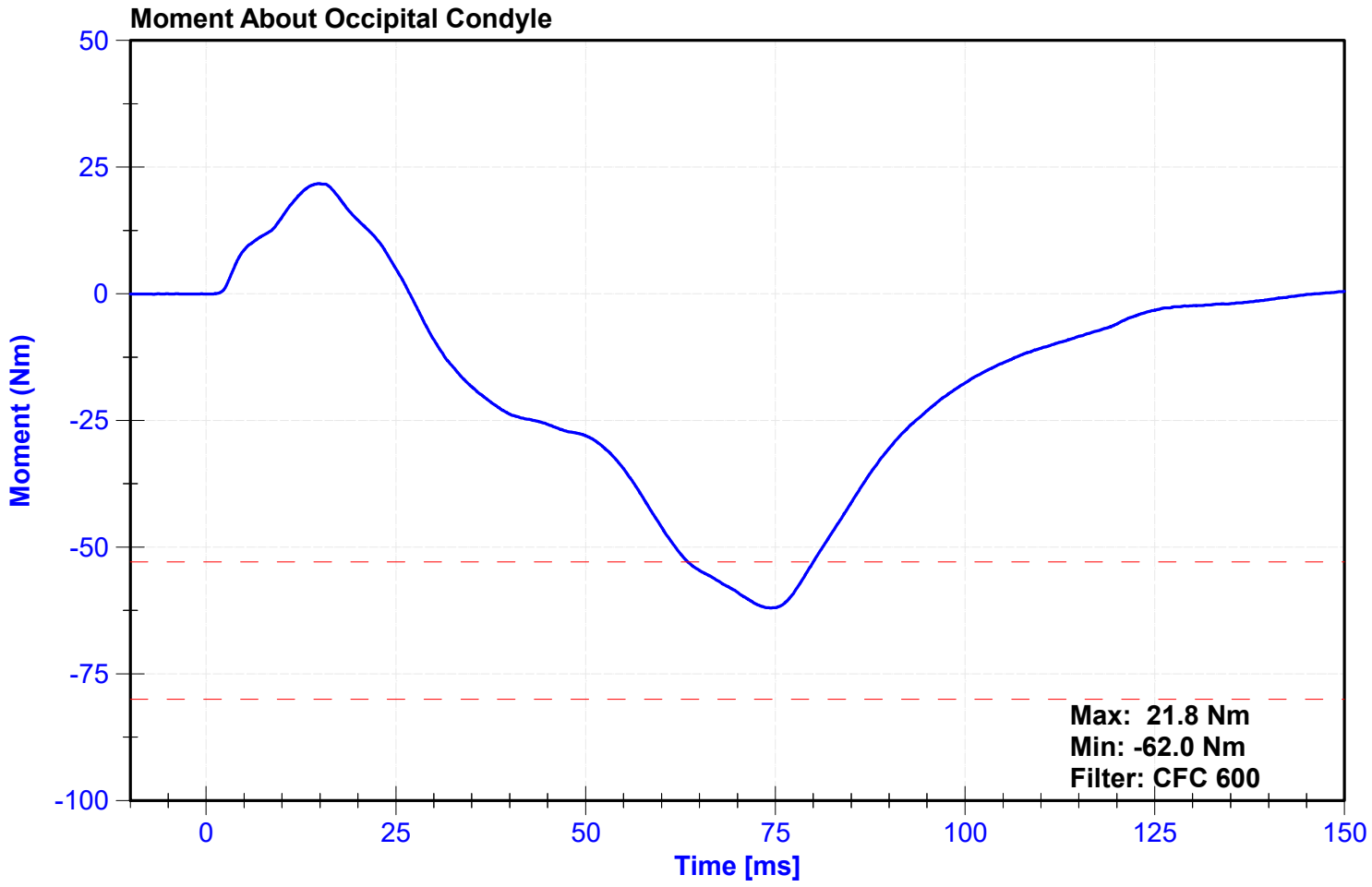
Results

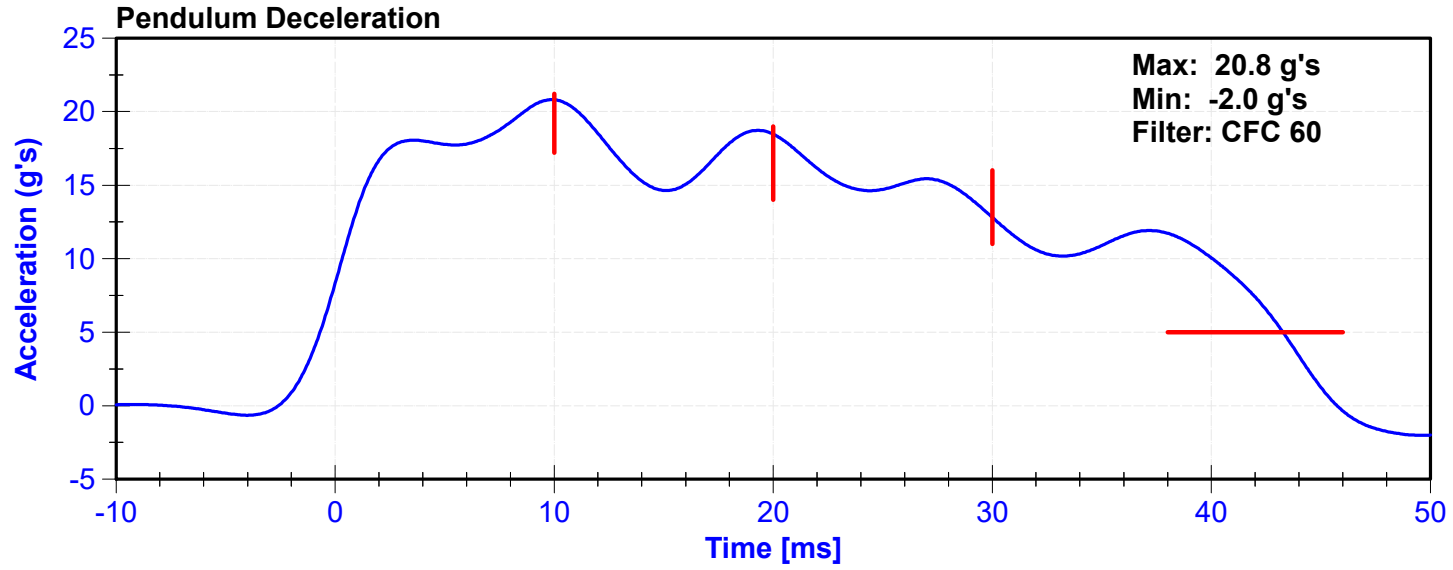
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21.0	Pass
Humidity	10	70	%	22	Pass
Velocity	5.94	6.19	m/s	6.064	Pass
Pendulum Deceleration at 10ms	17.2	21.2	g's	20.81	Pass
Pendulum Deceleration at 20ms	14	19	g's	18.5	Pass
Pendulum Deceleration at 30ms	11	16	g's	12.8	Pass
Max. Pendulum Deceleration After 30ms	0	22	g's	20.8	Pass
Pendulum Deceleration Time to 5 g's	38	46	ms	43.3	Pass
Maximum D Plane Rotation	81	106	deg	99.4	Pass
Time to Maximum Rotation	72	82	ms	78.7	Pass
Rotation Decay to Zero	147	174	ms	165.4	Pass
Minimum Moment About OC	-80	-52.9	Nm	-61.99	Pass
Time to Minimum Moment	65	79	ms	74.4	Pass
Moment Decay to Zero	120	148	ms	146.0	Pass

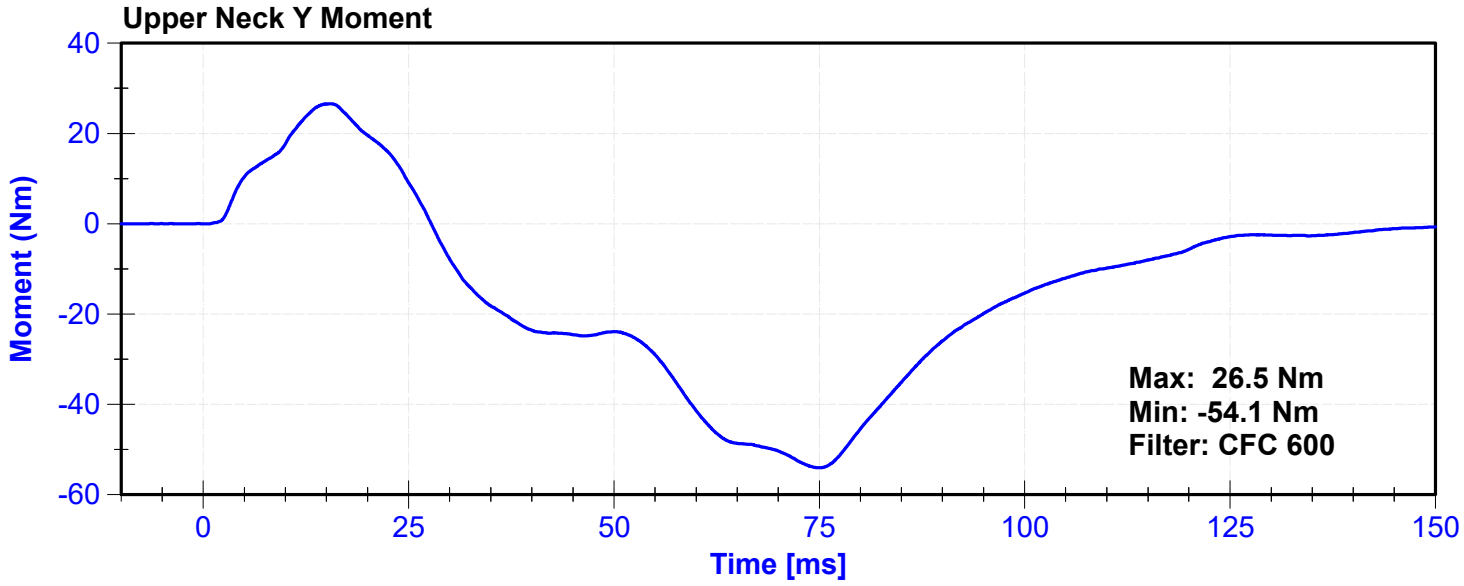
Transducer Calibrations

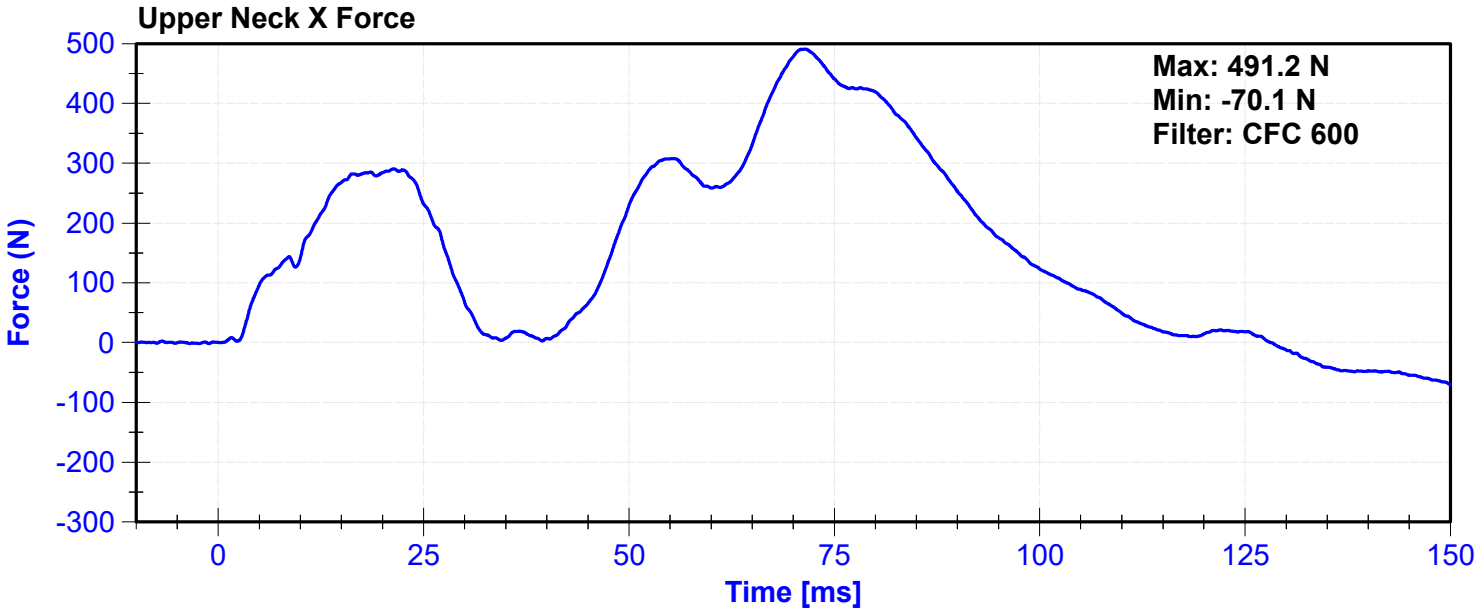
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16503	10/30/2024	4/28/2025
Pendulum Potentiometer	ETI	SP22G_LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	SP22G_LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Humanetics	851-FX	5/22/2024	5/22/2025


D-Plane Rotation
Rotation (deg)
125
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 99.4 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: 21.8 Nm
Min: -62.0 Nm
Filter: CFC 600


Pendulum Deceleration
Max: 20.8 g's
Min: -2.0 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: 26.5 Nm
Min: -54.1 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: 491.2 N
Min: -70.1 N
Filter: CFC 600
Force (N)
500
400
300
200
100
0
-100
-200
-300
0
25
50
75
100
125
150
Time [ms]

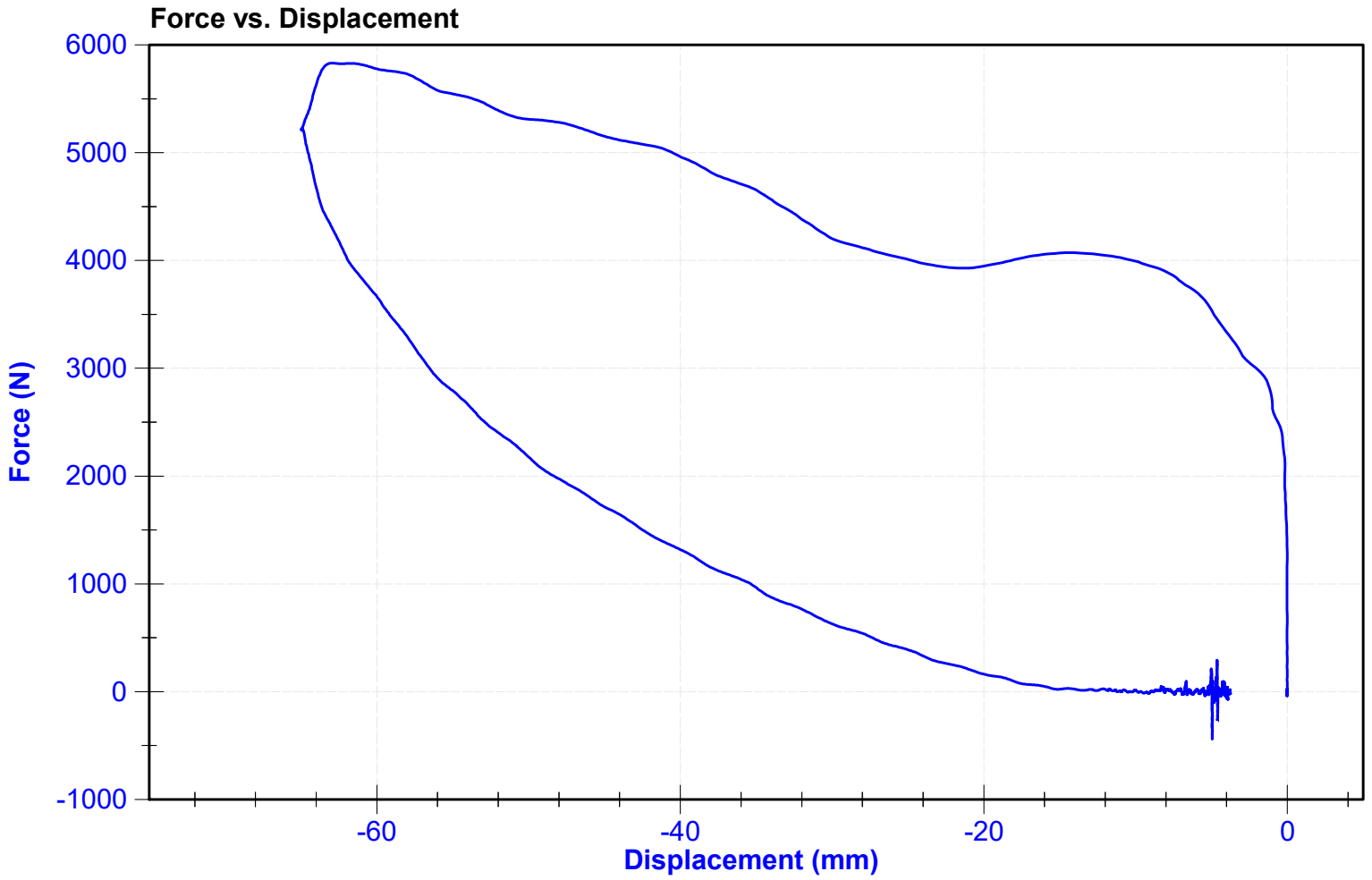
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

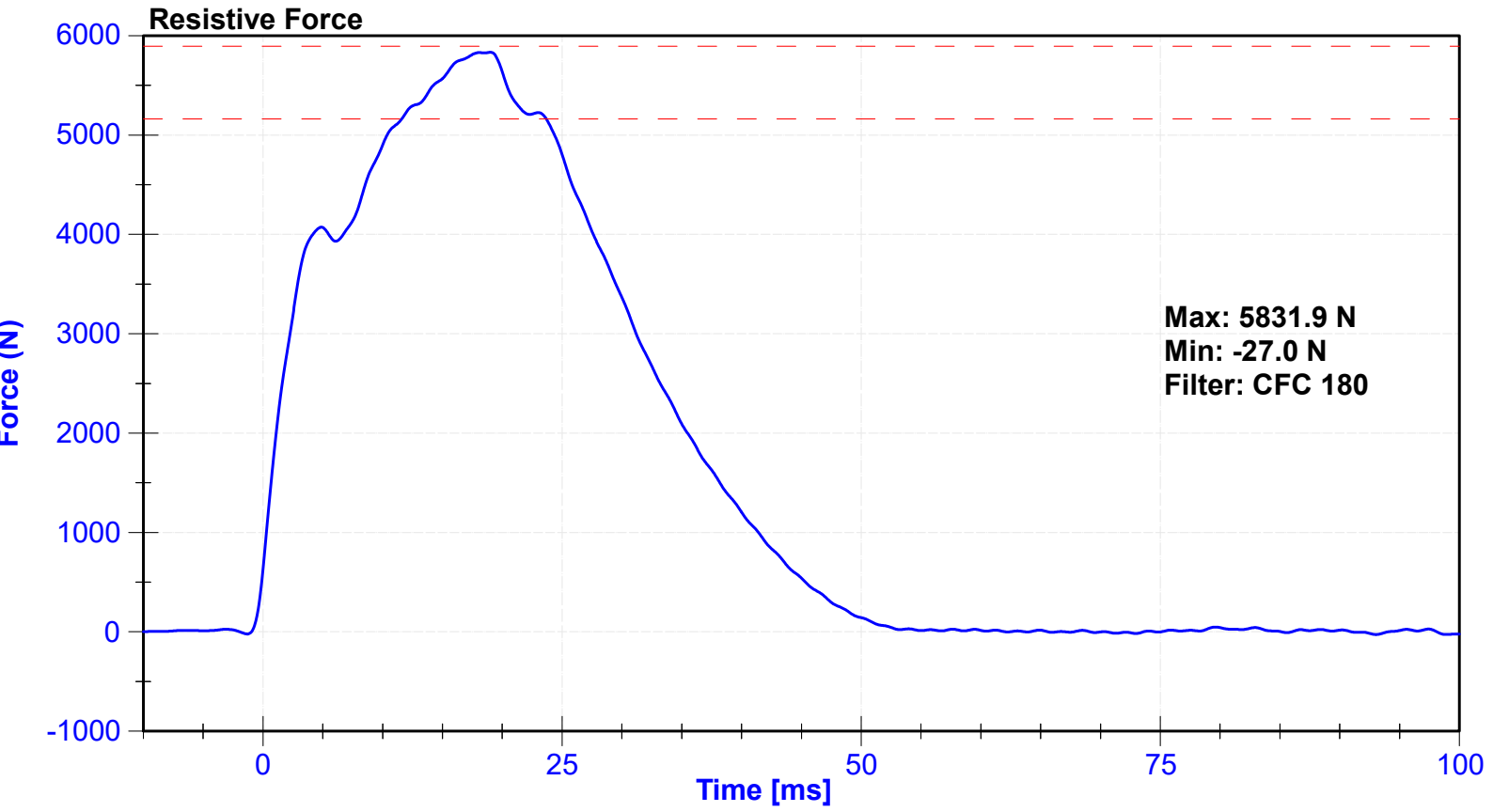
Results

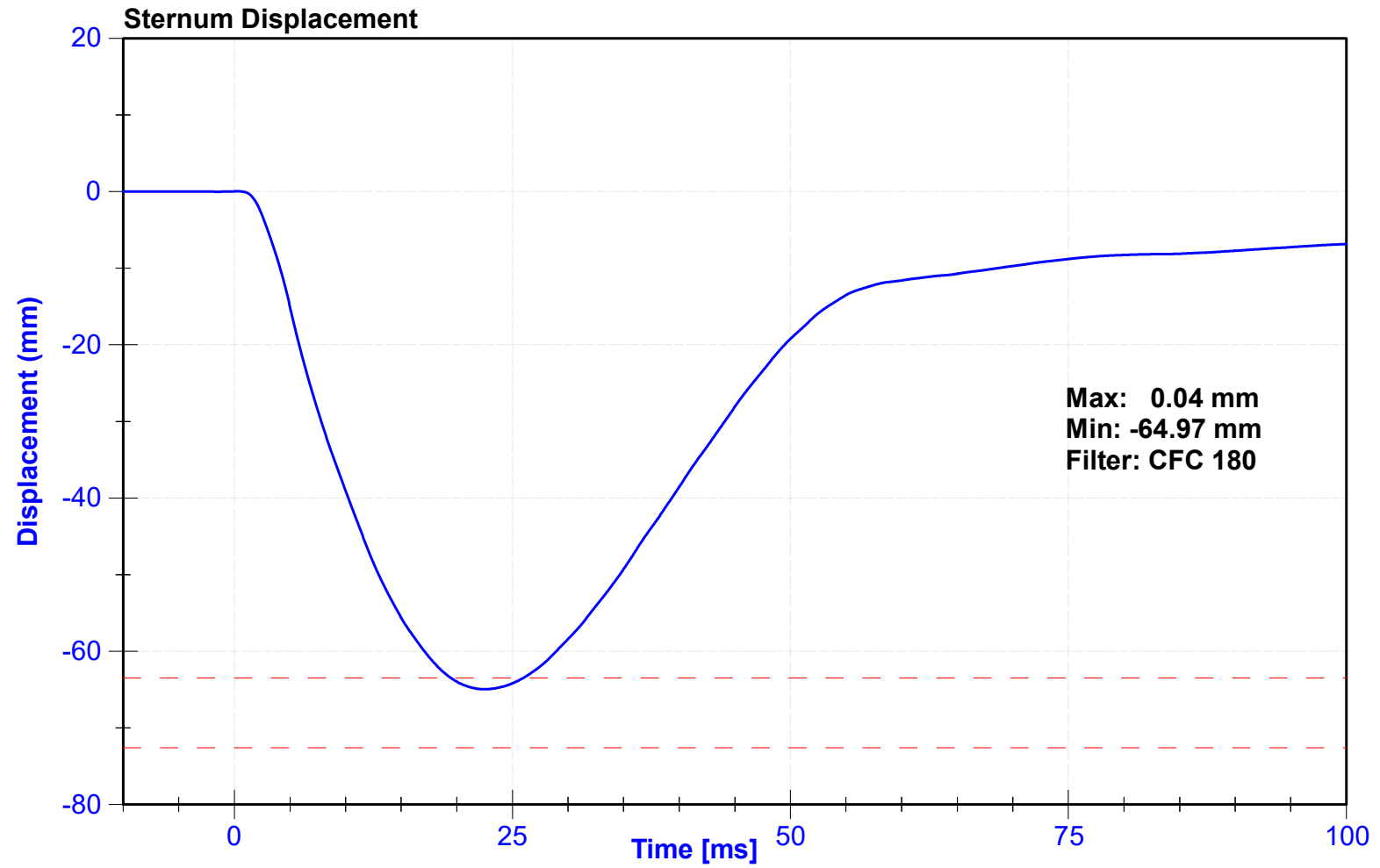
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	20.9	Pass
Humidity	10	70	%	16	Pass
Velocity	6.59	6.83	m/s	6.711	Pass
Chest Displacement	-72.6	-63.5	mm	-64.97	Pass
Resistive Force	5160	5894	N	5831.9	Pass
Hysteresis	69	85	%	72.8	Pass

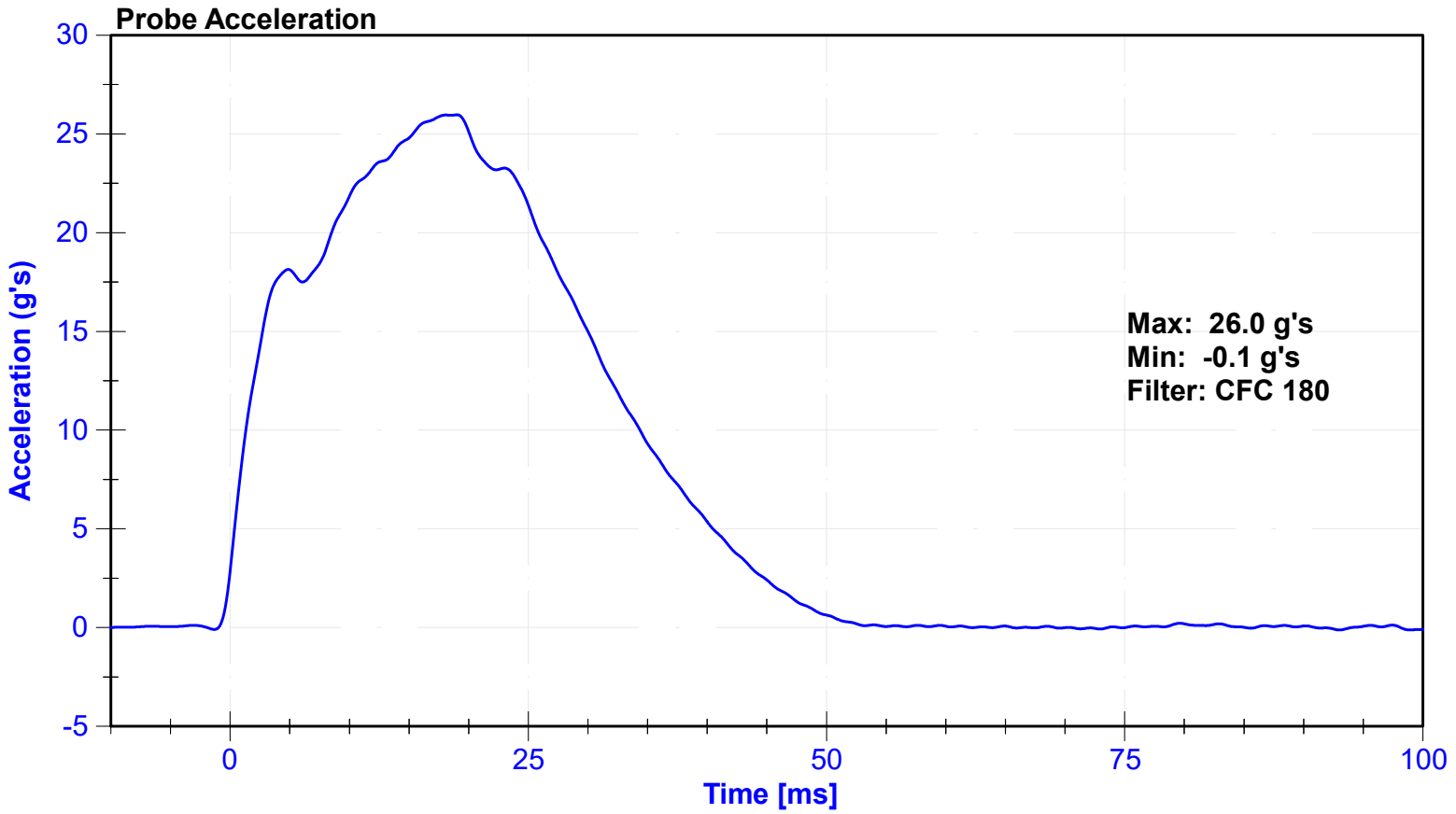
Transducer Calibrations

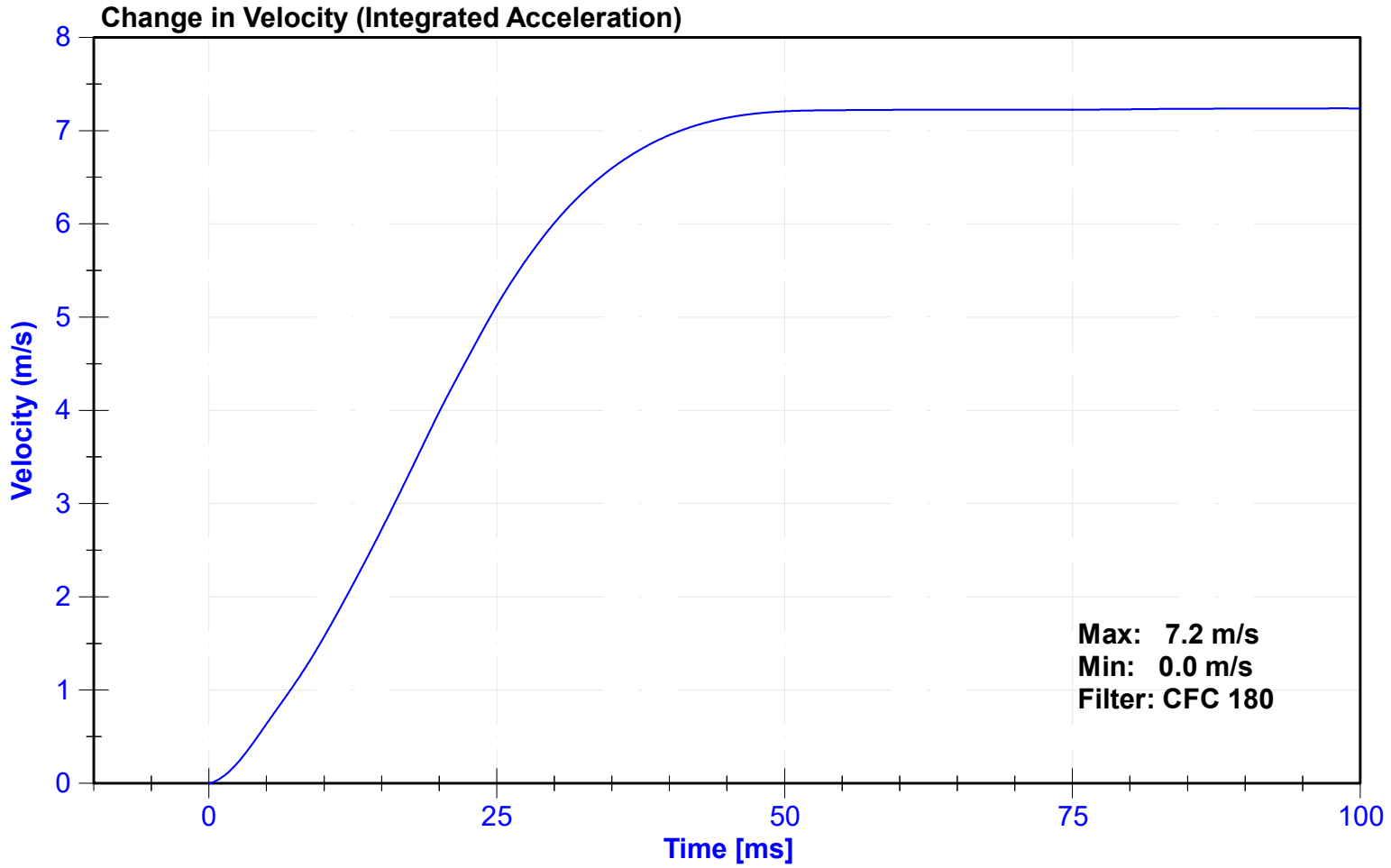
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Chest Potentiometer	Servo	1046	10/31/2024	5/1/2025




Resistive Force
Force (N)
6000
5000
4000
3000
2000
1000
0
-1000
0
25
50
75
100
Time [ms]
Max: 5831.9 N
Min: -27.0 N
Filter: CFC 180


Sternum Displacement
Displacement (mm)
20
0
-20
-40
-60
-80
0
25
50
75
100
Time [ms]
Max: 0.04 mm
Min: -64.97 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: 26.0 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: 7.2 m/s
Min: 0.0 m/s
Filter: CFC 180

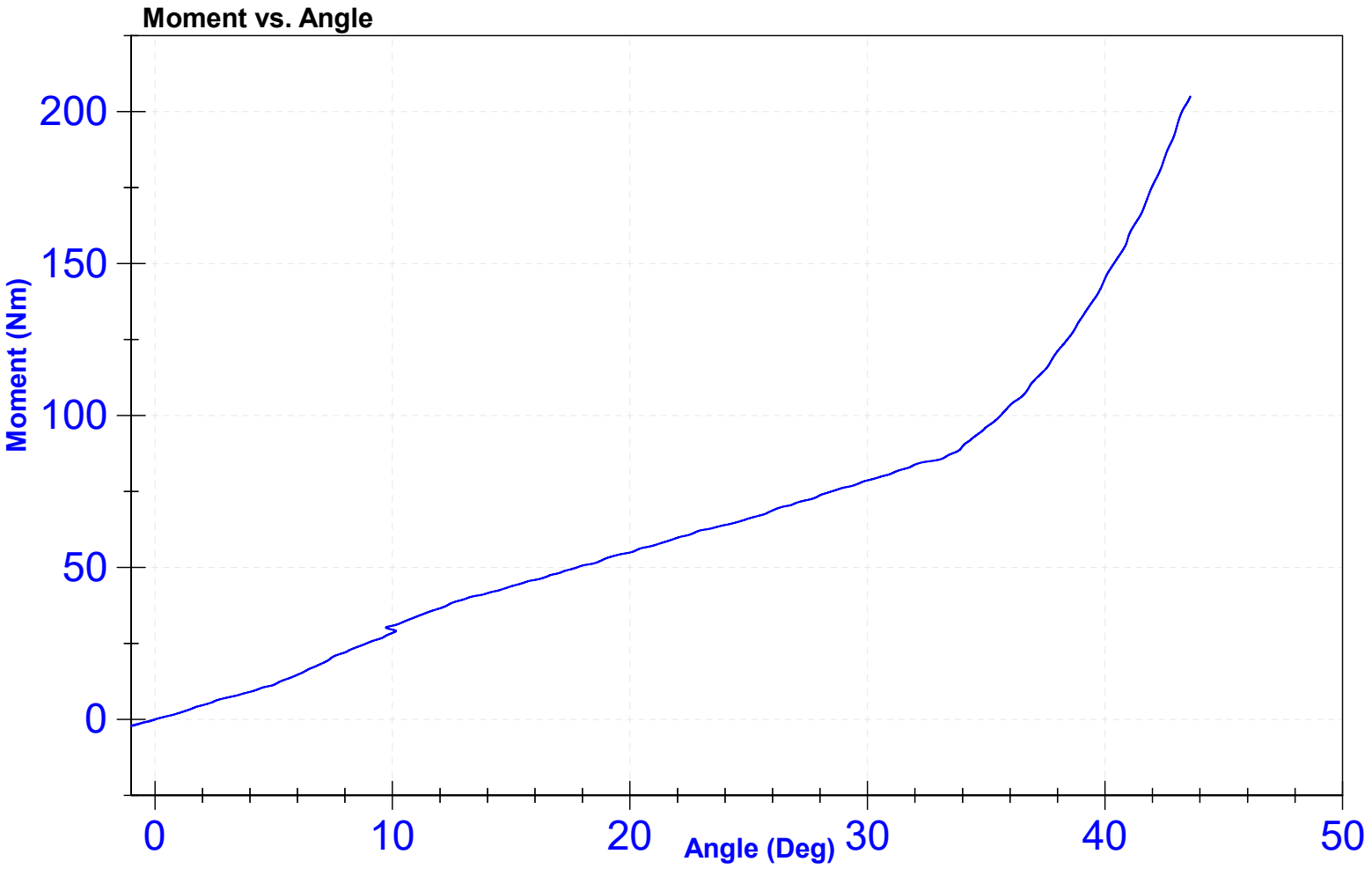
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.8	Pass
Humidity	10	70	%	15	Pass
Average Velocity	5	10	deg/s	7.0	Pass
Angle at 203Nm	40	50	deg	43.5	Pass
Moment at 30 degrees	0	94.9	Nm	78.7	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



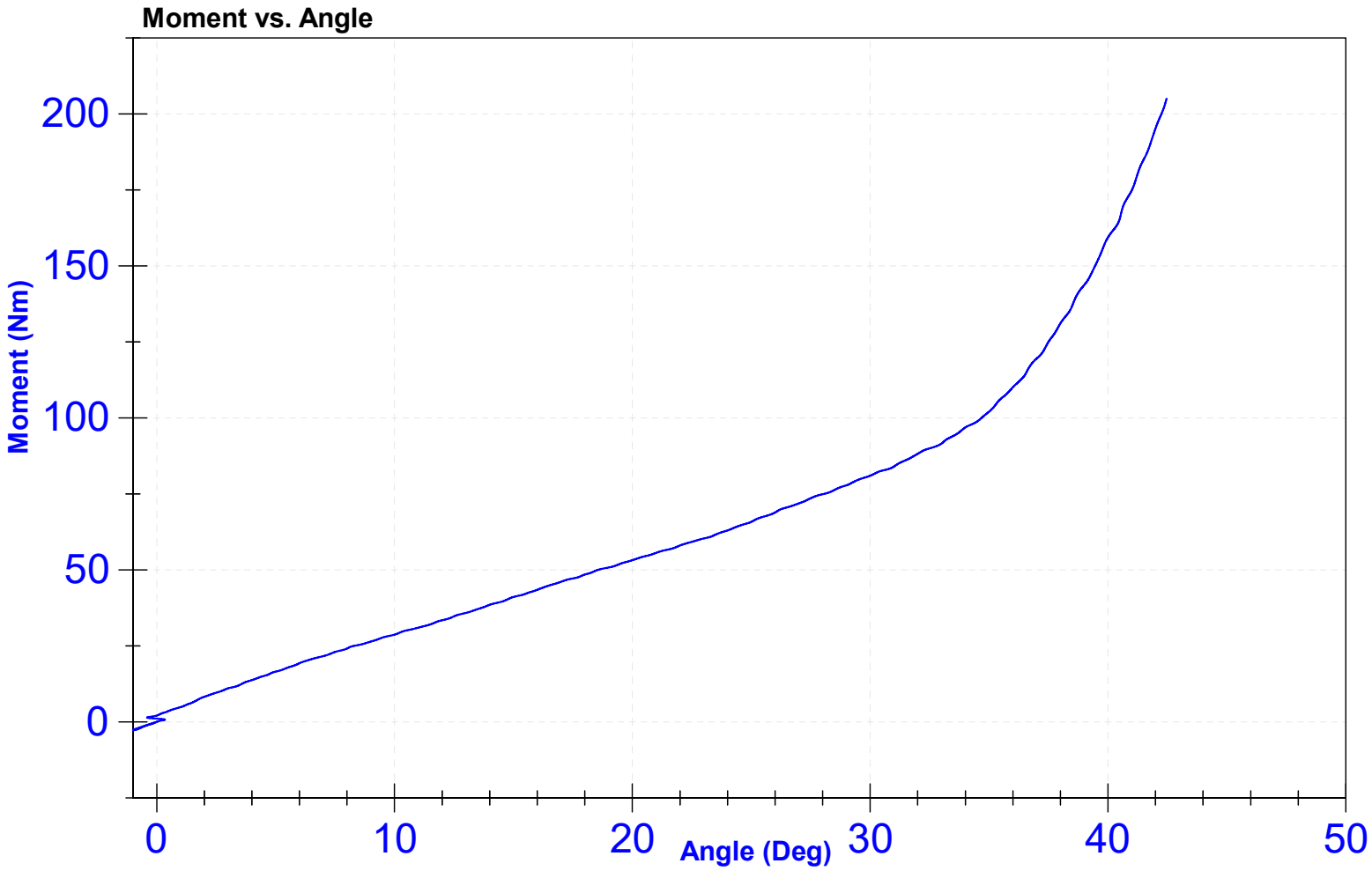
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.8	Pass
Humidity	10	70	%	15	Pass
Average Velocity	5	10	deg/s	7.0	Pass
Angle at 203Nm	40	50	deg	42.4	Pass
Moment at 30 degrees	0	94.9	Nm	81.0	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



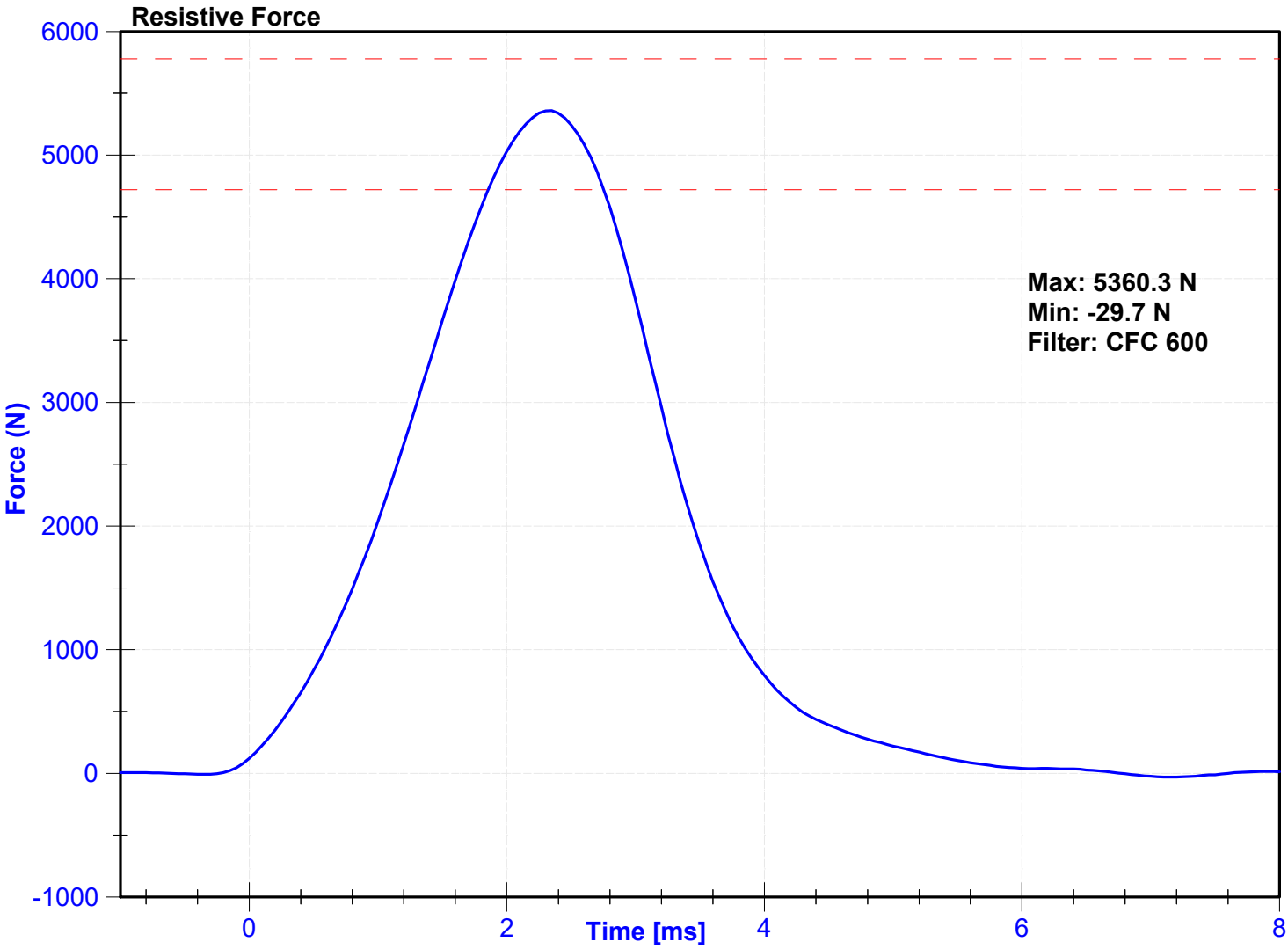
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

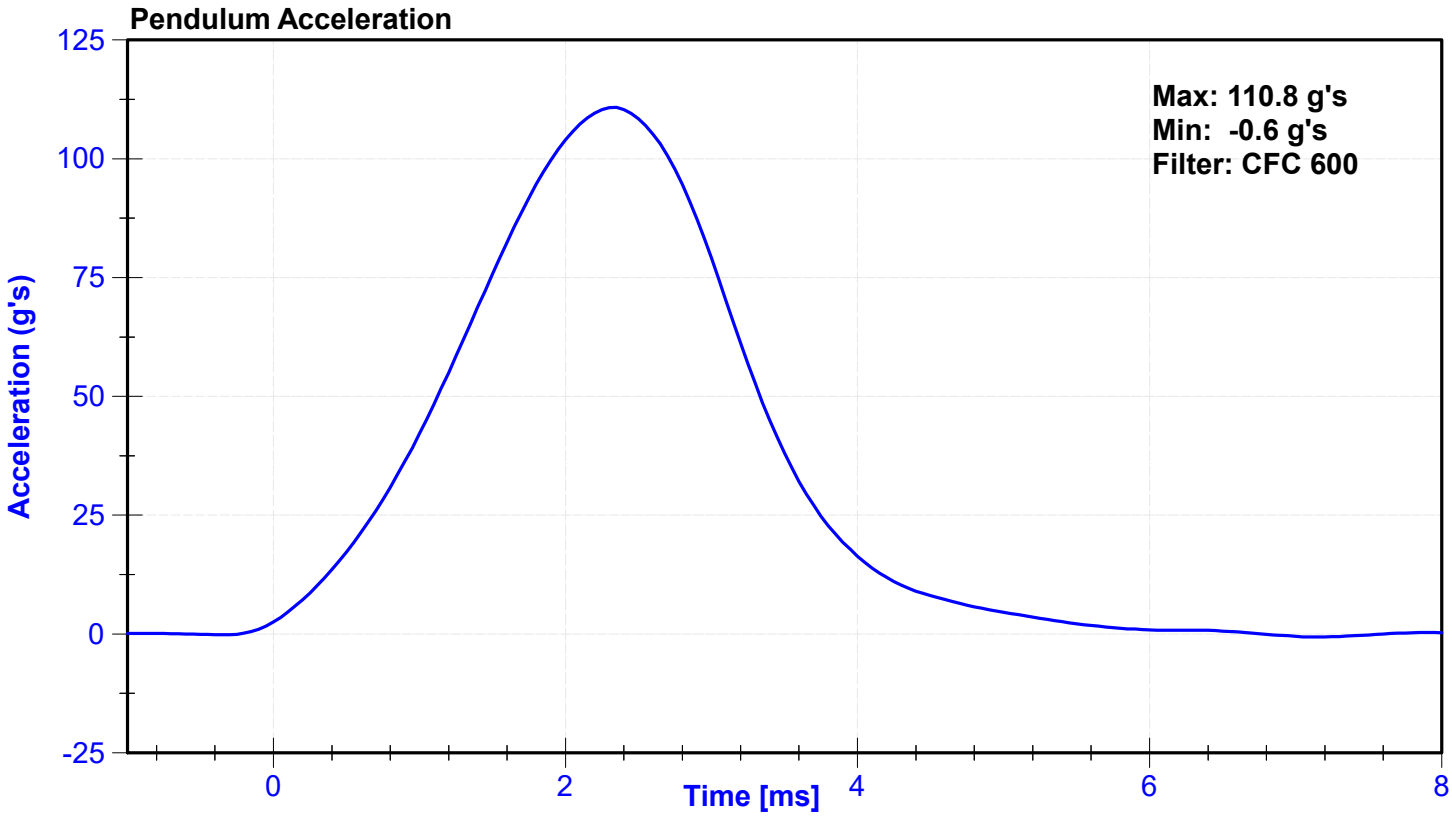
Results

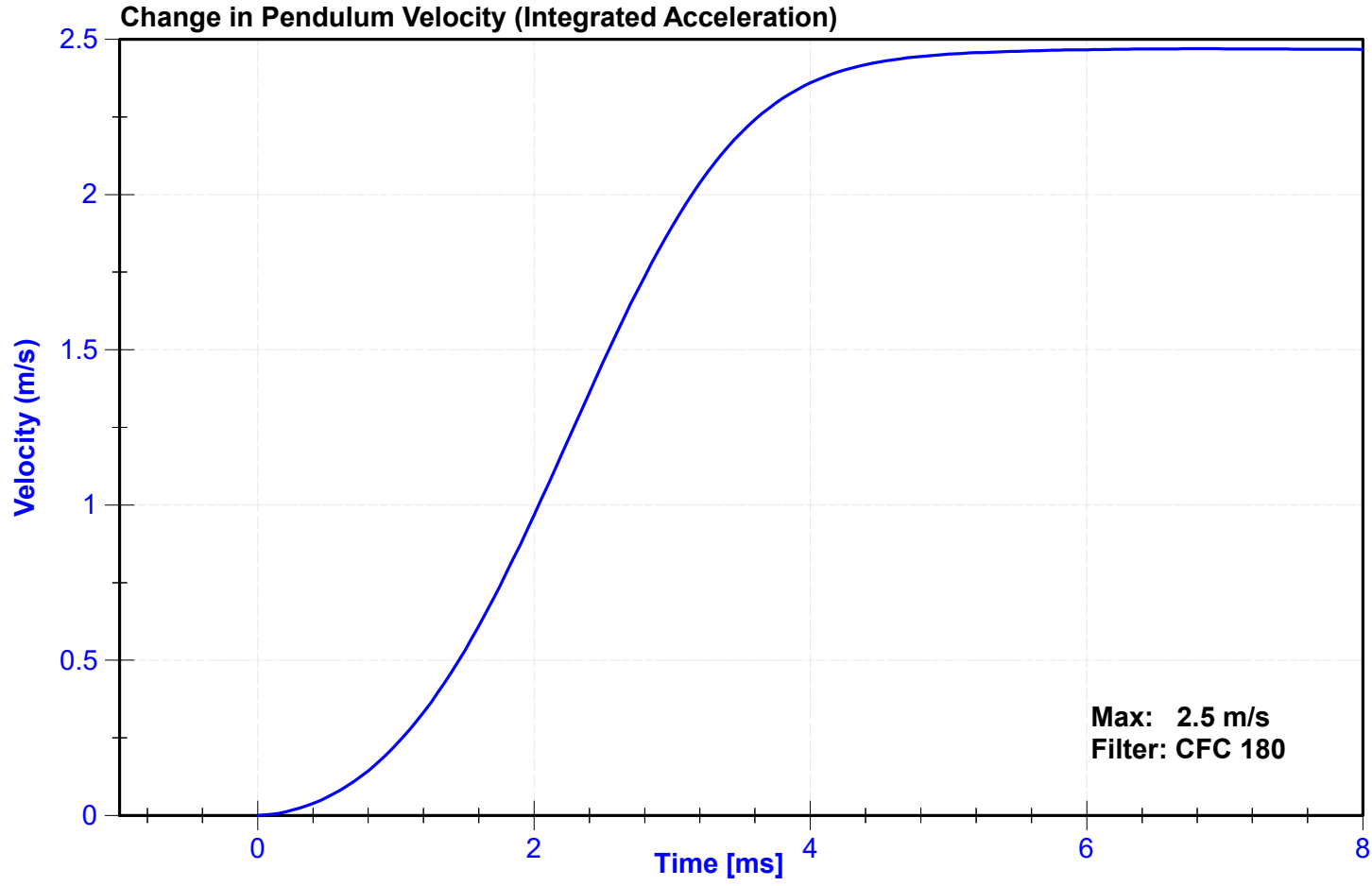
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	15	Pass
Velocity	2.07	2.13	m/s	2.081	Pass
Maximum Resistive Force	4720	5780	N	5360.3	Pass

Transducer Calibrations

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




Pendulum Acceleration
Max: 110.8 g's
Min: -0.6 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]

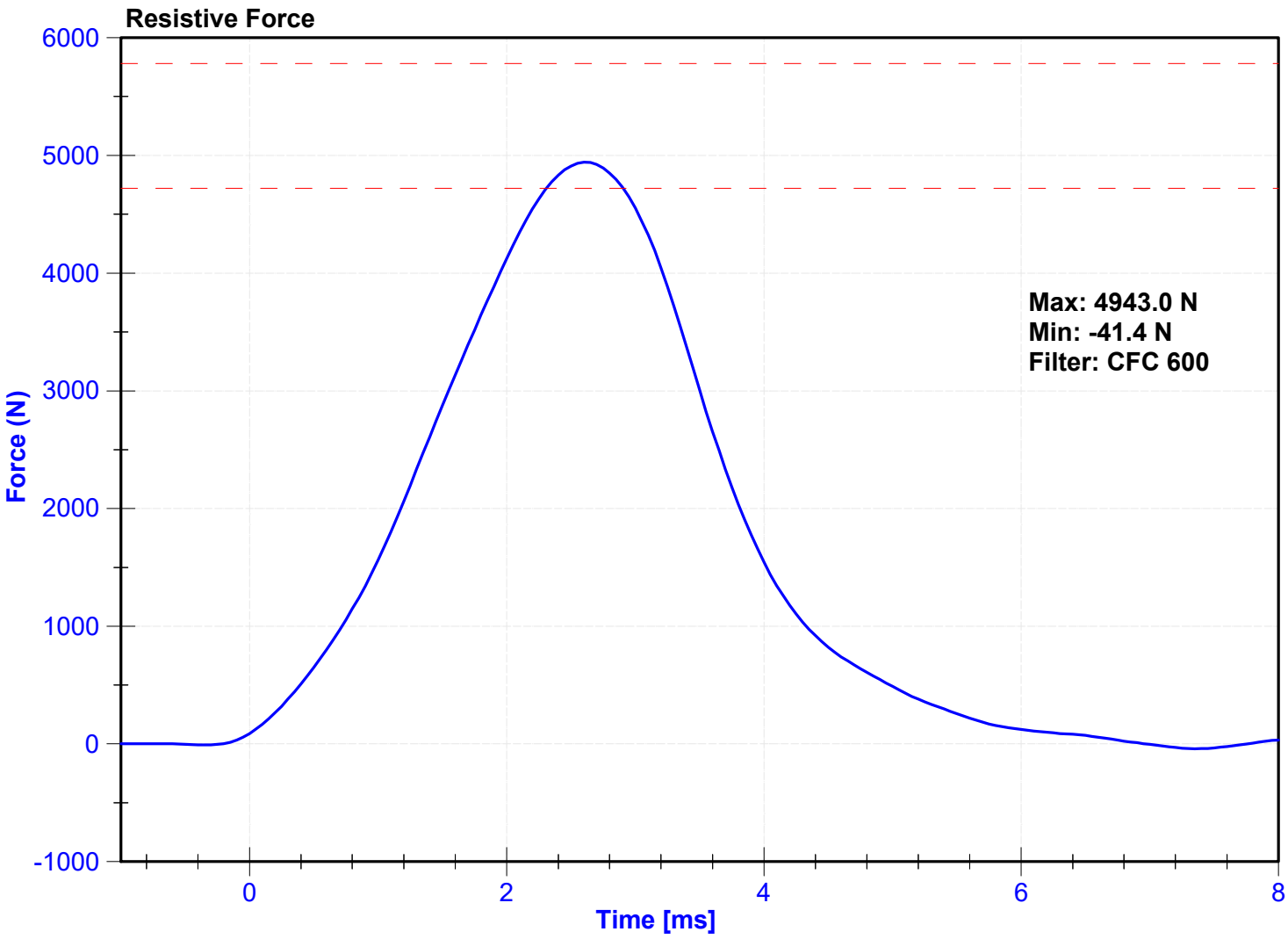
ATD Manufacturer	Humanetics	Test Technician	K. Konieczny
ATD Serial Number	065	Laboratory Supervisor	J. Kinderman

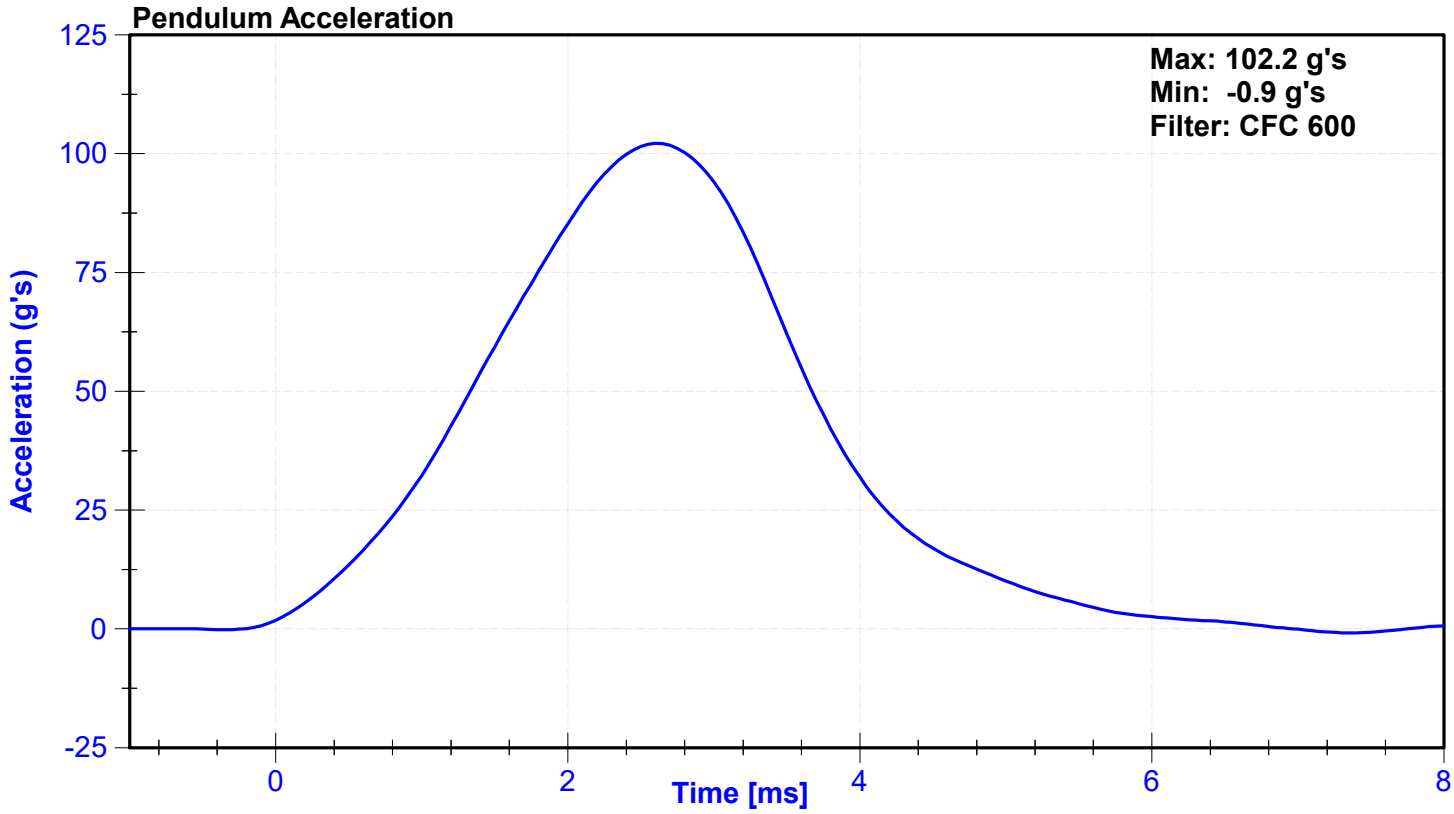
Results

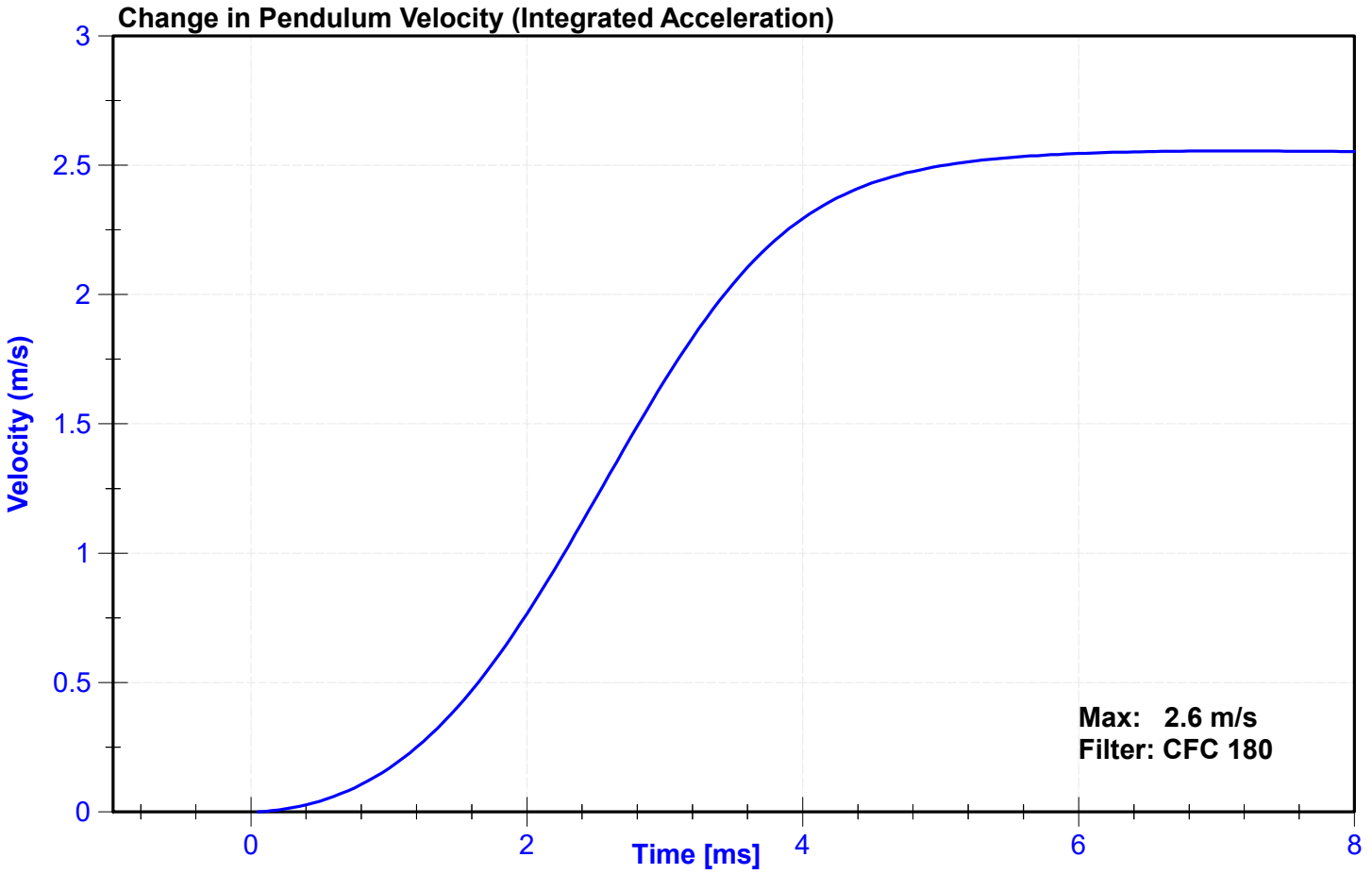
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	15	Pass
Velocity	2.07	2.13	m/s	2.078	Pass
Maximum Resistive Force	4720	5780	N	4943.0	Pass

Transducer Calibrations

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




Pendulum Acceleration
Max: 102.2 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)
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

POST-TEST

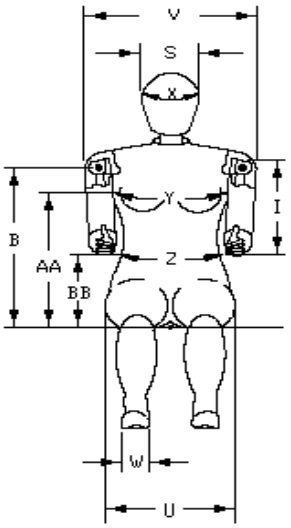
HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

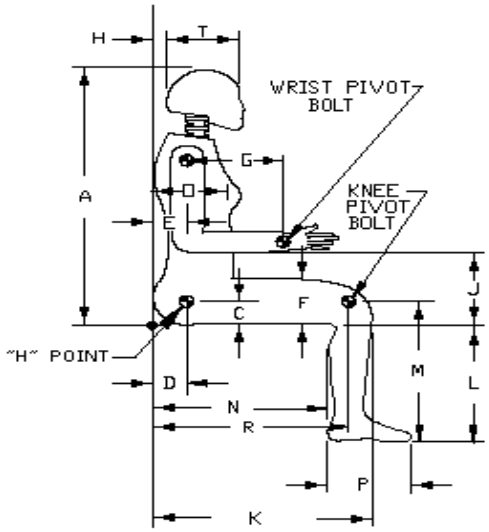
SERIAL NO: 137

External Measurements - Hybrid 3 - 5th Female

Technician: J. Rios Date: 1/9/2025

Dummy Serial Number: 137





Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	775	800	785	Pass
B	Shoulder Pivot Height	432	457	443	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	76	Pass
F	Thigh Clearance	119	135	131	Pass
G	Back of Elbow to Wrist Pivot	244	259	254	Pass
H	Head Back to Backline	43	48	45	Pass
I	Shoulder to Elbow Length	277	297	286	Pass
J	Elbow Rest Height	183	203	194	Pass
K	Buttock to Knee Length	521	546	532	Pass
L	Popliteal Height	356	376	366	Pass
M	Knee Pivot Height	394	419	410	Pass
N	Buttock Popliteal Length	414	439	430	Pass
O	Chest Depth without Jacket	175	191	187	Pass
P	Foot Length (right)	219	234	226	Pass
R	Buttock To Knee Pivot Length	457	483	470	Pass
S	Head Breadth	137	147	144	Pass
T	Head Depth	178	188	181	Pass
U	Hip Breadth	300	315	308	Pass
V	Shoulder Breadth	351	366	358	Pass
W	Foot Breadth	79	94	83	Pass
X	Head Circumference	528	549	538	Pass
Y	Chest Circumference with Jacket	851	881	877	Pass
Z	Waist Circumference	460	790	620	Pass
AA	Reference Location (Chest Circumference)	333	358	339	Pass
BB	Reference Location (Waist Circumference)	160	170	165	Pass

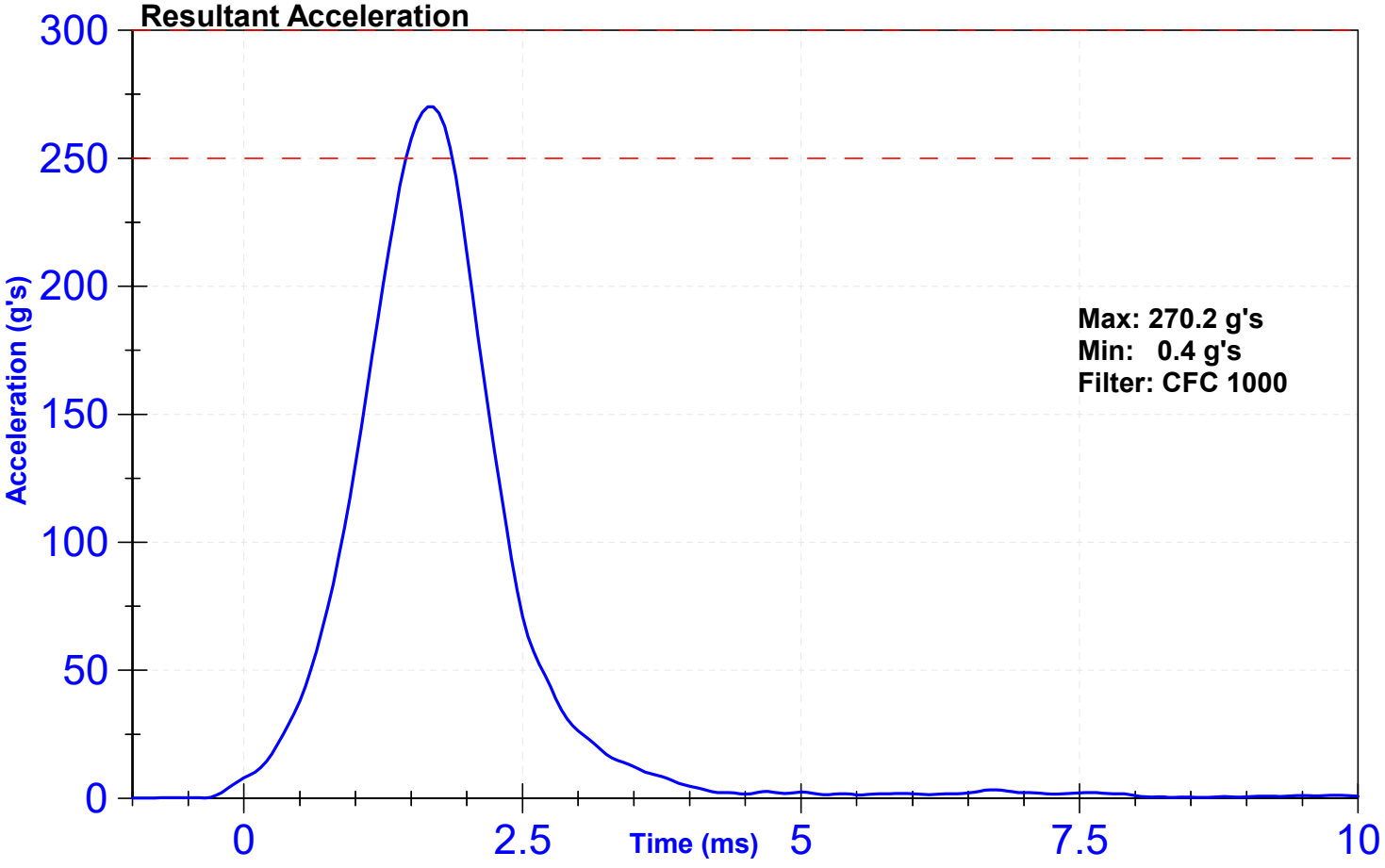
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

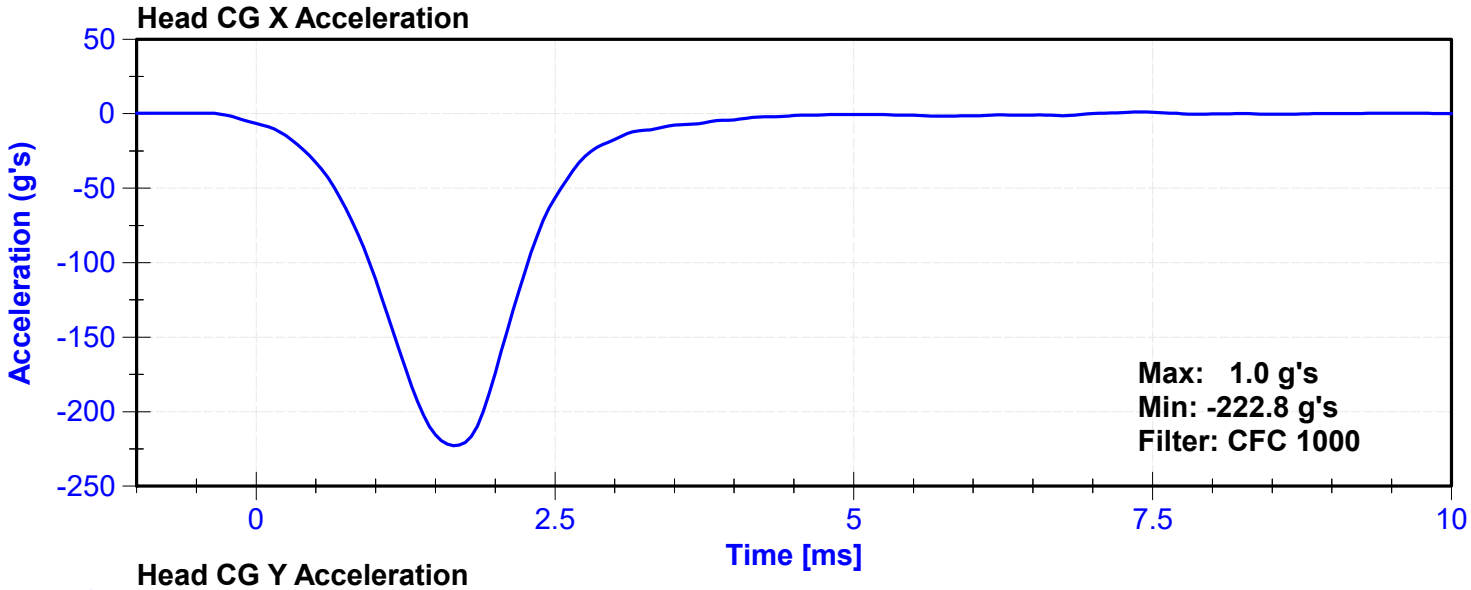
Results

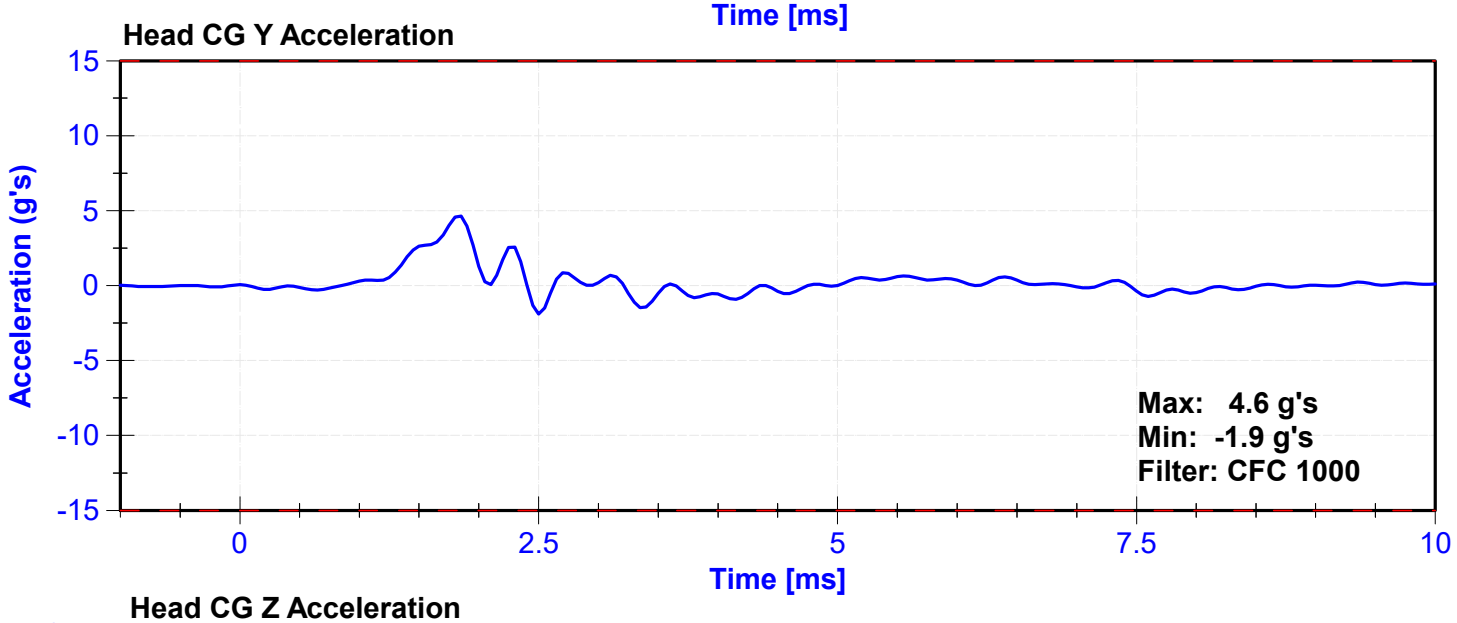
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	20.9	Pass
Humidity	10	70	%	31	Pass
Resultant Acceleration	250	300	g's	270.2	Pass
Oscillation	0	10	%	1.2	Pass
Lateral Acceleration	-15	15	g's	4.6	Pass

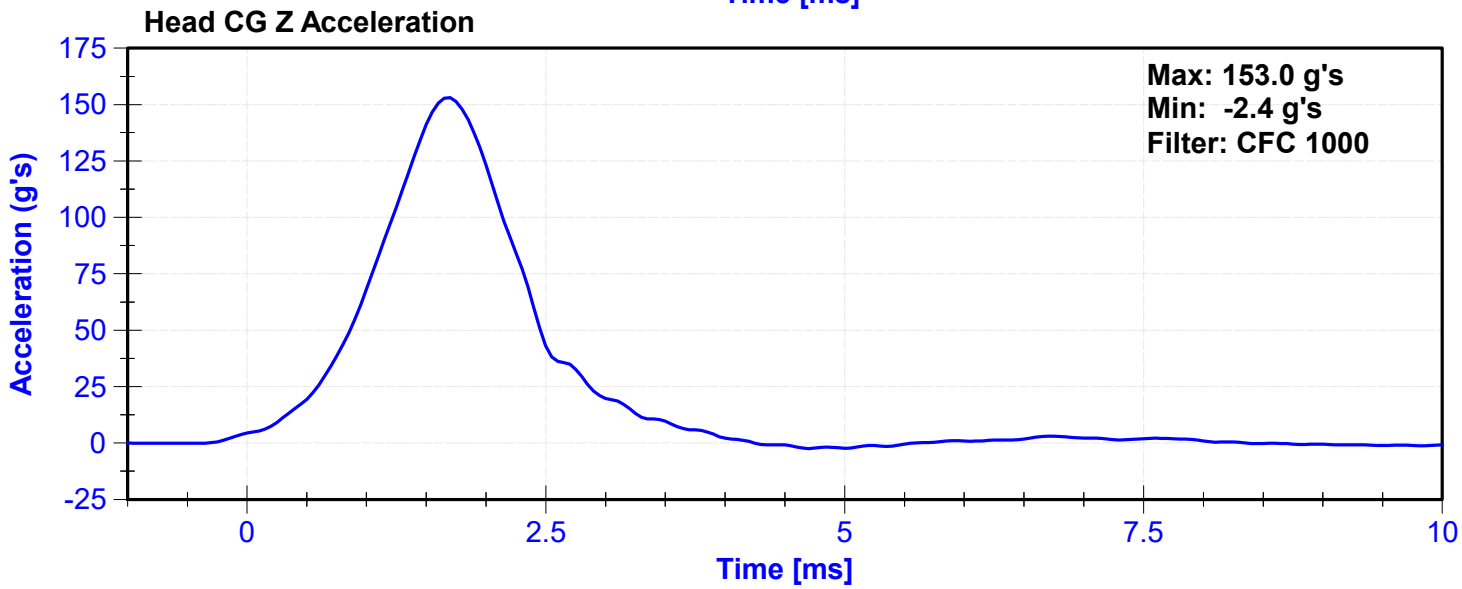
Transducer Calibrations

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)
50
0
-50
-100
-150
-200
-250
0
2.5
5
7.5
10
Time [ms]
Max: 1.0 g's
Min: -222.8 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: 4.6 g's
Min: -1.9 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: 153.0 g's
Min: -2.4 g's
Filter: CFC 1000

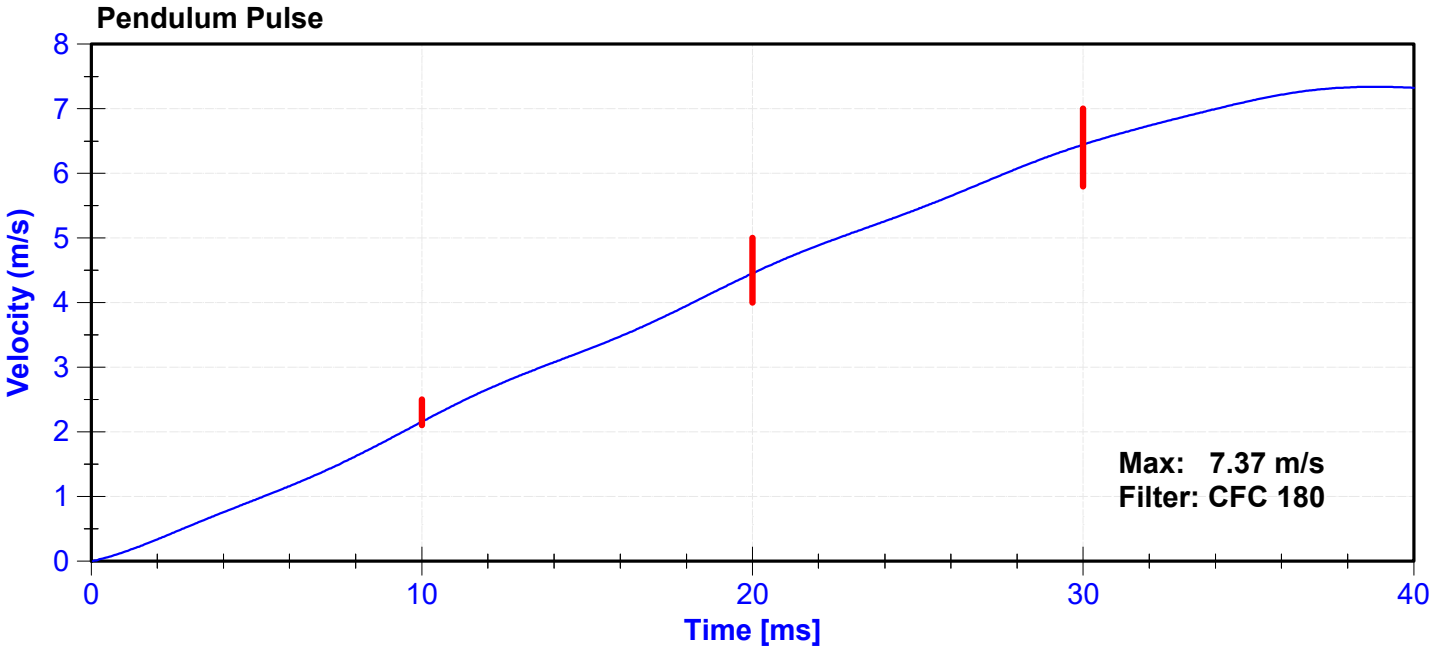
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

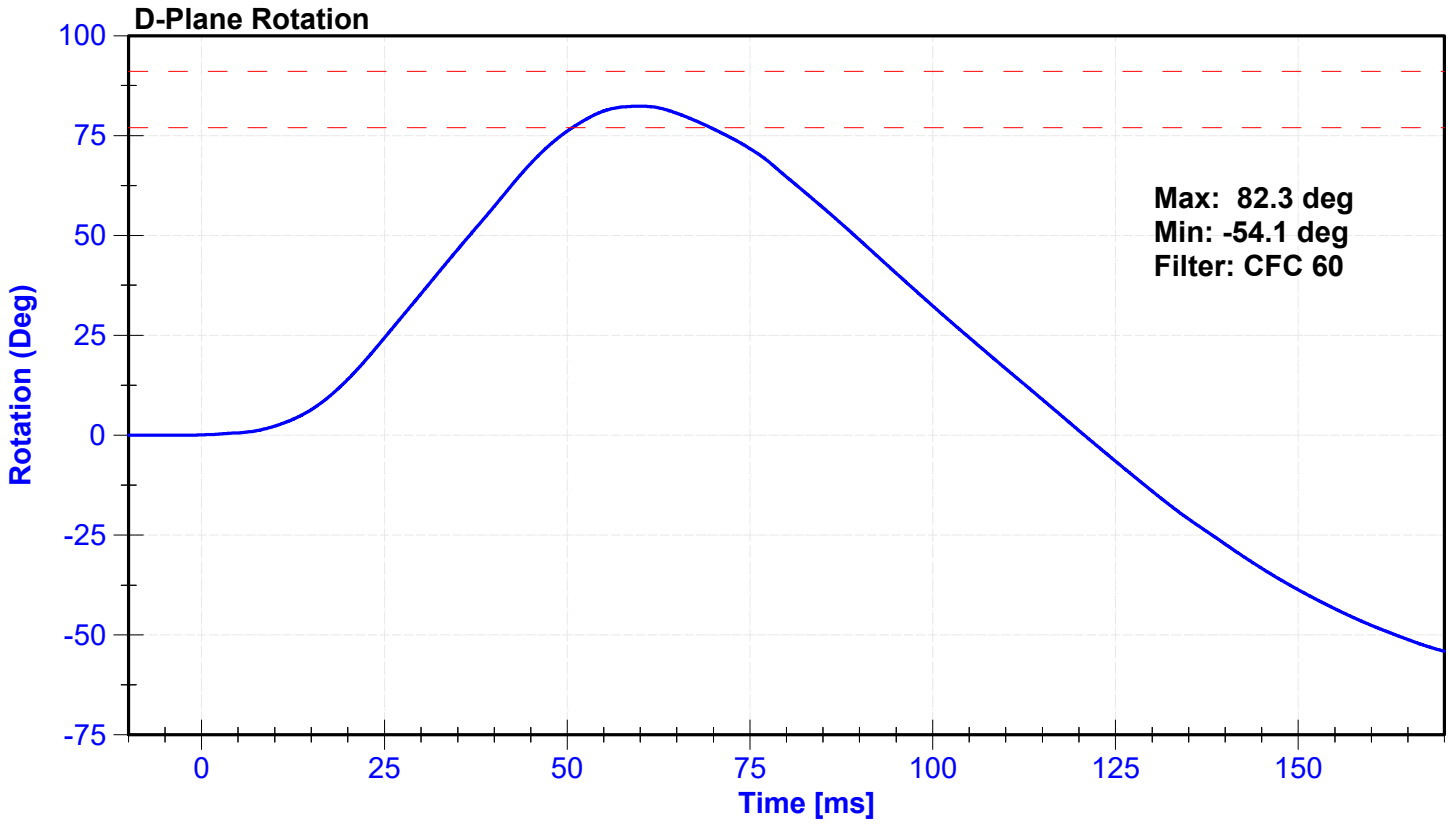
Results

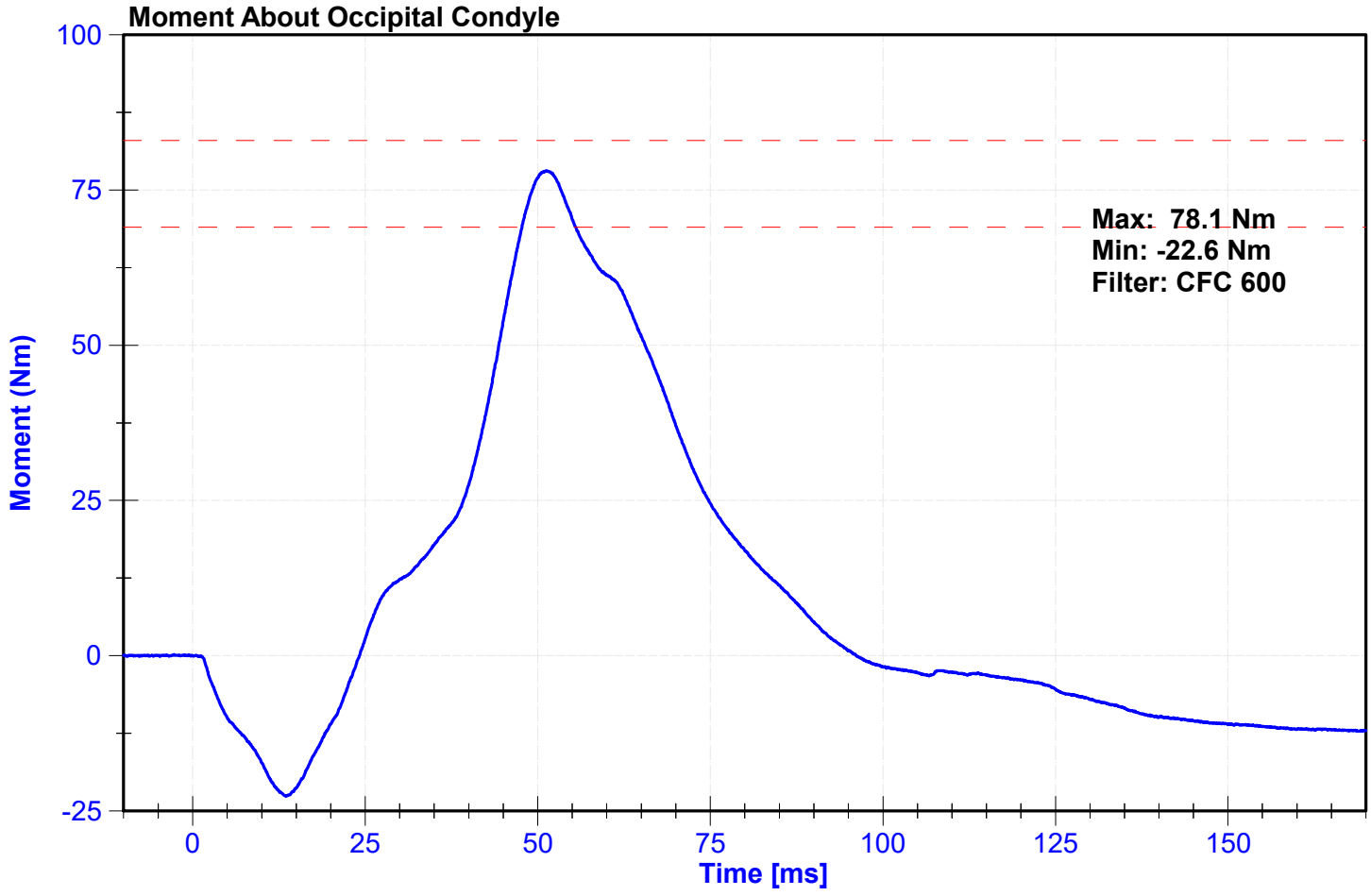
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	6.89	7.13	m/s	7.103	Pass
Pendulum Impulse at 10ms	2.1	2.5	m/s	2.16	Pass
Pendulum Impulse at 20ms	4.0	5.0	m/s	4.45	Pass
Pendulum Impulse at 30ms	5.8	7.0	m/s	6.44	Pass
Max D Plane Rotation	77	91	deg	82.3	Pass
Max Moment During Rotation Interval	69	83	Nm	78.1	Pass
Moment Decay to 10.0 Nm	80	100	ms	86.3	Pass

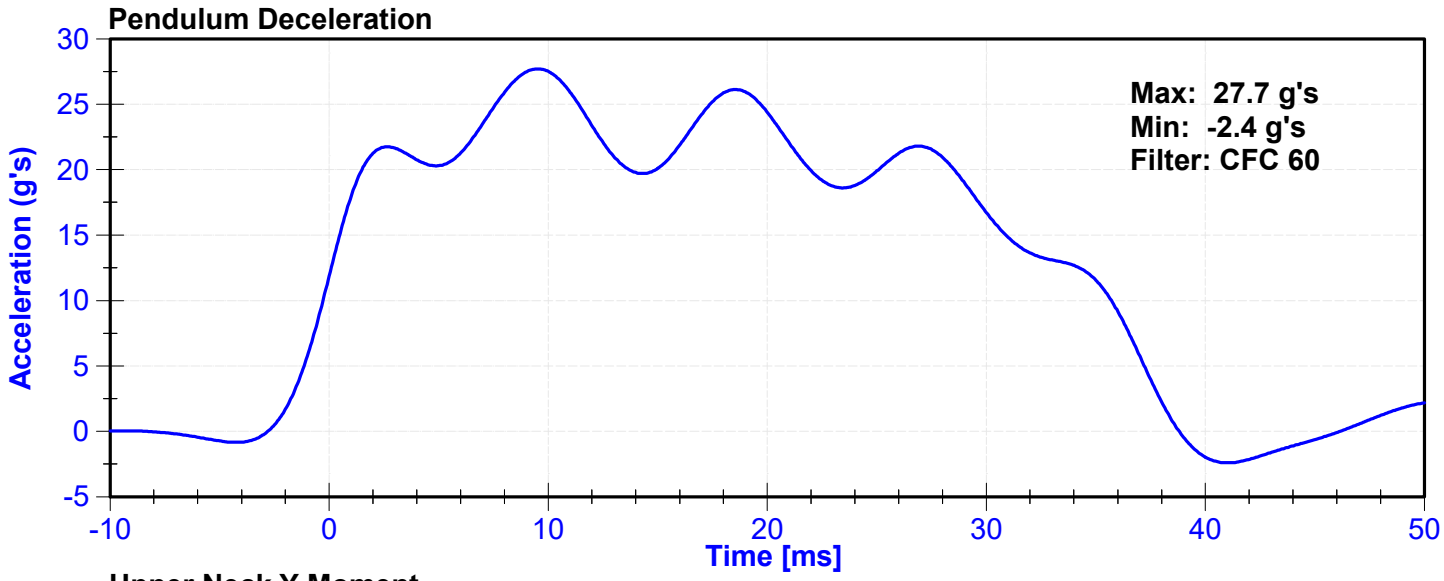
Transducer Calibrations

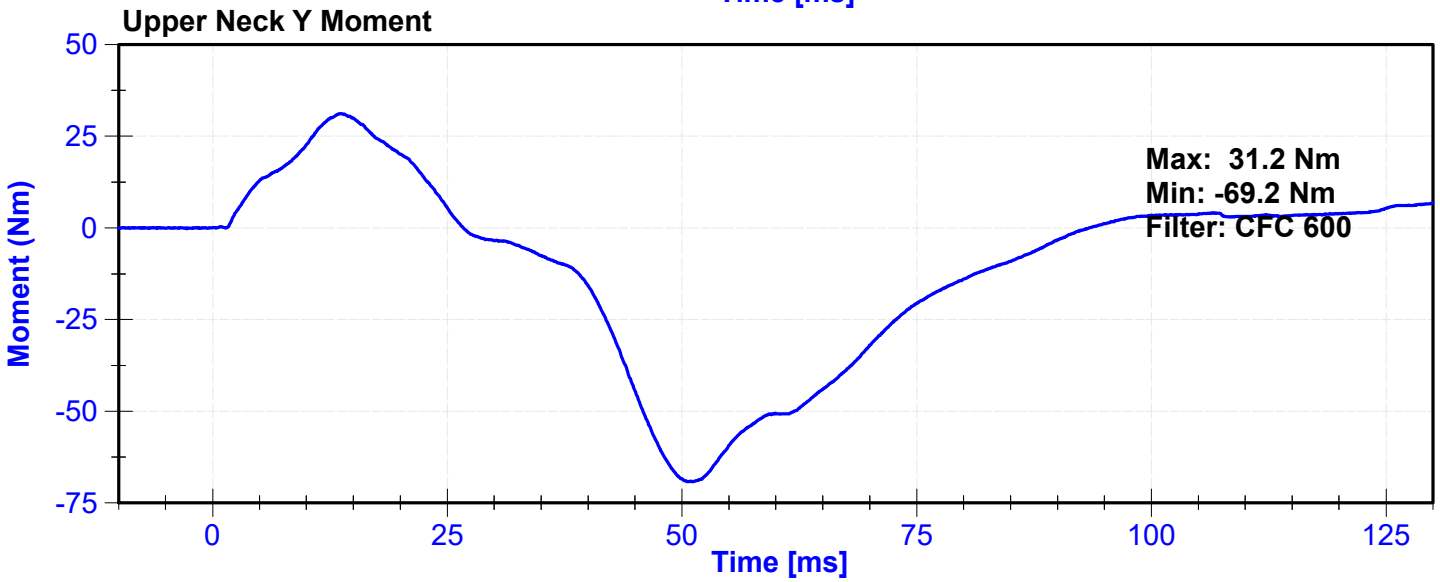
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Pendulum Potentiometer	ETI	SP22G_LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	SP22G_LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Denton	2184-FX	7/10/2024	7/10/2025

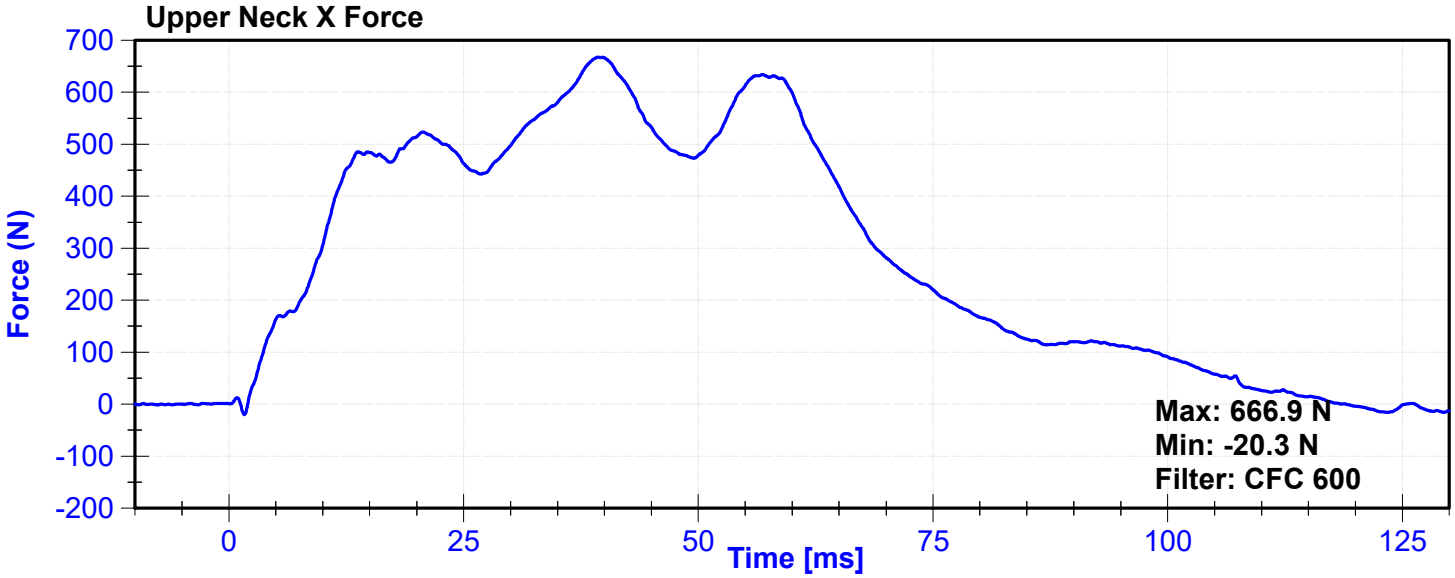



D-Plane Rotation
Max: 82.3 deg
Min: -54.1 deg
Filter: CFC 60
Rotation (Deg)
Time [ms]
100
75
50
25
0
-25
-50
-75
0
25
50
75
100
125
150


Moment About Occipital Condyle
Max: 78.1 Nm
Min: -22.6 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: 27.7 g's
Min: -2.4 g's
Filter: CFC 60


Upper Neck Y Moment
Moment (Nm)
Time [ms]
Max: 31.2 Nm
Min: -69.2 Nm
Filter: CFC 600


Upper Neck X Force
Force (N)
Time [ms]
Max: 666.9 N
Min: -20.3 N
Filter: CFC 600

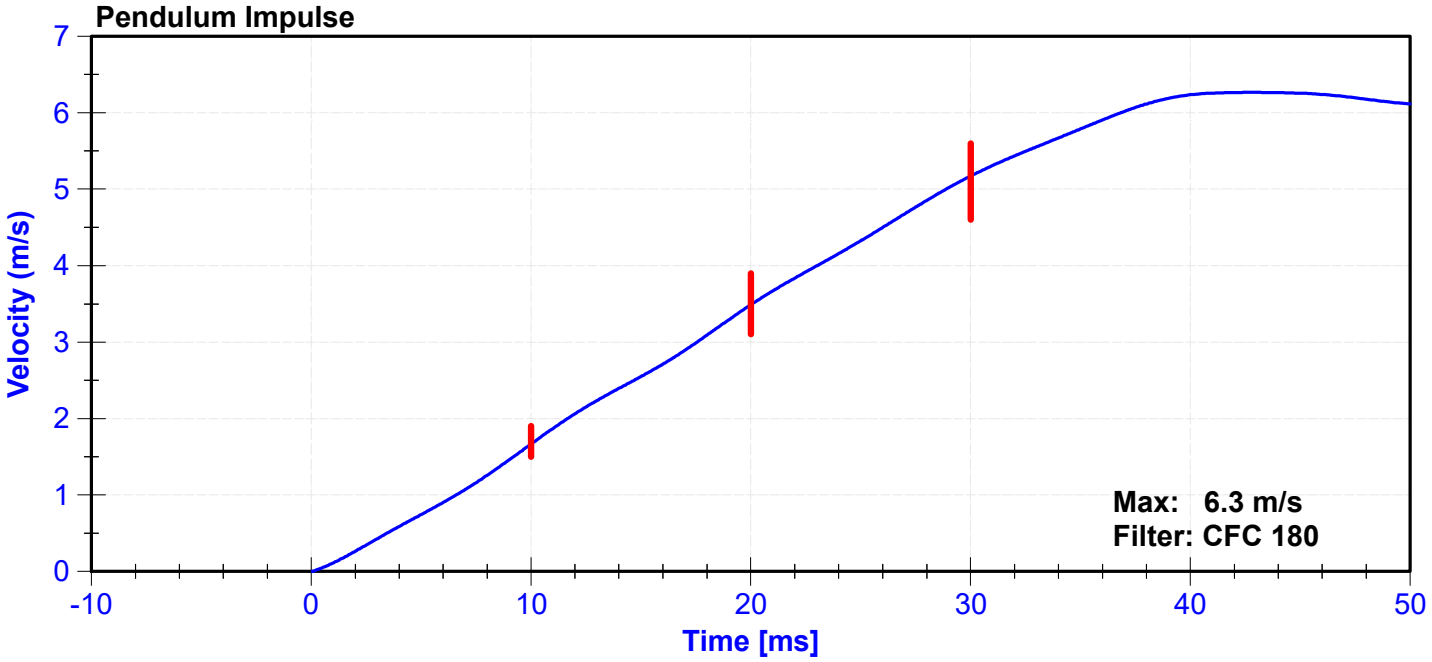
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

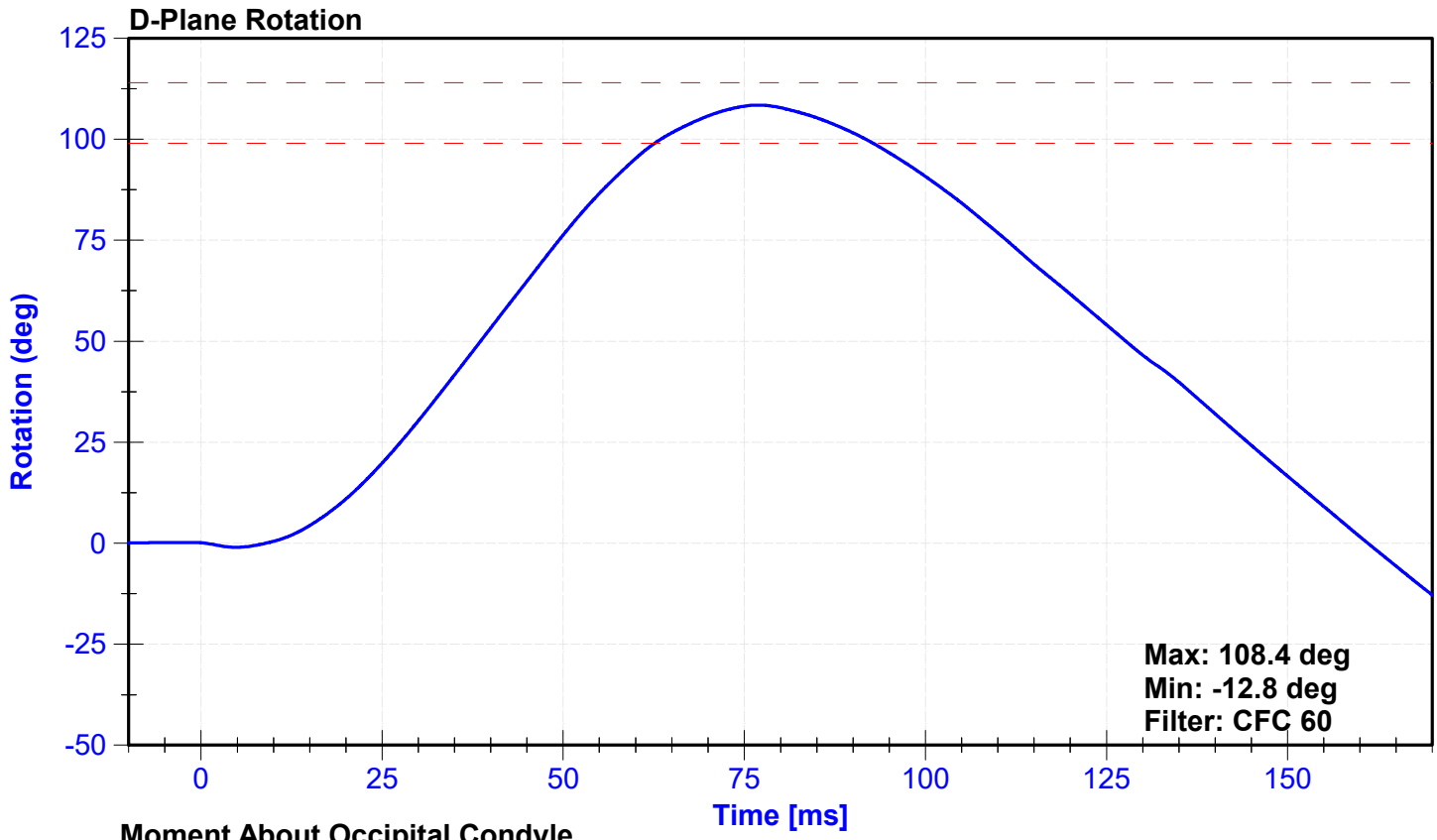
Results

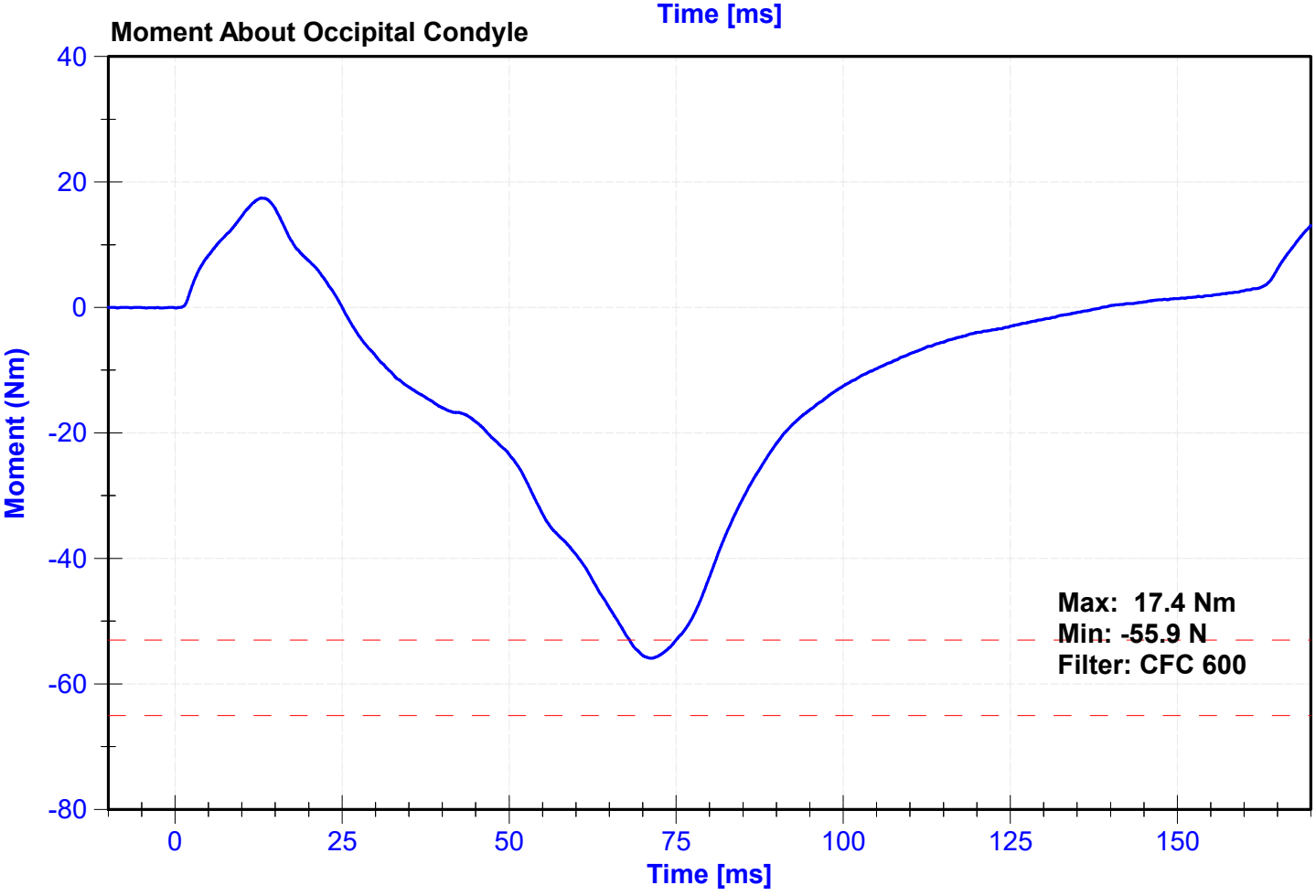
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	5.95	6.19	m/s	6.054	Pass
Pendulum Impulse at 10ms	1.5	1.9	m/s	1.67	Pass
Pendulum Impulse at 20ms	3.1	3.9	m/s	3.49	Pass
Pendulum Impulse at 30ms	4.6	5.6	m/s	5.17	Pass
D Plane Rotation	99	114	deg	108.4	Pass
Moment During Rotation Interval	-65	-53	Nm	-55.9	Pass
Moment Decay to -10Nm	94	114	ms	104.5	Pass

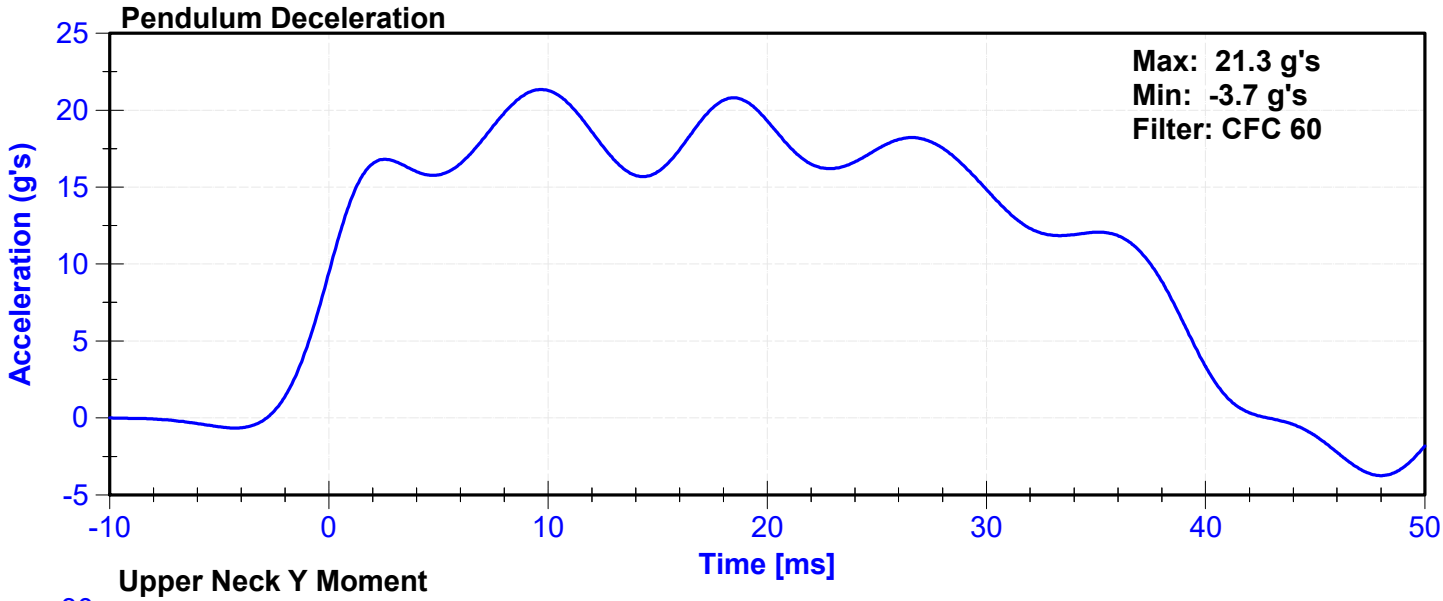
Transducer Calibrations

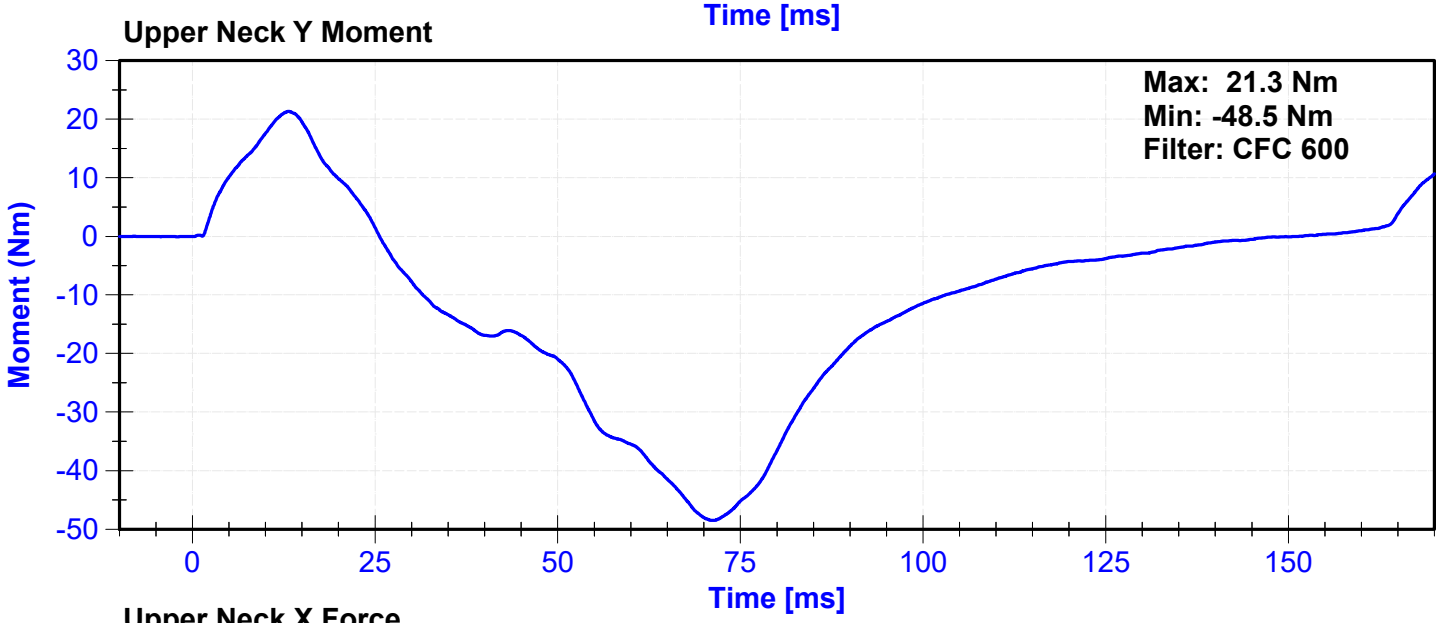
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	C16650	11/1/2024	11/1/2025
Pendulum Potentiometer	ETI	SP22G_LABPOT1	5/7/2024	5/7/2025
Condyle Potentiometer	ETI	SP22G_LABPOT2	5/7/2024	5/7/2025
Upper Neck Load Cell	Denton	2184-FX	7/10/2024	7/10/2025

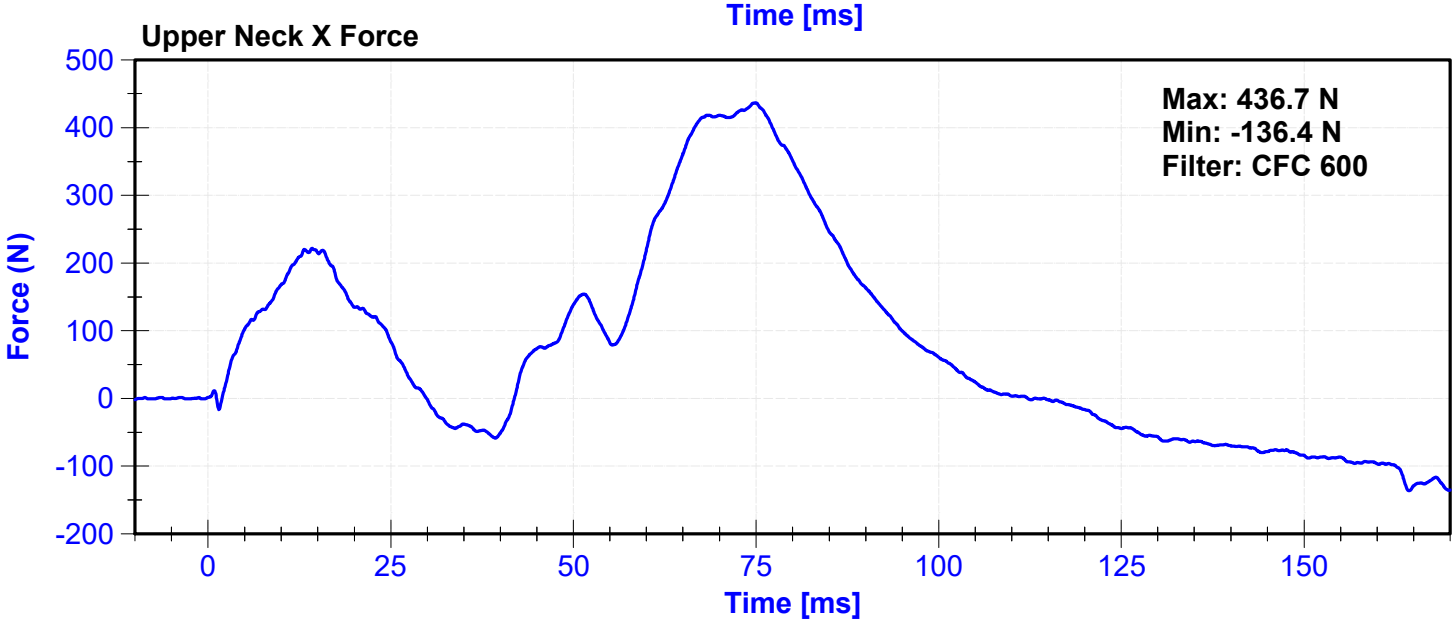



D-Plane Rotation
Rotation (deg)
125
100
75
50
25
0
-25
-50
0
25
50
75
100
125
150
Time [ms]
Max: 108.4 deg
Min: -12.8 deg
Filter: CFC 60


Moment About Occipital Condyle
Moment (Nm)
40
20
0
-20
-40
-60
-80
0
25
50
75
100
125
150
Time [ms]
Max: 17.4 Nm
Min: -55.9 N
Filter: CFC 600


Pendulum Deceleration
Max: 21.3 g's
Min: -3.7 g's
Filter: CFC 60
Acceleration (g's)
Time [ms]


Upper Neck Y Moment
Max: 21.3 Nm
Min: -48.5 Nm
Filter: CFC 600
Moment (Nm)
Time [ms]


Upper Neck X Force
Max: 436.7 N
Min: -136.4 N
Filter: CFC 600
Force (N)
Time [ms]

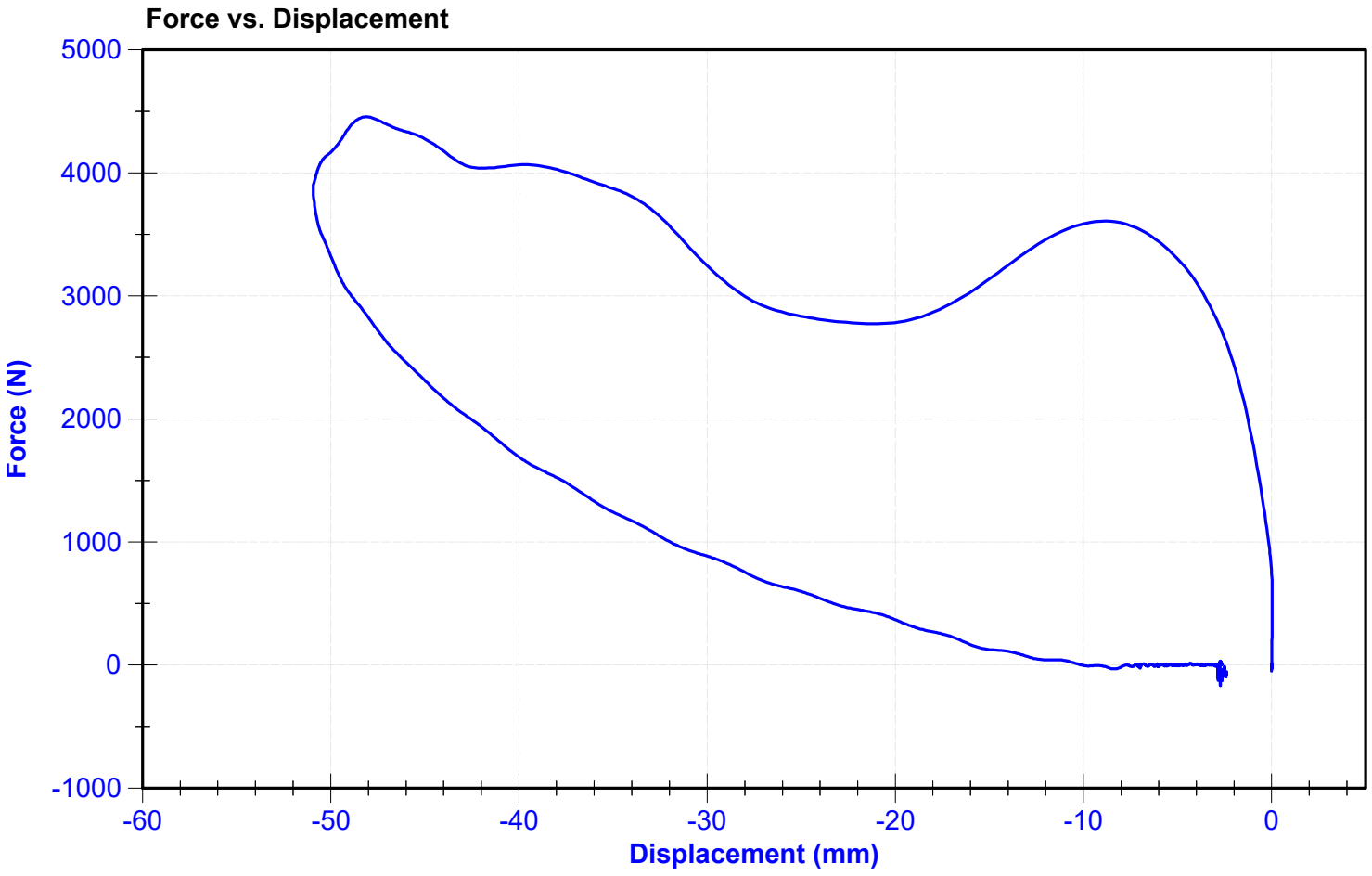
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

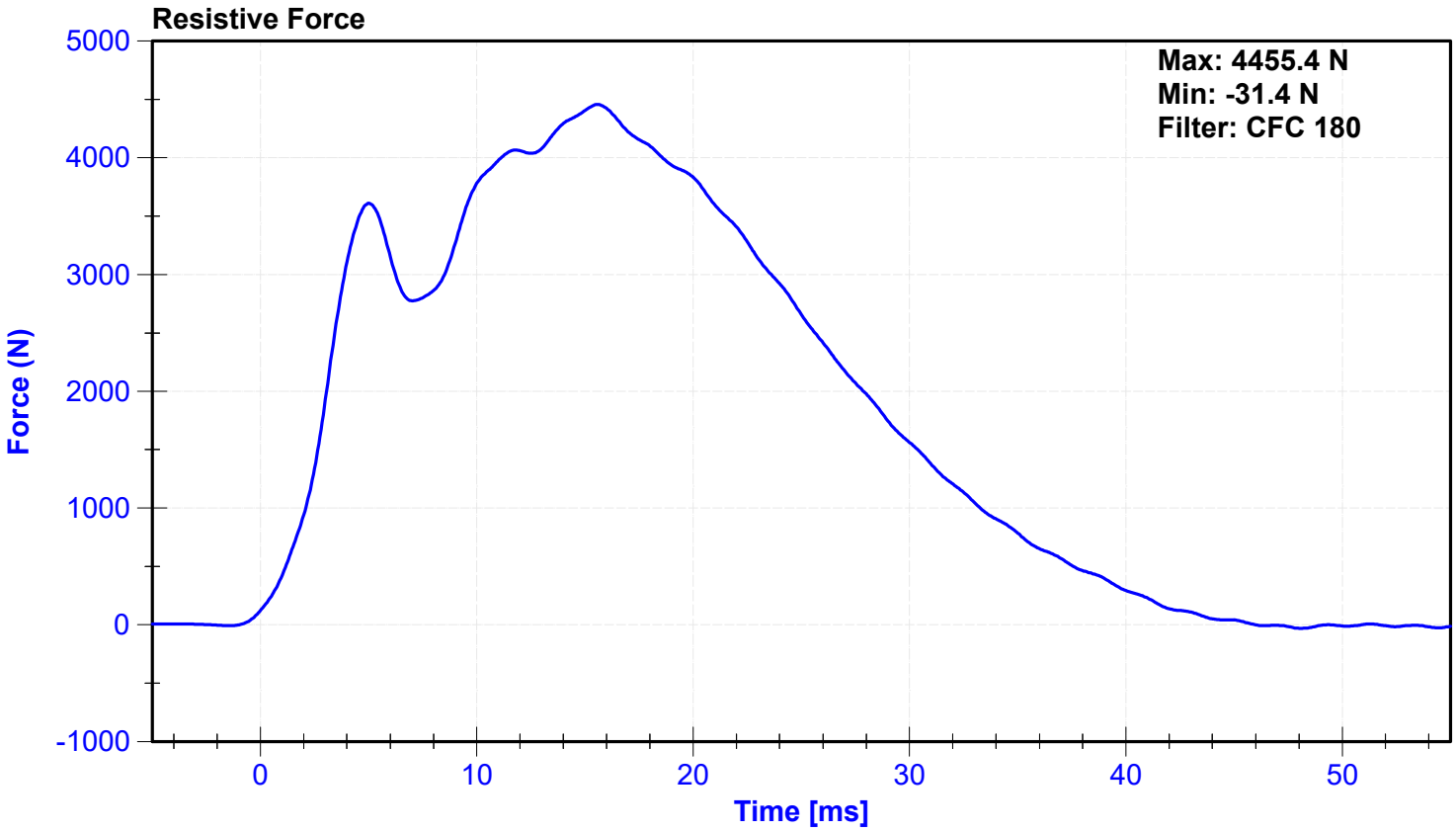
Results

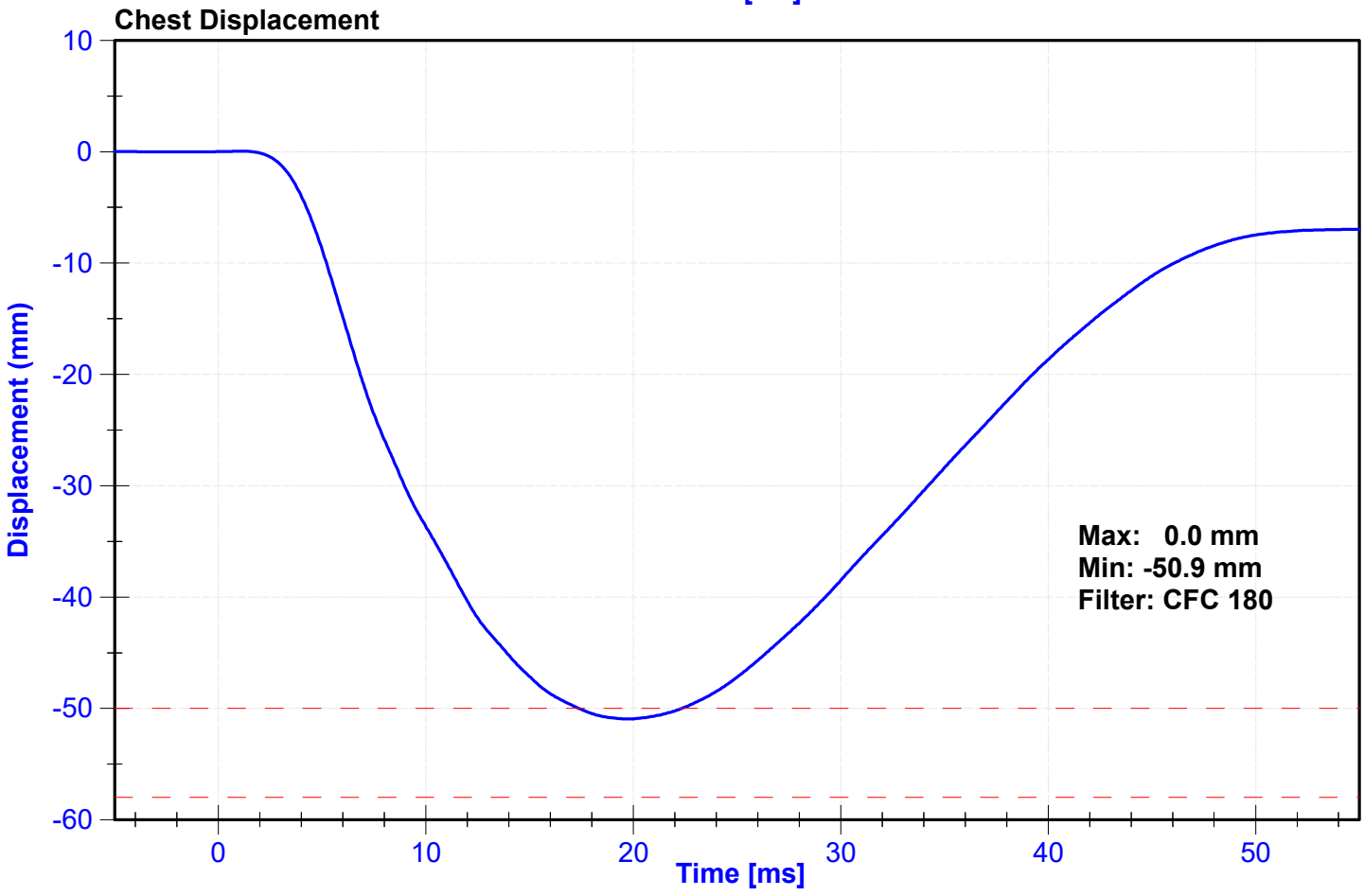
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	6.59	6.83	m/s	6.653	Pass
Chest Deflection	-58	-50	mm	-50.9	Pass
Maximum Resistive Force (50 to 58mm)	3900	4400	N	4170.7	Pass
Maximum Resistive Force (18 to 50mm)	0	4600	N	4455.4	Pass
Hysteresis	69	85	%	73.0	Pass

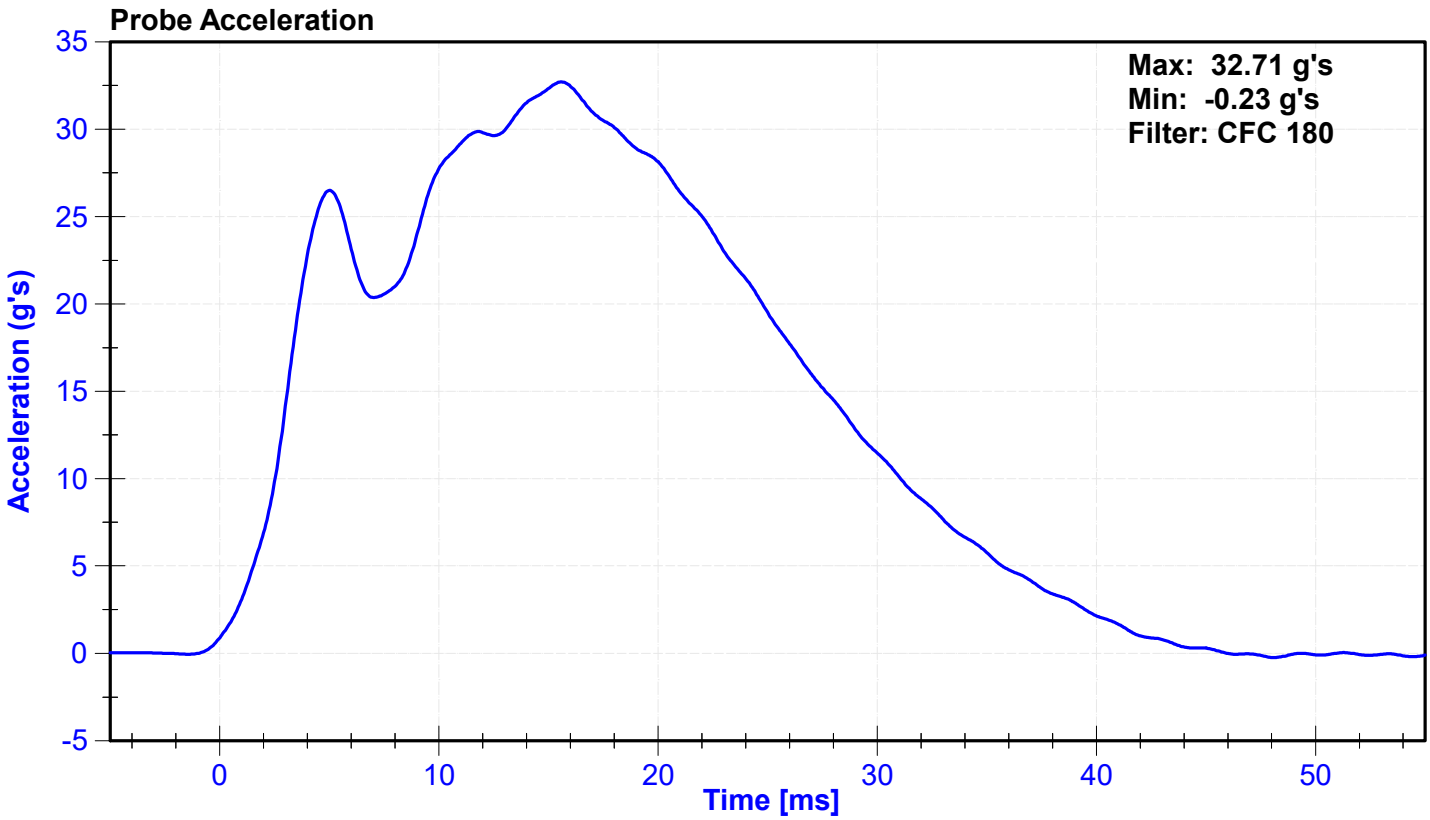
Transducer Calibrations

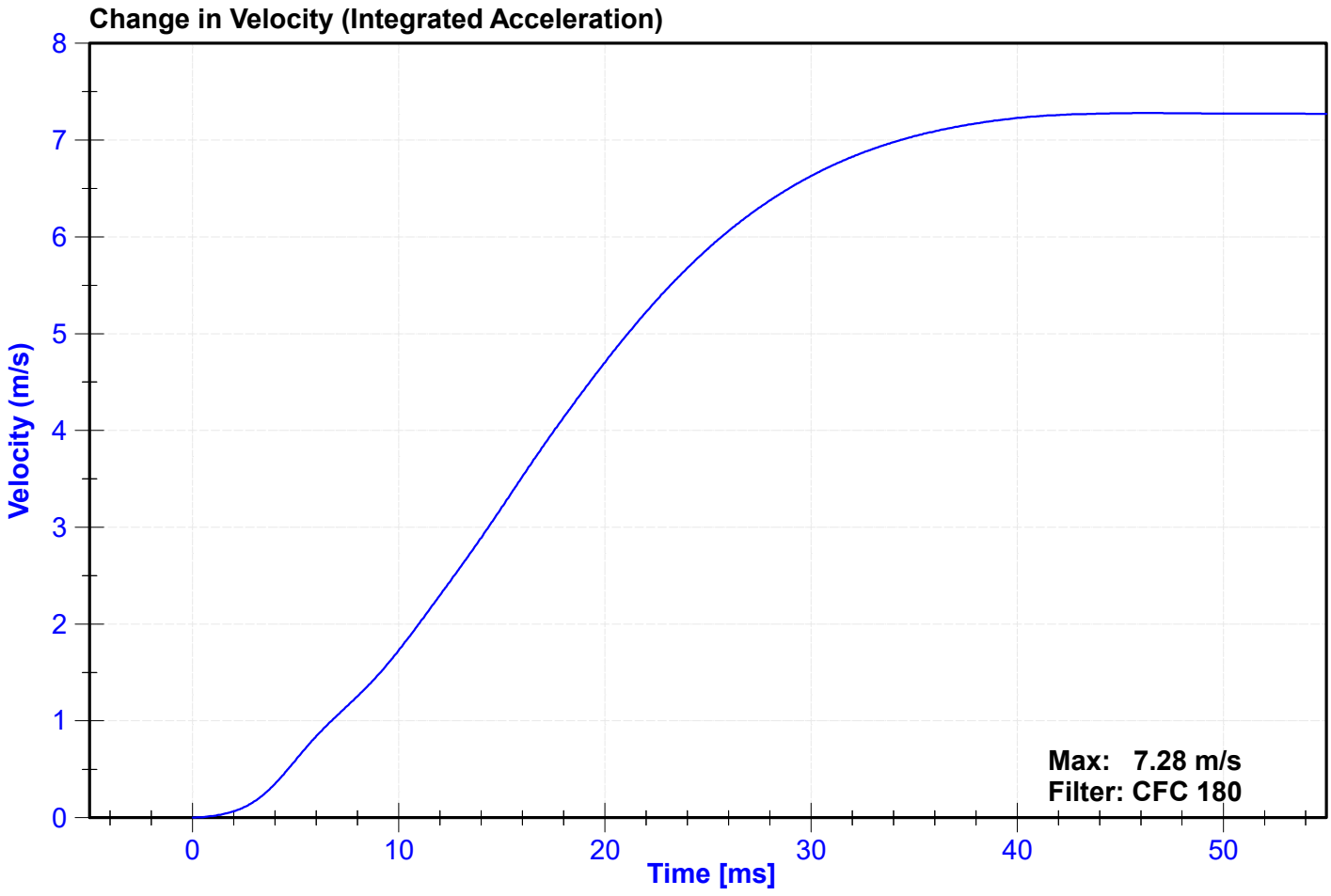
Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	Endevco	18566	11/26/2024	5/25/2025
Chest Potentiometer	Servo	0720	8/19/2024	2/17/2025




Resistive Force
Max: 4455.4 N
Min: -31.4 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: -50.9 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: 32.71 g's
Min: -0.23 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: 7.28 m/s
Filter: CFC 180
0
10
20
30
40
50
Time [ms]

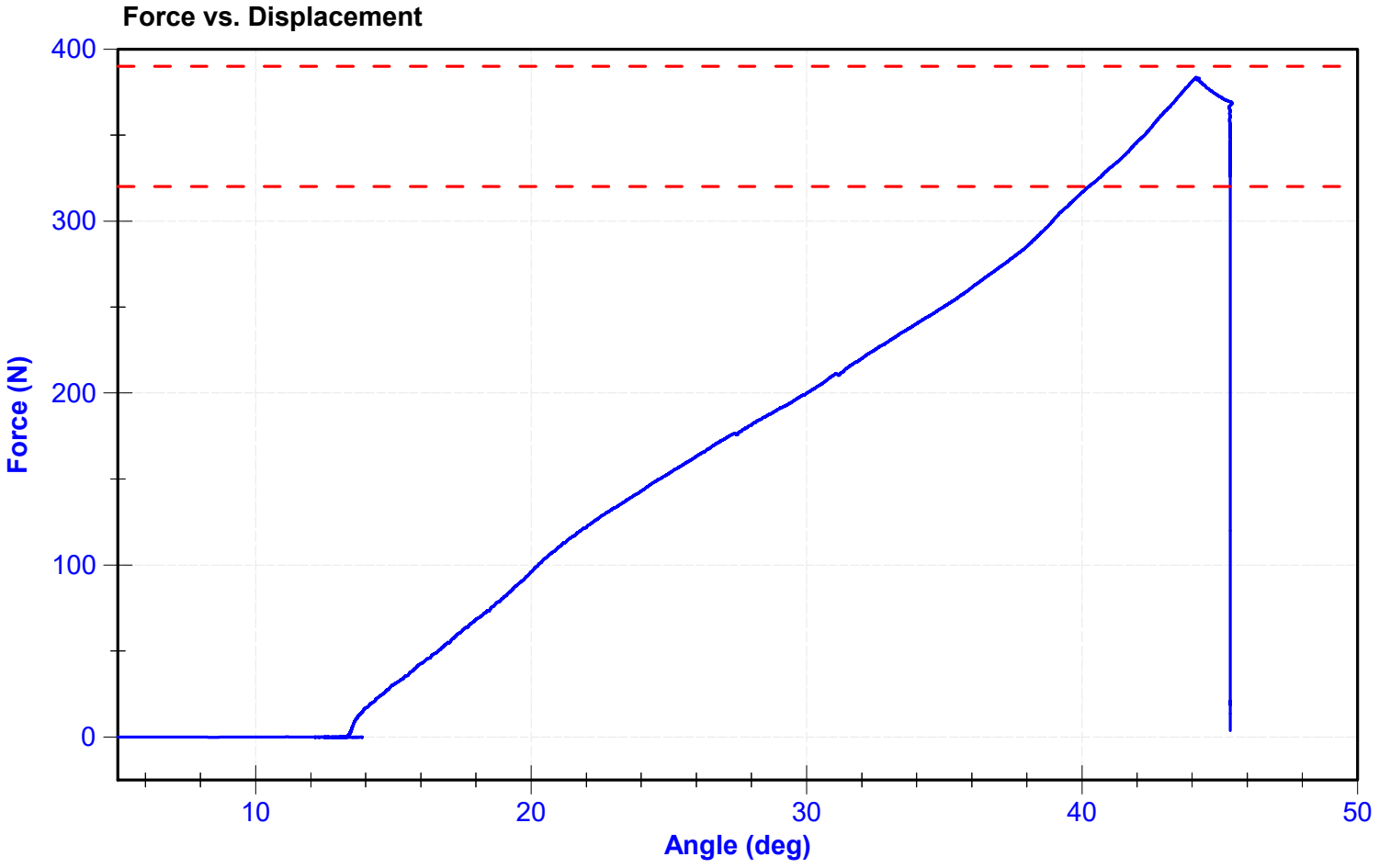
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

Results

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.6	25.6	ºC	20	Pass
Humidity	10	70	%	21	Pass
Initial Angle	0	20	deg	12.9	Pass
Force at 45 Degrees	320	390	N	387.4	Pass
Return Angle Relative to Initial	0	8	deg	4.6	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



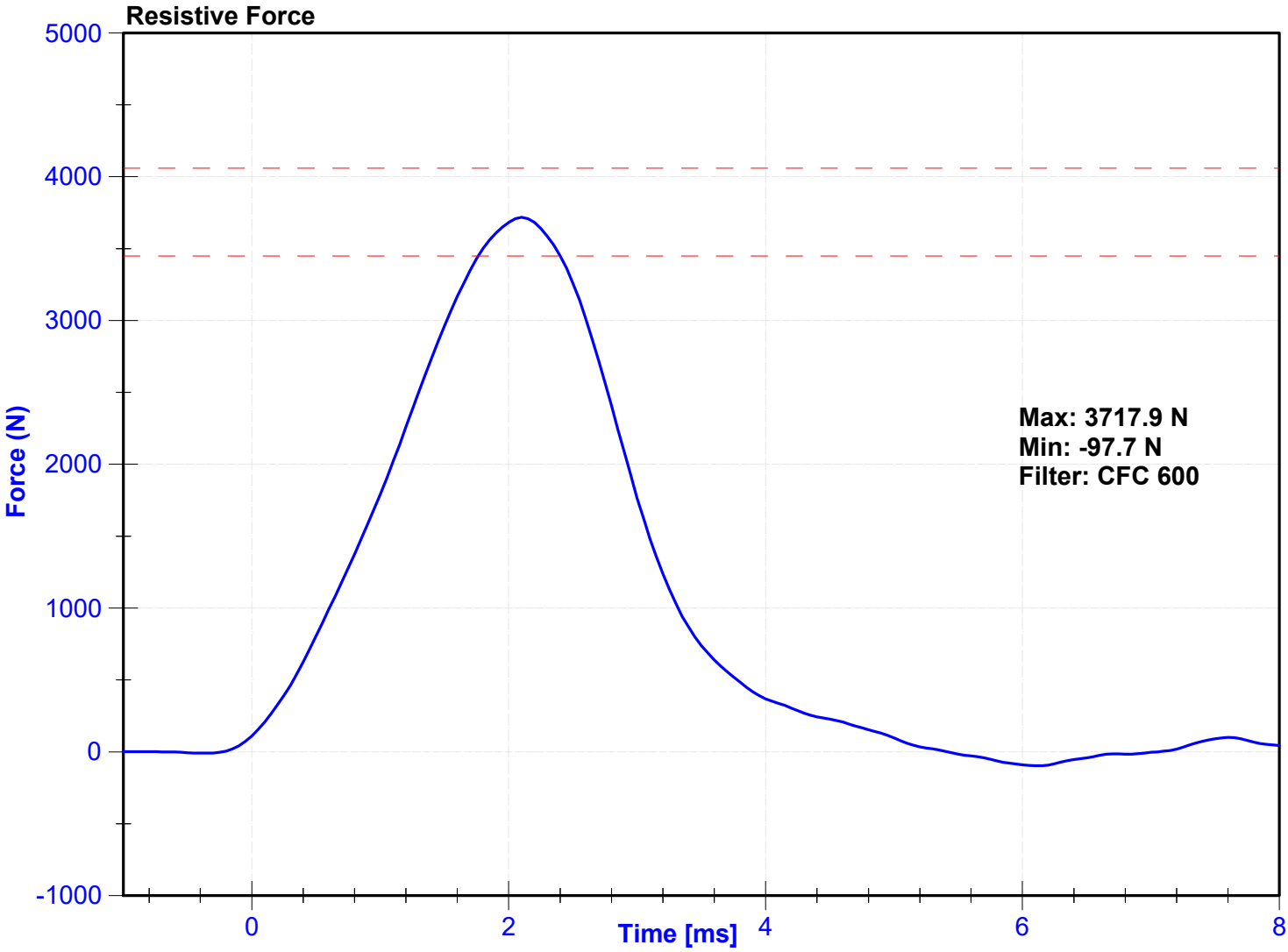
ATD Manufacturer	Humanetics	Test Technician	J. Rios
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

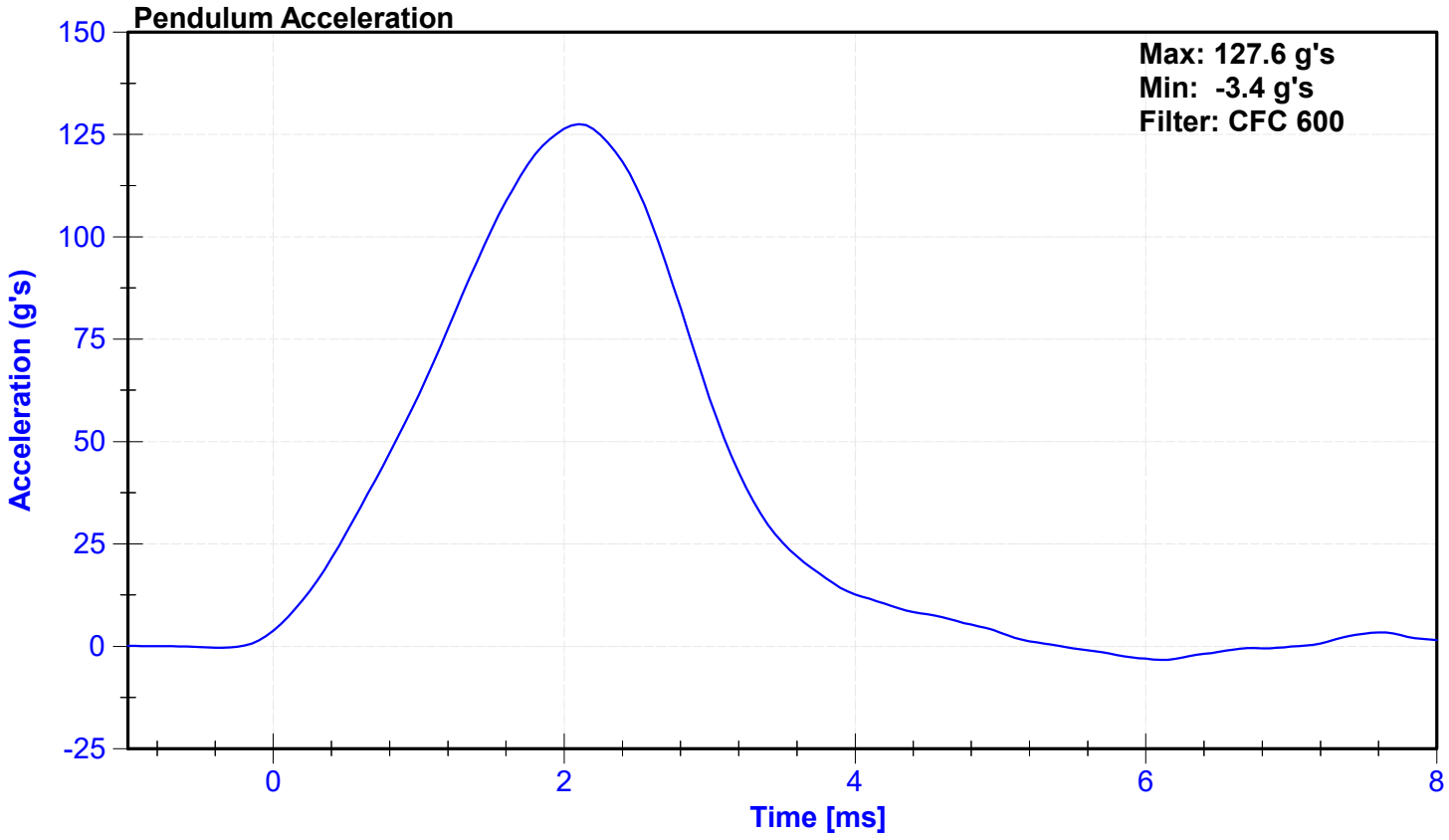
Results

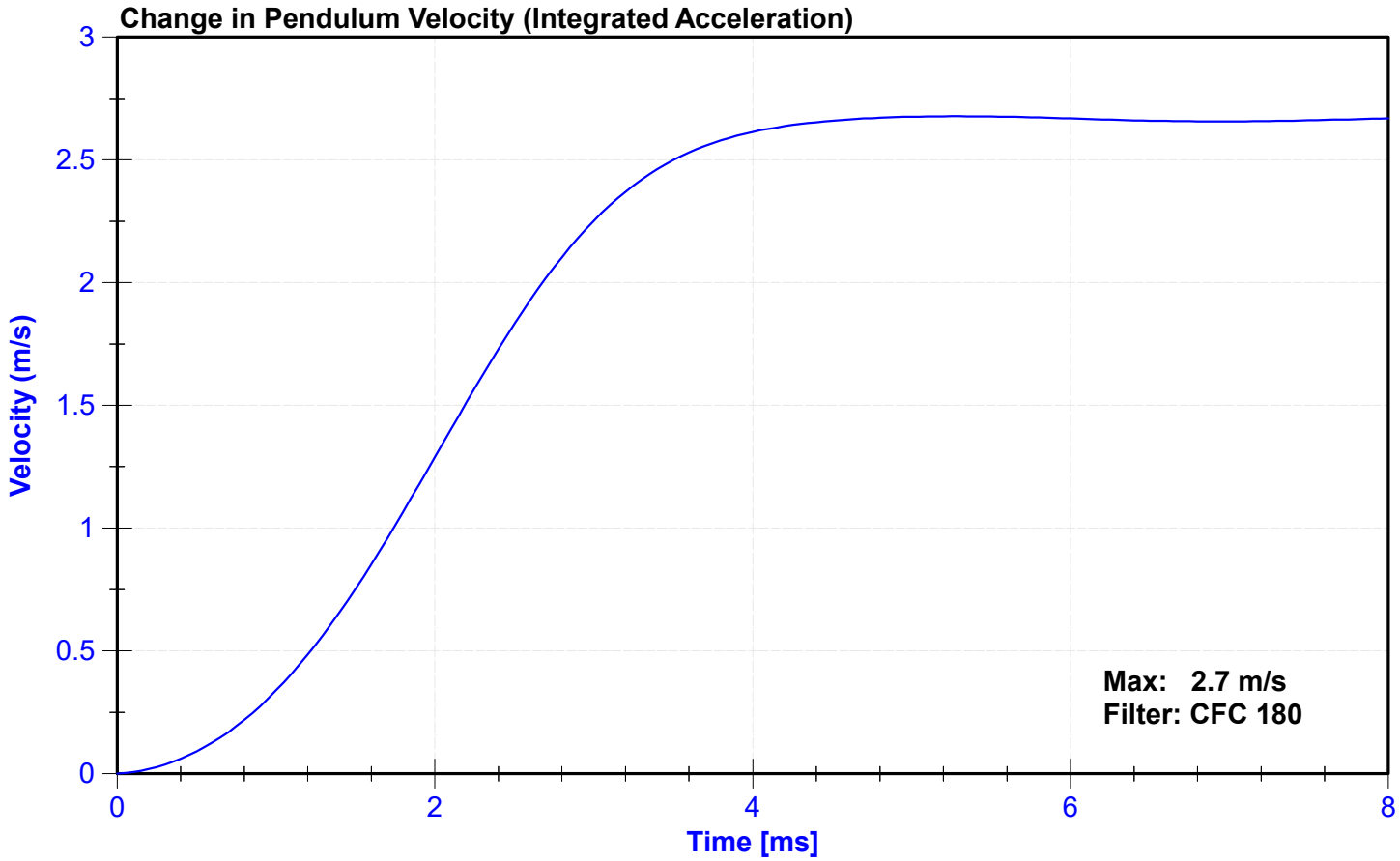
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	15	Pass
Velocity	2.07	2.13	m/s	2.117	Pass
Resistive Force	3450	4060	N	3717.9	Pass

Transducer Calibrations

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




Pendulum Acceleration
Max: 127.6 g's
Min: -3.4 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]

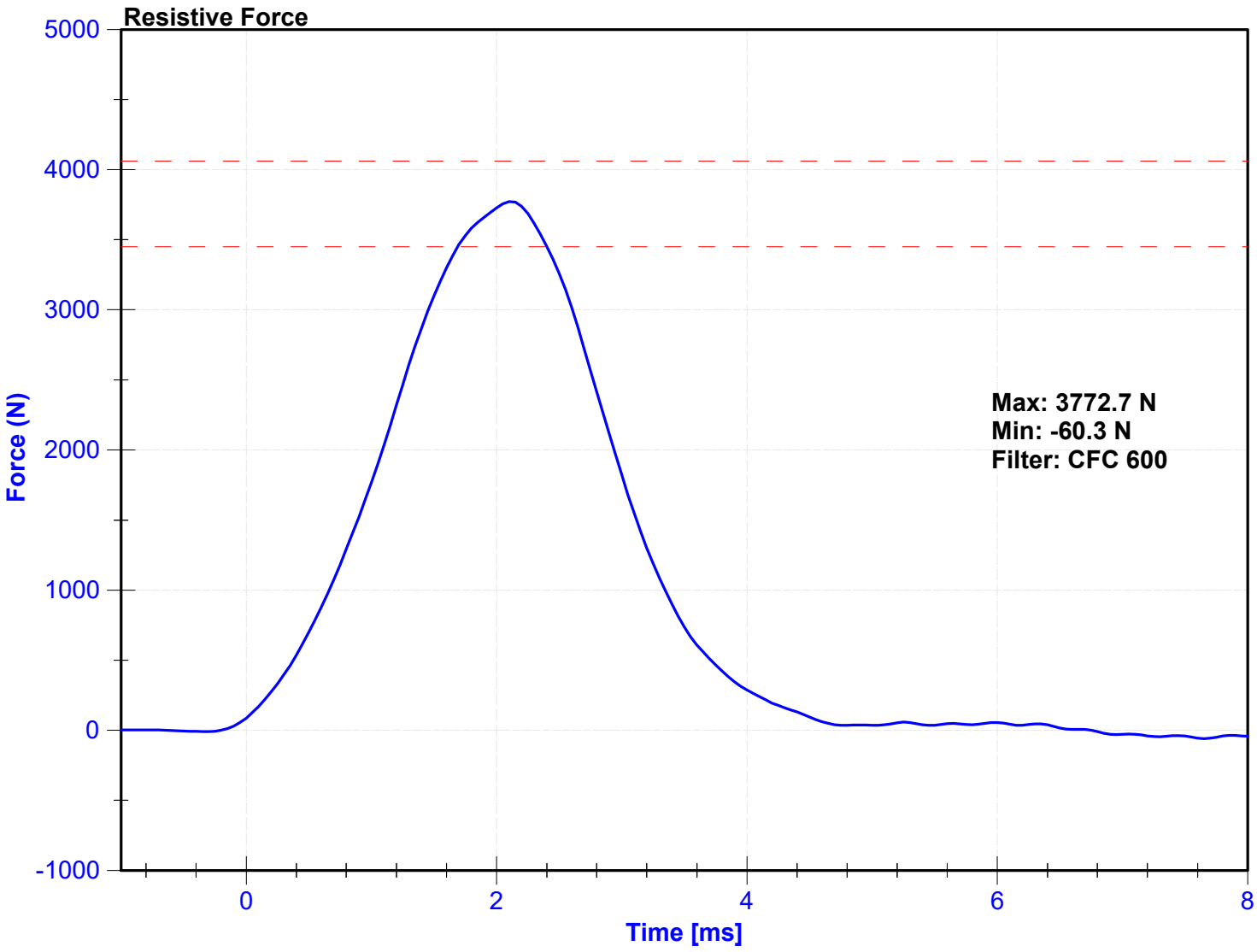
ATD Manufacturer	Humanetics	Test Technician	E. Andruczyk
ATD Serial Number	137	Laboratory Supervisor	J. Kinderman

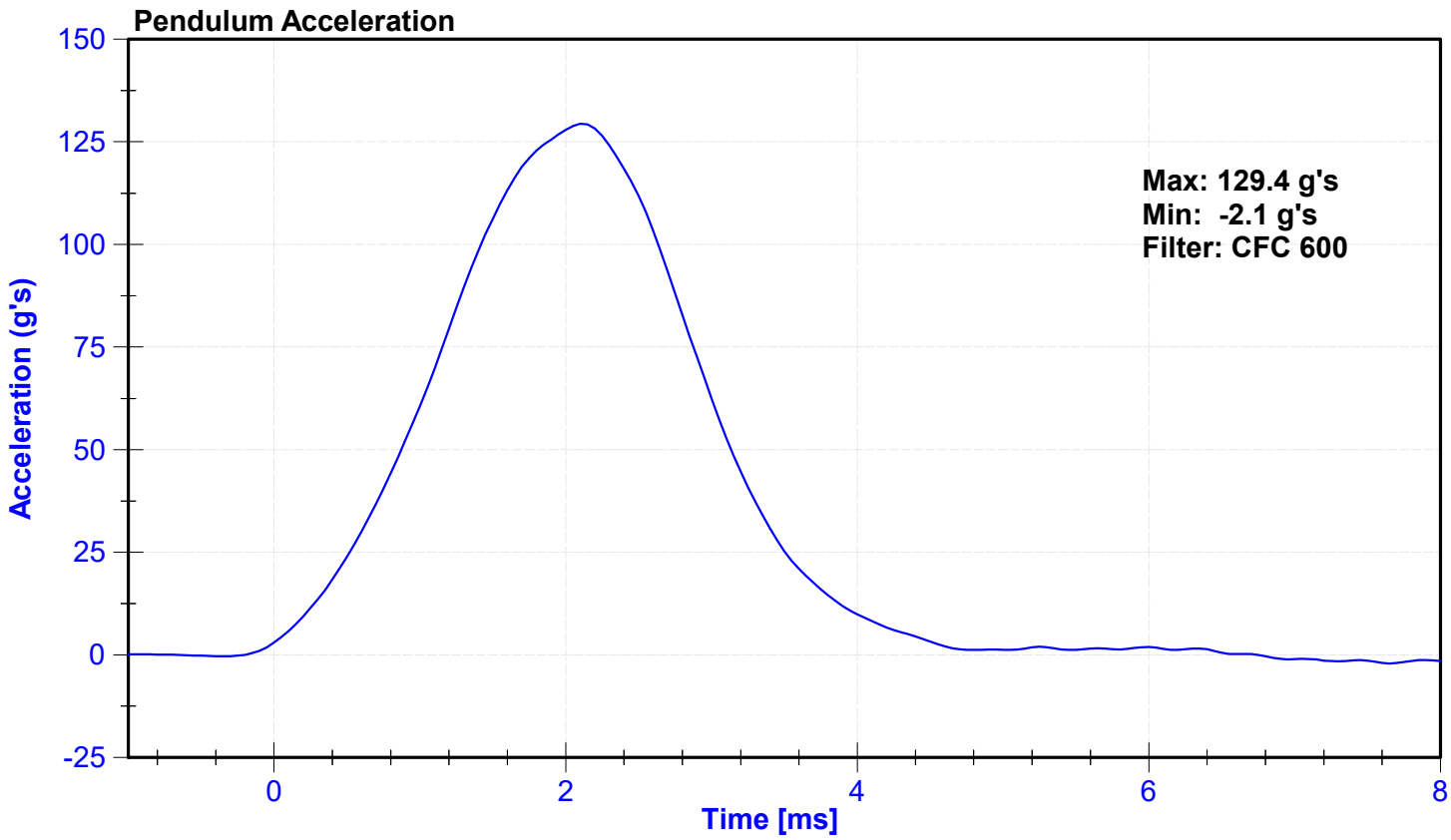
Results

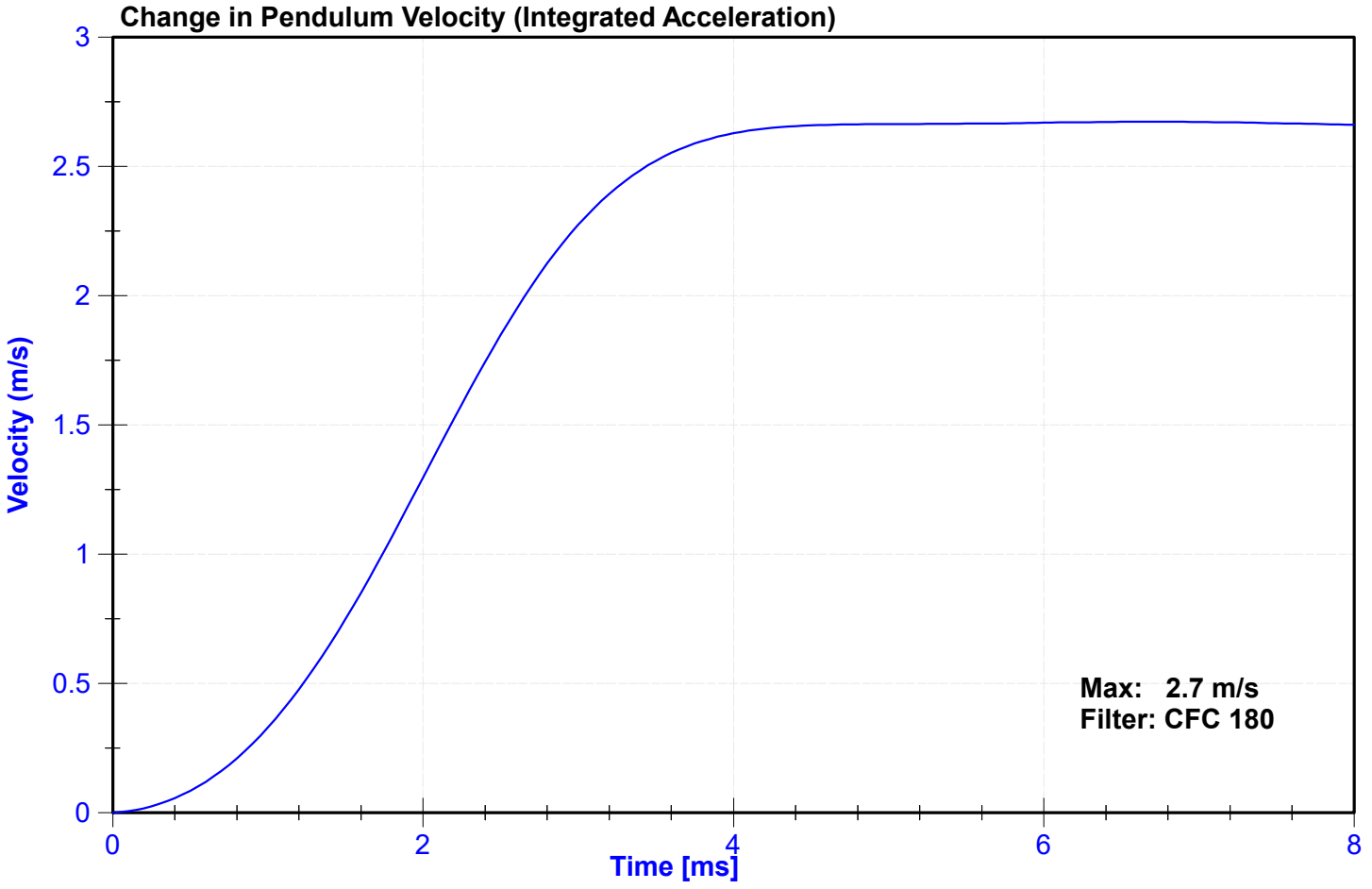
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	18.9	25.6	ºC	21	Pass
Humidity	10	70	%	20	Pass
Velocity	2.07	2.13	m/s	2.099	Pass
Resistive Force	3450	4060	N	3772.7	Pass

Transducer Calibrations

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




Pendulum Acceleration
Max: 129.4 g's
Min: -2.1 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

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		N/A	N/A	N/A
	Shoulder		174	GFE	02/08/2024

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		N/A	N/A	N/A
	Shoulder		295	GFE	02/08/2024

Table 3 – Vehicle Instrumentation

Instrumentation			Axis	Serial Number	Manufacturer	Calibration Date
Crossmember/Rear Seat Accelerometers	Left	Primary	X	A431211	Measurement Specialties	11/04/2024
			Z	G25866	Endevco	11/01/2024
		Redundant	X	G23861	Endevco	11/20/2024
	Right	Primary	X	G23413	Endevco	12/03/2024
			Z	G24335	Endevco	12/14/2024
		Redundant	X	G23848	Endevco	12/14/2024
Engine Accelerometers	Top		X	A400752	Measurement Specialties	08/21/2024
	Bottom		X	A400743	Measurement Specialties	08/01/2024